

MEMORANDUM

between

PHILLIPS 66 NATURAL GAS COMPANY

MARATHON OIL COMPANY

and

THE TOKYO ELECTRIC POWER COMPANY, INCORPORATED

TOKYO GAS CO., LTD.

MEMORANDUM

The parties referred to as Sellers and Buyers in the Liquefied Natural Gas Sale and Purchase Extension Agreement between them dated the *17th* day of *June*, 1988 (Extension Agreement) hereby agree, in the light of the circumstances that the contract year of the Original Agreement specified in the preamble of the Extension Agreement ends on May 31, 1989, and the contract year of the Extension Agreement begins on April 1, 1989 as follows:

1. With regard to the duplicate period of two (2) months, namely from April 1, 1989 through May 31, 1989, the Extension Agreement shall control over the Original Agreement.
2. The annual contract quantity of LNG for ten (10) months from June 1, 1988 through March 31, 1989 in the Original Agreement is forty-four trillion, six hundred twenty billion, five hundred eighty-eight million (44,620,588,000,000) Btu's, which is the methane equivalent of approximately eight hundred fifty thousand (850,000) metric tons. As between Tokyo Electric and Tokyo Gas, the annual contract quantity for Tokyo Electric shall be thirty-three trillion, four hundred sixty-five billion, four hundred forty-one million (33,465,441,000,000) Btu's, which is the methane equivalent of approximately six hundred thirty-seven thousand, five hundred (637,500) metric tons, and the annual contract quantity for Tokyo Gas shall be eleven trillion, one hundred fifty-five billion, one hundred forty-seven million (11,155,147,000,000) Btu's, which is the methane equivalent of approximately two hundred twelve thousand, five hundred (212,500) metric tons. All cargos for which unloading commences during the period beginning on June 1, 1988 through March 31, 1989 shall apply to the above annual contract quantity.

3. Notwithstanding Clauses 1 and 2 above, if Sellers fail to obtain the necessary approvals by March 31, 1989 under Section 17.1 of the Extension Agreement or the Extension Agreement is terminated pursuant to the same Section, the Original Agreement shall remain in force and shall control so long as the matter reasonably requires; however, in no case later than December 31, 1989. If the necessary approvals are obtained after March 31, 1989, and prior to termination, the Extension Agreement shall control on and after the date authorized by such approvals.

4. If the necessary approvals are obtained during the period of April 1, 1989 through December 31, 1989, Sellers and Buyers agree to make adjustments to reduce the annual contract quantity under Section 5.1 of the Extension Agreement for the first contract year to correspond to a normal delivery schedule for the balance of that contract year.

This MEMORANDUM shall be effective from the 17th day of June, 1988.

SELLERS:

PHILLIPS 66 NATURAL GAS COMPANY

A. J. Buckley
President

MARATHON OIL COMPANY

J. G. Beghian
President

BUYERS:

THE TOKYO ELECTRIC POWER COMPANY, INCORPORATED

那須 翔
President and Director

TOKYO GAS CO., LTD.

渡邊 宏
President and Director



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MEMORANDUM ON ADJUSTMENT

between

PHILLIPS 66 NATURAL GAS COMPANY

MARATHON OIL COMPANY

and

THE TOKYO ELECTRIC POWER COMPANY, INCORPORATED

TOKYO GAS CO., LTD.

MEMORANDUM ON ADJUSTMENT

The parties referred to as Sellers and Buyers in the Liquefied Natural Gas Sale and Purchase Extension Agreement between them dated the *17th* day of *June*, 1988 (Extension Agreement) hereby agree, with reference to the price of LNG provided in Article VIII of the Extension Agreement, as follows:

1. The adjustment factor provided in Section 8.1a shall be calculated in US cents per million Btu's as follows:

- (i) For the weighted average Government Selling Price, $G(n-1)$, equal to or greater than US \$14/bbl and less than US \$19/bbl, adjustment equals:

$$\text{adjustment} = 30.0 \times \frac{19.00 - G(n-1)}{19.00 - 14.00}$$

- (ii) For $G(n-1)$ equal to or greater than US \$19/bbl and equal to or less than US \$25/bbl, adjustment equals zero (0):

- (iii) For $G(n-1)$ greater than US \$25/bbl and equal to or less than US \$30/bbl, adjustment equals:

$$\text{adjustment} = 30.0 \times \frac{25.00 - G(n-1)}{30.00 - 25.00}$$

2. If $G(n-1)$ is less than US \$14/bbl or is greater than US \$30/bbl, Sellers and Buyers shall promptly meet to agree on the applicable adjustment. Until agreement is reached the adjustment shall be provisional at the level of plus US ¢ 30 (thirty United States cents) per million Btu's for $G(n-1)$ less than US \$14/bbl and minus US ¢ 30 (thirty United States cents) per million Btu's for $G(n-1)$ greater than US \$30/bbl.

This MEMORANDUM shall be effective from the 17th day of June, 1988.

SELLERS:

PHILLIPS 66 NATURAL GAS COMPANY

K. J. Buckley
President

MARATHON OIL COMPANY

V. G. Bedwin
President

BUYERS:

THE TOKYO ELECTRIC POWER COMPANY, INCORPORATED

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President and Director

TOKYO GAS CO., LTD.

渡邊 宏
President and Director



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MEMORANDUM ON LNG PRICING

THIS MEMORANDUM made and entered into by and between Phillips 66 Natural Gas Company (Phillips) 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".

WITNESSETH:

Sellers and Buyers discussed change of price index applicable to the pricing formula provided in Section 8.1 in the Liquefied Natural Gas Sale and Purchase Extension Agreement dated the 17th day of June, 1988 (hereinafter referred to as "Extension Agreement") and the Memorandum on Adjustment dated the 17th day of June, 1988 (hereinafter referred to as "Memorandum on Adjustment") and hereby agree that the price of LNG sold and delivered from April 1st, 1989 to March 31st, 1990 under the Extension Agreement shall be as follows:

1. The weighted average price of all crude oils imported into Japan shall be used as the price index applicable to the pricing formula provided in Section 8.1a in the Extension Agreement and Memorandum on Adjustment instead of the weighted average of the Government Selling Prices.
2. Pursuant to Section 1 above, the price of LNG sold and delivered under the Extension Agreement shall be calculated and determined according to the following formula:

$$P_n = B \times \frac{(J - 0.68)}{G_b} + A_n$$

where;

"P_n", "B", "G_b" are as provided in Section 8.1a of the Extension Agreement.

"J" = the arithmetic average price over a period of three (3) months (month "n", month "n-1" and month "n-2"), expressed in the United States dollars per barrel, rounded to two (2) decimal places in the manner as provided in Section 1.1r in the Extension Agreement, of weighted average price of all crude oils (including raw oils) imported into Japan in each such month (hereinafter referred to as "JCC").

The prices and quantities of imported crude oils (including raw oils) and the exchange rates used in the determination of each JCC shall be based upon the statistics in "Japan Exports & Imports Monthly" edited by Customs Bureau, Ministry of Finance, Japan and published by Japan Tariff Association.

"An" = the adjustment factor applicable to LNG sold and delivered in the calendar month "n", shall be calculated as follows expressed in the US cents per million BTU, notwithstanding the Memorandum on Adjustment.

- (1) When "J" is equal to or greater than US\$20.00/BBL and equal to or less than US\$26.00/BBL

$$\text{"An"} = \text{zero (0)}$$

- (2) When "J" is equal to or greater than US\$15.00/BBL and less than US\$20.00/BBL

$$\text{"An"} = \text{USc30/MMBTU} \times \frac{20\$/\text{bbl} - J}{20\$/\text{bbl} - 15\$/\text{bbl}}$$

- (3) When "J" is greater than US\$26.00/BBL and equal to or less than US\$31.00/BBL

$$\text{"An"} = \text{USc30/MMBTU} \times \frac{26\$/\text{bbl} - J}{31\$/\text{bbl} - 26\$/\text{bbl}}$$

- (4) If "J" is less than US\$15.00/BBL or greater than US\$31.00/BBL, Sellers and Buyers shall promptly meet to agree on the applicable adjustment. Until an agreement is reached the adjustment shall be provisional at the level of plus USC30 (thirty United States cents) per million Btu's for "J" less than US\$15/bbl and minus USC30 (thirty United States cents) per million Btu's for "J" greater than US\$31.00/BBL.

3. Since "Japan Exports & Imports Monthly" for any particular month is usually published two (2) months later, the latest determined LNG price shall be used as the provisional LNG price for month "n". The provisional LNG price shall be adjusted when the JCC of month "n" becomes available, whereupon Sellers shall promptly issue a debit note or credit note (as the case may be) to each Buyer. Sellers shall submit to each Buyer a debit note or credit note through Buyers' designated agent in the United States of America.

Invoices for the first LNG cargo delivered after the debit note or credit note has been issued shall be adjusted accordingly to settle such debit or credit.

In the event that the JCC for any month of any calendar year should be modified in "Japan Exports & Imports Monthly" issued for the month of December or any other month, the

price of LNG shall be modified accordingly and then any difference shall be included on the invoice for the first LNG cargo delivered after the price difference has been determined.

4. Sellers and Buyers agree that the LNG pricing formula set forth in this Memorandum shall be applied to determine the prices of LNG sold and delivered from April 1st, 1989 to September 30th, 1989. From October 1st, 1989 to March 31st, 1990, prices determined in accordance with such formula shall be applied as interim prices to all LNG sold and delivered during such period.

Sellers and Buyers shall discuss in good faith, after October 1st, 1989, the comparability of the Alaska LNG price with the prices of LNG supplied to Japan under other long-term contracts. Sellers and Buyers acknowledge that comparability discussions could result in the development of a new price formula incorporating the use of JCC as an index. Prices determined as a result of such comparability discussions shall be applied to LNG sold and delivered from October 1st, 1989 to March 31st, 1990, and any payment balance shall be settled retroactively.

5. (1) Notwithstanding the foregoing provisions, the prices of LNG sold and delivered for the period from April 1st, 1989 to June 30th, 1989, shall be as follows:

	Price Unit: U.S. Cents/MMBTU
April 1st, 1989 - April 30th, 1989	297.1
May 1st, 1989 - May 31st, 1989	309.7
June 1st, 1989 - June 30th, 1989	309.5

- (2) The balance of payment to Sellers arising from the difference between the prices shown in Section 5(1) above and the provisional prices used for the actual payment for LNG sold and delivered to Buyers for the period from April 1st, 1989 to June 30th, 1989 shall be U.S.\$422,473.95

- (3) The balance of payment due to Sellers from each Buyer shall be as follows:

The balance of payment in U.S. dollars	
Tokyo Electric	316,855.54
Tokyo Gas	105,618.41
<u>Total</u>	<u>422,473.95</u>

- (4) Each Buyer agrees to pay Sellers the balance of payment by adding the amounts provided in Section 5(3) to invoiced amounts for the last cargo delivered during September, 1989.

6. The balance of payment arising from the difference between the prices determined pursuant to Section 2 of this Memorandum and the provisional price of 305.0 USC/MMBTU used for the actual payment for LNG sold and delivered to Buyers for the period from July 1st, 1989 to August 31st, 1989 shall be settled promptly after such prices are determined.
7. The provisions of the Extension Agreement other than those specified in this Memorandum shall remain as they are.
8. This Memorandum is subject to the approval of the United States Department of Energy. Sellers agree to exercise their best endeavors to obtain such approval prior to the end of the term of this Memorandum.

IN WITNESS WHEREOF, the parties hereto have caused this MEMORANDUM to be executed in good faith, by their respective duly authorized officers as of the date set forth below.

BUYERS:

SELLERS:

THE TOKYO ELECTRIC POWER
COMPANY, INCORPORATED

PHILLIPS 66 NATURAL GAS
COMPANY

By: *Shoh Nasu*
President and Director

By: *H. H. H. H. H.*
President *H. L. D. J.*

TOKYO GAS CO., LTD.

MARATHON OIL COMPANY

By: *Kunio Inoue*
President and Director

By: *V. B. Beggs*
President *V. B.*

Dated: 22nd September, 1989

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MEMORANDUM OF AGREEMENT

THIS MEMORANDUM OF AGREEMENT made and entered into by and between Phillips 66 Natural Gas Company (Phillips) 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".

WITNESSETH:

Sellers and Buyers hereby agree that the Section 4.5 and 4.6 of Article IV, Article V and Table I in Exhibit A of the Liquefied Natural Gas Sale and Purchase Extension Agreement dated the 17th day of June, 1988 (hereinafter referred to as "Extension Agreement") shall be replaced by following provisions.

1. The following formulae 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 formulae to integrate it with the custody transfer equipment on board of the new LNG tankers.

(a) Determination of Total Btu's delivered

The total quantities of British Thermal Units delivered shall be calculated by use of the following formula:

$$Q = V \times D \times P - Q_r$$

Where:

- Q is the quantity of LNG delivered in British Thermal Units rounded to the nearest million Btu's.
- V is the volume of LNG unloaded, stated in cubic meters, calculated by subtracting V_h (corrected to initial conditions per Section 4.3 in Exhibit A of the Extension Agreement) from V_b and converting barrels into cubic meters by using the conversion factor in Table IV attached hereof, then rounding to the nearest one-tenth (0.1) cubic meter.
- V_b is the volume of LNG in the tanks of the LNG tanker immediately before unloading, stated in barrels, rounding to the nearest one (1) barrel.
- V_h is the volume of LNG in the tanks of the LNG tanker immediately after unloading, stated in barrels, rounding to the nearest one (1) barrel.

- D is the density of LNG unloaded, refer to paragraph (b) below.
- P is the gross heating value of LNG unloaded, refer to paragraph (c) below.
- Qr is the quantity of British Thermal Units of the vapor displaced the volume of LNG unloaded from the tanks of the LNG tanker, refer to paragraph (d) below.

(b) LNG Density Determination

The density of LNG shall be determined by use of the following formula:

$$D = \frac{\Sigma (X_i \times M_i)}{\Sigma (X_i \times V_i) - X_M \times (K1 + \frac{(K2 - K1) \times X_N}{0.0425})}$$

Where:

- D is the density of LNG unloaded in kilograms per cubic meter at temperature T_L rounded to two (2) decimal places.
- X_i is the molar fraction rounded to four (4) decimal places of component (i) as obtained by analysis method provided in Exhibit A of Extension Agreement.
- M_i is the molecular weight of component (i) as given in Table I.B attached hereof.
- V_i is the Saturated Liquid Molar Volume factor in cubic meters per kilogram-mol at temperature T_L and shall be obtained by linear interpolation of the V_L data in Table II attached hereof and rounded to six (6) decimal places.
- X_M is the molar fraction of methane rounded to four (4) decimal places as obtained by analysis method provided in Exhibit A of Extension Agreement.
- X_N is the molar fraction of nitrogen rounded to four (4) decimal places as obtained by analysis method provided in Exhibit A of Extension Agreement.
- K1 is the volume correction factor in cubic meters per kilogram-mol at temperature T_L and shall be obtained by linear interpolation of the V_L data for K1 in Table III attached hereof and rounded to six (6) decimal places.
- K2 is the volume correction factor in cubic meters per kilogram-mol at temperature T_L and shall be obtained by linear interpolation of the V_L data for K2 in Table III attached hereof and rounded to six (6) decimal places.

T_L is the temperature of LNG in the tanks of the LNG tanker immediately prior to unloading in degrees Kelvin. The readings of temperature shall be made by the temperature gauges in each cargo tank to the nearest one-tenth (0.1) degree Fahrenheit, then averaged and rounded to the nearest whole number. Converting degrees Fahrenheit into degrees Kelvin shall be made by using the conversion factors given in Table IV attached hereof, rounded to the nearest one-tenth (0.1) degree Kelvin.

(c)Gross Heating Value Determination of LNG unloaded

Gross heating value (mass basis) of LNG unloaded shall be calculated by the following formula:

$$P = \Sigma \left(H_i \times \frac{(X_i \times M_i)}{\Sigma (X_i \times M_i)} \right)$$

Where:

P is the gross heating value of LNG unloaded, stated in British Thermal Units per kilogram rounded to the nearest Btu per kilogram.

H_i is the gross heating value of component (i) stated in Btu's per kilogram as given in Table I.A attached hereof.

X_i is the molar fraction rounded to four (4) decimal places of component (i) as obtained by analysis method provided in Exhibit A of Extension Agreement.

M_i is the molecular weight of component (i) as given in Table I.B attached hereof.

(d)Gross Heating Value of Displacement Vapor Determination

The gross heating value of the vapor displacing LNG unloaded shall be determined by use of the following formula:

$$Q_r = V \times \frac{288.71}{T_v} \times \frac{P_v}{760} \times 35,668$$

Where:

Q_r is the quantity of British Thermal Units of vapor which displaced the volume of LNG unloaded from the tanks of the LNG tanker and rounded to the nearest Btu.

Tv is the temperature of vapor which displaced the volume of LNG unloaded from the tanks of the LNG tanker immediately after unloading in degrees Kelvin. The readings of temperature shall be made by the temperature gauges in each cargo tank to the nearest one-tenth (0.1) degree Fahrenheit, then averaged and rounded to the nearest whole number. Converting degrees Fahrenheit into degrees Kelvin shall be made by using the conversion factors given in Table IV attached hereof, rounded to the nearest one-tenth (0.1) degree Kelvin.

Pv is the absolute pressure of LNG vapor in the tanks of the LNG tanker immediately after unloading in millimeter of mercury. The reading of pressure shall be made by the pressure gauge mounted on the vapor header to the nearest millimeter of mercury rounding any fraction.

2. This agreement shall be applied to the cargos sold and delivered on and after October 1st, 1989 onwards.

IN WITNESS WHEREOF, the parties hereto have caused this Memorandum of Agreement to be executed in the manner hereafter appearing.

BUYERS:

THE TOKYO ELECTRIC POWER
COMPANY, INCORPORATED

By: Koichi Nemoto
General Manager
LNG Project Office
Fuel Department

TOKYO GAS CO., LTD.

By: Mitsuo Naga
General Manager
Raw Materials Department

SELLERS:

PHILLIPS 66 NATURAL GAS
COMPANY

By: Alan L. Riley *AL*
Manager *DS*
International and
Utility Sales

MARATHON OIL COMPANY

By: H. R. Delamater
Manager
International Natural
Gas

Dated: 28th September, 1989

T A B L E I
P H Y S I C A L D A T A

A. GROSS HEAT OF COMBUSTION

COMPONENT	Btu/lb Vapor at 60 F	Btu/kg Vapor at 60 F
METHANE	23,891	52,671
ETHANE	22,333	49,236
PROPANE	21,653	47,737
ISOBUTANE	21,232	46,809
N-BUTANE	21,300	46,958
ISOPENTANE	21,043	46,392.
N-PENTANE	21,085	46,484.
N-HEXANE	20,943	46,171
NITROGEN	0	0
OXYGEN	0	0
CARBON DIOXIDE	0	0

SOURCE: GPA 2145-86

B. MOLECULAR WEIGHT

COMPONENT	MOLECULAR WEIGHT
METHANE	16.043
ETHANE	30.070
PROPANE	44.097
BUTANES	58.123
PENTANES	72.150
HEXANES	86.177
NITROGEN	28.013
OXYGEN	31.999
CARBON DIOXIDE	44.010

SOURCE: GPA 2145-86

SATURATED LIQUID VOLUMES FOR MODIFIED KLOSEK AND MCKINLEY METHOD
m³/kg-mol

T (K)	CH ₄	C ₂ H ₆	C ₃ H ₈	N-C ₄	I-C ₄	N-C ₅	I-C ₅	N ₂	O ₂ *	CO ₂ **
90	0.0354411	0.046081	0.060461	0.074708	0.076084	0.089173	0.089243	0.037543	0.027782	0.034059
92	0.035649	0.046235	0.060632	0.074891	0.076274	0.089379	0.089454	0.038081	0.028269	0.034107
94	0.035861	0.046390	0.060804	0.075075	0.076466	0.089586	0.089666	0.038650	0.028524	0.034154
96	0.036077	0.046547	0.060977	0.075259	0.076659	0.089793	0.089878	0.039254	0.028787	0.034202
98	0.036298	0.046704	0.061151	0.075445	0.076853	0.090000	0.090091	0.039897	0.029058	0.034250
100	0.036524	0.046863	0.061325	0.075631	0.077047	0.090208	0.090304	0.040586	0.029338	0.034297
102	0.036755	0.047023	0.061501	0.075818	0.077243	0.090416	0.090518	0.041327	0.029629	0.034345
104	0.036992	0.047185	0.061677	0.076006	0.077440	0.090624	0.090733	0.042128	0.029929	0.034393
106	0.037234	0.047348	0.061855	0.076194	0.077637	0.090833	0.090948	0.043002	0.030242	0.034442
108	0.037481	0.047512	0.062033	0.076384	0.077836	0.091042	0.091163	0.043963	0.030566	0.034490
110	0.037735	0.047678	0.062212	0.076574	0.078035	0.091252	0.091379	0.045031	0.030904	0.034539
112	0.037995	0.047845	0.062392	0.076765	0.078236	0.091462	0.091596	0.046231	0.031258	0.034587
114	0.038262	0.048014	0.062574	0.076957	0.078438	0.091673	0.091814	0.047602	0.031628	0.034636
116	0.038536	0.048184	0.062756	0.077150	0.078640	0.091884	0.092032	0.049179	0.032015	0.034685
118	0.038817	0.048356	0.062939	0.077344	0.078844	0.092095	0.092251	0.050885	0.032423	0.034734
120	0.039106	0.048529	0.063124	0.077539	0.079049	0.092307	0.092470	0.052714	0.032854	0.034783
122	0.039404	0.048704	0.063309	0.077734	0.079255	0.092520	0.092690	0.054679	0.033308	0.034833
124	0.039710	0.048881	0.063496	0.077931	0.079462	0.092733	0.092911	0.056797	0.033792	0.034882
126	0.040025	0.049059	0.063684	0.078128	0.079671	0.092947	0.093133	0.059085	0.034308	0.034932
128	0.040350	0.049239	0.063873	0.078327	0.079880	0.093161	0.093355	0.061565	0.034859	0.034982
130	0.040685	0.049421	0.064063	0.078526	0.080091	0.093376	0.093578	0.064263	0.035446	0.035032

SOURCES: NBS MONOGRAPH 172

LIQUIFIED NATURAL GAS DENSITIES:
SUMMARY OF RESEARCH PROGRAM AT THE
NATIONAL BUREAU OF STANDARDS

* : ASRDI OXYGEN TECHNOLOGY SURVEY
VOLUME I : THERMOPHYSICAL PROPERTIES

** : INTERNATIONAL THERMODYNAMIC TABLES OF
THE FLUID STATE
VOLUME 3: CARBON DIOXIDE

T A B L E III

CORRECTION K1 FOR VOLUME REDUCTION OF MIXTURE

T (K)	CORRECTION K1 FOR VOLUME REDUCTION OF MIXTURE									
	m ³ /kg-mol									
	MOLECULAR WEIGHT OF MIXTURE									
	16	17	18	19	20	21	22	23	24	25
90	-0.000005	0.000120	0.000220	0.000340	0.000430	0.000515	0.000595	0.000660	0.000725	0.000795
95	-0.000005	0.000135	0.000250	0.000380	0.000500	0.000590	0.000665	0.000740	0.000810	0.000885
100	-0.000007	0.000150	0.000300	0.000425	0.000575	0.000675	0.000755	0.000830	0.000910	0.000990
105	-0.000007	0.000165	0.000340	0.000475	0.000635	0.000735	0.000840	0.000920	0.001045	0.001120
110	-0.000003	0.000190	0.000375	0.000535	0.000725	0.000835	0.000950	0.001055	0.001155	0.001245
115	-0.000009	0.000220	0.000440	0.000610	0.000810	0.000945	0.001065	0.001180	0.001280	0.001380
120	-0.000010	0.000250	0.000500	0.000695	0.000920	0.001055	0.001205	0.001330	0.001450	0.001550
125	-0.000013	0.000295	0.000590	0.000795	0.001035	0.001210	0.001385	0.001525	0.001640	0.001750
130	-0.000015	0.000345	0.000700	0.000920	0.001200	0.001370	0.001555	0.001715	0.001860	0.001990
135	-0.000017	0.000400	0.000825	0.001060	0.001390	0.001590	0.001800	0.001950	0.002105	0.002272

CORRECTION K2 FOR VOLUME REDUCTION OF MIXTURE

T (K)	CORRECTION K2 FOR VOLUME REDUCTION OF MIXTURE									
	m ³ /kg-mol									
	MOLECULAR WEIGHT OF MIXTURE									
	16	17	18	19	20	21	22	23	24	25
90	-0.000104	0.000100	0.000220	0.000350	0.000500	0.000600	0.000690	0.000780	0.000860	0.000950
95	-0.000105	0.000120	0.000280	0.000430	0.000590	0.000710	0.000830	0.000940	0.001050	0.001140
100	-0.000007	0.000160	0.000340	0.000490	0.000640	0.000790	0.000940	0.001080	0.001170	0.001270
105	-0.000010	0.000240	0.000420	0.000610	0.000750	0.000910	0.001050	0.001190	0.001330	0.001450
110	-0.000015	0.000320	0.000590	0.000770	0.000920	0.001070	0.001220	0.001370	0.001520	0.001710
115	-0.000024	0.000410	0.000720	0.000950	0.001150	0.001220	0.001300	0.001450	0.001650	0.002000
120	-0.000032	0.000500	0.000910	0.001230	0.001430	0.001630	0.001850	0.002080	0.002300	0.002450
125	-0.000043	0.000710	0.001130	0.001480	0.001730	0.001980	0.002230	0.002480	0.002750	0.002900
130	-0.000058	0.000950	0.001460	0.001920	0.002200	0.002420	0.002680	0.003000	0.003320	0.003520
135	-0.000075	0.001300	0.002000	0.002400	0.002600	0.003000	0.003400	0.003770	0.003990	0.004230

SOURCE: NBS MONOGRAPH 172

T A B L E IV

CONVERSION FACTORS

t (°C)	=	(t (°F) - 32) / 1.8
T (K)	=	(t (°F) + 459.67) / 1.8
T (K)	=	t (°C) + 273.15
1 bbl	=	0.1589873 m ³
1 m ³	=	10 ⁶ cm ³
1 g/cm ³	=	350.507 lb/bbl
1 kg/m ³	=	10 ³ g/cm ³
1 Btu	=	1055.056 J
1 lb	=	0.4535924 kg
1 mmHg	=	133.332 Pa

SOURCE: ASTM

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Sept. 28, 1989

Mr. A. W. Risley
Manager, International and Utility Sales
Phillips 66 Natural Gas Co.
8900 Plaza Office Building
Bartlesville, Oklahoma 74004
USA

Mr. F. R. Adamchak
Manager, International Natural Gas
Marathon Oil Co.
P.O. Box 3128
Houston, Texas 77253
USA

Application of LNG pricing formula

Dear Sirs,

We refer to the MEMORANDUM ON LNG PRICING dated as of Sept. 22, d., 1989, (hereinafter referred to as "Memorandum") relating to the LIQUEFIED NATURAL GAS SALES AND PURCHASE EXTENSION AGREEMENT dated as of June 17, 1988.

With respect to the application of the LNG pricing formula specified in the Memorandum, our understanding is as follows:

1. Definition of "JCC"

JCC includes the following items published in the "Customs Tariff Schedules of Japan" by the Japan Tariff Association.

Petroleum oils and oils obtained from bituminous minerals, crude Code No.: 2709.00-000
Raw oils Code No.: 2710.00-162, 164, 166, 169, 172, 174, 179, 182, 184 and 189

Should a significant change occur in the definition or weighting of raw oils compared to the total, Sellers and Buyers shall discuss in good faith the impact of such change on the price of LNG.

2. Calculation of "JCC"

$$\text{JCC} = \frac{X \times 1,000 \times 0.15898}{Y \times Z}, \text{ US \$/bbl (rounded to two decimal places)}$$

- X: Please look at the following schedule
 Y: Please look at the following schedule
 Z: Foreign exchange rate (imports) indicated in "Japan Exports & Imports Monthly"
 0.15898: Conversion factor from "kl" to "bbl"

code No.	Value (1,000 Yen)	Quantity (kl)
2709.00-000	A	a
2710.00-162	B	b
2710.00-164	C	c
2710.00-166	D	d
2710.00-169	E	e
2710.00-172	F	f
2710.00-174	G	g
2710.00-179	H	h
2710.00-182	I	i
2710.00-184	J	j
2710.00-189	K	k
SUM	X	Y

3. Calculation of "J"

$$J = \frac{O + P + Q}{3}, \text{ US \$/bbl (rounded to two decimal places)}$$

where:

$$O = JCC_{(n-2)}, \text{ US \$/bbl}$$

$$P = JCC_{(n-1)}, \text{ US \$/bbl}$$

$$Q = JCC_{(n)}, \text{ US \$/bbl}$$

"n" being the calendar month of delivery

4. Calculation of "Pn"

(1) $15 \leq J < 20$, \$/bbl

$$\langle 1 \rangle B_n = 592.8 \times \frac{(J - 0.68)}{34.48} \text{ (rounded to one decimal place)}$$

$$\langle 2 \rangle A_n = 30 \times \frac{20 - J}{20 - 15} \text{ (rounded to one decimal place)}$$

<3> $P_n = B_n + A_n$, US cents/MMBTU

(2) $20 \leq J \leq 26$, \$/bbl

$$P_n = 592.8 \times \frac{(J - 0.68)}{34.48}, \text{ US cents/MMBTU (rounded to one decimal place)}$$

(3) $26 < J \leq 31$, \$/bbl

<1> $B_n = 592.8 \times \frac{(J - 0.68)}{34.48}$ (rounded to one decimal place)

<2> $A_n = 30 \times \frac{26 - J}{31 - 26}$ (rounded to one decimal place)

<3> $P_n = B_n + A_n$, US cents/MMBTU

5. Format of the monthly price telex

Subject: Alaska LNG pricing monthly statement for the month of "n", 1989 (1990)

Based on the MEMORANDUM ON LNG PRICING dated as of _____, 1989, we confirm Alaska LNG price as follows.

<1> The determined (or interim) price of LNG sold and delivered during the month of "n", 1989 (1990) is _____ US cents/MMBTU.

<2> The provisional price for LNG sold and delivered during the month of "n+3", 1989 (1990) shall be _____ US cents/MMBTU

(Note)

Month:	"n-2"	"n-1"	"n"
JCC US\$/bbl:	0	P	Q
Price formula:	$P_n = B_n + A_n$, US cents/MMBTU		

Where:

$$J = \frac{0 + P + Q}{3} = \text{_____ US \$/bbl}$$

$$B_n = 592.8 \times \frac{(J - 0.68)}{34.48} = \text{_____ US cents/MMBTU}$$

$$A_n = 30 \times \frac{20 - J}{20 - 15} \text{ or zero (0) or } 30 \times \frac{26 - J}{31 - 26} = \text{_____ US cents/MMBTU}$$

Therefore:

$P_n = B_n + A_n = \underline{\hspace{2cm}}$ US cents/MMBTU

6. Format of debit/credit note

Subject: Debit/credit amount for the month of "n", 1989 (1990)

- <1> The provisional price for LNG sold and delivered during the month of "n", 1989 (1990) was US cents/MMBTU.
- <2> The determined (or interim) price of LNG sold and delivered during the month of "n", 1989 (1990) is US cents/MMBTU.
- <3> Debit/credit amount calculated in respect of the difference between the determined (or interim) price and provisional price of LNG sold and delivered during the month of "n", 1989 (1990) is:

Tokyo Electric	<u> </u>	US\$
Tokyo Gas	<u> </u>	US\$
TOTAL	<u> </u>	US\$

This balance of payment shall be settled in the invoice for the cargo for (ship name, cargo number).

If you agree to the foregoing, please so confirm by signing in the space indicated below and returning two copies thereof to us.

Yours faithfully,

SELLERS:

BUYERS:

PHILLIPS 66 NATURAL GAS CO.

THE TOKYO ELECTRIC POWER COMPANY, INCORPORATED

BY: *An Lisluy*
Manager
International and Utility Sales

BY: *Kaichi Nemoto*
General Manager
LNG Project Office,
Fuel Department

MARATHON OIL COMPANY

TOKYO GAS CO., LTD.

BY: *R. P. Amelak*
Manager
International Natural Gas

BY: *Mikio Rose*
General Manager
Raw Materials Department

Dated 27th September, 1989

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NEW MEMORANDUM ON ADJUSTMENT

The parties referred to as Sellers and Buyers in the Liquefied Natural Gas Sale and Purchase Extension Agreement between them dated the 17th day of June, 1988, (Extension Agreement) hereby agree to the following with reference to the price of LNG provided in the First Amendatory Agreement dated the 19th day of September 1990:

1. The Memorandum On Adjustment dated the 17th day of June, 1988 shall be of no further force upon the execution of this New Memorandum On Adjustment.

2. Effective October 1st, 1989 onwards, the adjustment factor, "An", provided in the First Amendatory Agreement, applicable to LNG sold and delivered in the calendar month "n", shall be calculated as follows expressed in the US cents per MMBtu.

(1) For the arithmetic average "J" equal to or greater than US\$17.50/BBL and equal to or less than US\$28.50/BBL;

$$An = 30 \times \frac{(23 - J)}{(28.50 - 17.50)}$$

(2) For "J" equal to or greater than US\$15.00/BBL and less than US\$17.50/BBL;

$$An = 30 \times \frac{(20 - J)}{(20 - 15)}$$

(3) For "J" greater than US\$28.50/BBL and equal to or less than US\$31.00/BBL;

$$An = 30 \times \frac{(26 - J)}{(31 - 26)}$$

(4) If "J" is less than US\$15.00/BBL or greater than US\$31.00/BBL, Sellers and Buyers shall promptly meet to agree on the applicable adjustment. Until an agreement is reached, the adjustment shall be provisional at the level of plus USC30 (thirty United States cents) per million Btu's for "J" less than US\$15/BBL and minus USC30 (thirty United States cents) per million Btu's for "J" greater than US\$31/BBL.

3. From October 1st, 1989 to March 31st, 1993, the special adjustment factor, "Sn", provided in the First Amendatory Agreement, applicable to LNG sold and delivered in the calendar month "n", shall be calculated as follows expressed in the US cents per MMBtu.

(1) For the arithmetic average "J" equal to or greater than US\$17.50/BBL and equal to or less than US\$28.50/BBL;

$$S_n = 8.5$$

(2) For "J" equal to or greater than US\$15.00/BBL and less than US\$17.50/BBL;

$$S_n = 8.5 + 3.9 \times \frac{(J - 17.50)}{(17.50 - 15.00)}$$

(3) For "J" greater than US\$28.50/BBL and equal to or less than US\$31.00/BBL;

$$S_n = 8.5$$

(4) If "J" is less than US\$15.00/BBL or greater than US\$31.00/BBL, Sellers and Buyers shall promptly meet to agree on the applicable special adjustment factor. Until an agreement is reached, the special adjustment factor shall be provisional at the level of plus USC4.6 (four point six United States cents) per million Btu's for "J" less than US\$15/BBL and plus USC8.5 (eight point five United States cents) per million Btu's for "J" greater than US\$31/BBL.

IN WITNESS WHEREOF, the parties hereto have caused this MEMORANDUM to be executed in good faith, by their respective duly authorized officers as of the date set forth below.

BUYERS:

SELLERS:

THE TOKYO ELECTRIC POWER COMPANY, INCORPORATED

PHILLIPS 66 NATURAL GAS COMPANY

By: Shoh Maen
President and Director

By: W. H. Duvall
President

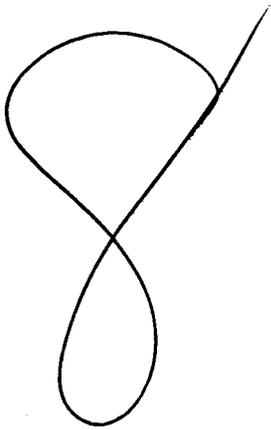
TOKYO GAS CO., LTD.

MARATHON OIL COMPANY

By: Kunio Inoue
President and Director

By: W. B. ...
President

Dated: September 19th, 1990



FIRST AMENDATORY AGREEMENT

THIS AGREEMENT made and entered into 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".

WITNESSETH:

By the Memorandum On LNG Pricing dated the 22nd day of September, 1989, Sellers and Buyers agreed the price of LNG sold and delivered for the period from April 1st, 1989 to September 30th, 1989. Sellers and Buyers discussed the pricing formula and hereby agree that the pricing formula of LNG sold and delivered from October 1st, 1989 to March 31st, 2004 under the Liquefied Natural Gas Sale and Purchase Extension Agreement dated the 17th day of June, 1988 (hereinafter referred to as "Extension Agreement") shall be amended as follows:

1. The weighted average price of all crude oils imported into Japan shall be used as the price index applicable to the pricing formula provided in Section 8.1a of the Extension Agreement instead of the weighted average of the Government Selling Prices.
2. Pursuant to Section 1. above, the price of LNG sold and delivered under the Extension Agreement shall be calculated and determined according to the following formula:

$$P_n = B \times \frac{(J-0.68)}{G_b} + A_n$$

where;

- (1) "Pn", "B", "Gb", "An" are as provided in Section 8.1a of the Extension Agreement.

(2) "J" = the arithmetic average price over a period of three (3) months (month "n", month "n-1" and month "n-2"), expressed in the United States dollars per barrel, rounded to two (2) decimal places in the manner as provided in Section 1.1r of the Extension Agreement, of weighted average price of all crude oils (including raw oils) imported into Japan in each such month (hereinafter referred to as "JCC").

The prices and quantities of imported crude oils (including raw oils) and the exchange rates used in the determination of each JCC shall be based upon the statistics in "Japan Exports & Imports Monthly" edited by Customs Bureau, Ministry of Finance, Japan and published by Japan Tariff Association.

3. Notwithstanding Section 2. above, a special adjustment factor, "Sn", shall be added to the price of LNG sold and delivered from October 1st, 1989 to March 31st, 1993. The applicable "J" range for "Sn" shall be equal to or greater than US\$15/BBL and equal to or less than US\$31/BBL. "Sn" shall be equal to or greater than USC4.6/MMBtu and equal to or less than USC8.5/MMBtu. Specifically, "Sn" shall be equal to USC4.6/MMBtu when "J" equals US\$15/BBL and USC8.5/MMBtu when "J" equals US\$31/BBL.
4. Since "Japan Exports & Imports Monthly" for any particular month is usually published two (2) months later, the latest determined LNG price available at the end of month "n-1" shall be used as the provisional LNG price for month "n". The provisional LNG price shall be adjusted when the JCC for month "n" becomes available, whereupon Sellers shall promptly issue a debit note or credit note (as the case may be) to each Buyer through Buyers' designated agent in the United States of America.

Invoices for the first LNG cargo delivered after the debit note or credit note has been issued shall be adjusted accordingly to settle such debit or credit.

In the event that the JCC for any month of any calendar year should be modified in "Japan Exports & Imports Monthly" issued for the month of December or any other month, the price of LNG shall be modified accordingly and then any difference shall be included on the invoice for the first LNG cargo delivered after the price difference has been determined.

5. The balance of payment arising from the difference between the prices determined according to the pricing formula specified in the foregoing provisions and the prices used for the actual payment for LNG sold and delivered to Buyers for the period from October, 1989 to the month of the execution of this Agreement shall be settled as early as practicable. The details, such as the confirmation of the amounts, the timing, and the methods of the settlement shall be discussed and agreed separately and immediately.
6. The provisions of the Extension Agreement other than those specified in this Agreement shall remain as they are.
7. This Agreement is subject to the approval of the United States Department of Energy. Sellers agree to exercise their best endeavors to obtain such approval.

IN WITNESS WHEREOF, the parties hereto have caused this 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 & Director

TOKYO GAS CO., LTD.

By: Kunio Azai
President & Director

SELLERS:

PHILLIPS 66 NATURAL GAS
COMPANY

By: R.A. Kelley
President *RAK P*

MARATHON OIL COMPANY

By: R.B. Bester
President *RBA*

Dated: September 19th, 1990

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