PHILLIPS

ALASKA NATURAL GAS CORP.

88-22-LNG

PHILLIPS ALASKA NATURAL GAS CORP.

88-22-LNG

OFFICE OF FOSSIL ENERGY
NATURAL GAS DIVISION
DOCKET INDEX

ERA DOCKET NO.: 88-22-LNG

APPLICANT(S): PHILLIPS ALASKA NATURAL GAS CORP & MARATHON OIL CO

REPRESENTED BY:

Jennifer A. Cates
Larry Pain
1256 Adams Building
Bartlesville, Oklahoma
74004
George H. Rothschild, Jr.,
P.O. Box 3128
Houston, Texas
77253

ITEM	PREPARED OR FILED BY	FILING TYPE	DESCRIPTION OF DOCUMENT	DATED	DATE FILED OR ISSUED
1	PHILLIPS 66 NATURAL GAS CO & MARATHON OIL CO	APPLICATION	Application to Amend Authorization to Export Liquefied Natural Gas $50.00 Application Fee to Accompany Filing	04/11/88	04/11/88
2	DOE/ERA	FEDERAL REGISTER ISSUED	F.R. Notice Issued 5/16/88 Inviting Interventions and Comments (Document was not date stamped by ERA)	05/16/88	05/16/88
3	DOE/ERA	FEDERAL REGISTER PUBLISH	F.R. Notice Published 5/20/88; 53 FR 18119 Comments Due 6/20/88 (Document was not date stamped by ERA.)	05/20/88	05/20/88
4	PHILLIPS 66 NATURAL GAS CO & MARATHON OIL CO	CORRESPONDENCE SUPPLEMENT	Liquified Natural Gas Sale and Purchase Extension Agreement, dated 6/17/88 Between Phillips 66 Natural Gas Co & Marathon Oil Co & the Tokyo Electric Pwr Co, Inc & Tokyo Gas Co	06/28/88	06/28/88
5	DOE/ERA	ORDER	Order 261--Amending Authorization to Export Liquefied Natural Gas to Japan	07/28/88	07/28/88
6	DOE/ERA	FEDERAL REGISTER ISSUED	F.R. Notice of Order Noticing Issuance of Order 261	07/28/88	07/28/88

ERA DOCKET NO.: 88-22-LNG

APPLICANT(S): PHILLIPS ALASKA NATURAL GAS CORP & MARATHON OIL CO

(CONTINUED)

ITEM	PREPARED OR FILED BY	FILING TYPE	DESCRIPTION OF DOCUMENT	DATED	DATE FILED OR ISSUED
7	DOE/ERA	FEDERAL REGISTER PUBLISH	F.R. Notice of Order Published 53 FR 29377	08/04/88	08/04/88
8	PHILLIPS 66 NATURAL GAS COMPANY	CORRESPONDENCE	Informational Filing of the 19th Amendatory Agreement Between Tokyo Electric Power Company, Inc. & Tokyo Gas Co as Buyers, and Phillips 66 Natural Gas & Marathon Oil Comany, as Sellers	08/04/88	08/04/88
9	PHILLIPS 66 NATURAL GAS COMPANY	CORRESPONDENCE	Informational Filing of the 20th Amendatory Agreement Between Tokyo Electric Power Company, Inc. & Tokyo Gas Co as Buyers, and Phillips 66 Natural Gas & Marathon Oil Comany, as Sellers	02/27/89	02/27/89
10	DOE/FE	ORDER	Order 261-B Transferring Authorization to Export Liquefied Natural Gas to Docket 91-103-LNG	12/18/91	12/18/91

AP

PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA 74004 PHONE 918 661-6600

ORIGINAL

April 7, 1988

Application to Amend Authorization
To Export Liquified Natural Gas

88 APR 11 A10:51

Natural Gas Division
Economic Regulatory Administration
Forrestal Building
Room GA-033, RG-43
1000 Independence Avenue, SW
Washington, DC 20585

Gentlemen:

Attached for filing pursuant to §590.201 of the regulations is an original and 15 copies of a joint application by Phillips 66 Natural Gas Company and Marathon Oil Company to extend and modify existing authorization to export liquified natural gas (LNG).

Also enclosed is a $50.00 filing fee pursuant to §590.207.

Respectfully Submitted,

PHILLIPS 66 NATURAL GAS COMPANY

BY: Barbara Price-Thurman
Barbara Price-Thurman
Vice President
Phillips 66 Natural Gas Company

MARATHON OIL COMPANY

BY: John V. Parziale
John V. Parziale
Manager, Natural Gas Division
Worldwide Production
Marathon Oil Company

pkc

VERIFICATION

STATE OF TEXAS)
) SS:
COUNTY OF HARRIS)

BEFORE ME, the undersigned authority, on this day personally appeared J. V. Parziale, who, having been by me first duly sworn, on oath says that he is Manager, Natural Gas Division of Marathon Oil Company and duly authorized to make this Verification; that he has read the foregoing instrument and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

J V Parziale

Subscribed and sworn to before me, a notary public, this 8th day of April, 1988.

Gretchen B. Sablatura
Notary Public

GRETCHEN B. SABLATURA
Notary Public, State of Texas
My Commission Expires 7-19-89

My Commission Expires:
July 19, 1989

ORIGINAL

UNITED STATES OF AMERICA

DEPARTMENT OF ENERGY

ECONOMIC REGULATORY ADMINISTRATION

In the Matter of	)	
	)	
Phillips 66 Natural Gas Company	)	ERA Docket No. 88-~~23~~ 22-LNG
	)	
Marathon Oil Company	)	

APPLICATION TO AMEND AUTHORIZATION
TO EXPORT LIQUEFIED NATURAL GAS

April 7, 1988

ORIGINAL

UNITED STATES OF AMERICA

DEPARTMENT OF ENERGY

ECONOMIC REGULATORY ADMINISTRATION

In the Matter of	)	
	)	
Phillips 66 Natural Gas Company	)	ERA Docket No. 88-[illegible]-LNG
	)	
Marathon Oil Company	)	

AUG 11 AM 10:52

APPLICATION TO AMEND AUTHORIZATION
TO EXPORT LIQUEFIED NATURAL GAS

Phillips 66 Natural Gas Company ("P66NG") and Marathon Oil Company ("Marathon") hereby request, pursuant to Section 3 of the Natural Gas Act, 15 U.S.C. §717b, and 10 C.F.R. Part 590, approval of a fifteen-year extension and modification of their existing authorization to export liquefied natural gas ("LNG" . The initial authorization was granted by the Federal Power Commission ("FPC") on April 19, 1967, to Phillips Petroleum Company ("Phillips"), predecessor in interest to P66NG, and Marathon for a fifteen-year period ending May 31, 1984 in Phillips Petroleum Co., et al., 37 FPC 777 (1967). The authorization was subsequently extended in DOE/ERA Opinion and Order No. 49, 1 ERA ¶ 70,116 (December 14, 1982) ("Order No. 49") and amended by DOE/ERA Opinion and Order No. 49A, 1 ERA ¶ 70,127 (April 3, 1986) ("Order No. 49A") and DOE/ERA Opinion and

Order No. 206, 1 ERA ¶ 70,128 (November 16, 1987) ("Order No. 206").

In support hereof, applicants submit the following:

I. GENERAL INFORMATION

The exact legal name of P66NG is Phillips 66 Natural Gas Company. P66NG is a Delaware corporation with principal offices in Bartlesville, Oklahoma. P66NG is a wholly-owned subsidiary of Phillips Petroleum Company and is authorized to do business in all states where P66NG conducts natural gas activities, including the State of Alaska.

The exact legal name of Marathon is Maratnon Oil Company. Marathon is an Ohio corporation with principal offices in Findlay, Ohio. Marathon is a wholly-owned subsidiary of USX Corporation and is authorized to do business in all states in which it does business, including the State of Alaska. P66NG and Marathon are not affiliated with each other.

All correspondence and communications regarding this application, including service of pleadings and notices, should be directed to the following persons:

Mrs. Barbara Price-Thurman
Vice President - Regulatory Affairs
Phillips 66 Natural Gas Company
990-G Plaza Office Building
Bartlesville, OK 74004
Phone: (918) 661-4355

Mr. Larry Pain, Attorney for
Phillips 66 Natural Gas Company
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Mr. John V. Parziale, Manager
Natural Gas Division, Worldwide Production
Marathon Oil Company
P. O. Box 3128
Houston, TX 77253
Phone: (713) 629-6600

Mr. George H. Rothschild, Jr., Attorney
Marathon Oil Company
P. O. Box 3128
Houston, TX 77253
Phone: (713) 629-6600

The applicants hereby certify that the undersigned persons and those named above are the duly authorized representatives of the applicants. There are no other proceedings related to this application pending at any other portion of the Department of Energy or any other governmental agency.

II. AUTHORIZATION REQUESTED

P66NG and Marathon request ERA authorization for the continued export of LNG through March 31, 2004 in accordance with an understanding in principle which has been reached between applicants and the buyers, which is referred to as the "agreement in principle". Applicants have attached a synopsis of the agreement in principle as Appendix A to this Application. Applicants will supplement this filing with a copy of the signed agreement by June 30, 1988. The signed

agreement will amend and extend the term of the Liquefied Natural Gas Sales Agreement dated March 6, 1967, as amended, and the Amendatory Extension Agreement dated April 15, 1982, as amended, under which applicants currently sell LNG to The Tokyo Electric Power Company, Incorporated ("Tokyo Electric") and Tokyo Gas Company, Ltd. ("Tokyo Gas"). These are hereinafter collectively referred to as the "Original Agreement". Under the agreement in principle, applicants will continue to export LNG manufactured at the Kenai LNG Plant in the Cook Inlet area of Alaska to the buyers in Japan for a period ending March 31, 2004. The extension agreement calls for continuation of operations and sales largely as they have been carried out since 1969 under prior export authority. The principal differences in the terms of the Original Agreement and the agreement in principle are:

(1) The contract year has been changed from a twelve (12) month period beginning June 1 to a twelve (12) month period beginning April 1. This change was made to correspond to the buyers' fiscal year.

(2) The pricing provisions have been amended to provide that the "adjustment" factor, currently approved to facilitate market responsive pricing,

will be limited to a range of 30.0¢ (plus/minus) per million Btu's.

(3) Commencing April 1, 1989, the annual contract quantity ("ACQ") has been increased from 50.57 trillion Btu's per year to 52.0 trillion Btu's per year. This quantity will increase to 57.5 trillion Btu's per year beginning in the first contract year in which applicants place larger LNG tankers into operation for the entire contract year. The increase to 57.5 trillion Btu's is likely to occur for the contract year commencing April 1, 1994, but could occur as early as the contract year commencing April 1, 1993.

(4) In addition to the above ACQ, buyers may request additional deliveries up to a maximum of 6% of the ACQ during any contract year. Therefore, export authorization is requested for up to 106% per year of the annual contract quantities stated above.

III. BACKGROUND

In November, 1969, Phillips and Marathon began exporting LNG manufactured from Alaskan natural gas to Japan. The exports originally commenced pursuant to the April 19,

1967, order of the FPC in Dockets Nos. CI67-1226 and CI67-1227, 37 FPC 777 (1967). In that order, the FPC found that the export of LNG by Phillips and Marathon would not be inconsistent with the public interest and authorized the export of LNG by applicants for a fifteen-year period ending May 31, 1984.

The Original Agreement provided that the term could be extended for an additional period of five years under certain circumstances. The parties agreed to a five-year extension. On May 10, 1982, Phillips and Marathon filed a joint application with the Economic Regulatory Administration to extend the initial export authorization granted by the FPC for an additional five years from May 31, 1984. In granting the authorization to amend and continue the LNG export in Order No. 49, ERA concluded, inter alia, (1) that the extension was not inconsistent with the public interest; (2) that the export contributed favorably to the United States' balance of payments; (3) that there was no regional or national need for the gas which Phillips and Marathon proposed to use for the manufacture of LNG for export and (4) that the price of the LNG was reasonable.1/

Historically, the natural gas used to manufacture LNG for export to Japan has been produced from the Cook Inlet

---

1/ In Order No. 49A, the authorization previously granted to Phillips to export LNG was transferred to P66NG effective as of January 1, 1986.

Basin Area of Alaska. Seventy percent has been produced by Phillips from its owned/controlled reserves in the North Cook Inlet Field. Thirty percent has been produced by Marathon from its owned/controlled reserves in the Kenai Field. During the fifteen year primary term of the agreement in principle, gas will continue to be produced from these two fields as well as other fields in the Cook Inlet area, and manufactured into LNG at the existing liquefaction plant which is indirectly owned by P66NG and Marathon near Kenai, Alaska.2/ The LNG will be delivered to Japan via LNG tankers.

As stated above, the agreement in principle provides for a slightly higher annual contract quantity and affords the buyers a greater annual quantity flexibility (+6% or -10% ACQ) than does the Original Agreement. However, applicants have the reserves available to supply these volumes, and the shipments will be made without alteration or addition to the Kenai LNG Plant or its storage facilities. It is anticipated that the two tankers currently being used will be replaced in five to six years. At that time the annual contract quantity will increase from 52 to 57.5 trillion Btu's per year.

2/ The Kenai LNG Plant is owned by Kenai LNG Corporation, which is 70% owned by P66NG and 30% owned by Marathon.

Pricing under the Original Agreement was amended by the Seventeenth Amendatory Agreement to reflect more accurately the market prices for energy imported into Japan. Subsequently, the request of P66NG and Marathon for pricing flexibility was granted in Order No. 206. There, ERA approved pricing terms containing a formula which permitted the LNG price to fluctuate with changes in prices for crude oil imported into Japan. The prices yielded by the formula were then subject to an adjustment factor to allow the delivered price of LNG to reflect market conditions more accurately. The pricing terms under the agreement in principle have been modified from those approved in Order No. 206 only by providing that the "adjustment" factor will be within a range of plus or minus 30.0¢. Therefore, the pricing provisions will continue to facilitate market responsive pricing.

IV. EXTENSION OF THIS EXPORT PROJECT IS NOT INCONSISTENT WITH THE PUBLIC INTEREST.

The existing Alaskan LNG export project has been a safe and reliable operation for all parties concerned for over eighteen years. Applicants seek approval for the continuation of that export service with basically the same onshore facilities and the same method of operation for an additional fifteen years through March 31, 2004.

Section 3 of the Natural Gas Act ("NGA"), in addressing natural gas imports and exports, provides in part, "The Commission shall issue such order upon application, unless, after opportunity for hearing, it finds that the proposed exportation or importation will not be consistent with the public interest." For the reasons stated herein, P66NG and Marathon believe that there continues to be no basis in fact or law for a conclusion other than that reached by the FPC in 1967, and again by ERA in 1982, that the export of Kenai liquefied natural gas to Japan by P66NG and Marathon from the Cook Inlet area is wholly consistent with the public interest.

This export project has for the past eighteen years improved the economy of the State of Alaska and the balance of payments between the United States and Japan. The requested fifteen-year extension of this export is not inconsistent with the public interest; rather, it would be detrimental to the public interest if the project were discontinued.

A. CONTINUED EXPORT OF ALASKAN LNG BENEFITS ALASKA, THE AMERICAN PUBLIC AND JAPAN.

P66NG and Marathon requested that Dames & Moore (D&M), an independent consulting firm, make a comprehensive economic analysis of the regional and national interests with respect to the Kenai LNG export project. This report,

dated April 5, 1988, is attached as Appendix C. The D&M report reviews in detail the benefits, both direct and indirect, derived by the local-regional economy as a result of the Kenai export project.

The State of Alaska continues to benefit significantly from the project. The operation of the liquefaction plant and natural gas production facilities provides employment for workers in the area and economic benefit for suppliers and businesses in the area. The State of Alaska and its citizens, as well as the federal government, also benefit from royalty payments on the natural gas utilized by the project as well as associated tax revenue. The effects of this project generate millions of dollars a year in Alaskan personal income and state and local taxes (Table 6-1, D&M report).

This export has provided a beneficial impact on the balance of payments between the United States and Japan and will continue to do so during the fifteen-year extension proposed. Although small in comparison to the total U.S.-Japanese trade balance (D&M table 6-7), this project provides a steady and continuous offset to the trade imbalance between the two countries. During the proposed extension, exported volumes will increase slightly, thereby increasing the favorable balance of trade effects to the United States.

While this source of LNG is not the largest source of imported energy consumed in Japan, it is one of the most secure and reliable energy sources available to that country. During the eighteen years that this project has been in operation there have been no major accidents or interruptions of service. This export has benefited the sellers, their customers and the trade relations between the two countries and will continue to do so during the fifteen year extension.

B. THERE IS NO NATIONAL OR REGIONAL NEED FOR THE NATURAL GAS WHICH WILL BE EXPORTED.

The prospects for shipping LNG to the lower forty-eight states are remote, considering both the economics and the absence of need for this gas in the lower forty-eight states. The supply of gas in the lower forty-eight continues to exceed demand. Even if economic conditions were such that LNG could be shipped to the lower forty-eight at market clearing prices, the constraints of building LNG receiving terminals on the west coast would likely prevent such interstate sales over the great majority, if not the entire period, of the proposed extension. There are no LNG receiving facilities on the west coast of the lower forty-eight states, and none are anticipated within the term of the proposed extension (D&M report at 1-13). Movement of Kenai LNG to existing terminals on the east coast or gulf

coast is economically improbable due to the distance and the necessity to employ smaller tankers to pass through the Panama Canal. In addition, Canada has and will continue to have huge gas reserves available for export to the lower forty-eight states and will continue to be able to provide gas to the U.S. market at lower costs than those necessary for Alaskan LNG.

With respect to the regional need for natural gas, the Cook Inlet area continues to have an oversupply with resulting low prices. Even with anticipated greater local market demand, it is estimated that there will be ample gas reserves remaining to supply the local and regional need for gas at the end of the fifteen-year extension requested. The D&M study compares the results of various supply/demand analyses to determine their effect on the Alaskan Railbelt Region. Under the expected supply/demand scenario estimated Cook Inlet area remaining reserves total 3,562 Bcf in 2004. Under the worst supply/demand scenario, estimated Cook Inlet area remaining reserves total in excess of one trillion cubic feet at the end of 2004 (D&M Chapter 5.0, Railbelt Region Supply/Demand Balance). Further, Alaska's Railbelt Region is blessed with huge oil, coal and hydroelectric energy resources.

Natural gas is now in surplus both in Alaska and in the lower forty-eight states. Applicants submit that there is

no evidence of need, either regional or national, for the gas involved in this export extension; therefore the proposed export extension is not inconsistent with the public interest.

C. THE PRICE TO BE CHARGED FOR THE LNG DELIVERED TO JAPAN IS CONSISTENT WITH THE PUBLIC INTEREST.

The price to be charged for LNG delivered during the fifteen year extension of this proposed export authorization has been amended in part from that recently approved by ERA in its Order No. 206. The primary pricing formula remains unchanged. The delivered LNG price is determined each month on the basis of the weighted average selling price for the preceding month of the top twenty (20) crude oils (ranked by descending volumes) imported into Japan. (See Appendix A for more details of the pricing provisions.) Therefore, the delivered LNG price will change as the prices of alternate energy imported into Japan change, thereby allowing the LNG price to be competitive and market-based for the term of the proposed LNG export extension. The provision for an "adjustment" factor, which will be within a range of plus or minus 30.0¢ per MMBtu, will allow the parties to insure that the LNG price responds to market conditions. Specifically, the "adjustment" is designed to provide the parties with flexibility to keep the price of Alaskan LNG competitive in the Japanese energy market. Applicants submit that the

pricing formula continues to be in accordance with the guidelines and policies of the ERA and with the spirit of the prior export authorizations issued in Order Nos. 49, 49A and 206, and applicants, therefore, request authority to negotiate and place into effect price adjustments within the range specified in the agreement in principle without further authority from ERA during this extension.

D. DISCONTINUATION OF THE PROJECT WOULD POSE A THREAT TO THE PUBLIC INTEREST.

Consideration of the foregoing as well as the attached Dames & Moore analysis clearly demonstrates that failure to allow this export project to continue would cause severe adverse consequences.

The impact on the local and state economies would be significant. If the authorization to export LNG is denied, there would be no foreseeable demand for this quantity of gas either locally or in the lower forty-eight states. Therefore, the facilities would be shut down, which would have considerable adverse impact on the applicants and on state and local tax revenue, royalty payments and local employment, both direct and indirect, associated with the LNG facility. The idling of productive assets would impose unnecessary hardships on the beneficiaries, both direct and indirect, of the project.

In addition, discontinuation of the project would exacerbate the chronic trade deficit between the United States and Japan. It would not be consistent with the policy of the United States concerning its efforts to improve trade relations with Japan. Denial of the requested extension would further conflict with House-Senate Conference Report 100-498, "Making Further Continuing Appropriations for the Fiscal Year Ending September 20, 1988," which supports United States LNG exports to Japan and encourages the Departments of State and Commerce to work for greater U. S. participation as a supplier of LNG to Japan.

V. ENVIRONMENTAL IMPACT

The same LNG manufacturing and storage facilities will be utilized during the fifteen-year extension of export operations as currently exist. The facilities have operated safely without major disruption of supply or accident from startup in 1969. Therefore, applicants request ERA find (as it did in Order No. 49) that approval of this application is not a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act of 1969, 42 U.S.C. §4321 et. seq. (1976), and that neither an environmental impact statement nor an environmental assessment is required.

VI. EXPEDITION

Applicants respectfully request expeditious consideration of and action on this application. Although the present export authorization does not expire at the earliest until May 31, 1989, it is imp rtant to the customers that there be no interruption in supply. Should applicants fail to receive reasonably prompt regulatory action, the buyers may feel obliged to seek some alternative supply of LNG in advance of May 31, 1989.

VII. APPENDICES

Attached hereto and incorporated by reference herein are the following appendices:

Appendix A: Synopsis of agreement in principle.

Appendix B: Opinions of legal counsel regarding corporate authority to export LNG

Appendix C: Dames and Moore report "Economic Analysis of Regional and National Interests Relating to Kenai LNG Export to Japan."

VIII. CONCLUSION

For the foregoing reasons, P66NG and Marathon respectfully request that the ERA amend its Order Nos. 49, 49A and 206 to authorize the continued export of LNG for an

additional fifteen years pursuant to the conditions set forth in this application.

Respectfully submitted,

PHILLIPS 66 NATURAL GAS COMPANY

BY Barbara Price-Thurman
Barbara Price-Thurman
Vice President
Phillips 66 Natural Gas Company

MARATHON OIL COMPANY

BY John V. Parziale
John V. Parziale
Manager, Natural Gas Division
Worldwide Production
Marathon Oil Company

April 7, 1988

VERIFICATION

STATE OF OKLAHOMA)
) SS:
COUNTY OF WASHINGTON)

BEFORE ME, the undersigned authority, on this day personally appeared BARBARA PRICE-THURMAN, who, having been by me first duly sworn, on oath says that she is Vice President of Phillips 66 Natural Gas Company and duly authorized to make this Verification; that she has read the foregoing instrument and that the facts therein stated are true and correct to the best of her knowledge, information and belief.

Barbara Price-Thurman
Barbara Price-Thurman

Subscribed and sworn to before me, a notary public, this 7th day of April, 1988.

Beverly L. Spicer
Notary Public

My Commission expires:

January 14, 1991

APPENDIX A

Basic terms of agreement in principle between Phillips 66 Natural Gas Company and Marathon Oil Company, sellers, and The Tokyo Electric Power Company, Incorporated and Tokyo Gas Company, Limited, buyers.

Term Extension	15 additional years (primary term) plus an optional five years, subject to agreement of buyers and sellers.
First Deliveries	April 1989
Annual Contract Quantity ("ACQ")	Initially 52.0 trillion Btu's; when larger ships are in service, 57.5 trillion Btu's.
Annual Flexibility	-10% ACQ + 6% ACQ (best efforts to provide)
Accumulated Underlift Limit	Not to exceed 55.7 trillion Btu's total over 15 years
Delivered Price	A base price of five hundred ninety-two and eight tenths (592.8) U.S. cents per million Btu as indexed and adjusted in accordance with the below formula so as to reflect changes in the weighted average of Government Selling Prices of a basket of twenty (20) crude oils imported into Japan and respond to market conditions.

Delivered Price for calendar month (U.S. cents per million Btu's)

$$= 592.8 \left[\frac{\text{Avg GSP (Month Prior to Calendar Month)}}{34.48} \right] + \text{Adjustment}$$

WHERE:

Avg GSP is the average of the Government Selling Prices (in U.S. dollars per barrel) weighted by the volumes for the top twenty (20) crude oils (ranked by descending volumes) imported into Japan during the preceding calendar year.

Adjustment is a factor negotiated from time to time between Buyers and Sellers better to allow the price of LNG sold under the contract to respond to market conditions. The adjustment is limited to a range of plus or minus 30.0 U.S. cents per million Btu's purchased and sold.

APPENDIX B

OPINIONS OF LEGAL COUNSEL REGARDING CORPORATE AUTHORITY TO EXPORT LNG

PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA 74004 918 661-6600

LEGAL

April 7, 1988

Natural Gas Division
Economic Regulatory Administration
Forrestal Building
Room GA-033, RG-43
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Re: Phillips 66 Natural Gas Company / Marathon Oil Company
Application for LNG Export Extension, Opinion of Counsel
Regarding Corporate Powers

Ladies and Gentlemen:

In accordance with the requirements of 10 C.F.R. § 590.202(c), I have examined the Certificate of Incorporation and Bylaws of Phillips 66 Natural Gas Company, a Delaware corporation, the Delaware corporation law and other authorities as necessary, and have concluded that the proposed exportation of natural gas by Phillips 66 Natural Gas Company, one of the applicants, is within the corporate powers of Phillips 66 Natural Gas Company. Further, Phillips 66 Natural Gas Company is authorized to do business in Alaska and to engage in foreign commerce. Phillips 66 Natural Gas Company is a wholly-owned subsidiary of Phillips Petroleum Company, a Delaware corporation, which has similar corporate powers and authority.

Very truly yours,

Larry Pain

LARRY PAIN

Attorney for
Phillips 66 Natural Gas Company
1258 Adams Building
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LP/kv-RC

George H. Rothschild, Jr.
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Telephone 713/629-6600

April 5, 1988

Natural Gas Division
Economic Regulatory Administration
Forrestal Building
Room GA-033, RG-43
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Re: Phillips 66 Natural Gas Company/Marathon Oil Company
Application for LNG Export Extension, Opinion of Counsel
Regarding Corporate Powers

Ladies and Gentlemen:

In accordance with the requirements of 10 C.F.R. § 590.202(c), I have reviewed the relevant corporate documents, and have concluded that the proposed exportation of liquefied natural gas by Marathon Oil Company, one of the applicants, is within the corporate powers of Marathon Oil Company. Further, Marathon Oil Company is a corporation duly organized under the laws of the State of Ohio and is authorized to do business in Alaska and to engage in foreign commerce.

Very truly yours,

G. H. Rothschild, Jr.

G. H. Rothschild, Jr.

Attorney for
Marathon Oil Company
P. O. Box 3128
Houston, Texas 77253

GHR:glm:0194g

APPENDIX C

DAMES AND MOORE REPORT

"ECONOMIC ANALYSIS OF REGIONAL AND NATIONAL INTERESTS RELATING TO KENAI LNG EXPORT TO JAPAN"

April 5, 1988

ECONOMIC ANALYSIS OF REGIONAL AND NATIONAL INTERESTS RELATING TO KENAI LNG EXPORT TO JAPAN

SUBMITTED TO:

PHILLIPS 66 NATURAL GAS COMPANY
MARATHON OIL COMPANY

By:

DAMES & MOORE
POLICY AND ECONOMICS SERVICES GROUP
MARVIN L. FELDMAN
CARMEN FRASER

In Association with:

SCOTT GOLDSMITH
INSTITUTE FOR SOCIAL AND ECONOMIC RESEARCH
UNIVERSITY OF ALASKA

PATRICK L. BURDEN
NORTHERN ECONOMICS

and

WILLIAM W. WOOD

April 5, 1988

MLF/1576a(C246a)

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EXECUTIVE SUMMARY

An economic analysis was performed to determine whether continued export of Cook Inlet LNG from Kenai to Japan is consistent with the public interest, both from the local and national viewpoint. The results of this analysis indicate that LNG export is beneficial from both viewpoints. During the period for which the export approval is requested, 1989 through 2004, natural gas and other energy supplies are ample to meet demands without any undue price effects. Cessation of LNG export would have a detrimental effect on the local economy, on the U.S. balance of trade, and on U.S./Japanese relations.

From a local perspective, natural gas resources will remain in oversupply through 2004, even if little new reserves are found and the most unfavorable assumptions are made regarding demand for natural gas. The Railbelt area, which comprises the local market for Cook Inlet natural gas, is rich in energy resources with more than 4.1 tcf (trillion cubic feet) of proven gas reserves, 1.6 billion tons of proven coal reserves (the energy equivalent of 35 tcf of natural gas) and numerous developable hydroelectric sites.

Two demand cases were postulated as the basis for projecting Railbelt energy and natural gas demand. The unfavorable case is highly biased in the direction of increasing natural gas demand. This case is contrasted with the expected case regarding anticipated demand. Similarly, two supply cases were postulated. The unfavorable case is based on existing reserves plus undiscovered potential resources which have an 80 percent probability of being exceeded. The expected supply case is based on mean resources estimates.

Under the Expected supply and demand scenario, 3,562 bcf of proven reserves of gas would remain available in 2004 in the Alaska Railbelt. This is a very comfortable margin to allow orderly transition to other fuel supplies over many years in the event that even more gas is not found.

An extremely pessimistic, unfavorable scenario was developed by combining the unfavorable (high) demand case with the unfavorable (low) supply case. Even under this scenario Railbelt natural gas supplies remain adequate through 2004 and beyond.

From a supply standpoint, before reserves dipped down to a few years' production, exploration effort would be renewed. Cost of production has typically been considerably below market price, providing a strong incentive to produce. Exploration and production have historically been inhibited by low demand. According to Alaska Department of Natural Resources estimates, there is an 80 percent probability that at least 1,490 bcf remain to be discovered, and a 50 percent probability that another 3,070 bcf remain, in addition to the 1987 known reserves of 4,158 bcf.

The demand under the Unfavorable Scenario would be tempered by price elasticity effects. Before gas reserves reached a few years' consumption, price rises would provide incentive for substitution of other energy resources present in the region, notably coal.

Thus, the likelihood of a local natural gas scarcity due to LNG export authorization is quite remote. On the other hand, the tangible benefits of continued exportation are quite significant in terms of employment, personal income and tax revenues. LNG manufacture provides a stable source of income and employment in an area noted for seasonal unemployment and extreme cyclic response to world oil price changes. Direct and indirect employment in Alaska due to gas feedstock production and LNG manufacture currently accounts for 568 jobs and $20 million in personal income per year.

From the national and international perspective, continued export is even more beneficial than from the local perspective. The prospect of finding a market for Cook Inlet LNG in the lower 48 is extremely remote. Even if such a market could be found, the impact on the price and availability of natural gas would be minimal. Balanced against these remote possibilities of domestic use

are the very substantial benefits of export to Japan. Both the overall foreign trade balance of the United States and the balance of U.S. trade with Japan would be improved. Furthermore, Kenai LNG provides a small but strategically important source of energy supply diversity for Japan. By providing Japan with this LNG supply, the U.S. strengthens a diplomatic and economic ally to the benefit of both nations.

Authorization of continued LNG export to Japan is clearly not inconsistent with the public interest of Alaska or the entire U.S.

1.0 INTRODUCTION

Phillips 66 Natural Gas Company and Marathon Oil Company jointly own and operate a liquefied natural gas (LNG) manufacturing facility near Kenai, Alaska. Since 1969, this facility has used Cook Inlet gas to manufacture LNG for export to Japan. The export authorization for the Phillips/Marathon LNG facility expires in 1989. To continue its LNG export operation, Phillips/Marathon must obtain a new export authorization from the Economic Regulatory Administration (ERA) of the U.S. Department of Energy. To obtain a new export authorization, Phillips/Marathon must demonstrate that the project is not inconsistent with the public interest.

In September 1987, Phillips and Marathon requested that Dames & Moore, in association with the Institute for Social and Economic Research (ISER), perform an economic study of the public interest issues related to continued LNG export from Kenai to Japan.

This report documents the methods and results of that study. The period of analysis extends from the present through the year 2004. This time frame covers the 15-year period for which the export authorization is sought (April 1, 1989 through March 31, 2004). As the analysis extends to the end of 2004, a small conservative bias is thus introduced.

The economic component of the public interest in Kenai LNG export encompasses several issues. Foremost among these issues is the effect of continued export on local supplies and prices. In the Kenai context, the "local" market includes all of southcentral Alaska and the interior extending from Whittier to Fairbanks. This region, which is known as the "Railbelt", defines the likely service area which is or could be served with Cook Inlet natural gas. A map of Alaska defining the Railbelt region is presented in Figure 1-1. Within this area, it is important to determine the present and projected future demand for natural gas and to evaluate the adequacy of known

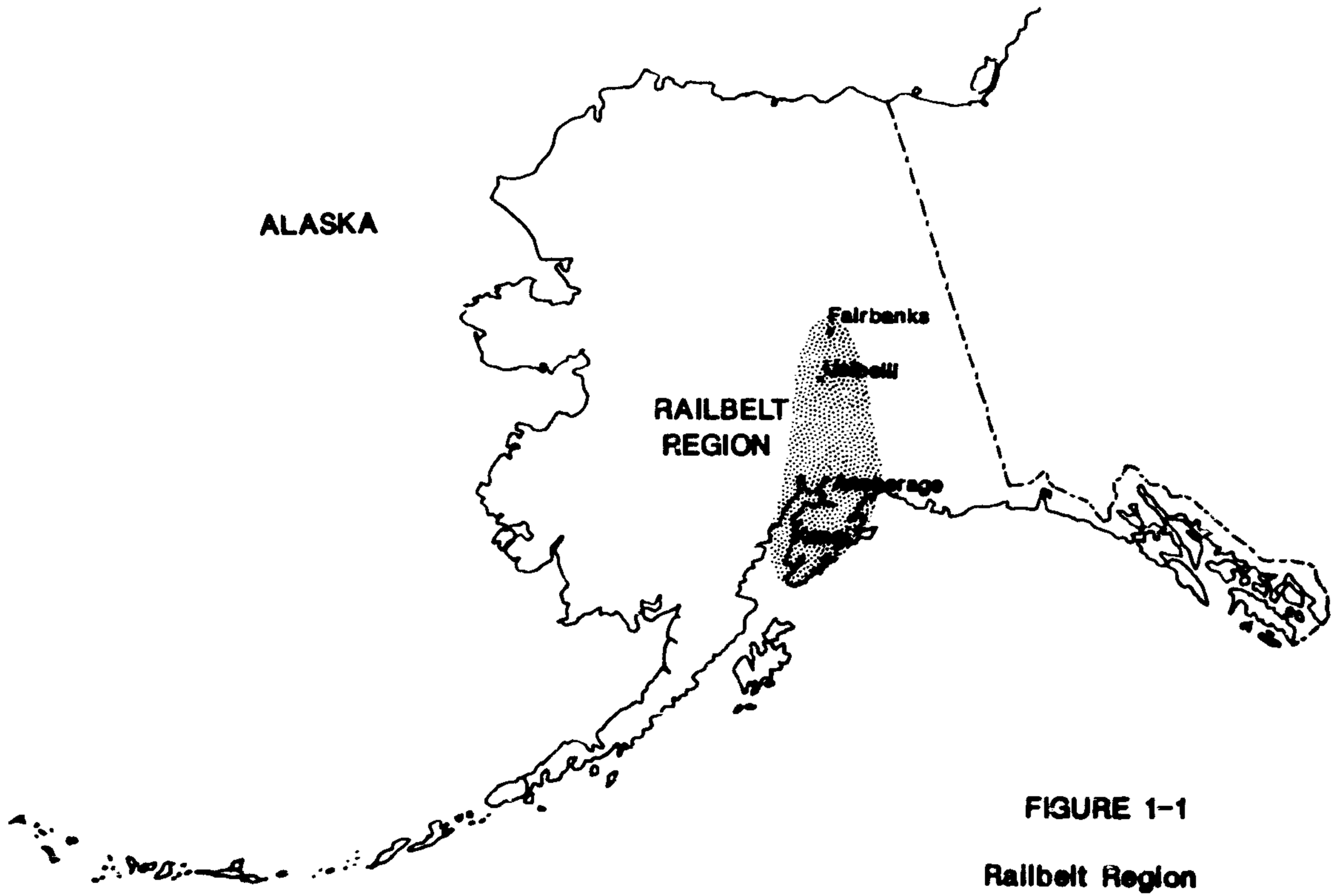

FIGURE 1-1

Railbelt Region
of Alaska

reserves and potential resources in meeting this demand. The price effects, if any, are also a potential issue.

Another economic component relevant to the public interest issues raised by continued LNG export is the prospect for and effect of exporting the Kenai LNG to the lower 48 states rather than to Japan. The question is whether lower 48 markets exist for this LNG, and if so, whether or not national economic interests would be affected, both from the gas market standpoint and from that of the strategic impact on Japan as a U.S. trading partner. A third economic component is the effect which cessation of LNG production would have on the local Alaska economy. This report addresses all of these economic components of the public interest.

1.1 PURPOSE

The purpose of this report is, therefore, to provide documentation of how the continued export of Kenai LNG to Japan from 1989 through 2004 will impact the economic components of the public interest mentioned above. Specifically, this report will address the following issues:

- the Railbelt demand for Cook Inlet natural gas for all existing and prospective use categories;
- the natural gas supplies in the Cook Inlet province and alternative gas and energy supplies in the Alaska Railbelt;
- the impacts of LNG export on taxes, employment and economic development in Alaska;
- the absence of economic viability of diverting the Kenai LNG export from Japan to the lower 48;

- the strategic importance of the Kenai LNG exports to the U.S. trade balance with Japan; and

- the importance of the Kenai LNG supply to Japan.

1.2 BACKGROUND AND ISSUES

1.2.1 Background of Natural Gas Uses in the Railbelt Region

The natural gas resources of the Cook Inlet were discovered in the late 1950's. Presently competing uses for Cook Inlet gas resources are the Phillips/Marathon LNG facility, an ammonia-urea plant and southcentral Alaska's electrical and heating energy demands. Table 1-1 illustrates the proportions of Cook Inlet gas which each use consumes.

Despite these competing uses, demand has typically been well below supply, as evidenced by the historically low price. In the future, demand for gas for the LNG and ammonia-urea facilities is anticipated to remain fairly stable, but a number of local market forces which will increase the demand for gas for other uses have recently converged.

For example, an electrical intertie was built in 1986 to allow Fairbanks, Alaska's second largest metropolitan area, to benefit from the low cost Cook Inlet gas supplies. In addition, within the past year, the Alaska Power Authority has decided to proceed with the construction of a Kenai-Anchorage intertie, thus bringing more than 80 percent of Alaska's population within a single electrical grid fueled predominantly by Cook Inlet natural gas.

In reviewing the gas supply situation, it is important to consider substitute energy sources which can be used for space heating and electrical generation. These include coal and hydropower. Both of these energy supplies are abundantly available in the Railbelt region, and development plans for

Table 1-1

Disposition of Cook Inlet
Net Gas Production (1986)

		Billion Cubic Feet	Percent of Total
Domestic Uses			
	Electric Utilities	40	21
	Gas Utilities	23	12
	Military	4	2
	Petroleum Production	2	1
Ammonia-Urea Manufacture		36	19
LNG Manufacture		62	32
Other			
	Field Operations	18	9
	Reinjection (rental gas)	8	4
TOTAL		193	100.0

Note: Net gas production excludes gas reinjected into wells.

Source: Institute for Social and Economic Research.

both sources are under consideration. To the extent that these alternatives are developed, the dependence on natural gas resources may be reduced. Figure 1-2 illustrates the location of various energy sources in the Railbelt region.

1.2.2 Railbelt Supply and Demand Issues

In addition to the normal supply and demand forces influencing Cook Inlet natural gas, there are several recent events which may have a bearing on the determination of the public interest associated with continued export. These recent events, which are briefly described below, will be addressed in depth in connection with the supply and demand analyses.

DEMOGRAPHICS: The downturn in the Alaska economy, the resultant population loss and the reduced business and industrial activity in Anchorage and other Alaska communities have resulted in lower demands for gas. This downturn is primarily the result of depressed world oil prices and can be expected to improve when oil prices recover.

ELECTRICITY DEMAND: The Fairbanks intertie and the recently authorized Kenai-Anchorage intertie enable lower cost gas-fired electricity to be provided to these communities to offset higher cost diesel- and coal-based electric power plants. These interties provide the potential for spreading peak loads among various generation facilities. With a large percentage of the population of Alaska connected to this grid, there will be additional pressures on the Cook Inlet gas resources for fueling electrical generation.

GAS PIPELINES: Enstar Natural Gas Company, which constructed a gas pipeline from the Beluga gas field to Anchorage in 1985, has aggressively expanded distribution lines in the rapidly growing communities of Wasilla and Palmer to enable residences and businesses to convert from diesel fuel to gas for home heating. The distribution system increases the local

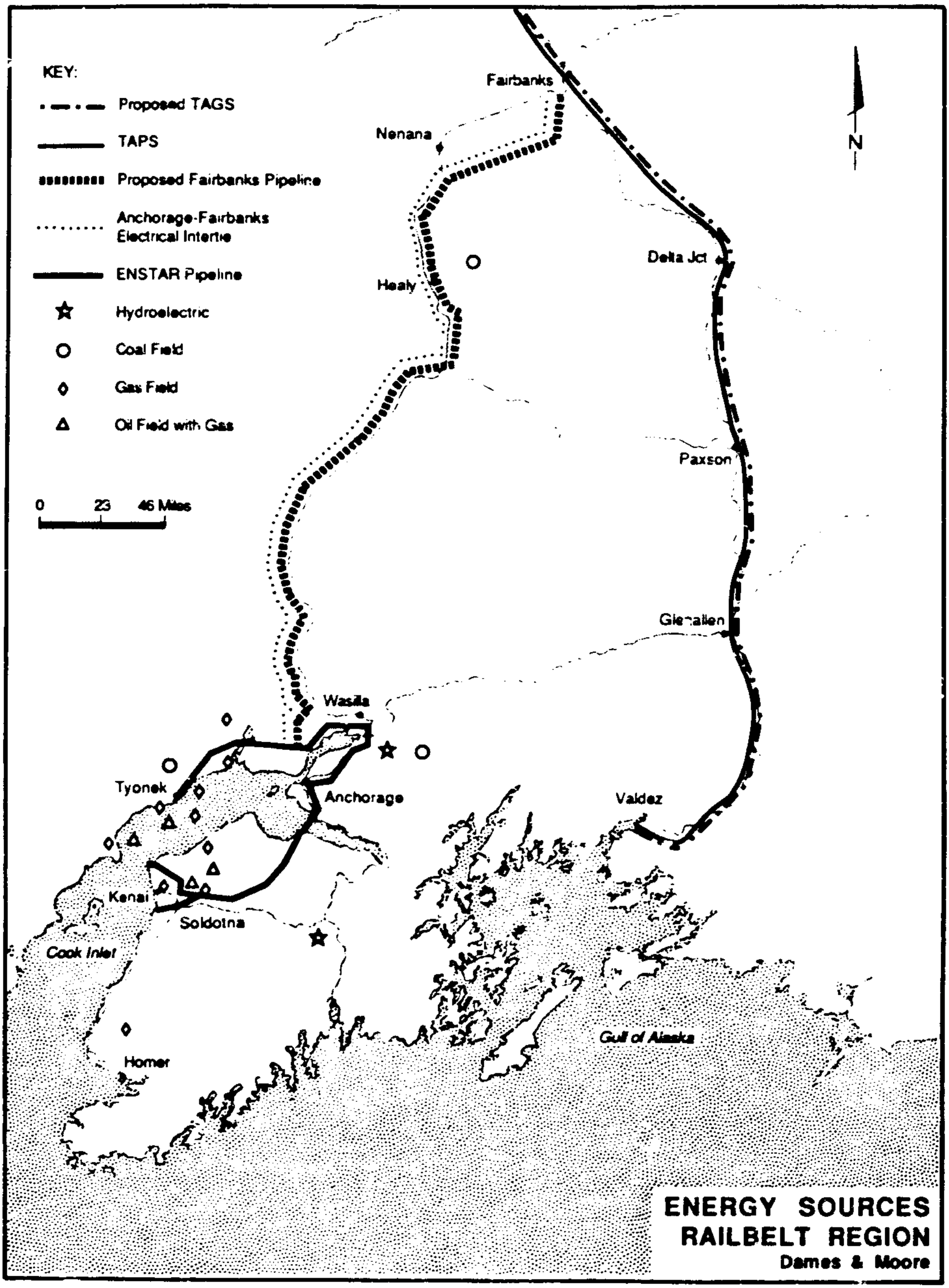
KEY:
Proposed TAGS
TAPS
Proposed Fairbanks Pipeline
Anchorage-Fairbanks Electrical Intertie
ENSTAR Pipeline
Hydroelectric
Coal Field
Gas Field
Oil Field with Gas
0 23 46 Miles
N
Fairbanks
Nenana
Healy
Delta Jct
Paxson
Glennallen
Wasilla
Tyonek
Anchorage
Valdez
Kenai
Soldotna
Cook Inlet
Homer
Gulf of Alaska
ENERGY SOURCES
RAILBELT REGION
Dames & Moore

FIGURE 1-2

demand for Cook Inlet natural gas. Enstar's Fairbanks area gas pipeline proposal, if developed, would further increase the demand for natural gas.

GAS DEVELOPMENT: Cook Inlet producers and Enstar have contracted for Cook Inlet gas at substantially higher wellhead prices. These higher prices have, in part, resulted in additional developmental drilling in the Cook Inlet region and proposals for alternative power sources.

HYDROELECTRIC AND COAL ENERGY SUPPLIES: The Railbelt region is amply endowed with coal and hydroelectric resources. Several proposals for hydroelectric and coal-fired power generation have come forth recently. If developed, these projects would reduce the demand for Cook Inlet Gas.

1.3 METHODOLOGY

Several factors which might influence future supply and demand for natural gas resources are presently uncertain. Because of these uncertainties, a scenario-based approach is used in this analysis. Expected and unfavorable assumptions are postulated for both supply and demand. In this context, "unfavorable" refers to conditions which increase local demand or decrease local supplies of natural gas or substitute energy sources. Unfavorable assumptions thus tend to militate against continued LNG export. If it can be demonstrated that, despite these unfavorable assumptions, continued export is in the public interest, then the case is conclusively proven. In contrast to the Unfavorable Scenario, an "Expected Scenario" utilizes the most likely estimates for the supply and demand for Cook Inlet gas supplies.

The analysis reported in this study consists of the following elements:

1. A demand model for the Railbelt region.
2. A supply analysis for Cook Inlet natural gas resources.
3. A supply-demand analysis for Cook Inlet LNG.
4. Impact analyses of alternative supply-demand outcomes.

Each of these elements is briefly described below.

DEMAND: The demand model is based on ISER's Railbelt Energy Demand model (RED). The Alaska Department of Natural Resources (ADNR) used this model in its Historical and Projected Oil and Gas Consumption study (January, 1987). In the analysis presented here, the Unfavorable Case is postulated to assume that all uncertain factors of demand will increase demand. This includes the 80th percentile (high) state oil revenue projection. The Expected Case assumes the oil revenues and other demand factors are at their mean or expected levels.

SUPPLY: The supply analysis projects the Cook Inlet gas production through 2004 under unfavorable and expected assumptions. The Unfavorable Case assumes that production is based on only the already known natural gas reserves plus the potential resources which are present with an 80 percent certainty. The Expected Case is based on mean estimates of supplies. Potential resource estimates are based on published Alaska Department of Natural Resources estimates (ADNR, 1983).

SUPPLY-DEMAND BALANCE: Supply-demand balances are projected through 2004 based on the supply and demand scenarios discussed above. The Unfavorable Supply-Demand Scenario couples the unfavorable (high) demand case with the unfavorable (low) supply case. The Expected Supply-Demand Scenario couples the mean or expected cases for both supply and demand. Intermediate scenarios of expected demand/low supply and high demand/expected supply are also analyzed.

IMPACT ANALYSIS: The impact analysis analyzes the regional and national economic effects of the three possible outcomes of the Economic Regulatory Administration decision. The three alternative outcomes are listed below:

- continued export of Kenai LNG to Japan;
- export of Kenai LNG to the lower 48 states; and
- closure of the Kenai LNG facility.

1.4 SUPPLY AND DEMAND ASSUMPTIONS

A series of assumptions is used to define the Railbelt supply and demand situation under the Unfavorable and Expected Scenarios. These assumptions are summarized in Table 1-2 and are described more fully in Section 2.0.

1.5 SUMMARY OF RESULTS AND CONCLUSIONS

The analyses conducted in this study clearly demonstrate that continued export of Kenai LNG is, in fact, consistent with the public interest. Indeed, it is difficult to postulate plausible future conditions which do not support this conclusion. Below is a brief summary of this study's findings:

DEMAND:

- Cook Inlet domestic gas demand has grown from 34 billion cubic feet (bcf) in 1974 to 70 bcf in 1986;

- Annual domestic gas demand is projected to rise to 89 bcf under the Expected Scenario and to 164 bcf under the Unfavorable Scenario (high demand) by 2004; and

- Total annual gas demand is currently 193 bcf (1986). By 2004, annual demand is projected to rise to 231 bcf under the Expected Scenario or 308 bcf under the Unfavorable (high demand) Scenario.

SUPPLY:

- Supplies of Cook Inlet natural gas have always far exceeded demand;

- Most current supplies of natural gas were developed only incidentally to the exploration and development of oil;

- Most of the current reserves were developed from fields which were discovered in the 1950s and 1960s;

- Proved reserves to production ratios have averaged 18.8, which is far in excess of the ratios typically observed in the lower 48;

- Current known proved reserves total 4,158 bcf;

- There is a 50 percent probability that undiscovered commercially available resources of 3,070 bcf remain to be discovered in the Railbelt area; and

- There is an 80 percent probability that at least 1,490 bcf of undiscovered commercially available resources remain to be discovered in the Railbelt area.

SUPPLY/DEMAND BALANCE:

- Under Expected supply and demand conditions, more than 3,500 bcf of gas will remain available in the Cook Inlet area by 2004 (the termination of the requested 15 year authorization);

- Under the Expected supply and Unfavorable (high) demand conditions more than 2,800 bcf will still remain available in 2004; and

- Even if Unfavorable (low) supply conditions are coupled with unfavorable demand conditions, gas supplies will remain abundant, with more than 1,200 bcf still available at the termination of the authorization period.

Table 1-2

ECONOMIC ASSUMPTIONS

EXPECTED SCENARIO	UNFAVORABLE SCENARIO
Alaska Department of Revenue's mean world oil price case	Alaska Department of Revenue's 80 percent case (based on high world oil price forecast)
Bradley Lake hydroelectric facility on line by 1992	No Bradley Lake hydroelectric facility development
New 100 MW Railbelt coal-fired capacity on line by 1992	No new coal-fired capacity in Railbelt
Strengthen electrical interties to Fairbanks, but no pipeline	Gas distribution lines extended from Kenai to Fairbanks by 1992
Increased distribution of gas from Kenai to Matanuska/Susitna Valley region	Same
Expanded ammonia-urea production in 1988 but no further expansion	Same
1 to 1.5 % population growth	Highest sustainable population growth driven by high oil prices and major development project employment
Mean (50 percent) estimate of probable natural gas resources exist in the Cook Inlet area	Low range (20 percent) estimate of probable natural gas resources exist in the Cook Inlet area
Reserves to production ratio remains at historic levels	Ratio decreases beyond historic levels
No Prudhoe Bay gas pipeline built	Yukon-Pacific pipeline (Prudhoe Bay to Valdez) built by 1994, but none of the gas is available to the Railbelt region

IMPACTS OF DISCONTINUING LNG EXPORT:

- Prospects for exporting LNG to the lower 48 are very remote from an economic standpoint; anticipated market demand does not support high cost LNG supplies, and no west coast receiving terminals exist or are anticipated;

- Even if economic conditions were favorable, the environmental constraints and federal, state, and local governmental approval delays for LNG receiving terminals being built on the west coast would likely prevent such export within the 15-year authorization request;

- In the absence of lower 48 domestic markets, if LNG export authorization were denied, the facility would shut down;

- Cessation of LNG production would result in a total loss (direct plus indirect) of 155 jobs in Kenai and the total loss of more than $5.5 million in direct and indirect personal incomes; the resultant loss of state and local taxes and royalties and private royalties would cause additional job and income loss of 413 and $14.6 million, respectively;

- Cessation of exports would have a small but unfavorable impact on the U.S. balance of trade worldwide and a more significant effect on the nation's already adverse balance of trade with Japan; and

- Japan is an important U.S. ally and trading partner. Loss of Kenai LNG would adversely affect Japan by reducing its already limited LNG supply diversity.

1.6 REPORT ORGANIZATION

This analysis is divided into eight sections. Section 2.0 describes the analytic framework and the interfuel substitution possibilities for natural gas. An analysis of the demand for natural gas in the Railbelt is presented in Section 3.0. Section 4.0 analyzes the supply of natural gas and other substitute fuels in the Railbelt area of Alaska. Section 5.0, the supply/demand balance, compares the results from the two previous sections. Section 6.0 provides a discussion of the regional and national economic effects of alternative LNG operations and export outcomes. References are provided in Section 7.0.

2.0 ANALYTIC FRAMEWORK FOR RAILBELT SUPPLY/DEMAND ANALYSIS

2.1 INTRODUCTION AND SUMMARY

The analysis of the Railbelt energy system and the projection of the possible impacts of continued export of LNG presented in this study relies on a simple and robust analytic framework. A set of assumptions which are unfavorable to continued export is postulated for both the supply and the demand sides of the energy balance. This unfavorable set of assumptions imparts a very conservative bias to the analysis. The very conservative Unfavorable Scenario is contrasted with the Expected Scenario. Section 2.2 discusses the analytic framework in more detail.

In order to understand the Railbelt energy situation, it is important to understand the interfuel substitution possibilities which exist between natural gas and other fuels. These possibilities include:

SUBSTITUTION OF GAS FOR FUEL OIL IN SPACE HEATING: Proposed pipeline projects which extend the natural gas distribution network tend to increase gas demand.

SUBSTITUTION OF HYDROELECTRIC POWER FOR GAS-FIRED ELECTRICAL GENERATION: Proposed projects such as Bradley Lake and Eklutna would tend to reduce gas demand.

NATURAL GAS-FIRED ELECTRICAL GENERATION CAN SUBSTITUTE FOR OIL-FIRED GENERATION: Proposals to strengthen electrical interties within the Railbelt area tend to increase the gas demand under anticipated prices.

COAL-FIRED GENERATION CAPA ITY CAN SUBSTITUTE FOR GAS-FIRED GENERATION: Several proposals are under consideration to use the vast coal reserves of the Railbelt area for electrical generation. The relative busbar cost of coal-generated electricity versus gas-generated electricity will

determine whether development occurs. The comparative prices of the two fuels are an important factor in busbar cost.

In Section 2.3 the historic trends and proposed plans affecting each of the above substitution possibilities is discussed. Expected and unfavorable assumptions are postulated for each substitution option.

2.2 ANALYTIC FRAMEWORK

The economic analysis conducted to determine whether export of Kenai LNG is consistent with the public interest consists of the following components:

- competing local demand for natural gas;
- available local supplies of natural gas or substitute fuels;
- local economic impacts which would result from cessation of LNG manufacture;
- lower 48 demand for natural gas; and
- strategic economic considerations for Japanese-American trade relations.

The first two items, local supply and local demand, constitute the most potentially important issues. Because of their importance, the majority of the analysis focuses on examination of local supply/demand issues. A framework for analyzing local supply/demand projections is presented below. The remaining three items are discussed in Section 6.0.

The relevant boundary for analysing local energy supply demand balance is the area defined as the "Railbelt" as illustrated in Figure 1-1. This area, so designated because it is served by the Alaska Railroad, extends north from Whittier to Fairbanks and west from Anchorage to the Kenai Peninsula. An increasingly comprehensive network of gas pipelines and electrical interties serves the area, making it a unified supply/demand region.

2.2.1 Local Supply/Demand Scenarios

Projecting the future energy situation in the Railbelt area is made difficult not only by uncertainty with respect to energy prices, but also due to the wide range of proposed energy projects which could affect natural gas supply/demand. To surmount this difficulty, the analysis reported here relies on a scenario approach. Two cases are postulated for both supply and demand.

The EXPECTED cases are based on the supply and demand situation which is most likely to prevail. These cases utilize the 50 percent probability for events which can be specified statistically (i.e., oil price and potential undiscovered resources), and the best professional judgment for other uncertain events.

The UNFAVORABLE cases are based on a supply/demand situation which is biased against adequacy of gas supply surplus for LNG export. Supply is thus biased toward the low side while demand is biased toward the high side. These cases utilize the 20 percent probability for events which can be specified statistically (that is the 20 percent likelihood that demand will be greater than specified while supplies have an 80 percent probability of exceeding the assumed value). For proposed projects affecting energy supplies, assumptions are made in each case which would maximize demand and minimize supply.

By combining these unlikely events, an extremely biased unfavorable scenario is created. The joint probability of all these unfavorable situations actually occurring has a very low probability (much lower than the 20 percent for any one component). If, as demonstrated, this pessimistic scenario indicates that sufficient natural gas would be available to the Railbelt, the case is clearly made that the export is not inconsistent with local interests.

The Railbelt energy demand projections are presented in detail in Section 3.0. In the EXPECTED case, oil and gas revenues are based on the

Alaska Department of Revenue (ADR) mean projections. Demographic projections and availability of proposed substitute fuel sources are based on best judgment estimates of professionals from the University of Alaska's Institute for Social and Economic Research (ISER). The UNFAVORABLE case demand assumes the 80 percent (high) ADR revenue projections. Demographic demand assumptions are consistent with the high oil prices associated with this revenue projection as well as the development of large prospective projects which would increase natural gas demand. All prospective projects which would tend to provide substitute fuels are assumed not to be developed, to further exaggerate the unfavorable bias.

The Railbelt supply assumptions are developed in detail in Section 4.C. Supplies in the EXPECTED case are limited to measured reserves plus discovery potential Cook Inlet natural gas supplies equal to the mean supply estimate. The UNFAVORABLE supply case assumes measured reserves plus undiscovered potential reserves which have an 80 percent probability of being exceeded.

2.2.2 Price Assumptions

Energy price elasticities among fuels which could substitute for natural gas will, in reality, affect the demand for natural gas. Coal is in abundant supply in the Railbelt area. Oil can substitute for gas in most applications. These interfuel substitutions are discussed in more detail in Section 2.3. To simplify the analysis, it is assumed that natural gas maintains its present price advantage over oil and coal in all interfuel substitution applications. Past, present and potential future energy prices are summarized in Table 2-1.

TABLE 2-1 Historic and Projected Future Relative Prices
For Railbelt Energy Sources
Constant 1987 $

				EXPECTED		UNFAVORABLE	
		1970	1980	1990	2000	1990	2000
World Oil	$bbl	$8.93	$29.73	$17.67	$19.00	$20.01	$29.79
	$/mmbtu	$1.53	$5.10	$3.03	$3.26	$3.44	$5.11
Alaska Oil Wellhead	$bbl	na	$22.73	$12.03	$12.00	$13.01	$22.79
	$/mmbtu	na	$ 3.90	$ 2.07	$ 2.06	$ 2.23	$ 3.91
Natural Gas	$/mmbtu	na	$ 0.53	$ 1.76*	$ 1.89*	$ 1.99*	$ 2.97*
Alaska Coal	$/ton	varied	$25.50	$27.20	$30.60	$33.66	$37.40
	$/mmbtu	varied	$ 1.50	$ 1.60	$ 1.80	$ 1.98	$ 2.20

* Refers to projected new contract prices, based on world oil price escalation.
Sources: Oil Prices: Alaska Department of Revenue, 1987 and Personal Communication C. Logsdon, 1988
Gas Prices: Northern Economics calculations
Coal Prices: Dames & Moore, 1985

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2.3 INTERFUEL SUBSTITUTION FOR NATURAL GAS

2.3.1 Substitution of Gas for Oil in Space Heating

SUMMARY: Southcentral Alaska is currently served with Cook Inlet gas. Proposed pipeline projects which extend the natural gas distribution network would tend to increase gas demand, reducing the consumption of oil.

CURRENT SITUATION: Pipelines connect the Cook Inlet gas fields with Southcentral Alaska markets which consumed 193 billion cubic feet in 1986. The pipelines were originally built from the Kenai area to Anchorage. Alaska Pipeline Company (Enstar Natural Gas Company) completed a gas pipeline from the Beluga gas field on the west side of Cook Inlet to Anchorage in 1985. The pipeline was routed around Cook Inlet and Knik Arm rather than a more direct approach with an underwater pipeline in order to provide gas to the Matanuska-Susitna Borough. Enstar has aggressively expanded distribution lines in the local communities of Wasilla and Palmer to enable residences and businesses to convert from diesel fuel to gas for home heating. The distribution system has resulted in substantial increases in gas sales for Enstar.

PROPOSED PROJECTS: There are two proposed pipeline projects which might influence natural gas demand: Enstar Fairbanks and Yukon Pacific. Enstar officials have proposed that a 285-mile, 20 inch pipeline be built to bring Cook Inlet natural gas to Fairbanks. A utility distribution system would be constructed within Fairbanks and other communities to supply individual homes, businesses and electric power plants with gas from the pipeline. Enstar asserts that it would be possible to provide gas in Fairbanks at the same rates as Southcentral communities. The project would result in a substantial increase in demand for Cook Inlet gas.

Since the discovery of oil and gas at Prudhoe Bay there have been several proposals for gas pipelines to move the gas from the North Slope

to domestic or international markets, but none have proven feasible to date. Currently, Yukon-Pacific Corporation (YPC) proposes to construct the Trans-Alaska Gas System (TAGS) from Prudhoe Bay to Anderson Bay near Valdez, Alaska for the purpose of using up to 2.3 billion cubic feet of natural gas per day to manufacture liquefied natural gas for export via tanker to Japan and other Pacific Rim countries by 1997. Although intended for export, the TAGS project might also provide the Fairbanks area with North Slope gas because the pipeline is expected to pass through the area. ARCO Alaska, Inc. has developed figures indicating electric power generated from North Slope gas could cost effectively replace oil for space heat and electricity. If constructed, this pipeline would increase demand for Cook Inlet gas by increasing the level of activity and population in the Railbelt. If the TAGS line is extended to Fairbanks, demand for Cook Inlet gas would be reduced.

EXPECTED SCENARIO: It is assumed that no gas pipeline is constructed from Kenai to Fairbanks; however, increased distribution of gas from Kenai to the Matanuska/Susitna Valley region occurs. Further, it is assumed that the TAGS pipeline is not constructed.

UNFAVORABLE SCENARIO: It is assumed that gas distribution lines are extended from Kenai to Fairbanks by 1992 and that increased distribution of gas from Kenai to the Matanuska/Susitna Valley region occurs. Further, it is assumed that the TAGS pipeline is built by 1994, but that no Prudhoe Bay gas is available to the Railbelt. This results in a very conservative (high) demand case assumption. TAGS construction increases demographically-driven demand without providing compensating supply augmentation.

2.3.2 Hydropower Substitution for Gas-Fired Electrical Generation

SUMMARY: Proposed hydroelectric projects such as Bradley Lake and Eklutna would tend to reduce gas demand.

CURRENT SITUATION: By virtue of Alaska's large size and high rainfall in the southeastern and southcentral parts of the State, Alaska has at least a third of the nation's hydropower resource and possesses the largest underdeveloped resource. However, major fluctuations in annual water flow and great seasonal variation in water runoff in Southcentral Alaska require expensive storage capacity and concomitant increases in capital costs. This has been a major adverse factor in feasibility analyses for hydropower projects.

Existing Hydroelectric Generation Facilities: There are two existing hydropower facilities in the area served by the Southcentral Alaska electrical grid, one at Eklutna Lake approximately 30 miles north of Anchorage, and the other at Cooper Lake near Cooper Landing on the Kenai Peninsula.

The Eklutna hydroelectric facility provides electrical power to the Anchorage utilities and the Matanuska Electric Association. Operated by the federal Alaska Power Administration, this lake tap project was completed in 1955 and is rated at 30 MW. The facility produced approximately 155,000 MWH of electricity in 1986 (Alaska Power Authority, 1987).

The Cooper Lake plant went on line in 1963 with a capacity of 15 MW. The plant produced approximately 38,900 MWH of electricity in 1986 (Alaska Power Authority, 1987).

PROPOSED PROJECTS: The U.S. Army Corps of Engineers promoted a 46 MW hydroplant at Bradley Lake near Homer in 1962. In October, 1982 the State of Alaska undertook sponsorship of the project and in December, 1985 the Federal Energy Regulatory Commission issued a license for the project. Power sales agreements for the Bradley Lake hydroelectric project have been reached between the Railbelt utilities and the Alaska Power Authority. These agreements are subject to regulatory review. The

present schedule calls for award of construction in July 1988, with the system operational by the end of 1991. This 42 MW average hydro project would supply about 10% of railbelt electrical demand and reduce the demand for Cook Inlet gas (Alaska Power Authority, 1986b).

EXPECTED SCENARIO: It is assumed that the Bradley Lake facility is on line by 1992. Existing facilities at Eklutna and Cooper Lakes continue to operate at capacity.

UNFAVORABLE SCENARIO: It is assumed that the Bradley Lake facility is not developed. Existing facilities continue to operate at capacity.

2.3.3 Gas Versus Oil-Fired Electrical Generation

SUMMARY: Proposals to strengthen electrical interties within the Railbelt area tend to increase the gas demand under anticipated prices, reducing demand for oil-fired electrical generation.

CURRENT SITUATION: Greater Anchorage and the Matanuska and Susitna Valley, which comprise the largest population concentration in Alaska, are served by relatively low cost gas-fired electrical generation. Recently, this low cost power has been extended to the Fairbanks area by means of an electrical intertie. This intertie enables the Fairbanks area to reduce its reliance on higher cost oil-fired generation. The intertie also provides the potential for spreading peak loads among various generation facilities.

PROPOSED PROJECTS: The existing intertie commenced commercial operation May 1, 1986. The facility was designed with an initial capacity of 70 megawatts (MW) at 138 kilovolts (KV), with an ultimate design capacity of 350 MW at 345 KV. In its present 70 MW capacity the ability to reduce oil-fired generation costs is limited. Expansion to the full 350 MW capacity would result in a significant increase in the use of Cook Inlet

natural gas. Expansion of the intertie is not consistent with the development of a natural gas pipeline from Anchorage to Fairbanks, because that pipeline would permit more economical gas-fired generation in Fairbanks.

EXPECTED SCENARIO: It is assumed that the capacity of the Fairbanks electrical intertie will be expanded to 350 MW.

UNFAVORABLE SCENARIO: It is assumed that there is no strengthening of the intertie system above the current 70 MW capacity. Instead, the proposed gas pipeline to Fairbanks is built creating even greater demands on Cook Inlet supplies.

2.3.4 Coal Versus Gas-Fired Generation Capacity

SUMMARY: Enormous coal reserves exist in the Railbelt region. However, coal use in electrical generation is limited to the Fairbanks area. If Railbelt natural gas resources are ever depleted or if they become relatively expensive, coal-fired electrical capacity could be brought on line at only marginally higher cost. Several proposals are under consideration to use the vast coal reserves of the Railbelt area for electrical generation. If developed, coal-fired generation would reduce the need for gas-fired generation. The relative price of coal, which in turn depends on development of export markets, is an important determinant of coal-fired generation development.

CURRENT SITUATION: The coal resources of the Railbelt occur in three main fields: The Usibelli Coal Mine, the Beluga/Susitna field and the Matanuska field.

The Usibelli Coal Mine, is the only operating coal mine in Alaska. Located near Fairbanks, this field contains over 850 million tons of measured coal reserves, largely reserves at the Usibelli mine or under lease to other

coal companies. The total potential resource base is over 17 billion tons. This mine supplies approximately 87 MW of coal-fired generation capacity in the Fairbanks area (Dames & Moore, 1987).

The Beluga/Susitna field is located in an undeveloped area across the Cook Inlet from Anchorage and Kenai. The field has approximately 750 million tons of measured reserves with total potential resources estimated at over 37 billion tons. This field is world-class in terms of its size and the amount of easily strippable reserves within a short distance of low cost marine transport.

The Matanuska coal field is the smallest of the fields discussed here with only 6.6 million tons of measured reserves and 248 million tons of potential resources. However, the low sulfur values and high BTU content of this coal make it attractive for power generation.

Coal fired power plants operated by Golden Valley Electric Association (GVEA) and Fairbanks Municipal Utilities (FMU) consumed approximately 250,000 tons of coal in 1986 with electrical generation by the military representing an additional 37,000 tons in the same year (Alaska Power Authority, 1987). Coal accounted for 52 percent of the total MWH generated by the two utilities in 1986.

PROPOSED PROJECTS: A number of studies have been conducted under the sponsorship of the State of Alaska and various private entities since the early 1980s to determine the feasibility of coal-fired power plants in Southcentral and Interior Alaska. None of these proposals has proven to be competitive with gas at this time. However, proponents assert that fluidized bed plants could be built in Alaska for a capital cost of about $1,500 per KW which is $1,000 per KW less than conventional systems. For a 100 MW plant, this represents a reduction of about $100 million, an amount that could significantly change the feasibility (Emmerman, 1987a).

The viability of this design, however, has not yet been demonstrated in Alaska.

The City of Nenana is presently assessing the feasibility of a 100 MW coal-fired powerplant. The power plant would provide electrical energy to the Railbelt via a transmission line to the Anchorage-Fairbanks Intertie. A schedule for development of the project has not been developed; however, an Alaska Power Authority (APA) representative (Emmerman, 1987b) felt that under an optimistic schedule, the project could not be on line until 1995 at the earliest.

Usibelli Coal Company and Brown and Root are investigating the feasibility of constructing a 90 - 110 MW power plant in the vicinity of Healy, near the Usibelli mine. The project sponsors are proposing a plant that would have dual roles. The first would be to provide energy to a coal beneficiation or drying facility to enhance the export potential of Usibelli coal, and the second would be to provide power to the Southcentral electric grid. The beneficiation facility would require 20 to 30 MW of the plant's capacity with the remaining 70 to 80 MW going to the grid (Hunt, 1987).

A coal-fired power plant at Healy or Nenana could substantially alter the potential for the natural gas pipeline from Cook Inlet to Fairbanks proposed by Enstar Natural Gas Company. Approximately half of the potential market for natural gas in the Fairbanks area identified by Enstar is in the area of power generation (Emmerman, 1987a). Construction of a major coal-fired power plant anywhere in Southcentral Alaska would eliminate a very significant share of the potential market for natural gas in the interior.

The Beluga coal field is considered an attractive location for an export-oriented mine due to its close proximity to deep water ocean shipping. Some of the leases held in the field are located within very short distances of Chugach Electric Association's main gas-fired power plant at Beluga, which would suggest the potential for future coal-fired power plants. Diamond

Alaska Coal Company and Voss International Corporation recently commissioned a study to determine the viability of a coal-fired mine-mouth powerplant. The study determined that such a facility was not competitive with Cook Inlet natural gas (Gilbert/Commonwealth, 1986). Gas prices would have to increase from the present price of less than $2 per million BTUs to $3 before coal could become competitive (Alaska Business Monthly, 1987).

The proposed Matanuska Power Project (MPP) is a mine-mouth coal-fired power plant to be located near Sutton, approximately 50 miles northeast of Anchorage in the Matanuska Valley. The coal to fuel the power plant would be mined from the Wishbone Hill District of the Matanuska Coal Field. The project would require approximately 735,000 tons per year of run-of-mine coal for use in a complete pulverized plant to produce 150 MW of electricity for distribution to the Southcentral Alaska electrical distribution system (MPP Associates, 1985). Proponents of this project have not been active in recent months.

EXPECTED SCENARIO: It is conservatively assumed that only one new 100 MW coal-fired facility will be built, and that it will be operational by 1992.

UNFAVORABLE SCENARIO: Despite the planned developments and vast resources, it is assumed that no new coal-fired generation capacity will be developed in the Railbelt region.

3.0 RAILBELT NATURAL GAS DEMAND ANALYSIS

This section discusses the demand for natural gas in the Railbelt region with the results summarized at the beginning of this section. This section also presents the economic and demographic assumptions specific to the demand analysis. These assumptions coupled with the energy assumptions in Section 2.0 drive the Railbelt Energy Demand (ENDMOD) model. The components of gas demand are then discussed. This section ends with a description of the models used in the analysis.

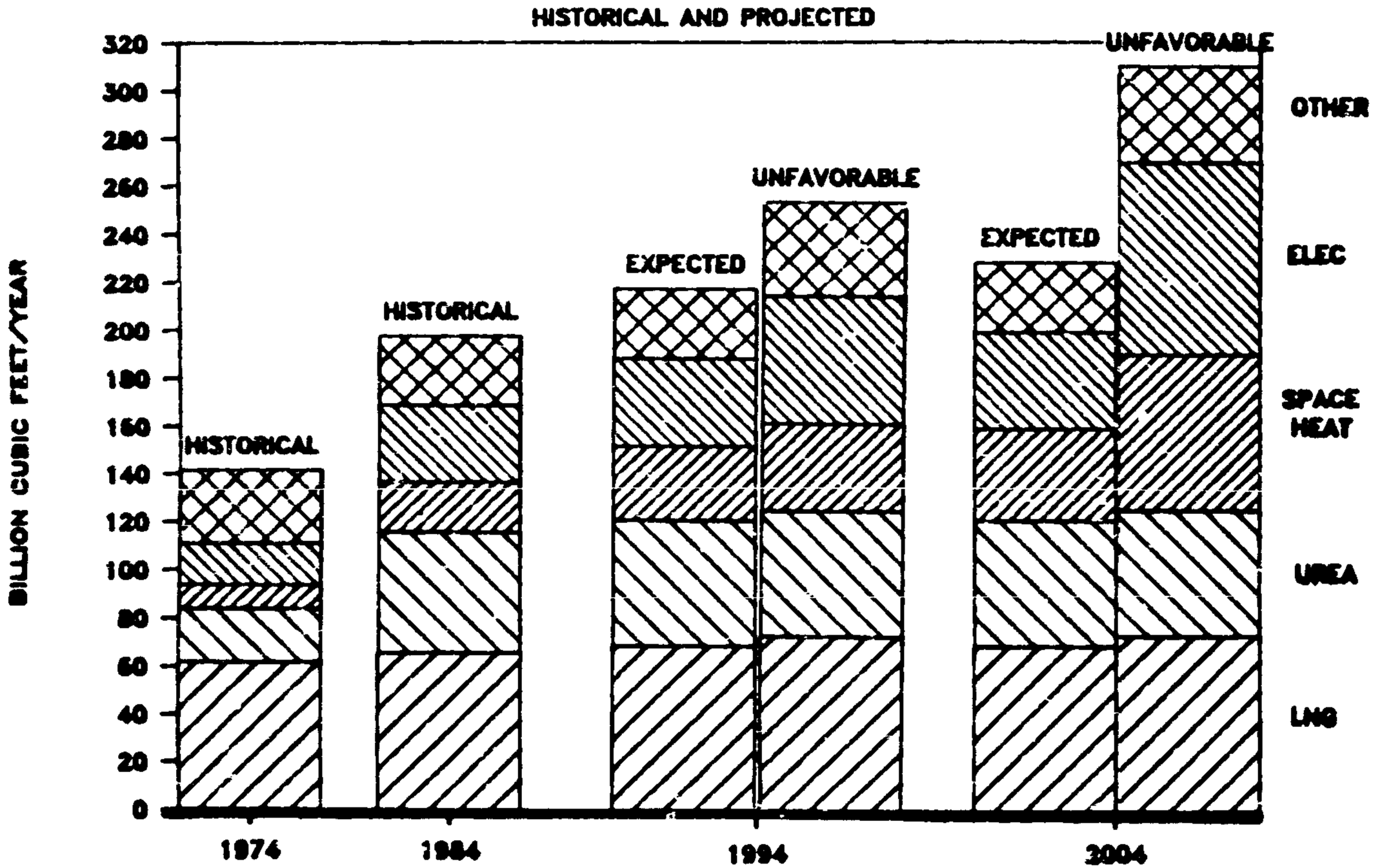
3.1 SUMMARY OF NATURAL GAS DEMAND

Figure 3-1 illustrates the historic and projected future demands for natural gas in the Railbelt area. Growth in demand for natural gas from Cook Inlet in the next decades will be largely a function of increased use of gas for domestic purposes in the Railbelt area. These domestic uses (space heating, electrical generation, military and petroleum manufacture) together account for only 35 percent of current demand. The remaining 65 percent is used for LNG and ammonia-urea manufacture, uses which are not slated to grow to any significant extent.

In the expected case, growth in domestic sales of gas will be modest and cumulative domestic consumption between 1989 and 2004 will be 1,244 bcf. If, as in the unfavorable case, economic growth is rapid and state government adopts a Railbelt energy policy which favors the use of natural gas throughout the Railbelt, domestic sales could cumulatively be as high as 1,922 bcf over the same period -- more than 50 percent higher. Because changes in the pattern of use of gas for the manufacture of LNG and ammonia-urea are unrelated to local economic conditions, that pattern should be the same under either scenario.

FIGURE 3-1

COOK INLET NATURAL GAS CONSUMPTION



3.1.1 Total Demand

3.1.1.1 Expected Scenario

Total use grows slowly, with annual consumption fluctuating in the range of approximately 210 to 220 bcf annually through 2000. Subsequently, use grows about 3 bcf annually for a growth rate of slightly more than 1 percent annually. As shown in Table 3-1, in 2004, consumption is 229 bcf, 22 bcf above estimated consumption in 1989. The pattern of growth is a function of the rate of growth of the economy of the Railbelt and the changing composition of electricity generation modes.

Gas use for electricity generation and space heating grows from 63 bcf in 1989 to 79 bcf in 2004. Cumulative gas use over the period from 1989 through 2004 will be 3,459 bcf. This consists of 1,072 bcf (31 percent) for LNG manufacture, 572 bcf (17 percent) for electricity generation, 838 bcf (24 percent) for ammonia-urea manufacture, 512 bcf (15 percent) for utility gas, 304 bcf (9 percent) for field operations (including venting and shrinking), 80 bcf (2 percent) for military use, and 80 bcf (2 percent) for petroleum manufacture. Projected gas use during 1987 and 1988 is 400 bcf. This brings the total draw on reserves from 1987 through 2004 to 3,859 bcf.

Electricity generation and space heat are the two main sources of consumption growth in this scenario. Use of gas for electricity generation fluctuates as new non-natural gas (coal and hydropower) generating capacity is added to the Railbelt system. In contrast, utility use of gas continues to grow with the economy and population. Total growth of gas use is relatively slow because electricity generation and utility gas form a relatively small portion of the total use of gas. In this scenario, these two uses still account for only 32 percent of total consumption after 15 years.

TABLE 3-1 TOTAL GAS DEMAND PROJECTIONS
EXPECTED SCENARIO
BILLION CUBIC FEET (BCF)

		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	TOTAL 1989-2004
DOMESTIC SALES		72.62	72.53	73.10	74.32	75.14	74.05	76.01	77.40	74.06	72.56	73.93	75.76	77.58	79.60	81.61	83.93	86.16	88.54	1244
ELECTRICITY GENERATION	[A]	36.30	36.42	36.92	37.68	38.18	36.75	35.68	36.50	32.72	30.86	31.67	32.75	33.82	35.01	36.20	37.58	38.90	40.31	572
UTILITY GAS	[B]	26.32	26.10	26.18	26.64	26.96	27.30	30.33	30.90	31.34	31.71	32.26	33.02	33.76	34.58	35.40	36.35	37.26	38.23	512
PETROLEUM MANUFACTURE	[C]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	80
MILITARY	[D]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	80
AMMONIA-UREA	[E]	40.00	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	838
FIELD OPERATIONS	[F]	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	304
ITEM- TOTAL NET OF LNG		131.62	143.93	144.50	145.72	146.54	145.45	147.41	148.80	145.46	143.96	145.33	147.16	148.98	151.00	153.01	155.33	157.56	159.94	2386
LNG MANUFACTURE	[G]	61.20	61.20	62.90	62.90	62.90	62.90	62.90	68.90	68.90	68.90	68.90	68.90	68.90	68.90	68.90	68.90	68.90	68.90	1072
TOTAL	[H]	192.82	205.13	207.40	208.62	209.44	208.35	210.31	217.70	214.26	212.86	214.23	216.06	217.88	219.90	221.91	224.23	226.46	228.84	3459

[A] TABLE 3-9
[B] TABLE 3-12
[C] CONSTANT AT CURRENT LEVEL
[D] CONSTANT AT CURRENT LEVEL
[E] THE 7 YEAR HISTORICAL AVERAGE BETWEEN 1979 AND 1985 HAS BEEN 52.4. 1987 IS PROJECTED TO BE 40 BY DNR
[F] CONSTANT AT CURRENT LEVEL
[G] BASED ON AGREEMENT REACHED BY PHILLIPS 66, MARATHON, TOKYO ELECTRIC AND TOKYO GAS
[H] [illegible] PRODUCTION NET OF A[illegible] REINJECTION IN TABLE 3-6

3.1.1.2 Unfavorable Case

As shown in Table 3-2, total use grows rapidly in this high consumption Unfavorable Case from an estimated level of 194 bcf in 1987 to approximately 254 bcf in 1994, and 310 bcf by 2004. Most of the growth is attributed to population growth and extension of the market for natural gas into the Fairbanks area. These factors result in rapid expansion of gas use for both electricity generation and space heating through the Railbelt. Military consumption also increases as a result of the availability of gas in the Fairbanks area. The small increase in industrial use of gas is primarily a result of unspecified demands associated with extension of the pipeline to Fairbanks.

By 2004 gas use for electricity generation and space heating will account for almost half of all consumption in contrast to less than one third currently. Cumulative gas use over the period from 1989 through 2004 will be 4,216 bcf. This consists of 1,136 bcf for LNG manufacture (27 percent), 936 bcf for electricity generation (22 percent), 838 bcf for ammonia-urea manufacture (20 percent), 705 bcf for utility gas (17 percent), 320 bcf (8 percent) for field operations (including venting and shrinkage), 180 bcf for military use (4 percent) and 101 bcf for petroleum manufacture (2 percent). Additional projected gas use during 1987 and 1988 is 401 bcf. This brings the total draw on reserves from 1987 through 2004 to 4,617 bcf.

3.2 ECONOMIC AND DEMOGRAPHIC ASSUMPTIONS

Since the time of statehood in 1959 the economic and demographic growth of the state of Alaska can be characterized as a series of cycles of rapid growth followed by consolidation. Between 1960 and 1988 annual average growth rates of important variables have been as follows: population, 3.1 percent; households, 4.2 percent; employment, 3.6 percent; and real personal income, 5.5 percent.

TABLE 3-2 TOTAL GAS DEMAND PROJECTIONS
UNFAVORABLE SCENARIO
BILLION CUBIC FEET (BCF)

		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	TOTAL 1989-2004
DOMESTIC SALES		72.62	73.59	75.63	78.68	81.52	94.87	103.67	108.33	112.62	116.60	122.22	128.13	135.03	140.74	147.26	153.07	158.87	164.30	1922
ELECTRICITY GENERATION	[A]	36.30	37.09	38.49	40.36	42.14	48.44	50.91	53.09	54.87	56.49	58.49	61.26	64.57	67.10	70.06	73.35	76.63	79.74	936
UTILITY GAS	[B]	26.32	26.50	27.14	28.29	29.39	31.44	33.77	36.25	38.76	41.10	43.74	46.87	50.47	53.64	57.20	59.72	62.23	64.63	705
PETROLEUM MANUFACTURE	[C]	5.00	5.00	5.00	5.00	5.00	6.00	6.00	6.00	6.00	6.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	101
MILITARY	[D]	5.00	5.00	5.00	5.00	5.00	9.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	160
AMMONIA-UREA	[E]	40.00	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	52.40	838
FIELD OPERATIONS	[F]	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	320
ITEM: TOTAL NET OF LNG		132.62	145.99	148.03	151.08	153.92	167.27	176.07	180.73	185.02	189.00	194.62	200.53	207.43	213.14	219.66	225.47	231.27	236.76	3080
LNG MANUFACTURE	[G]	61.20	61.20	66.60	66.60	66.60	66.60	66.60	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	1136
TOTAL	[H]	193.82	207.19	214.63	217.68	220.52	233.87	242.67	253.73	258.02	262.00	267.62	273.53	280.43	286.14	292.66	298.47	304.27	309.76	4216

[A] TABLE 3-9.
[B] TABLE 3-12.
[C] INITIALLY CONSTANT AT CURRENT LEVEL. SUBSEQUENTLY INCREASED TO FUEL THE FAIRBANKS GAS TRANSMISSION LINE.
[D] CONSTANT AT CURRENT LEVEL IN ANCHORAGE. TOTAL USE DOUBLES WHEN GAS LINE EXTENDED TO FAIRBANKS AND FURTHER EXPANDS TO ACCOMODATE NEW INFANTRY DIVISION.
[E] THE 7 YEAR HISTORICAL AVERAGE BETWEEN 1979 AND 1985 HAS BEEN 52.4. 1987 IS PROJECTED TO BE 40 BY DNR.
[F] THIS IS SLIGHTLY ABOVE THE HISTORICAL AVERAGE REFLECTING A CONSTANT RATE OF USE FOR EXISTING RESERVOIRS IN COOK INLET AND ALLOWANCE FOR SOME NEW OIL DEVELOPMENT. A SMALL AMOUNT OF GAS IS CONSUMED DURING REINJECTION. THIS COMPONENT OF CONSUMPTION IS DECLINING IN IMPORTANCE AS THE COOK INLET OIL FIELDS ARE DEPLETED.
[G] BASED ON CURRENT CONTRACT NEGOTIATIONS. AN ADDITIONAL 6 PERCENT WHICH BUYERS MAY DEMAND AT THEIR OPTION IS ALSO ASSUMED.
[H] THIS FIGURE IS COMPARABLE TO GROSS PRODUCTION NET OF ALL REINJECTION IN TABLE 3-6.

Most of the cycles in growth during this period are attributable to developments in the petroleum industry -- the discovery of oil in Cook Inlet, the discovery of oil at Prudhoe Bay, the first oil embargo in 1973, and the dramatic increase in the price of oil in 1979. Alaska has grown from a state with virtually no petroleum industry in 1959 to surpass Texas as the state with the largest annual production of oil in 1987. Although growth of the petroleum industry has been most spectacular in the past 25 years, the other basic industries in the state have also contributed to growth of the economy and population. These other industries include the military, federal civilian government, fish harvesting and processing, timber harvesting and limited processing (pulp mills), mining and the tourist industry.

The rate of growth Alaska has experienced in the past, however, can only be explained by looking beyond basic industry growth to the support sectors of the economy -- the service sector, infrastructure, and state-local government. All of these sectors of the economy have experienced much more rapid rates of growth than the basic sector of the economy, primarily because at the time of statehood these sectors of the economy were quite primitive.

At the time of statehood, federal government employment completely dominated the Alaska economy and accounted for half of the jobs. Of these government jobs, two-thirds were military. The transient nature of this employment, coupled with the seasonal nature of the other basic industries -- fishing, timber, mining -- resulted in an economy with little activity not directly related to the military, the administration of federal programs, or the extraction and primary processing of natural resources. Total employment in 1961 was 94,000. Nearly two-thirds of this employment was in basic sector activities; support sector jobs (service, infrastructure, and state-local government) accounted for about one-third.

Today the situation is reversed. About one job in four is in the basic industries, and the other three are in the service, infrastructure, and state-local government sectors. Employment in the basic sector has increased

about 2.5 percent. The service and state-local government sectors are six times as large as they were at statehood, and employment in the infrastructure sector has grown fourfold. Clearly most of the growth in the economy has occurred in these nonbasic sectors.

Several factors account for this pattern of growth. First the nonbasic sectors were quite primitive at the time of statehood. Not only have very large infrastructure investments been required to bring standards in line with the rest of the U.S., but also many service industries simply did not exist when Alaska became a state. Second, the very large value-added contribution to the economy from the growth in the petroleum industry has provided a significant source of growth. In particular most of state and local government is financed by revenues from petroleum. Third, the size of the market both in terms of total income and per capita income has contributed to support and infrastructure expansion. Finally, although the regional business cycle is still an important factor in the Alaska economy, the economic diversification has contributed to stability which in turn has stimulated the growth of services and infrastructure.

Historical economic and demographic growth has tended to concentrate in the Railbelt region of the state, particularly in the Greater Anchorage area including the Matanuska-Susitna Borough (Table 3-3). The share of state population in the Southern Railbelt (Anchorage, Matanuska-Susitna Borough and Kenai Peninsula Borough) has increased from 43 percent in 1960 to 61 percent today while the share of employment has grown from 47 percent in 1970 to 56 percent today. In particular, support and infrastructure employment growth has concentrated in the major urban areas of the state. In contrast, state and local government employment and basic sector growth have been more evenly distributed throughout the state with the exception of petroleum industry employment growth, half of which has taken place at regional headquarters in Anchorage.

TABLE 3-3: HISTORICAL RAILBELT ECONOMIC AND DEMOGRAPHIC DATA
(THOUSANDS)

	YEAR	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	
ANCHORAGE																
Population		162.50	177.82	179.84	182.92	180.25	174.59	174.43	187.76	204.22	230.85	244.33	248.26	248.05	224.8	
Employment	[A]	58.813	69.668	73.021	76.995	76.893	77.582	78.174	86.16	98.08	102.70	108.38	110.88	105.60	98.0	[C]
MATSU																
Population		9.787	12.462	14.606	15.573	15.400	18.536	17.816	22.329	27.649	30.568	34.122	41.093	44.280	NA	
Employment		1.784	2.028	2.269	2.524	2.954	3.078	3.264	3.700	4.382	5.354	6.542	6.996	6.699	NA	
KENAI																
Population		16.645	18.770	21.643	24.611	25.335	25.507	25.282	26.520	32.303	35.769	38.919	39.180	43.612	NA	
Employment		5.422	6.738	7.602	8.407	7.782	8.138	8.397	9.115	9.853	10.399	11.402	12.213	11.435	NA	
FAIRBANKS	[B]															
Population		57.300	62.100	67.000	67.700	63.900	63.500	59.659	65.033	69.001	73.917	76.576	79.370	NA	NA	
Employment		19.750	30.522	30.685	25.683	22.487	22.242	22.016	23.993	26.026	27.303	29.016	30.255	28.855	NA	

SOURCE: ISER DATABASE.
[A] WAGE AND SALARY EMPLOYMENT.
[B] INCLUDES THE SOUTHEAST FAIRBANKS CENSUS AREA AS WELL AS THE FAIRBANKS NORTH STAR BOROUGH.
[C] AUTHOR'S ESTIMATE.

Another important characteristic of the Railbelt in contrast with much of the rest of the state is that the level of population is largely determined by the health of the economy. A large proportion of the population is employed and changes in employment opportunities lead to commensurate changes in population. Elsewhere in the state, population change is not as sensitive to changing employment opportunities.

These factors help to explain the fact that although the economies of all regions have suffered as a result of the economic recession which began in late 1985, employment and population in the Railbelt are anticipated to decline by a larger percentage than the state and most other regions. The recession has largely affected jobs in the service and infrastructure sectors, and significant outmigration from the Railbelt has occurred in response to declining job opportunities, particularly in 1987.

3.2.1 Economic and Demographic Assumptions - Expected Case

In this case we assume developments consistent with the most likely pattern of growth of the Alaska population and economy (Table 3-4). First we assume that the real world oil price fluctuates around the current level of $18 until 1995 after which time it begins to rise at a rate of 1 percent annually in real terms (based on the Alaska Department of Revenue September 1987 Petroleum Revenue Projections, "Most Likely Case"). Petroleum industry exploration and development activity expands over time; however, this expansion is slow and cautious because of the softness of the world oil market as reflected in the price. Growth is stronger after the mid-1990s when the price begins to show a positive trend. Despite the price improvement, however, declines in state-owned production (where royalties are paid with oil production) lead to state petroleum revenues trending downward in real terms. (All detailed assumptions are provided in Appendix A.) The deterioration of the major source of state revenues results in the reimposition of the income tax, the elimination of the Permanent Fund Dividend, and the use of portions of the Permanent Fund earnings to fund the state operating budget in the

TABLE 3-4: RAILBELT ECONOMIC AND DEMOGRAPHIC PROJECTIONS

EXPECTED SCENARIO
(thousands)

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
POPULATION																		
Railbelt	377.8	373.4	375.1	377.6	378.0	380.6	384.5	387.2	388.3	388.8	391.3	395.7	400.0	405.0	409.9	416.1	421.6	427.7
Anchorage	224.8	220.5	218.9	220.1	220.5	221.2	223.6	225.4	226.2	226.5	227.9	230.7	233.3	236.3	239.3	242.9	246.2	249.7
Matsu	35.1	34.3	34.2	34.7	35.0	35.5	36.5	37.1	37.4	37.5	38.1	38.9	39.7	40.6	41.5	42.6	43.7	44.9
Kenai	39.2	39.0	38.7	39.7	39.7	39.2	39.4	39.6	39.7	39.8	40.1	40.5	40.9	41.5	41.9	42.4	42.9	43.4
Fairbanks	78.7	79.7	83.2	83.1	82.8	84.7	85.0	85.1	85.0	84.9	85.2	85.6	86.0	86.6	87.2	88.2	88.9	89.8
HOUSEHOLDS																		
Railbelt	134.4	133.2	134.1	135.6	136.2	137.7	139.5	141.0	141.8	142.4	143.7	145.7	147.6	149.7	151.8	154.4	156.7	159.1
Anchorage	81.2	79.9	79.5	80.2	80.7	81.2	82.4	83.3	83.9	84.3	85.0	86.3	87.4	88.8	90.0	91.5	92.9	94.4
Matsu	11.7	11.5	11.5	11.7	11.9	12.1	12.5	12.7	12.9	12.9	13.2	13.5	13.8	14.1	14.5	14.9	15.3	15.7
Kenai	13.8	13.7	13.7	14.1	14.1	14.0	14.1	14.2	14.3	14.4	14.5	14.7	14.9	15.1	15.3	15.5	15.7	15.9
Fairbanks	27.6	28.1	29.4	29.5	29.5	30.4	30.6	30.7	30.7	30.8	31.0	31.2	31.5	31.7	32.0	32.4	32.8	33.1
EMPLOYMENT																		
Railbelt	173.5	175.5	177.4	180.9	181.8	183.7	185.5	187.2	186.7	187.0	188.4	191.4	194.1	196.6	198.3	202.3	204.4	207.3
Anchorage	121.7	118.7	118.6	120.8	121.5	122.3	123.7	124.9	124.6	124.9	125.9	128.1	129.0	131.7	132.9	135.7	137.1	139.1
Matsu	6.7	6.6	6.6	6.8	6.9	7.1	7.4	7.6	7.6	7.6	7.8	8.1	8.3	8.5	8.8	9.1	9.4	9.7
Kenai	13.0	12.8	12.8	13.3	13.4	13.2	13.3	13.4	13.4	13.4	13.5	13.7	13.9	14.1	14.2	14.4	14.6	14.8
Fairbanks	37.1	37.4	39.5	39.9	39.9	41.1	41.2	41.3	41.0	41.0	41.2	41.6	42.0	42.3	42.5	43.1	43.4	43.8

SOURCE: ISER MAP MODEL, PROJECTION CASE LNGBR.

mid-1990s. In spite of these measures, state-local government employment contracts over time.

Growth is assumed to occur in the other basic industries of the state and this contributes to economic and population expansion. A number of new hardrock mines are assumed to be developed including the Red Dog Mine, the Greens Creek Mine, and the U.S. Borax Mine. Other sources of mining expansion include increased coal production for export and unspecified activity increasing at 1 percent annually. The fishing industry expands with growth of the domestic bottom fishing industry. Federal government civilian employment increases at a rate of 0.5 percent annually, consistent with the historical trend. Tourism growth also occurs at a rate consistent with the historical trend. Military expansion in the Fairbanks area occurs in the near term with the deployment of a new light infantry division, but henceforth employment once again begins to decline at an annual rate of 1 percent a year, consistent with the historical trend. Timber industry employment expands in the near term but growth is constrained by the productivity of the resource. Agriculture activity is constant at the current level, consistent with a reduction of state support and very little market penetration.

Over the period from 1988 to 2004 growth of statewide employment is projected to occur at the rate of 1 percent annually while population growth is 0.7 percent annually. These rates compare with 3.6 percent and 3.1 percent respectively for the historical period between 1960 and 1988. For the Railbelt, employment growth is expected to average 1 percent annually over this period while population growth is 0.8 percent annually. (Values for all important variables are documented in Appendix B.)

Although these growth rates are about one-third the historical growth rates, they are consistent with a likely growth scenario for the economy and population because of both the necessity to contract the state-local sector, and the maturation of the support and infrastructure sectors of the economy. Economic growth will be retarded by the contraction of state-local government

which currently accounts for 20 percent of statewide employment. Growth of the service and infrastructure sectors of the economy will be modest compared to historical rates because much of the growth in these sectors in the past was not in response to particular basic industry developments but rather was the manifestation of the process of maturation of the economy, a one-time phenomenon. The total growth generated by basic sector expansion will be modest because most manufactured inputs to the production process in the state are imports. Thus basic sector growth projected using the historical trends will result in slower overall economic growth in the future.

3.2.2 Economic and Demographic Assumptions - Unfavorable Case

In the Unfavorable Case, we assume developments which will contribute to the most likely rapid rates of employment and population growth for the Railbelt (Table 3-5). We assume first that the world price of oil increases from its current benchmark of $18 to $19.50 in the first half of 1988 and henceforth increases at an annual rate of 3.5 percent in real terms (based on the Alaska Department of Revenue September 1987 Petroleum Revenue Projections, 80th percentile case). This results both in a growing petroleum sector in the economy and a level of state petroleum revenues close to the current level into the early years of the next century. (All assumptions are detailed in Appendix A.) This eliminates the need to reimpose the personal income tax which, combined with the continuation of the Permanent Fund Dividend, serves to keep per capita personal income high.

Nonpetroleum basic sector economic activity is assumed to exceed the expected case in the following other respects. We assume the construction of a gas pipeline from Prudhoe Bay to Valdez in the early 1990s, development of a sizeable coal-for-export facility during the same period, and a three percent annual growth rate in unspecified mining activity. We assume that the historical downward trend in military employment ceases and employment in future years is equal to the current level plus the anticipated buildup in Fairbanks. In addition, we assume that the rate of growth of civilian federal

TABLE 3-5: RAILBELT ECONOMIC AND DEMOGRAPHIC PROJECTIONS

UNFAVORABLE SCENARIO
(thousands)

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
POPULATION																		
Railbelt	377.8	375.5	381.0	388.9	395.2	402.5	412.2	422.3	427.9	432.6	439.4	449.5	463.1	471.2	481.5	493.2	504.2	513.6
Anchorage	224.8	221.7	222.6	227.1	231.4	235.4	240.4	244.5	249.8	252.5	256.5	263.4	271.7	276.2	281.9	288.9	295.6	300.9
Matsu	35.1	34.5	34.9	36.0	37.0	38.0	38.9	39.9	41.1	42.3	43.4	44.8	46.6	48.1	49.8	51.7	53.5	55.0
Kenai	39.2	39.1	39.0	40.4	40.8	40.5	40.7	42.0	43.1	43.9	44.6	46.6	48.3	48.4	49.3	50.3	51.2	52.0
Fairbanks	78.7	80.2	84.4	85.4	86.1	88.6	92.2	95.9	94.1	94.0	94.9	94.8	96.5	98.5	100.5	102.4	104.0	105.8
HOUSEHOLDS																		
Railbelt	134.4	134.0	136.2	139.6	142.3	145.4	149.3	153.3	155.8	158.1	161.0	165.1	170.4	173.7	177.8	182.4	186.8	190.6
Anchorage	81.2	80.3	80.8	82.8	84.6	86.4	88.4	90.2	92.3	93.7	95.4	98.2	101.5	103.4	105.7	108.5	111.2	113.4
Matsu	11.7	11.6	11.8	12.2	12.5	12.9	13.2	13.6	14.1	14.5	15.0	15.5	16.1	16.7	17.3	18.0	18.6	19.2
Kenai	13.8	13.8	13.8	14.3	14.5	14.4	14.5	15.0	15.5	15.8	16.1	16.9	17.5	17.6	17.9	18.3	18.7	19.0
Fairbanks	27.6	28.3	29.9	30.3	30.7	31.7	33.1	34.3	33.9	34.1	34.5	34.5	35.2	36.1	36.9	37.6	38.3	39.1
EMPLOYMENT																		
Railbelt	178.5	177.2	183.3	190.0	194.4	197.6	204.2	211.7	212.5	211.1	215.3	221.8	227.2	231.1	237.2	243.1	247.4	251.4
Anchorage	121.7	119.9	122.7	127.2	130.6	132.6	136.6	140.9	142.5	141.5	144.3	149.3	153.4	155.8	159.8	163.9	166.9	169.5
Matsu	6.7	6.6	6.8	7.2	7.5	7.7	8.0	8.4	8.6	8.8	9.1	9.5	9.8	10.3	10.8	11.3	11.7	12.1
Kenai	13.0	12.9	13.1	13.8	14.0	13.9	14.0	14.7	14.9	14.9	15.3	16.0	16.5	16.6	17.0	17.3	17.6	17.8
Fairbanks	37.1	37.8	40.7	41.7	42.3	43.5	45.5	47.8	46.6	45.9	46.6	47.0	47.4	48.4	49.7	50.7	51.2	52.0

SOURCE: ISER MAP MODEL, PROJECTION CASE LMGHP.

employment increases to one percent annually, a doubling of the historical rate.

Over the 16 year period from 1988 to 2004, growth of statewide employment in this case is projected to occur at the rate of 2.1 percent annually while population growth is 1.8 percent annually. These rates compare with 3.6 and 3.1 percent, respectively, for the historical period between 1960 and 1988. For the Railbelt, employment growth is projected to average 2.3 percent annually over this period while population growth is 2 percent annually. (Values for all important variables are documented in Appendix B.)

Although these growth rates are less than historical rates, they are consistent with a high growth scenario because a majority of the economic growth from the time of statehood to the present has been in the service, infrastructure, and state-local government sectors which are projected to grow at a slower rate in the future than in the past. Because a significant part of the growth of the service and infrastructure sectors in the past served to transform the Railbelt economy from one dominated by the federal government to one with a full range of infrastructure and services, this growth cannot be expected to continue. The rapid growth of the state-local government sector in the past has been largely the result of the availability of petroleum revenues which are not expected to increase in real terms in the future (price increases are offset by the decrease in the royalty revenues due to the depletion of the major fields at Prudhoe Bay and elsewhere on the North Slope).

3.3 NATURAL GAS DEMAND

Since the commencement of production from Cook Inlet in 1960, natural gas use has grown to average about 200 bcf annually in seven uses (Table 3-6) sold and rented.

TABLE 3-6.
HISTORICAL DISPOSITION OF COOK INLET NATURAL GAS PRODUCTION
(Billion Cubic Feet/Year)

		1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	EST. 1987
GROSS PRODUCTION	(A)	228.44	252.55	265.25	279.96	293.80	305.08	299.94	295.05	309.12	306.34	306.96	306.94	285.19	274.81
DIRECT REINJECTION	(B)	NA	83.01	97.08	103.11	103.5[illegible]	112.87	115.44	100.41	102.25	94.39	93.69	89.03	92.14	81.08
NET PRODUCTION	(C)	NA	169.55	168.18	176.85	190.25	192.21	184.51	198.64	206.87	211.96	213.27	217.91	193.05	193.73
FIELD OPERATIONS	(D)	23.89	28.83	24.47	24.40	23.52	20.12	20.09	20.56	20.96	19.34	20.51	18.64	18.41	17.86
Vented and Flared	(E)	7.05	9.50	5.42	4.85	3.87	2.71	3.045	3.18	3.49	2.56	3.26	2.89	3.10	2.58
Used on Lease	(F)	14.31	16.22	15.82	16.40	16.23	14.56	14.698	14.95	14.86	14.06	14.60	13.97	13.85	14.14
Shrinkage	(G)	2.53	3.12	3.22	3.15	3.43	2.85	2.438	2.43	2.60	2.73	2.66	1.77	1.47	1.14
SOLD & RENTED	(H)	117.74	140.72	143.71	152.46	166.72	174.67	162.20	178.08	185.91	192.54	184.29	199.31	174.75	NA
Reinjection (rent)	(I)	NA	12.18	14.00	12.02	10.52	6.96	NA	NA	NA	NA	NA	15.32	7.60	6.00
Petroleum Production	(J)	1.16	2.37	1.78	3.53	3.20	4.76	NA	NA	NA	NA	NA	2.86	2.07	NA
Electric Utilities	(K)	17.11	19.62	22.19	23.59	24.59	28.16	28.76	29.07	30.99	31.57	32.18	36.32	39.68	35.87
Military	(L)	5.68	5.84	5.42	5.10	5.13	4.99	4.76	4.56	4.83	4.60	4.34	4.53	4.53	4.62
Gas Utilities	(M)	9.82	12.04	12.55	12.68	13.45	14.05	15.52	15.78	19.03	19.11	20.90	24.42	23.24	24.91
Ammonia-Urea	(N)	22.10	23.89	24.26	28.62	48.88	51.66	54.70	53.84	55.22	50.34	50.08	50.69	35.73	40.35
LNG Manufacture	(O)	61.87	64.78	63.51	66.91	60.87	64.11	54.84	68.82	64.44	67.73	65.88	65.18	61.91	NA
OTHER	(P)	0.00	0.00	0.00	0.02	2.43	3.98	2.213	0.00	0.00	0.04	0.00	0.00	0.00	0.00
ITEM: ALL REINJECTION	(Q)	86.81	95.18	111.08	115.13	114.07	119.83	NA	NA	NA	NA	NA	104.34	99.74	87.08
GROSS PRODUCTION NET OF ALL REINJECTION		141.63	157.37	154.17	164.83	179.73	185.25	NA	NA	NA	NA	NA	202.60	185.45	187.73
SALES NET OF ALL REINJECTION	(R)	117.74	128.54	129.71	140.43	156.20	167.71	158.58	172.07	174.50	173.35	173.39	184.00	167.15	NA
ITEM: DOMESTIC SALES	(S)	33.77	39.88	41.94	44.50	46.45	51.94	49.04	49.41	54.84	55.28	57.42	68.13	69.51	NA

NA = NOT AVAILABLE -- INFORMATION NOT COMPILED OR READILY AVAILABLE
(A) 60-74 SRI, 75-79 O&G 1/81, 80+ O&G 1/87 AND PERSONAL COMMUNICATION WITH DNR
(B) 75+ O&G 1/87 AND PERSONAL COMMUNICATION WITH DNR
(C) GROSS PRODUCTION MINUS DIRECT REINJECTION
(D) SUM OF E F G.
(E) 60-74 SRI,75-85 O&G 1/87, 86+ PERSONAL COMMUNICATION WITH DNR
(F) 60-74 SRI,75-85 O&G 1/87, 86+ PERSONAL COMMUNICATION WITH DNR
(G) 60-74 SRI,75-85 O&G 1/87, 86+ PERSONAL COMMUNICATION WITH DNR
(H) 60-79 SUM OF I J K L M N O,80+ STATE OF ALASKA REPORT OF GAS DISPOSITION
(I) 75-79 TOTAL MINUS DIRECT, 85 86 KENAI GAS FIELD ROYALTY REPORTS, 87 AUTHORS'S ESTIMATE.
(J) 60-69 SRI, 70-79 O&G 1/81,85+ RESIDUAL OF SALES.
(K) 60-74 SRI, 75-85 O&G 1/87, 86+ PERSONAL COMMUNICATION WITH DNR (RICHRDS AMOUNT REPORTED BY THE UTILITIES IN RECENT YEARS)
(L) 60-74 SRI, 75-85 O&G 1/87, 86+ PERSONAL COMMUNICATION WITH DNR
(M) 60-69 SRI, 70-85 O&G 1/87, 86+ PERSONAL COMMUNICATION WITH DNR
(N) 60-74 SRI, 75-85 O&G 1/87, 86+ PERSONAL COMMUNICATION WITH DNR
(O) 60-74 SRI, 75-85 O&G 1/87, 86+ PERSONAL COMMUNICATION WITH DNR
(P) 70-79 O&G 1/87, 80+ STATE OF ALASKA REPORT OF GAS DISPOSITION
(Q) 60-74 SRI, 75-79 O\G 1/81, 80+ SUM OF DIRECT REINJECTION AND RENTED REINJECTION-- CONSISTS OF DIRECT INJECTION AT SWANSON RIVER AND RENTED GAS FROM KENAI AND BEAVER CREEK GAS FIELDS WHICH APPEARS IN SALES FIGURES

3.3.1 Electricity Generation

3.3.1.1 Historical Patterns

Nearly 80 percent of the electricity generated by the electric utilities in the Railbelt is supplied by natural gas produced in Cook Inlet (Table 3-7). Other sources of generation are two hydroelectric facilities in the Southern Railbelt, two coal-fired plants in the Fairbanks area, and gas turbines burning fuel oil, also in the Fairbanks area. Until late 1986 natural gas generation supplied most of the needs of only the Southern Railbelt, but with the completion of the Railbelt electrical intertie the Fairbanks area can now receive natural gas-produced electricity by wholesale purchase from the Anchorage utilities. As a result, growth in the use of gas for electricity generation, which in the past was a function of growth of the Southern Railbelt market, may in the future be affected by increases in electricity consumption anywhere in the Railbelt.

Natural gas has dominated electrical generation because of its relatively inexpensive price, the relatively low capital cost of capacity additions, and the short time necessary to bring new units on line. These factors should continue to influence the generation mode and make natural gas an attractive method of producing electricity compared to coal, hydropower or fuel oil.

Historically the consumption of electricity in the Railbelt has grown very rapidly primarily because of rapid economic growth as well as increased market penetration and appliance saturation. Growth in population, reduction of average household size, and, particularly in the time shortly after statehood, extension of distribution facilities to the entire Railbelt have contributed to rapid growth in the number of customers. Growth in consumption per customer has been a function of strong growth in real per capita income, the relatively low price of electricity (compared to Lower 48 prices), and the maturation of the commercial sector of the economy. Electricity use for space heating has been significant in the past in the Fairbanks area and

TABLE 3-7.
HISTORICAL RAILBELT UTILITY AND MILITARY ELECTRICITY GENERATION AND CONSUMPTION
(Thousand Megawatt Hours/Year)

YEAR	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
NET GENERATION [A]														
Anchorage							2542	2609	2924	3018	3233	3457	3433	
CEA				1004	1932	2045	2112	2181	2445	2525	2692	2943	2874	
ANLMP				1180	1399	1401	1434	1473	1718	1782	1873	1859	1780	
APA-Eklutna				420	443	473	494	485	579	593	654	934	939	
Matsu(MEA)				204	180	171	184	223	148	150	165	150	155	
Kenai							0	0	0	0	0	0	0	
MEA							1	2	0	0	0	5	39	
SES							0	0	0	0	0	0	39	
Fairbanks							1	2	0	0	0	5	0	
GVEA							429	426	479	493	541	509	520	
FNUS							317	270	316	346	401	408	420	
							112	156	163	147	140	101	100	
GENERATION BY MODE [A]							2542	2600	2925	3019	3234	3457	3433	
Gas							1858	1900	2253	2363	2494	2746	2719	
ANLP							494	485	579	593	654	934	939	
CEA and HOMER							1364	1415	1674	1770	1840	1812	1780	
Hydro							254	201	192	162	196	197	194	
Eklutna							184	223	148	150	165	150	155	
Cooper Lake							70	58	44	12	33	47	39	
Coal							296	354	360	335	320	296	272	
Healy							184	198	196	188	185	196	173	
Fairbanks							112	156	164	147	135	100	99	
Fuel Oil							134	73	120	159	222	218	248	
Fairbanks							133	71	120	159	222	213	248	
Seward							1	2	0	0	0	5	0	
GENERATION MODE(%)							100	100	100	100	100	100	100	
Gas							73.092	72.852	77.025	78.270	77.118	79.433	79.201	
Hydro							9.9921	10.774	6.5641	5.3660	6.1224	5.6985	5.6510	
Coal							11.644	13.573	12.307	11.096	9.8948	8.5523	7.9230	
Fuel Oil							5.2714	2.7990	4.1025	5.2666	6.8645	6.3060	7.2240	
GAS CONSUMED (BCF/Year) [A]				23.534	24.557	27.952	28.763	29.071	30.113	31.547	31.571	34.194	34.243	
HEAT RATE (BTU/KWH) [B]	NA	NA	NA	NA	NA	NA	15,558	15,377	13,433	13,417	12,722	12,515	12,657	
MILITARY GENERATION [A]														
Anchorage					165	156	156	154	161	169	153	136	146	
Fairbanks					218	207	207	208	212	238	226	142	143	
MILITARY GENERATION MODE[A]														
Natural Gas							133	132	132	150	134	127	146	
Coal							181	181	181	213	202	139	129	
Fuel Oil							49	48	45	44	43	13	14	

[A] ALASKA POWER AUTHORITY, ANNUAL REPORT.
[B] CALCULATED BY AUTHORS.

Matanuska-Susitna Borough, but is less so at present. This is due to the relatively high cost of space heating by fuel oil fired electricity in Fairbanks and to the recent introduction of utility supplied natural gas as an alternative fuel for residential and commercial use in the Matanuska Valley.

3.3.1.2 Electricity Generation - Expected Case

In this likely demand case gas demand for electricity generation fluctuates around the current level of 36 bcf/year within a range of 31 to 40 bcf annually (Table 3-8). The pattern of use is a function both of changes in total electricity consumption over time and a changing mix in the fuels used in the generation of electricity.

3.3.1.3 Electricity Generation - Unfavorable Case

In the unfavorable case, projected gas demand for electricity generation increases rapidly from the current level of 36 bcf/year, surpassing 50 bcf by 1993 and 61 bcf by 1998, and reaching 80 bcf by 2004 (Table 3-9). This is the result of a rapid rate of growth in electricity consumption per capita combined with a significant shift toward generation by natural gas for the entire Railbelt.

3.3.2 Utility Gas

3.3.2.1 Historical Patterns

Gas distributed by utilities for space heating, water heating, cooking, and other miscellaneous purposes is the second largest current domestic use of Cook Inlet gas (Table 3-10). Like the gas used for electricity generation, the ultimate end users of most of this gas are residences and small commercial customers because there is very little manufacturing in the Southern Railbelt with the exception of petroleum products and fish processing.

TABLE 3-8: GAS DEMAND FOR ELECTRICITY GENERATION
EXPECTED SCENARIO

		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	TOTAL 1989-2004
POPULATION (000)		378	373	375	378	378	381	384	387	388	389	391	396	400	405	410	416	422	428	6327
Southern Railbelt		299	294	292	294	295	296	300	302	303	304	306	310	314	318	323	328	333	338	4956
Northern Railbelt		79	80	83	83	83	85	85	85	85	85	85	86	86	87	87	88	89	90	1371
ELECTRICITY SALES (MWHx1000)	[A]	3090	3080	3115	3169	3205	3256	3324	3382	3427	3466	3524	3601	3678	3763	3848	3947	4041	4142	56888
Southern Railbelt		2622	2602	2610	2660	2693	2727	2788	2840	2880	2914	2965	3034	3102	3177	3252	3338	3421	3510	47911
Northern Railbelt		468	478	505	509	512	529	536	543	547	552	559	567	576	586	596	608	620	632	8977
GENERATION (INCLUDING LOSSES)	[B]	3433	3422	3461	3522	3562	3618	3693	3758	3808	3851	3916	4001	4097	4181	4275	4385	4490	4602	63209
Hydro																				
Existing	[C]	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	3376
New	[D]	0	0	0	0	0	170	330	330	330	330	330	330	330	330	330	330	330	330	4130
Coal																				
Existing	[E]	319	319	319	319	319	319	319	319	319	160	160	160	160	160	160	160	160	160	3673
New	[F]	0	0	0	0	0	0	0	0	350	700	700	700	700	700	700	700	700	700	6650
Fuel Oil	[G]	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas	[H]	2882	2892	2931	2992	3032	2918	2833	2898	2598	2450	2515	2600	2686	2780	2874	2984	3089	3201	45380
Southern Railbelt		2882	2892	2931	2992	3032	2918	2833	2898	2598	2450	2515	2600	2686	2780	2874	2984	3089	3201	45380
Northern Railbelt		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GAS USE FOR ELECTRICITY (BCF)	[I]	36.30	36.42	36.92	37.68	38.18	36.75	35.68	36.50	32.72	30.86	31.67	32.75	33.82	35.01	36.20	37.58	38.90	40.21	572

ELECTRICAL INTERTIE UPGRADE IS COMPLETED IN 1992.

[A] 1% ANNUAL GROWTH PER CAPITA. INITIAL VALUES ARE ACTUAL 1986 GENERATION NET OF LOSSES.

[B] LOSSES ASSUMED AT 10% OF NET GENERATION.

[C] AVERAGE OF HISTORICAL VALUES FROM 1980-1986.

[D] BRADLEY LAKE CONSTRUCTION COMPLETED IN 1992.

[E] AVERAGE OF HISTORICAL VALUES FROM 1980-1986. FAIRBANKS COAL PLANT CLOSED WHEN NEW COAL CAPACITY COMES ON LINE.

[F] 100 MW OF NEW COAL GENERATION IS AVAILABLE IN THE RAILBELT IN 1995.

[G] FUEL OIL IS THE MARGINAL FUEL IN FAIRBANKS. WHEN INTERTIE EXPANDED FUEL OIL GENERATION IS NO LONGER REQUIRED.

[H] GENERATION NOT SUPPLIED BY HYDRO OR COAL IS PROVIDED BY GAS.

[I] HEAT RATE IN THE SOUTHERN RAILBELT IS CONSTANT AT CURRENT RATE.

TABLE 3-9: GAS DEMAND FOR ELECTRICITY GENERATION
UNFAVORABLE SCENARIO

		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	TOTAL 1989-2004
POPULATION (000)		378	376	381	389	395	402	412	422	428	433	439	450	463	471	482	493	504	514	7079
Southern Railbelt		299	295	297	304	309	314	320	326	334	339	344	355	367	373	381	391	400	408	5561
Northern Railbelt		79	80	84	85	86	89	92	96	94	94	95	95	96	98	101	102	104	106	1518
ELECTRICITY SALES (MWHx1000)	[A]	3090	3128	3228	3363	3488	3620	3777	3943	4085	4216	4369	4568	4804	4985	5196	5432	5666	5888	70629
Southern Railbelt		2622	2641	2705	2824	2934	3039	3160	3288	3430	3549	3682	3867	4077	4228	4408	4613	4818	5008	59630
Northern Railbelt		468	486	522	539	554	581	617	655	655	668	688	700	727	757	788	819	849	880	11000
GENERATION (INCLUDING LOSSES)	[B]	3433	3475	3586	3737	3876	4023	4197	4381	4539	4685	4855	5075	5338	5539	5774	6035	6296	6542	78477
Hydro																				
Existing	[C]	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	3376
New	[D]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal																				
Existing	[E]	319	319	319	319	319	160	0	0	0	0	0	0	0	0	0	0	0	0	1117
New	[F]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Oil	[G]	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas	[H]	2882	2945	3056	3207	3346	3812	3986	4170	4328	4474	4644	4864	5127	5328	5563	5824	6085	6331	74144
Southern Railbelt		2882	2945	3056	3207	3346	3625	3600	3742	3900	4032	4180	4386	4619	4787	4987	5214	5442	5653	67776
Northern Railbelt		0	0	0	0	0	186	386	428	428	442	464	478	508	541	576	610	643	678	6368
GAS USE FOR ELECTRICITY (BCF)	[I]	36.30	37.09	38.49	40.38	42.14	48.44	50.91	53.09	54.87	56.49	58.49	61.26	64.57	67.10	70.06	73.35	76.63	79.74	936

GAS TRANSMISSION LINE TO FAIRBANKS COMPLETED IN 1992.

[A] 2% ANNUAL GROWTH PER CAPITA. INITIAL VALUES ARE ACTUAL 1986 GENERATION NET OF LOSSES.

[B] LOSSES ASSUMED AT 10% OF NET GENERATION.

[C] AVERAGE OF HISTORICAL VALUES FROM 1980-1986.

[D] BRADLEY LAKE HYDROELECTRIC FACILITY IS NOT CONSTRUCTED.

[E] AVERAGE OF HISTORICAL VALUES:1980-1986. UPON COMPLETION OF GAS TRANSMISSION LINE TO FAIRBANKS COAL GENERATION CEASES.

[F] NO NEW COAL GENERATION.

[G] FUEL OIL IS THE MARGINAL FUEL IN FAIRBANKS. IT FILLS DEMAND NOT MET BY COAL OR GAS.

[H] GENERATION NOT SUPPLIED BY HYDRO, COAL, OR FUEL OIL IS PROVIDED BY GAS. GAS GENERATION GOES TO FAIRBANKS OVER THE 70 MW INTERTIE.

[I] HEAT RATE IN THE SOUTHERN RAILBELT IS CONSTANT AT CURRENT RATE.
HEAT RATE IN THE NORTHERN RAILBELT IS INITIALLY 15000 BTU/KWH, FALLING TO EQUALITY WITH ANCHORAGE IN 1997.

TABLE 3-10.
HISTORICAL RAILBELT GAS UTILITY CONSUMPTION DATA
(BILLION CUBIC FEET)

	YEAR	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
GAS UTILITY SALES	[A]	9.82	12.04	12.55	12.68	13.45	14.05	15.52	15.78	19.03	19.11	20.90	24.42	25.86
ENSTAR	[B]	20.996	24.281	23.13	22.538	23.489	25.004	31.641	31.601	35.634	36.933	37.385	42.602	42.513
RESIDENTIAL		6.598	5.402	5.766	5.849	6.367	6.73	7.577	7.757	9.747	9.976	10.727	12.445	11.935
SMALL COMM	[C]	8.136	2.799	2.802	2.834	2.973	3.04	3.299	3.263	3.844	3.566	3.734	4.818	4.492
LARGE COMM		0	3.386	3.521	3.535	3.67	3.819	4.17	4.295	4.889	5.042	5.837	7.156	7.442
OTHER SALES		6.262	12.694	11.041	10.32	10.422	11.244	16.595	16.481	17.264	18.18	16.779	18.532	18.371
INTERDEP		0	0	0	0	0.057	0.171	0	-0.195	-0.11	0.169	0.308	-0.349	0.273
ENSTAR CUSTOMERS	[B]													
RESIDENTIAL		22963	22779	25659	27901	30629	33229	35482	38570	43026	49386	55592	61903	65218
SMALL COMM		433	3070	3340	3674	4052	4422	4698	4876	5172	5634	7101	9082	9814
LARGE COMM		0	465	516	604	603	624	640	662	707	819	996	1188	1251
OTHER		1	2	2	2	4	4	7	7	7	7	7	7	6
ENSTAR USE/CUSTOMER														
RESIDENTIAL		287.33	237.14	224.71	209.63	207.87	202.53	213.54	201.11	226.53	202.00	192.95	201.04	183.00
SMALL COMM		18789.	911.72	835.92	771.36	733.71	687.47	702.21	669.19	743.23	632.94	525.84	530.49	457.71
LARGE COMM			7281.7	6823.6	5852.6	6086.2	6120.1	6515.6	6487.9	6915.1	6156.2	5860.4	6023.5	5948.8

[A] TABLE 3-6. SALES TO FINAL CONSUMERS ONLY.
[B] ANNUAL REPORTS TO THE APUC BY ALASKA GAS AND SERVICE COMPANY AND ENSTAR/ALASKA PIPELINE COMPANY
KENAI UTILITY SERVICE CORP BECAME PART OF ENSTAR IN 1985. AND ALASKA PIPELINE IN 1980
SERVICE EXTENDED TO THE MATSU BOROUGH IN 1985
[C] SALES TO CHUGACH ELECTRIC ASSOCIATION MAY BE IN THIS CATEGORY PRIOR TO 1975

Utility gas is currently available to most of the potential consumers in the Southern Railbelt, but the Fairbanks area is not served at the present time. In late 1984 gas became available for the first time in the Matanuska-Susitna Borough. Consequently the only communities of significant size not served by gas in the Southern Railbelt are Homer and Seward. Outlying and sparsely populated areas in other parts of the Southern Railbelt are also unserved.

When gas became available in the Southern Railbelt, it quickly penetrated existing markets, its demand grew rapidly, and it is now the most important source of energy for space heating in Anchorage and parts of the Kenai Peninsula. This is the result both of its low relative cost and its convenience. In 1980, 71 percent of occupied housing units in the Anchorage area were heated by utility gas with significant shares also accounted for by electricity (18 percent), and fuel oil (7 percent) (U.S. Department of Commerce, 1980). Since that time the utility gas share has increased as a result of the rapid increase in the housing stock. We assume that the market share is close to its long run equilibrium given the current structure of relative prices.

3.3.2.2 Utility Gas - Expected Case

Natural gas distributed to final users for space heating and other purposes by gas utilities increases from 26 bcf in 1987 to 30 bcf in 1993, 32 bcf in 1996 and 38 bcf in 2004 (Table 3-11). This growth is attributable to demand growth in the existing market area as well as increased penetration of the market in the Matanuska-Susitna Valley market.

3.3.2.2 Utility Gas - Unfavorable Case

Natural gas distributed to final users for space heating and other purposes by gas utilities increases rapidly from 26 bcf/year in 1987 to surpass 34 bcf in 1993, 41 bcf in 1996, and 65 bcf in 2004 (Table 3-12).

TABLE 3-11: UTILITY GAS DEMAND
EXPECTED SCENARIO

		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	TOTAL 1989-2004
POPULATION (000)																				
Southern Railbelt		299	294	292	294	295	296	300	302	303	304	306	310	314	318	323	328	333	338	4956
Anchorage		225	221	219	220	220	221	224	225	226	226	228	231	233	236	239	243	246	250	3689
Matsu		35	34	34	35	35	36	36	37	37	38	38	39	40	41	42	43	44	45	618
Kenai		39	39	39	40	40	39	39	40	40	40	40	40	41	41	42	42	43	43	649
Northern Railbelt		79	80	83	83	83	85	85	85	85	85	85	86	86	87	87	88	89	90	1371
NATURAL GAS USE (BCF)																				
Southern Railbelt		26	26	26	27	27	27	30	31	31	32	32	33	34	35	35	36	37	38	512
Anchorage	[A]	26	26	26	27	27	27	30	31	31	32	32	33	34	35	35	36	37	38	512
Matsu	[B]	23	22	22	23	23	23	24	24	25	25	25	26	26	27	28	28	29	30	409
Kenai	[C]	1	1	1	1	1	1	4	4	4	4	4	4	5	5	5	5	5	5	60
Northern Railbelt	[D]	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	43
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

[A] PER CAPITA USE GROWS 1 PERCENT ANNUALLY. INITIAL VALUES BASED ON ACTUAL 1986 CONSUMPTION ADJUSTED UPWARD BY 5% TO ACCOUNT FOR LESS THAN AVERAGE HEATING DEGREE DAYS.

[B] SATURATION GROWS TO EQUAL ANCHORAGE BY 1993.

[C] PER CAPITA USE GROWS 1 PERCENT ANNUALLY.

[D] THE GAS TRANSMISSION LINE IS NOT EXTENDED TO FAIRBANKS.

TABLE 3-12: UTILITY GAS DEMAND
UNFAVORABLE SCENARIO

		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	TOTAL 1989-2004
POPULATION (000)																				
Southern Railbelt		299	295	297	304	309	314	320	326	334	339	344	355	367	373	381	391	400	408	5561
Anchorage		225	222	223	227	231	235	240	245	250	253	256	263	272	275	282	289	296	301	4139
Matsu		35	35	35	36	37	38	39	40	41	42	43	45	47	48	50	52	53	55	701
Kenai		39	39	39	40	41	41	41	42	43	44	45	47	48	48	49	50	51	52	721
Northern Railbelt		79	80	84	85	86	89	92	96	94	94	95	95	96	98	101	102	104	106	1518
NATURAL GAS USE (BCF)		26	27	27	28	29	31	34	36	39	41	44	47	50	54	57	60	62	65	705
Southern Railbelt		26	27	27	28	29	30	32	33	34	35	37	39	41	42	44	46	48	50	595
Anchorage	[A]	23	23	23	24	25	26	27	28	29	30	31	33	35	36	37	39	41	42	509
Matsu	[B]	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	3	3	3	22
Kenai	[C]	2	2	2	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	53
Northern Railbelt	[D]	0	0	0	0	0	1	2	3	4	6	7	8	10	12	13	14	14	15	110

[A] PER CAPITA USE GROWS 2 PERCENT ANNUALLY. INITIAL VALUES BASED ON ACTUAL 1986 CONSUMPTION ADJUSTED UPWARD BY 5% TO ACCOUNT FOR LESS THAN AVERAGE HEATING DEGREE DAYS.

[B] SATURATION GROWS TO EQUAL ANCHORAGE BY 1993.

[C] PER CAPITA USE GROWS 2 PERCENT ANNUALLY.

[D] GAS TRANSMISSION LINE EXTENDED TO FAIRBANKS IN 1992. ANCHORAGE SATURATION REACHED IN 2001.

Although less gas is consumed through utilities than for electric generation, utility gas use is projected to grow more rapidly. As is the case with electricity generation, growth is a function both of a projected increase in consumption per capita, and of the expansion of the market served by the gas utilities into the Fairbanks area.

Gas becomes available in Fairbanks in 1992 and competes successfully with the existing space heating fuels, primarily fuel oil and electricity. Over a period of 10 years the majority of the space heating plant in the Fairbanks area is converted to natural gas. By 2001 the per capita consumption of natural gas in Fairbanks is equivalent to that of Anchorage in the same year, and it subsequently grows at 2 percent annually.

3.3.3 Military Use

3.3.3.1 Historical Patterns

Natural gas is used by the two military installations in the Anchorage area, Fort Richardson and Elmendorf Air Force Base, for electricity generation and space heating (Table 3-13). Since use of gas began in 1969, the pattern has been for annual consumption to slowly decline. This is a function of a gradual decline in personnel assigned to the bases and conservation efforts on the part of the military to minimize fuel costs.

3.3.3.2 Military Use - Expected Case

Military use of natural gas remains constant at the current level (Table 3-1). Natural gas continues to be used for electricity generation and space heating in the Anchorage area. The military installations in Fairbanks continue to generate electricity and provide space heating from existing sources and do not rely upon Cook Inlet gas-fired electricity delivered over the intertie.

TABLE 3-13.
HISTORICAL MILITARY CONSUMPTION OF COOK INLET NATURAL GAS
(Billion Cubic Feet/Year)

	YEAR	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	EST. 1987
MILITARY USE (BCF)	[A]	5.66	5.84	5.42	5.10	5.13	4.99	4.76	4.56	4.83	4.60	4.34	4.53	4.53	4.62
MILITARY EMPLOYMENT ('000)	[B]	18.81	18.61	17.79	18.21	17.69	18.29	16.94	17.17	16.87	17.19	17.72	17.46		
Anchorage	[C]	12.58	12.49	12.02	11.95	11.72	11.86	10.91	10.83	10.96	10.53	10.90	10.83		
Fairbanks	[D]	6.23	6.13	5.77	6.27	6.17	6.43	6.03	6.34	5.91	6.66	6.81	6.63		

[A] TABLE 3-6.
[B] ISER DATABASE, ACTIVE DUTY MILITARY.
[C] ANCHORAGE BOROUGH.
[D] INCLUDES SOUTHEAST FAIRBANKS CENSUS AREA.

3.3.3.3 Military Use - Unfavorable Case

Military use of natural gas expands when the gas transmission line makes gas available to the military bases in the Fairbanks area in 1992 (Table 3-2). Consumption quickly increases from 5 bcf/year to 13 bcf/year as a result of a complete conversion of electricity generation and space heating to gas in the Fairbanks military installations of Fort Wainwright and Eielson Air Force Base. Although not a military use, the small coal plant at the University of Alaska also converts to gas and is included in this category. The increase in military personnel in the Fairbanks area of about 60 percent (Fairbanks Community Research Quarterly, 1987) associated with the establishment of the new light infantry division, which will be located primarily in Fairbanks, further augments demand by 60 percent in Fairbanks.

3.3.4 Gas Use for Field Operations

3.3.4.1 Historical Patterns

A significant amount of natural gas is consumed in the process of production of both oil and gas on the lease (Table 3-14). This category of field operations consists of vented and flared gas and shrinkage (the volume reduction in natural gas that occurs when liquids are extracted from it, primarily from gas produced in conjunction with oil), as well as gas actually used to power the pumps, generating equipment, and other machinery on the offshore platforms and onshore facilities.

Annual gas use on the lease has remained quite stable since the early 1970s in the range of 12 to 16 bcf, with a peak in the late 1970s. Since oil production peaked at the beginning of the decade and gas production is continuing to increase, it is apparent that the use of gas on the lease does not correlate well with the level of production of either oil or gas, but rather is relatively constant over the life of the field once it has reached maturity.

TABLE 3-14.
HISTORICAL FIELD OPERATIONS USE OF OF COOK INLET NATURAL GAS PRODUCTION
(Billion Cubic Feet/Year)

	YEAR	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	EST. 1987
FIELD OPERATIONS(BCF)	[A]	23.89	28.83	24.47	24.40	23.52	20.12	20.09	20.56	20.96	19.34	20.51	18.64	18.42	17.86
Vented and Flared	[A]	7.05	9.50	5.42	4.85	3.87	2.71	3.045	3.18	3.49	2.56	3.26	2.89	3.10	2.50
Used on Lease	[A]	14.31	16.22	15.82	16.40	16.23	14.56	14.608	14.95	14.86	14.06	14.60	13.97	13.85	14.14
Shrinkage	[A]	2.53	3.12	3.22	3.15	3.43	2.85	2.438	2.43	2.60	2.73	2.66	1.77	1.47	1.14
PRODUCTION															
Oil (000 bpd)	[B]	197.79	197.18	183.58	160.36	137.55	117.77	98.851	86.411	75.151	67.947	59.769	47.154	46.611	
Gas (bcf/year)	[A]	228.44	252.55	265.25	279.96	293.80	295.08	299.94	299.05	309.12	306.34	306.96	306.94	285.19	274.81

[A] TABLE 3-6.
[B] ALASKA DEPARTMENT OF LABOR.

Since the middle of the 1970s, the venting and flaring of gas has averaged about 3 bcf annually, a considerable decline from the previous decade during which a significant portion of gross production was flared before restrictions were imposed on venting and flaring. Shrinkage is currently well below 1 percent of gross production and does not appear to be closely correlated with the annual production level.

3.3.4.2 Gas Use for Field Operations - Expected Case

Gas use on the lease associated with the production of gas and oil remains constant at a level of 19 bcf/year. This assumes that the growth in the use of gas associated with increasing production of gas is balanced by a decline in the use of gas associated with the decreasing production of oil.

3.3.4.3 Gas Use for Field Operations - Unfavorable Case

Gas use on the lease associated with the production of gas and oil remains constant at 20 bcf/year -- a level slightly above the historical average. Because of a continued growth in demand for gas in the aggregate in this projection, any decline in the use of gas for field operations due to depletion of the oil in Cook Inlet is largely offset by increases in demand due to increases in the production of gas.

3.3.5 Petroleum Manufacturing

3.3.5.1 Historical Patterns

Gas use in the refineries on the Kenai Peninsula has increased over the years with the size of the refinery operations in response to growth in the local market for products. Initially, at the beginning of the 1970s, 1 bcf was used annually for this purpose. Since 1980, consumption has been in the range of 5 bcf annually.

3.3.5.2 Petroleum Manufacturing - Expected Case

Gas used in the manufacture of petroleum products in the refineries of Cook Inlet remains constant at 5 bcf/year (Table 3-1). This is consistent with the economic assumptions of modest growth which results in no need for additional refinery capacity to supply the local market.

3.3.5.3 Petroleum Manufacturing - Unfavorable Case

Gas used in the manufacture of petroleum products in the refineries of Cook Inlet remains constant at 5 bcf/year. When the gas transmission line to Fairbanks is completed this total is increased to eventually equal 7 bcf to account for possible use of gas to power the pipeline and for possible new refining activities (Table 3-2).

3.3.6 Ammonia-Urea Manufacturing

3.3.6.1 Historical Patterns

One plant on the Kenai Peninsula which has been in operation since 1969 uses natural gas in the production of ammonia-urea. The initial annual use rate was in the range of 20 bcf. The plant was expanded after ten years and annual use now averages about 50 bcf annually varying somewhat from year to year with activity of the world fertilizer market (Table 3-6).

In 1986 and 1987, the plant did not operate at full capacity as some of the major equipment was being replaced. The reduction in natural gas use in 1986 and 1987 is expected to be temporary and annual consumption is expected to increase modestly above its historical level slightly to 54 bcf as a result of a small increase in capacity associated with the equipment replacement (Alaska Economic Report, 1987 and Corcoran, 1987).

3.3.6.2 Ammonia-Urea Manufacture - Expected Case

Although gas consumption in the manufacture of ammonia-urea was expected to be 40 bcf in 1987, we expect use in 1988 to resume to full capacity of 54 bcf annually. This consumption rate is constant throughout the projection period.

3.3.6.3 Ammonia-Urea Manufacture - Unfavorable Case

Although gas consumption in the manufacture of ammonia-urea was expected to be 40 bcf in 1987, we expect use in 1988 to resume at full capacity of 54 bcf annually. This consumption rate is constant throughout the projection period.

3.3.7 Liquefied Natural Gas Manufacturing

3.3.7.1 Historical Patterns and Current Contract

To deliver 50.57 trillion Btu's per year it is necessary to withdraw 61.2 bcf from the field. The difference between the feedstock withdrawn and the amount of gas delivered as LNG is accounted for by gas used in LNG manufacture as well as boil-off during transport to Japan. Net efficiency of the process averages 82.5 percent.

The new contract being negotiated with the Japanese calls for a 2.8 percent increase (from 50.57 to 52 trillion Btu's) from 1989 through 1993. In 1994, deliveries increase to 57.5 trillion Btu's. Also, at the option of the purchasers, contract quantities can be increased by 6 percent of the normal contract amount in any year.

Phillips-Marathon has a license for the annual export of 50.57 trillion Btu's (delivered) of liquified natural gas.

3.3.7.2 Liquefied Natural Gas Manufacture - Expected Case

Gas consumption in the manufacture of LNG is 61.2 bcf in 1987 and 1988, consistent with the level of consumption in the past 16 years. From 1989 through 1993, consumption is constant at 62.9 bcf annually, due to a 2.8 percent increase in contracted deliveries. Starting in 1994, consumption increases to 68.9 bcf annually.

3.3.7.3 Liquefied Natural Gas Manufacture - Unfavorable Case

Gas consumption in the manufacture and transportation of LNG is 61.2 bcf in 1987 and 1988, consistent with the level of consumption in the past 16 years. From 1989 through 1993, consumption is constant at 66.6 bcf annually. Starting in 1994, consumption increases to 73.0 bcf annually. These demands are higher than those of the Expected Case because they assume that the Japanese purchasers will exercise their option in each year to receive 6 percent more LNG than the base quantity set forth in the contract.

3.3.8 Reinjection

3.3.8.1 Historical Patterns

Considerable quantities of Cook Inlet gas have been used for repressuring of the Swanson River oil reservoir since production began in 1960. This gas came from two sources: the associated gas produced with the oil from the Swanson River field itself, and a fairly small amount of gas "rented" from the Kenai Field producers for that purpose. (Note that much of the gas utilized was recycled, i.e., the same gas more than once was produced and reinjected.) Now that depletion is significantly reducing annual oil production from the Swanson River field, gas use for repressuring is on the decline.

Both the gas which is reinjected into the field and the gas which is "rented" for injection is almost entirely available for future production and

use. Only a small amount is lost through reinjection. Since gas used for repressuring is not a draw on total reserves and the small amount that is consumed in this fashion will be insignificant in the future due to depletion of the oil, it is excluded from the consumption projections.

3.4 DEMAND MODELS

The demand projections presented in this report are based upon an economic-demographic model of the Railbelt and a model of Railbelt energy demand. The economic-demographic model is the MAP Econometric Modeling System of the Institute of Social and Economic Research (ISER) of the University of Alaska, Anchorage. The MAP model has been used for nearly 15 years to produce economic projections for the State of Alaska and its regions as well as to conduct policy and project impact analysis. The energy demand model is ENDMOD, also developed at ISER, for use by the State of Alaska to project oil and gas demand in the state. ENDMOD was extensively revised and updated for this analysis. The MAP model structure was not revised, but the input assumptions were revised for consistency in accordance with the assumptions in this study.

The MAP Econometric Modeling System combines an econometric model of the state with demographic, fiscal, and regionalization models and generates detailed annual projections of economic and demographic activity through the year 2010. Separate but consistent projections for each of four areas within the Railbelt were produced. These regions are Anchorage, Kenai Peninsula, Matanuska-Susitna and Fairbanks. Each region corresponds to a Census Area and a Borough (Alaska equivalent of a county) except for Fairbanks which is the aggregation of the Fairbanks and Southeast Fairbanks Census Areas and includes the area to the Southeast of the Fairbanks North Star Borough. Each projection is driven by an internally consistent scenario of input assumptions regarding world oil prices, basic sector economic developments in the state, state and local government fiscal behavior, and long-term national economic trends.

World oil price assumptions form an important element of the economic and demographic projections because of both the significance of the petroleum industry in the economic base of the state and the importance of petroleum revenues in the financing of state and local government. World oil price assumptions and consistent petroleum revenue projections are taken from the Alaska Department of Revenue (ADOR). The expected case utilizes oil price and revenue projections deemed most likely by the ADOR. The unfavorable case utilizes oil price level and revenue quantity projections felt by the ADOR to have only a 20 percent chance of being realized.

The Railbelt energy demand model, ENDMOD, projects the consumption of various fuels in different areas of the Railbelt based upon end uses. This model has been used for several years by the State of Alaska Department of Natural Resources to project the instate requirements for natural gas and oil for both the Railbelt and the state as a whole. This model has been extensively revised and updated for the purpose of this study, and it separately estimates future needs for natural gas in seven use categories in the Railbelt. Consumer preferences, government conservation measures, as well as price and income elasticities in those end uses which are sensitive to these factors (space heating and electric utility use) are incorporated into the model through a set of parameters which determine interfuel substitution in the space heating market and rates of both space heating demand per customer and electricity demand per customer. We assume the natural gas market share for space heating is not significantly eroded by gas price increases toward parity with fuel oil. We assume that gas space heat and electricity income and price elasticities are consistent with historical Railbelt patterns.

The Railbelt population and employment projections from each of the two MAP model runs were used to drive a projection using the energy demand model. The unfavorable economic projection was used to produce the Unfavorable Case demand projection and the expected economic projection was used to produce the Expected case demand projection.

In addition to different assumptions regarding the level of population and employment in the Railbelt, the two demand case projections also differed with regard to assumptions about the availability of gas in the Fairbanks area, the use of fuels other than natural gas in the generation of electricity in the Railbelt, and the intensity of use of natural gas for space heating and electricity.

The two case projections which result from this analysis represent the maximum and most likely values for the amount of gas consumption in future years based on current information. If events other than those projected in the economic scenarios and gas market scenarios occur, it is likely that they will result in gas use similar to the Expected case and very unlikely that gas use would exceed that of the Unfavorable case.

4.0 SUPPLY ANALYSIS

4.1 INTRODUCTION AND SUMMARY

Natural gas from Cook Inlet is an important energy resource to the residents of Southcentral Alaska for heating and electrical generation. An indicator of its importance is demonstrated by the fact that about 87 percent of total electrical generation in the area is fueled by gas.

The terms "gas resources" and "gas reserves" are used throughout this summary to discuss natural gas supplies. It is important that the distinctions between the two terms be maintained. Each term is defined below:

1. Gas Resources - All gas deposits that may eventually become available--either known deposits that are not economically or technologically recoverable at present, or unknown deposits that may be inferred to exist, but have not yet been discovered.

2. Gas Reserves - That portion of the identified gas resource that can be economically extracted. Reserves are generally not identified until sufficient drilling has been completed to permit delineation of the field and estimation of the size of the reservoir.

Resources and reserves are generally described in terms of recoverable resources or recoverable reserves estimate which takes into account the fact that physical and technological constraints mean only a portion of resources or reserves can be brought to the surface.

Table 4-1 summarizes information on gas resources and gas reserves in Cook Inlet. Cook Inlet reserves are estimated at 4,158 bcf while resources range from 470 bcf to 9,060 bcf. Total gas supplies range from 4,628 to 13,218 bcf. Additional information on resources and reserves is presented in the following sections.

4.2 COOK INLET NATURAL GAS

Cook Inlet gas fields began production in the mid 1960s and by the end of 1986 had produced about 3.1 trillion cubic feet, net of injection, with 192 billion cubic feet of that total in 1986 (Alaska Department of Natural Resources, Oil and Gas Division, 1987).

Table 4-1 shows the estimated recoverable reserves and historical production from Cook Inlet since 1980. [Reserve information has been compiled and published by the Alaska Oil and Gas Conservation Commission and the Department of Natural Resources only since 1980; earlier data does not exist in the present files of these agencies.]

Table 4-1

Estimated Remaining Recoverable Reserves and Historical Production in Cook Inlet (Billion Cubic Feet)

Year	Remaining Recoverable Reserves	Annual Production (bcf)	Reserves/ Production Ratio (years)
1980	3,544	184.505	19.2
1981	3,785	198.641	19.1
1982	3,594	206.871	17.4
1983	3,422	211.958	16.1
1984	3,264	213.269	15.3
1985	4,664	217.912	21.4
1986	4,377	193.050	22.7
1987	4,158 (a)	193.727	21.5
Mean	3,851	202.492	19.1

Notes:

(a) Estimated as of January 1, 1988

Sources: Alaska Oil & Gas Conservation Commission, various years; Alaska Department of Natural Resources, Oil and Gas Division, 1987; and Beasley, 1987.

Estimates of gas reserves have varied between 3,264 bcf and 4,664 bcf during the past seven years while production has ranged from 183 bcf to 218 bcf. The reserves/production ratio, which indicates the number of years that current reserves will last at present production rates, has ranged from 15.3 years to 22.7 years (Figure 4-1). The average reserves/production ratio over this time is more than double the U.S. average of approximately 9 years.

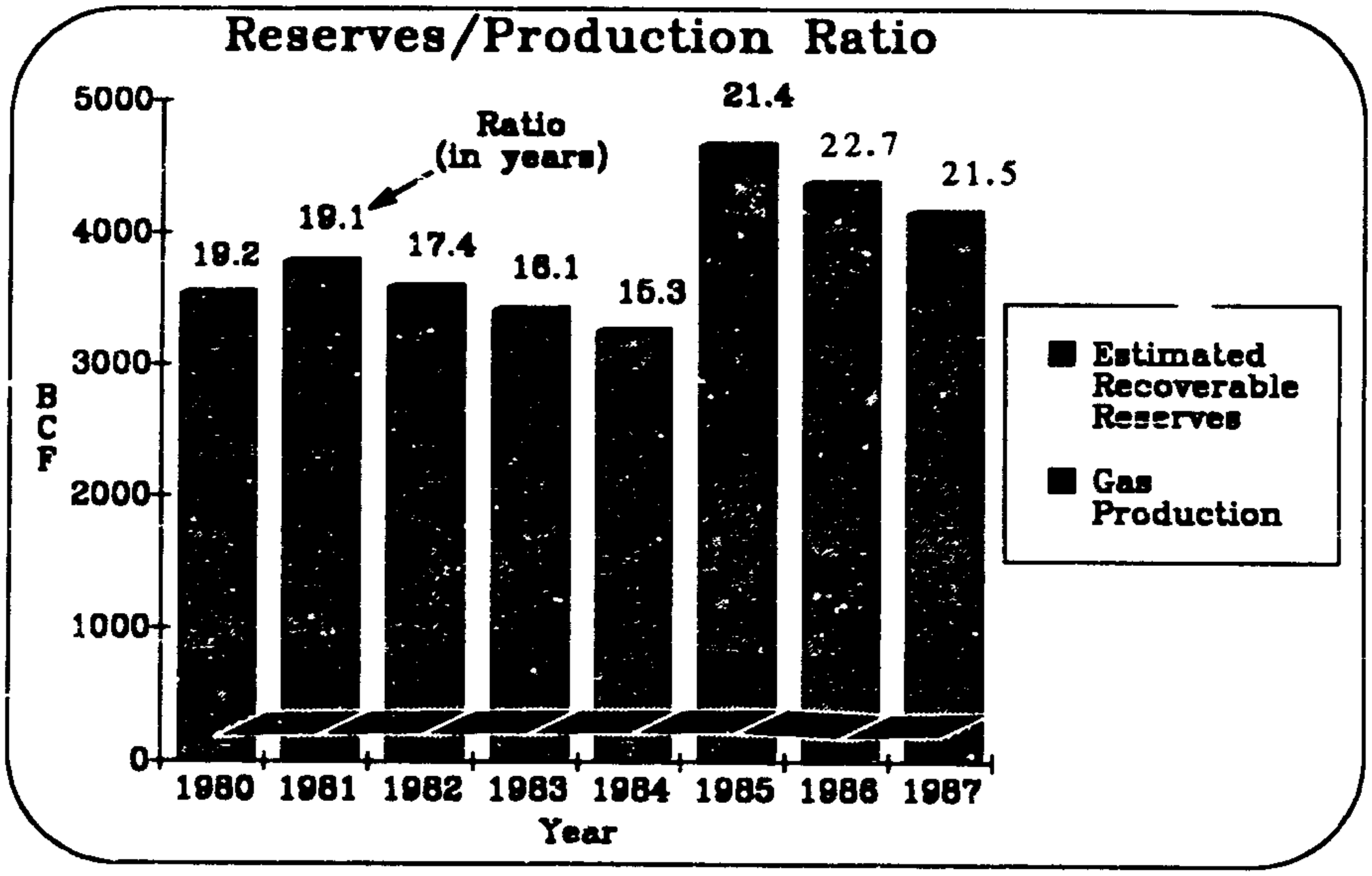
Because a large capital investment is required to develop a gas reservoir into recoverable reserves, gas reserves will be developed at a rate comparable with the growth in demand, and sufficient to meet peak consumption rates. Most of the development drilling in the Cook Inlet Basin has occurred to offset declining production from older gas fields. Additional wells and fields have been brought on line to meet the peak demands in winter. In any event, the petroleum industry will seek to moderate its investments in proven reserves to avoid unnecessary capital carrying costs.

Considerable historical and subsurface information is available about the gas reserves and potential in the Cook Inlet area. Because the larger structures have been explored, State resource agencies do not anticipate major new discoveries.

Additional discoveries of moderate to small size, comparable to the 300 billion cubic feet Cannery Loop discovery and the Pretty Creek discovery, are expected in this mature drilling province, and a few intermediate size fields (500 bcf to 1 tcf) may also be discovered. With the existing infrastructure, a number of these gas finds may be commercially viable (Kornbrath, 1987)

Exploration in the Cook Inlet Basin has focused on oil; gas discoveries have primarily occurred as a by-product of oil exploration. The major producers in Cook Inlet have not explored just for gas. However, Cities Service Co. and Pacific Lighting Gas Development Co. (sponsor of a now abandoned proposal to build a LNG plant in Cook Inlet for shipment of LNG to

FIGURE 4-1


Reserves/Production Ratio
5000
4000
3000
2000
1000
0
BCF
Ratio
(in years)
19.2
19.1
17.4
16.1
15.3
21.4
22.7
21.5
1980
1981
1982
1983
1984
1985
1986
1987
Year
Estimated Recoverable Reserves
Gas Production

California) discovered the Lewis River field in 1975, presumably while exploring for natural gas.

Until recently, the petroleum industry has not had sufficient incentive to explore for gas. Older gas sales contracts met the industry's basic cost structure, but did not provide sufficient incentives for true gas exploration. Table 4-2 shows that most of the known gas reserves in Cook Inlet were discovered during the 1950s and 1960s when the industry was exploring for oil.

Drilling activity has recently increased in the Cook Inlet region. Marathon Oil Co. has begun production drilling from the new Steelhead platform in Cook Inlet jointly owned by Marathon and Unocal. The oil and gas platform will develop more than 600 bcf of natural gas from the Grayling gas sands in the McArthur River field plus expand development of the "G" and West Foreland oil reservoirs (Marathon Oil Company and Union Oil Company of California, n.d.). The platform is expected to have 24 gas wells and 12 oil wells with production facilities to handle up to 160 mmcf of gas per day and 15,000 bbl of oil per day by 1990 (Alaska from the Inside, May 28, 1986, May 27, 1987, and Alaska Construction and Oil, October 1987).

Union Oil Company, in partnership with Marathon Oil and Cook Inlet Region, Inc. (CIRI), has begun drilling in the Cannery Loop unit in the Kenai gas field almost ten years after making a significant gas find. Plans call for the first well to explore for oil then plug back to gas-production zones if insufficient oil is found. Gas production has begun recently with most of the gas earmarked for the Union Chemicals ammonia-urea plant and the Phillips/Marathon LNG plant.

Table 4-2

Estimated Remaining Recoverable Gas Reserves in Cook Inlet by Field
(Billion Cubic Feet)

Type/Name	Remaining Recoverable Reserves (1988)	Year of Discovery
Proven and Developed		
Beaver Creek	176	1967
Beluga River	746	1962
Cannery Loop	300	1978
Granite Point	12	1965
Ivan River, Lewis River, Pretty Creek and Stump Lake	500	1960
Kenai	650	1959
McArthur River	633(a)	1968
Middle Ground Shoal	5	1962
North Cook Inlet	770	1962
Sterling	20	1961
Swanson River	250	1957
Trading Bay	(a)	1979
Proven but Undeveloped or Shut In		
Birch Hill	11	1965
Falls Creek	13	1961
Nicolai Creek	3	
North Fork	12	1965
West Foreland	20	1962
West Fork	6	1960
Total	4,158	

NOTE:

(a) McArthur River gas reserves include Trading Bay reserves.

Source: Beasley, 1987.

Union is negotiating to buy CIRI's 25 percent of the field. This production became available when Union and CIRI purchased interests held by Pacific Alaska LNG Association, a California-based consortium that planned to build a liquefaction plant and ship LNG to California. Cannery Loop development was effectively blocked while Pacific-Alaska assessed market conditions (Alaska from the Inside, May 13, 1987).

Exploratory drilling has been proposed by Alaskan Crude Corporation near Homer in the North Fork field, with gas production possible if insufficient oil is found, and near the Beluga River Unit. Another exploratory program has been announced by Nortec/ERT for Union Pacific Resources. The jack-up rig Key Hawaii has been contracted for a prospect 8 miles west of Kalgin Island near Cannery Creek (Alaska Report, October 28, 1987) and approximately 25 miles from the nearest known gas reserves.

The recent completion of the Alaska Pipeline Company (Enstar) pipeline from Beluga to Anchorage may result in additional drilling in the Susitna Basin and will enhance the viability of smaller discoveries that are along the pipeline route when demand for Cook Inlet gas increases.

4.3 COOK INLET NATURAL GAS RESOURCES

Most of the geologic structures in the current Cook Inlet production area (south of Point Possession and north of Kalgin Island) have been drilled to test for oil. With few exceptions, these structures have commercial quantities of hydrocarbons, either oil or gas.

However, the limited drilling which has occurred in the Lower Cook Inlet and Susitna basins of the region has established that poor stratigraphic conditions exist for oil accumulations in these areas. The mapped source rocks and presence of coal in these relatively unexplored basins strongly indicates that the structures in these regions will be gas bearing. As a

result, a number of structures in these basins have not been drilled because a market does not exist for additional gas supplies.

The Department of Natural Resources Oil and Gas Division has identified 21 proven fields in Cook Inlet (1987). Generalized geologic maps of the region encompassing Upper and Lower Cook Inlet and Susitna basins show at least 20 identified structures which have not yet been drilled, and a number of magnetic and geophysical anomalies which suggest additional structures.

Table 4-3 presents a 1983 estimate of undiscovered gas resources in the Cook Inlet Basin. While information in Table 4-3 is for the Cook Inlet Basin only, additional resources may be found in the Susitna Basin where limited drilling has occurred to date and in Lower Cook Inlet (Kornbrath, 1987). The Minerals Management Service (MMS) estimates oil and gas resources on federal offshore lands which, in Cook Inlet, are south of Kalgin Island and the present producing fields. MMS estimates that economically recoverable gas resources in the federal Cook Inlet planning area range from 80 bcf with a 90 percent probability to 760 bcf at a 5 percent probability. The mean estimate is 350 bcf (Cooke, 1985).

These resources are not included in the quantities shown in Table 4-3 because they are located far from existing infrastructure and any gas discoveries of this size range would be expensive to develop on a per thousand cubic foot basis. It is anticipated that industry would seek to explore and develop other geologic structures closer to the present production area before developing the Lower Cock Inlet or the Susitna Basin for natural gas. As a result, neither basin would be developed until after the year 2004.

Table 4-3

Estimate of Undiscovered Gas Resources
in Place for the Cook Inlet Basin

Probability that Quantity is at Least the Given Value	Billions of Cubic Feet
99	470
95	930
90	1,240
80	1,490
75	1,980
50	3,070
25	4,380
10	5,840
5	6,930
1	9,060
Mean	3,360

Source: Alaska Department of Natural Resources, Division of Geological and Geophysical Surveys, 1983.

4.4 NORTH SLOPE NATURAL GAS SUPPLIES

Recoverable gas reserves on the North Slope of Alaska are estimated to range from 35.227 trillion cubic feet to 41.327 cubic feet, with 29 trillion cubic feet contained within the Prudhoe Bay unit (Alaska Department of Natural Resources, Oil and Gas Division, 1987). The North Slope region produces a very large amount of gas in association with oil production, but there is no market for the gas other than operating the oil production facilities and injection for enhanced oil recovery. For example, in 1986 gas production on the North Slope was 1,111.787 billion cubic feet with 992.862 billion cubic feet injected, leaving a net production of 118.925 billion cubic feet.

Most of the net gas production, approximately 98 billion cubic feet, is consumed in field operations and the remainder, 21 billion cubic feet, is

sold, primarily to the Trans-Alaska Pipeline System (TAPS). Production from the region began in 1974, and since then operations net of injection have produced 802 billion cubic feet (Alaska Department of Natural Resources, Oil and Gas Division, 1987).

Yukon-Pacific Corporation has proposed a large LNG export project using gas transported in TAGS. The proposed pipeline will be designed to handle 2.3 Bcfd and could also significantly increase gas supplies to the Railbelt area (See Section 2.3.1). Gas supplies from the North Slope are not included in this analysis because of the uncertainty regarding the project. In addition, the absence of these potential supplies results in greater demand for Cook Inlet gas which represents a more conservative approach for determining the supply-demand balance.

4.5 SUPPLY SUMMARY

Alaska's Railbelt region has vast energy reserves that are readily accessible to its populace. The use of a particular resource is dependent upon its price relative to other competing resources, within the framework of various state and federal regulations. This section provides an assessment of the potential supply of energy from various resources in the region under two different scenarios.

Under either supply scenario the price received for Cook Inlet natural gas is projected to provide more than adequate incentive for the industry eventually to explore and develop new fields in the region. The major limitation to further exploration and development will be the size of the market available to Cook Inlet producers. It is anticipated that producers will continue to maintain the reserves/production ratio in excess of 15 years until such times as the regional gas resources are fully explored and known reserves become a limiting factor.

4.5.1 Expected Supply Case

Given the political and regulatory framework that supports hydropower and coal-fired plants, it is probable that further power generation facilities will be built during the 1989 - 2004 time period.

Known natural gas reserves in the Cook Inlet Basin amount to 4,158 bcf, and the 50 percent probability estimate for undiscovered gas resources in the same area is 3,070 bcf. It is probable that additional discoveries will be made in the Susitna and Lower Cook Inlet basins but such resources are not included here because they would likely occur after 2004. Combining the known reserves with the mean estimate for undiscovered resources in Cook Inlet results in a natural gas supply of 7,228 bcf, as of January 1, 1988.

4.5.2 Unfavorable Supply Case

This scenario assumes that additional energy resources will not be developed in the 1989 - 2004 time frame and that known reserves of natural gas, plus the potential resources which are present with an 80 percent certainty, represent the maximum supplies available to the region. Under this scenario, additional gas discoveries will not occur. This case places the greatest pressure upon the present Cook Inlet gas reserves of 4,158 bcf and the probable resources of 1,490 bcf.

4.6 GAS PRICES

The low price of Cook Inlet gas has been a primary determinant which utilities and residential and industrial users employ in choosing gas as the primary fuel for heating and electrical generation in Southcentral Alaska. Coal and fuel oil have been displaced from areas where natural gas pipelines have been constructed.

Table 4-4 shows the weighted annual average price of Cook Inlet gas at the point of production (prior to entering the pipeline system) for the 1979 to 1986 time frame. These prices include intra-company sales, and sales between related firms. Average prices of transactions between non-affiliated parties are higher than those shown in Table 4-4.

Table 4-4

Weighted Annual Average Price of Cook Inlet Gas

Year	Price
1979	$0.67
1980	.53
1981	.55
1982	.56
1983	.66
1984	.70
1985	.68
1986	1.05

Source: Alaska Department of Natural Resources, Oil and Gas Division, 1987b.

New gas sales contracts between Cook Inlet producers and Enstar and Chugach Electric have resulted in substantially higher wellhead prices for Cook Inlet gas. Some of the older sales contracts still in force have base gas prices as low as $0.20 per thousand cubic feet (mcf) (Emmerman, 1987a), while contracts signed in 1982 prior to the decline in world crude oil prices called for delivery at prices over $2.00 per thousand cubic feet, subject to escalation and de-escalation provisions. Some of the older contracts result in gas deliveries at prices in the vicinity of $0.70 per MCF while newer contracts result in producer prices of $1.50 to $1.70 per MCF. These higher prices have, in part, encouraged both additional drilling in the Cook Inlet region and proposals for alternative power sources.

Table 4-5 presents estimates of the cost components for bringing a new field on line in the Cook Inlet Area. These costs reflect a commercial oil

discovery with associated gas, which is the predominant structure in the present producing region of Cook Inlet. Industry estimates place delivery costs for non-associated gas fields (i.e., without oil) at over $1.00 per mcf.

Field development costs can have a wide variation around the estimates shown below since a number of factors such as depth of the discovery and well production rates will affect the interaction between field development costs and total gas production. Costs for the other components have much smaller variations around these estimates. The offshore estimates assume a sizable discovery to offset the higher capital and development costs.

The estimates for risk and return on investment incorporate a 15 percent return plus a cost for the risks assumed by the industry (e.g., exploration).

Table 4-5

Estimated Costs for Delivery of Cook Inlet Gas

	Cost per MCF	
Cost Component	Onshore	Offshore
Field Development	$0.25	$0.30*
Field Operations	0.05	0.05
Pipeline Construction	0.10	0.10
Pipeline Operations	$0.01	$0.01
Subtotal	$0.41	$0.46
Risk Factor and Return on Investment	$0.25	$0.25
Total	$0.66	$0.71*

Source: Industry Sources and verified by Ed Phillips, Petroleum Economist, ANDR, 1987.

*The offshore estimates assume a sizeable field which partially offsets higher development costs.

It is evident that the sales price structure under the older contracts approaches the industry's cost structure, while the newer contracts provide a significant incentive for further exploration and development. These higher prices have encouraged development drilling activity in Cook Inlet.

It is anticipated that the price of Cook Inlet gas will move in conjunction with the price of oil. Two factors support this assumption. First, fuel oil and natural gas are close substitutes in utility applications and industrial boilers. Therefore, if the price of fuel oil goes up, natural gas should experience a similar price increase. Second, existing contracts for the purchase of Cook Inlet gas tie the price of gas to the price of oil. In the 1982 Enstar contracts for purchase of gas from Marathon and Shell, the price of gas is adjusted annually based on changes in the posted price of fuel oil at a local refinery . The existing Phillips/Marathon contract for sale of LNG to Japan ties the delivered LNG price to the BTU equivalent price of crude oil delivered to Japan (Alaska Power Authority, 1985).

Cook Inlet natural gas contracts have an energy base escalator clause that is closely tied to the price of crude oil. Table 4-6 shows expected prices for Cook Inlet natural gas that correspond to forecasted crude oil prices. The natural gas prices are based on percent changes that are identical to percent changes for crude oil for the years listed in Table 4-6.

These forecast price increases are relatively modest. The gas prices in the year 2000 are below the prices received by Cook Inlet producers in 1986 prior to the fall in world crude oil prices. However, the forecast prices are above the cost of gas production in Cook Inlet, which suggest that at these prices, the petroleum industry will continue to explore and produce as much gas as the market requires. Figure 4-2 represents a comparison of Cook Inlet gas prices and world crude oil prices.

Table 4-6

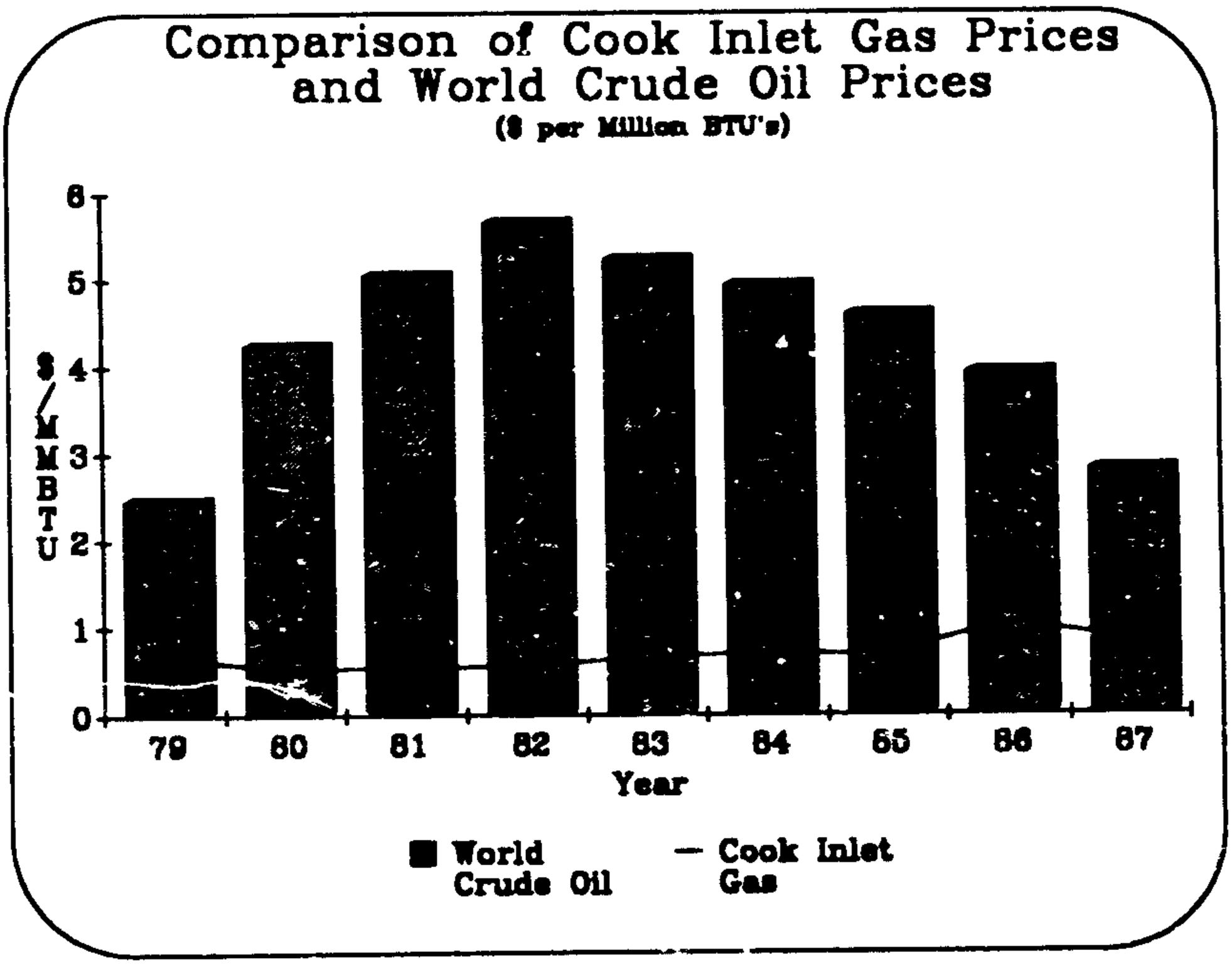
Expected Prices for World Crude Oil (50% Probability)
and Resulting Contract Prices For Delivery of Cook Inlet Natural Gas
(Constant 1987 Dollars)

Fiscal Year	World Crude Oil ($/bbl)	Alaska Contract Natural Gas Price* ($/MCF)
1987	$14.05	$1.40
1988	17.86	1.78
1989	17.25	1.72
1990	17.67	1.76
1995	18.27	1.82
2000	19.00	1.89

Sources: Crude oil forecast from Alaska Department of Revenue, 1987; natural gas calculations by Northern Economics.

*Based on 1987 actual Alaska contract prices versus world crude oil prices.

FIGURE 4-2


Comparison of Cook Inlet Gas Prices
and World Crude Oil Prices
($ per Million BTU's)
$/MMBTU
0
1
2
3
4
5
6
79
80
81
82
83
84
85
86
87
Year
World Crude Oil
Cook Inlet Gas

5.0 RAILBELT REGION SUPPLY/DEMAND BALANCE

5.1 INTRODUCTION AND SUMMARY

This section compares the results of the previous supply and demand analyses. In comparing supply and demand under the Expected and Unfavorable scenario, four scenarios are possible. These are presented in the matrix below:

NATURAL GAS AVAILABLE TO THE RAILBELT AFTER 2004

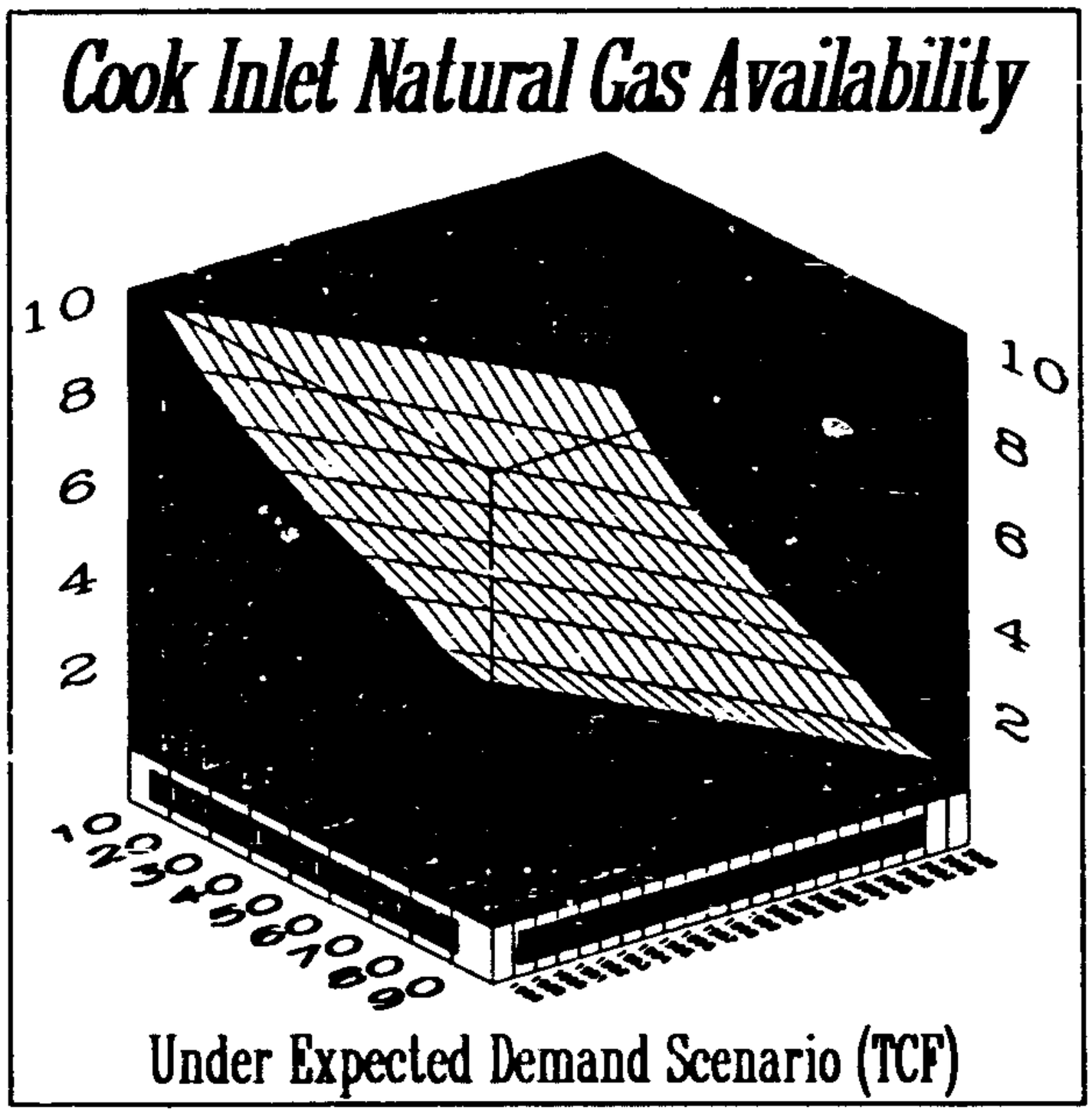
	Expected Supply	Unfavorable (Low Supply)
Expected Demand	Scenario I 3,562 bcf	Scenario II 1,982 bcf
Unfavorable (High) Demand	Scenario III 2,803 bcf	Scenario IV 1,223 bcf

Scenario I represents the most likely (expected) situation with respect to gas supply and demand. Scenario IV combines both unfavorable supply and unfavorable demand scenario to represent the worst plausible scenario. Scenarios II and III represent intermediate situations.

5.2 EXPECTED DEMAND: SCENARIO I AND SCENARIO II

Scenarios I and II both utilize the expected demand for gas. However, Scenario I assumes the expected 50 percent probability supply scenario whereas Scenario II assumes the Unfavorable supply scenario which has an 80 percent probability of being too low. Figure 5-1 illustrates the convergence of gas supply and expected demand for Scenarios I and II.

FIGURE 5-1


Cook Inlet Natural Gas Availability
10
8
6
4
2
10
8
6
4
2
10 20 30 40 50 60 70 80 90
Under Expected Demand Scenario (TCF)

As shown in Table 5-1 (the source of the data in Figure 5-1), the year 2004 estimated remaining reserves under Scenario I total 3,562 bcf. For Scenario II, which factors in the unfavorable supply scenario, the estimated remaining reserves in the year 2004 amount to 1,982 bcf. Thus for both Scenarios I and II very substantial reserves would remain following the 15-year period of the requested export authorization.

5.2 UNFAVORABLE DEMAND: SCENARIO III AND SCENARIO IV

Scenarios III and IV both assume unfavorable (high) demand for gas. However, Scenario III assumes the expected (mean) supply scenario, whereas Scenario IV assumes the unfavorable supply scenario which has an 80 percent probability of being too low. Figure 5-2 illustrates the convergence of gas supply and demand for Scenarios III and IV.

As shown in Table 5-2, the estimated remaining reserves for Scenario III total 2,803 bcf in the year 2004. For Scenario IV, which reflects the unfavorable supply scenario and represents the worst plausible scenario, estimated remaining reserves total 1,223 bcf in the year 2004. Thus, under the unfavorable supply and demand scenario for Scenario IV, considerable reserves would still remain following the 15-year period of the requested export authorization.

The results of this analysis assuming the worst plausible combination of supply and demand scenario are very conservative. Ordinarily, the supply of gas would increase in response to increasing oil prices which is the underlying premise of the Unfavorable (high demand) Case. Therefore, the combination of a <u>low</u> supply and high demand (both Unfavorable Cases) is even more pessimistic, hence more conservative, than the individual supply and demand components considered above. The fact that even the extremely conservative assumptions embodied in the Unfavorable Scenario still indicate remaining natural gas reserves constitutes compelling evidence that LNG export will not result in local scarcity.

Table 5-1

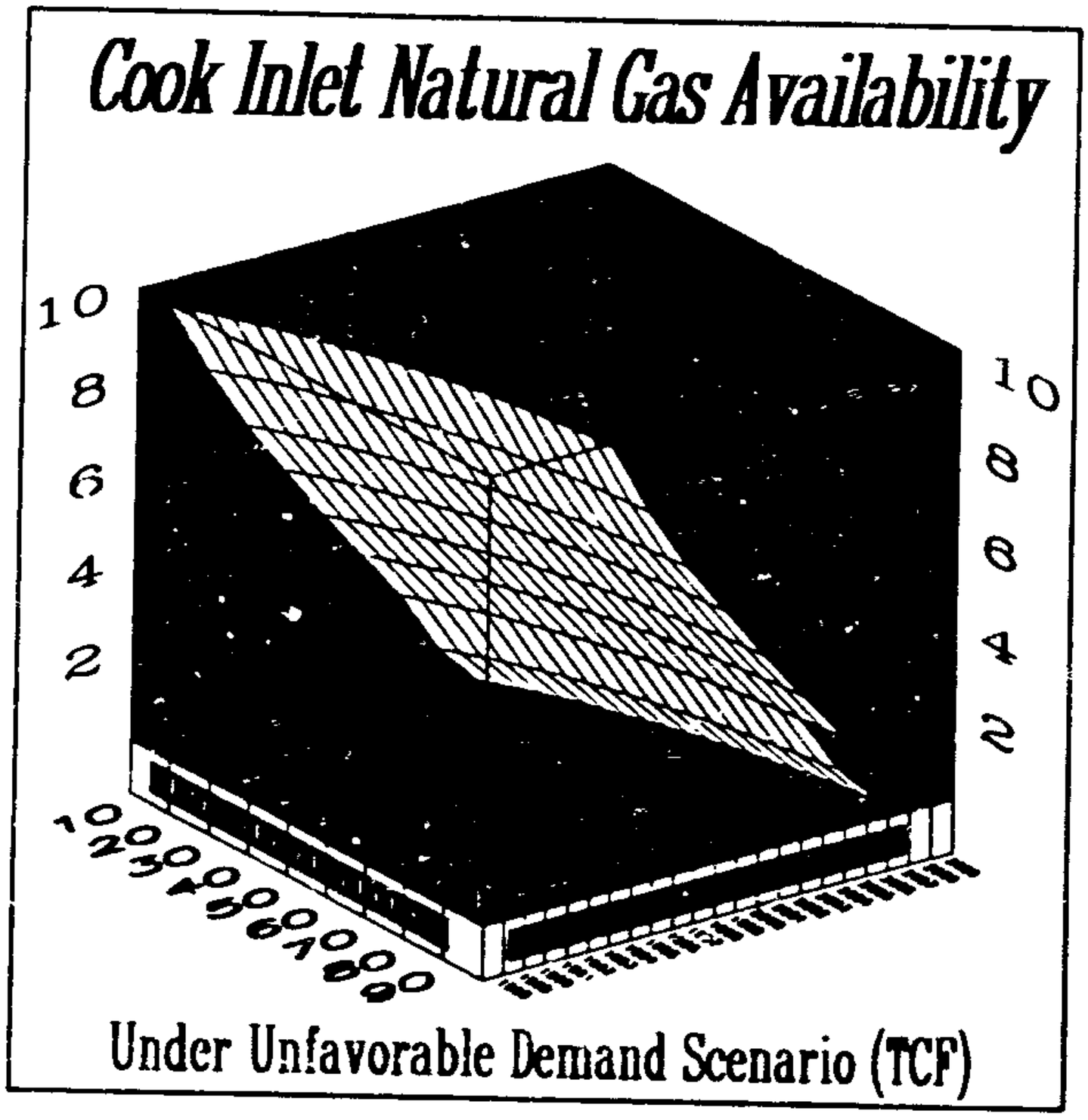
Cook Inlet Natural Gas Availability
Under Expected Demand Scenario (BCF)

Probability that Quantity Will At Least Exceed Given Value

Year	0.9	0.8*	0.7	0.6	0.5**	0.4	0.3	0.2	0.1
1988	5191	5441	6151	6591	7021	7541	8061	8821	9791
1989	4983	5233	5943	6383	6813	7333	7853	8613	9583
1990	4775	5025	5735	6175	6605	7125	7645	8405	9375
1991	4565	4815	5525	5965	6395	6915	7435	8195	9165
1992	4357	4607	5317	5757	6187	6707	7227	7987	8957
1993	4147	4397	5107	5547	5977	6497	7017	7777	8747
1994	3929	4179	4889	5329	5759	6279	6799	7559	8529
1995	3714	3964	4674	5114	5544	6064	6584	7344	8314
1996	3502	3752	4462	4902	5332	5852	6372	7132	8102
1997	3287	3537	4247	4687	5117	5637	6157	6917	7887
1998	3071	3321	4031	4471	4901	5421	5941	6701	7671
1999	2853	3103	3813	4253	4683	5203	5723	6483	7453
2000	2634	2884	3594	4034	4464	4984	5504	6264	7234
2001	2412	2662	3372	3812	4242	4762	5282	6042	7012
2002	2187	2437	3147	3587	4017	4537	5057	5817	6787
2003	1961	2211	2921	3361	3791	4311	4831	5591	6561
2004	1732	1982	2692	3132	3562	4082	4602	5362	6332

Note: * 0.8 probability represents unfavorable supply situation.
** 0.5 probability represents expected supply situation.

FIGURE 5-2


Cook Inlet Natural Gas Availability
10
8
6
4
2
10
8
6
4
2
10
20
30
40
50
60
70
80
90
Under Unfavorable Demand Scenario (TCF)

lable 5-2

Cook Inlet Natural Gas Availability
Under Unfavorable Demand Scenario (BCF)

Probability That Quantity Will At Least Exceed Given Value

Year	0.9	0.8*	0.7	0.6	0.5**	0.4	0.3	0.2	0.1
1988	5189	5439	6149	6589	7019	7539	8059	8819	9789
1989	4974	5224	5934	6374	6804	7324	7844	8604	9574
1990	4756	5006	5716	6156	6586	7106	7625	8386	9356
1991	4536	4786	5496	5936	6366	6886	7406	8166	9136
1992	4302	4552	5262	5702	6132	6652	7172	7932	8902
1993	4059	4309	5019	5459	5889	6409	6929	7689	8659
1994	3805	4055	4765	5205	5635	6155	6675	7435	8405
1995	3547	3797	4507	4947	5377	5897	6417	7177	8147
1996	3285	3535	4245	4685	5115	5635	6155	6915	7885
1997	3018	3268	3978	4418	4848	5368	5888	6648	7618
1998	2744	2994	3704	4144	4574	5094	5614	6374	7344
1999	2464	2714	3424	3864	4294	4814	5334	6094	7064
2000	2178	2428	3138	3578	4008	4528	5048	5808	6778
2001	1885	2135	2845	3285	3715	4235	4755	5515	6485
2002	1587	1837	2547	2987	3417	3937	4457	5217	6187
2003	1282	1532	2242	2682	3112	3632	4152	4912	5882
2004	973	1223	1933	2373	2803	3323	3843	4603	5573

Note: *.8 probability represents unfavorable supply situation;
**.5 probability represents expected supply situation.

6.0 ALTERNATIVE OUTCOMES IMPACT ANALYSIS

The ERA decision regarding the Phillips/Marathon LNG export authorization could result in three outcomes. The first outcome preserves the status quo pursuant to which LNG from the Kenai plant continues to be exported t Japan. The second outcome consists of continued LNG production; however, the LNG would be exported to the lower 48 instead of to Japan. The third outcome would involve neither LNG production nor export to either of the two destinations under a plant closure situation.

Sections 2.0 through 5.0 of this report have examined natural gas supply and demand from an Alaska perspective. This section examines the impacts which might occur if the Kenai LNG facility is shut down or if the LNG were to be restricted to lower 48 markets. Section 6.2 describes the local and regional employment, income and revenue impacts which would result from cessation of LNG production. Section 6.3 shifts to a national and international perspective to examine the strategic importance of the LNG export to Japan. Section 6.4 discusses the feasibility of delivering Kenai LNG to terminals in the lower 48 states.

6.1 SUMMARY OF ALTERNATIVE OUTCOMES ANALYSIS

The results of the alternative outcomes impact analysis are summarized as follows:

- Cessation of the LNG plant operations would result in the direct loss of 97 jobs and $3.9 million in personal income and the loss of 58 indirect jobs and $1.6 million in indirect personal income in the Kenai Peninsula area. Loss of revenues associated with production of natural gas feedstock used in LNG manufacture would result in the near-term loss of $14.6 million annually in personal income and 413 jobs.

- Thus cessation of LNG operations would result in an estimated loss of $20.2 million in personal income and 568 jobs (direct and indirect).

- Japan has made attempts to reduce its dependency on oil through energy policies aimed at energy diversification both by type of energy source and by geographic distribution. Discontinued export of Kenai LNG to Japan would hamper these efforts as well as result in a negative effect on the U.S./Japan balance of trade. Discontinued LNG exports would also adversely affect Japan's efforts to reduce its strategic vulnerability.

- Export of Kenai LNG to the lower 48 states is not economically feasible in that transportation costs to the lower 48 are higher than to Japan, and Kenai operators would face lower netback prices. Market demand for LNG in the lower 48 does not exist now nor is it likely to exist in the foreseeable future. No west coast LNG receiving facilities currently exist, and none are anticipated.

6.2 LOCAL/REGIONAL EFFECTS OF LNG PRODUCTION

The Kenai Peninsula Borough within which the Phillips-Marathon LNG facility is located has an estimated population of 39,000 dispersed throughout a land area of 25,600 square miles (Kenai Peninsula Borough, 1987). Most of the population is concentrated in the Central Peninsula around the twin cities of Kenai and Soldotna where over 60 percent of the population resides. Other population centers are Homer to the south and Seward to the southeast.

6.2.1 Regional Economic Base

Petroleum, commercial fishing and tourism dominate the economy of the region. Petroleum production began in the Cook Inlet region in 1959, and since that time, over 1 billion barrels of oil have been produced. Oil production peaked in 1970, and with annual production currently at less than

one quarter of the peak year, the fields are relatively mature. In contrast, gas production continues to expand. However, the expansion is slow primarily because of the absence of local markets. Petroleum production on the Kenai Peninsula directly employs about 850 people (Alaska Department of Labor, 1987).

The Phillips-Marathon LNG facility is located on the shores of Cook Inlet north of the City of Kenai The facility is one of four petrole processing installations in a complex which includes the Chevron refinery, the Tesoro refinery and the Union Chemical ammonia-urea plant. Together these plants form the petroleum processing component of the economic base of the economy and directly employ about 400.

A second basic industry of the area is commercial fishing, which consists of fish harvesting and processing. Both activities are not only highly seasonal but also fluctuate dramatically from year to year and over longer cycles with the size of the salmon, bottomfish and shellfish harvests. Statistics on the number of workers engaged in fish harvesting are unavailable because most fishermen are independent proprietors, but data on fish processing illustrates the cyclical nature of the industry. In 1985, average annual fish processing employment was about 1,200, considerably greater than the previous year when it was approximately 900. Employment is concentrated in the summer months with July employment ten times the winter employment levels.

Because of the region's many parks, excellent fishing and spectacular scenery, tourism is a significant basic industry. This industry has grown in response to growth in the nearby population center of Anchorage where the majority of the tourist visitors to the Peninsula originate. A significant portion of the jobs in the trade, service, and transportation sectors of the economy can be attributed to tourism. The fact that July traffic counts along the major highways generally exceed the annual average by 100 percent while

January traffic levels are about 50 percent of the annual average, indicates the highly seasonal nature of this industry (Kenai Peninsula Borough, 1987).

6.2.2 Regional Employment

In 1986, non-agricultural wage and salary employment in the Kenai Peninsula Borough was 11,435. An estimated 1,600 self-employed and military brought the total to 13,035. State and local government employment represents the largest component with a total of 2,930 jobs. The government sector, which has always been significant to the economy, has grown in size in recent years. Government employment, however, is subject to fluctuations based upon the volatility of state petroleum revenues, which are the source of the majority of state and local revenues. The construction industry, largely dependent upon government spending and capital expenditures of the petroleum industry, is also important to the local economy, having accounted for about 10 percent of the jobs in recent years. This industry is also quite seasonal.

The economy can thus be characterised as small, with a few basic sectors dependent largely on natural resource production and processing. The economic base tends to be cyclical, not only over the seasons but also from year to year, as commodity prices and resource stocks fluctuate. A significant number of people living on the Peninsula commute to petroleum-related jobs on the North Slope, and a significant number of jobs in the private sector are dependent upon state and local government grants funded from petroleum revenues. Thus, the dependence of the economic base on a few resources is greater than the employment numbers alone would suggest.

Economic growth was particularly rapid in the early 1980s because of high oil prices and growing state and local government spending in the region. In late 1985 a statewide recession began, resulting in significant reductions in the number of jobs and population in the Kenai Peninsula Borough. This effect is also evident in other parts of the state. The recession, as measured by the decline in the number of jobs in the economy, is expected to continue into

the middle of 1988 at which time a slow and protracted recovery will begin. Exact figures on the loss of jobs and population in the Kenai Peninsula Borough attributable to the recession are unavailable; however, the loss is comparable to statewide proportions. The state economy has suffered a job loss of about 10 percent over the last two years. The unemployment rate of 13.1 percent in the Kenai Peninsula is currently the second highest in the state (Alaska Department of Labor, 1987).

6.2.3 Role of LNG Facility in Local Economy

Because of its constant rate of production, the Phillips/Marathon LNG manufacturing facility provides an important source of stability to the economy, helping to offset both seasonal and cyclical fluctuations in other basic activities. The plant currently has full-time employment of 43, part-time employment of 3, and an annual wage bill of $2,496,000 or more than $54,000 annually per employee (Porter, 1987). Although accounting for less than 0.4 percent of the non-agricultural wage and salary employment in the region, plant wages directly account for 0.8 percent of the total payroll in the region (Table 6-1). In addition, Marathon employs three full-time personnel in the Borough to work on LNG transporation matters.

The total income and employment added to the economy by the plant includes a number of other direct activities of the facility as well as the multiplier effect from local purchases by employees. Other direct effects on the economy are associated with the local purchase of commodities and services by the plant in the normal course of operations and maintenance, the periodic purchases for repair, replacement and upgrading of facilities including construction employment, the ships which dock at the facility to transport the LNG, and the local taxes paid by the plant.

The local purchases of the plant itself are estimated to average $2 million annually (Porter, 1987). On average, a ship docks at the plant every nine days and spends two days loading. During this time, the ship purchases

Table 6-1

ECONOMIC IMPACTS OF LNG PRODUCTION
(Based on Current Operations)

		ALASKA PERSONAL INCOME (000)					AVERAGE ANNUAL EMPLOYMENT (ALASKA ONLY)			
	ANNUAL AMOUNT	DIRECT P.I.	INDIRECT P.I.	TOTAL[A] P.I.		DIRECT EMPLOYMENT	INDIRECT[J] EMPLOYMENT	TOTAL EMPLOYMENT	
LNG MANUFACTURE									
Plant: Payroll	$ 2,496	$2,496	$ 998	$ 3,494		46	37	83	
Plant: Local Procurement	$ 3,000[B]	$ 900[C]	$ 360	$ 1,260		33[K]	13	46	
Plant: Local Taxes	$ 700[D]	$ 560[E]	$ 224	$ 784		18[L]	8	26	
		$3,896	$1,582	$ 5,538	Subtotal	97	58	155	Subtotal
LNG GAS FEEDSTOCK									
Production: Payroll	$ 2,500[F]	$2,500	$1,000	$ 3,500		50[M]	37	87	
Production: State Taxes/Royalties	$14,214[G]	$7,323[H]	$2,929	$10,252		209[N]	108	317	
Production: Private Royalties	$ 3,072[I]	$ 614	$ 246	$ 860		-	9	9	
				$14,612	Subtotal			413	Subtotal
				$20,150	Grand Total			568	Grand Total

SOURCE: ISER Calculations

NOTES:

A. Conservative multiplier of 1.4 used.
B. Ships and crew $1 million, Plant $2 million.
C. Local value added 30% component of local procurement.
D. Local property tax.
E. Local govt. spending is 80% personnel.
F. Estimate by author based on allocation of total production employment.
G. State royalties and severance taxes on Kenai and North Cook Inlet production for LNG, production related local property tax (400K) as well as state income tax (41K) included.
H. 25% of royalties deposited in Permanent Fund, 60% of remainder is personnel.
I. Paid to Cook Inlet Region, Inc., an Alaska Native Corporation, with 20% becoming local value added.
J. Average annual support payroll is $27K, not including benefits.
K. Based on average support payroll of $27K.
L. Average annual local government payroll is $31K, not including benefits.
M. Average annual production payroll is $50K, not including benefits.
N Average annual state government payroll is $35K, not including benefits.

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provisions, and the 37 sailors make local purchases which are estimated to total $100,000 annually (Porter, 1987). The amount spent on ship provisions is estimated to be $900,000 annually. In addition, the plant pays approximately $700,000 annually in property taxes to the Borough. This is a significant proportion of total Borough tax revenues which currently total about $16 million annually. A majority of this tax revenue is used to support the employment of approximately 18 local government employees.

The local purchases of the plant and the ships along with those of the plant employees and government workers generate local sales, employment and income impacts in the support sectors of the economy via the economic "multiplier." With the inclusion of these secondary and induced effects, the annual contribution of the plant to the local economy is estimated to be $5.5 million in personal income, and 155 full time equivalent jobs. The proportion of jobs directly attributable to the plant is low because of the high average wage paid at the plant relative to all the jobs in the economy. These high wages support a relatively large number of lower paying support jobs. The locally generated gross business sales exceed the contributions to personal income; however, this is an undetermined amount because a significant component of the cost of gross sales will be allocated for the purchase of non-Alaskan inputs by businesses.

Gas production for the LNG facility also represents a significant economic impact on both the local and state economies. Total employment in the region attributable to gas production is estimated to be 87 jobs (direct and indirect) which produce $3.5 million in personal income. Gas production generates $14.2 million in state taxes and royalty payments as well as $3.1 million in royalties to private citizens and corporations in the state. The state revenues directly support employment of 209 state and local government employees throughout the state. The total economic impact of royalties and taxes is employment of 317 and personal income of $10.3 million. LNG feedstock production thus accounts for a total of 413 jobs and $14.6 million in personal income (direct and indirect).

Thus, if LNG manufacture were halted, economic losses to the State of Alaska would be considerable. The combined impact of feedstock gas production and LNG manufacture accounts for 568 jobs and $20.2 million in personal income. Direct and indirect local government losses would total almost $800,000 per year. Lost state revenues from taxes and royalties would total more than $10 million per year.

6.3 STRATEGIC AND ECONOMIC SIGNIFICANCE OF LNG EXPORT TO JAPAN

Thus far this report has focused on the importance of Cook Inlet gas from the Alaska perspective. This section shifts the focus from the local to the national and international perspective. Japan is an important U.S. trading partner and political ally. Although Kenai LNG provides Japan with a minor part of its total energy supply, the Kenai LNG is important in maintaining diversity of supply and price stability. The balance of trade benefits from continued LNG exports are likewise small, but strategically important.

6.3.1 Japan's Energy Balance

Japan has limited quantities of energy-producing natural resources such as produceable oil, natural gas and coal within its borders. Hydro power and geothermal electric generation are other limited primary energy resources in Japan. As a result, Japan imports over 80 percent of its energy requirements. This, coupled with the high energy dependence of its technical manufacturing economy, causes Japan to be extremely vulnerable to either energy price increases or reduced energy availability.

Table 6-2 provides an overview of Japan's 1986 consumption, production and imports of oil, natural gas, coal and nuclear and hydroelectric generation. As shown in Table 6-2, oil, natural gas and coal provide 84 percent of Japan's raw energy requirements, and over 96 percent of these resources are imported. Japan relies on oil for over 50 percent of its energy requirements and, most importantly, nearly 100 percent is imported. Natural gas, used principally as

a clean fuel to generate electricity, provides 10 percent of the primary fuel requirement. Nearly 95 percent of the gas is from imported liquefied natural gas. Coal consumption represents 19 percent of the primary energy requirement, with imports representing 85 percent of the coal used.

TABLE 6-2

JAPAN'S 1986 PRIMARY ENERGY USE
Million Tonnes of Oil Equivalent
(MTOE)

	OIL	NATURAL GAS	COAL	NUCLEAR	HYDRO	TOTAL
Consumption	204.4 (54.9%)	36.4 (9.8%)	70.2 (18.9%)	41.4 (11.1%)	19.6 (5.3%)	372.0 (100%)
Production	0.6 (0.8%)	1.9 (2.6%)	10.6 (14.3%)	41.4 (55.9%)	19.6 (26.5%)	74.1 (100%)
Imports	203.8 (68.4%)	34.5 (11.6%)	59.6 (20.0%)	0.0 (0%)	0.0 (0%)	297.9 (100%)
Imports as a Percent of Consumption	99.7%	94.8%	84.9%	0.0%	0.0%	80.1%

Source: BP Statistical Review of World Energy, June 1987.

Japan's high dependence on energy imports leaves it strategically and economically vulnerable. Japan relies heavily on oil from the Persian Gulf because of geography and resource availability. To alleviate the economic hardship that could result from oil supply disruptions, Japan has taken steps to develop alternatives to oil in meeting its long-term primary energy requirements. Policies such as developing new coal and nuclear facilities to meet electrical base load requirements while using LNG to meet intermediate

and peak load requirements have enabled Japan to achieve a more diversified supply of energy.

Table 6-3 and Figure 6-1 illustrate the success of Japan's energy policies. In the ten years since 1976, oil dependency has dropped by about 20 percent while natural gas use has increased over 290 percent. Coal has increased 34 percent and nuclear generated electric generation has increased 360 percent. Hydropower generation has held steady during the ten-year period.

6.3.2 Japan's Future Energy Requirements

Japan's overall energy requirements are forecasted to increase by nearly 150 million tonnes of oil equivalent (MTOE) between 1986 and 2010 (IEE, December 1986). This is a nearly 40 percent growth in primary energy requirements. Increases in LNG (87 percent) and nuclear (168 percent) fill most of the increase in forecasted energy requirements. Only modest or marginal growth is forecasted for use of the other energy sources. By the year 2000, Japan will need between 22 MTOE and 32 MTOE of LNG annually above 1986 levels (Peebles, June 1986). This implies that LNG imports will have to nearly double from present levels to meet the anticipated LNG goal. Table 6-4 presents Japan's future energy needs. Figure 6-2 illustrates Japan's historic and future natural gas consumption.

TABLE 6-3

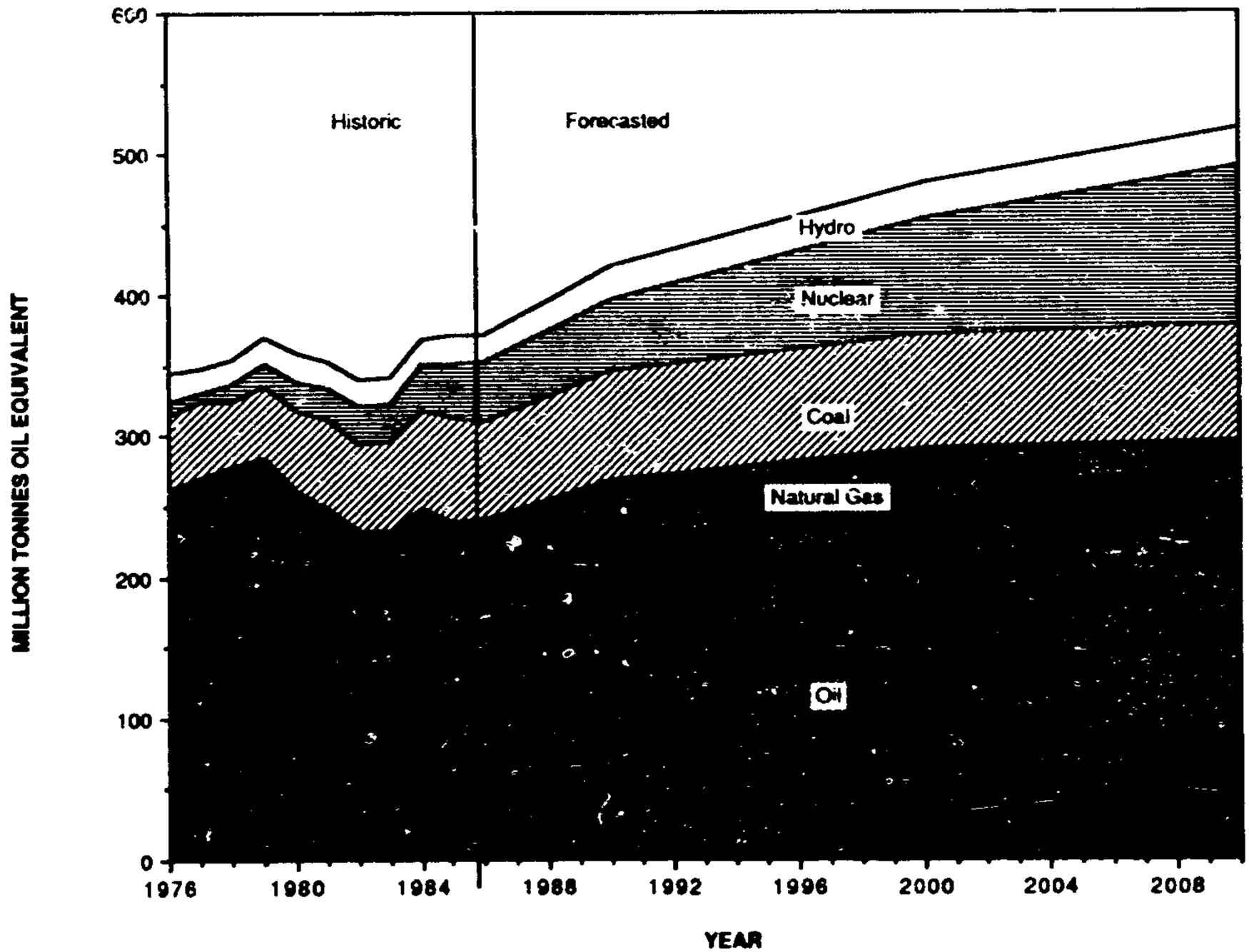
USE OF PRIMARY FUELS IN JAPAN
Millions of Tonnes in Oil Equivalent
(MTOE)

YEAR	OIL	NATURAL GAS	COAL	NUCLEAR	HYDRO	TOTAL
1976	253.5	9.3	52.5	9.0	20.4	344.7
1977	260.4	10.9	52.5	6.9	17.4	348.1
1978	262.7	15.8	46.5	12.7	16.8	354.5
1979	265.1	20.3	50.4	14.9	19.2	369.9
1980	237.7	23.4	57.6	20.1	20.8	359.6
1981	223.9	24.2	63.9	21.5	20.3	353.8
1982	207.8	24.7	62.0	27.0	19.5	341.0
1983	207.2	25.2	63.0	27.5	19.5	342.4
1984	215.1	33.6	69.9	33.3	17.7	369.6
1985	203.4	35.9	73.7	37.8	20.6	371.4
1986	204.4	36.4	70.2	41.4	19.6	372.0
Percent Growth 1976-1986	-19	291	34	360	-4	8

Source: BP Statistical Review of World Energy, June 1987.

FIGURE 6-1

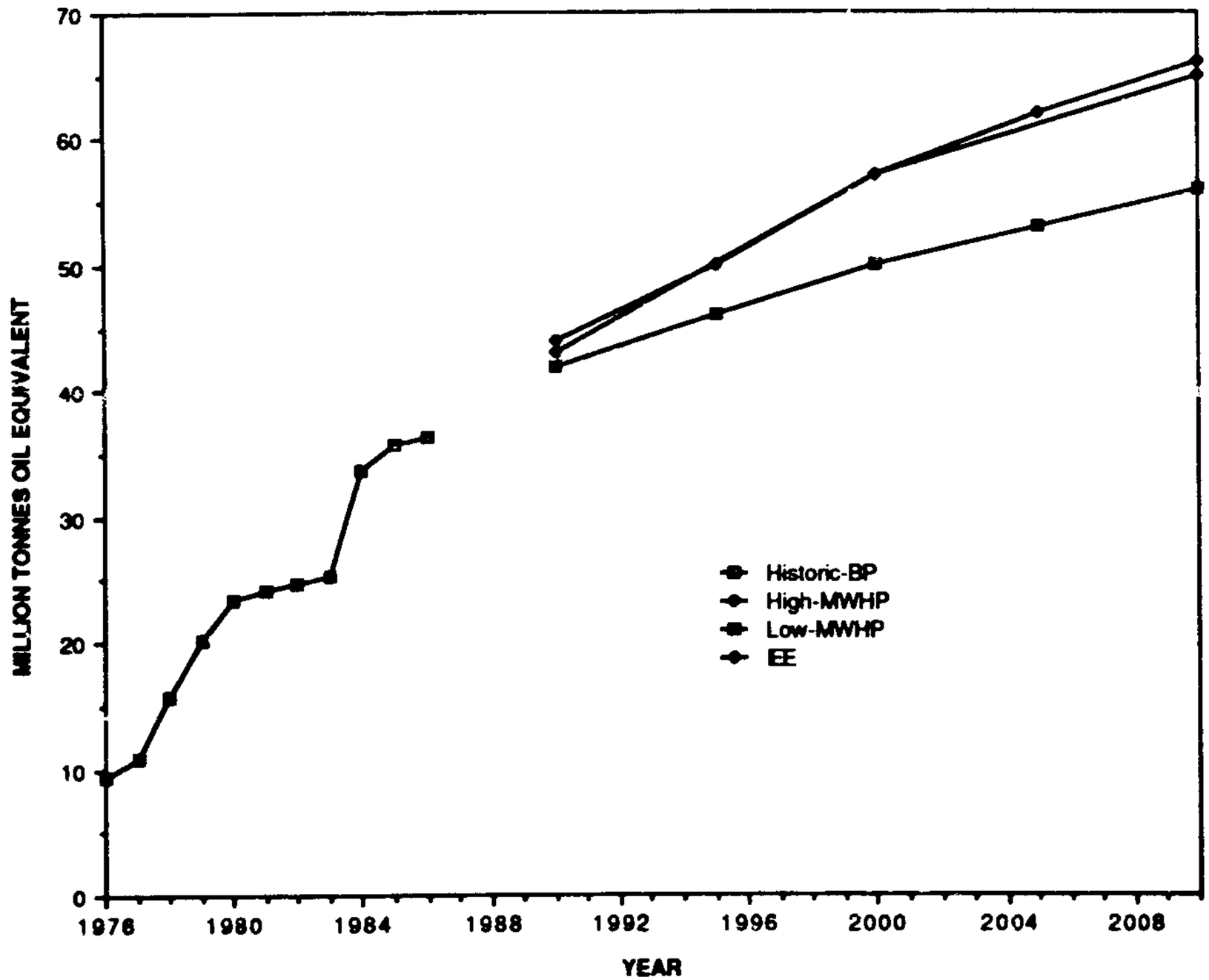
USE OF PRIMARY FUELS IN JAPAN



Source: BP Statistical Review of World Energy, June 1987
Institute of Energy Economics, Japan, Dec 1986

FIGURE 6-2

JAPAN: HISTORIC AND FORECASTED NATURAL GAS CONSUMPTION



Source: BP Statistical Review of World\Energy, June 1987
M. W. H. Peebles, World LNG Trade: Prospects to the Year 2010, June 1986
Institute of Energy Economics,Japan, Dec 1986

TABLE 6-4

JAPAN'S ENERGY SUPPLY AND DEMAND FORECAST
MTOE

	1990	2000	2010
Oil Demand	224	231	228
Oil Production	0.55	0.6	0.6
Oil Import	224	230	227
Natural Gas Demand	45	60	68
Natural Gas Production	2	3	3
Natural Gas Import	43	57	65
Coal Demand	77	81	83
Coal Production	6	4	3
Coal Import	71	77	80
Nuclear Energy	52	82	111
Hydro & Geothermal	23	25	27
Other	1	1	2
Total Demand	422	479	519
Total Production	84	120	154

Source: Institute of Energy Economics, Japan. Prospects for Japan's Energy Supply and Demand in the Years 2000 and 2010, December 1986.

6.3.3 Japan's Present and Future Potential LNG Source

Present LNG projects dedicated to Japan are listed in Table 6-5. Seven projects are operational with the combined capability to produce 34.4 MTOE. These facilities are fully operational, because Japan's 1986 import levels were 34.5 MTOE. An eighth project located on the Australian N.W. Shelf is scheduled to start operations in 1989. The Australian project will have a capability to produce 7.1 MTOE. This project would bring Japan's 1990 imports to 41.5 MTOE, well within the forecasted range in requirements. Clearly, to

meet longer term needs, Japan will need to both maintain existing projects and secure between 15 and 25 MTOE of new LNG sources.

Examination of the resources supporting the existing projects indicates that the Malaysian and Indonesian projects are capable of being expanded (see Table 6-5). Expansion of the other remaining projects is less certain. There is some question whether Japan would wish to increase Indonesian imports (Ikuta, March 1987). Japan is already nearly 50 percent dependent on Indonesia for present LNG deliveries. Additional quantities of LNG from Indonesia without further diversification would raise Japan's dependence, and therefore, its vulnerability.

There are several countries with resources that potentially could be developed for LNG trade. These include Thailand, the USSR (Sakhalin), the U.S. (Prudhoe Bay, Alaska), the Bonaparte Gulf off Australia and Chile. Japan currently purchases about 80 percent of the world's annual LNG production. Competition for LNG from neighboring South Korea and Taiwan is growing. These countries are only beginning to utilize LNG; however, it is projected that they, in combination, will import 13 MTOE in LNG by 2010 (Peebles, June 1986). This competition for LNG places more pressure on Japan to both maintain its existing LNG supply sources and develop new ones. Table 6-6 provides historical information on total LNG imports to Japan and the percent which Alaska supplies.

TABLE 6-5

JAPAN'S LNG SUPPLY PROJECTS
MTOE

	START-UP	PLATEAU VOLUME	CONTRACT EXPIRES	POTENTIAL FOR EXTENSION	POTENTIAL FOR EXPANSION
Alaska	1969	1.2	1989	Yes	Possible
Brunei	1972	6.3	1993	Yes	Limited
Abu Dhabi	1977	2.6	1997	Yes	Minimal
Indonesia I	1977	9.1	1999	Yes	Yes
Indonesia II	1983	3.9	2003	Yes	Yes
Indonesia III	1983	4.0	2003	Yes	Yes
Malaysia	1983	7.3	2003	Yes	Yes
Australia	1989	7.1	2009	Yes	Likely

Source: Peebles, M. W. H., World LNG Trade: Prospects to the Year 2010, Papers Eighth International Conference on Liquified Natural Gas, Vol. 1, June 15-19, 1986.

For Japan to maintain an acceptable level of LNG dependence from a single source, it is important that existing projects such as the Phillips/Marathon project continue to provide LNG to Japan and that new potential sources of LNG outside Indonesia are developed.

6.3.4 Japan in the World Economy

Japan is a major world trading power. In 1985, Japan exported in excess of $175 billion in goods to more than 38 countries (Keizai Koho Centers, September 1986). The U.S. received approximately 37 percent of the total value of Japan's export goods. In 1985 Japan imported over $129 billion in goods, with the U.S. providing 20 percent of the total import value.

Table 6-6

LNG Imports to Japan
1969-1986

	Total Imports (MTOE)	Imports From Alaska as a Percent of Total
1969	0.1	100.0
1970	1.1	100.0
1971	1.3	100.0
1972	1.3	92.9
1973	2.7	45.2
1974	4.4	28.8
1975	5.5	24.3
1976	7.1	17.7
1977	8.4	15.5
1978	13.4	9.1
1979	18.1	7.1
1980	21.4	5.3
1981	22.3	6.3
1982	22.9	5.5
1983	23.3	5.7
1984	31.7	4.2
1985	33.9	3.9
1986	34.5	3.7

BP Statistical Review of World Energy, 1982, 1985, 1987.

DOE/EIA, Natural Gas Monthly for May 1987, published July 1987.

Japan's world balance of trade has improved significantly since the early 1980s. As shown in Table 6-7, Japan has been able to reverse its negative balance of trade in 1979-80 to a positive balance of trade of $46.1 billion in 1985.

The U.S. has been a major contributor to Japan's balance of trade with a continuing positive balance of trade in Japan's favor. In the early part of the decade this helped to offset negative balances of trade with other countries. The U.S.'s contribution continues to be large (over 85 percent of Japan's world balance of trade in 1985) while the remaining countries in the world during 1983-85 imported more from Japan than they exported to Japan.

6.3.5 U.S.-Japan Balance of Trade

The U.S. has maintained a substantially negative balance of trade with Japan in recent years. As seen on Table 6-7, the negative U.S.-Japan trade balance has been increasing through the 1980s and stood at $40 billion in 1985. The value of 1985 LNG exports alone represents 0.6 percent of that balance. Although no single export project can be expected to reverse the trade balance between the two nations, the LNG export is significant both in its absolute and its symbolic significance in correcting the trade imbalance.

6.4 IMPACT OF KENAI LNG DELIVERY TO THE LOWER 48 STATES

If Kenai LNG is not exported to Japan, it could conceivably be used domestically. However, as discussed in this section, the economic conditions which would render LNG delivery to the lower 48 economically viable are quite improbable.

6.4.1 Status of Lower 48 LNG Terminals

The lower 48 states have three operational LNG terminals located on the eastern seaboard and one on the coast of the Gulf of Mexico. These are

TABLE 6-7

ECONOMIC COMPARISON OF JAPAN
WITH THE USA AND THE WORLD
(U.S. $ In Billions)

Year	Japan Exports to USA	Japan Exports to Other Countries	Japan Exports to World Total	Japan Imports from USA	Japan Imports from Other Countries	Japan Imports from World Total	Japan Balance of Trade USA	Japan Balance of Trade Other Countries	Japan Balance of Trade World Total
1973	9.5	27.4	36.9	9.3	29.0	38.3	0.2	-1.6	-1.4
1974	12.8	42.7	55.5	12.7	49.4	62.1	0.1	-6.7	-6.6
1975	11.1	44.7	55.8	11.6	46.3	57.9	-0.5	-1.6	-2.1
1976	15.7	51.5	67.2	11.8	53.0	64.8	3.9	-1.5	2.4
1977	19.7	60.8	80.5	12.4	58.4	70.8	7.3	2.4	9.7
1978	24.9	72.6	97.5	14.8	64.5	79.3	10.1	8.1	18.2
1979	26.4	76.6	103.0	20.4	90.3	110.7	6.0	-13.7	-7.7
1980	31.4	98.4	129.8	24.4	116.1	140.5	7.0	-17.7	-10.7
1981	38.6	113.4	152.0	25.3	118.0	143.3	13.3	-4.6	8.7
1982	36.3	102.5	138.8	24.2	107.7	131.9	12.1	-5.2	6.9
1983	42.8	104.1	146.9	24.6	101.8	126.4	18.2	2.3	20.5
1984	59.9	110.2	170.1	26.9	109.6	136.5	33.0	0.6	33.6
1985	65.6	110.0	175.6	25.8	103.7	129.5	39.8	6.3	46.1

Keizai Koho Center, Japan 1983, *An International Comparison*, September 22, 1983, pg. 32.

Keizai Koho Center, Japan 1986, *An International Comparison*, September 30, 1986, pg. 40.

located at Everett in Massachusetts, Cove Point in Maryland, Elba Island in Georgia and Lake Charles in Louisiana. It is very likely that two of these facilities will be operated during 1988, while the others will be maintained for future deliveries.

Distrigas, a subsidiary of the Cabot Corporation operates the Everett, Massachusetts terminal. It has an operational capability of regassifying about 100 million feet per day (mmcfd). Distrigas received a shipment of Algerian LNG on January 2, 1988. A total of 17 cargoes per year (47.5 trillion Btu's) are anticipated under new contract terms (LNG Surveillance - 8377, December 1987).

Trunkline LNG Company operates the Lake Charles, Louisiana terminal. The LNG regassification facility has the capacity to operated at 700 mmcfd. The facility has been maintained in a state of suspension and could become operational with a lead time of about 30 days. A sister company, Pan National Gas Sales, is awaiting approval of an application to import the equivalent of 450 mmcfd from Algeria for a period of 20 years. It is reported that the price for the imports must be competitive for a confirmed end use customer (Price, November 1987).

Columbia LNG Corporation operates the Cove Point, Maryland terminal. It has the capability of regassifying 1,000 mmcfd. This facility has been maintained to receive future LNG deliveries. It would require from 12 months to 18 months to become fully operational.

Southern Energy Company operates the Elba Island, Georgia terminal. This facility last received a shipment of LNG in April 1980. Southern continues to maintain the facilities in anticipation of future deliveries (Wingenroth, July 1986).

6.4.2 Economics of LNG Delivery to the Lower 48

The cost to transport LNG to the lower 48 terminals from Kenai will be higher than to Japan for two reasons: (1) the distances are greater, and (2) potentially smaller ships would be needed.

The distance from Kenai to the lower 48 terminals via the Panama Canal is between 4,700 and 5,100 nautical miles. In comparison, the distance between Kenai and Japan is 3300 nautical miles. The use of the 125,000 cubic meter LNG tankers would require a shipping route many thousands of miles longer than the shorter route through the Panama Canal. Although LNG has been shipped from the Kenai facility to the Everett facility in the past, smaller LNG tankers made the deliveries so that passage through the Panama Canal could be accomplished (Auchy, November 1987). Using the shorter Panama Canal route results in increased transportation costs because the smaller LNG tankers would need to make additional trips to deliver the same amount of LNG.

In 1986, the operators of the Kenai facilities received $2.91 per mcf equivalent for their LNG delivered to Japan (EIA, July 1987). LNG delivered to the lower 48 terminals, however, would have to be competitively priced to compete with either gas or fuel oils, depending on the market. An upper bound landed price (excluding transportation, distribution, and regassification costs) would be in the area of $2.75 per mcf based on an averaged delivered gas price of $5.51 per mcf to all customers in the New England-Middle Atlantic states for 1986 (EIA, November 1987). To compete with fuel oils, the landed LNG price would have to be considerably less than the upper bound set by natural gas ($2.75) based on low sulfur residual fuel oil averaging $3.43 per MMBTU in 1986 in postings for New York Harbor (Platts, 1987). Thus, the delivered price to Japan is slightly higher than the upper bound competitive price for the lower 48.

The greater distance to the lower 48 facilities and potential use of smaller vessels would make such a transaction less attractive to the Kenai operators. Transportation costs to the lower 48 would be higher than to Japan. This, coupled with a lower delivered price to the lower 48 states, leads to a lower netback to Phillips and Marathon -- potentially below economic viability.

Finally, in Japan end-users directly purchase energy imports on a long term basis. For LNG to be successful in the lower 48, a similar approach might be required. Natural gas supplies are in surplus with much gas shut in. Any new supplies entering the lower 48 market with large associated capital costs in terminaling, transporting and processing would have difficulty without first being competitively priced and second, having an identified committed market. Otherwise, a constant threat of being substituted for a more favorably priced supply would be present.

The prospects of finding specific markets for Kenai LNG in the lower 48 states would be difficult. Although some large end users may seek alternative gas supplies, other closer and potentially more competitive sources are available.

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APPENDIX A

ECONOMIC AND GAS MARKET ASSUMPTIONS

PHILLIPS/MARATHON KENAI LNG ANALYSIS
ECONOMIC AND GAS MARKET ASSUMPTIONS

	EXPECTED CASE (LNG B)	UNFAVORABLE CASE (LNG.H)
A. PETROLEUM REVENUE ASSUMPTIONS		
1. Average Expected OPEC Price	Real world oil price fluctuates around the current $17 (1987) benchmark until 1990. After that, it rises .7 percent annually in real terms. This assumption is from the mean case from the Alaska Department of Revenue Sept 1987 Petroleum Production Revenue Forecast (DORS7.50).	Real world oil price increases from current $17 (1987) benchmark to $20.01 in 1990 and henceforth grows at an annual rate of 4.1 percent in real terms. This assumption is from the 80th percentile case from the Alaska Department of Revenue September 1987 Petroleum Production Revenue Forecast (DORS7.80).
2. Petroleum Production--North Slope & Cook Inlet	Total oil production peaks in 1989 at 722 million barrels annually and gradually declines with the depletion of the giant Prudhoe Bay field to 508 million barrels per year in 1995 and 241 million in 2003. Producing fields include Prudhoe Bay, Kuparuk, West Sak, Lisburne, Endicott, Milne Point, Cook Inlet, and other small onshore and offshore fields (DORS7.50).	Same as EXPECTED SCENARIO.
3. Severance Taxes [RPTS]	Calculated from assumptions on price and production. Current tax structure assumed. After 2003, revenues remain constant in nominal dollars (DORS7.50). Revenues from settlement of Alyeska pipeline tariff dispute included.	Consistent with assumptions on price and production (DORS7.80).
4. Royalties [RPRY]	Calculated from assumptions on price and production. Current royalty structure assumed. After 2003, revenues remain constant in nominal dollars. These revenues are distributed between the General Fund and Permanent Fund (DORS7.50).	Consistent with assumptions on price and production (DORS7.80).

NOTES: The Economic Scenarios are S87.LNGB and S87.LNGH.
The Fiscal Scenarios are A6.3LNGB and A6.3LNGH.

Codes in parentheses indicate ISER names for MAP Model SCEN_ case files, and codes in brackets indicate MAP variable names.

	EXPECTED CASE (LNG.B)	UNFAVORABLE CASE (LNG.H)
5. Bonuses [RPBS]	Alaska receives $500 million over the period FY 1989 to 1992 in settlement of disputed offshore leases in the Beaufort Sea. Also treated as bonuses are $500 million received between 1991 and 1995 in settlement of lawsuits and tax disputes regarding the valuation of North Slope oil. These revenues are distributed between the General Fund and Permanent Fund.	Alaska receives $500 million over the period FY 1989 to 1994 in settlement of disputed offshore leases in the Beaufort Sea. Also treated as bonuses are $800 million received between 1991 and 1998 in settlement of lawsuits and tax disputes regarding the valuation of North Slope oil.
6. Property taxes [RPPS]	Based on projections published by Alaska Department of Revenue, Revenue Sources (DORS7.50) augmented by taxes on onshore facilities related to OCS development (OCS.6NGT -12).	Based on projections published by Alaska Department of Revenue, Revenue Sources (DORS7.80) augmented by taxes on onshore facilities related to OCS development (OCS.6NGT -5).
7. Petroleum Corporate Income Tax [RTCSPX]	Based on projections published by Alaska Department of Revenue, Revenue Sources (DORS7.50). No change in tax regulations.	Same as EXPECTED SCENARIO.
8. Rents [RPEN]	Increasing slowly from current level of $8 million	Same as EXPECTED SCENARIO.
9. Miscellaneous Petroleum Revenues [RP9X]	Zero.	Same as EXPECTED SCENARIO.
10. Federal-State Petroleum-Related Shared Revenues [RSFDNPX]	Increasing $1 million annually from current level of $25 million.	Same as EXPECTED SCENARIO.

	EXPECTED CASE (LNG B)	UNFAVORABLE CASE (LNG.H)
B. FISCAL ASSUMPTIONS		
B.1. State Appropriations		
1. Aggregate Appropriations [EXWIND]	If funds available, ceiling established by Constitutional Spending Limit; otherwise, appropriations equal revenues plus 50 percent of general fund balance available for appropriations	Same as EXPECTED SCENARIO.
2. Capital/Operations Split [EXSPLITX]	Two-thirds operations if Spending Limit in effect, 85 percent operations otherwise.	Seventy-five percent operations during 1990s when revenues are large, 85 percent operations otherwise.
3. General Obligation Bonds	Bonding occurs up to point where debt service is 5 percent of state revenues	Same as EXPECTED SCENARIO.
4. Federal Grants-in-Aid for Capital Expenditures [RSFDNCAX]	Constant at $75 million	Same as EXPECTED SCENARIO.
5. State Loan Programs [EXKTR1X] [EXLOAN2] [EXCPSR1]	New capitalization terminated after FY 1987. Programs continue functioning on existing capitalization including AHFC and APA revenue bond expenditures.	Same as EXPECTED SCENARIO.
6. Municipal Capital Grants [RLTMCAP]	Funding terminated after FY 1987.	Same as EXPECTED SCENARIO.
7. State-Local Revenue Sharing [RLTRS]	Continuation proportional to total state expenditures	Same as EXPECTED SCENARIO.
8. State-Local Municipal Assistance [RLTMA]	Continuation proportional to total state expenditures.	Same as EXPECTED SCENARIO.
9. Permanent Fund/Other Appropriations in Excess of Spending Limit [EXGFOPSX] [EXSPCAP]	None for operations, none for capital.	Same as EXPECTED SCENARIO.
B.2. Permanent Fund		
10. Permanent Fund Principal [EXKPF1]	Continuous accumulation from petroleum revenues; inflation-proofing eliminated when complete withdrawal of earnings commences.	Same as EXPECTED SCENARIO.

	EXPECTED CASE (LMG.B)	UNFAVORABLE CASE (LMG.H)
11 Permanent Fund Earnings [EXPFTOGF]	A quarter of the earnings after payment of the dividend are allocated to the General Fund beginning in 1992, rising to 50 percent of earnings in 1998, 75 percent in 2002, and all earnings in 2005.	Half the earnings after payment of the dividend are allocated to the General Fund beginning in 2001, rising to 100 percent of earnings in 2007.
12. Permanent Fund Dividend [EXPFDIST]	Eliminated after FY 1998 distribution which occurs in the fall of that year.	Continued through 2010.
B.3 Revenues		
13. Personal Income Tax [EXPIT]	Reimposed FY 1996, collections begin January of that year.	Reimposed FY 2004, collections begin January of that year.
14. Miscellaneous Local Revenue Sources [RLTX] [RLPTX] [RLTFPX]	Miscellaneous state-local transfers, large project property taxes, petroleum-related federal transfers all set to zero.	Same as EXPECTED SCENARIO
15. New Federal-State Shared Revenues [RSFDNX]	Zero.	Same as EXPECTED SCENARIO.
16. Large Project Corporate Income Taxes [RTCSX]	Zero.	Same as EXPECTED SCENARIO.
B.4. Miscellaneous		
17. State-Local Wage Rates [EXWR]	Constant average real wage rate beginning in 1988 and continuing through 1995.	No constraints on average real wage rates.
C. INDUSTRY ASSUMPTIONS		
1. Trans-Alaska Pipeline	Operating employment remains constant at 885 through 2010 (TAP.S86X).	Same as EXPECTED SCENARIO.
2. North Slope--ANWR Petroleum Development and Production	Petroleum industry employment on the North Slope rises from 3,500 in 1986 to 4,000 in 1998. Employment engaged in new construction is constant at 1,000 (NSO.S87A).	Petroleum industry employment on the North Slope rises from 3,500 in 1986 to 5,000 in 2001. Employment engaged in new construction is constant at 1,500 (NSO.S87H).

	EXPECTED CASE (LNG.B)	UNFAVORABLE CASE (LNG.H)
3. Upper Cook Inlet Petroleum Production	Employment in exploration and development of oil and gas in the Upper Cook Inlet area declines gradually beginning in 1983 by approximately 2.5 percent per year as the oil field is depleted (UPC.S86).	Same as EXPECTED SCENARIO.
4. OCS Development	Employment in exploration and development activity associated with Bering Sea and Arctic areas peaks at about 7,000 in 2005. Direct employment continues through the following decade at a level of about 3,000 (OCS.6NGT -12).	Employment in exploration and development activity associated with Bering Sea and Arctic areas peaks at about 7,000 in 1998. Direct employment continues through the following decade at a level of about 3,000 (OCS.6NGT -5)
5. Oil Industry Headquarters	Oil company headquarters employment in Anchorage remains at about 3,900 through 2010 (OHQ.S86).	Same as EXPECTED SCENARIO
5a. Yukon-Pacific Gas Pipeline	No gasline is constructed.	[illegible] natural gas to [illegible] constructed between 1991 and 1995. The line extends from Prudhoe Bay to Valdez and includes compressor stations, conditioning facilities, and a liquefaction plant and marine terminal. Construction employment peaks at 7,202 in 1994. Operations employment is 1,180. Construction and operations employment occurs all along the pipeline corridor (TAG.S87).
6. Beluga Chuitna Coal Production	Development of a 3.5 million ton/year mine for export beginning in 1990 provides employment of 375 by 1992 (BCL.S87 0).	Development of a 10 million ton/year mine for export beginning in 1990 provides employment of 900 by 2000 (BCL.S87H 0).
7. U.S. Borax	The U.S. Borax mine near Ketchikan is brought into production with operating employment of 685 beginning in 1993, eventually increasing to 1,020 (BXM.F84-4).	Same as EXPECTED SCENARIO.
8. Greens Creek Mine	Production from the Greens Creek Mine on Admiralty Island results in employment of 150 people from 1988 through 2003 (GCM.F84).	Same as EXPECTED SCENARIO

	EXPECTED CASE (LNG.B)	UNFAVORABLE CASE (LNG.H)
9 Red Dog Mine	The Red Dog Mine in the Western Brooks Range begins operation in 1991 with production employment of 393 rising to 428 (RED.F84-1).	Same as EXPECTED SCENARIO.
10. Other Mining Activity	Mining employment not included in special projects increases from current level at 1 percent annually (OMN.S87).	Mining employment not included in special projects increases from current level at 3 percent annually (OMN.H87).
11 Agriculture	Reduction in state support results in constant employment in agriculture (AGR.S86).	Same as EXPECTED SCENARIO.
12 Logging and Sawmills	Logging for export by Native corporations expands employment to 2,500 by 1991 before declining at 1% annually due to productivity gains (FLL.S87X).	Same as EXPECTED SCENARIO.
13. Pulp Mills	Productivity gains result in employment declines at a rate of 1 percent per year after 1991 from the present level of 600 (FPU.S86).	Same as EXPECTED SCENARIO.
14 Commercial Fish Harvesting--Nonbottomfish	Employment levels in traditional fisheries harvest remain constant at 7,500 through 2010 (TCF.S86).	Same as EXPECTED SCENARIO.
15 Commercial Fish Processing--Nonbottomfish	Employment in processing traditional fisheries harvest remains at 7,000 (TFP.S87).	Same as EXPECTED SCENARIO.
16 Commercial Fishing--Bottomfish	The total U.S. bottomfish catch expands at a constant rate to allowable catch in 2000, with Alaska resident harvesting employment rising to 1,033. Onshore processing capacity provides total resident employment of 1,471 by 2000 (BCF.S87).	Same as EXPECTED SCENARIO.
17. Federal Military Employment	Employment declines at 1 percent per year, consistent with the long-term trend since 1960 (GFM.S86).	Employment constant after 1987 (GFM.S87H).
18. Light Infantry Division Deployment	A portion of a new Army division is deployed to Fairbanks and Anchorage beginning in 1985, augmenting active-duty personnel by 3,800 by 1989 (GFM.S87)	Same as EXPECTED SCENARIO.

	EXPECTED CASE (LNG.B)	UNFAVORABLE CASE (LNG.H)
19. Federal Civilian Employment	Employment rises at 0.5 percent annual rate consistent with the long-term trend since 1960 (GFC.S87X)	Employment rises at 1 percent annual rate (GFC.S87H).
20. Tourism	Number of visitors to Alaska increases by 30,000 per year to over 1.3 million by 2010 (TRS S87)	Same as EXPECTED SCENARIO.
21. State Electric Projects	Construction employment from Alaska Power Authority projects includes Bradley Lake (SHP.B86-1) and a new Southcentral coal-fired plant in the mid-1990s (SHP CL87)	Bradley Lake not built and no new coal-fired power plant.
D NATIONAL VARIABLE ASSUMPTIONS		
1. U.S. Inflation Rate	Consumer prices rise at an annual rate of 3.6% in 1987, 4.3% in 1988, 4.9% in 1989, 5.3% in 1990, 5.5% from 1991 to 1995, 5.6% in 2000, and 5.8% thereafter. This assumption is consistent with petroleum price and revenue projections.	Same as EXPECTED SCENARIO.
2. Real Average Weekly Earnings	Growth in real average weekly earnings averages 1 percent annually.	Same as EXPECTED SCENARIO.
3. Real Per Capita Income	Growth in real per capita income averages 1.5 percent annually.	Same as EXPECTED SCENARIO.
4. Unemployment Rate	Long-run rate of 6.5 percent.	Same as EXPECTED SCENARIO.
E REGIONAL ASSUMPTIONS		
1. Population	Regional population growth allocated on the basis of employment growth	Same as EXPECTED SCENARIO.
2. Employment	No significant shifts in the location of support industries.	Same as EXPECTED SCENARIO.

	EXPECTED CASE (LNG B)	UNFAVORABLE CASE (LNG H)
F. ALASKA ENERGY MARKETS		
1. Utility Gas Availability	Gas availability saturates currently served markets in Anchorage, Matanuska Susitna, and Kenai	Cook Inlet gas becomes available in Fairbanks area in 1992 as a result of construction of gas transmission line
2. Railbelt Electricity Generation	The current mix of generation capabilities is augmented by the competition of the Bradley Lake hydroelectric project in 1992 and 100MW coal capacity in 1995	Electricity generation is from currently existing hydroelectric capacity and gas. Bradley Lake is not built.
3. Intertie	The electric intertie is upgraded in 1992 to allow generation by any method to be utilized throughout the Railbelt	No intertie upgrade

APPENDIX B

ISER MAP MODEL ECONOMIC PROJECTIONS

Unfavorable Case

ISER MAP MODEL ECONOMIC PROJECTIONS
NOVEMBER 1987
TABLE 1.
SUMMARY

	POPULATION (000)	HOUSEHOLDS (000)	TOTAL EMPLOYMENT (000)	WAGE AND SALARY EMPLOYMENT (000)	PERSONAL INCOME (MILLION 1986 $)	PETROLEUM REVENUES (MILLION 1986 $)
1985	539.963	183.149	272.100	226.686	9599.570	3170.220
1986	535.337	182.225	262.993	217.841	9258.110	2547.099
1987	528.945	180.814	254.439	209.988	9032.690	1457.240
1988	527.339	180.748	254.093	208.354	8901.250	2112.274
1989	534.549	183.672	262.676	214.802	9138.720	2236.762
1990	544.497	187.818	272.229	223.503	9474.350	2325.723
1991	554.630	192.023	280.084	230.634	9737.410	2314.764
1992	562.274	195.365	283.952	234.108	10010.980	2239.994
1993	575.113	200.475	293.211	242.500	10445.550	2195.774
1994	590.514	206.460	304.220	252.469	10930.340	2396.544
1995	597.740	209.045	304.885	252.994	11146.690	2187.566
1996	598.702	210.664	299.816	248.326	11228.020	2145.908
1997	608.551	214.690	305.643	253.579	11612.060	2441.713
1998	624.849	220.914	317.565	264.361	12274.870	2321.588
1999	638.995	226.411	325.700	271.665	12776.760	2093.927
2000	647.724	230.061	327.438	273.197	12968.450	1954.992
2001	662.027	235.596	335.484	280.504	13427.140	1793.497
2002	676.500	241.193	342.711	287.060	13884.080	1707.378
2003	688.767	246.042	347.120	291.056	14245.400	1672.345
2004	701.734	251.125	352.666	296.080	14658.270	1591.556

SOURCE: ISER MAP MODEL SIMULATION LNGH, CREATED NOVEMBER 1987.

POPULATION (POP) IS JULY 1, CENSUS DEFINITION.
HOUSEHOLDS (HH) IS JULY 1, CENSUS DEFINITION.
TOTAL EMPLOYMENT (EM99) INCLUDES ACTIVE DUTY MILITARY AND PROPRIETORS--
PRE 1985 PROPRIETOR DEFINITION.
WAGE AND SALARY EMPLOYMENT (EM97) IS ALASKA
DEPARTMENT OF LABOR DEFINITION.
PERSONAL INCOME (DF.PIB) IS US BEA DEFINITION.
PETROLEUM REVENUES (DF.RP9S) INCLUDES PERMANENT FUND CONTRIBUTION.

Unfavorable Case

ISER MAP MODEL ECONOMIC PROJECTIONS

NOVEMBER 1987

TABLE 2.

EMPLOYMENT BY SECTOR

(THOUSANDS)

	TOTAL EMPLOYMENT	BASIC EMPLOYMENT	INFRA-STRUCTURE EMPLOYMENT	SERVICES EMPLOYMENT	GOVERNMENT EMPLOYMENT
1985	272.100	76.850	40.963	104.283	50.004
1986	262.993	77.525	35.679	100.926	48.864
1987	254.439	78.354	31.164	97.767	47.154
1988	254.093	81.316	29.530	95.528	47.719
1989	262.676	83.739	30.436	96.589	51.912
1990	272.229	85.889	34.884	99.417	52.039
1991	280.084	88.683	36.665	102.585	52.151
1992	283.952	90.042	38.179	105.534	50.197
1993	293.2[illegible]	94.342	39.623	110.484	48.762
1994	304.220	97.299	39.917	116.244	50.761
1995	304.885	97.346	39.670	119.224	48.644
1996	299.816	92.923	39.386	119.212	48.235
1997	305.643	93.008	39.749	121.975	50.911
1998	317.565	98.772	41.273	127.976	49.545
1999	325.700	101.959	42.706	133.657	47.379
2000	327.438	99.217	42.995	136.847	48.380
2001	335.484	99.044	43.341	141.395	51.704
2002	342.711	99.654	44.387	146.518	52.153
2003	347.120	100.199	45.400	150.754	50.768
2004	352.666	100.635	45.793	153.471	52.708

SOURCE: ISER MAP MODEL SIMULATION LNGH, CREATED NOVEMBER 1987.

TOTAL EMPLOYMENT (EM99).
BASIC EMPLOYMENT (EM9BASE) CONSISTS OF EXOGENOUS COMPONENTS OF CONSTRUCTION, MANUFACTURING, AND TRANSPORTATION; MINING (PETROLEUM); TOURISM, FEDERAL GOVERNMENT, AND AGRICULTURE, FORESTRY, AND FISH HARVESTING.
INFRASTRUCTURE EMPLOYMENT (EM9INFR) CONSISTS OF TRANSPORTATION, COMMUNICATIONS, PUBLIC UTILITIES, ENDOGENOUS CONSTRUCTION, AND BUSINESS SERVICES, NET OF EXOGENOUS AND TOURISM-RELATED TRANSPORTATION.
SUPPORT EMPLOYMENT (EM9SUPRT) CONSISTS OF TRADE, FINANCE, SERVICES, LOCAL MANUFACTURING, AND PROPRIETORS NOT ENGAGED IN FISH HARVESTING, NET OF TRADE AND SERVICE TOURISM EMPLOYMENT AND BUSINESS SERVICES.
GOVERNMENT EMPLOYMENT (EMGA) CONSISTS OF STATE AND LOCAL GOVERNMENT EMPLOYMENT.

Unfavorable Case

ISER MAP MODEL ECONOMIC PROJECTIONS
NOVEMBER 1987
TABLE 3
PRIVATE EMPLOYMENT
(THOUSANDS)

	TOTAL PRIVATE	AGRI-CULTURE, FORESTRY, FISHERIES	MINING	CONSTRUC TION	MANU-FACTURING	TRANS-PORTATION, COMMUNI-CATIONS, PUBLIC UTILITIES	SUPPORT
1985	181.917	9.330	9.472	18.772	11.344	18.722	113.776
1986	172.876	9.532	9.125	12.040	12.618	18.445	111.117
1987	165.808	9.560	8.914	8.323	12.777	18.204	108.028
1988	163.412	9.577	9.210	8.065	12.861	18.000	105.680
1989	166.717	9.612	9.421	9.273	13.009	18.155	106.747
1990	175.458	9.675	10.622	13.620	13.235	18.523	109.783
1991	183.013	9.741	11.181	16.302	13.456	19.019	113.314
1992	188.645	9.812	11.932	17.078	13.549	19.594	116.680
1993	199.147	9.888	12.582	20.610	13.703	20.348	122.016
1994	207.963	9.972	12.587	22.202	13.865	21.063	128.274
1995	210.549	10.064	13.030	19.921	13.968	21.683	131.883
1996	205.632	10.117	13.154	13.967	14.085	21.889	132.421
1997	208.643	10.184	13.307	13.127	14.272	22.239	135.515
1998	221.730	10.268	17.174	14.252	14.552	23.538	141.947
1999	231.827	10.374	19.112	14.788	14.853	24.457	148.244
2000	232.359	10.429	16.510	13.506	15.116	24.525	152.112
2001	236.872	10.429	15.970	13.021	15.167	25.105	157.182
2002	243.441	10.429	16.127	13.028	15.218	25.712	162.928
2003	249.022	10.429	16.189	13.163	15.252	26.226	167.765
2004	252.415	10.429	16.172	12.996	15.242	26.519	171.057

SOURCE ISER MAP MODEL SIMULATION LMSH, CREATED NOVEMBER 1987.

PRIVATE (EMPVT) IS ALL NON-GOVERNMENT.
AGRICULTURE, FORESTRY, FISHERIES (EMAFF).
MINING (EMP9) IS TOTAL MINING, INCLUDING OIL AND GAS.
CONSTRUCTION (EMCN).
MANUFACTURING (EMM9).
TRANSPORTATION, COMMUNICATIONS, PUBLIC UTILITIES (EMTCU).
SUPPORT (EMSUP) INCLUDES TRADE, FINANCE, SERVICE, AND
PROPRIETORS NOT INVOLVED IN FISH HARVESTING.

Unfavorable Case

ISER MAP MODEL ECONOMIC PROJECTIONS

NOVEMBER 1987

TABLE 4

GOVERNMENT EMPLOYMENT

(THOUSANDS)

	TOTAL	MILITARY	FEDERAL CIVILIAN	STATE	LOCAL
1985	90.183	22.579	17.600	20.904	29.100
1986	90.117	23.253	18.000	19.911	28.953
1987	88.634	23.230	18.250	19.007	28.147
1988	90.681	24.530	18.432	20.658	27.061
1989	96.459	25.930	18.617	23.006	28.906
1990	96.771	25.930	18.803	22.880	29.159
1991	97.071	25.930	18.991	22.499	29.652
1992	95.307	25.930	19.181	21.122	29.074
1993	94.064	25.930	19.373	20.015	28.747
1994	96.257	25.930	19.566	20.725	30.035
1995	94.336	25.930	19.762	19.092	29.552
1996	94.184	25.930	19.960	18.419	29.876
1997	97.000	25.930	20.159	19.667	31.244
1998	95.836	25.930	20.361	18.523	31.022
1999	93.873	25.930	20.565	16.922	30.457
2000	95.079	25.930	20.770	16.667	31.713
2001	96.612	25.930	20.978	18.[illegible]	33.671
2002	99.270	25.930	21.188	17.939	34.214
2003	98.097	25.930	21.400	16.514	34.255
2004	100.251	25.930	21.614	17.100	35.608

SOURCE: ISER MAP MODEL SIMULATION LNGH, CREATED NOVEMBER 1987

TOTAL (EMGG)
MILITARY (EMGM) IS ACTIVE DUTY.
FEDERAL CIVILIAN (EMGC).
STATE (EMGS) INCLUDES UNIVERSITY OF ALASKA.
LOCAL (EMGL).

Unfavorable Case

ISER MAP MODEL ECONOMIC PROJECTIONS

NOVEMBER 1987

TABLE 5.

POPULATION CHANGE

(THOUSANDS)

		COMPONENTS OF CHANGE			
	TOTAL POPULATION	TOTAL ANNUAL CHANGE	NATURAL INCREASE	NON-MILITARY MIGRATION	MILITARY MIGRATION
1985	539.963	16.915	10.203	5.377	0.623
1986	535.337	-4.626	10.149	-15.168	0.391
1987	528.945	-6.392	9.533	-14.909	-1.058
1988	527.339	-1.605	9.085	-12.388	1.635
1989	534.549	7.209	8.768	-3.378	1.782
1990	544.497	9.948	8.682	2.370	-1.126
1991	554.630	10.133	8.762	2.480	-1.126
1992	562.274	7.645	8.842	-0.088	-1.126
1993	575.113	12.839	8.855	5.086	-1.126
1994	590.514	15.401	9.027	7.486	-1.126
1995	597.740	7.226	9.258	-0.917	-1.126
1996	598.702	0.962	9.243	-7.183	-1.126
1997	608.551	9.848	9.077	1.858	-1.126
1998	624.849	16.299	9.194	8.201	-1.126
1999	638.995	14.145	9.477	5.775	-1.126
2000	647.724	8.730	9.673	0.163	-1.126
2001	662.027	14.302	9.711	5.686	-1.126
2002	676.500	14.473	9.922	5.655	-1.126
2003	688.767	12.267	10.120	3.248	-1.126
2004	701.734	12.968	10.249	3.820	-1.126

SOURCE: ISER MAP MODEL SIMULATION LNGH, CREATED NOVEMBER 1987.

NOTE: POPULATION IS EQUAL TO POPULATION IN PRIOR YEAR PLUS MIGRATION AND NATURAL INCREASE. THE SUM OF COMPONENTS DOES NOT EQUAL THE TOTAL DUE TO ROUNDING IN THE ALLOCATION OF MIGRANTS TO INDIVIDUAL COHORTS.

POPULATION (POP) IS JULY 1, CENSUS DEFINITION.
ANNUAL CHANGE IN POPULATION (DELPOP) IS YEAR TO YEAR JULY 1 CHANGE.
NATURAL INCREASE (POPNI9) INCLUDES CIVILIAN AND MILITARY.
NON- MILITARY MIGRATION (POPMIG).
MILITARY MIGRATION (POPMIGM) INCLUDES ACTIVE DUTY MILITARY PLUS DEPENDENTS.

Unfavorable Case

ISER MAP MODEL ECONOMIC PROJECTIONS

NOVEMBER 1987

TABLE 6.

POPULATION COMPONENTS

(THOUSANDS)

	TOTAL	CIVILIAN NON-NATIVE	NATIVE	MILITARY
1985	539.963	419.416	73.639	46.908
1986	535.337	411.521	75.507	48.309
1987	528.945	403.304	77.381	48.260
1988	527.339	397.118	79.261	50.961
1989	534.549	399.533	81.147	53.869
1990	544.497	407.588	83.040	53.869
1991	554.630	415.819	84.942	53.869
1992	562.274	421.550	86.855	53.869
1993	575.113	432.461	88.784	53.869
1994	590.514	445.915	90.730	53.869
1995	597.740	451.174	92.697	53.869
1996	598.702	450.144	94.689	53.869
1997	608.551	457.973	96.708	53.869
1998	624.849	472.223	98.758	53.869
1999	638.995	484.286	100.840	53.869
2000	647.724	490.898	102.957	53.869
2001	662.027	503.046	105.111	53.869
2002	676.500	515.327	107.304	53.869
2003	688.767	525.361	109.536	53.869
2004	701.734	536.055	111.810	53.869

SOURCE: ISER MAP MODEL SIMULATION LNGH, CREATED NOVEMBER 1987.

POPULATION (POP) IS JULY 1, CENSUS DEFINITION.
CIVILIAN NON-NATIVE (CNNTOT).
NATIVE (NATTOT) CIVILIAN.
MILITARY (MILTOT) IS ACTIVE DUTY PLUS DEPENDENTS.

Unfavorable Case

ISER MAP MODEL ECONOMIC PROJECTIONS
NOVEMBER 1987
TABLE 7.
STATE UNRESTRICTED GENERAL FUND
(MILLION 1986 DOLLARS)

	EXPENDI-TURES	REVENUES			
		TOTAL	PETROLEUM	ENDOGENOUS	INVESTMENT EARNINGS
1985	3896.517	3294.335	2806.588	250.092	237.655
1986	3200.097	2607.657	2249.149	250.507	108.000
1987	2591.729	2158.950	1300.825	244.537	613.587
1988	2179.856	2230.537	1843.989	235.401	151.147
1989	2396.063	2341.942	1929.298	231.378	180.665
1990	2615.600	2425.655	2007.692	233.034	184.929
1991	2524.314	2392.763	1985.992	236.410	170.361
1992	2392.353	2302.400	1907.274	241.499	153.626
1993	2312.912	2253.398	1866.158	245.313	141.927
1994	2443.317	2441.673	2044.199	256.380	141.094
1995	2322.485	2269.453	1872.475	265.367	131.610
1996	2249.703	2223.906	1834.168	264.584	125.154
1997	2430.807	2473.314	2089.049	253.867	130.400
1998	2372.456	2364.021	1981.841	255.111	127.070
1999	2181.220	2158.600	1780.169	262.012	116.420
2000	2112.779	2033.830	1658.500	267.425	107.905
2001	2212.665	2168.077	1518.731	268.547	380.799
2002	2159.869	2087.360	1447.077	272.178	368.107
2003	1977.035	2036.384	1404.113	276.442	355.831
2004	2167.325	2179.645	1335.550	490.571	353.525

SOURCE: ISER MAP MODEL SIMULATION LNGH, CREATED NOVEMBER 1987.

EXPENDITURES (DF.EXGFB) IS UNRESTRICTED GENERAL FUND EXPENDITURES.
TOTAL REVENUES (DF.RSGFB).
PETROLEUM REVENUES (DF.RP9SG) EXCLUDES PERMANENT FUND CONTRIBUTION.
ENDOGENOUS REVENUES (DF.RSENG) IS TOTAL NET OF PETROLEUM AND INVESTMENT EARNINGS.
INVESTMENT EARNINGS (DF.RSIN) IS EARNINGS FROM ALL SOURCES DEPOSITED IN THE GENERAL FUND.

Unfavorable Case

ISER MAP MODEL ECONOMIC PROJECTIONS
NOVEMBER 1987
TABLE 8
STATE GOVERNMENT MISCELLANEOUS VARIABLES
(MILLION 1986 DOLLARS)

	GENERAL FUND APPROPRIATIONS				PERMANENT	PERMANENT	PERSONAL
	TOTAL	OPERATING	CAPITAL	DEBT SERVICE	FUND DIVIDEND	FUND BALANCE	INCOME TAX
1985	3273.425	2290.949	823.496	158.979	210.245	6619.926	0.000
1986	3115.115	2307.982	652.018	155.115	266.350	7199.996	0.000
1987	2514.267	1954.433	410.256	149.578	310.612	7882.297	0.000
1988	2121.470	1738.003	245.796	137.670	309.460	8077.629	0.000
1989	2678.413	1917.520	639.173	121.720	311.341	8370.102	0.000
1990	2629.843	1894.486	631.495	103.862	308.069	8690.531	0.000
1991	2531.561	1839.256	613.085	79.219	308.870	9033.630	0.000
1992	2388.375	1738.476	579.492	70.406	306.357	9395.770	0.000
1993	2313.283	1661.389	553.796	98.097	325.344	9751.320	0.000
1994	2488.256	1778.970	592.990	116.295	341.716	10128.090	0.000
1995	2308.862	1639.814	546.605	122.443	356.011	10462.500	0.000
1996	2259.058	1603.100	534.366	121.591	369.513	10785.720	0.000
1997	2490.075	1782.838	594.279	112.960	383.276	11155.180	0.000
1998	2372.016	1699.206	566.402	106.410	397.310	11516.070	0.000
1999	2162.416	1540.658	513.553	108.205	411.224	11848.750	0.000
2000	2049.204	1547.438	399.024	102.743	424.788	12158.210	0.000
2001	2175.410	1754.329	327.465	93.618	437.386	12160.240	0.000
2002	2090.859	1789.808	213.866	87.187	447.113	12143.980	0.000
2003	2038.049	1650.196	291.211	96.646	453.878	12131.790	0.000
2004	2191.670	1771.264	312.576	107.832	457.863	12103.310	210.869

SOURCE: ISER MAP MODEL SIMULATION LNGH, CREATED NOVEMBER 1987.

TOTAL (DF.APGF)
OPERATING (DF.APGFO)
CAPITAL (DF.APGFC).
DEBT SERVICE (DF.EXDSS) INCLUDES ONLY GENERAL OBLIGATION DEBT OF STATE.
PERMANENT FUND DIVIDEND (DF.EXTRP)
PERMANENT FUND BALANCE (DF.BALPF)
PERSONAL INCOME TAX (DF.RTIS)

Unfavorable Case

ISER MAP MODEL ECONOMIC PROJECTIONS
NOVEMBER 1987
TABLE 9
COMPONENTS OF REAL PERSONAL INCOME
(MILLION 1986 DOLLARS)

	WAGE AND SALARY PAYMENTS	NET EARNINGS	RESIDENCE ADJUSTMENT	DIVIDENDS, INTEREST, RENT	TRANSFERS	PERSONAL INCOME	DISPOSABLE PERSONAL INCOME
1985	7228.051	8060.391	597.825	857.160	1076.681	9599.570	8131.738
1986	6762.566	7501.953	512.282	908.995	1166.949	9258.110	7848.125
1987	6406.684	7118.348	482.702	930.358	1282.481	9032.690	7660.375
1988	5250.828	6964.535	484.562	909.183	1333.165	8901.250	7547.887
1989	6422.512	7168.566	494.770	891.212	1393.097	9138.720	7745.844
1990	6693.867	7475.934	514.959	880.714	1448.636	9474.350	8025.340
1991	6909.234	7722.160	565.651	885.804	1509.117	9737.410	8243.141
1992	7119.723	7948.441	597.844	905.534	1567.196	10010.980	8470.262
1993	7562.275	8426.938	760.587	936.803	1648.980	10445.550	8830.590
1994	7991.034	8899.527	871.873	973.835	1730.420	10930.340	9233.900
1995	8052.293	8965.906	834.997	1008.262	1810.774	11146.690	9414.940
1996	7836.792	8733.965	624.389	1037.466	1890.687	11228.520	9486.550
1997	8080.031	9002.180	625.378	1069.666	1974.042	11612.060	9807.390
1998	8619.660	9590.970	682.527	1108.001	2061.140	12274.870	10359.670
1999	8991.44.	9998.140	718.917	1147.302	2150.349	12776.760	10777.900
2000	9028.650	10045.600	700.056	1185.084	2240.525	12968.450	10937.640
2001	9339.160	10392.130	725.843	1229.561	2332.771	13427.140	11319.670
2002	9647.690	10733.870	749.221	1275.350	2424.656	13884.080	11699.860
2003	9874.810	10982.840	767.435	1315.530	2515.465	14245.400	11999.930
2004	10163.680	11298.640	791.654	1346.891	2605.261	14658.270	12068.710

SOURCE: ISER MAP MODEL SIMULATION LNGH, CREATED NOVEMBER 1987.

WAGE AND SALARY PAYMENTS (DF.PIWS) IN NONAGRICULTURAL
WAGE AND SALARY JOB CATEGORIES PLUS MILITARY.
NET EARNINGS (DF.PINE) IS NET LABOR AND PROPRIETORS' INCOME
BY PLACE OF WORK.
RESIDENCE ADJUSTMENT (DF.PIRAD).
DIVIDENDS, INTEREST, AND RENT (DF.PIDIR).
TRANSFERS (DF.PITRAN).
PERSONAL INCOME (DF.PIB).
DISPOSABLE PERSONAL INCOME (DF.DPIB)

Unfavorable Case

ISER MAP MODEL ECONOMIC PROJECTIONS
NOVEMBER 1987
TABLE 10
PRICE INDEXES

	ANCHORAGE CPI-W	ALASKA/US PRICE LEVEL
1985	275.400	1.230
1986	280.300	1.235
1987	284.480	1.210
1988	296.719	1.210
1989	309.276	1.202
1990	323.460	1.194
1991	338.895	1.186
1992	355.059	1.178
1993	371.890	1.169
1994	389.475	1.161
1995	408.000	1.152
1996	428.049	1.145
1997	448.843	1.137
1998	470.413	1.128
1999	493.031	1.120
2000	516.891	1.112
2001	541.789	1.104
2002	567.822	1.095
2003	595.142	1.087
2004	623.873	1.079

SOURCE: ISER MAP MODEL SIMULATION LNGH, CREATED NOVEMBER 1987.

ANCHORAGE CPI (PDANCPI) CONSUMER PRICE INDEX FOR URBAN WAGE EARNERS.
ALASKA/US PRICE LEVEL (PDRATIO) IS THE RATIO OF US AND
ANCHORAGE CONSUMER PRICE INDEX LEVELS.

Unfavorable Case

ISER MAP REGIONAL MODEL ECONOMIC PROJECTIONS

NOVEMBER 1987

TABLE 11

POPULATION BY LABOR MARKET AREA

(THOUSANDS)

	ANCH/MATSU	SOUTHEAST	INTERIOR	NORTH	GULF COAST	SOUTHWEST	TOTAL
1985	272.180	64.236	88.342	19.105	61.261	34.839	539.962
1986	265.868	65.084	88.801	18.249	61.669	35.667	535.336
1987	259.826	65.022	87.815	18.508	62.041	35.733	528.945
1988	256.230	65.222	89.274	19.297	61.872	35.449	527.339
1989	257.537	66.509	93.736	19.131	61.977	35.660	534.548
1990	263.176	67.376	94.657	20.712	63.245	35.333	544.497
1991	268.348	70.120	95.408	21.103	64.043	35.609	554.630
1992	273.403	69.598	97.831	21.246	64.136	36.061	562.274
1993	279.284	68.407	102.919	21.232	67.582	35.691	575.114
1994	284.421	69.579	108.376	21.661	70.769	35.710	590.513
1995	290.821	69.851	104.907	21.632	74.171	36.360	597.740
1996	294.814	72.118	103.751	21.987	68.637	37.396	598.702
1997	299.908	73.538	104.790	22.463	69.579	38.274	608.550
1998	308.172	72.991	104.536	22.276	71.760	45.116	624.850
1999	318.313	72.750	106.233	23.675	73.596	44.430	638.995
2000	324.341	74.582	108.492	23.447	74.288	42.575	647.724
2001	331.666	76.848	110.873	24.084	75.763	42.794	662.027
2002	340.594	78.099	112.896	24.451	77.076	43.385	676.500
2003	349.082	78.677	114.594	24.571	78.202	43.642	688.767
2004	355.891	80.018	116.653	25.202	79.504	44.469	701.733

SOURCE: ISER MAP MODEL SIMULATION LNGHR, CREATED NOVEMBER 1987.

NOTE:OFFICIAL STATE OF ALASKA AND CENSUS AREA GOVERNMENT POPULATION ESTIMATES MAY NOT BE EQUAL.

ANCH/MATSU (PL.ANCMS).
SOUTHEAST (PL.SEAST).
INTERIOR (PL.INTER).
NORTH (PL.NORTH).
GULF COAST (PL.GULF).
SOUTHWEST (PL.SWEST).
TOTAL (P.ST)

Unfavorable Case

ISER MAP REGIONAL MODEL ECONOMIC PROJECTIONS

NOVEMBER 1987

TABLE 12

TOTAL EMPLOYMENT BY LABOR MARKET AREA

(THOUSANDS)

	ANCH/MATSU	SOUTHEAST	INTERIOR	NORTH	GULF COAST	SOUTHWEST	TOTAL
1985	140.009	33.955	41.980	14.634	25.538	16.199	272.313
1986	134.050	33.573	41.568	12.450	25.294	16.262	263.198
1987	128.427	32.881	40.327	12.016	24.960	16.026	254.636
1988	126.501	33.042	40.987	12.930	24.884	15.943	254.286
1989	129.528	34.357	44.000	13.306	25.415	16.269	262.875
1990	134.448	35.425	45.126	14.756	26.261	16.422	272.436
1991	138.040	37.211	45.767	15.736	26.772	16.777	280.300
1992	140.265	36.888	46.902	16.234	26.771	17.116	284.175
1993	144.626	36.609	49.601	16.821	28.636	17.154	293.445
1994	149.223	37.701	52.734	17.120	30.424	17.269	304.470
1995	151.031	37.435	50.746	16.792	31.631	17.506	305.140
1996	150.240	37.925	49.538	16.312	28.388	17.667	300.069
1997	153.414	38.811	50.262	16.429	28.890	18.099	305.903
1998	158.787	38.930	50.630	16.823	29.790	22.886	317.844
1999	163.283	38.874	51.053	19.811	30.332	22.590	325.992
2000	166.043	39.570	52.139	18.283	30.710	20.996	327.739
2001	170.557	40.917	53.546	18.359	31.485	20.934	335.796
2002	175.156	41.576	54.562	18.526	32.017	21.200	343.036
2003	178.601	41.658	55.147	18.520	32.299	21.234	347.457
2004	181.605	42.272	56.000	18.839	32.765	21.530	353.010

SOURCE. ISER MAP MODEL SIMULATION LNGHR, CREATED NOVEMBER 1987.

ANCH/MATSU (ML.ANCMS)
SOUTHEAST (ML SEAST).
INTERIOR (ML INTER).
NORTH (ML.NORTH)
GULF COAST (ML.GULF).
SOUTHWEST (ML.SWEST).
TOTAL (M.ST)

Expected Case
ISER MAP MODEL ECONOMIC PROJECTIONS
NOVEMBER 1987
TABLE 1
SUMMARY

	POPULATION (000)	HOUSEHOLDS (000)	TOTAL EMPLOYMENT (000)	WAGE AND SALARY EMPLOYMENT (000)	PERSONAL INCOME (MILLION 1986 $)	PETROLEUM REVENUES (MILLION 1986 $)
1985	539.963	183.149	272.100	226.886	9599.570	3170.220
1986	535.337	182.225	262.993	217.841	9258.110	2547.099
1987	528.945	180.814	254.439	209.988	9032.690	1457.240
1988	523.853	179.592	250.400	205.183	8833.305	1885.554
1989	524.154	180.174	252.300	205.717	8908.270	1630.800
1990	527.874	182.198	257.283	210.455	9107.530	1935.650
1991	530.253	183.744	259.755	212.879	9224.500	1923.631
1992	532.994	185.391	262.040	215.125	9408.750	1811.086
1993	535.036	186.773	263.133	216.270	9590.580	1638.465
1994	538.163	188.498	265.250	218.346	9796.860	1589.952
1995	538.554	189.260	264.110	217.425	9893.330	1431.655
1996	540.997	190.691	265.565	218.916	10070.050	1262.755
1997	544.041	192.302	267.426	220.765	10154.540	1236.765
1998	549.914	194.854	271.922	225.011	10463.460	1150.003
1999	556.906	197.771	276.756	229.541	10449.010	1045.009
2000	562.823	200.308	279.641	232.329	10706.290	949.741
2001	567.281	202.329	280.692	233.484	10907.490	872.766
2002	575.962	205.769	286.457	238.948	11273.170	796.785
2003	581.972	208.293	288.309	240.831	11495.310	721.476
2004	589.004	211.149	291.412	243.854	11764.270	692.188

SOURCE: ISER MAP MODEL SIMULATION LN68. CREATED NOVEMBER 1987.

POPULATION (POP) IS JULY 1, CENSUS DEFINITION.
HOUSEHOLDS (HH) IS JULY 1, CENSUS DEFINITION.
TOTAL EMPLOYMENT (EM99) INCLUDES ACTIVE DUTY MILITARY AND PROPRIETORS--
PRE 1985 PROPRIETOR DEFINITION.
WAGE AND SALARY EMPLOYMENT (EM97) IS ALASKA
DEPARTMENT OF LABOR DEFINITION.
PERSONAL INCOME (DF.PIB) IS US BEA DEFINITION.
PETROLEUM REVENUES (DF RP95) INCLUDES PERMANENT FUND CONTRIBUTION.

Expected Case
ISER MAP MODEL ECONOMIC PROJECTIONS
NOVEMBER 1987
TABLE 2
EMPLOYMENT BY SECTOR
(THOUSANDS)

	TOTAL EMPLOYMENT	BASIC EMPLOYMENT	INFRA-STRUCTURE EMPLOYMENT	SERVICES EMPLOYMENT	GOVERNMENT EMPLOYMENT
1985	272.100	76.850	40.963	104.283	50.004
1986	262.993	77.525	35.679	100.926	48.864
1987	254.439	78.354	31.164	97.767	47.154
1988	250.400	80.003	29.461	94.784	46.151
1989	252.300	81.621	30.152	94.177	46.351
1990	257.283	82.839	32.968	95.312	46.165
1991	259.755	84.272	33.291	96.499	45.693
1992	262.040	84.315	34.106	98.030	45.589
1993	263.133	84.506	35.543	99.741	43.342
1994	265.250	85.055	35.887	101.686	42.623
1995	264.110	85.507	35.024	102.910	40.670
1996	265.565	86.150	34.408	103.386	41.621
1997	267.426	85.534	34.564	104.573	41.756
1998	271.922	87.474	35.150	107.127	42.171
1999	275.756	88.666	35.594	108.893	43.603
2000	279.641	89.092	36.397	111.101	43.051
2001	280.692	88.901	37.182	113.034	41.576
2002	286.457	89.398	37.752	116.127	43.180
2003	288.309	89.374	38.023	118.615	42.297
2004	291.412	89.274	38.385	121.367	42.385

SOURCE: ISER MAP MODEL SIMULATION LNGB. CREATED NOVEMBER 1987.

TOTAL EMPLOYMENT (EM99)
BASIC EMPLOYMENT (EM9BASE) CONSISTS OF EXOGENOUS COMPONENTS OF CONSTRUCTION, MANUFACTURING, AND TRANSPORTATION, MINING (PETROLEUM); TOURISM, FEDERAL GOVERNMENT, AND AGRICULTURE, FORESTRY, AND FISH HARVESTING.
INFRASTRUCTURE EMPLOYMENT (EM9INFR) CONSISTS OF TRANSPORTATION, COMMUNICATIONS, PUBLIC UTILITIES, ENDOGENOUS CONSTRUCTION, AND BUSINESS SERVICES, NET OF EXOGENOUS AND TOURISM-RELATED TRANSPORTATION.
SUPPORT EMPLOYMENT (EM9SUPRT) CONSISTS OF TRADE, FINANCE, SERVICES, LOCAL MANUFACTURING, AND PROPRIETORS NOT ENGAGED IN FISH HARVESTING, NET OF TRADE AND SERVICE TOURISM EMPLOYMENT AND BUSINESS SERVICES.
GOVERNMENT EMPLOYMENT (EMGA) CONSISTS OF STATE AND LOCAL GOVERNMENT EMPLOYMENT

Expected Case
ISER MAP MODEL ECONOMIC PROJECTIONS
NOVEMBER 1987
TABLE 3
PRIVATE EMPLOYMENT
(THOUSANDS)

	TOTAL PRIVATE	AGRI-CULTURE, FORESTRY, FISHERIES	MINING	CONSTRUC-TION	MANU-FACTURING	TRANS-PORTATION, COMMUNI-CATIONS, PUBLIC UTILITIES	SUPPORT
1985	181.917	9.330	9.472	18.772	11.844	18.722	113.776
1986	172.876	9.532	9.125	12.040	12.618	18.445	111.117
1987	165.806	9.560	8.914	8.323	12.777	18.204	108.028
1988	161.599	9.577	8.710	7.585	12.845	17.930	104.352
1989	162.027	9.612	8.803	8.398	12.963	17.930	104.322
1990	167.321	9.675	9.382	11.404	13.165	18.132	105.564
1991	170.386	9.741	9.642	12.287	13.352	18.337	107.028
1992	172.896	9.812	9.970	12.237	13.426	18.605	108.845
1993	176.352	9.888	10.540	12.632	13.507	18.875	110.911
1994	179.303	9.972	10.776	12.573	13.604	19.167	113.212
1995	180.227	10.064	10.870	11.380	13.694	19.383	114.835
1996	180.841	10.117	11.017	10.762	13.780	19.470	115.695
1997	182.674	10.184	11.226	10.397	13.919	19.675	117.273
1998	186.859	10.268	11.631	10.531	14.134	20.131	120.164
1999	190.362	10.374	12.038	10.731	14.356	20.489	122.374
2000	193.898	10.429	12.083	10.952	14.635	20.844	124.955
2001	196.522	10.429	11.828	11.343	14.642	21.025	127.256
2002	200.776	10.429	12.060	11.404	14.678	21.524	130.682
2003	203.604	10.429	11.912	11.175	14.690	21.794	133.605
2004	206.707	10.429	11.679	10.970	14.710	22.120	136.800

SOURCE: ISER MAP MODEL SIMULATION LNGB, CREATED NOVEMBER 1987.

PRIVATE (EMPVT) IS ALL NON-GOVERNMENT.
AGRICULTURE, FORESTRY, FISHERIES (EMAFF).
MINING (EMP9) IS TOTAL MINING, INCLUDING OIL AND GAS.
CONSTRUCTION (EMCN).
MANUFACTURING (EMM9).
TRANSPORTATION, COMMUNICATIONS, PUBLIC UTILITIES (EMTCU).
SUPPORT (EMSUP) INCLUDES TRADE, FINANCE, SERVICE, AND
PROPRIETORS NOT INVOLVED IN FISH HARVESTING.

Expected Case
ISER MAP MODEL ECONOMIC PROJECTIONS
NOVEMBER 1987
TABLE 4.
GOVERNMENT EMPLOYMENT
(THOUSANDS)

	TOTAL	MILITARY	FEDERAL CIVILIAN	STATE	LOCAL
1985	90.183	22.579	17.600	20.904	29.100
1986	90.117	23.253	18.000	19.911	28.953
1987	88.634	23.230	18.250	19.007	28.147
1988	88.801	24.308	18.341	19.090	27.061
1989	90.273	25.489	18.433	20.033	26.318
1990	89.962	25.272	18.525	20.079	26.085
1991	89.369	25.058	18.618	19.692	26.001
1992	89.145	24.845	18.711	19.424	26.165
1993	86.781	24.635	18.804	18.091	25.251
1994	85.948	24.426	18.898	17.516	25.107
1995	83.883	24.220	18.993	16.279	24.391
1996	84.724	24.016	19.088	16.113	25.507
1997	84.752	23.814	19.183	16.251	25.504
1998	85.064	23.613	19.279	16.165	26.006
1999	86.394	23.415	19.376	16.360	27.243
2000	85.743	23.219	19.472	15.662	27.300
2001	84.170	23.025	19.570	14.903	26.673
2002	85.681	22.833	19.668	15.409	27.772
2003	84.706	22.642	19.766	14.609	27.689
2004	84.704	22.454	19.865	14.234	28.152

SOURCE: ISER MAP MODEL SIMULATION LNGB, CREATED NOVEMBER 1987.

TOTAL (EMG9).
MILITARY (EMGM) IS ACTIVE DUTY.
FEDERAL CIVILIAN (EMGC).
STATE (EMGS) INCLUDES UNIVERSITY OF ALASKA.
LOCAL (EMGL).

Expected Case
ISER MAP MODEL ECONOMIC PROJECTIONS
NOVEMBER 1987
TABLE 5
POPULATION CHANGE
(THOUSANDS)

		COMPONENTS OF CHANGE			
	TOTAL POPULATION	TOTAL ANNUAL CHANGE	NATURAL INCREASE	NON-MILITARY MIGRATION	MILITARY MIGRATION
1985	539.963	16.915	10.203	5.377	0.623
1986	535.337	-4.626	10.179	-15.168	0.391
1987	528.945	-6.392	9.533	-14.909	-1.058
1988	523.853	-5.092	9.075	-15.393	1.185
1989	524.154	0.301	8.664	-9.752	1.346
1990	527.874	3.720	8.398	-3.164	-1.548
1991	530.253	2.378	8.337	-4.451	-1.534
1992	532.994	2.741	8.241	-4.010	-1.521
1993	535.036	2.043	8.172	-4.651	-1.507
1994	538.163	3.127	8.094	-3.505	-1.494
1995	538.554	0.391	8.058	-6.220	-1.481
1996	540.997	2.443	7.949	-4.078	-1.467
1997	544.041	3.044	7.914	-3.450	-1.454
1998	549.914	5.873	7.897	-0.615	-1.441
1999	556.906	6.992	7.961	0.429	-1.429
2000	562.823	5.917	8.049	-0.745	-1.416
2001	567.281	4.457	8.098	-2.272	-1.404
2002	575.962	8.682	8.106	1.931	-1.391
2003	581.972	6.010	8.239	-0.880	-1.379
2004	589.004	7.032	8.281	0.082	-1.367

SOURCE: ISER MAP MODEL SIMULATION LMGB, CREATED NOVEMBER 1987.

NOTE: POPULATION IS EQUAL TO POPULATION IN PRIOR YEAR PLUS MIGRATION AND NATURAL INCREASE. THE SUM OF COMPONENTS DOES NOT EQUAL THE TOTAL DUE TO ROUNDING IN THE ALLOCATION OF MIGRANTS TO INDIVIDUAL COHORTS.

POPULATION (POP) IS JULY 1, CENSUS DEFINITION.
ANNUAL CHANGE IN POPULATION (DELPOP) IS YEAR TO YEAR JULY 1 CHANGE.
NATURAL INCREASE (POPNI9) INCLUDES CIVILIAN AND MILITARY.
NON- MILITARY MIGRATION (POPMIG).
MILITARY MIGRATION (POPMIGM) INCLUDES ACTIVE DUTY MILITARY PLUS DEPENDENTS.

Expected Case

ISER MAP MODEL ECONOMIC PROJECTIONS

NOVEMBER 1987

TABLE 6.

POPULATION COMPONENTS

(THOUSANDS)

	TOTAL	CIVILIAN NON-NATIVE	NATIVE	MILITARY
1985	539.963	419.416	73.639	46.908
1986	535.337	411.521	75.507	48.309
1987	528.945	403.304	77.381	48.260
1988	523.853	394.091	79.261	50.501
1989	524.154	390.053	81.147	52.954
1990	527.874	392.331	83.040	52.504
1991	530.253	393.254	84.942	52.058
1992	532.994	394.522	86.855	51.616
1993	535.036	395.074	88.784	51.179
1994	538.163	396.688	90.730	50.746
1995	538.554	395.540	92.697	50.317
1996	540.997	396.416	94.689	49.893
1997	544.041	397.860	96.706	49.473
1998	549.914	402.099	98.758	49.057
1999	556.906	407.420	100.840	48.646
2000	562.823	411.628	102.957	48.238
2001	567.281	414.334	105.111	47.835
2002	575.962	421.223	107.304	47.435
2003	581.972	425.396	109.536	47.040
2004	589.004	430.546	111.810	46.648

SOURCE. ISER MAP MODEL SIMULATION LNGB, CREATED NOVEMBER 1987.

POPULATION (POP) IS JULY 1, CENSUS DEFINITION.
CIVILIAN NON-NATIVE (CNNTOT).
NATIVE (NATTOT) CIVILIAN.
MILITARY (MILTOT) IS ACTIVE DUTY PLUS DEPENDENTS.

Expected Case

ISER MAP MODEL ECONOMIC PROJECTIONS

NOVEMBER 1987

TABLE 7

STATE UNRESTRICTED GENERAL FUND

(MILLION 1986 DOLLARS)

	EXPENDI-TURES	REVENUES			
		TOTAL	PETROLEUM	ENDOGENOUS	INVESTMENT EARNINGS
1985	3896.512	3294.335	2606.588	250.092	237.655
1986	3200.097	2607.657	2249.149	250.507	108.000
1987	2591.729	2158.950	1300.825	244.537	613.587
1988	2179.856	2096.993	1647.970	235.124	213.899
1989	2182.022	1969.883	1582.701	227.964	159.198
1990	2215.048	2052.739	1674.631	226.018	152.089
1991	2138.520	2019.372	1653.661	226.148	139.563
1992	2070.445	1997.532	1542.977	226.503	228.051
1993	1912.006	1846.117	1404.783	227.053	214.280
1994	1838.699	1794.047	1361.189	227.582	205.276
1995	1693.133	1645.033	1222.033	228.052	194.948
1996	1673.375	1646.706	1081.172	378.029	187.505
1997	1726.913	1732.371	1058.542	495.574	178.255
1998	1763.041	1766.906	981.406	507.173	278.327
1999	1822.560	1834.643	883.806	511.815	439.018
2000	1767.882	1755.953	801.493	514.750	439.709
2001	1701.334	1694.983	735.155	521.063	438.764
2002	1813.250	1830.220	670.505	529.054	630.662
2003	1762.731	1761.378	602.754	537.808	620.816
2004	1739.882	1734.597	578.842	544.615	611.140

SOURCE: ISER MAP MODEL SIMULATION LNGB, CREATED NOVEMBER 1987.

EXPENDITURES (DF.EXGFB) IS UNRESTRICTED GENERAL FUND EXPENDITURES
TOTAL REVENUES (DF.RSGFB).
PETROLEUM REVENUES (DF.RP9SG) EXCLUDES PERMANENT FUND CONTRIBUTION.
ENDOGENOUS REVENUES (DF.RSENG) IS TOTAL NET OF PETROLEUM AND
INVESTMENT EARNINGS.
INVESTMENT EARNINGS (DF.RSTN) IS EARNINGS FROM ALL SOURCES
DEPOSITED IN THE GENERAL FUND.

Expected Case

ISER MAP MODEL ECONOMIC PROJECTIONS

NOVEMBER 1987

TABLE 8.

STATE GOVERNMENT MISCELLANEOUS VARIABLES

(MILLION 1986 DOLLARS)

	GENERAL FUND APPROPRIATIONS						
	TOTAL	OPERATING	CAPITAL	DEBT SERVICE	PERMANENT FUND DIVIDEND	PERMANENT FUND BALANCE	PERSONAL INCOME TAX
1985	3273.425	2290.949	823.496	156.979	219.245	6619.926	0.000
1986	3115.115	2307.982	652.018	155.115	266.950	7199.996	0.000
1987	2514.267	1954.433	410.256	149.578	310.612	7882.297	0.000
1988	2121.470	1738.003	245.796	137.670	309.348	7983.168	0.000
1989	2240.561	1801.673	317.942	120.946	308.315	8161.066	0.000
1990	2225.133	1803.675	318.295	103.163	303.533	8416.086	0.000
1991	2142.669	1754.413	309.602	78.655	302.326	8691.141	0.000
1992	2075.944	1718.543	303.272	54.129	297.418	8875.195	0.000
1993	1902.222	1560.735	275.424	66.064	312.441	9015.950	0.000
1994	1838.659	1489.143	262.790	86.726	323.866	9145.940	0.000
1995	1683.342	1341.746	236.778	104.818	332.047	9251.130	0.000
1996	1681.191	1342.207	236.860	102.124	338.269	9320.600	150.412
1997	1748.247	1408.522	248.563	91.161	331.397	9070.820	274.626
1998	1774.475	1435.536	253.330	85.609	335.465	9025.100	284.675
1999	1838.250	1495.630	263.935	78.685	0.000	9139.110	287.423
2000	1770.623	1448.236	255.571	66.816	0.000	9240.110	289.607
2001	1701.977	1386.021	244.592	71.364	0.000	9329.400	294.049
2002	1833.556	1486.191	262.269	85.096	0.000	9216.230	300.455
2003	1762.968	1419.198	250.447	93.324	0.000	9097.810	306.619
2004	1746.065	1403.544	247.684	94.838	0.000	8977.766	311.189

SOURCE: ISER MAP MODEL SIMULATION LMGB, CREATED NOVEMBER 1987

TOTAL (DF.APGF).
OPERATING (DF.APGFO).
CAPITAL (DF.APGFC).
DEBT SERVICE (DF.EXDSS) INCLUDES ONLY GENERAL OBLIGATION DEBT OF STATE.
PERMANENT FUND DIVIDEND (DF.EXTRM).
PERMANENT FUND BALANCE (DF.BALPF).
PERSONAL INCOME TAX (DF.RTIS).

Expected Case

ISER MAP MODEL ECONOMIC PROJECTIONS

NOVEMBER 1987

TABLE 9

COMPONENTS OF REAL PERSONAL INCOME

(MILLION 1986 DOLLARS)

	WAGE AND SALARY PAYMENTS	NET EARNINGS	RESIDENCE ADJUSTMENT	DIVIDENDS, INTEREST, RENT	TRANSFERS	PERSONAL INCOME	DISPOSABLE PERSONAL INCOME
1985	7228.05[illegible]	8060.391	597.825	857.160	1076.681	9599.570	8131.738
1986	6762.56[illegible]	7501.953	512.282	908.995	1166.949	9258.110	7848.125
1987	6406.58[illegible]	7118.348	482.702	930.358	1282.481	9032.690	7660.375
1988	6176.77[illegible]	6877.559	462.044	907.730	1332.716	8833.305	7491.391
1989	6223.65[illegible]	6933.078	463.468	880.491	1381.995	8908.270	7552.715
1990	6379.477	7108.063	475.266	863.458	1434.013	9107.580	7717.902
1991	6439.34[illegible]	7178.863	479.680	859.197	1489.797	9224.500	7814.074
1992	6561.938	7311.285	489.805	868.151	1542.604	9408.750	7966.633
1993	6656.19[illegible]	7411.[illegible]91	497.742	884.833	1616.217	9590.580	8118.105
1994	6772.500	7536.353	507.389	903.873	1687.462	9796.860	8289.840
1995	6789.074	7551.523	509.344	920.944	1756.255	9893.330	8369.395
1996	6887.352	7657.043	517.622	933.142	1824.178	10070.050	8321.055
1997	6984.76[illegible]	7765.070	527.654	918.753	1827.555	10154.540	8386.164
1998	7205.059	8003.867	546.042	939.223	1894.388	10463.460	8637.660
1999	7449.21[illegible]	8268.145	570.189	954.615	1623.022	10449.010	8608.762
2000	7617.68[illegible]	8449.758	578.770	973.3[illegible]7	1688.507	10706.290	8818.684
2001	7735.65[illegible]	8572.031	588.458	996.473	1754.964	10907.490	8982.867
2002	8004.35[illegible]	8867.078	610.140	1019.280	1823.247	11273.170	9280.810
2003	8139.270	9011.730	621.946	1040.560	1892.185	11495.310	9461.980
2004	831[illegible].46[illegible]	9198.630	636.031	1067.262	1962.165	11764.270	9681.580

SOURCE: ISER MAP MODEL SIMULATION LNGB, CREATED NOVEMBER 1987.

WAGE AND SALARY PAYMENTS (DF.PIWS) IN NONAGRICULTURAL
WAGE AND SALARY JOB CATEGORIES PLUS MILITARY.
NET EARNINGS (DF.PINE) IS NET LABOR AND PROPRIETORS' INCOME
BY PLACE OF WORK.
RESIDENCE ADJUSTMENT (DF.PIRAD).
DIVIDENDS, INTEREST, AND RENT (DF.PIDIR).
TRANSFERS (DF PITRAN).
PERSONAL INCOME (DF.PIB).
DISPOSABLE PERSONAL INCOME (DF.DPIB)

Expected Case

ISER MAP MODEL ECONOMIC PROJECTIONS
NOVEMBER 1987
TABLE 10.
PRICE INDEXES

	ANCHORAGE CPI-W	ALASKA/US PRICE LEVEL
1985	275.400	1.230
1986	280.300	1.235
1987	284.486	1.210
1988	296.719	1.210
1989	311.257	1.210
1990	325.65[illegible]	1.202
1991	341.329	1.194
1992	357.719	1.187
1993	374.866	1.179
1994	392.802	1.171
1995	411.635	1.163
1996	431.850	1.155
1997	469.024	1.188
1998	491.915	1.180
1999	515.96	1.172
2000	541.136	1.164
2001	567.55[illegible]	1.156
2002	595.11[illegible]	1.148
2003	624.056	1.140
2004	654.34[illegible]	1.132

SOURCE: ISER MAP MODEL SIMULATION LNGB, CREATED NOVEMBER 1987.

ANCHORAGE CPI (PDANCPI) CONSUMER PRICE INDEX FOR URBAN WAGE EARNERS.
ALASKA/US PRICE LEVEL (PDRATIO) IS THE RATIO OF US AND
ANCHORAGE CONSUMER PRICE INDEX LEVELS.

Expected Case

ISER MAP REGIONAL MODEL ECONOMIC PROJECTIONS

NOVEMBER 1987

TABLE 11

POPULATION BY LABOR MARKET AREA

(THOUSANDS)

	ANCH/MATSU	SOUTHEAST	INTERIOR	NORTH	GULF COAST	SOUTHWEST	TOTAL
1985	272.180	64.236	86.342	19.105	61.261	34.839	539.962
1986	265.868	65.084	88.801	18.249	61.669	35.667	535.336
1987	259.826	65.022	87.815	18.508	62.041	35.733	528.945
1988	254.792	64.853	88.621	18.498	61.722	35.367	523.852
1989	253.178	64.722	92.110	17.736	61.352	35.058	524.154
1990	254.815	65.270	91.924	18.969	62.216	34.681	527.875
1991	255.480	67.652	91.504	18.872	62.213	34.532	530.253
1992	256.738	67.436	93.452	18.957	61.767	34.645	532.993
1993	260.095	66.241	93.583	18.727	61.951	34.439	535.036
1994	262.470	66.408	93.691	18.897	62.209	34.490	538.163
1995	263.604	65.916	93.402	18.794	62.336	34.504	538.554
1996	264.004	67.063	93.451	19.031	62.643	34.806	540.997
1997	266.008	67.079	93.684	19.163	63.063	35.046	544.040
1998	269.615	67.468	94.111	19.410	63.553	35.658	549.914
1999	272.985	68.235	94.708	19.870	64.412	36.696	556.905
2000	276.921	68.493	95.264	19.653	65.186	37.107	562.823
2001	280.768	68.585	95.864	19.698	65.683	36.685	567.281
2002	285.514	69.664	96.936	20.133	66.476	37.242	575.962
2003	289.849	70.010	97.654	20.104	67.118	37.239	581.971
2004	294.544	70.300	98.589	20.212	67.683	37.477	589.004

SOURCE: ISER MAP MODEL SIMULATION LNGBR, CREATED NOVEMBER 1987.

NOTE:OFFICIAL STATE OF ALASKA AND CENSUS AREA GOVERNMENT POPULATION ESTIMATES MAY NOT BE EQUAL

ANCH/MATSU (PL.ANCMS).
SOUTHEAST (PL SEAST).
INTERIOR (PL INTER).
NORTH (PL.NORTH).
GULF COAST (PL.GULF).
SOUTHWEST (PL.SWEST).
TOTAL (P.ST)

Expected Case

ISER MAP REGIONAL MODEL ECONOMIC PROJECTIONS

NOVEMBER 1987

TABLE 12.

TOTAL EMPLOYMENT BY LABOR MARKET AREA

(THOUSANDS)

	ANCH/MATSU	SOUTHEAST	INTERIOR	NORTH	GULF COAST	SOUTHWEST	TOTAL
1985	140.009	33.955	41.980	14.634	25.538	16.199	272.313
1986	134.050	33.573	41.568	12.450	25.294	16.262	263.198
1987	128.427	32.881	40.327	12.016	24.960	16.026	254.636
1988	125.270	32.596	40.598	11.616	24.704	15.807	250.590
1989	125.154	32.732	42.611	11.513	24.707	15.773	252.490
1990	127.600	33.454	43.103	12.177	25.311	15.833	257.478
1991	128.475	34.839	43.094	12.264	25.413	15.863	259.949
1992	129.425	34.841	44.222	12.429	25.343	15.980	262.240
1993	131.038	34.217	44.310	12.430	25.390	15.951	263.334
1994	132.458	34.375	44.457	12.589	25.536	16.042	265.456
1995	132.261	34.939	44.090	12.547	25.445	16.036	264.318
1996	132.549	34.571	44.126	12.736	25.605	16.188	265.774
1997	133.672	34.631	44.288	12.893	25.811	16.343	267.638
1998	136.120	35.038	44.708	13.300	26.175	16.802	272.141
1999	138.268	35.619	45.131	13.906	26.587	17.471	276.980
2000	140.228	35.743	45.425	13.851	26.901	17.722	279.870
2001	141.676	35.639	45.595	13.607	27.004	17.406	280.926
2002	144.764	36.402	46.332	13.998	27.460	17.743	286.697
2003	146.468	36.441	46.364	13.799	27.627	17.659	288.556
2004	148.746	36.556	47.023	13.691	27.922	17.728	291.664

SOURCE: ISER MAP MODEL SIMULATION LNGBR, CREATED NOVEMBER 1987.

ANCH/MATSU (ML.ANCMS).
SOUTHEAST (ML.SEAST).
INTERIOR (ML.INTER).
NORTH (ML.NORTH)
GULF COAST (ML.GULF).
SOUTHWEST (ML.SWEST).
TOTAL (M.ST).

FI

UNITED STATES OF AMERICA

[6450-01]

DEPARTMENT OF ENERGY
ECONOMIC REGULATORY ADMINISTRATION

[ERA DOCKET NO. 88-22-NG]

PHILLIPS 66 NATURAL GAS COMPANY

MARATHON OIL COMPANY

APPLICATION TO AMEND AUTHORIZATION
TO EXPORT LIQUEFIED NATURAL GAS

AGENCY: Department of Energy
Economic Regulatory Administration

ACTION: Notice of Application to Amend Authorization to Export Liquefied Natural gas

SUMMARY: The Economic Regulatory Administration (ERA) of the Department of Energy (DOE) gives notice of receipt on April 11, 1988, of an application filed by Phillips 66 Natural Gas Company (Phillips 66) and Marathon Oil Company (Marathon) requesting approval of a 15-year extension and modification of their existing authorization to export liquefied natural gas (LNG) from the Kenai peninsula of Alaska to Japan.

The application is filed with the ERA pursuant to Section 3 of the Natural Gas Act and DOE Delegation Order No. 0204-111. Protests, motions to intervene, notices of intervention and written comments are invited.

DATE: Protests, motions to intervene, or notices of intervention, as applicable, requests for additional procedures and written comments are to be filed no later than _____.
(30 days after date of publication).

FOR FURTHER INFORMATION:

Frank Duchaine
Natural Gas Division
Economic Regulatory Administration
U.S. Department of Energy
Forrestal Building, Room GA-076
1000 Independence Avenue, S.W.
Washington, D.C. 20585
(202) 586-8233

Diane Stubbs
Natural Gas and Mineral Leasing
Office of General Counsel
U.S. Department of Energy
Forrestal Building, Room 6E-042
1000 Independence Avenue, S.W.
Washington, D.C. 20585
(202) 586-6667

SUPPLEMENTARY INFORMATION:

The LNG export authorization held by Phillips 66 and Marathon was granted originally by the Federal Power Commission on April 19, 1967 (37 FPC 777), and was subsequently amended by DOE/ERA Opinion and Order No. 49 (1 ERA ¶70,116, December 14, 1982); DOE/ERA Opinion and Order No. 49A (1 ERA ¶70,127, April 3, 1986); and DOE/ERA Opinion and Order No. 206 (Order 206) (1 ERA ¶70,128, November 16, 1987). The applicants currently are authorized to export annually through May 31, 1989, up to 50.57 trillion Btus of LNG from the Kenai LNG plant in the Cook Inlet area of Alaska to two Japanese customers, the Tokyo Electric Power Company, Inc., and the Tokyo Gas Company, Ltd. Order 206 approved application of the following pricing formula to these LNG sales:

$$\text{Price for Calendar Month} = 592.8 \times \frac{\text{Avg. selling price (month prior to Calendar month)}}{34.48} + \text{Adjustment}$$

Where: average selling price is the weighted average official price in U.S. dollars per barrel for the top 20 crude oils imported into Japan in the previous year and sold on a term basis.

adjustment is an adjustment required to keep the price of Alaskan LNG competitive with other sales of LNG in the Japanese market (the adjustment changes as frequently as market conditions require or on request of either party).

Phillips 66 and Marathon request the ERA to extend their export authorization under modified terms through March 31, 2004, in accordance with an agreement in principle reached between themselves and their Japanese buyers. The agreement reflects four principal changes to the contractual arrangement currently authorized by Order 206. First, the contract year has been changed from a twelve-month period beginning June 1 to a twelve-month period beginning April 1. Second, the pricing formula set forth above has been amended to limit the presently unspecified "adjustment" factor to a range of 30.0 cents (plus or minus) per MMBtu. Third, commencing April 1, 1989, the annual contract quantity (ACQ) has been increased from 50.57 trillion Btu's per year to 52.0 trillion Btu's per year. This quantity will increase to 57.5 trillion Btu's per year beginning in the first contract year in which applicants place larger LNG tankers into operation for the entire contract year. According to the application, an increase to 57.5 trillion Btu's is likely to occur for the contract year commencing April 1, 1994, but could occur as early as the contract year commencing April 1, 1993. Fourth, buyers may request

additional deliveries up to a maximum of 6 percent of the ACQ, as increased above, during any contract year.

In support of their application, Phillips 66 and Marathon state that extension of the export would continue the beneficial impact of the project on the economy of the State of Alaska and on the balance of payments between the United States and Japan. The applicants also state that, in light of the current natural gas surplus in Alaska and in the lower forty-eight states, there is no evidence of either regional or national need for the gas proposed to be exported. The applicants included as part of their application an analysis of the economic impacts of the proposed export. Further, they assert that the pricing formula will continue to provide parties with the flexibility to respond to market conditions and therefore is consistent with ERA policy.

Phillips 66 and Marathon request that this amendment be granted on an expedited basis. An ERA decision on their request for expedited treatment will not be made until all responses to this notice have been received and evaluated.

This export application will be reviewed pursuant to Section 3 of the Natural Gas Act and the authority contained in DOE Delegation Order No. 0204-111. The decision on whether this export of natural gas is in the public interest will be based upon consideration of domestic need for the gas and such other matters as the Administrator finds to be appropriate in the particular circumstances of this case.

PUBLIC COMMENT PROCEDURES:

In response to this notice, any person may file a protest, motion to intervene or notice of intervention, as applicable, and written comments. Any person wishing to become a party to the proceeding and to have the written comments considered as the basis for any decision on the application must, however, file a motion to intervene or notice of intervention, as applicable. The filing of a protest with respect to this application will not serve to make the protestant a party to the proceeding, although protests and comments received from persons who are not parties will be considered in determining the appropriate action to be taken on the application. All protests, motions to intervene, notices of intervention, and written comments must meet the requirements that are specified by the regulations in 10 CFR Part 590.

Protests, motions to intervene, notices of intervention, requests for additional procedures, and written comments should be filed with the Natural Gas Division, Office of Fuels Programs, Economic Regulatory Administration, Room CA-076, RG-23, Forrestal Building, 1000 Independence Avenue, S.W., Washington, D.C. 20585, (202) 586-9478. They must be filed no later than 4:30 p.m. e.d.t., _____ (30 days after publication).

The Administrator intends to develop a decisional record on the application through responses to this notice by parties, including the parties' written comments and replies thereto. Additional procedures will be used as necessary to achieve a complete understanding of the facts and issues. A party seeking intervention may request that additional procedures be provided,

such as additional written comments, an oral presentation, a conference, or trial-type hearing. Any request to file additional written comments should explain why they are necessary. Any request for an oral presentation should identify the substantial question of fact, law, or policy at issue, show that it is material and relevant to a decision in the proceeding, and demonstrate why an oral presentation is needed. Any request for a conference should demonstrate why the conference would materially advance the proceeding. Any request for a trial-type hearing must show that there are factual issues genuinely in dispute that are relevant and material to a decision and that a trial-type hearing is necessary for a full and true disclosure of the facts.

If an additional procedure is scheduled, the ERA will provide notice to all parties. If no party requests additional procedures, a final opinion and order may be issued based on the official record, including the application and responses filed by parties pursuant to this notice, in accordance with 10 CFR Sec. 590.316.

A copy of Phillip 66's and Marathon's application is available for inspection and copying in the Natural Gas Division Docket Room, GA-076-A at the above address. The docket room is open between the hours of 8:00 a.m. and 4:30 p.m., Monday through Friday, except Federal holidays.

Issued in Washington, D.C., May 16, 1988.

Constance L. Buckley
Director
Natural Gas Division
Office of Fuels Programs
Economic Regulatory Administration

FP

Compagnie Generale des Matieres Nucleaires (COGEMA), for the purpose of reprocessing, 60 irradiated fuel assemblies, containing approximately 10,567 kilograms of uranium, enriched to approximately 0.81% in U-235 and 92 kilograms of plutonium, from the Muhleberg nuclear power station, and 96 irradiated fuel assemblies, containing approximately 29,613 kilograms of uranium, enriched to approximately 1.02% in U-235 and 294 kilograms of plutonium, from the Beznau nuclear power station. These subsequent arrangements are designated as RTD/EU(SD)-68 and RTD/EU(SD)-69, respectively. The Department of Energy has received letters of assurance from the Government of Switzerland that the recovered uranium and plutonium will be stored in France, and will not be transferred from France, nor put to any use, without the prior consent of the United States Government.

In accordance with section 131 of the Atomic Energy Act of 1954, as amended, it has been determined that these subsequent arrangements will not be inimical to the common defense and security.

These subsequent arrangements will take effect no sooner than fifteen days after the date of publication of this notice and after fifteen days of continuous session of the Congress, beginning the day after the date on which the reports required by section 131 of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2160) are submitted to the Committee on Foreign Affairs of the House of Representatives and the Committee on Foreign Relations of the Senate. The two time periods referred to above shall run concurrently.

Dated: May 17, 1988.

George J. Bradley, Jr.,

Principal Deputy Assistant Secretary for International Affairs and Energy Emergencies.

[FR Doc. 88-11327 Filed 5-19-88; 8:45 am]

BILLING CODE 6450-01-M

Liquids Transportation Task Group, Coordinating Subcommittee on Petroleum Storage & Transportation, National Petroleum Council; Open Meeting

Notice is hereby given of the following meeting:

Name: Liquids Transportation Task Group, Coordinating Subcommittee on Petroleum Storage & Transportation of the National Petroleum Council.

Date and Time: Friday, June 3, 1988, 10:00 a.m. (Please note: This meeting replaces the one scheduled for May 25, 1988, which had to be canceled.)

Place: O'Hare Marriott Hotel, Salon A, 8535 West Higgins, Chicago, Illinois.

Contact: Margie D. Biggerstaff, U.S. Department of Energy, Office of Fossil Energy (FE-1), Washington, DC 20585, Telephone: 202/586-4695.

Purpose of the parent council: To provide advice, information, and recommendations to the Secretary of Energy on matters relating to oil and gas or the oil and gas industries.

Purpose of the meeting: Discuss pipeline survey and progress on individual assignments.

Tentative Agenda:

Opening remarks by Chairman and Government Cochairman.

Discuss the pipeline survey.

Review progress on individual assignments.

Discuss any other matters pertinent to the overall assignment from the Secretary of Energy.

Public Participation: The meeting is open to the public. The Chairman of the Task Group is empowered to conduct the meeting in a fashion that will, in his judgment, facilitate the orderly conduct of business. Any member of the public who wishes to file a written statement with the Task Group will be permitted to do so, either before or after the meeting. Members of the public who wish to make oral statements pertaining to agenda items should contact Ms. Margie D. Biggerstaff at the address or telephone number listed above. Requests must be received at least 5 days prior to the meeting and reasonable provisions will be made to include the presentation on the agenda.

Summary minutes of the meeting will be available for public review at the Freedom of Information Reading Room, Room 1E-190, DOE Forrestal Building, 1000 Independence Avenue SW., Washington, DC, between the hours of 9:00 AM and 4:00 PM Monday through Friday, except Federal holidays.

Donald L. Bauer,

Principal Deputy Assistant Secretary, Fossil Energy.

[FR Doc. 88-11478 Filed 5-18-88; 2:30 pm]

BILLING CODE 6450-01-M

Economic Regulatory Administration

[ERA Docket No. 88-22-NG]

Phillips 66 Natural Gas Co. and Marathon Oil Co.; Application To Amend Authorization To Export Liquefied Natural Gas

AGENCY: Economic Regulatory Administration, DOE.

ACTION: Notice of application to amend authorization to export liquefied natural gas.

SUMMARY: The Economic Regulatory Administration (ERA) of the Department of Energy (DOE) gives notice of receipt on April 11, 1988, of an application filed by Phillips 66 Natural Gas Company (Phillips 66) and Marathon Oil Company (Marathon) requesting approval of a 15-year extension and modification of their existing authorization to export liquefied natural gas (LNG) from the Kenai peninsula of Alaska to Japan.

The application is filed with the ERA pursuant to Section 3 of the Natural Gas Act and DOE Delegation Order No. 0204-111. Protests, motions to intervene, notices of intervention and written comments are invited.

DATE: Protests, motions to intervene, or notices of intervention, as applicable, requests for additional procedures and written comments are to be filed no later than June 20, 1988.

FOR FURTHER INFORMATION CONTACT:

Frank Duchaine, Natural Gas Division, Economic Regulatory Administration, U.S. Department of Energy, Forrestal Building, Room GA-076, 1000 Independence Avenue, SW., Washington, DC 20585, (202) 586-8233

Diane Stubbs, Natural Gas and Mineral Leasing, Office of General Counsel, U.S. Department of Energy, Forrestal Building, Room 6E-042, 1000 Independence Avenue, SW., Washington, DC 20585, (202) 586-6667

SUPPLEMENTARY INFORMATION: The LNG export authorization held by Phillips 66 and Marathon was granted originally by the Federal Power Commission on April 19, 1967 (37 FPC 777), and was subsequently amended by DOE/ERA Opinion and Order No. 49 (1 ERA ¶ 70.116, December 14, 1982); DOE/ERA Opinion and Order No. 49A (1 ERA ¶ 70.127, April 3, 1986); and DOE/ERA Opinion and Order No. 206 (Order 206) (1 ERA ¶ 70.128, November 16, 1987). The applicants currently are authorized to export annually through May 31, 1989 up to 50.57 trillion Btus of LNG from the Kenai LNG plant in the Cook Inlet area of Alaska to two Japanese customers, the Tokyo Electric Power Company, Inc., and the Tokyo Gas Company, Ltd. Order 206 approved application of the following pricing formula to these LNG sales:

$$\text{Price for Calendar Month} = 592.8 \times \frac{\text{Avg. selling price (month prior to Calendar month)}}{34.48} + \text{Adjustment}$$

Where: *average selling price* is the weighted average official price in U.S. dollars per barrel for the top 20 crude oils imported into Japan in the previous year and sold on a term basis.

adjustment is an adjustment required to keep the price of Alaskan LNG competitive with other sales of LNG in the Japanese market (the adjustment changes as frequently as market conditions require or on request of either party).

Phillips 66 and Marathon request the ERA to extend their export authorization under modified terms through March 31, 2004, in accordance with an agreement in principle reached between themselves and their Japanese buyers. The agreement reflects four principal changes to the contractual arrangement currently authorized by Order 206. First, the contract year has been changed from a twelve-month period beginning June 1 to a twelve-month period beginning April 1. Second, the pricing formula set forth above has been amended to limit the presently unspecified "adjustment" factor to a range of 30.0 cents (plus or minus) per MMBtu. Third, commencing April 1, 1989, the annual contract quantity (ACQ) has been increased from 50.57 trillion Btu's per year to 52.0 trillion Btu's per year. This quantity will increase to 57.5 trillion Btu's per year beginning in the first contract year in which applicants place larger LNG tankers into operation for the entire contract year. According to the application, an increase to 57.5 trillion Btu's is likely to occur for the contract year commencing April 1, 1994, but could occur as early as the contract year commencing April 1, 1993. Fourth, buyers may request additional deliveries up to a maximum of 6 percent of the ACQ, as increased above, during any contract year.

In support of their application, Phillips 66 and Marathon state that extension of the export would continue the beneficial impact of the project on the economy of the State of Alaska and on the balance of payments between the United States and Japan. The applicants also state that, in light of the current natural gas surplus in Alaska and in the lower forty-eight states, there is no evidence of either regional or national need for the gas proposed to be exported. The applicants included as part of their application an analysis of the economic impacts of the proposed export. Further, they assert that the pricing formula will continue to provide parties with the flexibility to respond to market conditions and therefore is consistent with ERA policy.

Phillips 36 and Marathon request that this amendment be granted on an expedited basis. An ERA decision on their request for expedited treatment will not be made until all responses to this notice have been received and evaluated.

This export application will be reviewed pursuant to Section 3 of the Natural Gas Act and the authority contained in DOE Delegation Order No. 0204–111. The decision on whether this export of natural gas is in the public interest will be based upon consideration of domestic need for the gas and such other matters as the Administrator finds to be appropriate in the particular circumstances of this case.

Public Comment Procedures

In response to this notice, any person may file a protest, motion to intervene or notice of intervention, as applicable, and written comments. Any person wishing to become a party to the proceeding and to have the written comments considered as the basis for any decision on the application must, however, file a motion to intervene or notice of intervention, as applicable. The filing of a protest with respect to this application will not serve to make the protestants a party to the proceeding, although protests and comments received from persons who are not parties will be considered in determining the appropriate action to be taken on the application. All protests, motions to intervene, notices of intervention, and written comments must meet the requirements that are specified by the regulations in 10 CFR Part 590.

Protests, motions to intervene, notices of intervention, requests for additional procedures, and written comments should be filed with the Natural Gas Division, Office of Fuels Programs, Economic Regulatory Administration, Room GA–076, RG–23, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585, (202) 586–9478. They must filed no later than 4:30 p.m. e.d.t., June 20, 1988.

The Administrator intends to develop a decisional record on the application through reponses to this notice by parties, including the parties' written comments and replies thereto. Additional procedures will be used as necessary to achieve a complete understanding of the facts and issues. A party seeking intervention may request that additional procedures be provided, such as additional written comments, an oral presentation, a conference, or trial-type hearing. Any request to file additional written comments should explain why they are necessary. Any request for an oral presentation should identify the substantial question of fact, law, or policy at issue, show that it is material and relevant to a decision in the proceeding, and demonstrate why an oral presentation is needed. Any request for a conference should demonstrate why the conference would materially advance the proceeding. Any request for a trial-type hearing must show that there are factual issues genuinely in dispute that are relevant and material to a decision and that a trial-type hearing is necessary for a full and true disclosure of the facts.

If an additional procedure is scheduled, the EKA will provide notice to all parties. If no party requests additional procedures, a final opinion and order may be issued based on the official record, including the application and responses filed by parties pursuant to this notice, in accordance with 20 CFR 590.316.

A copy of Phillip 66's and Marathon's application is available for inspection and copying in the Natural Gas Division Docket Room, GA–076–A at the above address. The docket room is open between the hours of 8:00 a.m. and 4:30

p.m., Monday through Friday, except Federal holidays.

Issued in Washington, DC, May 18, 1988

Constance L. Buckley,

Director, Natural Gas Division, Office of Field Programs, Economic Regulatory Administration.

[FR Doc. 88-11328 Filed 5-19-88; 8:45 am]

BILLING CODE 6450-01-M

Federal Energy Regulatory Commission

[Project No. 9260-001]

Adirondack Hydro Development Corp.; Availability of Environmental Assessment and Finding of No Significant Impact

May 18, 1988.

In accordance with the National Environmental Policy Act of 1969, the Office of Hydropower Licensing, Federal Energy Regulatory Commission (Commission), has reviewed the application for major license listed below and has assessed the environmental impacts of the proposed development.

LICENSE

Project No	Project name	State	Water body	Nearest town or county	Applicant
9260-001	Sissonville Project	NY	Raquette River	St. Lawrence	Adirondack Hydro Development Corp

An Environmental Assessment (EA) was prepared for the above proposed project. Based on independent analysis of the above action as set forth in the EA, the Commission's staff concludes that this project would not have significant effects on the quality of the human environment. Therefore, an environmental impact statement for this project will not be prepared. Copies of the EA are available for review in the Commission's Division of Public Information, Room 1000, 825 North Capitol Street NE., Washington, DC 20426.

Lois D. Cashell,

Acting Secretary.

Environmental Assessment

Federal Energy Regulatory Commission
Office of Hydropower Licensing
Division of Project Review

Sissonville Hydroelectric Project

[FERC Project No. 9260-001—New York]

April 22, 1988.

I. Application

On May 8, 1986, the Adirondack Hydro Development Corporation (Adirondack Hydro) filed an application for a license for the Sissonville Hydroelectric Project, a major project of 2.3 megawatts (MW). Adirondack Hydro supplemented the application on December 23, 1986, and October 29, 1987.

The project would be located on the Raquette River, a major tributary to the St. Lawrence River in northern New York State. The project site is located 1.5 miles downstream from the Village of Potsdam, in St. Lawrence County, New York (figure 1).

II. Resource Development

A. Purpose

The proposed project would provide an estimated 12,677,000 kilowatthours (kWh) of electrical energy per year to the Niagara Mohawk Power Corporation (NMPC).

B. Need for Power

The power from the project would be useful in meeting a small portion of the need for power projected for the New York Power Pool of the Northeast Power Coordinating Council (NPCC) region. From the time the project goes on-line (i.e., into commercial operation), it would be available to displace fossil-fueled, electric power generation in the NPCC region, thus conserving nonrenewable fossil fuels and reducing the emission of noxious byproducts caused by the combustion of fossil fuels.

III. Proposed Project and Alternatives

A. The Proposed Project

1. Project Description

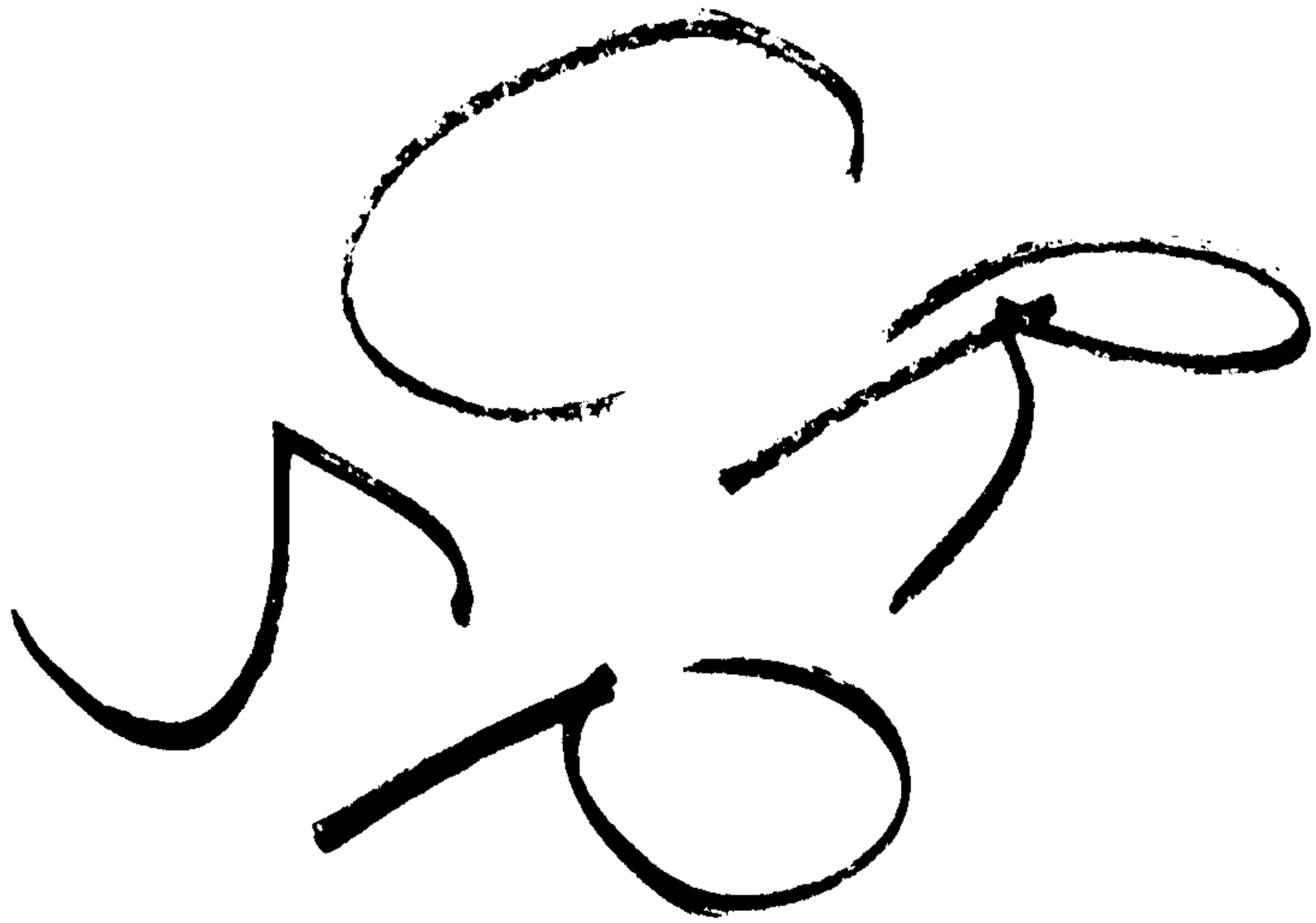
The proposed project consists of reconstructing a breached dam, which is owned by the applicant, and constructing a new concrete powerhouse. The project features include the following facilities: (1) A 14-foot high, 370-foot-wide dam with a spillway at elevation 394 feet mean sea level (msl); (2) a 30-acre reservoir with a storage capacity of 205 acre-feet at 394 feet msl; (3) a 45-foot wide, 22-foot high intake structure; (4) a headrace channel approximately 160 feet long and 80 feet wide; (5) a concrete powerhouse 40 feet wide and 100 feet long containing one turbine/generator with an installed capacity of 2.3 MW; (6) a tailrace channel approximately 970 feet long and 60 feet wide; (7) a 400-foot-long bypassed reach; (8) a 13.2 kilovolt (kV), 4,000-foot-long transmission line; and (9) appurtenant facilities. The project has a hydraulic range from 440 cubic feet per second (cfs) to 2,200 cfs and would generate an average of 12,677,000 kWh when operating with a net head of 15 feet. The power produced by the project would be sold to the NMPC.

2. Proposed Mitigative Measures

Adirondack Hydro proposes to reduce the impacts of developing the project by implementing the following mitigative measures: (1) Analyzing the sediments to be removed from the project site for contaminants prior to initiating project construction; (2) disposing of the sediments in a manner approved by the New York State Department of Environmental Conservation (DEC); (3) consulting with the DEC to determine a schedule for installing cofferdams, removing sediments, and altering the waterflows prior to construction; (4) utilizing bedrock removed from the tailrace to stabilize the riverbank and to minimize erosion; and (5) releasing 200 cfs into the 400-foot-long bypassed reach during the spring to provide spawning habitat for resident fish and releasing 100 cfs during the remainder of the year. In addition, Adirondack Hydro has purchased a 9-acre parcel of land along the Raquette River for mitigating the anticipated loss of 7.9 acres of woodland from the developing the proposed project.

B. Alternative to the Proposed Project

Because Adirondack Hydro is not an electrical utility, the only alternative to the proposed action, in the event of denial of license, is to not construct the project. If the license is not issued, the project would not be constructed, and



PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA 74004 PHONE 918 661-6600

June 22, 1988

ERA Docket No. 88-22-NG
Application To Amend Authorization
To Export Liquified Natural Gas

88 JUN 28 A10:40
RECD DOE/ERA

Natural Gas Division
Economic Regulatory Administration
Forrestal Building, Room GA 033, RG-43
1000 Independence Avenue, SW
Washington, DC 20585

Gentlemen:

Attached for your information are 16 copies of "Liquified Natural Gas Sale and Purchase Extension Agreement" dated June 17, 1988 between Phillips 66 Natural Gas Company and Marathon Oil Company and The Tokyo Electric Power Company, Incorporated and Tokyo Gas Co., LTD.

The attached agreement details the terms set forth in the "agreement in principle", a synopsis of which was attached as Appendix A to the application filed on April 11, 1988 in the captioned docket.

Copies of the executed Liquified Natural Gas Sale and Purchase Extension Agreement are furnished pursuant to the representation made in our Application To Amend Authorization To Export Liquified Natural Gas. Should you have any questions, please advise.

Respectfully Submitted,

PHILLIPS 66 NATURAL GAS COMPANY

BY: Barbara Price-Thurman
Barbara Price-Thurman
Vice President

MARATHON OIL COMPANY

BY: J. V. Panziale
John V. Panziale, Manager
Natural Gas Division
Worldwide Production

MDG/70/pkc
Attachment

LIQUEFIED NATURAL GAS

SALE AND PURCHASE EXTENSION AGREEMENT

93 JAN 28 A10:44
FASSE/FEDERED

between

PHILLIPS 66 NATURAL GAS COMPANY

MARATHON OIL COMPANY

and

THE TOKYO ELECTRIC POWER COMPANY, INCORPORATED

TOKYO GAS CO., LTD.

INDEX

LIQUEFIED NATURAL GAS SALE AND PURCHASE EXTENSION AGREEMENT

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EXHIBIT A MEASUREMENT PROCEDURES

EXHIBIT B ANALYSIS METHODS FOR DETERMINING IMPURITIES CONTAINED IN LNG

LIQUEFIED NATURAL GAS SALE AND PURCHASE EXTENSION AGREEMENT

THIS EXTENSION AGREEMENT is entered into as of this 17th day of June, 1988, by and between Phillips 66 Natural Gas Company (Phillips) as successor to Phillips Petroleum Company, a corporation incorporated under the laws of the State of Delaware, the United States of America and Marathon Oil Company (Marathon), a corporation incorporated under the laws of the State of Ohio, the United States of America, hereinafter collectively referred to as "Sellers", and The Tokyo Electric Power Company, Incorporated (Tokyo Electric) and Tokyo Gas Co., Ltd. (Tokyo Gas), corporations incorporated under the laws of Japan, hereinafter collectively referred to as "Buyers" and executed in both the English and Japanese languages.

WITNESSETH:

WHEREAS, on the 6th day of March, 1967, Sellers and Buyers entered into that certain Liquefied Natural Gas Sales Agreement, (as subsequently amended by Amendatory Extension Agreement as of the 15th day of April, 1982) "Original Agreement", providing for the sale and purchase of LNG manufactured from natural gas produced from natural gas reserves located in the State of Alaska, the United States of America;

WHEREAS, Sellers represent that natural gas reserves are and will be adequate to continue the manufacture of LNG to be sold and purchased under this Extension Agreement;

WHEREAS, Sellers' present manufacturing facilities, the two (2) LNG tankers currently in service and the two (2) new LNG tankers to be brought into service are and

will be adequate to continue the manufacture and delivery of LNG to be sold and purchased under this Extension Agreement;

WHEREAS, Buyers' berthing facilities before and after revision are and will be adequate to continue the receipt of LNG to be sold and purchased under this Extension Agreement;

WHEREAS, Sellers and Buyers intend to extend the Original Agreement with some amendments;

NOW THEREFORE, in consideration of the mutual and dependent promises herein contained, the parties hereto agree to this Extension Agreement as follows:

I. DEFINITIONS:

1.1 Definitions of Terms

Except where context otherwise indicates another or different meaning or intent, the following terms as used herein shall be construed to have meanings as follows:

a. The term "day" shall mean a period of twenty-four (24) consecutive hours beginning and ending at 0:00 a.m. (midnight) Japan Standard Time.

b The term "month", unless preceded by the term "calendar", shall mean a period of time beginning at 0:00 a.m. Japan Standard Time on any day of a calendar month (Gregorian Calendar) and ending at 0:00 a.m. Japan Standard Time on the same day of the next succeeding calendar month.

c. The term "year", unless preceded by the term "calendar", shall mean a period of time beginning at 0:00 a.m. Japan Standard Time on any day of a calendar year (Gregorian Calendar) and ending at 0:00 a.m. Japan Standard Time on the same day of the next succeeding calendar year.

d. The term "contract year" shall mean a period of twelve (12) consecutive months beginning on April 1 each year and ending on the succeeding March 31. The first contract year of this Extension Agreement shall begin on April 1, 1989 and end on March 31, 1990.

e. The term "Btu" shall mean one (1) British Thermal Unit, and is defined as the amount of heat required to raise the temperature of one (1) pound of water from fifty-nine (59) to sixty (60) degrees Fahrenheit.

f. The term "standard cubic foot" or "Scf" shall mean the quantity of gas occupying one (1) cubic foot at a temperature of sixty (60) degrees Fahrenheit and an absolute pressure of fourteen and six hundred ninety-six-thousandths (14.696) pounds per square inch.

g. The term "normal cubic meter" or "Nm^3" shall mean the quantity of gas occupying one (1) cubic meter at a temperature of zero (0) degrees Celsius and an absolute pressure of one thousand thirteen and twenty-five-hundredths (1,013.25) millibars.

h. The term "gross heating value" is the heat liberated from burning one (1) cubic foot of water-free gas, measured at sixty (60) degrees Fahrenheit and an absolute pressure of fourteen and six hundred ninety-six-thousandths (14.696) pounds per square inch, determined by cooling the products of combustion including the moisture formed to sixty (60) degrees Fahrenheit.

i. The term "liquefied natural gas" or "LNG" shall mean a liquid state hydrocarbon commodity which has been manufactured from vaporous natural gas in manufacturing facilities and can be stored, transferred and transported in the liquid state at approximately atmospheric pressure and a temperature of minus two hundred fifty-nine (−259) degrees Fahrenheit.

j. The term "natural gas" shall mean gas and vapors produced from subterranean formations, whether produced from gas wells or oil wells.

k. The term "annual contract quantity" or "ACQ" shall mean the base quantity of LNG that Sellers agree to sell and deliver and Buyers agree to purchase and receive in each contract year.

l. The term "semester" shall mean either the first or last six (6) months of each contract year, starting each April 1 through the immediately following September 30 or each October 1 through the immediately following March 31.

m. The term "metric ton" shall mean a measure consisting of two thousand two hundred four and six-tenths (2,204.6) pounds.

n. The term "LNG tanker" shall mean a ship in which LNG sold and purchased hereunder is transported.

o. The term "barrel" shall mean forty-two (42) United States gallons (five and six thousand one hundred forty-six-ten thousandths (5.6146) cubic feet).

p. The term "Buyers' working day" shall mean a day from Monday through Friday when both Buyers' registered head offices are officially open for business.

q. The term "cargo" shall mean the entire amount of LNG available for sale and purchase from an LNG tanker.

r. The term "round" shall mean the effect of eliminating figures which are not required in order to establish a required number, using the following method: If the first of the figures to be discarded is 5 or more, the last of the figures to

be retained is increased by 1; if the first of the figures to be discarded is 4 or less, the last of the figures to be retained is unaltered.

The following illustrates the examples of this method:

number before being rounded	number after being rounded to 1 decimal place
3.64	3.6
3.649	3.6
3.650	3.7
3.66	3.7

II. SALE AND PURCHASE:

2.1 Sale and Purchase

Subject to all of the terms and conditions of this Extension Agreement, Sellers agree to sell and deliver to Buyers and Buyers agree to purchase and receive from Sellers, LNG in the quantities, at the times and places and at the price hereinafter set forth.

2.2 Severalty and Independence of Buyers

The rights and obligations of either of Buyers under this Extension Agreement shall be several and independent of the rights and obligations of the other of Buyers except where this Extension Agreement expressly requires Buyers to act together or jointly.

2.3 Natural Gas Reserves

LNG which Sellers will sell and deliver to Buyers will be manufactured from natural gas produced from natural gas reserves owned by, controlled by or otherwise committed to Sellers, located in the State of Alaska, the United States of America. Sellers warrant that they own, control or otherwise have committed to them natural gas and natural gas reserves sufficient to satisfy the total quantities of LNG to be sold and purchased hereunder. Sellers further warrant title to LNG delivered pursuant to this Extension Agreement and that such LNG at the delivery point specified herein will be free of all lawful liens, charges and claims of any and every kind.

Sellers' studies and evaluations of natural gas reserves are consistent with the authoritative data of the State of Alaska as published in "Historical and Projected Oil and Gas Consumption", January 1987, Alaska Department of Natural Resources, Division of Oil and Gas.

III. TITLE PASSAGE AND PLACE OF DELIVERY:

3.1 Transportation of LNG and Title Passage

Sellers shall be responsible for transportation and delivery of LNG sold and purchased under this Extension Agreement. Such delivery shall be made by Sellers to Buyers in the LNG tankers and the point of delivery and passage of title to and risk of loss of LNG shall be at the flange connecting the unloading piping of the LNG tanker with the piping of Buyers.

3.2 Place of Delivery

Unless otherwise mutually agreed the place of delivery shall be the LNG berthing facility at Negishi terminal in the city of Yokohama, Japan. Upon request of Buyers to direct any LNG tanker to any other Buyers' LNG berthing facility in the Bay of Tokyo, Sellers shall comply with Buyers' request subject to technical, safety and operational considerations. Buyers shall endeavor to notify Sellers of destinations other than Negishi terminal prior to the LNG tanker's departure from Sellers' facilities in the State of Alaska.

IV. FACILITIES:

4.1 Sellers' Facilities

Sellers shall maintain and operate, or cause to be maintained and operated, at their sole cost, expense and risk, manufacturing facilities, located in the State of Alaska, sufficient in size to enable Sellers to manufacture and deliver to Buyers the quantities of LNG sold and purchased hereunder. Sellers shall also maintain and operate, or cause to be maintained and operated, the two (2) LNG tankers to deliver LNG hereunder. Sellers agree to use their best endeavors to replace the LNG tankers currently in service, the Arctic Tokyo and the Polar Alaska, within six (6) years after the signing date of this Extension Agreement with the two (2) new LNG tankers which are to be constructed for delivery of Alaska LNG and suitable to deliver LNG hereunder; provided, however, that Sellers will not be required to commit expenditures or to begin construction until final governmental approval or authorization for this Extension Agreement is received. Such new LNG tankers will be of adequate size, capacity and speed to deliver at least the quantities of LNG sold and purchased hereunder, but Sellers shall determine the exact specifications of the new LNG tankers later taking into consideration Buyers' berthing facilities at Negishi terminal in the city of Yokohama, Japan, which are being revised as of the date of execution hereof.

4.2 Buyers' Facilities

Buyers shall maintain and operate, or cause to be maintained and operated, at their sole cost, expense and risk, docking, unloading and receiving facilities. The docking facilities designated for delivery of LNG shall be capable of handling and accommodating the LNG tanker which shall have the right to use Buyers' docking facilities in line with normal shipping industry practice of "first come, first served",

without any charges being imposed by Buyers for such use. The unloading facilities shall include lines and other terminal equipment of sufficient capacity to permit the unloading of the LNG tanker in a reasonable time mutually agreed between Sellers and Buyers. Such facilities shall also include a pipeline sufficient in size to return natural gas vapors from Buyers' storage tanks to the LNG tanker. The receiving facilities shall include storage and other auxiliary facilities of sufficient capacity to permit Sellers to deliver and Buyers to receive cargo at reasonable unloading rate of delivery. Buyers shall give Sellers pursuant to Sellers' request, before the specifications of the new LNG tankers are determined, information on Buyers' facilities which are being revised as of the date of execution hereof. Should the new LNG tankers or Buyers' facilities require further revisions, Sellers and Buyers agree to discuss in good faith how to cope with it. Sellers and Buyers agree to cooperate in coordinating the timing of the in-service date of the new LNG tankers with the completion of the revisions of Buyers' facilities being made as of the date of execution hereof.

4.3 Facilities for LNG Tankers

Buyers shall provide facilities for loading of ship's stores, excluding liquid nitrogen, free of cost to Sellers as long as such facilities existing as of the date of execution hereof are adequate. Buyers shall cooperate with Sellers, but without commitment, in providing other facilities, except the facilities provided in Section 4.2, as reasonably required for the new LNG tankers. Sellers shall bear an appropriate proportion of the costs and expenses of these facilities having regard to the use made of them by the new LNG tankers.

V. QUANTITIES AND SCHEDULES OF DELIVERY:

5.1 Annual Contract Quantity

From the first contract year through the contract year during which the second new LNG tanker is brought into service, the annual contract quantity of LNG which Sellers agree to sell and deliver and Buyers agree to purchase and receive under this Extension Agreement is fifty-two trillion (52,000,000,000,000) Btu's, which is the methane equivalent of approximately nine hundred eighty-eight thousand (988,000) metric tons. As between Tokyo Electric and Tokyo Gas, the annual contract quantity for Tokyo Electric shall be thirty-nine trillion (39,000,000,000,000) Btu's, which is the methane equivalent of approximately seven hundred forty-one thousand (741,000) metric tons, and the annual contract quantity for Tokyo Gas shall be thirteen trillion (13,000,000,000,000) Btu's, which is the methane equivalent of approximately two hundred forty-seven thousand (247,000) metric tons.

From the contract year following the contract year during which the second new LNG tanker is brought into service through the fifteenth contract year, the annual contract quantity of LNG which Sellers agree to sell and deliver and Buyers agree to purchase and receive under this Extension Agreement is fifty-seven trillion, five hundred billion (57,500,000,000,000) Btu's, which is the methane equivalent of approximately one million, ninety-two thousand (1,092,000) metric tons. As between Tokyo Electric and Tokyo Gas, the annual contract quantity for Tokyo Electric shall be forty-three trillion, one hundred twenty-five billion (43,125,000,000,000) Btu's, which is the methane equivalent of approximately eight hundred nineteen thousand (819,000) metric tons, and the the annual contract quantity for Tokyo Gas shall be fourteen trillion, three hundred seventy-five billion (14,375,000,000,000) Btu's, which is the methane equivalent of approximately two hundred seventy-three thousand (273,000)

metric tons.

Prior to the arrival of a cargo of LNG at the LNG berthing facilities used jointly by Buyers, Buyers shall declare together to Sellers the ratio, totalling one hundred (100) percent, in which such cargo is to be allocated between Buyers.

For the purpose of calculating the quantity delivered in a contract year, delivery and receipt of all LNG unloaded from any LNG tanker shall be deemed to have been made on the day on which unloading of that LNG was commenced.

5.2a Decrease in Annual Quantity

Buyers may decrease the quantity of LNG to be delivered and received in any contract year by an amount not exceeding ten (10) percent of the applicable ACQ subject to the further limitation specified in Section 5.2c below. In the case the quantity of LNG delivered and received in a contract year is less than the ACQ, the difference between such quantity and the ACQ shall be the "annual underlift quantity".

5.2b Increase in Annual Quantity

Buyers may request Sellers to increase the quantity of LNG to be delivered and received in any contract year by not more than six (6) percent of the applicable ACQ, and Sellers shall endeavor to comply with such Buyers' request. The quantity of LNG delivered and received in a contract year which exceeds the ACQ shall be the "annual overlift quantity". The quantity of LNG in excess of the ACQ delivered and received in a contract year pursuant to Article XIII herein shall not be considered in determining the annual overlift quantity.

5.2c Accumulated Annual Underlift Quantity

All annual underlift quantities and annual overlift quantities shall be accumulated at the end of each contract year and the accumulated annual overlift quantity shall be subtracted from the accumulated annual underlift quantity to determine the net accumulated underlift quantity, if any. Buyers shall limit the net accumulated underlift quantity to a maximum of fifty-five trillion, seven hundred billion (55,700,000,000,000) Btu's, as for Tokyo Electric to a maximum of forty-one trillion, seven hundred seventy-five billion (41,775,000,000,000) Btu's and as for Tokyo Gas to a maximum of thirteen trillion, nine hundred twenty-five billion (13,925,000,000,000) Btu's. Buyers shall not exercise their rights under Section 5.2a above at any time during any contract year if such exercise would result in a net accumulated underlift quantity exceeding the maximums mentioned above at the end of that contract year. Buyers shall endeavor to bring the net accumulated underlift quantity to zero (0) by the end of this Extension Agreement.

5.2d Transfer of Annual Contract Quantity

Each of Buyers may transfer to the other the rights and obligations attaching to the purchase and receipt of its ACQ in any contract year on the condition that:

(i) Buyers give Sellers reasonable prior notice of the proposed transfer; and

(ii) Sellers' consent, which shall not be unreasonably withheld, is obtained.

All the terms and conditions of this Extension Agreement shall apply to such revised ACQ, provided that the limitations of the net accumulated underlift quantity of each of Buyers specified in Section 5.2c shall not be transferred unless otherwise agreed by Sellers and Buyers.

5.3a Constant Delivery and Seasonal Fluctuations

Sellers shall deliver and Buyers shall receive cargos of LNG in each contract year at rates and intervals and in volumes reasonably equal and constant throughout that contract year with due consideration of the maintenance periods of their respective plants and facilities.

Sellers shall cooperate with Buyers for the purpose of providing flexible deliveries of LNG to Buyers to accommodate Buyers' seasonal fluctuations in demand for electricity or gas. Buyers may decrease the quantity of LNG to be received in either semester to the extent that Sellers can reasonably deliver the total quantities of LNG to be received by Buyers hereunder in a contract year.

5.3b Delivery Schedule

At least two (2) months before the start of each contract year, Sellers and Buyers shall commence discussions on the delivery schedule proposed by Sellers or Buyers for the contract year. At least one (1) month before the start of each contract year, Sellers and Buyers shall agree on an annual delivery schedule for the contract year. Sellers and Buyers shall cooperate to cause the annual maintenance of their respective plants and facilities to be scheduled in a manner which will minimize disruptions to the deliveries of LNG.

If Sellers or Buyers consider that it is necessary to make a change to the annual

delivery schedule, such annual delivery schedule shall be revised after discussion and agreement between Sellers and Buyers.

5.3c Specific Delivery Schedule

On, or close to, the first day of April, July, October and January in each contract year, Sellers shall, after discussion and agreement with Buyers, provide to Buyers a specific delivery schedule based on the current annual delivery schedule for the contract year. The specific delivery schedule shall cover the deliveries of LNG to be made by Sellers to Buyers during the period of following three (3) months.

5.4 Shipping Movement Information and Cargo Information

Sellers shall notify Buyers or cause Buyers to be notified at least seventy-two (72) hours and again at least twenty-four (24) hours in advance of the estimated time each LNG tanker will arrive at Buyers' berthing facilities.

Sellers shall inform Buyers not later than three (3) days before the estimated time of arrival of each LNG tanker at Buyers' berthing facilities, of the quality of each cargo of LNG at the plant at the time of its loading into the LNG tanker.

VI. QUALITY:

6.1 Gross Heating Value

LNG delivered hereunder shall have a standard gross heating value of approximately one thousand ten (1,010) Btu's per standard cubic foot, and Sellers warrant that LNG shall have a minimum gross heating value of nine hundred ninety (990) Btu's per standard cubic foot and a maximum gross heating value of one thousand one hundred fifty (1,150) Btu's per standard cubic foot. The gross heating value of LNG delivered hereunder shall be determined by computations using the procedure, physical constants and correction factors contained in Exhibit A attached hereto and made a part hereof.

6.2 LNG Composition

Sellers warrant LNG delivered hereunder shall have components within the following ranges:

Methane	- not less than eighty-five (85) mole percent;
Butanes and heavier	- not more than two (2) mole percent;
Pentanes and heavier	- not more than one-tenth of one (0.1) mole percent;
Nitrogen	- not more than one (1) mole percent.

The components shall be analyzed and determined by the test method specified in Article III in Exhibit A.

6.3 Impurities

Sellers warrant LNG delivered hereunder shall not contain amounts of impurities in excess of the following ranges:

Hydrogen sulfide	- not more than five (5) milligrams per Nm^3;
Total sulfur	- not more than thirty (30) milligrams per Nm^3.

The method specified in Exhibit B shall be used in carrying out tests for the impurities.

Furthermore, Sellers warrant it shall not contain objectionable solids or solid impurities such as solid carbon dioxide, hydrates of hydrocarbons, inorganic compounds or lubricants in such quantities as will interfere with Buyers' receipt of LNG or use of LNG for power generation, city gas supply or industrial uses.

VII. MEASUREMENT AND ANALYSIS:

7.1 Sellers' Equipment

Sellers shall maintain and operate in each LNG tanker, at their sole cost and expense, suitable equipment and devices for the purpose of measuring the quantities of LNG delivered hereunder. Tests for the accuracy of the equipment and devices shall be made by Sellers and shall be witnessed and verified upon request of Buyers by an independent surveyor selected jointly by Sellers and Buyers. Tests for the accuracy of the equipment and devices shall be made at each drydocking of an LNG tanker and at any other time the accuracy of the equipment and devices is questioned by either party. Buyers shall have the right to be present at each such test. Tests for the accuracy of the equipment and devices shall also be made on the new LNG tankers prior to their introduction into service and thereafter, as required above.

7.2 Buyers' Equipment

Buyers shall maintain and operate, at their sole cost and expense, suitable equipment and devices for the purpose of collecting and analyzing samples of LNG. Tests for the accuracy of the equipment and devices shall be made by Buyers and shall be witnessed and verified upon request of Sellers by an independent surveyor selected jointly by Sellers and Buyers. Sellers shall have the right to be present at each such test.

7.3 Measurement of Quantities of LNG Delivered

Sellers shall determine the quantities of LNG delivered from each LNG tanker following the methods and procedures contained in Exhibit A. The measurement of each cargo of LNG shall be made by Sellers and shall be witnessed and verified upon request of Sellers or Buyers by an independent surveyor selected jointly by Sellers and

Buyers. Buyers shall have the right to be present during measurement.

7.4 Collection and Analysis of Samples

Buyers shall collect representative samples of LNG from each cargo and as promptly as practicable after completion of unloading. Buyers shall, during normal working hours, analyze for quality under Article VI the appropriate sample following the methods provided in Exhibits A and B. The analyses when correctly made in accordance with the provisions of this Extension Agreement and Exhibits A and B shall be final. Sellers shall have the right to be present when the samples are collected and the analyses are made. Buyers shall promptly report to Sellers the results of the analyses.

7.5 Determination of Quantities of Btu's Delivered

The quantities of Btu's delivered to Buyers from each LNG tanker shall be determined from the results of the measurements and analyses made under Sections 7.3 and 7.4 and in accordance with the procedures set out in Exhibit A.

Sellers shall promptly notify Buyers of the result of the determination, which shall be verified by an independent surveyor selected jointly by Sellers and Buyers.

7.6 Costs and Expenses of Tests and Verifications

All the costs and expenses for testing Sellers' equipment and devices shall be borne by Sellers, and all the costs and expenses for testing Buyers' equipment and devices shall be borne by Buyers; provided, however, that costs and expenses for supplemental tests upon request of Sellers or Buyers shall be borne equally by Sellers and Buyers. The fees and charges of the independent surveyor for witnessing and verification of measurement, sampling and analyses, and for verification of determination of quantities of Btu's delivered shall be borne equally by Sellers and Buyers.

VIII. PRICE:

8.1a LNG Price

The Price of LNG shall be determined according to the following formula:

$$Pn = B \times \frac{G(n\text{-}1)}{Gb} + An$$

Where:

Pn = the price applicable to LNG sold and delivered in the calendar month "n" expressed in United States cents per million Btu's and rounded to one (1) decimal place.

B = the base price, that is US¢ 592.8 (five hundred ninety-two and eight-tenths United States cents) per million Btu's.

Gb = the base Government Selling Price, that is US$ 34.48 (thirty-four and forty-eight-hundredths United States dollars) per barrel.

G(n-1) = the average of the Government Selling Prices applicable on the last day of the calendar month "n-1"; weighted by volumes, expressed in United States dollars per barrel and rounded to two (2) decimal places, for the top twenty (20) crude oils, ranked by descending volumes, imported into Japan during the calendar year immediately preceding each contract year.

An = the adjustment factor applicable to LNG sold and delivered in the calendar month "n". The adjustment factor is negotiated from time to time between Sellers and Buyers to allow the price of LNG

sold and delivered under this Extension Agreement to respond to market conditions, provided that such adjustment is limited to plus or minus US ¢ 30.0 (thirty United States cents) per million Btu's.

"Government Selling Price" shall mean a selling price of crude oil expressed in United States dollars per barrel, as published in sources mutually agreed in writing, officially set by the government of the oil producing country.

8.1b Revision of Government Selling Price

If the Government Selling Price (GSP) for any of such top twenty (20) crude oils ultimately determined to be applicable on the last day of the month prior to the month in which LNG is sold and delivered is different from the GSP used in calculating the applicable LNG price, and the different GSP is announced on or before the end of the month following the month of delivery, then the applicable LNG price shall be recalculated using the different GSP and appropriate adjusting payments shall be made accordingly.

8.1c Unavailability of Government Selling Price

If at any time the Government Selling Price of one or more of the crude oils used in the formula ceases to be published, is quoted on a revised basis, or if Sellers or Buyers have any information that a significant difference exists between the Government Selling Price and the market price based on a term contract basis, then Sellers and Buyers shall meet and discuss in good faith to seek a suitable solution. From such time until the time when agreement is reached, a provisional price shall be determined on the basis of the last available or agreed information. When agreement is reached, it shall apply retroactively from the time the aforesaid provisional pricing began.

8.2 Discussion on LNG Pricing

Sellers and Buyers agree to meet and discuss applicable LNG pricing prior to the commencement of each contract year and at any time that Sellers or Buyers require.

In discussing the price of LNG sold and purchased hereunder, it is Sellers' and Buyers' intent that the following factors shall be considered:

(i) competitiveness and comparability with the prices of other LNG supplied to Japan after paying regard to specific conditions of other LNG projects such as contract term, transportation arrangements and currency adjustment arrangements; and

(ii) energy market situation including crude oil, petroleum products and other competitive fuels.

8.3 Review

If a change of circumstance arises that is beyond the control of the parties and the effects of such change result in conditions fundamentally different than contemplated, Sellers and Buyers shall promptly meet to review the price of LNG provided in Section 8.1a taking into consideration the factors specified in Section 8.2.

IX. TAXES AND DUTIES:

9.1 Taxes and Duties

With respect to LNG sold and delivered hereunder, Sellers shall pay all taxes and duties imposed by governmental bodies outside Japan, and Buyers shall pay all taxes and duties imposed by Japanese governmental bodies; provided, however, that Sellers shall bear all port and harbor duties, fees and assessments imposed by Japanese governmental bodies on the LNG tankers.

X. INVOICING AND PAYMENT:

10.1 Invoicing and Payment

Sellers shall prepare and submit to Buyers after completion of unloading, through Buyers' designated agent in the United States of America (such agent to be maintained at all times by Buyers), for each cargo of LNG, an invoice showing the quantity of Btu's delivered to each Buyer and the sum in United States dollars owed by each Buyer to Sellers as determined by the quantity allocation made by Buyers applicable to that cargo under Article V herein. Each Buyer shall pay Sellers on or before the eighth (8th) Buyers' working day after Buyers' agent has received such invoice the sum owed by each Buyer to Sellers. However, should final due date fall on a banking holiday of Sellers' designated banks, final due date shall be moved to the next Buyers' working day which is not a banking holiday of Sellers' designated banks. Payment shall be made in United States dollars by each Buyer depositing the sum owed to Sellers to the credit of Phillips 66 Natural Gas Company's account with the Manufacturers Hanover Trust Company, New York City, New York, the United States of America and Marathon Oil Company's account with the National City Bank of Cleveland, Cleveland, Ohio, the United States of America in the proportions as stated in Sellers' invoice, or in any other bank or banks as may be designated in writing by Sellers from time to time.

10.2 Determination of Amount Payable for LNG Delivered

The amount payable for each cargo of LNG delivered to Buyers shall be the product of the quantity of Btu's calculated pursuant to Section 7.5 as determined by the quantity allocation made by Buyers applicable to that cargo under Article V herein, multiplied by the unit price provided in Section 8.1.

The price applied to each cargo shall be the price in effect at the time when

unloading is commenced.

10.3 Errors

In the event any error is discovered in the amount of any invoice rendered hereunder, such error shall be rectified within one (1) month after the determination thereof, provided a claim therefor shall have been made within two (2) years after the date of such invoice.

XI. OPERATING SAFETY:

11.1 Responsibility for Safety and Reliability

Sellers shall be responsible to assure the safe and reliable supply of natural gas, and shall be responsible for the safety and reliability of Sellers' natural gas production and transportation facilities, LNG manufacturing, storage and loading facilities and the LNG tankers, and for the safety and reliability in operation and maintenance thereof.

Buyers shall be responsible for the safety and reliability of docking, unloading and receiving facilities and for the safety and reliability in operation and maintenance thereof.

11.2 Facility Operations

Sellers and Buyers recognize the importance of safety in all phases contemplated by this Extension Agreement and agree to secure and maintain safety to the high standards within the natural gas, liquefied natural gas and liquefied natural gas shipping industries. For the promotion of safe and efficient operations, Sellers and Buyers agree to assure that operations are conducted by their respective personnel with adequate qualifications who are suitably trained and skilled for the positions, including the officers and crew operating the LNG tankers.

11.3 Facility Maintenance

Sellers and Buyers recognize the importance of facility maintenance in performing safe, efficient and reliable operations. Sellers and Buyers agree to carry out, or cause to be carried out, maintenance programs to secure and maintain safety, efficiency and reliability in all phases contemplated by this Extension Agreement.

Furthermore, Sellers and Buyers agree to conduct, each at their sole discretion and expense, independent safety inspections of their respective LNG facilities utilized in performance of this Extension Agreement, including the LNG tankers.

11.4 Authorities and Regulations

Sellers and Buyers, in a spirit of mutual cooperation, shall maintain a close relationship and cooperate with relevant marine and other authorities and shall observe all relevant laws, regulations and orders, as well as international standards and regulations and shall pay due regard to appropriate guidances and restrictions relating to safety in all operations such as navigation of the LNG tankers, berthing, unberthing, loading and unloading.

11.5 Safe Works

Sellers and Buyers shall use their best endeavors to assure that their respective employees, agents, contractors and suppliers shall have due regard for safety and abide by the relevant regulations while performing works and services within and around the receiving terminal area and on board the LNG tankers.

XII. STABLE DELIVERY AND RECEIPT:

12.1 Elimination of Delivery or Receipt Problem

If Sellers are unable to deliver LNG or Buyers are unable to receive LNG, as required under this Extension Agreement for any reason, Sellers and Buyers shall immediately meet and consult in good faith to give sincere consideration in a spirit of good will and mutual trust to any action which could be taken to eliminate or alleviate the delivery or receipt problem. Such consideration shall include whether Sellers could reasonably make available other natural gas, other liquefied natural gas, alternative fuels and feedstocks or other LNG ships, or whether Buyers could reasonably change the place of delivery.

XIII. FORCE MAJEURE:

13.1 Force Majeure

If either or both of Sellers or either or both of Buyers are rendered unable, wholly or in part, by force majeure to carry out their obligations under this Extension Agreement, other than the obligation to make money payments, and if such Sellers or Buyers, as the case may be, give notice and reasonably full particulars of such force majeure condition in writing or by telegraph or telex to the other party within a reasonable time after the occurrence of the facts relied on, then the obligations of the party giving the notice, so far as and to the extent that the obligations are affected by such force majeure, shall be suspended during the continuance of any inability so caused, but for no longer period. The party giving the notice shall, if requested by the party receiving the notice, deliver to the party receiving the notice a sworn statement of the facts relied on as constituting force majeure, and, if available, a certificate from a government official of the occurrence of the facts when known to the official. If, as a result of the temporary suspension, wholly or in part, of the obligations of either or both of Sellers or either or both of Buyers as above provided, the ACQ of LNG is not delivered or received during any contract year, then the party claiming force majeure shall endeavor to deliver or to receive, as the case may be, during the remaining term of this Extension Agreement, all or such portions of the undelivered quantities of LNG as may be delivered within the capabilities of the facilities of Sellers and Buyers, such undelivered quantities to be delivered and received as soon as reasonably possible after termination of such suspension, and to be in addition to the ACQ for the particular year in which such deliveries are made and receipts occur.

The term "force majeure", as used in this Extension Agreement, means cause or causes which are not reasonably within the control of the party or parties claiming

force majeure, and which cannot be overcome by the exercise of reasonable endeavors under the then existing circumstances and includes but shall not be limited to forces of nature, perils of the sea, shipwrecks, strikes, lockouts, or other industrial disturbances, acts of God, acts of government or any governmental agency, compliance with any directive, order or regulation of any governmental authority or representative thereof acting under claim or color of authority, wars, blockades, insurrections, riots, epidemics, quarantine restrictions, landslides, lightning, earthquakes, fires, storms, floods, washouts, civil or military disturbances or interferences, explosions, et cetera. The party claiming force majeure shall use endeavors which are reasonable under the then existing circumstances to eliminate the circumstance of force majeure to enable it to resume full performance of its obligations and to minimize the effects of the circumstance of force majeure. Labor disputes shall be settled at the sole discretion of the party having such dispute.

Failure to perform by a third party including, but not limited to, the operator of the LNG manufacturing facilities, the LNG tankers and the berthing facilities, performing services for or supplying goods to the party shall not constitute force majeure of the party unless the failure to perform is the result of a cause or causes which are not reasonably within the control of the third party and the party, and which cannot be overcome by the exercise of reasonable endeavors of the third party and the party under the then existing circumstances.

XIV. EFFECTIVE DATE AND TERM:

14.1 Effective Date and Term

This Extension Agreement shall come into force on the date of execution hereof and shall continue in force thereafter until and including March 31, 2004, unless otherwise terminated under Section 17.1 or Section 23.1. The term of this Extension Agreement may be further extended for an additional period of five (5) years if prior to April 1, 2003, Sellers and Buyers mutually agree in writing on the terms and provisions of such extension.

XV. NOTICES:

15.1 Notices

All notices, requests, demands, invoices, statements or other communications required or permitted hereunder, or any notice one party may desire to give to the other parties or its designee, shall be in writing and deemed to have been properly delivered if personally handed to a responsible employee of the party or its designee for whom intended, or received by registered mail, telegraph or telex at the address of such party or designee for whom intended. Sellers and Buyers initially designate their official designees and addresses as follows:

Sellers:

Phillips 66 Natural Gas Company
800 Plaza Office Building
Bartlesville, Oklahoma 74004, U.S.A.

Marathon Oil Company
P.O. Box 3128
Houston, Texas 77253, U.S.A.

Buyers:

The Tokyo Electric Power Company, Incorporated
1-3, Uchisaiwai-cho, 1-chome
Chiyoda-ku, Tokyo, Japan

Tokyo Gas Co., Ltd.
5-20, Kaigan, 1-chome
Minato-ku, Tokyo, Japan

Buyers' Agent: Mitsubishi International Corporation
333 South Hope Street, Suite 2500
Los Angeles, California 90071, U.S.A.

Any party hereto may change its address at any time by giving prior written notice to the other parties. All notices which are mailed or sent by telegraph or telex shall be deemed to have been given on the date of the addressee's receipt thereof.

XVI. ARBITRATION:

16.1 Resolution by Arbitration

Any dispute between Sellers and Buyers touching the construction, meaning or effect of this Extension Agreement, the rights or liabilities of the parties hereunder, or any matter arising out of the same or connected therewith, which cannot be resolved by the parties after discussion in a good faith attempt to reach an amicable solution, shall be resolved in Tokyo, Japan by arbitration in accordance with the Rules of Conciliation and Arbitration of the International Chamber of Commerce before a board of three (3) arbitrators named in accordance with such rules. The parties shall carry out the award of the arbitrators without invoking any immunity, and judgment upon the award rendered may be entered in any court having jurisdiction, or application may be made to such court for a judicial acceptance of the award and an order of enforcement, as the case may be. Any monetary award shall be free of deduction or offset. The parties hereby waive any objection to the award of the arbitrators insofar as is permissible under the laws or treaties of the United States or any of the United States of America or of Japan. The laws of Japan shall be applied by the arbitrators in settling disputes between the parties unless it clearly appears to the arbitrators that other laws should be applied.

XVII. APPROVAL AND AUTHORIZATION OF GOVERNMENTAL REGULATORY BODIES:

17.1 Endeavors to Obtain Approvals and Authorizations

Sellers shall use their best endeavors to obtain forthwith any and all approvals and authorizations required by any legally constituted regulatory bodies of the United States of America and the State of Alaska, or deemed necessary by Sellers to allow Sellers to commence and continue deliveries of LNG to Buyers under the terms and conditions of this Extension Agreement, furnishing Buyers with certified copies of all such governmental approvals and authorizations, together with certified copies of rules, regulations and restrictions promulgated by each and every regulatory body in connection with such approvals and authorizations. Sellers shall also exercise their best endeavors to obtain any other or additional governmental approvals and authorizations of the United States of America or the State of Alaska which may be required from time to time during the term of this Extension Agreement.

Buyers shall use their best endeavors to obtain forthwith all approvals and authorizations, if any are required, by any legally constituted regulatory bodies of Japan, or deemed necessary by Buyers to allow Buyers to commence and continue receipts of LNG under the terms and conditions of this Extension Agreement, furnishing Sellers with certified copies of all such governmental approvals and authorizations, together with certified copies of rules, regulations and restrictions promulgated by each and every regulatory body, if any, in connection with such approvals and authorizations. Buyers shall also exercise their best endeavors to obtain any other or additional governmental approvals and authorizations of Japanese governmental bodies which may be required from time to time during the term of this Extension Agreement.

Either Sellers or Buyers at the request of the other party shall assist by all reasonable means in obtaining such governmental approvals and authorizations. Forthwith upon any such governmental approvals and authorizations being obtained, the party obtaining the same shall notify the other party, and shall advise such party as soon thereafter as is reasonably possible whether such governmental approvals and authorizations are in form acceptable to it and in terms which will enable it to perform its obligations hereunder. Sellers and Buyers shall each notify the other party when all such governmental approvals and authorizations deemed necessary by Sellers and Buyers have been obtained.

If Sellers fail to obtain by December 31, 1989 the necessary governmental approvals and authorizations, Sellers or Buyers may terminate this Extension Agreement at any time thereafter by written notice to the other of their intent to terminate, so long as such notice is given prior to the obtaining of such approvals and authorizations. Further, if any governmental approval or authorization issued imposes terms or conditions unreasonable to Sellers, then Sellers may terminate this Extension Agreement by written notice to Buyers within thirty (30) days after issuance of the said final governmental approval or authorization.

If any governmental approval or authorization issued imposes terms or conditions unreasonable to Buyers or imposes terms or conditions on Sellers which materially affect Sellers' ability to perform as required by this Extension Agreement, then Buyers may terminate this Extension Agreement by written notice to Sellers within thirty (30) days after issuance of the said final governmental approval or authorization.

Both of Sellers or both of Buyers shall act jointly in terminating this Extension Agreement under this Section.

17.2 Liability of Termination

Should either Sellers or Buyers exercise the right under Section 17.1 to terminate this Extension Agreement, the parties exercising the right shall not be liable to the other parties for any losses, damages or expenses incurred by such other parties as a result of the termination of this Extension Agreement.

XVIII. LAWS AND REGULATIONS:

18.1 Laws and Regulations

This Extension Agreement shall be subject to all valid and applicable laws, orders, rules and regulations of governmental authorities having jurisdiction.

XIX. INDEMNITY:

19.1 Injury and Damage Indemnity

While the LNG tanker is being berthed, is berthed or is leaving the berth at Buyers' dock, at Negishi terminal or other Buyers' facilities, Sellers shall defend and indemnify Buyers from any injuries or damages Buyers may suffer as a result of the negligence, willful and malicious acts or omissions of Sellers, their employees, contractors, suppliers of labor or materials or their employees while performing services for Sellers, and Buyers shall defend and indemnify Sellers from any injuries or damages Sellers may suffer as a result of the negligence, willful and malicious acts or omissions of Buyers, their employees, contractors, suppliers of labor or materials or their employees while performing services for Buyers.

19.2 Sellers' Indemnity

Sellers shall defend, indemnify and hold harmless Buyers in, for and against any claims, demands or actions which may be brought against Buyers by any third parties due to or in connection with any personal injuries or property damages which may be suffered by such third parties as a result of the negligence, willful and malicious acts or omissions of Sellers, their employees, contractors, suppliers of labor or materials or their employees while performing services within the scope of this Extension Agreement for Sellers, and any costs, expenses, losses, damages and liability incurred or suffered by Buyers due to or in connection with such claims, demands or actions.

Buyers shall promptly notify Sellers in writing of any claims, demands or actions covered by this Section and shall cooperate with Sellers in the defense of any such claims, demands or actions.

19.3 Buyers' Indemnity

Buyers shall defend, indemnify and hold harmless Sellers in, for and against any claims, demands or actions which may be brought against Sellers by any third parties due to or in connection with any personal injuries or property damages which may be suffered by such third parties as a result of the negligence, willful and malicious acts or omissions of Buyers, their employees, contractors, suppliers of labor or materials or their employees while performing sevices within the scope of this Extension Agreement for Buyers, and any costs, expenses, losses, damages and liability incurred or suffered by Sellers due to or in connection with such claims, demands or actions.

Sellers shall promptly notify Buyers in writing of any claims, demands or actions covered by this Section and shall cooperate with Buyers in the defense of any such claims, demands or actions.

19.4 No Third Party Beneficiaries

Nothing in this Article XIX or any other provision of this Extension Agreement is intended, expressly or impliedly, to be for the benefit of any third party or to create or confer any rights or remedies on any third party.

XX. ASSIGNMENT:

20.1 Assignment

No party shall be entitled to assign any of its rights and obligations under this Extension Agreement unless it has previously obtained the consent in writing of all the other parties. Such consent shall not be withheld when all the parties agree that the proposed assignee has sufficient capability to perform the obligations under this Extension Agreement to be assigned.

It shall be a condition of any assignment that the assignee shall assume all the rights and obligations of the assignor under this Extension Agreement to be assigned and the assignor shall thereupon be released from all such rights and obligations.

XXI. CONSTRUCTION OF CONTRACT:

21.1 Construction of Contract

This Extension Agreement contains the entire agreement between the parties and supersedes all prior agreements between them on the same subject, and there are no oral promises or representations affecting it. This Extension Agreement may be amended or modified by only written instrument, fully executed by authorized representatives of Sellers and Buyers. Exhibit A (Measurement Procedures) and Exhibit B (Analysis Methods for Determining Impurities Contained in LNG) may be amended or supplemented by written memorandum executed by employees of Sellers and Buyers who are responsible for and have the authority for conducting such measurement procedures and analysis methods.

XXII. NON-WAIVER:

22.1 Non-waiver

The failure of Sellers or Buyers at any time to require performance by the others of any provisions hereof shall in no way affect the right of a party to require any performance which may be due thereafter pursuant to such provision; nor shall the waiver by Sellers or Buyers of any breach of any provision hereof be taken or held to be a waiver of any subsequent breach of such provision.

XXIII. DEFAULT AND TERMINATION OF AGREEMENT:

23.1 Default and Termination of Agreement

Should either Sellers or Buyers default in the performance of any obligation under this Extension Agreement, and such default continues for sixty (60) days after the party not in default has requested in writing the party in default to remedy the default, the party not in default may, in addition to all other rights and remedies, suspend the deliveries or receipts of LNG until the default is remedied, or may cancel and terminate this Extension Agreement by providing thirty (30) days written notice.

XXIV. LANGUAGES:

24.1 Languages

This Extension Agreement shall be made and originals executed in the English and Japanese languages, and the originals executed in both languages shall have the same effect; provided, however, that should either party gives a meaning to any provision of this Extension Agreement as written in one language different to the meaning the other party gives to the same provision as written in the other language, both parties shall attempt in good faith to mutually reconcile and adjust the differences in meaning, but until they have mutually reconciled and adjusted the differences in meaning, the Extension Agreement executed in English shall control.

IN WITNESS WHEREOF, the parties hereto have caused this Extension Agreement to be executed in the manner hereafter appearing.

SELLERS: PHILLIPS 66 NATURAL GAS COMPANY

President

MARATHON OIL COMPANY

President

BUYERS: THE TOKYO ELECTRIC POWER COMPANY, INCORPORATED

President and Director

TOKYO GAS CO., LTD.

President and Director

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EXHIBIT A

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EXHIBIT A

MEASUREMENT PROCEDURES

This Exhibit is attached to and made a part of that certain Liquefied Natural Gas Sale and Purchase Extension Agreement between Phillips 66 Natural Gas Company and Marathon Oil Company, as Sellers, and The Tokyo Electric Power Company, Incorporated and Tokyo Gas Co., Ltd., as Buyers, dated the 17th day of June, 1988.

Sellers and Buyers shall have the right for good reason to request changes to the physical constants, conversion factors, methods and equipment for measurement and analysis herein provided. When such request is made, Sellers and Buyers shall promptly hold mutual discussions in an attempt to agree upon revised constants, conversion factors, methods and equipment.

Furthermore, Sellers and Buyers recognize that Sellers use their best endeavors to replace the LNG tankers currently in service with the new LNG tankers within six (6) years after the signing date of this Extension Agreement under Section 4.1 in this Extension Agreement. If it is considered necessary to review this Exhibit A after the specifications of the new LNG tankers are determined, Sellers and Buyers shall promptly meet and discuss in good faith such review.

I. CALIBRATION OF LNG TANKS:

1.1 Each LNG tank in each LNG tanker currently in service shall be calibrated by an independent surveyor selected jointly by Sellers and Buyers or measurement and testing specialists (measurement specialists) in the industry mutually agreed by Sellers and Buyers. Such calibration shall be in accordance with the standard procedure for petroleum tankage as prescribed in ASTM Method D-1220 or other mutually agreed standard, including any revisions or amendments thereto.

Based upon the measurements so made, the said measurement specialists shall prepare accurate tank tables correlating the tank volume in barrels with the tank depth in hundredths of feet.

During or immediately following each new LNG tanker construction, but prior to loading of the first cargo with each new LNG tanker, each LNG tank in each new LNG tanker shall be calibrated by an independent surveyor selected jointly by Sellers and Buyers. The tank table resulting from the calibration of each LNG tank shall correlate the tank volume using one-thousandth (0.001) cubic meter as the smallest unit with the tank depth using one (1) millimeter as the smallest unit. The tank tables shall clearly indicate the temperature and density of LNG to which they relate and any corrections to be applied for any changes from the reference parameters specified.

1.2 Sellers and Buyers shall each have the right to have representatives be present at the time each LNG tank in each LNG tanker is volumetrically calibrated as provided above.

1.3 If any LNG tank in any of the LNG tankers is internally modified in such a way or suffers damage or distortion of such a nature as to cause a prudent expert to reasonably question the validity of the tank table provided in Section 1.1 (or resulting from any subsequent calibration herein). Sellers or Buyers may require recalibration of such LNG tank in the same manner as provided in Section 1.1 during any period when such LNG tanker shall be out of service. Except as provided in this Section no other recalibration of the LNG tank shall be required.

II. LIQUID LEVEL, TEMPERATURE AND PRESSURE MEASURING EQUIPMENT:

2.1 Each LNG tank in each LNG tanker shall be provided with a main liquid level gauging device especially suited to LNG service and capable of measuring liquid level in this service to within an accuracy equal to or better than plus or minus seven and five-tenths (7.5) millimeters. Each such tank shall also be provided with an auxiliary liquid level gauging device. Prior to Sellers' selecting such main liquid level gauging devices and auxiliary liquid level gauging devices for the new LNG tankers, Sellers shall hold discussions with Buyers regarding the type of such main liquid level gauging devices and auxiliary devices to be provided. Such liquid level gauging devices shall be installed in each tank on the longitudinal axis of the LNG tanker.

2.2 Each LNG tank in each LNG tanker shall be provided with a minimum of four (4) temperature measuring devices. One such measuring device shall be located in the vapor space at the top of each LNG tank, one near the bottom of each LNG tank and the remainder distributed at appropriate intervals from the top to the bottom of each LNG tank. These devices shall be used to determine the average temperatures of LNG and vapor in the LNG tanks, and shall have an accuracy equal to or better than plus or minus two-tenths (0.2) degrees Celsius in the temperature range, minus one hundred sixty-five (-165) degrees to minus one hundred forty-five (-145) degrees Celsius, and an accuracy equal to or better than plus or minus one and five-tenths (1.5) degrees Celsius in the temperature range, minus one hundred forty-five (-145) degrees to plus forty (40) degrees Celsius.

2.3 Each LNG tank in each LNG tanker shall be provided with pressure gauging equipment approved by the parties, capable of determining the pressure of the vapor phase of the LNG tank.

2.4 The liquid level of each LNG tank in each LNG tanker shall be determined by taking ten (10) level readings, or such lesser number as the parties mutually agree as practical, at one (1) minute intervals. An average of these readings shall be the final liquid level of each LNG tank. The procedure described above shall be used for determining liquid levels before and after unloading.

The liquid temperature of each LNG tank before and after unloading shall be determined by averaging the temperature readings of any of the temperature measuring devices to be immersed in the liquid known by the result of liquid level measurement. The vapor temperature of each LNG tank before and after unloading shall be determined by averaging the temperature readings of any of the temperature measuring devices not to be immersed in the liquid known by the result of liquid level measurement. Each LNG tanker shall be provided with a data logging instrument capable of automatically recording in digital form the various readings as described above.

III. SAMPLING AND ANALYSIS PROCEDURES:

3.1 Representative samples of LNG unloaded from an LNG tanker shall be obtained continuously and at a certain rate during the period of stable unloading. Such liquid samples shall be collected in a gasholder from the sampling point installed by Buyers through the vapor [illegible] with an appropriate method not to mix other vapors than sample gas.

Precautions shall be taken to avoid any partial vaporization of the liquid sample before it reaches the vaporizer. Such liquid samples shall be vaporized completely in the vaporizer. The method, location and equipment for sampling and vaporization together with the quantities of samples to be taken shall be agreed between Sellers and Buyers.

After unloading, adequate portions of the gas collected in the gasholder shall be directly transferred to three (3) sample bottles, and these sample bottles shall be distributed as follows: One sample from each set of three (3) shall be analyzed by Buyers during Buyers' normal working hours upon completion of unloading; and one sample from each set of three (3) shall be retained by Buyers for forty-five (45) days or in the event of a dispute between the parties as to the accuracy of the analysis until the dispute is resolved; and the third sample from each set of three (3) shall be returned to Sellers aboard such LNG tanker.

3.2 The gas samples obtained in accordance with Section 3.1 hereof shall be analyzed by Buyers with gas chromatography in conformance with the method described in the N.G.P.A. Standard 2261-72. Duplicate runs shall be made on the samples to determine that repeatabilities of the measurements are either within one (1)

percent of peak area or within one (1) millimeter of peak height of each component. When the repeatabilities are within the above limit, the calculated results of such duplicate runs of analyses shall be averaged.

3.3 The collecting and analyzing of the samples shall be witnessed and verified upon request of Sellers or Buyers by an independent surveyor selected jointly by Sellers and Buyers. Sellers shall have the right to be present when the samples are collected and the analyses are made and shall have the right to require check runs or other tests to ascertain that samples are representative and that the equipment performance is proper and that the composition of the reference standards is accurate.

IV. MEASUREMENT PROCEDURES:

4.1 Immediately prior to unloading each cargo of LNG, by use of the main liquid level gauging device specified in Section 2.1 hereof the liquid level of LNG in each LNG tank in each LNG tanker shall be determined when berthed at Buyers' docking facilities. By use of this liquid level and the appropriate tank table provided in Article I hereof, the total volume of LNG in the LNG tanks shall be determined and recorded.

If the main liquid level gauging device in the LNG tank fails to operate correctly, then Sellers and Buyers shall determine the liquid level by using the auxiliary liquid level gauging device, or shall discuss and agree on whatever other appropriate method which may be available to ascertain the liquid level.

4.2 Through the sampling and analysis procedures provided in Article III hereof, the composition of LNG unloaded shall be determined in mole fractions.

4.3 Immediately following the completion of unloading of LNG from each LNG tanker, the total volume of LNG remaining in the LNG tanks shall be determined and recorded in the same manner as provided in Section 4.1 hereof. The total volume of LNG remaining in the LNG tanks corrected by use of the average temperature of the liquid determined prior to unloading shall be subtracted from the total volume of LNG in the LNG tanks determined prior to unloading. The difference shall be the apparent volume of LNG delivered from the LNG tanker.

4.4 Through use of the temperature measuring devices and pressure gauging equipment specified in Article II hereof, the average temperature of the vapor and the

pressure of the vapor in the LNG tanks shall be calculated upon completion of unloading.

4.5 The following formula shall be used to determine the total quantities of Btu's delivered from Sellers to Buyers.

However, prior to the introduction of the new LNG tankers, Sellers and Buyers shall review the formula to integrate it with the custody transfer equipment on board of the new LNG tankers.

$$Q = \left(B \times \frac{\Sigma MH}{\Sigma ML}\right) - \left(5.6146 \times B \times \frac{520}{T} \times \frac{P}{760} \times \frac{\Sigma MH}{379.495}\right)$$

Where:

Q = Actual quantity of Btu's delivered (per LNG tanker unloaded).

B = Number of barrels of LNG apparently delivered, as described in Section 4.3 hereof.

M = Component mole fraction.

L = Liquid factor for average LNG temperature from Table I.

Liquid factor means liquid volume in barrels occupied by one (1)pound mole at the average temperature of liquid determined before unloading.

H = Gross heat of combustion in Btu's per pound mole from Table 1 hereof.

T = Average temperature of tank vapors in degrees Rankine.

P = Absolute pressure of tank vapors at the time unloading is completed. The unit of measurement shall be millimeters of mercury.

4.6 Numerical values used in Section 4.5 above shall be treated as follows:

Q : Omit from quantities of Btu's delivered any part of one million (1,000,000) Btu's between one (1) and nine hundred ninety-nine thousand, nine hundred ninety-nine (999,999).

B : Omit from barrels of LNG any fraction of one (1) barrel.

M : Significant figures shall be one-ten thousandth (0.0001) or larger.

L : To pick this number from Table I, use the nearest whole number average temperature in the unit of one (1) degree Fahrenheit. The fractional degrees of the average temperature shall be dropped when they are less than five-tenths (0.5) of one (1) degree and shall be increased to the next whole number when they are five-tenths (0.5) or more.

T : Use the nearest whole number average temperature in the unit of one (1) degree Rankine. The fractional degrees of the average temperature shall be dropped when they are less than five-tenths (0.5) of one (1) degree and shall be increased to the next whole number when they are five-tenths (0.5) or more.

P : Use the value to the nearest unit recorded, expressed in millimeters of mercury.

V. PHYSICAL DATA:

5.1 Basic Physical Factors

A. Gross Heat of Combustion

Component	Btu/pound vapor at 60°F
Methane	23.885
Ethane	22.323
Propane	21.664
Isobutane	21.238
N-butane	21.299
N-pentane	21.088
N-hexane	20.944

Gross Heat of Combustion, Btu/pound mole of component equals Btu/pound times molecular weight.

Source: N.G.P.A. Publication 2145-66

B. Molecular Weight

Component	
Methane	16.042
Ethane	30.068
Propane	44.094
Butanes	58.120
Pentanes	72.146
Hexanes	86.172

Source: N.G.P.A. Publication 2145-66

EXHIBIT A

TABLE I

(Consisting of Schedules A through I)

LIQUEFIED NATURAL GAS CONVERSION FACTORS

HEATING VALUE: 0.0000 Btu per pound mole

LIQUID FACTORS:Barrels of Liquid at Specified Temperature per pound mole of Component

Temperature DegreesF	Factor Bbls/PoundMole
-245.0	0.165738
-246.0	0.164830
-247.0	0.163919
-248.0	0.163005
-249.0	0.162091
-250.0	0.161174
-251.0	0.160257
-252.0	0.159339
-253.0	0.158421
-254.0	0.157502
-255.0	0.156585
-256.0	0.155668
-257.0	0.154752
-258.0	0.153837
-259.0	0.152923
-260.0	0.152012
-261.0	0.151102
-262.0	0.150195
-263.0	0.149290
-264.0	0.148388
-265.0	0.147489
-266.0	0.146593
-267.0	0.145700
-268.0	0.144810
-269.0	0.143924
-270.0	0.143042
-271.0	0.142163
-272.0	0.141288
-273.0	0.140418
-274.0	0.139551
-275.0	0.138689

EXHIBIT A

TABLE I

(Consisting of Schedules A through I)

LIQUEFIED NATURAL GAS CONVERSION FACTORS

HEATING VALUE: 0.0000 Btu per pound mole

LIQUID FACTORS:Barrels of Liquid at Specified Temperature per pound mole of Component

Temperature DegreesF	Factor Bbls/PoundMole
-245.0	0.086301
-246.0	0.086221
-247.0	0.086141
-248.0	0.086061
-249.0	0.085982
-250.0	0.085903
-251.0	0.085824
-252.0	0.085745
-253.0	0.085667
-254.0	0.085588
-255.0	0.085510
-256.0	0.085433
-257.0	0.085355
-258.0	0.085278
-259.0	0.085201
-260.0	0.085124
-261.0	0.085048
-262.0	0.084972
-263.0	0.084895
-264.0	0.084820
-265.0	0.084744
-266.0	0.084669
-267.0	0.084594
-268.0	0.084519
-269.0	0.084444
-270.0	0.084370
-271.0	0.084296
-272.0	0.084222
-273.0	0.084148
-274.0	0.084075
-275.0	0.084001

EXHIBIT A

TABLE I

(Consisting of Schedules A through I)

LIQUEFIED NATURAL GAS CONVERSION FACTORS

HEATING VALUE: 383,163 Btu per pound mole

LIQUID FACTORS:Barrels of Liquid at Specified Temperature per pound mole of Component

Temperature DegreesF	Factor Bbls/PoundMole
-245.0	0.110397
-246.0	0.110189
-247.0	0.109983
-248.0	0.109778
-249.0	0.109576
-250.0	0.109376
-251.0	0.109178
-252.0	0.108981
-253.0	0.108787
-254.0	0.108594
-255.0	0.108403
-256.0	0.108214
-257.0	0.108026
-258.0	0.107840
-259.0	0.107656
-260.0	0.107474
-261.0	0.107293
-262.0	0.107114
-263.0	0.106936
-264.0	0.106760
-265.0	0.106586
-266.0	0.106413
-267.0	0.106242
-268.0	0.106072
-269.0	0.105903
-270.0	0.105736
-271.0	0.105571
-272.0	0.105407
-273.0	0.105244
-274.0	0.105083
-275.0	0.104923

EXHIBIT A

TABLE I

(Consisting of Schedules A through I)

LIQUEFIED NATURAL GAS CONVERSION FACTORS

HEATING VALUE: 671.208 Btu per pound mole

LIQUID FACTORS:Barrels of Liquid at Specified Temperature per pound mole of Component

Temperature DegreesF	Factor Bbls/PoundMole
-245.0	0.140564
-246.0	0.140447
-247.0	0.140331
-248.0	0.140215
-249.0	0.140099
-250.0	0.139984
-251.0	0.139869
-252.0	0.139754
-253.0	0.139640
-254.0	0.139526
-255.0	0.139412
-256.0	0.139299
-257.0	0.139186
-258.0	0.139073
-259.0	0.138961
-260.0	0.138849
-261.0	0.138737
-262.0	0.138626
-263.0	0.138515
-264.0	0.138404
-265.0	0.138293
-266.0	0.138183
-267.0	0.138073
-268.0	0.137964
-269.0	0.137855
-270.0	0.137746
-271.0	0.137637
-272.0	0.137529
-273.0	0.137421
-274.0	0.137313
-275.0	0.137206

EXHIBIT A

TABLE I

(Consisting of Schedules A through I)

LIQUEFIED NATURAL GAS CONVERSION FACTORS

HEATING VALUE: 955,252 Btu per pound mole

LIQUID FACTORS:Barrels of Liquid at Specified Temperature per pound mole of Component

Temperature DegreesF	Factor Bbls/PoundMole
-245.0	0.180728
-246.0	0.180596
-247.0	0.180465
-248.0	0.180334
-249.0	0.180203
-250.0	0.180072
-251.0	0.179942
-252.0	0.179812
-253.0	0.179682
-254.0	0.179553
-255.0	0.179423
-256.0	0.179295
-257.0	0.179166
-258.0	0.179038
-259.0	0.178909
-260.0	0.178782
-261.0	0.178654
-262.0	0.178527
-263.0	0.178400
-264.0	0.178273
-265.0	0.178147
-266.0	0.178020
-267.0	0.177895
-268.0	0.177769
-269.0	0.177644
-270.0	0.177518
-271.0	0.177394
-272.0	0.177269
-273.0	0.177145
-274.0	0.177021
-275.0	0.176897

EXHIBIT A

TABLE I

(Consisting of Schedules A through I)

LIQUEFIED NATURAL GAS CONVERSION FACTORS

HEATING VALUE: 1,234,353 Btu per pound mole

LIQUID FACTORS: Barrels of Liquid at Specified Temperature per pound mole of Component

Temperature DegreesF	Factor Bbls/PoundMole
-245.0	0.225631
-246.0	0.225480
-247.0	0.225330
-248.0	0.225180
-249.0	0.225030
-250.0	0.224881
-251.0	0.224732
-252.0	0.224583
-253.0	0.224434
-254.0	0.224286
-255.0	0.224138
-256.0	0.223990
-257.0	0.223843
-258.0	0.223695
-259.0	0.223548
-260.0	0.223402
-261.0	0.223255
-262.0	0.223109
-263.0	0.222963
-264.0	0.222818
-265.0	0.222672
-266.0	0.222527
-267.0	0.222383
-268.0	0.222238
-269.0	0.222094
-270.0	0.221950
-271.0	0.221806
-272.0	0.221662
-273.0	0.221519
-274.0	0.221376
-275.0	0.221233

EXHIBIT A

TABLE I

(Consisting of Schedules A through I)

LIQUEFIED NATURAL GAS CONVERSION FACTORS

HEATING VALUE: 1,237,898 Btu per pound mole

LIQUID FACTORS: Barrels of Liquid at Specified Temperature per pound mole of Component

Temperature DegreesF	Factor Bbls/PoundMole
-245.0	0.223311
-246.0	0.223178
-247.0	0.223045
-248.0	0.222912
-249.0	0.222780
-250.0	0.222648
-251.0	0.222516
-252.0	0.222384
-253.0	0.222253
-254.0	0.222121
-255.0	0.221990
-256.0	0.221860
-257.0	0.221729
-258.0	0.221599
-259.0	0.221469
-260.0	0.221340
-261.0	0.221210
-262.0	0.221081
-263.0	0.220952
-264.0	0.220823
-265.0	0.220695
-266.0	0.220567
-267.0	0.220439
-268.0	0.220311
-269.0	0.220183
-270.0	0.220056
-271.0	0.219929
-272.0	0.219802
-273.0	0.219676
-274.0	0.219550
-275.0	0.219424

EXHIBIT A

TABLE I

(Consisting of Schedules A through I)

LIQUEFIED NATURAL GAS CONVERSION FACTORS

HEATING VALUE: 1,521,415 Btu per pound mole

LIQUID FACTORS:Barrels of Liquid at Specified Temperature per pound mole of Component

Temperature DegreesF	Factor Bbls/PoundMole
-245.0	0.264798
-246.0	0.264646
-247.0	0.264494
-248.0	0.264342
-249.0	0.264191
-250.0	0.264039
-251.0	0.263888
-252.0	0.263737
-253.0	0.263587
-254.0	0.263436
-255.0	0.263286
-256.0	0.263136
-257.0	0.262986
-258.0	0.262837
-259.0	0.262687
-260.0	0.262538
-261.0	0.262390
-262.0	0.262241
-263.0	0.262093
-264.0	0.261945
-265.0	0.261797
-266.0	0.261649
-267.0	0.261502
-268.0	0.261354
-269.0	0.261207
-270.0	0.261061
-271.0	0.260914
-272.0	0.260768
-273.0	0.260622
-274.0	0.260476
-275.0	0.260330

EXHIBIT A

TABLE I

(Consisting of Schedules A through I)

LIQUEFIED NATURAL GAS CONVERSION FACTORS

HEATING VALUE: 1,804,786 Btu per pound mole

LIQUID FACTORS:Barrels of Liquid at Specified Temperature per pound mole of Component

Temperature DegreesF	Factor Bbls/PoundMole
-245.0	0.306225
-246.0	0.306064
-247.0	0.305903
-248.0	0.305743
-249.0	0.305583
-250.0	0.305422
-251.0	0.305263
-252.0	0.305103
-253.0	0.304944
-254.0	0.304784
-255.0	0.304626
-256.0	0.304467
-257.0	0.304308
-258.0	0.304150
-259.0	0.303992
-260.0	0.303834
-261.0	0.303677
-262.0	0.303519
-263.0	0.303362
-264.0	0.303205
-265.0	0.303048
-266.0	0.302892
-267.0	0.302735
-268.0	0.302579
-269.0	0.302423
-270.0	0.302268
-271.0	0.302112
-272.0	0.301957
-273.0	0.301802
-274.0	0.301647
-275.0	0.301492

INDEX

EXHIBIT B

ANALYSIS METHODS

FOR DETERMINING IMPURITIES CONTAINED IN LNG

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EXHIBIT B

ANALYSIS METHODS

FOR DETERMINING IMPURITIES CONTAINED IN LNG

This Exhibit is attached to and made a part of that certain Liquefied Natural Gas Sale and Purchase Extension Agreement between Phillips 66 Natural Gas Company and Marathon Oil Company, as Sellers, and The Tokyo Electric Power Company, Incorporated and Tokyo Gas Co., Ltd., as Buyers, dated the 17th day of June ,1988.

Sellers and Buyers shall have the right for good reason to request changes in the test methods and procedures as specified herein. When such request is made, Sellers and Buyers shall promptly hold mutual discussions in an attempt to agree upon revised methods and procedures.

I. SCOPE OF THIS EXHIBIT B:

Analyses of the impurities described in Section 6.3 of this Extension Agreement shall follow the methods and procedures specified herein.

II. SAMPLING AND ANALYSES:

The representative samples of LNG delivered shall be obtained and analyses performed in accordance with the provisions in Sections 3.1 and 3.3 of Exhibit A of this Extension Agreement and sound engineering practices.

Buyers shall maintain and operate suitable equipment and devices for sampling and analyses.

Analyses of the impurities shall follow the methods and procedures specified below:

(a) Hydrogen Sulfide

JIS K2301-1980 Section 6.2.2 (methylene blue absorptiometry method);

(b) Total Sulfur

JIS K2301-1980 Section 6.1.1 (barium perchlorate precipitation titration method, with oxygen-hydrogen flame combustion method).

OR

UNITED STATES OF AMERICA

DEPARTMENT OF ENERGY

ECONOMIC REGULATORY ADMINISTRATION

88 JUL 28 P6:03

PHILLIPS 66 NATURAL GAS COMPANY MARATHON OIL COMPANY	ERA DOCKET NO. 88-22-LNG

ORDER AMENDING AUTHORIZATION
TO EXPORT LIQUEFIED NATURAL GAS TO JAPAN

DOE/ERA OPINION AND ORDER NO. 261

JULY 28, 1988

I. BACKGROUND

On April 11, 1988, Phillips 66 Natural Gas Company (Phillips 66) and Marathon Oil Company (Marathon) filed an application with the Economic Regulatory Administration (ERA) of the Department of Energy (DOE), pursuant to Section 3 of the Natural Gas Act (NGA), requesting approval of a 15-year extension and modification of their existing authorization to export liquefied natural gas (LNG) from the Kenai peninsula of Alaska to Japan.

The LNG export authorization held by Phillips 66 and Marathon was granted originally by the Federal Power Commission on April 19, 1967 (37 FPC 777), and was subsequently amended by DOE/ERA Opinion and Order No. 49 (1 ERA ¶70,116, December 14, 1982); DOE/ERA Opinion and Order No. 49A (1 ERA ¶70,127, April 3, 1986); and DOE/ERA Opinion and Order No. 206 (Order 206) (1 ERA ¶70,128, November 16, 1987). The applicants currently are authorized to export annually through May 31, 1989, up to 50.57 trillion Btu's of LNG from the Kenai LNG plant in the Cook Inlet area of Alaska to two Japanese customers, the Tokyo Electric Power Company, Inc., and the Tokyo Gas Company, Ltd. Order 206 approved application of the following pricing formula to these LNG sales:

$$\text{Price for Calendar month} = 592.8 \times \frac{\text{Avg. selling price (month prior to Calendar month)}}{34.48} + \text{Adjustment}$$

Where: average selling price is the weighted average official price in U.S. dollars per barrel for the top 20 crude oils imported into Japan in the previous year and sold on a term basis.

adjustment is an adjustment required to keep the price of Alaskan LNG competitive with other sales of LNG in the

Japanese market (the adjustment changes as frequently as market conditions require or on request of either party).

Phillips 66 and Marathon request the ERA to extend their export authorization under modified terms through March 31, 2004, in accordance with an agreement in principle reached between themselves and their Japanese buyers. The agreement reflects four principal changes to the contractual arrangement currently authorized by Order 206. First, the contract year has been changed from a twelve-month period beginning June 1 to a twelve-month period beginning April 1. Second, the pricing formula set forth above has been amended to limit the presently unspecified "adjustment" factor to a range of 30.0 cents (plus or minus) per MMBtu. Third, commencing April 1, 1989, the annual contract quantity (ACQ) has been increased from 50.57 trillion Btu's per year to 52.0 trillion Btu's per year. This quantity will increase to 57.5 trillion Btu's per year beginning in the first contract year in which applicants place larger LNG tankers into operation for the entire contract year. According to the application, an increase to 57.5 trillion Btu's is likely to occur for the contract year commencing April 1, 1993. Fourth, buyers may request additional deliveries up to a maximum of 6 percent of the ACQ, as increased above, during any contract year.

In support of their application, Phillips 66 and Marathon state that extension of the export would continue the beneficial impact of the project on the economy of the State of Alaska and on the balance of payments between the United States and Japan. The applicants also state that, in light of the current natural gas surplus in Alaska and in the lower-48 states, there is no evidence of either

regional or national need for the gas proposed to be exported. The applicants included as part of their application an analysis of the economic impacts of the proposed export prepared by Dames & Moore (D&M). Further, they assert that the pricing formula will continue to provide parties with the flexibility to respond to market conditions and therefore is consistent with ERA policy.

The ERA issued a notice of this application on May 16, 1988, inviting protests, motions to intervene, notices of intervention, and comments to be filed by June 20, 1988.[1] No protests, motions to intervene, or notices of intervention were received.

II. DECISION

The application filed by Phillips 66 and Marathon has been evaluated to determine if the proposed export arrangement meets the public interest requirements of Section 3 of the NGA. Under Section 3 an export must be authorized unless ERA finds that it "will not be consistent with the public interest."[2] In reviewing natural gas export applications, the ERA considers the domestic need for the gas to be exported, and any other issues determined by the Administrator to be appropriate in a particular case.

Phillips 66's and Marathon's proposed amendment to their arrangement for the export of liquefied natural gas, as set forth in the application, is not inconsistent with Section 3 of the

---

1. 53 FR 18119, May 20, 1988.

2. 15 U.S.C. §717b.

NGA. Our decision takes into account the absence of opposition to the proposed extension and modification and is based on the findings discussed below.

Applicants contend that there is no evidence of either national or regional domestic need for the natural gas affected by the requested amendment. Gas is currently in surplus both in Alaska and the lower-48 states. The LNG cannot be delivered to the lower-48 states at market-clearing prices primarily because of high shipping costs to the East and Gulf Coasts, and because the Pacific Coast lacks LNG receiving facilities and none are anticipated to be constructed within the 15-year extension. With respect to regional need, even with anticipated greater local demand, applicants estimate that ample gas reserves will remain at the end of the 15-year extension. Relying on the record, including the uncontested assertions of Phillips 66 and Marathon, and the D&M study submitted as part of their application, ERA finds that there is no domestic need for the gas involved in this export over the term of the extended authorization.

In addition, we find this export arrangement to be in accord with the DOE's international gas trade policy. The project has been successfully exporting LNG since 1969. Its continuation will contribute favorably to the U.S. balance of payments and further reduce trade barriers. Its approval underscores our market approach to trade, including a reduction in government intervention. The proposed amendment has been negotiated by the parties to the export and the ERA continues to believe, as emphasized in Order 206, that "allowing free operation of market forces . . . will be the best

means for fostering the development of more effective and efficient gas trade between the U.S. and other countries and ensuring protection of the public interest." The ERA notes that the pricing formula, amended to specify a previously unspecified adjustment range, continues to provide the parties with the flexibility to respond to market conditions.

After taking into consideration all of the information in the record of this proceeding, I find that approving the proposed amendment, as requested by the joint applicants, is not inconsistent with the public interest.[3]

ORDER

For the reasons set forth above, pursuant to Section 3 of the Natural Gas Act, the Economic Regulatory Administration (ERA) hereby orders that:

A. DOE/ERA Opinion and Order No. 49 (Order 49), issued to Phillips Petroleum Company, the predecessor of Phillips 66 Natural Gas Company (Phillips 66), and Marathon Oil Company (Marathon) on December 14, 1982, as amended by Opinion and Order No. 206, issued to Phillips 66 and Marathon on November 16, 1987, is hereby further amended to extend the export authorization term through March 31, 2004, under the modified terms described in the application and this Opinion.

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3. Because the proposed exportation of gas will use existing facilities, the DOE has determined that granting this application is clearly not a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act (42 U.S.C. 4321, et seq.) and therefore an environmental impact statement or environmental assessment is not required.

B. Order 49 is further amended to require Phillips 66 and Marathon to file with ERA within 30 days following each calendar quarter, reports indicating the volume of gas, by month, exported pursuant to this Order and the average sale price of this gas on a per unit (MMBtu) basis. This amendment supersedes Paragraph D of Order 49 and is effective upon issuance of this Order.

Issued in Washington D.C. on July 26, 1988.

Chandler L. van Orman
Deputy Administrator
Economic Regulatory Administration

FP

Gas Division Docket Room, GA-076, Forrestal Building, 1000 Independence Avenue SW., Washington, DC 20585, (202) 586-9478. The docket room is open between the hours of 8:00 a.m. and 4:30 p.m., Monday through Friday, except Federal holidays.

Issued in Washington, DC, July 27, 1988.

Constance L. Buckley,

Acting Director, Office of Fuels Programs, Economic Regulatory Administration.

[FR Doc. 88-17615 Filed 8-3-88; 8:45 am]

BILLING CODE 6450-01-M

[ERA Docket No. 88-22-NG]

Phillips 66 Natural Gas Co. and Marathon Oil Co.; Order Extending Authorization To Export Liquefied Natural Gas

AGENCY: Economic Regulatory Administration, DOE.

ACTION: Notice of order extending authorization to export liquefied natural gas.

SUMMARY: The Economic Regulatory Administration (ERA) of the Department of Energy (DOE) gives notice that it has issued an order extending authorization to Phillips 66 Natural Gas Company and Marathon Oil Company to export liquefied natural gas from May 31, 1989, to March 31, 2004. The order also increases volumes from 52.0 trillion Btu's up to 57.5 trillion Btu's.

A copy of this order is available for inspection and copying in the Natural Gas Division Docket Room, GA-076, Forrestal Building, 1000 Independence Avenue SW., Washington, DC 20585, (202) 586-9478. The docket room is open between the hours of 8:00 a.m. and 4:30 p.m., Monday through Friday, except Federal holidays.

Issued in Washington, DC, July 29, 1988.

Constance L. Buckley,

Acting Director, Office of Fuels Programs, Economic Regulatory Administration.

[FR Doc. 88-17616 Filed 8-3-88; 8:45 am]

BILLING CODE 6450-01-M

Energy Information Administration

Agency Information Collections Under Review by the Office of Management and Budget

AGENCY: Energy Information Administration, DOE.

ACTION: Notice of requests submitted for review by the Office of Management and Budget.

SUMMARY: The Energy Information Administration (EIA) has submitted the energy information collection(s) listed at the end of this notice to the Office of Management and Budget (OMB) for review under provisions of the Paperwork Reduction Act (44 U.S.C. Ch. 35).

The listing does not include information collection requirements contained in new or revised regulations which are to be submitted under 3504(h) of the Paperwork Reduction Act, nor management and procurement assistance requirements collected by the Department of Energy (DOE).

Each entry contains the following information: (1) The sponsor of the Collection (the DOE component or Federal Energy Regulatory Commission (FERC)); (2) collection number(s); (3) current OMB docket number (if applicable); (4) collection title; (5) type of request, e.g., new, revision, or extension; (6) frequency of collection; (7) response obligation, i.e., mandatory, voluntary, or required to obtain or retain benefit; (8) affected public; (9) an estimate of the number of respondents per report period; (10) an estimate of the number of response annually; (11) an estimate of the average hours per response; (12) The estimated total annual respondent burden; and (13) a brief abstract describing the proposed collection and the respondents.

DATE: Comments must be filed on or before September 6, 1988.

ADDRESS: Address comments to the Department of Energy Desk Officer, Office of Information and Regulatory Affairs, Office of Management and Budget, 726 Jackson Place, NW., Washington, DC 20503. (Comments should also be addressed to the office of Statistical Standards, at the address below.)

FOR FURTHER INFORMATION AND COPIES OF RELEVANT MATERIALS CONTACT: Carole Patton, Office of Statistical Standards (E1-70), Energy Information Administration, M.S. 1H-023, Forrestal Building, 1000 Independence Ave., SW., Washington, DC 20585, (202) 586-2222.

SUPPLEMENTARY INFORMATION: If you anticipate that you will be submitting comments, but find it difficult to do so within the period of time allowed by this Notice, you should advise the OMB DOE Desk officer of your intention to do so as soon as possible. The Desk Officer may be telephoned at (202) 395-3084.

The energy information collection submitted to OMB for review was:

1. Energy Information Administration.
2. EIA-800-804, 806, 810-814, 816-818, 820 and 825.
3. 1905-0165.
4. Petroleum Supply Reporting System.
5. Revision.
6. Weekly, Montly, Annually, Triennially.
7. Mandatory for all except EIA-806 which is voluntary.
8. Businesses or other for profit.
9. 3,264 respondents annually (total).
10. 48,000 responses annually (total).
11. The estimated average hours per response for the forms in the Petroleum Supply Reporting System are: EIA-800, 1 hour; EIA-801, .52 hours; EIA-802, .5 hours; EIA-803, .5 hours; EIA-804, 1 hour; EIA-806, 1 hour; EIA-810, 3.25 hours; EIA-811, 1.5 hours; EIA-812, 2 hours; EIA-813, 1.5 hours; EIA-814, 2 hours; EIA-816, .75 hours; EIA-817, 1.5 hours; EIA-818, 3 hours; EIA-820, 2 hours; and EIA-825, .5 hours.
12. 55,760 hours annually (total).
13. The Petroleum Supply Reporting System, collects information needed for determining the supply and disposition of crude petroleum, petroleum products, and natural gas liquids. These data are published by the EIA. Respondents are operators of petroleum refining facilities, blending plants, bulk terminals, crude oil and product pipelines, natural gas plant facilities, tankers and barges, and oil importers.

Statutory Authority: Sec. 5(a), 5(b), 13(b), and 52, Pub. L. 93-275, Federal Energy Administration Act of 1974, (15 U.S.C. 764(a), 764(b), 772(b), and 790a).

Issued in Washington, DC., July 29, 1988.

Yvonne M. Bishop,

Director Statistical Standards, Energy Information Administration.

[FR Doc. 88-17617 Filed 8-3-88; 8:45 am]

BILLING CODE 6450-01-M

FEDERAL EMERGENCY MANAGEMENT AGENCY

[FEMA-814-DR]

Major Disaster and Related Determinations; Iowa

AGENCY: Federal Emergency Management Agency.

ACTION: Notice.

SUMMARY: This is a notice of the Presidential declaration of a major disaster for the State of Iowa (FEMA-814-DR), dated July 28, 1988, and related determinations.

DATED: July 28, 1988.

FOR FURTHER INFORMATION CONTACT: Neva K. Elliott, Disaster Assistance Programs, Federal Emergency Management Agency, Washington, DC 20472 (202) 646-3614.

CR

PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE OKLAHOMA 74004 PHONE 918 661-6600

December 15, 1988

ERA Docket No. 88-22-LNG

Natural Gas Division
Economic Regulatory Administration
Forrestal Building, Room GA 076
1000 Independence Avenue, SW
Washington, DC 20585

Gentlemen:

Attached for your information and file is one copy of the Nineteenth Amendatory Agreement relating to the LNG Sales Agreement between Tokyo Electric Power Company, Inc. and Tokyo Gas Company, as buyers, and Phillips 66 Natural Gas Company and Marathon Oil Company, as sellers. The amendment covers the LNG price from April 1, 1988 through August 31, 1988.

Very truly yours,

PHILLIPS 66 NATURAL GAS COMPANY

K. R. Lilley

K. R. Lilley
990C Plaza Office Building
Bartlesville, OK 74004
(918) 661-5615

KRL/62/pkc

Attachment

NINETEENTH AMENDATORY AGREEMENT

THIS NINETEENTH AMENDATORY AGREEMENT is effective April 1, 1988, by and between The Tokyo Electric Power Company, Incorporated ("Tokyo Electric") and Tokyo Gas Co., Ltd. ("Tokyo Gas"), corporations organized and existing under the laws of Japan, hereinafter collectively referred to as "Buyers" and Marathon Oil Company ("Marathon") and Phillips 66 Natural Gas Company ("Phillips") as successor to Phillips Petroleum Company, corporations organized and existing under the laws of various states of the United States of America, hereinafter collectively referred to as "Sellers".

WITNESSETH:

WHEREAS, on the 6th day of March, 1967, Sellers and Buyers entered into a certain Liquefied Natural Gas Sales Agreement (Basic Agreement - as subsequently amended) providing for the purchase by Buyers from Sellers of LNG manufactured from natural gas produced from natural gas reserves located in the State of Alaska, the United States of America.

NOW THEREFORE, in consideration of the mutual and dependent promises herein contained, the parties hereto agree, for the purpose of further amending a part of the Basic Agreement regarding the price provided in Article Nine Sub Section 9.1(a) of the Basic Agreement, as follows:

1. Effective April 1, 1988 through August 31, 1988, the price which shall apply in respect to LNG sold and delivered shall be a base price of 592.8 U.S. cents per million Btu's as indexed in accordance with the formula given below so as to reflect changes in the weighted average of Government Selling Prices of a basket of twenty (20) crude oils imported into Japan.

Price for calendar month

$$= 592.8 \times \left[\frac{\text{Av GSP (Month Prior to Calendar Month)}}{34.48}\right]$$

$$+ 17 \times \left(\frac{26.50 - \text{Av GSP}}{26.50 - 17.38}\right)$$

WHERE:

Av GSP is the average of the Government Selling Prices (in U.S. dollars per barrel) weighted by the 1987 volumes for the top twenty (20) crude oils (ranked by descending volumes) imported into Japan during the calendar year of 1987.

2. If the Government Selling Price (GSP) for any of such top twenty (20) crude oils applicable on the last day of the month prior to the month in which LNG is sold and delivered is different from the GSP used in calculating the applicable LNG price, and the different GSP is announced before the end of the month following the month of delivery, then the applicable LNG price shall be re-calculated using the different GSP and appropriate adjusting payments shall be made at the next regular payment date, or at such other time as mutually agreed between the parties. If at any time any of the Government Selling Prices used in the formula ceases to be published or is quoted on a revised basis, Sellers and Buyers shall promptly meet to agree on an appropriate modification.

3. If Av GSP equals or exceeds $26.50/bbl during the period April 1, 1988 through August 31, 1988, Sellers and Buyers shall promptly meet to agree on a pricing basis.

4. Except as herein specifically amended, all other terms and conditions of the Basic Agreement shall remain unchanged.

IN WITNESS WHEREOF, the parties hereto have caused this Nineteenth Amendatory Agreement to be executed in good faith, by their respective duly authorized officers as of the date set forth below.

BUYERS:

THE TOKYO ELECTRIC POWER COMPANY, INCORPORATED

By: Shoh Nagai
President and Director

TOKYO GAS CO., LTD.

By: Hiroshi Watanabe
President and Director

SELLERS:

MARATHON OIL COMPANY

By: V G Beghini
President

PHILLIPS 66 NATURAL GAS COMPANY

By: [illegible]
President

Dated 1st September, 1988

CR

PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE OKLAHOMA 74004 PHONE 918 661 6600

'89 FEB 27 A11:08

February 17, 1989

ERA Docket No. 88-22-LNG

Natural Gas Division
Economic Regulatory Administration
Forrestal Building, Room GA 076
1000 Independence Avenue, SW
Washington, DC 20585

Gentlemen:

Attached for your information and file is one copy of the Twentieth Amendatory Agreement relating to the LNG Sales Agreement between Tokyo Electric Power Company, Inc. and Tokyo Gas Company, as buyers, and Phillips 66 Natural Gas Company and Marathon Oil Company, as sellers.

Very truly yours,

PHILLIPS 66 NATURAL GAS COMPANY

K. R. Lilley

K. R. Lilley
990C Plaza Office Building
Bartlesville, OK 74004
(918) 661-5615

KRL/62/pkr

Attachment

TWENTIETH AMENDATORY AGREEMENT

THIS TWENTIETH AMENDATORY AGREEMENT is effective September 1, 1988, by and between The Tokyo Electric Power Company, Incorporated ("Tokyo Electric") and Tokyo Gas Co., Ltd. ("Tokyo Gas"), corporations organized and existing under the laws of Japan, hereinafter collectively referred to as "Buyers" and Marathon Oil Company ("Marathon") and Phillips 66 Natural Gas Company ("Phillips") as successor to Phillips Petroleum Company, corporations organized and existing under the laws of various states of the United States of America, hereinafter collectively referred to as "Sellers".

WITNESSETH:

WHEREAS, on the 6th day of March, 1967, Sellers and Buyers entered into a certain Liquefied Natural Gas Sales Agreement (Basic Agreement - as subsequently amended) providing for the purchase by Buyers from Sellers of LNG manufactured from natural gas produced from natural gas reserves located in the State of Alaska, the United States of America.

NOW THEREFORE, in consideration of the mutual and dependent promises herein contained, the parties hereto agree, for the purpose of further amending a part of the Basic Agreement regarding the price provided in Article Nine Sub-Section 9.1(a) of the Basic Agreement, as follows:

1. Effective September 1, 1988 through September 30, 1988, the price which shall be applied in respect to LNG sold and delivered shall be a base price of 592.8 U.S. cents per million Btu's as indexed in accordance with the formula given below so as to reflect changes in the weighted average of Government Selling Prices of a basket of twenty (20) crude oils imported into Japan.

   Price for calendar month

$$= 592.8 \times \left[\frac{\text{Av GSP (Month Prior to Calendar Month)}}{34.48}\right]$$

$$+ 17 \times \left[\frac{(26.50 - \text{Av GSP})}{(26.50 - 17.38)}\right]$$

WHERE:

Av GSP is the average of the Government Selling Prices (in U.S. dollars per barrel) weighted by the 1987 volumes for the top twenty (20) crude oils (ranked by descending volumes) imported into Japan during the calendar year of 1987.

2. If the Government Selling Price (GSP) for any of such top twenty (20) crude oils applicable on the last day of the month prior to the month in which LNG is sold and delivered is different from the GSP used in calculating the applicable LNG price, and the different GSP is announced before the end of the month following the month of delivery, then the applicable LNG price shall be re-calculated using the different GSP and appropriate adjusting payments shall be made at the next regular payment date, or at such other time as mutually agreed between the parties. If at any time any of the Government Selling Prices used in the formula ceases to be published or is quoted on a revised basis, Sellers and Buyers shall promptly meet to agree on an appropriate modification.

3. If Av GSP equals or exceeds $26.50/bbl during the period September 1, 1988 through September 30, 1988, Sellers and Buyers shall promptly meet to agree on a pricing basis.

4. Except as herein specifically amended, all other terms and conditions of the Basic Agreement shall remain unchanged.

IN WITNESS WHEREOF, the parties hereto have caused this Twentieth Amendatory Agreement to be executed in good faith, by their respective duly authorized officers as of the date set forth below.

BUYERS:

THE TOKYO ELECTRIC POWER COMPANY, INCORPORATED

By: Shoh Nasu
President and Director

TOKYO GAS CO., LTD.

By: Hiroshi Watanabe
President and Director

SELLERS:

MARATHON OIL COMPANY

By: [signature]
President

PHILLIPS 66 NATURAL GAS COMPANY

By: [signature] DJ
President

Dated Sixth January, 1989

OR

UNITED STATES OF AMERICA

DEPARTMENT OF ENERGY

OFFICE OF FOSSIL ENERGY

PHILLIPS ALASKA NATURAL GAS CORPORATION AND MARATHON OIL COMPANY	FE DOCKET NO. 91-103-LNG

AM DEC 19 A10:19 DOE/FE/OP

ORDER TRANSFERRING AUTHORIZATION TO EXPORT LIQUEFIED NATURAL GAS

DOE/FE OPINION AND ORDER NO. 261-B

ORDER

Pursuant to section 3 of the Natural Gas Act and 10 CFR Sec. 590.405, it is hereby ordered that:

The authorization granted to Phillips 66 Natural Gas Company and Marathon Oil Company to export liquefied natural gas from Alaska to Japan, pursuant to DOE/FE Opinion and Order Nos. 261 and 261-A, FE Docket Nos. 88-22-LNG and 91-10-LNG, is hereby transferred to Phillips Alaska Natural Gas Corporation and Marathon Oil Company effective the date of issuance of this order.

Issued in Washington, D.C., on December 17, 1991.

Clifford P. Tomaszewski
Acting Deputy Assistant Secretary
for Fuels Programs
Office of Fossil Energy

Department of Energy
Washington, DC 20585

December 19, 1991

Mr. Larry Pain
Attorney
Phillips Alaska Natural Gas Corporation
1256 Adams Building
Bartlesville, Oklahoma 74004

RE: Transfer Existing Export Authorization in FE Docket Nos. 88-22-LNG, 91-10-LNG and 91-103-LNG

Dear Mr. Pain:

This is in response to your request, submitted as part of your application filed on November 26, 1991, for the transfer of the export authorization currently held by Phillips 66 Natural Gas Company (Phillips) and Marathon Oil Company (Marathon) to Phillips Alaska Natural Gas Corporation (PANGC) and Marathon. See DOE/ERA Opinion and Order No. 261, 1 ERA ¶70,130 DOE/FE, and Opinion and Order 261-A (Order 261-A), 1 FE ¶70,454. Orders 261 and 261-A give Phillips and Marathon long-term authorization to export liquefied natural gas (LNG) from the Kenai peninsula of Alaska to Japan.

In your application you indicate that as a result of a corporation restructuring designed to closely align operating group responsibilities with ownership of business assets and to better identify results of its operating groups PANGC has assumed responsibilities for the Kenai LNG operations.

Based on the information you furnished, I find that transferring the authorization granted in Orders 261 and 261-A in the referenced dockets from Phillips 66 Natural Gas Company and Marathon Oil Company to Phillips Alaska Natural Gas Corporation and Marathon Oil Company, is not inconsistent with the public interest. Accordingly, I have signed the enclosed order

transferring that authority effective the date of issuance of that order. A copy of this letter and the enclosed order are being served on all parties to Docket Nos. 88-22-LNG, 91-10-LNG and 91-103-LNG.

Sincerely,

Clifford P. Tomaszewski
Acting Deputy Assistant Secretary
for Fuels Programs
Office of Fossil Energy

Enclosure

QT

PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA 74004 PHONE 918 661-6600

October 26, 1988

Phillips 66 Natural Gas Company
Marathon Oil Company
ERA Docket No. LNG 88-22-

Natural Gas Division
Economic Regulatory Administration
Forrestal Building, Room GA 076
1000 Independence Avenue, SW
Washington, DC 20585

ATTN: Ms. Constance L. Buckley

Gentlemen:

Pursuant to Ordering paragraph B of DOE/ERA Opinion No. 261, issued July 28, 1988, Phillips 66 Natural Gas Company reports the monthly prices and export volumes of LNG delivered to Japan for the third quarter, 1988.

Month/1988	Volumes (MMBtu)	Price (Cents/MMBtu)
July	3,337,710	296.0
August	3,173,125	292.5
September	2,938,416	292.5

The LNG deliveries from February, 1988 through June, 1988 were made under a provisional pricing system. Firm prices for this period which have been finalized are as follows:

Month/1988	Provisional Price Reported (Cents/MMBtu)	Firm Price (Cents/MMBtu)
February	312.0	313.7
March	312.4	313.4
April	312.4	306.0
May	312.4	306.2
June	312.4	301.3

Very truly yours,

K. R. Lilley

K. R. Lilley
990A Plaza Office Building
Bartlesville, OK 74004

KRL/57/pkc
cc: Marathon Oil Company
Attn: John V. Parziale
P. O. Box 3128

1988 OCT 31 PM 12:42

PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA 74004 PHONE 918 661-6600

January 26, 1989

Phillips 66 Natural Gas Company
Marathon Oil Company
ERA Docket No. LNG 88-22-

Natural Gas Division
Economic Regulatory Administration
Forrestal Building, Room GA C76
1000 Independence Avenue, SW
Washington, DC 20585

ATTN: Ms. Constance L. Buckley

Gentlemen:

Pursuant to Ordering paragraph B of DOE/ERA Opinion No. 261, issued July 28, 1988, Phillips 66 Natural Gas Company reports the monthly prices and export volumes of LNG delivered to Japan for the fourth quarter, 1988.

Month/1988	Volumes (MMBtu)	Price (Cents/MMBtu)
October	3,112,637	291.0
November	3,227,725	274.3
December	4,311,842	270.4

The LNG deliveries for August, 1988 were made under a provisional pricing system. Firm prices for August, 1988 have been finalized as follows:

Month/1988	Provisional Price Reported (Cents/MMBtu)	Firm Price (Cents/MMBtu)
August	292.5	290.2

Very truly yours,

K. R. Lilley
990A Plaza Office Building
Bartlesville, OK 74004

KRL/57/pkc
cc: Marathon Oil Company
Attn: R. G. Grammens
P. O. Box 3128
Houston, TX 77253

PM 1:57

Richard G. Grammens
Manager, Natural Gas Division
Worldwide Production

P.O. Box 3128
Houston, Texas 77253
Telephone 713/629-6600
Telex 792069

89 JAN 30 P 1:57

January 26, 1989

Natural Gas Division
Economic Regulatory Administration
Forrestal Building Room GA076
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Attn: Ms. Constance L. Buckley

Re: Phillips 66 Natural Gas Company
Marathon Oil Company
ERA Docket No. 88-22-LNG

Gentlemen:

In compliance with Ordering Paragraph B of DOE/ERA Opinion and Order No. 261 issued on July 28, 1988, in the above Docket, Marathon Oil Company hereby submits a schedule of its exported volumes and the prices for LNG at the delivery point in Japan for the months October 1988 through December 1988:

	VOLUME MMBTU	PRICE CENTS PER MMBTU
October 1988	1,351,809	291.0
November 1988	1,232,800	274.3
December 1988	1,638,892	270.4

Subsequent to our letter of October 26, 1988, the applicable price for August 1988 was retroactively changed to 290.20 cents per MMBTU in accordance with the terms of the contract.

Please revise your records accordingly.

It would be appreciated if you would date stamp the duplicate copy of this letter and return same in the self-addressed envelope enclosed.

Very truly yours,

Richard G. Grammens

RGG/azs

Enclosures (2)

cc: Phillips 66 Natural Gas Company
Attn: Ms. Barbara Price-Thurman
920 Plaza Office Building
Bartlesville, OK 74004

Richard G. Grammens
Manager, Natural Gas Division
Worldwide Production

Marathon Oil Company

P.O. Box 3128
Houston, Texas 77253
Telephone 713/629-6600
Telex 792069

REC'D DOE/FE/OFP
MAY 1 1989

April 25, 1989

Natural Gas Division
Economic Regulatory Administration
Forrestal Building Room GA076
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Attn: Ms. Constance L. Buckley

Re: Phillips 66 Natural Gas Company
Marathon Oil Company
ERA Docket No. 82-22-LNG

Gentlemen:

In compliance with Ordering Paragraph B of DOE/ERA Opinion and Order No. 261 issued on July 28, 1988, in the above Docket, Marathon Oil Company hereby submits a schedule of its exported volumes and the prices for LNG at the delivery point in Japan for the months January 1989 through March 1989:

	VOLUME MMBTU	PRICE CENTS PER MMBTU
January 1989	810,318	270.4
February 1989	880,725	284.0
March 1989	1,814,990	284.0

Subsequent to our letter of January 26, 1989, the applicable volume and price for September 1988 were retroactively changed to 1,514,719 MMBTU and 288.7 cents per MMBTU in accordance with the terms of the contract.

Please revise your records accordingly.

It would be appreciated if you would date stamp the duplicate copy of this letter and return same in the self-addressed envelope enclosed.

Very truly yours,

Richard G. Grammens

RGG/azs

Enclosures (2)

cc: Phillips 66 Natural Gas Company
Attn: Ms. Barbara Price-Thurman
920 Plaza Office Building
Bartlesville, OK 74004

REC'D DOE/FF/OFP
MAY 1 1989

PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA 74004 PHONE 918 661-6600

April 25, 1989

Phillips 66 Natural Gas Company
Marathon Oil Company
ERA Docket No. 88-22-LNG

Office of Fuels Programs
Fossil Energy
Forrestal Building, Room 3F-056, FE-50
1000 Independence Avenue, SW
Washington, DC 20585

ATTN: Ms. Constance L. Buckley

Gentlemen:

Pursuant to Ordering paragraph B of DOE/ERA Opinion No. 261, issued July 28, 1988, Phillips 66 Natural Gas Company reports the monthly prices and export volumes of LNG delivered to Japan for the first quarter, 1989.

Month/1988	Volumes (MMBtu)	Price (Cents/MMBtu)
January	2,162,300	270.4
February	2,082,005	284.0
March	4,129,520	284.0

Very truly yours,

K. R. Lilley

K. R. Lilley
990A Plaza Office Building
Bartlesville, OK 74004

KRL/57/pkc

cc: Marathon Oil Company
Attn: R. G. Grammens
P. O. Box 3128
Houston, TX 77253

Richard G. Grammens
Manager, Natural Gas Division
Worldwide Production

Marathon Oil Company

P.O. Box 3128
Houston, Texas 77253
Telephone 713/629-6600
Telex 792069

REC'D DOE/FE
OFFICE OF FUEL PROGRAM
1989 JUL 27 A 10: 24

July 25, 1989

Natural Gas Division
Economic Regulatory Administration
Forrestal Building, Room GA076
1000 Independence Avenue, S.W.
Washington, DC 20585

Attn: Ms. Constance L. Buckley

Re: Phillips 66 Natural Gas Company
Marathon Oil Company
ERA Docket No. 82-22-LNG

Gentlemen:

In compliance with ordering Paragraph B of DOE/ERA Opinion and Order No. 261 issued on July 28, 1988, in the above Docket, Marathon Oil Company hereby submits a schedule of its exported volumes and the prices for LNG at the delivery point in Japan for the months April 1989 through June 1989:

	VOLUME MMBTU	PRICE CENTS PER MMBTU
April	470,392	285.9
	888,041	300.0
May	884,823	305.0
June	1,359,163	305.0

Subsequent to our letter of April 25, 1989, the applicable volumes and prices for October 1988 through

March 1989 were retroactively changed with the terms of the contract, as follows:

	VOLUME MMBTU	PRICE CENTS PER MMBTU
October 1988	1,352,063	292.9
November 1988	1,233,786	276.2
December 1988	1,639,836	272.3
January 1989	810,585	272.3
February 1989	880,715	285.9
March 1989	1,814,852	285.9

It would be appreciated if you would date stamp the duplicate copy of this letter and return same in the self-addressed envelope enclosed.

Very truly yours,

Richard G. Grammens

Richard G. Grammens by JRG

RGG:jcd

Enclosures (2)

cc: Phillips 66 Natural Gas Company
Attn: Ms. Barbara Price-Thurman
920 Plaz Office Building
Bartlesville, OK 74004

PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA 74004 PHONE 918 661-6600

July 26, 1989

REC'D DOE/FE
OFFICE OF FUEL PROGRAM

'89 JUL 28 A 10:49

Phillips 66 Natural Gas Company
Marathon Oil Company
ERA Docket No. 88-22-LNG

Office of Fuels Programs
Fossil Energy
Forrestal Building, Room 3F-056, FE-50
1000 Independence Avenue, SW
Washington, DC 20585

ATTN: Ms. Constance L. Buckley

Gentlemen:

Pursuant to Ordering paragraph B of DOE/ERA Opinion No. 261, issued July 28, 1988, Phillips 66 Natural Gas Company reports the monthly prices and export volumes of LNG delivered to Japan for the second quarter, 1989.

Month/1989	Volumes (MMBtu)	Price (Cents/MMBtu)
April	3,047,195	300.0
May	2,114,237	305.0
June	3,105,489	305.0

The reported volumes and prices for the period from October, 1988 through March, 1989 have been revised as follows:

Period	Volumes (MMBtu)	Price (Cents/MMBtu)
October, 1988	3,112,383	292.9
November, 1988	3,226,739	276.2
December, 1988	4,310,898	272.3
January, 1989	2,162,032	272.3
February, 1989	2,082,015	285.9
March, 1989	4,129,658	285.9

Very truly yours,

K. R. Lilley

K. R. Lilley
990A Plaza Office Building
Bartlesville, OK 74004

KRL/57/pkc

cc: Marathon Oil Company
Attn: R. G. Grammens
P. O. Box 3128
Houston, TX 77253

Richard G. Grammens
Manager, Natural Gas Division
Worldwide Production

Marathon Oil Company

P.O. Box 3128
Houston, Texas 77253
Telephone 713/629-6600
Telex 792069

October 26, 1989

REC'D DOE/FE
OFFICE OF FOIA
89 OCT 31 A 10:01

Natural Gas Division
Economic Regulatory Administration
Forrestal Building, Room GA076
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Attn: Ms. Constance L. Buckley

Re: Phillips 66 Natural Gas Company
Marathon Oil Company
ERA Docket No. 82-22-LNG

Gentlemen:

In compliance with ordering Paragraph B of DOE/ERA Opinion and Order No. 261 issued on July 28, 1988, in the above Docket, Marathon Oil Company hereby submits a schedule of its exported volumes and the prices for LNG at the delivery point in Japan for the months July 1989 through September 1989:

	VOLUME MMBTU	PRICE CENTS PER MMBTU
July 1989	1,320,942	307.6
August 1989	1,319,207	304.7
September 1989	1,303,240	309.5

Subsequent to our letter of July 25, 1989, the applicable volumes and prices for April through June 1989 were retroactively changed with the terms of the contract as follows:

	VOLUME MMBTU	PRICE CENTS PER MMBTU
April 1989	1,357,415	297.1
May 1989	884,983	309.7
June 1989	1,358,951	309.5

It would be appreciated if you would date stamp the duplicate copy of this letter and return same in the self-addressed envelope enclosed.

Very truly yours,

R. G. Grammens

RGG/azs

Enclosures (2)

cc: Phillips 66 Natural Gas Company
Attn: Ms. Barbara Price-Thurman
920 Plaza Office Building
Bartlesville, OK 74004

PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE OKLAHOMA 74004 PHONE 918 661-6600

October 26, 1989

REC'D DOE/FE
OFFICE OF FUELS PROGRAM
89 NOV -1 A 8:46

Office of Fuels Program
Fossil Energy
Forrestal Bldg., Rm. 35-056, FE-50
1000 Independence Ave. S.W.
Washington, D.C. 20585

Attn.: Ms. Constance L. Buckley

Re: Phillips 66 Natural Gas Co.
Marathon Oil Co.
Docket No. 88-22-LNG

Gentlemen:

Pursuant to Ordering Paragraph B of Opinion No. 261, issued July 28, 1988, Phillips 66 Natural Gas Company reports the monthly prices and exported volumes of LNG to Japan for the third quarter, 1989 as follows:

Month/1989	Volumes (MMBtu)	Price (Cents/MMBtu)
July	3,136,050	307.6
August	3,138,962	304.7
September	3,154,425	309.5

Revisions in the prices and volumes for the second quarter, 1989 will be reported at a later date.

Respectfully submitted,

K. R. Lilley

K. R. Lilley

KRL:sm
krl\L005

cc: Marathon Oil Company
P. O. Box 3128
Houston, Tx. 77253
Attn.: R. G. Grammens

PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA 74004 PHONE 918 661-6600

November 8, 1989

Office of Fossil Energy
Forrestal Bldg., Rm. 3F-056, FE-50
1000 Independence Ave. S.W.
Washington, D.C. 20585

Attn.: Ms. Constance L. Buckley

RECEIVED
OFFICE OF FOSSIL ENERGY
DOE/FE

Re: Phillips 66 Natural Gas Co.
Marathon Oil Co.
Docket No. 88-22-LNG

Gentlemen:

The LNG deliveries for the second quarter 1989 were made under the provisional pricing terms of the contract. In accordance with the contract firm prices were finalized and retroactively changed as follows:

Month	Volumes (MMBtu)	Price (Cents/MMBtu)
April, 1989	3,095,916	297.1
May, 1989	2,114,077	309.7
June, 1989	3,105,701	309.5

Very truly yours,

K. R. Lilley

K. R. Lilley
990A Plaza Office Bldg.
(918) 661-5615

KRL:sm
krl\L006

cc: Marathon Oil Company
P. O. Box 3128
Houston, Tx. 77253
Attn.: R. G. Grammens

Richard G. Grammens
Manager, Natural Gas Division
Worldwide Production

P.O. Box 3128
Houston, Texas 77253
Telephone 713/629-6600
Telex 792069

REC'D DOE/FE
OFFICE OF FUELS PROGRAMS
1990 JAN 26 PM 3:

January 26, 1990

Natural Gas Division
Economic Regulatory Administration
Forrestal Building, Room GA076
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Attn: Ms. Constance L. Buckley

Re: Phillips 66 Natural Gas Company
Marathon Oil Company
ERA Docket No. 82-22-LNG

Gentlemen:

In compliance with ordering Paragraph B of DOE/ERA Opinion and Order No. 261 issued on July 28, 1988, in the above Docket, Marathon Oil Company hereby submits a schedule of its exported volumes and the prices for LNG at the delivery point in Japan for the months October 1989 through December 1989:

	VOLUME MMBTU	PRICE CENTS PER MMBTU
October 1989	1,768,038	298.8
November 1989	1,519,881	304.7
December 1989	1,515,653	300.8

Subsequent to our letter of July 25, 1989, the applicable volume and price for September 1989 was retroactively changed with the terms of the contract as follows:

	VOLUME MMBTU	PRICE CENTS PER MMBTU
September 1989	1,302,611	300.8

It would be appreciated if you would date stamp the duplicate copy of this letter and return same in the self-addressed envelope enclosed.

Very truly yours,

R. G. Grammens

RGG:ped

Enclosures (2)

cc: Phillips 66 Natural Gas Company
Attn: Ms. Barbara Price-Thurman
920 Plaza Office Building
Bartlesville, OK 74004

PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE OKLAHOMA 74004 PHONE 918 661-6600

REC'D DOE/FE
OFFICE OF FUEL PROGRAM
'90 FEB -1 P 3:18

January 26, 1990

Office of Fuels Programs,
Fossil Energy
Forrestal Bldg., Rm. 3F-056, FE-50
1000 Independence Ave. S.W.
Washington, D.C. 20585

Re: Phillips 66 Natural Gas Co.
Marathon Oil Co.
Docket No. 88-22-LNG

Gentlemen:

Pursuant to Ordering Paragraph B of Opinion No. 261, issued July 28, 1988, Phillips 66 Natural Gas Company reports the monthly prices and exported volumes of LNG to Japan for the fourth quarter, 1989 as follows:

Month/1989	Volumes (MMBtu)	Price (Cents/MMBtu)
October	4,339,667	298.8
November	3,258,756	304.7
December	2,904,182	300.8

Subsequent to our report dated October 26, 1989, the price for LNG during September, 1989 was retroactively changed to 300.8 cents in accordance with the terms of the agreement. Please revise your records accordingly.

Respectfully submitted,

K. R. Lilley

K. R. Lilley
Phillips 66 Natural Gas Company
990A Plaza Office Building
(918) 661-5615

KRL:sm
krl\L005

cc: Marathon Oil Company
P. O. Box 3128
Houston, Tx. 77253
Attn.: R. G. Grammens

Richard G. Grammens
Manager, Natural Gas Division
Worldwide Production

Marathon Oil Company

P.O. Box 3128
Houston, Texas 77253
Telephone 713/629-6600
Telex 792069

REC'D DOE/FE
OFFICE OF FUEL PROGRAM
1990 APR 30 P 2:17

April 25, 1990

Natural Gas Division
Economic Regulatory Administration
Forrestal Building, Room GA076
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Attn: Ms. Constance L. Buckley

Re: Phillips 66 Natural Gas Company
Marathon Oil Company
ERA Docket No. 82-22-LNG

Gentlemen:

In compliance with ordering Paragraph B of DOE/ERA Opinion and Order No. 261 issued on July 28, 1988, in the above Docket, Marathon Oil Company hereby submits a schedule of its exported volumes and the prices for LNG at the delivery point in Japan for the months January 1990 through March 1990:

	VOLUME MMBTU	PRICE CENTS PER MMBTU
January 1990	1,388,235	308.9
February 1990	1,272,817	299.7
March 1990	1,332,219	303.1

Subsequent to our letter of January 26, 1990, the applicable volumes and/or prices for the following months were retroactively changed with the terms of the contract as follows:

	VOLUME MMBTU	PRICE CENTS PER MMBTU
April 1989	1,357,523	297.1
July 1989	1,320,954	307.9
August 1989	1,319,203	304.7
September 1989	1,302,598	300.7
October 1989	1,768,041	298.7
November 1989	1,157,577	299.6
December 1989	1,513,357	303.1

It would be appreciated if you would date stamp the duplicate copy of this letter and return same in the self-addressed envelope enclosed.

Very truly yours,

R. G. Grammens JG

RGG:hf

Enclosures (2)

cc: Phillips 66 Natural Gas Company
Attn: Ms. Barbara Price-Thurman
920 Plaza Office Building
Bartlesville, OK 74004

REC'D DOE/FE
OFFICE OF FUEL PROGRAM
1990 APR

PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA 74004 PHONE 918 661-6600

REC'D DOE/FE
OFFICE OF FUEL PROGRAM
1990 MAY -1 A 9:45

April 26, 1990

REC'D DOE/FE
OFFICE OF FUEL PROGRAM
1990 APR 31 A 9:53

Office of Fuels Programs,
Fossil Energy
Forrestal Bldg., Rm. 3F-056, FE-50
1000 Independence Ave. S.W.
Washington, D.C. 20585

Re: Phillips 66 Natural Gas
Marathon Oil Co.
Docket No. 88-22-LNG

Gentlemen:

Pursuant to Ordering Paragraph B of Opinion No. 261, issued July 28, 1988, Phillips 66 Natural Gas Company reports the monthly prices and exported volumes of LNG to Japan for the first quarter, 1990 as follows:

Month/1990	Volumes (MMBtu)	Price (Cents/MMBtu)
January	3,026,945	308.9
February	3,146,600	299.7
March	3,080,451	303.1

The reported prices and/or volumes for the period from April, 1989 through December, 1989 have been revised as follows:

Month/1989	Volumes (MMBtu)	Price (Cents/MMBtu)
April	3,095,808	297.1
May	2,114,077	309.7 (NC)
June	3,105,701	309.5 (NC)
July	3,135,984	307.9
August	3,139,031	304.7
September	3,154,925	300.7
October	4,139,463	298.7
November	3,260,679	299.6
December	2,904,052	303.1

Respectfully submitted,

K. R. Lilley

K. R. Lilley
Phillips 66 Natural Gas Company
990A Plaza Office Building
(918) 661-5615

KRL:sm
krl\L005

cc: Marathon Oil Company
P. O. Box 3128
Houston, Tx. 77253
Attn.: R. G. Grammens

Richard G. Grammens
Manager, Natural Gas Division
Worldwide Production

Marathon Oil Company

P.O. Box 3128
Houston, Texas 77253
Telephone 713/629-6600
Telex 792069

REC'D DOE/FE
OFFICE OF FUTL PROGRAM
1990 AUG -1 P 4: 28

July 27, 1990

Natural Gas Division
Economic Regulatory Administration
Forrestal Building, Room GA076
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Attn: Ms. Constance L. Buckley

Re: **Phillips 66 Natural Gas Company**
Marathon Oil Company
ERA Docket No. 82-22-LNG

Gentlemen: 88

In compliance with ordering Paragraph B of DOE/ERA Opinion and Order No. 261 issued on July 28, 1988, in the above Docket, Marathon Oil Company hereby submits a schedule of its exported volumes and the prices for LNG at the delivery point in Japan for the months April 1990 through June 1990:

		VOLUME MMBTU	PRICE CENTS PER MMBTU
April	1990	1,345,770	320.2
May	1990	940,416	310.6
June	1990	1,390,827	321.0

Subsequent to our letter of April 25, 1990, the applicable volumes and/or prices for the following months were retroactively changed with the terms of the contract as follows:

		VOLUME MMBTU	PRICE CENTS PER MMBTU
February	1990	1,275,418	316.2
March	1990	1,331,819	321.0

It would be appreciated if you would date stamp the duplicate copy of this letter and return same in the self-addressed envelope enclosed.

Very truly yours,

R. G. Grammens Jr.

RGG/JRG:hf

Enclosures (2)

cc: Phillips 66 Natural Gas Company
Attn: Ms. Barbara Price-Thurman
920 Plaza Office Building
Bartlesville, OK 74004

RGG002/TXTEEL

PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE OKLAHOMA 74004 PHONE 918 661 6600

July 26, 1990

REC'D DOE/FE
OFFICE OF FUEL PROGRAM
1990 JUL 30 P 3:53

Office of Fuels Programs
Fossil Energy
Forrestal Bldg., Rm. 3F-056, FE-50
1000 Independence Ave. S. W.
Washington, D.C. 20585

Re: Phillips 66 Natural Gas Company
Marathon Oil Company
Docket No. 88-22-LNG

Gentlemen:

Pursuant to Ordering Paragraph B of Opinion No. 261, issued July 28, 1988, Phillips 66 Natural Gas Company reports the monthly prices and exported volumes of LNG to Japan for the second quarter, 1990 as follows:

Month 1990	Volumes (MMBtu)	Price (Cents/MMBtu)
April	3,070,693	320.2
May	2,077,754	310.6
June	3,034,727	299.6 (estimate)

Respectfully submitted,

K. R. Lilley

K. R. Lilley
Phillips 66 Natural Gas Company
990-A Plaza Office Building
(918) 661-5615

KRL:dc90:295

cc: Marathon Oil Company
P. O. Box 3128
Houston, TX 77253
Attn: R. G. Grammens

PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA 74004 918 661-6600

August 7, 1990

REC'D DOE/FE
OFFICE OF FUELS PROGRAM
1990 AUG 10 P 3:50

Office of Fuels Programs,
Fossil Energy
Forrestal Bldg., Rm. 3F-056, FE-50
1000 Independence Ave. S.W.
Washington, D.C. 20585

Re: Phillips 66 Natural Gas Co.
Marathon Oil Co.
Docket No. 88-22-LNG

Gentlemen:

The LNG deliveries for February and March 1990 were made under the provisional pricing terms of the contract. The firm prices have been finalized pursuant to the agreement and revised retroactively as follows:

Month/1990	Volumes (MMBtu)	Price (Cents/MMBtu)
February	3,144,680	316.2
March	3,080,991	321.0

Respectfully submitted,

K. R. Lilley

K. R. Lilley
Phillips 66 Natural Gas Company
990A Plaza Office Building
(918) 661-5615

KRL:sm
krl\L005

cc: Marathon Oil Company
P. O. Box 3128
Houston, Tx. 77253
Attn.: R. G. Grammens

Richard G. Grammens
Manager, Natural Gas Division
Worldwide Production

ORIGINAL

Marathon Oil Company

P.O. Box 3128
Houston, Texas 77253
Telephone 713/629-6600
Telex 792069

October 29, 1990

REC'D DOE/FE
OFFICE OF FUEL PROGRAM
'90 NOV 2 A 11:27

Natural Gas Division
Economic Regulatory Administration
Forrestal Building, Room GA076
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Attn: Ms. Constance L. Buckley

Re: Phillips 66 Natural Gas Company
Marathon Oil Company
ERA Docket No. 82-22-LNG
88

Gentlemen:

In compliance with ordering Paragraph B of DOE/ERA Opinion and Order No. 261 issued on July 29, 1988, in the above Docket, Marathon Oil Company hereby submits a schedule of its exported volumes and the prices for LNG at the delivery point in Japan for the months July 1990 through September 1990:

		VOLUME MMBTU	PRICE CENTS PER MMBTU
July	1990	1,261,364	295.2
August	1990	1,273,729	310.6
September	1990	1,322,046	307.5

Subsequent to our letter of July 27, 1990, the applicable volumes and/or prices for the following months were retroactively changed with the terms of the contract as follows:

		VOLUME MMBTU	PRICE CENTS PER MMBTU
October	1989	1,767,799	306.4
November	1989	1,160,432	307.5
December	1989	1,509,660	311.4
January	1990	1,386,919	318.8
February	1990	1,276,586	328.2
March	1990	1,331,553	334.4
April	1990	1,345,182	333.4
May	1990	940,617	320.9
June	1990	1,392,365	307.5

It would be appreciated if you would date stamp the duplicate copy of this letter and return same in the self-addressed envelope enclosed.

Very truly yours,

R G Grammens

R. G. Grammens by JRG

RGG/JRG:hf

Enclosures (2)

cc: Phillips 66 Natural Gas Company
Attn: Ms. Barbara Price-Thurman
920 Plaza Office Building
Bartlesville, OK 74004

RGG002/TXTEEL

PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE OKLAHOMA 74004 PHONE 918 661-6600

October 30, 1990

REC'D DOE/FE
OFFICE OF FUELS PROGRAM
90 NOV -5 P 5:27

Office of Fuels Programs
Fossil Energy
Forrestal Building, Room 3F-056, FE-50
1000 Independence Ave., S.W.
Washington, DC 20585

Re: Phillips 66 Natural Gas Company
Marathon Oil Company
Docket No. 88-22-LNG

Gentlemen:

Pursuant to Ordering Paragraph B of Opinion No. 261, issued July 28, 1988, Phillips 66 Natural Gas Company reports the monthly prices and exported volumes of LNG to Japan for the third quarter, 1990 as follows:

Month/1990	Volumes (MMBtu)	Price (Cents/MMBtu)
July	3,159,690	295.2
August	3,145,699	310.6
September	3,096,380	307.5

Respectfully submitted

K. R. Lilley

K. R. Lilley
Phillips 66 Natural Gas Company
990-A Plaza Office Building
(918) 661-5615

KRL:sm
\L057

cc: Marathon Oil Company
Attn: R. G. Grammens
P. O. Box 3128
Houston, TX 77253

PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA 74004 918 661-6600

November 14, 1990

Office of Fuels Program
Fossil Energy
Forrestal Building, RM3F-056, FE-50
1000 Independence Ave., S.W.
Washington, D.C. 20585

RECEIVED
OFFICE OF FUELS PROGRAM
FE/300 NOV 19 P 3:41

Re: Phillips 66 Natural Gas Company
Marathon Oil Company
Docket No. 88-22-LNG

Gentlemen:

The volumes and prices reported for the period from October, 1989 to June, 1990 have been revised retroactively in accordance with the terms of the contract. The changes are as follows:

Period	Volume (MMBtu)	Price (Cents/MMBtu)
October, 1989	4,139,463	306.4
November, 1989	3,258,756	307.5
December, 1989	2,904,182	311.4
January, 1990	2,934,053	318.8
February, 1990	3,029,700	328.2
March, 1990	2,957,531	334.4
April, 1990	2,987,736	333.4
May, 1990	2,011,063	320.9
June, 1990	3,034,727	307.5

Very truly yours,

K. R. Lilley

K. R. Lilley

KRL:sm
\L032

cc: Marathon Oil Company
P. O. Box 3128
Houston, Tx. 77253
Attn.: Richard G. Grammens

Richard G. Grammens
Vice President
Natural Gas Marketing & Transportation
Worldwide Production

P.O. Box 3128
Houston, Texas 77253
Telephone 713/296-2226
Telex 166438

January 25, 1991

Natural Gas Division
Economic Regulatory Administration
Forrestal Building, Room GA076
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Attn: Ms. Constance L. Buckley

Re: Phillips 66 Natural Gas Company
Marathon Oil Company
ERA Docket No. 88-22-LNG

REC'D DOE/FE
Washington, D.C.
91 JAN 1 PM 1:44

Gentlemen:

In compliance with ordering Paragraph B of DOE/ERA Opinion and Order No. 261 issued on July 28, 1988, in the above Docket, Marathon Oil Company hereby submits a schedule of its exported volumes and the prices for LNG at the delivery point in Japan for the months October 1990 through December 1990:

		VOLUME MMBTU	PRICE CENTS PER MMBTU
October	1990	1,754,484	392.4
November	1990	1,331,862	476.8
December	1990	1,289,232	320.2

Subsequent to our letter of October 29, 1990, the applicable volumes and/or prices for the following months were retroactively changed with the terms of the contract as follows:

		VOLUME MMBTU	PRICE CENTS PER MMBTU
August	1990	1,270,730	293.2
September	1990	1,321,081	320.2

It would be appreciated if you would date stamp the duplicate copy of this letter and return same in the self-addressed envelope enclosed.

Very truly yours,

R. G. Grammens

RGG/JRG:hf

Enclosures (2)

cc: Phillips 66 Natural Gas Company
Attn: Ms. Barbara Price-Thurman
920 Plaza Office Building
Bartlesville, OK 74004

RGG002/TXTEEL

PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE OKLAHOMA 74004 PHONE 918 661-6600

January 28, 1991

REC'D DOE/FE
OFFICE OF FUELS PROGRAM
1991 FEB -5 P 3:56

Office of Fuels Programs
Fossil Energy
Forrestal Building, Room 3F-056, FE-50
1000 Independence Ave., S.W.
Washington, DC 20585

Re: Phillips 66 Natural Gas Company
Marathon Oil Company
Docket No. 88-22-LNG

Gentlemen:

Pursuant to Ordering Paragraph B of Opinion No. 261, issued July 28, 1988, Phillips 66 Natural Gas Company reports the monthly prices and exported volumes of LNG to Japan for the fourth quarter, 1990 as follows:

Month/1990	Volumes (MMBtu)	Price (Cents/MMBtu)
October	4,139,478	392.4
November	1,892,246	476.8
December	3,115,192	320.2

The reported prices and volumes for August and September, 1990 have been revised as follows:

Month/1990	Volumes (MMBtu)	Price (Cents/MMBtu)
August	3,148,698	293.2
September	3,095,196	320.2

Respectfully submitted

K. R. Lilley

K. R. Lilley
Phillips 66 Natural Gas Company
990-A Plaza Office Building
(918) 661-5615

KRL:sm
\L057

Richard G. Grammens
Vice President
Natural Gas Marketing & Transportation

Marathon Oil Company

P.O. Box 3128
Houston, Texas 77253
Telephone 713/296-2226
Telex 166438

May 3, 1991

Natural Gas Division
Economic Regulatory Administration
Forrestal Building, Room GA076
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Attn: Ms. Constance L. Buckley

Re: Phillips 66 Natural Gas Company
Marathon Oil Company
ERA Docket No. ~~82-22-LNG~~ 88-22-LNG

DOE/FE
RECD DOCKET PROGRAM
91 MAY 13 P 1:27

Gentlemen:

In compliance with ordering Paragraph B of DOE/ERA Opinion and Order No. 261 issued on July 28, 1988, in the above Docket, Marathon Oil Company hereby submits a schedule of its exported volumes and the prices for LNG at the delivery point in Japan for the months January 1991 through March 1991:

		VOLUME MMBTU	PRICE CENTS PER MMBTU
January	1991	1,344,301	5.144
February	1991	1,325,324	4.740
March	1991	1,323,042	4.768

Subsequent to our letter of January 25, 1991, the applicable volumes and/or prices for the following months were retroactively changed with the terms of the contract as follows:

		VOLUME MMBTU	PRICE CENTS PER MMBTU
January	1990	1,386,899	3.189
February	1990	1,276,613	3.284
March	1990	1,331,544	3.347
April	1990	1,345,186	3.334
May	1990	940,617	3.209
June	1990	1,392,378	3.073
July	1990	1,261,385	2.952
August	1990	1,270,814	2.936
September	1990	1,321,086	3.211
October	1990	1,754,494	3.931
November	1990	1,331,865	4.771
December	1990	1,299,872	5.242

It would be appreciated if you would date stamp the duplicate copy of this letter and return same in the self-addressed envelope enclosed.

Very truly yours,

R. G. Grammens

RGG/JRG:hf

Enclosures (2)

cc: Phillips 66 Natural Gas Company
Attn: Ms. Barbara Price-Thurman
920 Plaza Office Building
Bartlesville, OK 74004

RGG002/TXTEEL

PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE OKLAHOMA 74004 PHONE 918 661-6600

May 10, 1991

Office of Fuels Programs
Fossil Energy
Forrestal Building, Room 3F-056, FE-50
1000 Independence Avenue, S. W.
Washington, D. C. 20585

REC'D DOE/FE
OFFICE OF FUELS PROGRAM
91 MAY 16 P 5:00

Re: Phillips 66 Natural Gas Company
Marathon Oil Company
Docket No. 88-22-LNG

Gentlemen:

Pursuant to Ordering Paragraph B of Opinion No. 261, issued July 28, 1988, Phillips 66 Natural Gas Company reports the monthly prices and exported volumes of LNG to Japan for the first quarter, 1991 as follows:

Month/1991	Volumes (MMBtu)	Price (Cents/MMBtu)
January	3,043,018	514.4
February	3,057,445	474.0
March	3,057,979	476.8

The reported prices and volumes for January through December 1990 have been revised as follows:

Month/1990	Volumes (MMBtu)	Price (Cents/MMBtu)
January	3,029,423	318.9
February	3,143,485	328.4
March	3,081,266	334.7
April	3,071,277	333.4
May	2,040,301	320.9
June	3,033,342	307.3
July	3,159,669	295.2
August	3,148,614	293.6
September	3,096,262	321.1
October	4,139,468	393.1
November	3,083,035	477.1
December	3,106,443	524.2

Respectfully submitted,

PHILLIPS 66 NATURAL GAS COMPANY

Jerry W. Nickerson

JWN:bls:FL94

Richard G. Grammens
Vice President
Natural Gas Marketing & Transportation

Marathon Oil Company

P.O. Box 3128
Houston, Texas 77253
Telephone 713/296-2226
Telex 166438

July 29, 1991

REC'D DOE/FE
JUL 31 P 3:52

Natural Gas Division
Economic Regulatory Administration
Forrestal Building, Room GA076
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Attn: Ms. Constance L. Buckley

Re: Phillips 66 Natural Gas Company
Marathon Oil Company
ERA Docket No. ~~82-82-LNG~~ 88-22-LNG

Gentlemen:

In compliance with ordering Paragraph B of DOE/ERA Opinion and Order No. 261 issued on July 28, 1988, in the above Docket, Marathon Oil Company hereby submits a schedule of its exported volumes and the prices for LNG at the delivery point in Japan for the months April 1991 through June 1991:

		VOLUME MMBTU	PRICE CENTS PER MMBTU	PRICE CENTS PER MCF
April	1991	1,761,907	355.2	358.6
May	1991	887,126	320.2	323.2
June	1991	915,169	408.9	412.8

Subsequent to our letter of May 3, 1991, the applicable volumes and/or prices for March 1991 were retroactively changed with the terms of the contract as follows:

		VOLUME MMBTU	PRICE CENTS PER MMBTU	PRICE CENTS PER MCF
March	1991	1,323,260	408.9	412.8

It would be appreciated if you would date stamp the duplicate copy of this letter and return same in the self-addressed envelope enclosed.

Very truly yours,

for R. G. Grammens

RGG/JRG:hf

Enclosures (2)

cc: Phillips 66 Natural Gas Company
Attn: Ms. Barbara Price-Thurman
920 Plaza Office Building
Bartlesville, OK 74004

PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE OKLAHOMA 74004 PHONE 918 661 6600

July 30, 1991

REC'D DOE/FE
A 10:33

Office of Fuels Programs,
Fossil Energy
Forrestal Bldg., Rm. 3F-056, FE-50
1000 Independence Ave. S.W.
Washington, D.C. 20585

Re: Phillips 66 Natural Gas Co.
Marathon Oil Co.
Docket No. 88-22-LNG

Gentlemen:

Pursuant to Ordering Paragraph B of Opinion No. 261, issued July 28, 1988, Phillips 66 Natural Gas Company reports the monthly prices and exported volumes of LNG to Japan for the second quarter, 1991 as follows:

Month/1991	Volumes (MCF)	Volumes (MMBtu)	Price (¢/MCF)	Price (¢/MMBtu)
April	4,083,255	4,122,047	358.6	355.2
May	2,066,803	2,086,438	323.2	320.2
June	2,004,033	2,023,071	412.8	408.9

The reported prices and/or volumes for March, 1991 have been revised as follows:

Month/1991	Volumes (MCF)	Volumes (MMBtu)	Price (¢/MCF)	Price (¢/MMBtu)
March	3,057,762	3,086,811	412.8	408.9

Respectfully

Jerry W Nickerson

J. W. Nickerson
Phillips 66 Natural Gas Company
990A Plaza Office Building
(918) 661-8970

JWN/jrj
JWN\L005

bcc: ERA Docket No. 88-22-LNG (RC)
J. S. McGough
K. R. Fabry

cc: Marathon Oil Company
P. O. Box 3128
Houston, TX. 77253
Attn.: R. G. Grammens

PHILLIPS ALASKA NATURAL GAS CORPORATION
HOUSTON, TEXAS 77251-1967
BOX 1967

BELLAIRE, TEXAS
6330 WEST LOOP SOUTH
PHILLIPS BUILDING

July 24, 1992

Office of Fuels Programs,
Fossil Energy
Forrestal Bldg., Rm. 3F-056, FE-50
1000 Independence Ave., S.W.
Washington, D.C. 20585

RE: Phillips Alaska Natural Gas Corporation
Marathon Oil Company
Docket No. 88-22-LNG

1992 JUL 27 P 3:36
RECEIVED
U.S. DOE/FE

Gentlemen:

Pursuant to Ordering Paragraph B of Opinion No. 261, issued July 28, 1988, Phillips Alaska Natural Gas Corporation reports the monthly prices and exported volumes of LNG to Japan for the second quarter, 1992 as follows:

	Volumes		Price	
Month/1992	(MCF)	(MMBtu)	(¢/MCF)	(¢/MMBtu)
April	3,062,895	3,091,992	321.3	318.3
May	4,054,046	4,092,559	343.8	340.6
June	3,065,729	3,094,853	326.7	323.6

The reported prices and/or volumes for March, 1992, have been revised as follows:

	Volumes		Price	
Month/1992	(MCF)	(MMBtu)	(¢/MCF)	(¢/MMBtu)
March	3,080,935	3,110,204	326.7	323.6

Respectfully,

Sharon K. Widener

Sharon K. Widener
Agent for Phillips Alaska Natural
Gas Corporation
(713) 669-7518

:sw
88-22LNG

cc: Marathon Oil Company
P. O. Box 3128
Houston, Texas 77253
Attn: R. G. Grammens

Richard G. Grammens
Vice President
Natural Gas Marketing & Transportation

P.O. Box 3128
Houston, Texas 77253
Telephone 713/296-2226
Telex 166438

January 27, 1992

REC'D DOE/FE/OFP
JAN 30 1992

Office of Fuels Program
Fossil Energy FE-50
Forrestal Building, Room 3H087
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Attn: Mr. Clifford Tomaszewski

Re: Phillips 66 Natural Gas Company
Marathon Oil Company
ERA Docket No. 82-22-LNG

Gentlemen:

In compliance with ordering Paragraph B of DOE/ERA Opinion and Order No. 261 issued on July 28, 1988, in the above Docket, Marathon Oil Company hereby submits a schedule of its exported volumes and the prices for LNG at the delivery point in Japan for the months October 1991 through December 1991:

		VOLUME		PRICE	
		MMBTU	MCF	CENTS/MMBTU	CENTS/MCF
October	1991	1,305,810	1,293,522	335.5	338.7
November	1991	1,316,992	1,304,599	322.4	325.5
December	1991	1,776,288	1,759,572	327.4	330.5

Subsequent to our letter of October 28, 1991, the applicable volumes and/or prices for August and September 1991 were retroactively changed with the terms of the contract as follows:

		VOLUME		PRICE	
		MMBTU	MCF	CENTS/MMBTU	CENTS/MCF
August	1991	1,754,513	1,738,003	322.4	325.5
September	1991	1,342,361	1,329,729	327.4	330.5

It would be appreciated if you would date stamp the duplicate copy of this letter and return same in the self-addressed envelope enclosed.

Very truly yours,

For R. G. Grammens

RGG/JRG:hf

Enclosures (2)

cc: Phillips 66 Natural Gas Company
Attn: D. J. Ryan
P. O. Box 1967
Houston, TX 77251-1967

PHILLIPS GAS MARKETING COMPANY
A SUBSIDIARY OF PHILLIPS 66 NATURAL GAS COMPANY

HOUSTON, TEXAS 77056
1300 POST OAK BOULEVARD FIRST INTERSTATE TOWER

NATURAL GAS MARKETING
PHONE 713 297-6066
FAX 713 297-5963

Jan 29, 1992

RECEIVED
OFC OF FOSSIL ENERGY
FEB 3 1992

Office of Fuels Programs,
Fossil Energy
Forrestal Bldg., Rm 3F-056, FE-50
1000 Independence Ave., S.W.
Washington, D.C. 20585

Re: Phillips 66 Natural Gas Co.
Marathon Oil Co.
Docket No. 88-22-LNG

Gentlemen:

Pursuant to Ordering Paragraph B of Opinion No. 261, issued July 28, 1988, Phillips 66 Natural Gas Company reports the monthly prices and exported volumes of LNG to Japan for the fourth quarter, 1991, as follows:

Month/1991	Volumes (MCF)	Volumes (MMBtu)	Price (¢/MCF)	Price (¢/MMBtu)
October	3,077,976	3,107,217	338.7	335.5
November	3,065,937	3,095,064	325.5	322.4
December	4,060,742	4,099,319	330.5	327.4

The reported prices and/or volumes for August and September, 1991, have been revised as follows:

Month/1991	Volumes (MCF)	Volumes (MMBtu)	Price (¢/MCF)	Price (¢/MMBtu)
August	4,130,766	4,170,008	325.5	322.4
September	3,040,153	3,069,035	330.5	327.4

Respectfully

Virgil Spurgeon

Virgil R. Spurgeon
Phillips 66 Natural Gas Company
(713) 297-6024

VRS:sw
Fossil.ltr

cc: Marathon Oil Company
P.O. Box 3128
Houston, Texas 77253
Attention: R. G. Grammens

Amendment Request

Moore, Larine

From: Munoz, Leisa C. (LDZX) [Leisa.C.Munoz@conocophillips.com]
Sent: Tuesday, December 11, 2007 9:59 AM
To: Moore, Larine
Cc: Brannon, Dan H.
Subject: FE DKT ~~96-66~~-LNG - Name Change Request
96-99-LNG

RECEIVED DEC 11 2007

Ms. Moore:

Please change the name on FE DKT 96-99-LNG from Phillips Alaska Natural Gas Corporation to ConocoPhillips Alaska Natural Gas Corporation. I will be providing an original Secretary's Certificate certifying the name change documentation by overnight mail. The document will leave ConocoPhillips Company's Houston office today. Please let me know if you have any additional questions.

Regards,
Leisa C. Munoz
Corporate Legal Specialist and Assistant Secretary ConocoPhillips Company 600 North Dairy Ashford Rd., ML 3166 Houston, Texas 77079
(281) 293-4746
ETN 639-4746
Fax 281-293-4111
leisa.c.munoz@conocophillips.com

all 3 need the name change

Delaware

The First State

I, HARRIET SMITH WINDSOR, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY THE ATTACHED IS A TRUE AND CORRECT COPY OF THE CERTIFICATE OF AMENDMENT OF "PHILLIPS ALASKA NATURAL GAS CORPORATION", CHANGING ITS NAME FROM "PHILLIPS ALASKA NATURAL GAS CORPORATION" TO "CONOCOPHILLIPS ALASKA NATURAL GAS CORPORATION", FILED IN THIS OFFICE ON THE TWENTIETH DAY OF FEBRUARY, A.D. 2004, AT 3:25 O'CLOCK P.M.

A FILED COPY OF THIS CERTIFICATE HAS BEEN FORWARDED TO THE NEW CASTLE COUNTY RECORDER OF DEEDS.

RECEIVED
DEC 11 2007

Harriet Smith Windsor

Harriet Smith Windsor, Secretary of State

0853395 8100

AUTHENTICATION: 2943243

040122685

DATE: 02-20-04

CERTIFICATE OF AMENDMENT

OF

CERTIFICATE OF INCORPORATION

OF

PHILLIPS ALASKA NATURAL GAS CORPORATION

RECEIVED
DEC 11 2007

Phillips Alaska Natural Gas Corporation, a Delaware corporation, does hereby certify that the following amendment to its Certificate of Incorporation has been duly adopted in accordance with the provisions of Section 242 of the General Corporation Law of the State of Delaware.

The name of the corporation is changed, effective as of February 20, 2004, by amending the present article FIRST to read as follows:

FIRST. The name of the corporation is ConocoPhillips Alaska Natural Gas Corporation

Executed on February 20, 2004

Attest:

By: L. C. Munoz
Assistant Secretary
L. C. Munoz

PHILLIPS ALASKA NATURAL GAS CORPRATION

By: Dana C. Jones
Director and Vice President
D. C. Jones
Authorized Person

State of Delaware
Secretary of State
Division of Corporations
Delivered 03:29 PM 02/20/2004
FILED 03:25 PM 02/20/2004
SRV 040122685 - 0853395 FILE

ConocoPhillips

CONOCOPHILLIPS ALASKA NATURAL GAS CORPORATION
A WHOLLY OWNED SUBSIDIARY OF CONOCOPHILLIPS

SECRETARY'S CERTIFICATE

I, Leisa C. Munoz, Assistant Secretary of ConocoPhillips Alaska Natural Gas Corporation, a corporation organized and existing under and by virtue of the laws of the State of Delaware, United States of America (the "Company"), hereby certify that I am duly authorized to execute this Certificate on behalf of the Company, and on behalf of the Company certify that:

1. Attached hereto as Exhibit A is a true and correct photocopy of the Certificate of Amendment to the Certificate of Incorporation of Phillips Alaska Natural Gas Corporation changing the name of the company to ConocoPhillips Alaska Natural Gas Corporation as filed with the office of the Secretary of State of Delaware on the 20th day of February 2004 and such Certificate has not been modified, amended, rescinded or revoked and is in full force and effect as of the date hereof.

IN WITNESS WHEREOF, I have hereunto set my hand as Assistant Secretary and affixed the corporate seal of said Company this 11th day of December 2007.

_____

Leisa C. Munoz
Assistant Secretary
ConocoPhillips Alaska Natural Gas Corporation

STATE OF TEXAS §
COUNTY OF HARRIS §

Before me, the undersigned Notary Public in and for the State of Texas, County of Harris, on this day personally appeared Leisa C. Munoz, known by me to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that she executed the same as the act and deed of ConocoPhillips Alaska Natural Gas Corporation in her capacity as Assistant Secretary for the purpose therein expressed, and that the seal affixed to said instrument is the corporate seal of said Company.

IN WITNESS WHEREOF, I have hereunto signed my name and affixed my Notarial Seal in the City of Houston, County of Harris, State of Texas, this 11th day of December 2007.

_____
Notary Public

UNITED STATES OF AMERICA

DEPARTMENT OF ENERGY

OFFICE OF FOSSIL ENERGY

RECEIVED
JAN 30 2008
DOE/OFE/NGR

CONOCOPHILLIPS ALASKA NATURAL GAS CORPORATION	)	ERA DOCKET NO. 88-22-LNG FE DOCKET NOS. 96-99-LNG 99-110-LNG

ORDER AMENDING AUTHORITY TO EXPORT
LIQUEFIED NATURAL GAS FROM ALASKA

DOE/FE ORDER NOS. 261-G
1473-A
1580-A

On December 11, 2007, ConocoPhillips Alaska Natural Gas Corporation (ConocoPhillips) filed an application with the Office of Fossil Energy of the Department of Energy (DOE), under section 3 of the Natural Gas Act (NGA),[1/] to amend DOE/FE Order No. 261 (Order 261), as amended, DOE/FE Order No. 1473 (Order 1473) and DOE/FE Order No. 1580 (Order 1580) to reflect a name change from Phillips Alaska Natural Gas Corporation to

1/ 15 U.S.C. § 717b. This authority is delegated to the Assistant Secretary for Fossil Energy pursuant to Redelegation Order No. 00-002.04 (January 8, 2002).

ConocoPhillips Alaska Natural Gas Corporation.[2] Phillips Alaska Natural Gas Corporation's name was changed to ConocoPhillips Alaska Natural Gas Corporation on February 20, 2004.

Accordingly, pursuant to section 3 of the Natural Gas Act, it is ordered that DOE/FE Order No. 261, as amended, DOE/FE Order No. 1473 and DOE/FE Order No. 1580, is further amended to substitute ConocoPhillips Natural Gas Corporation for Phillips Natural Gas Corporation as the importer of LNG effective the date of this Order. All terms and conditions in Order 261, as amended, Order 1473 and Order 1580 remain in full force and effect.

Issued in Washington, D.C., on January 30, 2008.

R. F. Corbin
Manager, Natural Gas Regulatory Activities
Office of Oil and Gas Global Security and Supply
Office of Fossil Energy

2/ DOE/FE Order No. 261, as amended, and DOE/FE Order No. 1473, granted Phillips Alaska Natural Gas Corporation and Marathon Oil Company (PANGC/Marathon) long-term authorization to export liquefied natural gas (LNG) from Alaska (2 FE ¶ 70,506 and 2 FE ¶ 70,317, respectively) and DOE/FE Order No. 1580 granted (PANGC/Marathon) blanket authorization to export LNG from Alaska (2 FE ¶ 70,472).

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ANALYST: B. Howard

UNITED STATES OF AMERICA

FILE: 96-99 amend.

DEPARTMENT OF ENERGY

DATE REC'D: 12/11/07

OFFICE OF FOSSIL ENERGY

CONCURRENCE:

RTG. SYMB. FE-34 (ORIG.)
INITIALS BBH
DATE 1/23/08
RTG. SYMB. GC-72
INITIALS
DATE
Submit to Manager:
INITIALS BBH
DATE 1/23/08
MANAGER FE-34
INITIALS
DATE 1/30/08

CONOCOPHILLIPS ALASKA NATURAL GAS CORPORATION	)	ERA DOCKET NO. 88-22-LNG
	)	FE DOCKET NOS. 96-99-LNG
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L. C. Munoz

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By: Dana C. Jones
Director and Vice President
D. C. Jones
Authorized Person

State of Delaware
Secretary of State
Division of Corporations
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FILED 03:25 PM 02/20/2004
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IN WITNESS WHEREOF, I have hereunto set my hand as Assistant Secretary and affixed the corporate seal of said Company this 11th day of December 2007.

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Leisa C. Munoz
Assistant Secretary
ConocoPhillips Alaska Natural Gas Corporation

STATE OF TEXAS §
COUNTY OF HARRIS §

Before me, the undersigned Notary Public in and for the State of Texas, County of Harris, on this day personally appeared Leisa C. Munoz, known by me to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that she executed the same as the act and deed of ConocoPhillips Alaska Natural Gas Corporation in her capacity as Assistant Secretary for the purpose therein expressed, and that the seal affixed to said instrument is the corporate seal of said Company.

IN WITNESS WHEREOF, I have hereunto signed my name and affixed my Notarial Seal in the City of Houston, County of Harris, State of Texas, this 11th day of December 2007.

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UNITED STATES OF AMERICA

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