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HYDROCARBON SYNTHESIS
2001-2-P 11-8-55

THE TEXAS COMPANY

RESEARCH AND TECHNICAL DEPARTMENT

REPORT ON

HYDROCARBON SYNTHESIS

EFFECT OF REDUCTION TEMPERATURE ON SYNTHESIS CATALYST

RUNS 63, 64, 65, AND 66

NOTICE

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Laboratory Montebello

Report No. 2001-2-P

Date November 8, 1955

PERSONAL AND CONFIDENTIAL

BRIEF OF PARTIAL REPORT

Laboratory Montebello
Date Approved November 8, 1955
Date Work Completed February 4, 1952

Experiment No. 2001
Partial Report No. 2
Subject: Hydrocarbon Synthesis

Subject: Hydrocarbon Synthesis: Effect of Reduction Temperature on Synthesis Catalyst

Object: (1) To determine whether the poor yields at the Carthage Hydrocol, Inc., plant at Brownsville, Texas, were due in part to methods of catalyst preparation. (2) To determine whether high reduction temperature could be used to speed the preparation of catalyst without affecting catalyst quality.

History: The yields at the Carthage Hydrocol, Inc., plant had never reached design level nor had they ever been as high as those obtained in pilot plants. It was desired to increase the capacity of the catalyst reduction facilities and one possibility was to use higher reduction temperatures.

Experimental Work: A run was made with the Montebello hydrocarbon synthesis reactor evaluating Bethlehem mill scale catalyst promoted, sized, and reduced at Brownsville. Three additional runs were made using Bethlehem mill scale catalysts reduced at different temperatures. During part of one run the effects of recycle/fresh feed ratio were investigated. Near the end of another run, an attempt was made to increase the promoter on the catalyst by the addition of anhydrous potassium carbonate.

Conclusions:

1. The mill scale catalyst treated and reduced at Brownsville exhibited no difference from mill scale catalysts prepared at Montebello.
2. Variation of the catalyst reduction temperature in the range of 650°F to 800°F had no effect on the quality of the catalyst.
3. Increasing the recycle/fresh feed ratio in the range of 0.06/1 to 2.0/1 increased the yields of saleable liquid products and suppressed the yields of methane and CO_2.
4. The addition of anhydrous potassium carbonate to the catalyst bed during a run had no effect on the synthesis reaction.

WLS-EW

(WEK-WAMcM)-WJC(2)-RWH-HDM(2)-RLSr(2)-duBE(2)
WMS-RP-CEL-GK-FHH-[redacted] JCW

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Montebello Research Laboratory — Experiment No. 2001
Work Completed: February 4, 1952 — Report Approved: Nov. 8, 1955

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RUNS 63, 64, 65, AND 66

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HYDROCARBON SYNTHESIS

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EFFECT OF REDUCTION TEMPERATURE ON SYNTHESIS CATALYST RUNS 63, 64, 65, AND 66

I. INTRODUCTION

Production at the Carthage Hydrocol, Inc., synthetic fuels plant at Brownsville, Texas, had not reached the design yield level, nor had it reached the levels obtained by various pilot units using the same catalyst base stock. It was believed possible that the method of catalyst preparation at Brownsville was at least partially responsible for the poor yields.

For this reason Montebello Laboratory made a run with a hydrocarbon synthesis reactor, evaluating Bethlehem mill scale catalyst promoted, sized, and reduced at Brownsville. All treatment prior to the synthesis operations was the same as at Brownsville.

It was desired to increase the capacity of the catalyst reduction facilities at Brownsville, and one possibility was to use higher reduction temperatures. In order to ascertain the time advantage to be gained by higher temperatures and also to determine any deleterious effects on catalyst activity, Montebello Laboratory made three runs with a synthesis reactor using catalysts reduced at different temperatures.[1]

[1] Detailed data on the catalyst reduction rate were presented in TDC 802-45-P.

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During the latter part of one of the runs, the effect of recycle/fresh feed ratio was investigated by doubling the flow rate of recycle gas. The data were compared with other data from a run in which the recycle rate had been reduced to practically nothing. Extensive investigation of the effect of recycle/fresh feed ratio had not been made at Montebello because the facilities at the commercial plant at Brownsville were not flexible enough, anyhow, to allow much deviation from the design recycle ratio.

This report concerns Runs 63, 64, 65, and 66 made between October 19, 1951, and February 2, 1952.

II. EQUIPMENT AND MATERIALS

Runs 63, 64, 65, and 66 were made in Reactor No. 5S[1], a vessel 12.5 inches in diameter by 30 feet tall with a sparger at the bottom for better inlet gas distribution. For comparison purposes, some data are included from Run 55[a] made in Reactor No. 5C. That reactor was the same as No. 5S except that it had a 60-degree cone instead of a sparger at the bottom.

The synthesis gas feed was obtained by using the Texaco Synthesis Gas Generation Process with natural gas and oxygen in a 2-cubic-foot generator. A water-wash tower was used on the synthesis gas in all runs except No. 55.

The catalyst used in Run 63 was Bethlehem mill scale, sized, promoted, and reduced at Brownsville. It was shipped to

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[1] For description and drawing, see TDC 802-50-P.
[a] Ibid.

TABLE I

SUMMARY OF DATA AND OPERATING CONDITIONS

Period	Hours on Stream	Average Catalyst Age, Hours	Fresh Feed Rate,[1] MSCFH	Recycle Ratio	Bed Depth, Feet	Space Velocity v/hr/v	Inlet Pressure psig	Conversion H_2 + CO Per Cent	Selectivity C_3+/C_1+ Per Cent	Activity Index[2]	Yield C_3+ lbs/MCF H_2+CO	BPD Brownsville Basis
63-0	0-96	48	15.7	0.97	20.6	1118	414	86.16	79.77	28.73	9.18	7221
-1	96-216	156	16.0	0.96	20.6	1152	413	84.87	78.05	27.84	8.73	6737
-2	216-336	276	16.2	0.99	19.3	1237	406	80.39	76.30	24.90	8.13	6148
64-0	0-106	53	15.2	1.05	18.2	1229	416	84.00	80.18	27.90	8.90	6930
-1	106-194	150	15.7	1.02	18.9	1226	416	82.40	78.56	26.41	8.51	6518
-2	194-290	242	15.5	1.08	19.7	1156	414	80.56	77.44	24.18	8.11	6148
-3	290-386	338	15.6	1.07	19.8	1156	413	79.15	76.29	23.15	7.84	5866
65-0	0-112	56	15.8	1.02	18.3	1281	416	85.10	78.44	29.59	8.80	6836
-1	112-232	172	15.5	1.05	18.8	1214	414	82.77	77.37	26.61	8.43	6446
-2	232-326	279	15.4	1.04	18.7	1222	410	79.05	75.67	23.73	7.80	5871
66-0	0-94	47	16.4	0.95	19.0	1272	404	83.06	80.04	27.50	8.81	6823
-1	94-207	150	15.7	0.97	18.7	1241	403	81.73	77.71	26.01	8.33	6310
-2	207-296	252	15.0	1.03	18.7	1179	403	80.59	75.40	24.45	8.10	6122
-3	296-416	356	14.3	1.07	18.6	1125	401	79.78	75.50	23.28	8.02	6003
-4	416-500	458	15.2	1.05	16.3	1369	398	72.84	74.83	20.94	7.03	5212
-5	500-619	560	15.0	2.09	8.2	2668	404	72.28	79.56	28.79	7.72	5819

[1] MSCFH = thousand standard cubic feet per hour, based on 60°F and 14.73 psia.

[2] Activity Index $= \sqrt{v/h/v} \log\left(\frac{100}{(100-\text{conversion})}\right)$

Montebello in sealed, stainless steel drums and loaded into the reactor in air-tight cans pressured with cylinder nitrogen. The nitrogen was obtained from Air Reduction Company.

The catalysts used in Runs 64, 65, and 66 also were received from Brownsville, but in the unreduced state. They were reduced in the Montebello reactor at, respectively, 730°F, 800°F, and 650°F average bed temperature.[1] Linde cylinder hydrogen was used for reducing the catalyst.

III. OPERATIONS

The average operating conditions are summarized in Table I, opposite.[2]

Run 63

The reduced catalyst for Run 63 was transferred from the stainless steel drums in which it was received from Brownsville to the reactor in 50-pound batches, using sealed cans pressured slightly with cylinder nitrogen. During the loading into the reactor, natural gas was circulated at 500°F and 75 psig. Analysis of the circulated gas at the beginning of the loading showed 0.11 per cent free oxygen. After the loading, the oxygen content was too low to be detected.

After 18 hours the reactor pressure was increased to 120 psi with natural gas and then to 215 psi with hydrogen. The circulated mixture was maintained at approximately 45 per cent hydrogen at 700°F for 24 hours before the fresh feed was cut in. This

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[1] Reduction data are summarized in Tables IV, V, and VI in the Appendix. Analyses of catalysts are in the Appendix, Table III.

[2] Further details of the operating conditions are given in the daily average data sheets in the Appendix.

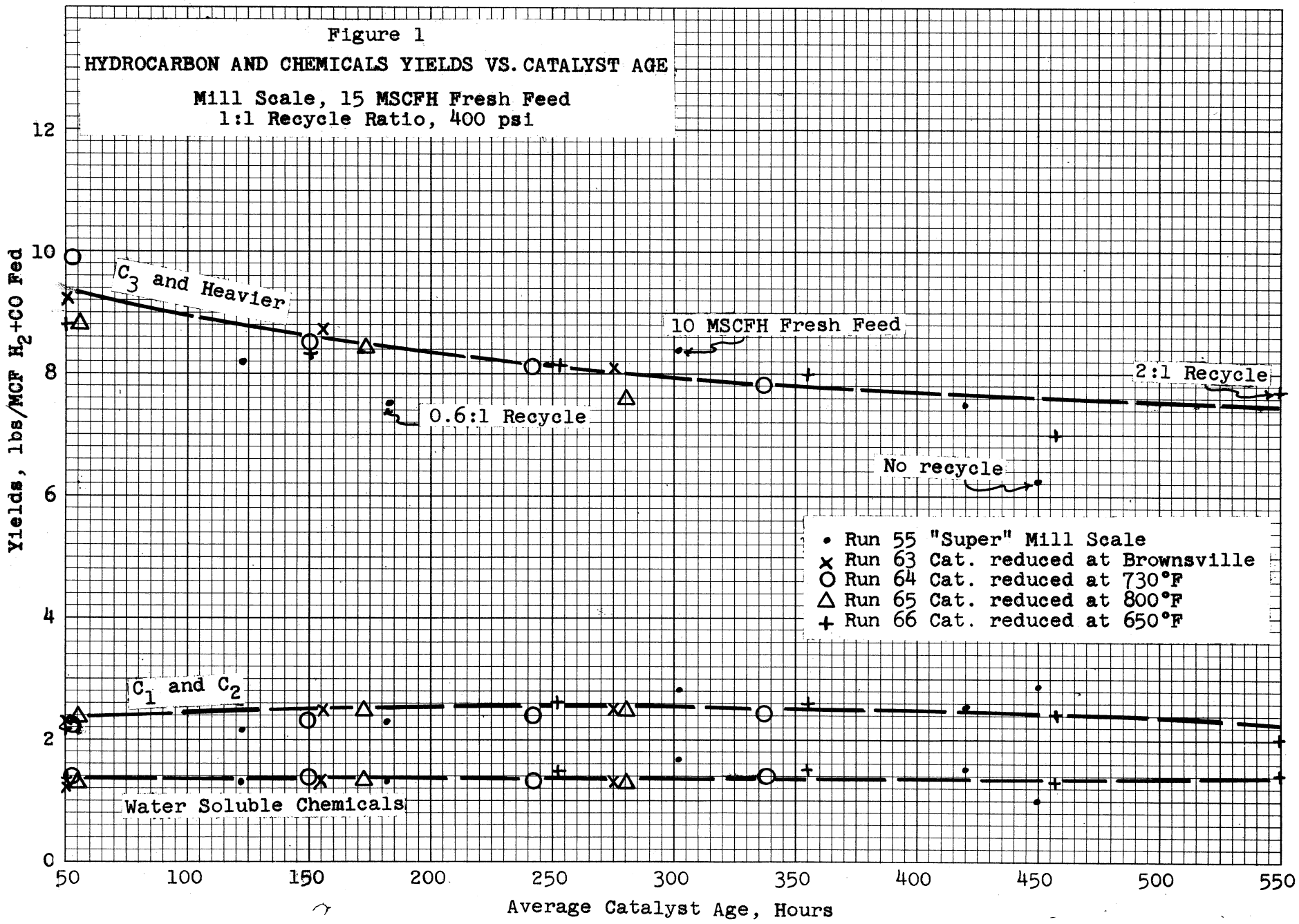
Figure 1
HYDROCARBON AND CHEMICALS YIELDS VS. CATALYST AGE
Mill Scale, 15 MSCFH Fresh Feed
1:1 Recycle Ratio, 400 psi
Yields, lbs/MCF H_2+CO Fed
Average Catalyst Age, Hours
C_3 and Heavier
C_1 and C_2
Water Soluble Chemicals
0.6:1 Recycle
10 MSCFH Fresh Feed
2:1 Recycle
No recycle
• Run 55 "Super" Mill Scale
× Run 63 Cat. reduced at Brownsville
○ Run 64 Cat. reduced at 730°F
△ Run 65 Cat. reduced at 800°F
+ Run 66 Cat. reduced at 650°F
0
2
4
6
8
10
12
50
100
150
200
250
300
350
400
450
500
550

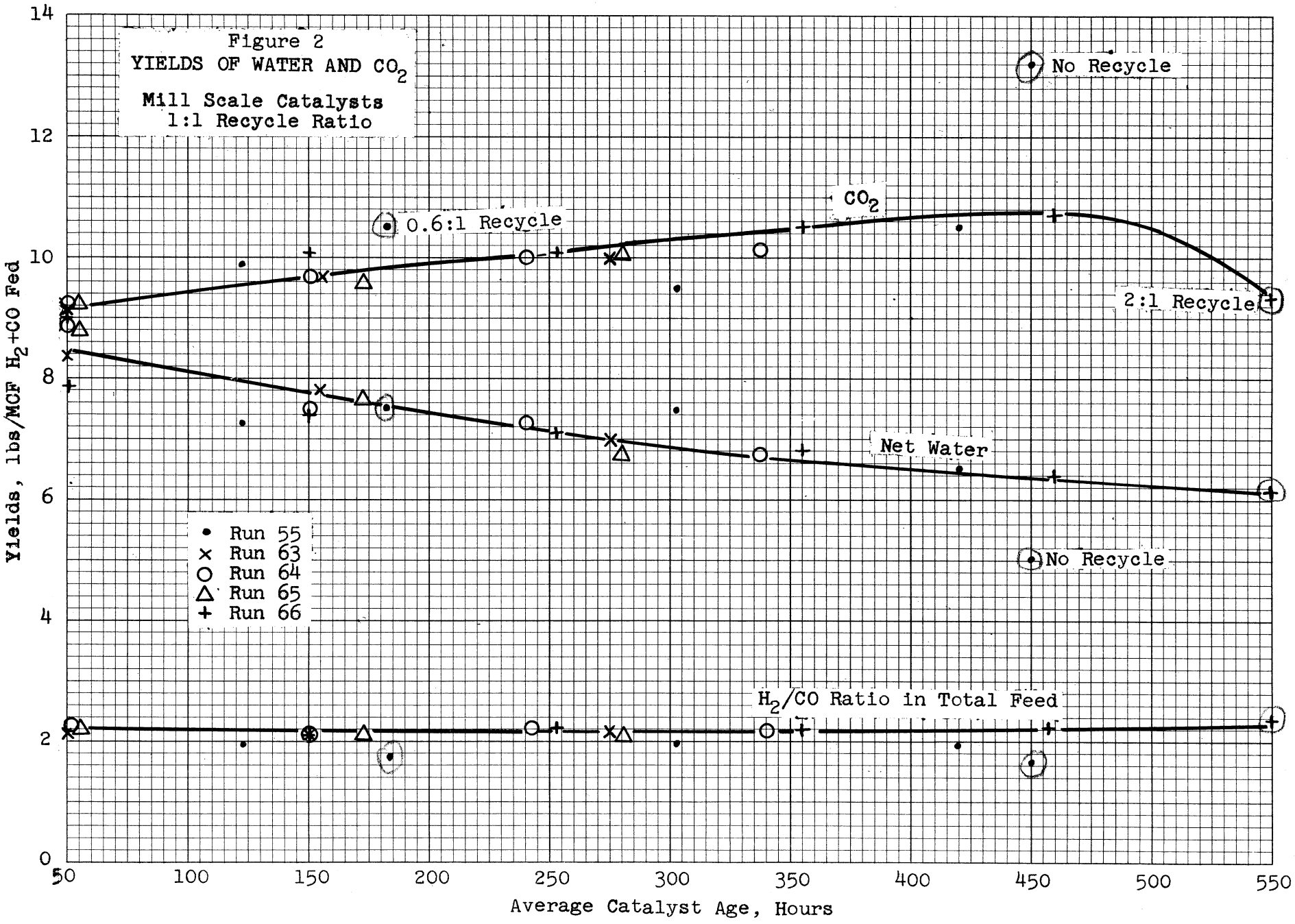
Figure 2
YIELDS OF WATER AND CO_2
Mill Scale Catalysts
1:1 Recycle Ratio
No Recycle
CO_2
0.6:1 Recycle
2:1 Recycle
Net Water
No Recycle
H_2/CO Ratio in Total Feed
Run 55
Run 63
Run 64
Run 65
Run 66
Yields, lbs/MCF H_2+CO Fed
Average Catalyst Age, Hours
0
2
4
6
8
10
12
14
50
100
150
200
250
300
350
400
450
500
550

procedure was followed in order to duplicate as much as possible the Brownsville start-up practice.

The initial load of 2000 pounds of catalyst resulted in a 22-foot depth, which gradually declined to 19 feet during the run. The fresh feed rate was 16 MSCFH with a recycle-to-fresh-feed ratio of 1:1.

Runs 64, 65, and 66

These runs were made with catalyst base stock shipped from Brownsville but the reduction was carried out at various temperatures in the Montebello reactor. The general operating conditions were similar to those of Run 63. No make-up catalyst was added during any of the runs.

Between Runs 64 and 65 the line between the feed heater and the reactor was changed from carbon steel to 18-8 stainless steel to allow higher reduction temperatures.

Near the end of the Run 65, period J, 20 pounds of potassium carbonate was added to the approximately 2000 pounds of catalyst in the reactor in an effort to increase the yield.

During the terminal 119 hours of Run 66 the recycle/fresh feed ratio was increased from 1/1 to 2/1.

IV. RESULTS AND DISCUSSION

Effect of Catalyst Reduction Conditions

The yields of hydrocarbons and water-soluble chemicals have been plotted as a function of average catalyst age in Figure 1, page 5. The yields of carbon dioxide and water are shown similarly in Figure 2, opposite. It is evident that the yield structures were the same for Runs 63 through 66 when the only variables were the catalyst reduction conditions previously discussed.

H_2/CO in Effluent 5.628
H_2/CO in Combined Feed 1.654
H_2/CO in F.F. 1.604

TABLE II

EFFECT OF RECYCLE RATIO ON PRODUCT DISTRIBUTION

Run No.	55-2	55-3	55-4	55-5	66-3	66-4	66-5
Periods	L-Q	R-Z	AA-FF	GG-KK	P-T	U-X	Y-CC
Hours	235-379	379-570	570-714	714-834	296-416	416-500	500-619
Recycle Ratio	0.63	0.96	1.01	0.06	1.07	1.05	2.09
Fresh Feed, SCFH	14111	9922	14581	14776	14293	15232	15014
CO_2 in Total Feed, ~~mol %~~ mol/hr.	6.23	8.22	11.74	1.57	12.39	11.37	19.78
Space Velocity, v/hr/v	1097	720	1021	1069	1125	1369	2668
Conversion of H_2+CO, %	73.03	83.47	76.06	73.64	79.78	72.84	72.28
Selectivity, C_3+/C_1+, %	76.51	75.06	74.86	69.12	75.50	74.83	79.56
Yield of C_1+, lbs/MCF H_2+CO	9.82	11.19	10.07	8.96	10.63	9.39	9.71
Product Distribution, Weight Per Cent of C_1+							
CH_4	12.93	12.94	12.86	18.00	13.02	13.87	10.73
C_2H_4	6.32	5.95	6.83	7.64	6.28	6.37	6.06
C_2H_6	4.23	6.05	5.45	5.24	5.20	4.93	3.65
C_1+C_2	23.48	24.94	25.14	30.88	24.50	25.17	20.44
C_3H_6	12.46	12.65	11.93	11.91	11.87	11.49	10.37
C_3H_8	1.90	1.70	1.50	1.23	1.32	1.31	1.09
C_4H_8	8.73	8.97	9.53	8.62	9.13	8.75	9.12
C_4H_{10}	4.80	2.51	2.83	3.20	2.81	2.85	2.85
C_5+ Recovered Oil	34.81	34.42	34.36	33.17	36.43	36.32	41.46
C_3+	62.70	60.25	60.15	58.13	61.56	60.72	64.89
Alcohols	10.67	11.59	11.11	9.22	10.52	10.66	10.37
Acids	3.15	3.22	3.60	1.77	3.42	3.45	4.30
Water Soluble Chemicals	13.82	14.81	14.71	10.99	13.94	14.11	14.67
Yield Basis Brownsville Design Feed Rate, 9488 MCFH H_2+CO BPD							
Liquid Hydrocarbons	4336	5051	4480	3814	4988	4301	4854
Alcohols	731	915	772	582	766	688	682
Acids	215	254	250	112	249	223	283
Total Liquid	5282	6220	5502	4508	6003	5212	5819

Effect of Recycle/Fresh Feed Ratio

The data from Run 55 also have been shown in Figures 1 and 2. During this run there were two periods of low recycle ratio, Periods 55-2 with 0.06/1 ratio and Period 55-5 with no recycle gas except the bleed gas through the pressure taps. This flow corresponds to a 0.06/1 ratio. Otherwise the conditions were similar to those of Run 63 through 66, made with a recycle ratio of 1/1 except for Period 66-5, made with 2/1 recycle ratio.

It can be seen in Figure 2 that the H_2/CO ratio in the total feed stream tended to be constant at about 2.2/1. Since the H_2/CO ratio in the fresh feed was fixed at about 1.65 to 1, the composition of recycle gas changed sufficiently, when the recycle ratio was raised from 1/1 to 2/1, to maintain the constant H_2/CO ratio in the total feed. A similar change in the opposite direction took place when the recycle ratio was decreased. Of course, when the recycle flow was practically stopped, then the total feed composition became almost the same as the fresh feed.

The period of lower recycle ratio in Run 55 showed lower yields of C_3 and heavier hydrocarbons, lower yields of water-soluble chemicals, lower yields of water, higher yields of C_1 and C_2 hydrocarbons, and higher yields of CO_2. The effect of raising the recycle ratio in Run 66 was to increase the yields of C_3 and heavier hydrocarbons (even though the catalyst volume was less). The yields of CO_2 were decreased, but there was only a slight effect on the yield of other products.

Additional data on the effects of recycle ratio are shown in Table II, opposite. The tabulated data show in more detail the same effects of recycle ratio shown graphically in Figures 1 and 2.

In summary, higher recycle/fresh feed ratio was beneficial in the range of 0.06/1 to 2.0/1. The yields of useful liquid product increased with recycle ratio, and the yields of methane and CO_2 were suppressed. Since the selectivity and conversion decrease with catalyst age, and the CO_2 yields increase, the beneficial effects of increasing the recycle ratio may be more pronounced as the catalyst gets older.

Effect of Addition of Potassium Carbonate

The addition of anhydrous potassium carbonate during period 65-J had no apparent effect on the synthesis reaction.

V. CONCLUSIONS

1. The mill scale catalyst treated and reduced at Brownsville exhibited no difference from mill scale catalysts prepared at Montebello.

2. Variation of the catalyst reduction temperature in the range of 650°F to 800°F had no effect on the quality of the catalyst.

3. Increasing the recycle/fresh feed ratio in the range of 0.06/1 to 2.0/1 increased the yields of saleable liquid products and suppressed the yields of methane and CO_2.

4. The addition of anhydrous potassium carbonate during a run had no effect on the synthesis reaction.

REPORT PREPARED BY Signed: W. L. Slater

WLS-EW

REPORT APPROVED BY Signed: duBois Eastman

(WEK-WAMcM)-WJC(2)-RWH-HDM(2)
RLSr(2)-duBE(2)
WMS-RP-CEL-GK-Jcw

Exp. No. 2001-2-P-11

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(WEK-WAMcM)-WJC(2)-RWH-HDM(2)-RLSr(2)-duBE(2)
WMS
RP
CEL
GK
JCW

VI. APPENDIX

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TABLE III

ANALYSES OF CATALYSTS

Run	63 S.D.*	64, 65, 66 Raw*	64 A *	64 S.D.**	65 Red.*	65 A *	65 S.D.*	66 A	66 C	66 D *	66 S.D.*
Screen Analysis, Weight Per Cent											
On U.S. No.											
40 (420 microns)	2.0	0.6	1.2	0.4	1.0			0.8	1.0	0.5	1.0
100 (150 microns)	48.3	45.3	53.4		52.7			63.8	68.4	58.1	70.6
150 (105 microns)	23.4	16.9	19.0	20.3	19.2			21.0	19.2	21.4	25.2
200 (74 microns)	14.8	12.1	11.0	71.5	12.7			9.6	7.8	13.0	2.0
250 (62 microns)	5.1	3.4	5.4	2.2	1.4			4.0	2.6	2.6	0.4
325 (44 microns)	4.3	10.4	7.6	5.7	8.1			0.4	0.6	3.8	0.2
Through 325	2.1	11.3	2.4	2.0	4.9			0.4	0.4	0.6	0.6
50 Per Cent Point, microns	150	140	150	95	150			180	190	170	190
Bulk Density, lbs/cu. ft.											
Aerated	151		157	131	139	139	133	146	140		120
Settled	156		159	132	140	140	135	148	141		121
Compacted	172		187	159	174	186	160	180	174		128
Specific Gravity	4.93		5.90	3.98	6.44	5.35	3.74	4.98	3.66		4.82
Per Cent Iron				78.2	97.7		77.6				74.4
Per Cent Oil Soluble in CCl_4	1.8			0.15							
Per Cent Carbon after extraction with CCl_4				11.2							
Per Cent K_2O basis Fe					1.17						

*S.D.=catalyst sampled after reactor shutdown; Raw = catalyst before reduction;
Red.:catalyst sampled after reduction but before cutting in feed gas.

TABLE IV

[redacted]

MONTEBELLO RUN 64 REDUCTION
BETHLEHEM MILL SCALE

Loaded 2200#

Hours above 600°F.	Water Production lbs. Spot	lbs. Total	% of Total	lbs./hr.	m/hr.	Temperature - °F Heater	Bed	Meter Run	Recycle √h	Recycle Press. psig.	Total H_2 m/hr.	H_2 Conv. %	Carry-over lbs. Spot	Carry-over lbs. Total	H_2 Flow Recycle SCFH	H_2 Flow Bleed SCFH	H_2 Flow Total SCFH
1	16	16	2.6	16	0.888		628	90	5.8	251	52.35	0.848	18	18	18122	1746	19868
4	14½	30½	4.9	4.83	0.268		668	93	6.23	226	54.77	0.489	20½	38½	19007	1780	20787
7	35½	66	10.6	11.83	0.657		689	91	5.93	226	52.67	1.247	43½	82	18289	1698	19987
9	33	99	15.9	16.5	0.916		702	88	5.60	236	50.70	1.807	34	116	17602	1637	19239
11	49	148	23.8	24.5	1.360		719	88	5.75	231	52.38	2.597	32	148	18177	1703	19880
13	53	201	32.3	26.5	1.471		714	96	5.95	229	49.96	2.944	22½	170½	17254	1705	18959
15	36½	237½	38.1	18.25	1.013		718	100	5.65	226	48.67	2.081	13½	184	16866	1604	18470
17	55½	293	47.0	27.75	1.540		730	96	5.65	230	48.85	3.153	12½	196½	16908	1630	18538
19	48½	341½	54.8	24.25	1.346		733	90	5.60	225	48.28	2.788	6½	203	16725	1598	18323
21	59	400½	64.3	29.5	1.637		741	90	5.55	228	49.92	3.279	8	211	17344	1599	18943
23	48½	449	72.1	24.25	1.346		747	92	5.70	229	48.78	2.759	8	219	16870	1640	18511
25	46	495	79.5	23.0	1.277		750	90	5.60	226	48.44	2.636	7½	226½	16779	1603	18382
27	42	537	86.2	21.0	1.166		752	88	5.60	226	48.54	2.402	6	232½	16814	1606	18420
29	35	572	91.8	17.5	0.971		756	88	5.60	216	47.60	2.040	5	237½	16844	1575	18063
31	26½	598½	96.1	13.25	0.735		768	88	5.75	225	49.09	1.497	5½	243	16986	1644	18630
33	6	604½	97.0	3.0	0.167		788	87	5.50	229	48.82	0.341	5	248	16937	1589	18528
35	11½	616	98.9	5.75	0.319		731	94	5.95	226	51.23	0.623	5½	253½	17744	1698	19442
39	2	618	99.2	0.50	0.028		785	93	6.03	234	52.18	0.053	8½	262	18044	1755	19800
46	1½	619½	99.5	0.21	0.012		778	91	7.39	230	51.14	0.023	11	273	17232	2175	19408
57	3½	623		0.32	0.018		800	88	7.4	230	51.14	0.035			17232	2175	19408
Average 7-27					1.3072		730			228.7	49.452	2.643					

Flow Rate = $\frac{(49.45)(379.5)}{3600}$ $(\frac{14.7}{244.7})(\frac{1191}{520})$ = 0.7172 CFS V= 1.08 ft./sec.

Average Inventory = 2200# @160#/CF = 13.75 CF @67% V = 9.213 CF

t = 9.213/0.7172 = 12.84 sec.

Exp. No. 2001-2-P-15

TABLE V

[redacted]

MONTEBELLO RUN 65 REDUCTION
BETHLEHEM MILL SCALE

Loaded 2445#

Hours above 600°F	Water Production lbs. Spot	lbs. Total	% of Total	lbs/hr	m/hr	Temperature - °F Heater	Bed	Meter Run	Recycle √h	Press. psig.	Rate SCFH	Bleed √h	Rate SCFH	Total Feed SCFH	m/hr	Hydrogen Conv. %	Carry-over lbs. Spot	Total	Density #/CF	Depth Ft.
3	56	56	9.1	18.67	1.036	1140	739	62	4.01	235	19032	6.2	1860	20892	55.05	1.88	91	91	167	20.9
5	82	138	22.5	41.0	2.276	1140	809	60	3.94	236	18754	5.3	1595	20349	53.62	4.14	68	159	165	19.9
7	92	230	37.4	46.0	2.553	1090	815	61	3.85	231	18122	5.0	1488	19610	51.67	4.94	43	202		
9	86½	316½	51.5	43.25	2.401	1095	802	59	3.95	223	18333	5.0	1471	19804	52.18	4.60	29	231	165	17.8
11	75	391½	63.7	37.5	2.081	1085	800	54	3.75	224	17523	4.9	1449	18972	49.99	4.17	17	248	162	17.4
7AM 12	52	443½	72.2	52.0	2.886	1080	800	53	3.63	225	17012	4.9	1450	18462	48.65	5.92	10	258		
13	24½	468	76.2	24.5	1.360	1085	784	55	3.55	220	16432	6.5	1925	18357	48.37	2.81	4½	262½	161	16.6
14	37½	505½	82.3	37.5	2.081	1095	786	62	3.55	215	16152	6.5	1870	18022	47.49	4.40	5	267½	156	16.8
15	24½	530	86.2	24.5	1.360	1085	792	65	3.65	225	16908	6.5	1910	18818	49.59	2.74	4	271½	155	16.6
16	28½	558½	90.9	28.5	1.582	1040	800	66	4.00	225	18530	6.5	1905	20435	53.85	2.94	4½	276	160	15.8
17	26	584½	95.1	26.0	1.443	1020	794	70	4.00	225	18442	6.0	1750	20192	53.21	2.72	6½	282½	159	15.7
18	18½	603	98.1	18.5		1005	794	72	4.30	220		6.2					6½	289	158	15.5
19	5	608	98.9	5.0		934	793	75		226		6.2					4	293	159	15.4
20	2	610	99.3	2.0		950	790	74		230		6.4					3	296	160	15.2
23	4½	614½		1.5													7½	303½	164	14.8
Average 3-15					2.125		799			225					50.195	4.23			161	17.6

Flow Rate = $\frac{(50.195)(379.5)}{3600}$ $(\frac{14.7}{229.7})(\frac{1259}{520})$ = 0.820 CFS = 1.24 ft/sec.

Average Inventory = 2445
1590
2017 /160 = 12.60 CF @67% V = 8.442/0.820 = 10.30 sec.

TABLE VI

[redacted]

MONTEBELLO RUN 66 REDUCTION
BETHLEHEM MILL SCALE

Loaded 2883#

Hours above 600°F.	Water Production lbs. Spot	lbs. Total	% of Total	lbs./hr.	m/hr.	Temperature - °F. Heater	Bed	Meter Run	Recycle √h	Press. psig.	Rate SCFH	Bleed √h	Rate SCFH	Total Feed SCFH	m/hr.	Hydrogen Conv. %	Carry-over lbs. Spot	Total
4	27	27	4.75	6.75		800	633	54	6.0	226		8.5						
6	12	39	6.86	6.0		790	649	50	5.9	238		7.9					75	75
8	20	59	10.38	10.0		795	654	50	5.9	245		7.05					61	136
10	29	88	15.5	14.5		790	657	46	5.9	232		6.7					58½	194½
12	33½	121½	21.4	16.65		788	657	45	5.95	235		6.8					34	228½
14	34	155½	27.4	17.0		782	653	45	5.98	235		6.95					26	254½
16	38½	194	34.1	19.25		786	656	46	6.0	235		7.2					24	278½
18	31½	225½	39.7	15.75		780	652	52	6.0	232		7.25					18½	297
19	28	253½	44.6	28.0		780	653	65	6.0	230		7.2					16½	313½
21	33	286½	50.4	16.5		780	653	72	6.0	232		7.3					12½	326
23	43½	330	58.0	21.75		785	652	73	6.0	222		6.7					11½	337½
25	36	366	64.4	18.0		751	650	64	5.95	232		6.7					10	347½
27	31	397	69.8	15.5		750	630	60	5.95	240		6.9					6½	354
29	30	427	75.1	15.0		761	647	53	5.98	235		6.5					5½	359½
31	29	456	80.2	14.5		760	649	49	5.98	230		6.8					5	364½
33	27	483	85.0	18.5		760	652	48	5.98	235		6.8					6	370½
35	25	508	89.4	12.5		760	654	45	5.9	225		6.7					5½	376
37	21	529	93.0	10.5		760	657	45	6.0	235		6.5					6	382
39	15	544	95.7	7.5		755	659	42	5.95	227		6.0					4	386
41	11½	555½	97.7	5.75		750	655	45	6.05	235		6.5					5½	391½
43	7	562½	98.9	3.5		752	657	56	6.08	231		6.7					4½	396
45	4	566½	99.6	2.0		752	663	69	6.02	225		6.7					4	400
47	2	568½		1.0		740	653	72	6.05	225		6.5					3	403
Average 8-33 25 hours	424			16.96	0.9413		651	55	5.97	233	28472	6.9	2080	30555	80.51	1.17		

Recycle Flow = (79.31)(3.7854)(5.97)(√250)(1.0048) = 28472
Bleed Flow = (5.02)(3.7854)(6.9)(15.81)(1.0048) = 2083
30555

$\left(\frac{30555}{3600}\right)\left(\frac{14.7}{250}\right)\left(\frac{1111}{520}\right)$ = 1.066 Cu. Ft./sec. = 1.61 ft./sec.

Average Inventory = 2420# @160#/CF = 15.13 Cu. Ft. @67% Void = 10.14 CF Void

t = 10.14/1.066 = 9.51 sec.

Exp. No. 2001-2-P-17

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 63-0 (A-E)
HOURS 0-96
CATALYST Bethlehem MS

FRESH FEED				WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
					At Wt. Balance							CONDENSATE								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	37.075	15.340	429.67	6.756	0.870	24.37	2.720	18.060	3.590	-14.470	-405.30						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
H_2 2.016	59.906	24.787	49.97	36.381	4.684	9.44	14.645	39.432	19.329	-20.103	-40.53				83.17	400 EP	78.80	8.118	98.0	7.956
CO_2 44.010	2.345	0.970	42.69	32.187	4.144	182.38	12.957	13.927	17.101	3.174	139.69	9.173			9.46	400-550	11.92	1.228	91.4	1.122
N_2 28.016	0.268	0.111	3.11	1.682	0.217	6.08	0.677	0.788	0.894						7.37	550 +	9.28	0.956	114.6	1.096
CH_4 16.042	0.406	0.168	2.70	10.525	1.355	21.74	4.237	4.405	5.592	1.187	19.04	1.250								
C_2H_4 28.052				2.524	0.325	9.12	1.016	1.016	1.341	0.325	9.12	0.599					RECOVERY %	#/hr	gal/hr	
C_3H_6 30.068				1.890	0.243	7.31	0.761	0.761	1.004	0.243	7.31	0.480				PROPYLENE	45.8	8.02		
C_1+C_2											35.47	2.329				C_3 POLY GASO.	87.5	7.02	1.174	
C_3H_8 42.078				3.231	0.416	17.50	1.301	1.301	1.717	0.416	17.50	1.149	4.32	4.051	0.266	C_3 POLY TAR	12.5	1.00	0.133	
C_3H_8 44.094				0.295	0.038	1.68	0.119	0.119	0.157	0.038	1.68	0.110	4.24	0.396	0.026					
C_4H_8 56.104				2.836	0.288	16.16	0.900	0.900	1.188	0.288	16.16	1.062	5.00	3.232	0.212		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.746	0.096	5.58	0.300	0.300	0.396	0.096	5.58	0.366	4.88	1.148	0.075	C_4H_8	5.00	0.24	0.048	68.0
C_5H_{10} 70.130				0.994	0.128	8.98	0.400	0.400	0.528	0.128	8.98	0.590	5.45	1.648	0.108	C_4 POLY GASO.	5.98	13.93	2.329	1.5
C_5H_{12} 72.146				0.264	0.034	2.45	0.106	0.106	0.140	0.034	2.45	0.161	5.28	0.467	0.031	C_4H_{10}	4.86	5.58	1.148	68.0
C_6H_{12} 84.158				0.289	0.037	3.11	0.116	0.116	0.153	0.037	3.11	0.204	5.64	0.561	0.037	C_4 FREE GASO.			11.806	5.8
C_5-C_6											55.46	3.642		11.503	0.755	C_4 POLY TAR	7.58	1.99	0.264	
TOTAL		41.376	528.14		12.875	315.90	40.254	81.630	61.041											
H_2+CO	96.981	40.127	15,228 SCFH		5.554		17.365	57.492	22.919	-34.573							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.62	Factor 656685		5.38		5.38	2.18	5.38	1.39						10 # RVP 400 EP GASOLINE	15.331	1.0068	5458	
Weight Recovery, % 90.45			Catalyst Age, hrs. 48			Space Velocity, vhv 1118			RECOVERED OIL	0.472	66.17	4.345		10.302	0.677	GAS OIL	1.122	0.0737	400	
Pressure, psig 414			Inlet Velocity, Ft/sec 0.96			Catalyst 13.62			TOTAL OIL		121.63	7.987		21.805	1.432	FUEL OIL	1.096	0.0720	390	
Temperature, °F 655			Bed Depth, Ft 20.64			Weight, # 2111			WATER SOLUBLE CHEMICALS Acids	0.344	12.66 5.57	0.831 0.366	7.815	1.620 0.713	0.153	POLY TAR	0.396	0.0261	142	
Recycle Ratio 0.97			Bed Density, #/CF 155			Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ shift Ratio = 13.0			TOTAL LIQUID PRODUCTS C_4+		139.86	9.184		24.138	1.585	TOTAL	17.946	1.1786	6390	
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY		NET WATER	7.096	127.84	8.394		15.347	1.008	W. S. CHEM.	1.620 0.713	1.064 0.468	577 254	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_2+/C_1+		GROSS WATER		146.07	9.592		17.680	1.161	TOTAL	20.279	1.3318	7221	
68.88	94.33	81.10	86.16	80.12	50.98	60.14	79.77		HYDROCARBON TOTAL—C_1+		175.33	11.514								

Form ML—11

g/NCM = 16.91 × #/MCF *0488 MCPH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 63-1 (F-J)
HOURS 96-216
CATALYST Bethlehem MS

FRESH FEED				WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
					At Wt. Balance							CONDENSATE								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	37.358	15.774	441.83	7.691	1.063	29.77	3.114	18.888	4.177	-14.711	-412.06						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
H_2 2.016	60.271	25.449	51.31	37.427	5.176	10.43	15.153	40.602	20.329	-20.273	-40.88				86.99	400 EP	82.88	7.344	98.0	7.197
CO_2 44.010	2.061	0.870	38.29	31.151	4.307	189.55	12.613	13.483	16.920	3.437	151.26	9.669			8.17	400-550	10.76	0.953	91.4	0.871
N_2 28.016	0.196	0.083	2.33	1.709	0.236	6.61	0.692	0.774	0.928						4.84	550 +	6.36	0.564	114.6	0.646
CH_4 16.042	0.114	0.048	0.77	9.630	1.332	21.37	3.899	3.947	5.231	1.284	20.60	1.317								
C_2H_4 28.052				2.596	0.359	10.07	1.051	1.051	1.410	0.359	10.07	0.644					RECOVERY %	#/hr	gal/hr	
C_3H_6 30.068				1.860	0.257	7.73	0.753	0.753	1.010	0.257	7.73	0.494				PROPYLENE	43.4	8.25		
C_1+C_2											38.40	2.455				C_3 POLY GASO.	87.5	7.22	1.207	
C_3H_8 42.078				3.269	0.452	19.02	1.324	1.324	1.776	0.452	19.02	1.216	4.32	4.403	0.281	C_3 POLY TAR	12.5	1.03	0.137	
C_3H_8 44.094				0.292	0.040	1.76	0.118	0.118	0.158	0.040	1.76	0.113	4.24	0.415	0.027					
C_4H_8 56.104				2.201	0.304	17.06	0.891	0.891	1.195	0.304	17.06	1.091	5.00	3.412	0.218		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.671	0.093	5.41	0.272	0.272	0.365	0.093	5.41	0.346	4.88	1.113	0.071	C_4H_8	5.00	0.29	0.058	68.0
C_5H_{10} 70.130				0.985	0.136	9.54	0.399	0.399	0.535	0.136	9.54	0.610	5.45	1.750	0.112	C_4 POLY GASO.	5.98	14.67	2.454	1.5
C_5H_{12} 72.146				0.217	0.030	2.16	0.088	0.088	0.118	0.030	2.16	0.138	5.28	0.411	0.026	C_4H_{10}	4.86	5.41	1.113	68.0
C_6H_{12} 84.158				0.301	0.042	3.53	0.122	0.122	0.164	0.042	3.53	0.226	5.84	0.637	0.041	C_4 FREE GASO.			11.202	5.8
C_5-C_6											58.48	3.740		12.141	0.776	C_4 POLY TAR	7.58	2.10	0.279	
TOTAL		42.224	534.53		13.827	334.01	40.489	82.713	61.926											
H_2+CO	97.629	41.223	15644 SCFH		6.239		18.267	59.490	24.506	34.984							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.61	Factor 639222		4.87		4.87	2.15	4.87	1.38						10 # RVP 400 EP GASOLINE	14.827	0.9478	5139	
Weight Recovery, % 92.28			Catalyst Age, hrs. 156			Space Velocity, vhv 1152			RECOVERED OIL	0.405	56.82	3.632		8.861	0.566	GAS OIL	0.871	0.0557	302	
Pressure, psig 413			Inlet Velocity, Ft/sec 0.98			Catalyst 13.58			TOTAL OIL		115.30	7.372		21.002	1.342	FUEL OIL	0.646	0.0413	224	
Temperature, °F 657			Bed Depth, Ft 20.57			Weight, # 2091			WATER SOLUBLE CHEMICALS	0.400	21.21	1.356	7.919	2.678	0.171	POLY TAR	0.416	0.0266	144	
Recycle Ratio 0.96			Bed Density, #/CF 154			Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ shift Ratio = 12.1			TOTAL LIQUID PRODUCTS C_4+		136.51	8.728		23.680	1.513	TOTAL	16.760	1.0714	5809	
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY		NET WATER	6.805	122.60	7.837		14.718	0.941	W. S. CHEM.	2.678	0.1712	928	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_2+/C_1+		GROSS WATER		143.81	9.193		17.396	1.112	TOTAL	19.438	1.2426	6737	
67.25	93.26	79.66	84.87	77.89	49.93	58.81	78.05		HYDROCARBON TOTAL—C_1+		174.91	11.181								

Form ML—11

g/NCM = 16.91 × #/MCF *0488 MCPH H_2+CO. Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 63-2 (K-O)
HOURS 216-336
CATALYST Bethlehem MS

FRESH FEED				WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
					At Wt. Balance							CONDENSATE								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	36.981	15.751	441.19	9.255	1.475	41.31	3.900	19.651	5.375	-14.276	-399.88						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
H_2 2.016	60.683	25.847	52.11	41.937	6.684	13.47	17.672	43.519	24.356	-19.163	-38.64				89.03	400 EP	84.56	6.232	98.0	6.107
CO_2 44.010	1.850	0.788	34.68	27.338	4.357	191.75	11.521	12.309	15.878	3.569	157.07	9.950			7.39	400-550	10.40	0.766	91.4	0.700
N_2 28.016	0.217	0.092	2.58	1.394	0.222	6.22	0.587	0.679	0.809						3.58	550 +	5.04	0.371	114.6	0.425
CH_4 16.042	0.269	0.115	1.84	8.871	1.414	22.68	3.738	3.853	5.152	1.299	20.84	1.320								
C_2H_4 28.052				2.407	0.384	10.77	1.014	1.014	1.398	0.384	10.77	0.682					RECOVERY %	#/hr	gal/hr	
C_3H_6 30.068				1.723	0.275	8.27	0.726	0.726	1.001	0.275	8.27	0.524				PROPYLENE	37.6	7.12		
C_1+C_2											39.88	2.526				C_3 POLY GASO.	87.5	6.23	1.042	
C_3H_8 42.078				2.823	0.450	18.94	1.190	1.190	1.640	0.450	18.94	1.200	4.32	4.384	0.278	C_3 POLY TAR	12.5	0.89	0.118	
C_3H_8 44.094				0.298	0.047	2.07	0.126	0.126	0.173	0.047	2.07	0.131	4.84	0.488	0.031					
C_4H_8 56.104				1.929	0.307	17.22	0.813	0.813	1.120	0.307	17.22	1.091	5.00	3.444	0.218		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.631	0.101	5.87	0.266	0.266	0.367	0.101	5.87	0.373	4.88	1.208	0.077	C_4H_8	5.00	--	--	68.0
C_5H_{10} 70.130				0.894	0.142	9.96	0.377	0.377	0.519	0.142	9.96	0.631	5.45	1.828	0.116	C_4 POLY GASO.	5.98	15.07	2.520	1.5
C_5H_{12} 72.146				0.213	0.034	2.45	0.090	0.090	0.124	0.034	2.45	0.155	5.28	0.467	0.030	C_4H_{10}	4.86	(5.87) 5.36	(1.208) 1.103	68.0
C_6H_{12} 84.158				0.287	0.046	3.87	0.121	0.121	0.167	0.046	3.87	0.245	5.84	0.699	0.044	C_4 FREE GASO.			10.143	5.8
C_5-C_6											60.38	3.825		12.518	0.794	C_4 POLY TAR	7.58	2.15	0.286	
TOTAL		42.593	532.40		15.938	354.85	42.141	84.734	64.902											
H_2+CO	97.664	41.598	15786 SCFH		8.159		21.572	63.170	29.731	-33.439							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.64	Factor 633472		4.53		4.53	2.21	4.53	1.34						10 # RVP 400 EP GASOLINE	13.766	0.8720	4728	
Weight Recovery, % 91.88			Catalyst Age, hrs. 276			Space Velocity, vhv 1237			RECOVERED OIL	0.338	47.42	3.004		7.369	0.467	GAS OIL	0.700	0.0443	240	
Pressure, psig 406			Inlet Velocity, Ft/sec 1.02			Catalyst 12.76			TOTAL OIL		107.80	6.829		19.887	1.261	FUEL OIL	0.485	0.0269	146	
Temperature, °F 660			Bed Depth, Ft 19.33			Weight, # 1876			WATER SOLUBLE CHEMICALS	0.388	20.58	1.304	7.899	2.605	0.165	POLY TAR	0.404	0.0256	139	
Recycle Ratio 0.99			Bed Density, #/CF 147			Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ shift Ratio = 11.8			TOTAL LIQUID PRODUCTS C_4+		128.38	8.133		22.492	1.426	TOTAL	15.295	0.9688	5253	
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY		NET WATER	6.097	109.85	6.959		13.187	0.835	W. S. CHEM.	2.605	0.1650	895	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_2+/C_1+		GROSS WATER		130.43	8.262		15.792	1.000	TOTAL	17.900	1.1338	6148	
62.58	90.64	74.14	80.39	72.65	44.03	52.93	76.30		HYDROCARBON TOTAL—C_1+		168.26	10.659								

Form ML—11

g/NCM = 16.91 × #/MCF *0488 MCPH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

RUN NO. 63-A
HOURS 0-17
CATALYST Mill Scale Red. at Brownsville

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

FRESH FEED				WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
					At Wt. Balance							CONDENSATE								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL %	gal/hr	TREATING RECOVERY,%	gal/hr
CO 28.010	37.805	15.213	426.12	6.885	0.859	24.03	2.740	17.953	3.598	-14.355	-402.09									
H_2 2.016	59.020	23.751	47.88	36.305	4.524	9.12	14.448	38.199	18.972	-19.227	-38.76					400 EP	77	8.466	98.0	8.297
CO_2 44.010	2.780	1.119	49.25	34.820	4.339	190.96	13.857	14.976	18.196	3.220	141.71	9.583				400-550	14	1.539	91.4	1.407
N_2 28.016	0.345	0.139	3.89	1.625	0.203	5.69	0.647	0.786	0.850							550 +	9	0.990	114.6	1.135
CH_4 16.042	0.050	0.020	0.32	9.100	1.134	18.19	3.621	3.641	4.755	1.114	17.87	1.208								
C_2H_6 28.052				2.355	0.293	8.22	0.937	0.937	1.230	0.293	8.22	0.556					RECOVERY %	#/hr	gal/hr	
C_3H_8 30.068				1.540	0.192	5.77	0.613	0.613	0.805	0.192	5.77	0.390				PROPYLENE	46.0	6.79		
C_4+C_5											31.86	2.154				C_3 POLY GASO.	87.5	5.94	0.993	
C_2H_2 26.038				2.815	0.351	14.77	1.120	1.120	1.471	0.351	14.77	0.999	4.32	3.419	0.231	C_3 POLY TAR	12.5	0.85	0.113	
C_3H_8 44.094				0.255	0.032	1.41	0.101	0.101	0.133	0.032	1.41	0.095	4.24	0.333	0.023					
C_4H_8 56.104				2.055	0.256	14.36	0.818	0.818	1.074	0.256	14.36	0.971	5.00	2.872	0.194		#/gal	#/hr	gal/hr	RVP
C_5H_{10} 84.120				0.700	0.087	5.06	0.279	0.279	0.366	0.087	5.06	0.342	4.86	1.041	0.070	C_4H_8	5.00	0.58	0.116	68.0
C_6H_{10} 70.130				0.935	0.117	8.21	0.372	0.372	0.489	0.117	8.21	0.555	5.45	1.506	0.102	C_4 POLY GASO.	5.98	12.06	2.016	1.5
C_7H_{12} 72.146				0.310	0.039	2.81	0.123	0.123	0.162	0.039	2.81	0.190	5.25	0.535	0.036	C_4H_{10}	4.86	5.06	1.041	68.0
$C_{17}H_{32}$ 24.156				0.300	0.037	3.11	0.119	0.119	0.156	0.037	3.11	0.210	5.54	0.561	0.038	C_4 FREE GASO.			11.892	5.8
C_3-C_8											49.73	3.362		10.267	0.694	C_4 POLY TAR	7.53	1.72	0.228	
TOTAL		40.242	527.46		12.462	311.71	39.795	80.037	60.425											
H_2+CO	96.825	38.964	14787	SCFH	5.382		17.188	56.152	22.570	-33.582							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.56	Factor	676269	5.27		5.27	2.13	5.27	1.34						10 # RVP 400 EP GASOLINE	15.065	1.0188	5524	

Weight Recovery, %	88.58	Catalyst Age, hrs.	17	Space Velocity, vhv	1039	RECOVERED OIL	0.5074**	71.09	4.808	10.995	0.744
Pressure, psig	415	Inlet Velocity, Ft/sec	0.94	Catalyst Vol., CF	14.23	TOTAL OIL		120.82	8.170	21.262	1.438
Temperature, °F	653	Bed Depth, Ft	21.56	Weight, #	2191	WATER SOLUBLE CHEMICALS	0.190**	10.07	0.681	1.310	0.089
Recycle Ratio	0.99	Bed Density, #/CF	154	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	12.84	TOTAL LIQUID PRODUCTS C_5+		130.89	8.851	22.572	1.527
						NET WATER	7.471**	134.59	9.102	16.157	1.093
						GROSS WATER		144.66	9.783	17.467	1.182
						HYDROCARBON TOTAL—C_1+		162.75	11.006		

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_2+ / C_1+
69.03	94.36	80.95	86.19	79.96	50.33	59.81	80.42

Form ML—11

**Included in Reactor Effluent Total

#/NCM = 16.91×#/MCF

*9488 MCFH H_2+CO, Bbl/Day = 5421.6×gal/MCF

OPERATING CONDITIONS				
PRESSURES PSIG		RATES S.C.F.H.		
Oxygen	439	Fresh Feed	15,272	
Natural Gas	435	Recycle	15,102	
Generator Outlet	417	Combined Feed	30,374	
Reactor Inlet	415	Wet Gas—Measured	3,815	
Condenser Inlet		Adjusted	4,729	
Product Accumulator	360	Loss	914	
TEMPERATURES—°F.		Recycle/Fresh Feed	0.99	
Oxygen	419	Inlet Velocity—ft./sec.	0.94	
Natural Gas	761	Fresh Feed Rate—S.C.F.H.	14787	
Generator		per Cu. Ft. Dense Bed	1039	
Quench Accumulator	154	per Lb. Catalyst	6.75	
Reactor Inlet	381	per Sq. Ft.	22405	
Condenser Inlet	578			
Product Accumulator	89	Heat Transfer Calculations		
Catalyst No. Height		Steam Rate = 221 #/hr.		
1 0'0"	626	@707 psia & 505°F		
2 0'9"	654	= 1201 Btu/#		
3 1'9"	648	Water in @60° F = 28 Btu/#		
4 4'5"	657	= 1173 Btu		
5 7'0"	662	(1173)(221) = 259,233 Btu/hr.		
6 12'3"	660	Ave. Bed Temp. = 653°F		
7 17'5"	650	dT = 653-505 = 148°F		
8 20'0"	642	Tube Area = 37.8 sq. ft.		
9 22'7"	635	$K = \frac{259,233}{(37.8)(148)} = 46.3$ Btu/°F/sq. ft.		
10 25'2"	631			
11 26'11"	516			

PRODUCT TESTS		
	OIL	WATER
°API	50.7	10.8
Neut. No.	39.7	32.5
Sap. No.	46.8	36.7
Hydrox. No.		
Bromine No.	75	
Pour °F.		
Chemicals, % by K_2CO_3		7.5
HEMPEL DIST. %		°API
205 °F.		
400	76	55.4
400-550	14	34.7
550+	10	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	96	
10%	137	
50%	226	
90%	380	
EP	396	
Rec.	96	

CATALYST DATA		
INVENTORY DATA		
In Reactor at Start of Period		
Fresh Catalyst Added		
Total		
Catalyst Recovered	58	
In Reactor at End of Period		
REACTOR d-p, Inches H_2O		
No. Height		
0 0-21 3/8	-	
1 21 3/8-52 3/4	75	
2 52 3/4-84	76	
3 84-115 3/8	83	
4 115 3/8-353 1/8	375	
Total	609	
CALCULATED FROM dp		
Density, Lbs./Cu.Ft.	154	
Inventory, Lbs.	2191	
Bed Depth, Ft.	21.56	
Vol., Cu. Ft.	14.23	

PARTICLE SIZE				
	Screen Analysis		Sedimentation	
Mesh	Microns	%	Microns	%
On 40	419+		80+	
100	150		40—80	
150	105		20—40	
200	74		10—20	
250	62		0—20	
325	44			
<325				

CATALYST
Bulk Density, Lbs./Cu.Ft.
Aerated
Settled
Compacted
Particle Density, gm./cc.
NH_3 Value, ml./gm.
N_2 Surface, m^2/gm.
CHEMICAL ANALYSIS
Fe
C
O
H
K_2O, W+, % basis Fe
X-Ray Analysis—
Fe_2nC_9
Fe_3O_4
Fe

GAS ANALYSES					GENERATOR BALANCE								
HOUR	2200	0600		AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O
FRESH FEED									O_2 32.000	0.18	10.735 0.023			21.516
CO 28.010	37.37	38.24		37.805	15.213	15.213		15.213	CO_2 44.010	1.40	0.183	0.183		0.366
H_2 2.016	59.37	58.67		59.020	23.751		47.502		N_2 28.016	1.25	0.163			
CO_2 44.010	2.85	2.71		2.780	1.119	1.119		2.238	CH_4 16.042	82.63	10.773	10.773	43.092	
N_2 28.016	0.36	0.33		0.345	0.139				C_2H_6 30.068	6.73	0.877	1.754	5.262	
CH_4 16.042	0.05	0.05		0.050	0.020	0.020	0.080		C_3H_8 44.094	5.40	0.704	2.112	5.632	
			M. W	13.107178					C_4H_{10} 58.120	1.67	0.218	0.872	2.180	
			H_2O 18.016				9.305	4.653	C_5H_{12} 72.146	0.74	0.097	0.485	1.164	
						16.352	56.887	22.104	MW =	20.1885814				
			BALANCE			101.07	99.23	101.01	TOTAL			16.179	57.330	21.882

WEIGHT BALANCE		
	#/hr Measured	At Wt. Balance
WET GAS	251.45	311.71
OIL	71.09	71.09
WATER	144.66	144.66
TOTAL	467.20	527.46
FRESH FEED	527.46	
WEIGHT BALANCE	88.58	
WET GAS FACTOR	1239650	
INDICATED LOSS—S C F H	914	

WET GAS					GAS FLOW RATES								LIQUID PRODUCT RATES Basis 15 hours							
CO 28.010	6.70	7.07		6.885		$\sqrt{R}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
H_2 2.016	36.93	35.68		36.305			414.8	67	2208713			OIL	5'6"	292.57	57	1.0015	293.01	50.7 6.466	1894.60	
CO_2 44.010	35.15	34.49		34.820	FRESH FEED	79.31	20.724	0.9933	1.4862	15.272	40.242		2'5½"	130.04	65	0.9975	129.71		838.70	
N_2 28.016	1.58	1.67		1.625			1.49	65	1157445								+1.62		+10.50	71.09
CH_4 16.042	9.00	9.20		9.100	WET GAS	158.44	4.024	0.9952	1.0758	3.815	10.053						164.92		1066.40	10.995
C_2H_6 28.052	2.23	2.48		2.355			413.3	122												
C_3H_8 33.068	1.50	1.58		1.540	RECYCLE	79.31	20.688	0.9452	1.0758	14.153	37.294									
C_4H_{10} 48.078	2.60	3.03		2.815	BLEED															
C_5H_{12} 44.094	0.22	0.29		0.255		5.02	20.688	1.0000	1.0758	949	2.501	WATER	7'3-3/4	387.50	74	0.99846	386.90	10.8 8.282	3204.31	
C_6H_{14} 58.104	1.91	2.20		2.055	NATURAL GAS		435.4	198	1433978				5'7½"	299.12	74	0.99846	298.66		2473.50	
C_7H_{16} 88.120	0.65	0.75		0.700		28.43	21.216	0.8890	1.1975	4.948	13.038		4'2-3/4	226.01	71	0.99883	225.75		1869.66	
C_8H_{18} 72.232	0.88	0.99		0.935	OXYGEN		438.8	69					1'0"	52.00	64	0.99963	51.98		430.50	144.66
C_9H_{20} 72.146	0.36	0.26		0.310		27.07	21.296	0.9915		4.074	10.735						262.01		2169.97	17.467
$C_{10}H_{22}$ 84.188	0.29	0.31		0.300	STEAM		30.6 4.7 35.3													
			M. W.	25.01198	215.7	3.489	0.2940		221 #/hr.											

RUN NO. 63-B
HOURS 17-28
CATALYST Mill Scale Red. at Brownsville

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

FRESH FEED	%	m/hr	#/hr
CO 28.010	36.88	15.343	429.76
H_2 2.016	60.25	25.065	50.53
CO_2 44.010	2.08	0.865	38.07
N_2 28.016	0.31	0.129	3.61
CH_4 16.042	0.48	0.200	3.21
C_2H_4 28.052			
C_3H_6 30.068			
C_4+C_5			
C_6H_6 42.078			
C_6H_6 44.094			
C_7H_8 58.104			
C_8H_{10} 58.120			
C_8H_{10} 70.130			
C_9H_{12} 72.146			
C_9H_{12} 84.156			
C_9-C_6			
TOTAL		41.602	525.18
H_2+CO	97.13	40.408	15335 SCFH
H_2/CO		1.63	Factor 552103

WET GAS	%	At Wt. Balance m/hr	At Wt. Balance #/hr
CO 28.010	6.81	0.898	25.15
H_2 2.016	37.44	4.939	9.96
CO_2 44.010	31.19	4.115	181.12
N_2 28.016	1.51	0.199	5.58
CH_4 16.042	11.18	1.475	23.66
C_2H_4 28.052	2.46	0.324	9.09
C_3H_6 30.068	1.70	0.224	6.74
C_4H_8 42.078	2.89	0.381	16.03
C_6H_6 78.108	0.26	0.034	1.50
C_7H_8 92.124	2.17	0.286	16.05
C_8H_{10} 106.140	0.76	0.100	5.81
C_8H_{10} 106.140	1.01	0.133	9.33
C_9H_{12} 120.156	0.31	0.041	2.96
C_9H_{12} 120.156	0.31	0.041	3.45
TOTAL		13.190	316.43

RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
2.782	18.125	3.680	-14.445	-404.61
15.294	40.359	20.233	-20.126	-40.57
12.742	13.607	16.857	3.250	143.05
0.617	0.746	0.816		
4.567	4.767	6.042	1.275	20.45
1.005	1.005	1.329	0.324	9.09
0.695	0.695	0.919	0.224	6.74
				36.28
1.181	1.181	1.562	0.381	16.03
0.106	0.106	0.140	0.034	1.50
0.887	0.887	1.173	0.286	16.05
0.310	0.310	0.410	0.100	5.81
0.413	0.413	0.546	0.133	9.33
0.127	0.127	0.168	0.041	2.96
0.127	0.127	0.168	0.041	3.45
				55.13
40.853	82.455	62.031		
18.076	58.484	23.913	-34.571	
5.837				
5.50	2.23	5.50	1.39	
5.50				

YIELD BASIS H_2+CO FED

CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
1.334			
0.593			
0.440			
2.367			
1.045	4.32	3.711	0.242
0.098	4.24	0.354	0.023
1.047	5.00	3.210	0.209
0.379	4.86	1.195	0.078
0.608	5.45	1.712	0.112
0.193	5.25	0.564	0.037
0.225	5.54	0.623	0.041
3.595		11.369	0.742

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
400 EP	77	7.969	98.0	7.810
400-550	14	1.449	91.4	1.324
550 +	9	0.931	114.6	1.067

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	44.9	7.20		
C_3 POLY GASO.	87.5	6.30	1.054	
C_3 POLY TAR	12.5	0.90	0.120	

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	-	-	68.0
C_6 POLY GASO.	5.98	14.04	2.348	1.5
C_4H_{10}	4.86	5.81	1.195	68.0
C_6 FREE GASO.			11.763	5.8
C_6 POLY TAR	7.53	2.01	0.267	

	gal/hr	gal / MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	15.306	0.9981	5411
GAS OIL	1.324	0.0863	468
FUEL OIL	1.067	0.0696	377
POLY TAR	0.387	0.0252	137
TOTAL	18.084	1.1792	6393
W. S CHEM.	1.284	0.0837	454
TOTAL	19.368	1.2629	6847

Weight Recovery, %	87.62	Catalyst Age, hrs.	28	Space Velocity, vhv	1079	RECOVERED OIL	0.4774**	66.92
Pressure, psig	414	Inlet Velocity, Ft/sec	0.97	Catalyst Vol., CF	14.21	TOTAL OIL		122.05
Temperature, °F	656	Bed Depth, Ft	21.53	Weight, #	2217	WATER SOLUBLE CHEMICALS	0.1864**	9.87
Recycle Ratio	0.98	Bed Density, #/CF	156	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	12.65	TOTAL LIQUID PRODUCTS C_6+		131.92
						NET WATER	7.325**	131.96
						GROSS WATER		141.83
						HYDROCARBON TOTAL—C_1+		189.20

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY				
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+ / C_1+	8.605	15.841	1.033	W. S CHEM.
68.29	94.15	80.30	85.55	79.70	49.87	59.11	78.43	9.249	17.125	1.117	TOTAL

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 63-C
HOURS 28-48
CATALYST Mill Scale Red. at Brownsville

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE	
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr
$CO_{28.010}$	37.043	15.338	429.61	6.387	0.834	23.36	2.535	17.873	3.369	-14.504	-406.25
$H_{2.016}$	59.197	24.512	49.42	35.937	4.695	9.47	14.264	38.776	18.959	-19.817	-39.95
$CO_{44.010}$	2.373	0.983	43.26	32.304	4.221	185.77	12.823	13.806	17.044	3.238	142.51
$N_{28.016}$	0.220	0.091	2.55	1.513	0.198	5.55	0.601	0.692	0.799		
$CH_{4\ 16.042}$	1.167	0.483	7.75	10.923	1.427	22.89	4.336	4.819	5.763	0.944	15.14
$C_2H_{4\ 28.052}$				2.633	0.344	9.65	1.045	1.045	1.389	0.344	9.65
$C_2H_{6\ 30.068}$				1.937	0.253	7.61	0.769	0.769	1.022	0.253	7.61
C_3+C_3											32.40
$C_3H_{6\ 42.078}$				3.273	0.428	18.01	1.299	1.299	1.727	0.428	18.01
$C_3H_{8\ 44.094}$				0.353	0.046	2.03	0.140	0.140	0.186	0.046	2.03
$C_4H_{8\ 56.104}$				2.320	0.303	17.00	0.921	0.921	1.224	0.303	17.00
$C_4H_{10\ 58.120}$				0.757	0.099	5.75	0.300	0.300	0.399	0.099	5.75
$C_5H_{10\ 70.130}$				1.093	0.143	10.03	0.434	0.434	0.577	0.143	10.03
$C_5H_{12\ 72.146}$				0.223	0.029	2.09	0.089	0.089	0.118	0.029	2.09
$C_6H_{12\ 84.158}$				0.347	0.045	3.79	0.138	0.138	0.183	0.045	3.79
C_5+C_6											58.70
TOTAL		41.407	532.59		13.065	323.00	39.694	81.101	60.792		
H_2+CO	96.240	39.850	15123 SCFH		5.529		16.799	56.649	22.328	-34.321	
H_2/CO		1.60	Factor 661244		5.63		5.63	2.17	5.63	1.37	

YIELD BASIS H_2+CO FED				
	#/MCF	CONDENSATE #/gal	gal/hr	gal/MCF
	1.001			
	0.638			
	0.503			
	2.142			
	1.191	4.32	4.169	0.276
	0.134	4.24	0.479	0.032
	1.124	5.00	3.400	0.225
	0.380	4.86	1.183	0.078
	0.663	5.45	1.840	0.122
	0.138	5.25	0.398	0.026
	0.251	5.54	0.684	0.045
	3.881		12.153	0.804
	8.107		22.119	1.463
	0.918		1.758	0.116
	9.025		23.877	1.579
	8.715		15.821	1.046
	9.633		17.579	1.162
	11.168			

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
400 EP	79	7.873	98.0	7.716
400-550	10	0.997	91.4	0.911
550 +	11	1.096	114.6	1.256
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	45.1	8.12		
C_3 POLY GASO.	87.5	7.10	1.187	
C_3 POLY TAR	12.5	1.02	0.135	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.17	0.034	68.0
C_4 POLY GASO.	5.98	14.73	2.463	1.5
C_4H_{10}	4.86	5.75	1.183	68.0
C_4 FREE GASO.			11.825	5.8
C_4 POLY TAR	7.53	2.10	0.279	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	15.505	1.0253	5559	
GAS OIL	0.911	0.0602	326	
FUEL OIL	1.256	0.0831	451	
POLY TAR	0.414	0.0274	149	
TOTAL	18.086	1.1960	6485	
W. S. CHEM.	1.758	0.1162	630	
TOTAL	19.844	1.3122	7115	

Weight Recovery, %	88.83	Catalyst Age, hrs.	48	Space Velocity, vhv	1085	RECOVERED OIL	0.456**	63.91	4.226	9.966	0.659
Pressure, psig	412	Inlet Velocity, Ft/sec	0.96	Catalyst Vol., CF	13.94	TOTAL OIL		122.61	8.107	22.119	1.463
Temperature, °F	655	Bed Depth, Ft	21.12	Weight, #	2133	WATER SOLUBLE CHEMICALS	0.262**	13.89	0.918	1.758	0.116
Recycle Ratio	0.96	Bed Density, #/CF	153	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ = 13.11		TOTAL LIQUID PRODUCTS C_5+		136.50	9.025	23.877	1.579
						NET WATER	7.315**	131.79	8.715	15.821	1.046
						GROSS WATER		145.68	9.633	17.579	1.162
						HYDROCARBON TOTAL—C_1+		168.90	11.168		

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
68.45	94.56	80.85	86.13	81.15	51.11	60.59	80.82

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91X#/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6X gal/MCF

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	439	Fresh Feed	15,714
Natural Gas	442	Recycle	15,064
Generator Outlet	417	Combined Feed	30,778
Reactor Inlet	412	Wet Gas—Measured	4,045
Condenser Inlet		Adjusted	4,958
Product Accumulator	361	Loss	913
TEMPERATURES—°F.		Recycle/Fresh Feed	0.96
Oxygen	478	Inlet Velocity—ft./sec.	0.96
Natural Gas	747	Fresh Feed Rate—S.C.F.H. H_2+CO	15123
Generator	2068	per Cu. Ft. Dense Bed	1085
Quench Accumulator	151	per Lb. Catalyst	7.09
Reactor Inlet	357	per Sq. Ft.	22914
Condenser Inlet	577		
Product Accumulator	92	Heat Transfer Calculations	
Catalyst No. Height		Steam Rate = 237 #/hr.	
1 See Period A	565	@705 psia & 506°F =	
2	658	1201 Btu/#	
3	651	Water in @63°F = 31 Btu/#	
4	660	Net Heat Trans./# steam =	
5	664	1170 Btu	
6	662	(1170)(237) = 277,290 Btu	
7	650	Ave. Bed Temp. = 655°F	
8	641	dT = 655-506 = 149°F	
9	634	Tube Area = 37.6 sq. ft.	
10	629	$K = \frac{277,290}{(37.6)(149)} = 49.5$ Btu/°F/sq.ft.	
11			

PRODUCT TESTS	OIL	WATER
°API	52.2	10.7
Neut. No.	40.0	31.9
Sap. No.	47.7	35.0
Hydrox. No.		
Bromine No.	82	
Pour °F.		
Chemicals, % by K_2CO_3		10.0
HEMPEL. DIST. %		°API
205 °F.		
400	78	55.2
400-550	10	30.2
550+	12	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	107	
10%	134	
50%	221	
90%	350	
EP	411	
Rec.		

CATALYST DATA					
INVENTORY DATA		PARTICLE SIZE			
		Screen Analysis		Sedimentation	
In Reactor at Start of Period		Mesh	Microns	Microns	%
Fresh Catalyst Added		On 40	419+	80+	
Total		100	150	40—80	
Catalyst Recovered	33	150	105	20—40	
In Reactor at End of Period		200	74	10—20	
		250	62	0—20	
REACTOR d-p, Inches H_2O		325	44		
No. Height		<325			
0 See Period A	-				
1	76	CATALYST			
2	75	Bulk Density, Lbs./Cu.Ft.			
3	81	Aerated			
4	360	Settled			
Total	592	Compacted			
		Particle Density, gm./cc.			
CALCULATED FROM dp		NH_3 Value, ml./gm.			
Density, Lbs./Cu.Ft.	153	N_2 Surface, m^2/gm.			
Inventory, Lbs.	2133				
Bed Depth, Ft.	21.12	CHEMICAL ANALYSIS			
Vol., Cu. Ft.	13.94	Fe			
		C			
		O			
		H			
		K_2O, W+, % basis Fe			
		X-Ray Analysis—			
		Fe_2O_3			
		Fe_3O_4			
		Fe			

	GAS ANALYSES				GENERATOR BALANCE									
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O
FRESH FEED									O_2 32.000	0.23	10.364 0.030			20.788
$CO_{28.010}$	37.02	36.15	37.96	37.043	15.338	15.338		15.338	$CO_{2\ 44.010}$	1.42	0.186	0.186		0.372
$H_{2\ 2.016}$	60.08	58.38	59.13	59.197	24.512		49.024		$N_{2\ 28.016}$	0.42	0.055			
$CO_{2\ 44.010}$	2.05	2.41	2.66	2.373	0.983	0.983		1.966	$CH_{4\ 16.042}$	83.32	10.914	10.914	43.656	
$N_{2\ 28.016}$	0.19	0.27	0.20	0.220	0.091				$C_2H_{6\ 30.068}$	7.13	0.934	1.868	5.604	
$CH_{4\ 16.042}$	0.66	2.79	0.05	1.167	0.483	0.483	1.932		$C_3H_{8\ 44.094}$	5.29	0.693	2.079	5.544	
			M. W	12.862358					$C_4H_{10\ 58.120}$	1.56	0.204	0.816	2.040	
			H_2O 18.016				6.926	3.463	$C_5H_{12\ 72.146}$	0.63	0.083	0.415	0.996	
						16.804	57.882	20.767	MW =	20.02002				
			BALANCE			103.23	100.07	99.90	TOTAL			16.278	57.840	20.788

WEIGHT BALANCE		
	#/hr Measured	At Wt. Balance
WET GAS	263.51	323.00
OIL	63.91	63.91
WATER	145.68	145.68
TOTAL	473.10	532.59
FRESH FEED	532.59	
WEIGHT BALANCE	88.83	
WET GAS FACTOR	1225759	
INDICATED LOSS—S C F H	913	

WET GAS				
$CO_{28.010}$	6.31	6.17	6.68	6.387
$H_{2\ 2.016}$	36.55	35.82	35.44	35.937
$CO_{2\ 44.010}$	29.71	33.33	33.87	32.304
$N_{2\ 28.016}$	1.42	1.63	1.49	1.513
$CH_{4\ 16.042}$	12.40	10.25	10.12	10.923
$C_2H_{4\ 28.052}$	2.79	2.52	2.59	2.633
$C_2H_{6\ 30.068}$	1.96	1.93	1.92	1.937
$C_3H_{6\ 42.078}$	3.45	3.12	3.25	3.273
$C_3H_{8\ 44.094}$	0.41	0.28	0.37	0.353
$C_4H_{8\ 56.104}$	2.49	2.30	2.17	2.320
$C_4H_{10\ 58.120}$	0.72	0.89	0.66	0.757
$C_5H_{10\ 70.130}$	1.18	1.12	0.98	1.093
$C_5H_{12\ 72.146}$	0.26	0.25	0.16	0.223
$C_6H_{12\ 84.158}$	0.35	0.39	0.30	0.347
			M. W.	24.72153

GAS FLOW RATES									
		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED			412.3	72	2250753			
			1.50	66	1171044			
WET GAS								
	158.44	5.895	4.025	0.9943	1.0821	4,045	10.659	
			411.6	127				
RECYCLE								
	79.31	8.482	20.647	0.9412	1.0821	14,146	37.275	
BLEED								
	5.02	8.182	20.647	1.0000	1.0821	918	2.419	
			442.3	201	1446052			
NATURAL GAS								
	28.43	7.668	21.378	0.8870	1.2025	4,971	13.099	
			438.7	73				
OXYGEN								
	27.07	6.909	21.293	0.9877		3,933	10.364	
			30.6					
STEAM			4.7					
	215.7	3.759	34.7 0.2917		237 #/hr.			

LIQUID PRODUCT RATES Basis 19 hours							
HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
OIL	6'0¾"	320.94	54	1.0030	321.90	52.2	2064.34	
	2'6¾"	135.80	68	0.9961	135.27	6.413	867.49	
					42.73		17.50	63.91
					189.36		1214.35	9.966
WATER	7'3"	384.23	74	0.99846	383.64	10.7	3179.22	
	1'11½"	102.89	73	0.99858	102.74	8.287	851.41	
	2'6"	133.50	66	0.99942	133.42		1105.65	
	1'6¾"	80.37	68	0.99920	80.31		665.53	145.68
					334.01		2767.93	17.579

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 63-D
HOURS 48-72
CATALYST Mill Scale Red. at Brownsville

	FRESH FEED			WET GAS	At Wt. Balance		RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		CONDENSATE			
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	37.043	15.511	434.47	6.530	0.858	24.03	2.657	18.168	3.515	-14.653	-410.44				
H_2 2.016	60.237	25.224	50.85	36.277	4.765	9.60	14.759	39.983	19.524	-20.459	-41.25				
CO_2 44.010	2.300	0.963	42.38	30.750	4.037	177.65	12.511	13.474	16.548	3.074	135.27	8.750			
N_2 28.016	0.243	0.102	2.86	1.520	0.200	5.60	0.618	0.720	0.818	•					
CH_4 16.042	0.177	0.074	1.19	11.500	1.511	24.24	4.679	4.753	6.190	1.437	23.05	1.491			
C_2H_4 28.052				2.667	0.350	9.82	1.085	1.085	1.435	0.350	9.82	0.635			
C_2H_6 30.068				2.173	0.285	8.57	0.884	0.884	1.169	0.285	8.57	0.554			
C_1+C_2											41.44	2.680			
C_3H_6 42.078				3.690	0.485	20.41	1.501	1.501	1.986	0.485	20.41	1.320	4.32	4.725	0.306
C_3H_8 44.094				0.320	0.042	1.85	0.130	0.130	0.172	0.042	1.85	0.120	4.24	0.436	0.028
C_4H_8 56.104				2.373	0.312	17.50	0.965	0.965	1.277	0.312	17.50	1.132	5.00	3.500	0.226
C_4H_{10} 58.120				0.720	0.095	5.52	0.293	0.293	0.388	0.095	5.52	0.357	4.86	1.136	0.073
C_5H_{10} 70.130				0.987	0.130	9.12	0.402	0.402	0.532	0.130	9.12	0.590	5.45	1.673	0.108
C_5H_{12} 72.146				0.243	0.032	2.31	0.099	0.099	0.131	0.032	2.31	0.149	5.25	0.440	0.028
C_6H_{12} 84.156				0.250	0.033	2.78	0.102	0.102	0.135	0.033	2.78	0.180	5.54	0.502	0.032
C_3-C_6											59.49	3.848		12.412	0.801
TOTAL		41.874	531.74		13.135	319.00	40.685	82.559	62.031						
H_2+CO	97.280	40.735	15459	SCFH	5.623		17.416	58.151	23.039	-35.112					
H_2/CO		1.63	Factor 646872		5.55		5.55	2.20	5.55	1.40					

							NET CHANGE m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF
Weight Recovery, %	92.82	Catalyst Age, hrs. 72	Space Velocity, vhv 1096			RECOVERED OIL	0.460**	64.52	4.174		10.094	0.653
Pressure, psig	415	Inlet Velocity, Ft/sec 0.97	Catalyst Vol.CF 14.10			TOTAL OIL		124.01	8.022		22.506	1.454
Temperature, °F	655	Bed Depth, Ft 21.37	Weight, # 2228			WATER SOLUBLE CHEMICALS	0.245**	13.01	0.842		1.665	0.108
Recycle Ratio	0.97	Bed Density, #/CF 158	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ = 12.25			TOTAL LIQUID PRODUCTS C_3+		137.02	8.864		24.171	1.562
FRESH FEED CONVERSION — %			TOTAL FEED CONVERSION — %		SELECTIVITY	NET WATER	7.506**	135.22	8.747		16.233	1.050
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+	GROSS WATER		148.23	9.589	17.898	1.158
68.63	94.47	81.11	86.20	80.65	51.17	60.38	76.78	HYDROCARBON TOTAL—C_1+		178.46	11.544	

YIELD BASIS H_2+CO FED

YIELDS	BASIS BROWNSVILLE DESIGN FEED RATE*			
	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	80.0	8.075	98.0	7.914
400-550	10.4	1.050	91.4	0.960
550 +	9.6	0.969	114.6	1.110
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	45.4	9.27		
C_3 POLY GASO.	87.5	8.11	1.356	
C_3 POLY TAR	12.5	1.16	0.154	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.45	0.090	68.0
C_4 POLY GASO.	5.98	14.92	2.495	1.5
C_4H_{10}	4.86	5.52	1.136	68.0
C_4-FREE GASO.			11.885	5.8
C_4 POLY TAR	7.53	2.13	0.283	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	15.606	1.0095	5473	
GAS OIL	0.960	0.0621	337	
FUEL OIL	1.110	0.0718	389	
POLY TAR	0.437	0.0283	153	
TOTAL	18.113	1.1717	6352	
W. S. CHEM.	1.665	0.1077	584	
TOTAL	19.778	1.2794	6936	

Form ML—11 **Included in Reactor Effluent Total g/NCM = 16.91×#/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6×gal/MCF

OPERATING CONDITIONS

PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	443	Fresh Feed	15,891
Natural Gas	445	Recycle	15,440
Generator Outlet	420	Combined Feed	31,331
Reactor Inlet	415	Wet Gas—Measured	4,388
Condenser Inlet		Adjusted	4,984
Product Accumulator	364	Loss	596
TEMPERATURES—°F.		Recycle/Fresh Feed	0.97
Oxygen	503	Inlet Velocity—ft./sec.	0.97
Natural Gas	796	Fresh Feed Rate—S.C.F.H. H_2 + CO	15459
Generator	2267	per Cu.Ft. Dense Bed	1096
Quench Accumulator	153	per Lb. Catalyst	6.94
Reactor Inlet	338	per Sq. Ft.	23423
Condenser Inlet	577		
Product Accumulator	91		
Catalyst No. Height			
1 See Period A	557		
2	659		
3	653		
4	659		
5	663		
6	660		
7	649		
8	642		
9	636		
10	631		
11	516		

PRODUCT TESTS

	OIL	WATER
°API	52.8	10.8
Neut. No.	44.0	33.0
Sap. No.	55.0	36.3
Hydrox. No.		
Bromine No.	88	
Pour °F.		
Chemicals, % by K_2CO_3		9.3
HEMPEL, DIST. %		°API
205 °F.		
400	79.0	55.8
400-550	10.4	36.0
550+	10.6	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	93	
10%	120	
50%	200	
90%	324	
EP	348	
Rec.	98	

CATALYST DATA

INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	49
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 See Period A	-
1	76
2	81
3	82
4	380
Total	619
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	158
Inventory, Lbs.	2228
Bed Depth, Ft.	21.37
Vol., Cu. Ft.	14.10

PARTICLE SIZE

Screen Analysis			Sedimentation	
Mesh	Microns	%	Microns	%
On 40	419+		80+	
100	150		40—80	
150	105		20—40	
200	74		10—20	
250	62		0—20	
325	44			
<325				

CATALYST	
Bulk Density, Lbs./Cu.Ft.	
Aerated	
Settled	
Compacted	
Particle Density, gm./cc.	
NH_3 Value, ml./gm.	
N_2 Surface, m^2/gm.	
CHEMICAL ANALYSIS	
Fe	
C	
O	
H	
K_2O, W+, % basis Fe	
X-Ray Analysis—	
$Fe_{20}C_9$	
Fe_3O_4	
Fe	

GAS ANALYSES / GENERATOR BALANCE

HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O
FRESH FEED								
CO 28.010	36.94	37.02	37.17	37.043	15.511	15.511		15.511
H_2 2.016	60.19	60.37	60.15	60.237	25.224		50.448	
CO_2 44.010	2.27	2.29	2.34	2.300	0.963	0.963		1.926
N_2 28.016	0.25	0.21	0.27	0.243	0.102			
CH_4 16.042	0.35	0.11	0.07	0.177	0.074	0.074	0.296	
			M. W	12.698825				
			H_2O 18.016				7.525	3.763
						16.548	58.269	21.200
			BALANCE			101.92	100.98	98.69

	Mol %	M/Hr	C	H	O
O_2 32.000	0.21	10.522 0.028			21.100
CO_2 44.010	1.44	0.191	0.191		0.382
N_2 28.016	1.79	0.237			
CH_4 16.042	82.33	10.918	10.918	43.672	
C_2H_6 30.068	6.80	0.902	1.804	5.412	
C_3H_8 44.094	5.28	0.700	2.100	5.600	
C_4H_{10} 58.120	1.55	0.206	0.824	2.060	
C_5H_{12} 72.146	0.60	0.080	0.400	0.960	
MW = 20.116332					
TOTAL			16.237	57.704	21.482

WEIGHT BALANCE

	#/hr Measured	At Wt. Balance
WET GAS	280.83	319.00
OIL	64.52	64.52
WATER	148.23	148.23
TOTAL	493.58	531.75
FRESH FEED	531.75	
WEIGHT BALANCE	92.82	
WET GAS FACTOR	1135918	
INDICATED LOSS—S C F H	596	

WET GAS	1400	2200	0600	AVERAGE
CO 28.010	6.48	6.29	6.82	6.530
H_2 2.016	36.04	35.26	37.53	36.277
CO_2 44.010	32.01	32.91	27.33	30.750
N_2 28.016	1.49	1.29	1.78	1.520
CH_4 16.042	11.65	11.04	11.81	11.500
C_2H_4 28.052	2.55	2.73	2.72	2.667
C_2H_6 30.068	1.99	2.15	2.38	2.173
C_3H_6 42.078	3.57	3.57	3.93	3.690
C_3H_8 44.094	0.41	0.27	0.28	0.320
C_4H_8 56.104	2.12	2.30	2.70	2.373
C_4H_{10} 58.120	0.55	0.66	0.95	0.720
C_5H_{10} 70.130	0.79	1.00	1.17	0.987
C_5H_{12} 72.146	0.18	0.26	0.29	0.243
C_6H_{12} 84.156	0.17	0.27	0.31	0.250
			M. W.	24.28715

GAS FLOW RATES

	$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED 79.31	6.463	415 / 20.729	70 / 0.9905	2279738 / 1.5099	15,891	41.874
WET GAS 158.44	6.325	1.51 / 4.026	64 / 0.9962	1191988 / 1.0918	4,388	11.563
RECYCLE 79.31	8.479	415.3 / 20.736	118 / 0.9485	1.0918	14,440	38.050
BLEED 5.02	8.800	20.736	1.0000	1.0918	1,000	2.635
NATURAL GAS 28.43	7.700	445 / 21.441	191 / 0.8938	1439129 / 1.1996	5,033	13.262
OXYGEN 27.07	6.963	442.6 / 21.385	70 \ / 0.9905		3,993	10.522
STEAM 215.7	3.354	30.1 + 4.7 = 34.8 / 0.2920		211 #/hr.		

LIQUID PRODUCT RATES

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
OIL	7'3½"	386.41	65	0.9975	385.44	52.8	2463.73	
	6'0½"	320.94	54	1.0030	321.90	6.392	2057.58	
	4'4"	231.47	53	1.0035	232.28		1484.73	
	1'1¼"	57.39	72	0.9941	57.05		364.66	
					+3.48		+22.25	64.52
					242.25		1548.47	10.094
WATER	7'7"	401.69	76	0.99819	400.96	10.8	3320.75	
	2'6"	133.50	66	0.99942	133.42	8.282	1104.98	
	4'5½"	238.01	66	0.99942	237.87		1970.04	
	1'5½"	75.97	74	0.99846	75.85		628.19	148.23
					429.56		3557.62	17.898

THE TEXAS COMPANY — MONTEBELLO LABORATORY

YIELD CALCULATIONS

RUN NO. 63-E
HOURS 72-96
CATALYST Mill Scale Red. at Brownsville

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO 28.010	36.603	15.284	428.08	7.167	0.897	25.12	2.884	18.168	3.781	-14.387	-402.96				
H_2 2.016	60.827	25.397	51.20	35.947	4.501	9.08	14.467	39.864	18.968	-20.896	-42.12				
CO_2 44.010	2.193	0.916	40.30	31.870	3.991	175.65	12.825	13.741	16.816	3.075	135.35	8.767			
N_2 28.016	0.220	0.092	2.58	2.243	0.281	7.87	0.903	0.995	1.184						
CH_4 16.042	0.157	0.066	1.06	9.924	1.243	19.94	3.994	4.060	5.237	1.177	18.88	1.223			
C_2H_4 28.052				2.503	0.313	8.78	1.007	1.007	1.320	0.313	8.78	0.569			
C_2H_6 30.068				2.103	0.263	7.91	0.846	0.846	1.109	0.263	7.91	0.512			
C_1+C_2											35.57	2.304			
C_3H_6 42.078				3.487	0.437	18.39	1.403	1.403	1.840	0.437	18.39	1.191	4.32	4.257	0.276
C_3H_8 44.094				0.287	0.036	1.59	0.115	0.115	0.151	0.036	1.59	0.103	4.24	0.375	0.024
C_4H_8 56.104				2.260	0.283	15.88	0.909	0.909	1.192	0.283	15.88	1.029	5.00	3.176	0.206
C_4H_{10} 58.120				0.793	0.099	5.75	0.319	0.319	0.418	0.099	5.75	0.372	4.86	1.183	0.077
C_5H_{10} 70.130				0.943	0.118	8.28	0.379	0.379	0.497	0.118	8.28	0.536	5.45	1.519	0.098
C_5H_{12} 72.146				0.233	0.029	2.09	0.094	0.094	0.123	0.029	2.09	0.135	5.25	0.398	0.026
C_6H_{12} 84.156				0.240	0.030	2.52	0.097	0.097	0.127	0.030	2.52	0.163	5.54	0.455	0.029
C_3-C_4											54.50	3.529		11.363	0.736
TOTAL		41.755	523.22		12.521	308.85	40.242	81.997	60.942						
H_2+CO	97.430	40.681	15439	SCFH	5.398		17.351	58.032	22.749	-35.283					
H_2/CO		1.66	Factor 647710		5.02		5.02	2.19	5.02	1.45					

							NET CHANGE m/hr	NET CHANGE #/hr	#/MCF	#/gal	gal/hr	gal/MCF
Weight Recovery, %	94.39	Catalyst Age, hrs.	96	Space Velocity, vhv	1084	RECOVERED OIL	0.459**	64.40	4.171		10.108	0.655
Pressure, psig	414	Inlet Velocity, Ft/sec	0.96	Catalyst Vol., CF	14.24	TOTAL OIL		118.90	7.700		21.471	1.391
Temperature, °F	656	Bed Depth, Ft	21.57	Weight, #	2221	WATER SOLUBLE CHEMICALS	0.310**	16.47	1.067		2.082	0.135
Recycle Ratio	0.96	Bed Density, #/CF	156	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ =	11.38	TOTAL LIQUID PRODUCTS C_3+		135.37	8.767		23.553	1.526

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY		NET CHANGE m/hr	NET CHANGE #/hr	#/MCF	#/gal	gal/hr	gal/MCF
								NET WATER	7.410**	133.50	8.647		16.026	1.038
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+	GROSS WATER		149.97	9.714		18.108	1.173
70.01	94.13	82.28	86.73	79.19	52.42	60.80	79.19	HYDROCARBON TOTAL—C_1+		170.94	11.071			

YIELD BASIS H_2+CO FED — YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*

	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	81.0	8.187	98.0	8.023
400-550	11.2	1.132	91.4	1.035
550 +	7.8	0.789	114.6	0.904
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	47.6	8.75		
C_3 POLY GASO.	87.5	7.66	1.281	
C_3 POLY TAR	12.5	1.09	0.145	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.02	0.004	68.0
C_4 POLY GASO.	5.98	13.88	2.321	1.5
C_4H_{10}	4.86	5.75	1.183	68.0
C_4-FREE GASO.			11.676	5.8
C_4 POLY TAR	7.53	1.98	0.263	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	15.184	0.9835	5332	
GAS OIL	1.035	0.0670	363	
FUEL OIL	0.904	0.0586	318	
POLY TAR	0.408	0.0264	143	
TOTAL	17.531	1.1355	6156	
W. S. CHEM.	2.082	0.1349	731	
TOTAL	19.613	1.2704	6887	

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91×#/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6×gal/MCF

OPERATING CONDITIONS

PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	441	Fresh Feed	15,846
Natural Gas	445	Recycle	15,272
Generator Outlet	417	Combined Feed	31,118
Reactor Inlet	414	Wet Gas—Measured	4,300
Condenser Inlet		Adjusted	4,752
Product Accumulator	362	Loss	452
TEMPERATURES—°F.		Recycle/Fresh Feed	0.96
Oxygen	502	Inlet Velocity—ft./sec.	0.96
Natural Gas	792	Fresh Feed Rate—S.C.F.H. H_2 + CO	15439
Generator	2259	per Cu. Ft. Dense Bed	1084
Quench Accumulator	137	per Lb. Catalyst	6.95
Reactor Inlet	331	per Sq. Ft.	23392
Condenser Inlet	578		
Product Accumulator	88		
Catalyst No. Height			
1	567		
2	659		
3	654		
4	659		
5	663		
6	661		
7	650		
8	643		
9	637		
10	632		
11	517		

PRODUCT TESTS

	OIL	WATER
°API	53.4	10.8
Neut. No.	43.0	33.2
Sap. No.	56.7	36.2
Hydrox. No.		
Bromine No.	96	
Pour °F.		
Chemicals, % by K_2CO_3		11.5
HEMPEL, DIST. %		°API
205 °F.		
400	80.0	55.8
400-550	11.2	35.4
550+	8.8	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	83	
10%	124	
50%	201	
90%	326	
EP	384	
Rec.	97.5	

CATALYST DATA

INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	42
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 See Period A	-
1	75
2	79
3	83
4	380
Total	617
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	156
Inventory, Lbs.	2221
Bed Depth, Ft.	21.57
Vol., Cu. Ft.	14.24

PARTICLE SIZE

Screen Analysis Mesh	Microns	%	Sedimentation Microns	%
On 40	419+		80+	
100	150		40—80	
150	105		20—40	
200	74		10—20	
250	62		0—20	
325	44			
<325				

CATALYST	
Bulk Density, Lbs./Cu.Ft.	
Aerated	
Settled	
Compacted	
Particle Density, gm./cc.	
NH_3 Value, ml./gm.	
N_2 Surface, m^2/gm.	
CHEMICAL ANALYSIS	
Fe	
C	
O	
H	
K_2O, W+, % basis Fe	
X-Ray Analysis—	
$Fe_{20}C_9$	
Fe_3O_4	
Fe	

GAS ANALYSES / GENERATOR BALANCE

HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O
FRESH FEED								
CO 28.010	35.93	36.97	36.91	36.603	15.284	15.284		15.284
H_2 2.016	61.19	60.69	60.60	60.827	25.397		50.794	
CO_2 44.010	2.38	2.02	2.18	2.193	0.916	0.916		1.832
N_2 28.016	0.29	0.16	0.21	0.220	0.092			
CH_4 16.042	0.21	0.16	0.10	0.157	0.066	0.066	0.264	
			M. W	12.53073				
			H_2O 18.016				7.450	3.725
						16.266	58.508	20.841
			BALANCE			100.94	101.93	97.42

	Mol %	M/Hr	C	H	O
O_2 32.000	0.29	10.495 0.038			21.066
CO_2 44.010	1.24	0.164	0.164		0.328
N_2 28.016	1.98	0.262			
CH_4 16.042	81.91	10.825	10.825	43.300	
C_2H_6 30.068	7.24	0.957	1.914	5.742	
C_3H_8 44.094	5.51	0.728	2.184	5.824	
C_4H_{10} 58.120	1.35	0.178	0.712	1.780	
C_5H_{12} 72.146	0.48	0.063	0.315	0.756	
MW =20.070666					
TOTAL			16.114	57.402	21.394

WEIGHT BALANCE

	#/hr Measured	At Wt. Balance
WET GAS	279.50	308.85
OIL	64.40	64.40
WATER	149.97	149.97
TOTAL	493.87	523.22
FRESH FEED	523.22	
WEIGHT BALANCE	94.39	
WET GAS FACTOR	1105008	
INDICATED LOSS—S C F H	452	

WET GAS	1400	2200	0600	AVERAGE
CO 28.010	6.66	7.16	7.68	7.167
H_2 2.016	36.64	35.68	35.52	35.947
CO_2 44.010	31.96	31.53	32.12	31.870
N_2 28.016	1.72	1.72	3.29	2.243
CH_4 16.042	10.76	10.25	8.76	9.924
C_2H_4 28.052	2.61	2.49	2.41	2.503
C_2H_6 30.068	2.09	2.13	2.09	2.103
C_3H_6 42.078	3.42	3.64	3.40	3.487
C_3H_8 44.094	0.30	0.28	0.28	0.287
C_4H_8 56.104	1.98	2.62	2.18	2.260
C_4H_{10} 58.120	0.61	0.85	0.92	0.793
C_5H_{10} 70.130	0.84	1.11	0.88	0.943
C_5H_{12} 72.146	0.16	0.26	0.28	0.233
C_6H_{12} 84.156	0.25	0.28	0.19	0.240
			M. W.	24.66709

GAS FLOW RATES

	√H	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED 79.31	6.367	414.0 20.705	63 0.9971	2310319 1.5200	15,846	41.755
WET GAS 158.44	6.225	1.50 4.025	60 1.0000	1173628 1.0833	4,300	11.331
RECYCLE 79.31	8.483	412.8 20.676	119 0.9477	1.0833	14,281	37.631
BLEED 5.02	8.813	20.676	1.0000	1.0833	991	2.611
NATURAL GAS 28.43	7.692	445.3 21.447	196 0.8903	1442403 1.2010	5,015	13.215
OXYGEN 27.07	6.921	440.6 21.338	64 0.9962		3,983	10.495
STEAM 215.7	2.950	29.9 4.7 34.6 0.2913		185 #/hr.		

LIQUID PRODUCT RATES

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
OIL	7'3½"	386.41	58	1.0010	386.80	53.4	2464.30	
	4'4"	231.47	53	1.0035	232.28	6.371	1479.86	
	2'7"	138.11	49	1.0054	138.86		884.68	
	1'0"	52.00	52	1.0039	52.20		332.57	
					+1.41		+9.00	64.40
					242.59		1545.55	10.108
WATER	7'3"	384.23	74	0.99846	383.64	10.8	3177.31	
	4'5½"	238.01	66	0.99942	237.87	8.282	1970.04	
	6'2 5/8"	330.22	66	0.99942	330.03		2733.31	
	0'9½"	41.26	70	0.99896	41.22		341.38	149.97
					434.58		3599.20	18.108

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 63-F
HOURS 96-120
CATALYST Mill Scale Red. at Brownsville

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO 28.010	37.247	15.639	438.04	7.447	0.983	27.53	3.012	18.651	3.995	-14.656	-410.51				
H_2 2.016	60.526	25.413	51.23	36.844	4.861	9.80	14.899	40.312	19.760	-20.552	-41.43				
CO_2 44.010	1.917	0.805	35.43	31.634	4.174	183.67	12.793	13.598	16.967	3.369	148.24	9.515			
N_2 28.016	0.217	0.091	2.55	1.940	0.256	7.17	0.785	0.876	1.041						
CH_4 16.042	0.093	0.039	0.63	9.763	1.288	20.66	3.948	3.987	5.236	1.249	20.03	1.286			
C_2H_4 28.052				2.663	0.351	9.85	1.077	1.077	1.428	0.351	9.85	0.632			
C_2H_6 30.068				1.777	0.234	7.04	0.719	0.719	0.953	0.234	7.04	0.452			
C_1+C_2											36.92	2.370			
C_3H_6 42.078				3.420	0.451	18.98	1.383	1.383	1.834	0.451	18.98	1.218	4.32	4.394	0.282
C_3H_8 44.094				0.317	0.042	1.85	0.128	0.128	0.170	0.042	1.85	0.119	4.24	0.436	0.028
C_4H_8 56.104				2.143	0.283	15.88	0.867	0.867	1.150	0.283	15.88	1.019	5.00	3.176	0.204
C_4H_{10} 58.120				0.703	0.093	5.41	0.284	0.284	0.377	0.093	5.41	0.347	4.86	1.113	0.071
C_5H_{10} 70.130				0.893	0.118	8.28	0.361	0.361	0.479	0.118	8.28	0.531	5.45	1.519	0.098
C_5H_{12} 72.146				0.213	0.028	2.02	0.086	0.086	0.114	0.028	2.02	0.130	5.25	0.385	0.025
C_6H_{12} 84.156				0.243	0.032	2.69	0.098	0.098	0.130	0.032	2.69	0.173	5.54	0.486	0.031
C_3-C_6											55.11	3.537		11.509	0.739
TOTAL		41.987	527.88		13.194	320.83	40.440	82.427	61.606						
H_2+CO	97.773	41.052	15579	SCFH	5.844		17.911	58.963	23.755	-35.208					
H_2/CO		1.62	Factor 641889		4.95		4.95	2.16	4.95	1.40					

								NET CHANGE m/hr	NET CHANGE #/hr	#/MCF	#/gal	gal/hr	gal/MCF
Weight Recovery, %	92.80	Catalyst Age, hrs.	120	Space Velocity, vhv	1095		RECOVERED OIL	0.436**	61.17	3.926		9.596	0.616
Pressure, psig	413	Inlet Velocity, Ft/sec	0.97	Catalyst Vol.,CF	14.23		TOTAL OIL		116.28	7.463		21.105	1.355
Temperature, °F	656	Bed Depth, Ft	21.56	Weight, #	2191		WATER SOLUBLE CHEMICALS	0.288**	15.30	0.982		1.938	0.124
Recycle Ratio	0.96	Bed Density, #/CF	154	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$	= 11.58		TOTAL LIQUID PRODUCTS C_3+		131.58	8.445		23.043	1.479
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %		SELECTIVITY	NET WATER	7,248**	130.58	8.382		15.676	1.006
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$ / C_3+/C_1+	GROSS WATER		145.88	9.364		17.614	1.130
68.58	93.71	80.87	85.76	78.58	50.98	59.71 / 78.09	HYDROCARBON TOTAL—C_1+		168.50	10.816			

YIELD BASIS H_2+CO FED — YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*

	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	82.2	7.887	98.0	7.729
400-550	9.6	0.921	91.4	0.842
550 +	8.2	0.788	114.6	0.903
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	45.3	8.60		
C_3 POLY GASO.	87.5	7.52	1.258	
C_3 POLY TAR	12.5	1.08	0.143	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.23	0.046	68.0
C_4 POLY GASO.	5.98	13.69	2.290	1.5
C_4H_{10}	4.86	5.41	1.113	68.0
C_4-FREE GASO.			11.377	5.8
C_4 POLY TAR	7.53	1.96	0.260	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	14.826	0.9517	5160	
GAS OIL	0.842	0.0540	293	
FUEL OIL	0.903	0.0580	314	
POLY TAR	0.403	0.0259	140	
TOTAL	16.974	1.0896	5907	
W. S. CHEM.	1.938	0.1244	674	
TOTAL	18.912	1.2140	6581	

Form ML—11 **Included in Reactor Effluent Total g/NCM = 16.91×#/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

OPERATING CONDITIONS

PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	441	Fresh Feed	15,934
Natural Gas	446	Recycle	15,347
Generator Outlet	416	Combined Feed	31,281
Reactor Inlet	413	Wet Gas—Measured	4,414
Condenser Inlet		Adjusted	5,007
Product Accumulator	362	Loss	593
TEMPERATURES—°F.		Recycle/Fresh Feed	0.96
Oxygen	478	Inlet Velocity—ft./sec.	0.97
Natural Gas	781	Fresh Feed Rate—S.C.F.H. H_2+CO	15579
Generator	2282	per Cu.Ft. Dense Bed	1095
Quench Accumulator	153	per Lb. Catalyst	7.11
Reactor Inlet	318	per Sq. Ft.	23605
Condenser Inlet	582		
Product Accumulator	91	Heat Transfer Calculations	
Catalyst No. Height		Steam Rate = 164 #/hr.	
1 See Period A	564	@705 psia & 506°F =	
2	657	= 1201 Btu/#	
3	650	Water in @54°F = 22 Btu/#	
4	657	Net Heat Trans./# steam =	
5	663	(1179)(164) = 193,356 Btu/hr.	
6	662	Ave. Bed Temp. = 656°F	
7	653	dT = 656-506 = 150°F	
8	647	Tube Area = 37.8 sq. ft.	
9	640	$K = \frac{193,356}{(37.8)(150)} = 34.1$ Btu/°F/sq.ft.	
10	636		
11	519		

PRODUCT TESTS

	OIL	WATER
°API	53.3	10.8
Neut. No.	41.8	34.5
Sap. No.	55.5	37.0
Hydrox. No.		
Bromine No.	95	
Pour °F.		
Chemicals, % by K_2CO_3		11.0
HEMPEL, DIST. %		°API
205 °F.		
400	81.2	56.1
400-550	9.6	35.2
550+	9.2	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	94	
10%	128	
50%	212	
90%	330	
EP	384	
Rec.	96.5	

CATALYST DATA

INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	28
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 See Period A	
1	74
2	80
3	80
4	375
Total	609
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	154
Inventory, Lbs.	2191
Bed Depth, Ft.	21.56
Vol., Cu. Ft.	14.23

PARTICLE SIZE

Screen Analysis Mesh	Microns	%	Sedimentation Microns	%
On 40	419+		80+	
100	150		40—80	
150	105		20—40	
200	74		10—20	
250	62		0—20	
325	44			
<325				

CATALYST	
Bulk Density, Lbs./Cu.Ft.	
Aerated	
Settled	
Compacted	
Particle Density, gm./cc.	
NH_3 Value, ml./gm.	
N_2 Surface, m²/gm.	
CHEMICAL ANALYSIS	
Fe	
C	
O	
H	
K_2O, W+. % basis Fe	
X-Ray Analysis—	
$Fe_{20}C_9$	
Fe_3O_4	
Fe	

GAS ANALYSES / GENERATOR BALANCE

HOUR	1300	2200	0600	AVERAGE	M/HR	C	H	O
FRESH FEED								
CO 28.010	37.25	37.29	37.20	37.247	15.639	15.639		15.639
H_2 2.016	60.57	60.52	60.49	60.526	25.413		50.826	
CO_2 44.010	1.84	1.89	2.02	1.917	0.805			1.610
N_2 28.016	0.24	0.20	0.21	0.217	0.091			
CH_4 16.042	0.10	0.10	0.08	0.093	0.039	0.039	0.156	
			M. W	12.572474			6.888	4.279
			H_2O 18.016				7.723	3.862
						16.483	58.705	21.111
			BALANCE			101.40	101.44	98.06

	Mol %	M/Hr	C	H	O
O_2 32.000	0.20	10.551 0.026			21.154
CO_2 44.010	1.41	0.187	0.187		0.374
N_2 28.016	1.19	0.158			
CH_4 16.042	82.85	10.967	10.967	43.868	
C_2H_6 30.068	7.00	0.927	1.854	5.562	
C_3H_8 44.094	5.37	0.711	2.133	5.688	
C_4H_{10} 58.120	1.48	0.196	0.784	1.960	
C_5H_{12} 72.146	0.50	0.066	0.330	0.792	
MW=	20.00224				
TOTAL			16.255	57.870	21.528

WEIGHT BALANCE

	#/hr Measured	At Wt. Balance
WET GAS	282.82	320.83
OIL	61.17	61.17
WATER	145.88	145.88
TOTAL	489.87	527.88
FRESH FEED	527.88	
WEIGHT BALANCE	92.80	
WET GAS FACTOR	1134396	
INDICATED LOSS—S C F H	593	
	5007	

WET GAS	1300	2200	0600	AVERAGE
CO 28.010	7.60	7.22	7.52	7.447
H_2 2.016	36.44	37.14	36.95	36.844
CO_2 44.010	31.88	31.53	31.49	31.634
N_2 28.016	2.36	1.74	1.72	1.940
CH_4 16.042	9.25	10.10	9.94	9.763
C_2H_4 28.052	2.43	2.77	2.79	2.663
C_2H_6 30.068	1.87	1.65	1.81	1.777
C_3H_6 42.078	3.32	3.34	3.60	3.420
C_3H_8 44.094	0.31	0.31	0.33	0.317
C_4H_8 56.104	2.25	2.12	2.06	2.143
C_4H_{10} 58.120	0.83	0.71	0.57	0.703
C_5H_{10} 70.130	0.96	0.89	0.83	0.893
C_5H_{12} 72.146	0.25	0.24	0.15	0.213
C_6H_{12} 84.156	0.25	0.24	0.24	0.243
			M. W.	24.315996

GAS FLOW RATES

	√h	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED 79.31	6.433	413.0 20.681	65 0.9952	2392649 1.5174	15,934	41.987
WET GAS 158.44	6.350	1.53 4.029	62 0.9981	1190574 1.0911	4,414	11.631
RECYCLE 79.31	8.508	412.5 20.669	122 0.9452	1.0911	14,383	37.900
BLEED 5.02	8.513	20.669	1.0000	1.0911	964	2.540
NATURAL GAS 28.43	7.700	445.7 21.457	198 0.8890	1447337 1.2031	5,024	13.238
OXYGEN 27.07	6.979	440.5 21.335	67 0.9933		4,004	10.551
STEAM 215.7	2.633	29.3 4.7 0.2889		164 #/hr.		

LIQUID PRODUCT RATES

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL. HR
OIL	6'10⅛"	364.59	53	1.0035	365.87	53.3	2332.42	
	2'7"	138.11	49	1.0054	138.86	6.375	885.23	
					+3.29		+21.00	61.17
					230.30		1468.19	9.596
WATER	7'3"	384.23	67	0.99932	383.97	10.8		
	6'2⅝"	330.22	66	0.99942	330.03	8.282		
	7'3¼"	385.32	68	0.99920	385.01			
	0'7"	30.98	72	0.99872	30.94			
	1'11¾"	104.04	62	0.99982	104.02			
	1'8½"	89.24	53	1.00052	89.29			145.88
					482.74		3501.13	17.614

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 63-G
HOURS 120-144
CATALYST Mill Scale Red. at Brownsville

FRESH FEED	%	m/hr	#/hr
CO 28.010	37.203	15.777	441.89
H_2 2.016	60.417	25.621	51.64
CO_2 44.010	2.140	0.908	39.96
N_2 28.016	0.160	0.068	1.91
CH_4 16.042	0.080	0.034	0.55
C_2H_4 28.052			
C_2H_6 30.068			
C_3+C_4			
C_3H_6 42.078			
C_3H_8 44.094			
C_4H_8 56.104			
C_4H_{10} 58.120			
C_5H_{10} 70.130			
C_5H_{12} 72.146			
C_6H_{12} 84.156			
C_5+C_6			
TOTAL		42.408	535.95
H_2+CO	97.620	41.398	15711 SCFH
H_2/CO		1.62	Factor 636496

WET GAS	%	At Wt. Balance m/hr	At Wt. Balance #/hr
CO 28.010	7.810	1.052	29.47
H_2 2.016	36.584	4.929	9.94
CO_2 44.010	31.410	4.232	186.25
N_2 28.016	1.710	0.230	6.44
CH_4 16.042	9.640	1.299	20.84
C_2H_4 28.052	2.553	0.344	0.65
C_2H_6 30.068	1.973	0.266	8.00
C_3H_6 42.078	3.447	0.464	19.52
C_3H_8 44.094	0.313	0.042	1.85
C_4H_8 56.104	2.373	0.320	17.95
C_4H_{10} 58.120	0.613	0.083	4.82
C_5H_{10} 70.130	1.077	0.145	10.17
C_5H_{12} 72.146	0.187	0.025	1.80
C_6H_{12} 84.156	0.310	0.042	3.53
C_5+C_6			
TOTAL		13.473	330.23
H_2+CO		5.981	
H_2/CO		4.68	

RECYCLE	COMBINED FEED	EFFLUENT
m/hr	m/hr	m/hr
3.137	18.914	4.189
14.693	40.314	19.622
12.615	13.523	16.847
0.687	0.755	0.917
3.872	3.906	5.171
1.025	1.025	1.369
0.792	0.792	1.058
1.384	1.384	1.848
0.126	0.126	0.168
0.953	0.953	1.273
0.246	0.246	0.329
0.433	0.433	0.578
0.075	0.075	0.100
0.125	0.125	0.167
40.163	82.571	61.606
17.830	59.228	23.811
4.68	2.13	4.68

NET CHANGE	
m/hr	#/hr
-14.725	-412.42
-20.692	-41.70
3.324	146.29
1.265	20.29
0.344	9.65
0.266	8.00
	37.94
0.464	19.52
0.042	1.85
0.320	17.95
0.083	4.82
0.145	10.17
0.025	1.80
0.042	3.53
	59.64
12.383	0.790
-35.417	
1.41	

YIELD BASIS H_2+CO FED — CONDENSATE			
#/MCF	#/gal	gal/hr	gal/MCF
9.311			
1.291			
0.614			
0.509			
2.414			
1.242	4.32	4.519	0.288
0.118	4.24	0.436	0.028
1.143	5.00	3.590	0.229
0.307	4.86	0.992	0.063
0.647	5.48	1.866	0.119
0.115	5.25	0.343	0.022
0.225	5.54	0.637	0.041
3.797		12.383	0.790
7.255**		130.71	8.320
9.300		17.631	1.122
10.985		172.59	

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY %	gal/hr
400 EP	83.0	7.732	98.0	7.577
400-550	10.6	0.988	91.4	0.903
550 +	6.4	0.596	114.6	0.683

	RECOVERY %	#/hr	gal/hr
PROPYLENE	44.4	8.67	
C_3 POLY GASO.	87.5	7.59	1.269
C_3 POLY TAR	12.5	1.08	0.143

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	1.08	0.216	68.0
C_4 POLY GASO.	5.98	14.76	2.468	1.5
C_4H_{10}	4.86	4.82	0.992	68.0
C_4 FREE GASO.			11.692	5.8
C_4 POLY TAR	7.53	2.11	0.280	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	15.368	0.9782	5303
GAS OIL	0.903	0.0575	312
FUEL OIL	0.683	0.0435	236
POLY TAR	0.423	0.0269	146
TOTAL	17.377	1.1061	5997
W. S. CHEM.	1.939	0.1234	669
TOTAL	19.316	1.2295	6666

Weight Recovery, %	92.47	Catalyst Age, hrs.	144	Space Velocity, vhv	1114
Pressure, psig	416	Inlet Velocity, Ft/sec	0.97	Catalyst Vol, CF	14.10
Temperature, °F	656	Bed Depth, Ft	21.37	Weight, #	2200
Recycle Ratio	0.95	Bed Density, #/CF	156	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$	= 10.88

RECOVERED OIL	0.425**
TOTAL OIL	
WATER SOLUBLE CHEMICALS	0.290**
TOTAL LIQUID PRODUCTS C_5+	
NET WATER	
GROSS WATER	
HYDROCARBON TOTAL—C_1+	

FRESH FEED CONVERSION — %			
Contraction	CO	H_2	H_2+CO
68.23	93.33	80.76	85.55

TOTAL FEED CONVERSION — %			
CO	H_2	$CO+H_2$	C_5+/C_1+
77.85	51.33	59.80	78.02

SELECTIVITY
7.255**
8.320
9.300
10.985

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *948 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

OPERATING CONDITIONS

PRESSURES PSIG	
Oxygen	446
Natural Gas	452
Generator Outlet	422
Reactor Inlet	416
Condenser Inlet	
Product Accumulator	367
TEMPERATURES—°F.	
Oxygen	469
Natural Gas	785
Generator	2293
Quench Accumulator	152
Reactor Inlet	326
Condenser Inlet	584
Product Accumulator	95
Catalyst No. Height	
1 See Period A	-
2	655
3	651
4	658
5	662
6	661
7	654
8	649
9	641
10	637
11	523

RATES S.C.F.H.	
Fresh Feed	16,094
Recycle	15,242
Combined Feed	31,336
Wet Gas—Measured	4,488
Adjusted	5,113
Loss	625
Recycle/Fresh Feed	0.95
Inlet Velocity—ft./sec.	0.97
Fresh Feed Rate = SCFH / H_2+CO	15711
per Cu. Ft. Dense Bed	1114
per Lb. Catalyst	7.14
per Sq. Ft.	23805

Heat Transfer Calculations

Steam Rate = 160#/hr.

@705 psia & 506°P. =

1201 Btu/#

Water in @60°P. = 28 Btu/#

Net Heat Transferred/# steam =

1173 Btu

(1173)(160) = 187,680 Btu/hr.

Ave. Bed Temp. = 656°F.

dT = 656-506 = 150°F.

Tube Area = 37.7 sq. ft.

$K = \frac{187,680}{(37.7)(150)} = 33.2$ Btu/°F./sq. ft.

PRODUCT TESTS

	OIL	WATER
°API	52.6	10.7
Neut. No.	43.9	34.6
Sap. No.	55.0	36.6
Hydrox. No.		
Bromine No.	86	
Pour °F.		
Chemicals, % by K_2CO_3		11.0

HEMPEL DIST. %		°API
205 °F.		
400	82.0	55.3
400-550	10.6	33.3
550+	7.4	

A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	98	
10%	128	
50%	213	
90%	343	
EP	386	
Rec.	97.0	

CATALYST DATA

INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	38
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
See Period A	
1	76
2	80
3	80
4	375
Total	611
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	156
Inventory, Lbs.	2200
Bed Depth, Ft.	21.37
Vol., Cu. Ft.	14.10

PARTICLE SIZE — Screen Analysis			Sedimentation	
Mesh	Microns	%	Microns	%
On 40	419+		80+	
100	150		40—80	
150	105		20—40	
200	74		10—20	
250	62		0—20	
325	44			
<325				

CATALYST

Bulk Density, Lbs./Cu.Ft.

Aerated

Settled

Compacted

Particle Density, gm./cc.

NH_3 Value, ml./gm.

N_2 Surface, m^2/gm.

CHEMICAL ANALYSIS

Fe

C

O

H

K_2O. W+. % basis Fe

X-Ray Analysis—

$Fe_{20}C_9$

Fe_3O_4

Fe

GAS ANALYSES	1400	2200	0600	AVERAGE
HOUR				
FRESH FEED				
CO 28.010	37.17	37.23	37.21	37.203
H_2 2.016	60.51	60.47	60.27	60.417
CO_2 44.010	2.04	2.10	2.28	2.140
N_2 28.016	0.14	0.15	0.19	0.160
CH_4 16.042	0.14	0.05	0.05	0.080
			M. W	12.63804
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	7.46	8.12	7.85	7.810
H_2 2.016	37.32	36.18	36.25	36.584
CO_2 44.010	30.30	31.58	32.35	31.410
N_2 28.016	1.35	1.91	1.87	1.710
CH_4 16.042	10.69	9.08	9.15	9.640
C_2H_4 28.052	2.66	2.43	2.57	2.553
C_2H_6 30.068	2.02	1.94	1.96	1.973
C_3H_6 42.078	3.56	3.31	3.47	3.447
C_3H_8 44.094	0.32	0.30	0.32	0.313
C_4H_8 56.104	2.35	2.57	2.20	2.373
C_4H_{10} 58.120	0.46	0.80	0.58	0.613
C_5H_{10} 70.130	1.05	1.21	0.97	1.077
C_5H_{12} 72.146	0.16	0.24	0.16	0.187
C_6H_{12} 84.156	0.30	0.33	0.30	0.310
			M. W.	24.51075

GENERATOR BALANCE

M/HR	C	H	O
15.777	15.777		15.777
25.621		51.242	
0.908	0.908		1.816
0.068			
0.034	0.034	0.136	
		7.571	3.836
	16.719	58.949	21.429
	101.88	101.14	98.71

	Mol %	M/Hr	C	H	O
O_2 32.000	0.28	10.675 / 0.037			21.424
CO_2 44.010	1.08	0.143	0.143		0.286
N_2 28.016	1.44	0.191			
CH_4 16.042	82.30	10.902	10.902	43.608	
C_2H_6 30.068	7.09	0.939	1.878	5.634	
C_3H_8 44.094	5.55	0.735	2.205	5.880	
C_4H_{10} 58.120	1.60	0.212	0.848	2.120	
C_5H_{12} 72.146	0.66	0.087	0.435	1.044	
MW =	20.156026				
TOTAL			16.411	58.286	21.710

GAS FLOW RATES

	VTR	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
		416	67	2290703		
FRESH FEED						
79.31	6.504	20.753	0.9933	1.5135	16,094	42.408
		1.50	66	1181114		
WET GAS						
158.44	6.513	4.025	0.9943	1.0868	4,488	11.826
		416.5	126			
RECYCLE						
79.31	8.454	20.765	0.9420	1.0868	14,254	37.560
BLEED						
5.02	8,721	20.765	1.0000	1.0868	988	2.603
		451.8	203	1436295		
NATURAL GAS						
28.43	7.713	21.599	0.8856	1.1985	5,027	13.246
		446.0	71			
OXYGEN						
27.07	7.046	21.464	0.9896		4,051	10.675
		29.0				
		4.7				
STEAM		33.7				
215.7	2.579	0.2878		160 #/hr.		

WEIGHT BALANCE

	#/hr Measured	At Wt. Balance
WET GAS	289.86	330.23
OIL	59.61	59.61
WATER	146.11	146.11
TOTAL	495.58	535.95
FRESH FEED	535.95	
WEIGHT BALANCE	92.47	
WET GAS FACTOR	1139274	
INDICATED LOSS—S C F H	625	

LIQUID PRODUCT RATES

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR. GAL. HR
OIL	7'0½"	373.32	52	1.0039	374.78	52.6	2398.22	
	6'10¾"	364.59	53	1.0035	365.87	6.399	2341.20	
	5'0"	266.38	52	1.0038	267.42		1711.22	
	1'11"	56.30	50	1.0049	56.58		362.06	
					+3.83		+24.50	59.61
					223.58		1430.68	9.316
WATER	7'3⅜"	387.50	80	0.99759	386.57	10.7	3803.51	
	1'11¼"	104.04	62	0.99982	104.02	8.287	862.01	
	3'7⅝"	193.88	68	0.99920	193.66		1604.86	
	1'10½"	53.06	60	1.00000	53.06		439.71	146.11
					423.15		3506.85	17.631

RUN NO. 63-H
HOURS 144-168
CATALYST Mill Scale Reduced at Brownsville

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

FRESH FEED	%	m/hr	#/hr	WET GAS	%	At Wt. Balance m/hr	At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
CO 28.010	37.203	15.684	439.31	7.460	1.014	28.40		3.022	18.706	4.036	-14.670	-410.91
H_2 2.016	60.340	25.438	51.28	36.930	5.020	10.12		14.958	40.396	19.978	-20.418	-41.16
CO_2 44.010	2.147	0.905	39.83	31.484	4.280	188.37		12.753	13.658	17.033	3.375	148.54
N_2 28.016	0.187	0.079	2.21	1.650	0.224	6.28		0.668	0.747	0.892		
CH_4 16.042	0.123	0.052	0.84	10.020	1.362	21.85		4.059	4.111	5.421	1.310	21.01
C_2H_4 28.052				2.554	0.347	9.73		1.035	1.035	1.382	0.347	9.73
C_2H_6 30.068				1.920	0.261	7.85		0.778	0.778	1.039	0.261	7.85
C_1+C_2												38.59
C_3H_6 42.078				3.360	0.457	19.23		1.361	1.361	1.818	0.457	19.23
C_3H_8 44.094				0.293	0.040	1.76		0.119	0.119	0.159	0.040	1.76
C_4H_8 56.104				2.193	0.298	16.72		0.888	0.888	1.186	0.298	16.72
C_4H_{10} 58.120				0.717	0.097	5.64		0.290	0.290	0.387	0.097	5.64
C_5H_{10} 70.130				0.943	0.128	8.98		0.382	0.382	0.510	0.128	8.98
C_5H_{12} 72.146				0.213	0.029	2.09		0.086	0.086	0.115	0.029	2.09
C_6H_{12} 84.156				0.263	0.036	3.03		0.107	0.107	0.143	0.036	3.03
C_3+C_4												57.45
TOTAL		42.158	533.47		13.593	330.05		40.506	82.664	62.078		
H_2+CO	97.543	41.122	15606 SCFH		6.034			17.980	59.102	24.014	-35.088	
H_2/CO		1.62	Factor 640779		4.95			4.95	2.16	4.95	1.39	

Weight Recovery, %	93.29	Catalyst Age, hrs.	168	Space Velocity, vhv	1102	RECOVERED OIL	0.405** 56.76
Pressure, psig	415	Inlet Velocity, Ft/sec	0.97	Catalyst Vol., CF.	14.16	TOTAL OIL	114.21
Temperature, °F	657	Bed Depth, Ft	21.46	Weight, #	2166	WATER SOLUBLE CHEMICALS	0.291** 15.45
Recycle Ratio	0.96	Bed Density, #/CF	153	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	11.58	TOTAL LIQUID PRODUCTS C_3+	129.66

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY	NET WATER	7.283** 131.21
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3^+/C_1^+	GROSS WATER	146.66
67.76	93.53	80.27	85.33	78.42	50.54	59.37	77.06	HYDROCARBON TOTAL—C_1+	168.25

YIELD BASIS H_2+CO FED	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
	9.518			
	1.346			
	0.623			
	0.503			
	2.472			
	1.232	4.32	4.451	0.285
	0.113	4.24	0.415	0.027
	1.071	5.00	3.344	0.214
	0.361	4.86	1.160	0.074
	0.575	5.45	1.648	0.106
	0.134	5.25	0.398	0.026
	0.194	5.54	0.547	0.035
	3.680		11.963	0.767
	3.637		8.846	0.567
	7.317		20.809	1.334
	0.990		1.947	0.125
	8.307		22.756	1.459
	8.408		15.751	1.009
	9.398		17.698	1.134
	10.781			

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	83.0	7.342	98.0	7.195
400-550	11.2	0.991	91.4	0.906
550 +	5.8	0.513	114.6	0.588

	RECOVERY %	#/hr	gal/hr
PROPYLENE	44.1	8.48	
C_3 POLY GASO.	87.5	7.42	1.241
C_3 POLY TAR	12.5	1.06	0.141

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	-	-	68.0
C_4 POLY GASO.	5.98	12.38	2.446	1.5
C_4H_{10}	4.86	5.64	1.160	68.0
C_4 FREE GASO.			11.029	5.8
C_4 POLY TAR	7.53	2.09	0.278	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	14.635	0.9378	5084
GAS OIL	0.906	0.0581	315
FUEL OIL	0.588	0.0377	204
POLY TAR	0.419	0.0268	145
TOTAL	16.548	1.0604	5748
W. S. CHEM.	1.947	0.1248	677
TOTAL	18.495	1.1851	6425

Form ML—:1

**Included in Reactor Effluent Total

g/NCM = 16.91X#/MCF

*9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	444	Fresh Feed	15,999
Natural Gas	450	Recycle	15,372
Generator Outlet	419	Combined Feed	31,371
Reactor Inlet	415	Wet Gas—Measured	4,599
Condenser Inlet		Adjusted	5,159
Product Accumulator	365	Loss	560
TEMPERATURES—°F.		Recycle/Fresh Feed	0.96
Oxygen	493	Inlet Velocity—ft./sec.	0.97
Natural Gas	812	Fresh Feed Rate—S.C.F.H. / H_2+CO	15606
Generator	2277	per Cu. Ft. Dense Bed	1102
Quench Accumulator	154	per Lb. Catalyst	7.20
Reactor Inlet	333	per Sq. Ft.	23645
Condenser Inlet	584		
Product Accumulator	94		
Catalyst No. Height			
1 See Period A			
2	656		
3	650		
4	660		
5 Average 657	663		
6	663		
7	656		
8	650		
9	643		
10	638		
11	524		

PRODUCT TESTS	OIL	WATER
°API	52.1	10.7
Neut. No.	44.7	34.2
Sap. No.	56.7	37.9
Hydrox. No.		
Bromine No.	86	
Pour °F.		
Chemicals, % by K_2CO_3		11.0
HEMPEL. DIST. %		°API
205 °F.		
400	82.0	54.6
400-550	11.2	35.2
550+	6.8	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	101	
10%	132	
50%	212	
90%	329	
EP	375	
Rec.	97.0	

CATALYST DATA		PARTICLE SIZE			
INVENTORY DATA		Screen Analysis		Sedimentation	
In Reactor at Start of Period		Mesh	Microns	%	Microns	%
Fresh Catalyst Added		On 40	419+		80+	
Total		100	150		40—80	
Catalyst Recovered	40	150	105		20—40	
In Reactor at End of Period		200	74		10—20	
		250	62		0—20	
REACTOR d-p, Inches H_2O		325	44			
No. Height		<325				
0 See Period A						
1	73	CATALYST				
2	81	Bulk Density, Lbs./Cu.Ft.				
3	78	Aerated				
4	370	Settled				
Total	602	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	153	N_2 Surface, m^2/gm.				
Inventory, Lbs.	2166					
Bed Depth, Ft.	21.46	CHEMICAL ANALYSIS				
Vol., Cu. Ft.	14.16	Fe				
		C				
		O				
		H				
		K_2O, W+. % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

GAS ANALYSES	1400	2200	0600	AVERAGE
HOUR				
FRESH FEED				
CO 28.010	37.24	37.03	37.34	37.203
H_2 2.016	60.37	60.42	60.23	60.340
CO_2 44.010	2.00	2.30	2.14	2.147
N_2 28.016	0.17	0.20	0.19	0.187
CH_4 16.042	0.22	0.05	0.10	0.123
			M. W	12.65403
			H_2O 18.016	
			BALANCE	

GENERATOR BALANCE	M/HR	C	H	O
FRESH FEED				
CO 28.010	15.684	15.684		15.684
H_2 2.016	25.438		50.876	
CO_2 44.010	0.905	0.905		1.810
N_2 28.016	0.079			
CH_4 16.042	0.052	0.052	0.208	
			7.503	3.752
		16.641	58.587	21.246
BALANCE		101.86	100.91	98.77

	Mol %	M/Hr	C	H	O
O_2 32.000	0.27	10.540 0.036			21.152
CO_2 44.010	1.36	0.179	0.179		0.358
N_2 28.016	0.83	0.110			
CH_4 16.042	83.02	10.955	10.955	43.820	
C_2H_6 30.068	6.90	0.911	1.822	5.466	
C_3H_8 44.094	5.45	0.719	2.157	5.752	
C_6H_{14} 86.120	1.56	0.206	0.824	2.060	
C_6H_{12} 72.146	0.61	0.080	0.400	0.960	
MW =	20.06012				
TOTAL			16.337	58.058	21.510

WEIGHT BALANCE	#/hr Measured	At Wt. Balance
WET GAS	294.25	330.05
OIL	56.76	56.76
WATER	146.66	146.66
TOTAL	497.67	533.47
FRESH FEED	533.47	
WEIGHT BALANCE	93.29	
WET GAS FACTOR	1121665	
INDICATED LOSS—S C F H	560	

WET GAS				
CO 28.010	7.38	7.47	7.53	7.460
H_2 2.016	37.23	37.12	36.44	36.930
CO_2 44.010	30.81	31.47	32.17	31.484
N_2 28.016	1.54	1.62	1.79	1.650
CH_4 16.042	10.43	9.93	9.70	10.020
C_2H_4 28.052	2.53	2.65	2.48	2.554
C_2H_6 30.068	1.90	1.95	1.91	1.920
C_3H_6 42.078	3.44	3.49	3.15	3.360
C_3H_8 44.094	0.31	0.29	0.28	0.293
C_4H_8 56.104	2.25	2.18	2.15	2.193
C_6H_{12} 86.120	0.70	0.54	0.91	0.717
C_5H_{10} 70.130	0.97	0.91	0.95	0.943
C_6H_{12} 72.146	0.23	0.15	0.26	0.213
C_6H_{12} 84.156	0.28	0.23	0.28	0.263
			M. W.	24.28001

GAS FLOW RATES	V̄R	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
		414.9	70	2287808		
FRESH FEED	79.31	6.496	20.727	0.9905	1.5126	15.999	42.158
		1.51	68	1192338		
WET GAS	158.44	6.654	4.026	0.9924	1.0919	4.599	12.119
		414.8	126			
RECYCLE	79.31	8.500	20.724	0.9420	1.0919	14.370	37.866
BLEED	5.02	8.821	20.724	1.0000	1.0919	1.002	2.640
		449.9	204	1443162		
NATURAL GAS	28.43	7.688	21.555	0.8849	1.2013	5.008	13.196
		443.5	74			
OXYGEN	27.07	6.995	21.406	0.9868		4.000	10.540
STEAM	215.7	2.471					

LIQUID PRODUCT RATES	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
OIL		7'3½"	386.41	70	0.9951	384.52	52.1	2467.08	
		5'0"	266.38	52	1.0039	267.42	6.416	1715.77	
		3'1⅝"	169.79	52	1.0039	170.45		1093.61	
		1'5¾"	77.06	72	0.9941	76.61		491.53	
						+1.36		+8.75	56.76
						212.30		1362.14	8.846
WATER		7'1⅝"	388.59	84	0.99692	387.39	10.7		
		3'0⅝"	193.82	68	0.99920	193.66	8.287		
		4'7½"	246.74	70	0.99896	246.48			
		0'3½"	15.49	79	0.99775	15.46			146.66
						424.75		3519.90	17.698

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 63-I
HOURS 168-192
CATALYST Mill Scale Red. at Brownsville

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO 28.010	37.337	15.891	445.11	7.587	1.070	29.97	3.060	18.951	4.130	-14.821	-415.14				
H_2 2.016	60.323	25.674	51.76	37.974	5.355	10.80	15.316	40.990	20.671	-20.319	-40.96				
CO_2 44.010	1.987	0.846	37.23	30.707	4.331	190.60	12.386	13.232	16.717	3.485	153.37	9.723			
N_2 28.016	0.210	0.089	2.49	1.780	0.251	7.03	0.718	0.807	0.969						
CH_4 16.042	0.143	0.061	0.98	9.360	1.320	21.18	3.775	3.836	5.095	1.259	20.20	1.281			
C_2H_4 28.052				2.630	0.371	10.41	1.061	1.061	1.432	0.371	10.41	0.660			
C_2H_6 30.068				1.833	0.259	7.79	0.739	0.739	0.998	0.259	7.79	0.494			
C_1+C_2											38.40	2.435			
C_3H_6 42.078				3.083	0.435	18.30	1.244	1.244	1.679	0.435	18.30	1.160	4.32	4.236	0.269
C_3H_8 44.094				0.250	0.035	1.54	0.101	0.101	0.136	0.035	1.54	0.098	4.24	0.363	0.023
C_4H_8 56.104				2.280	0.322	18.07	0.920	0.920	1.242	0.322	18.07	1.146	5.00	3.614	0.229
C_4H_{10} 58.120				0.753	0.106	6.16	0.304	0.304	0.410	0.106	6.16	0.391	4.86	1.267	0.080
C_5H_{10} 70.130				1.113	0.157	11.01	0.449	0.449	0.606	0.157	11.01	0.698	5.45	2.020	0.128
C_5H_{12} 72.146				0.223	0.031	2.24	0.090	0.090	0.121	0.031	2.24	0.142	5.25	0.427	0.027
C_6H_{12} 84.156				0.427	0.060	5.05	0.172	0.172	0.232	0.060	5.05	0.320	5.54	0.912	0.058
C_3-C_6											62.37	3.955		12.839	0.814
TOTAL		42.561	537.57		14.103	340.15	40.335	82.896	62.124						
H_2+CO	97.660	41.565	15774	SCFH	6.425		18.376	59.941	24.801	-35.140					
H_2/CO		1.62	Factor 633954		5.01		5.01	2.16	5.01	1.37					

Weight Recovery, %	92.20	Catalyst Age, hrs.	192	Space Velocity, vhv	1126
Pressure, psig	412	Inlet Velocity, Ft/sec	0.98	Catalyst Vol., CF.	14.01
Temperature, °F	658	Bed Depth, Ft	21.23	Weight, #	2158
Recycle Ratio	0.95	Bed Density, #/CF	154	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$	= 11.98

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
66.86	93.27	79.14	84.51	78.21	49.57	58.62	77.72

	NET CHANGE m/hr	NET CHANGE #/hr	#/MCF	#/gal	gal/hr	gal/MCF
RECOVERED OIL	0.394**	55.25	3.503		8.593	0.545
TOTAL OIL		117.62	7.458		21.432	1.359
WATER SOLUBLE CHEMICALS	0.308**	16.34	1.036		2.060	0.131
TOTAL LIQUID PRODUCTS C_3+		133.96	8.494		23.492	1.490
NET WATER	6.984**	125.83	7.977		15.106	0.958
GROSS WATER		142.17	9.013		17.166	1.088
HYDROCARBON TOTAL—C_1+		172.36	10.929			

YIELD BASIS H_2+CO FED — YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*

	CORRECTED HEMPEL %	gal/hr	TREATING RECOVERY %	gal/hr
400 EP	82.0	7.047	98.0	6.906
400-550	11.2	0.962	91.4	0.879
550 +	6.8	0.584	114.6	0.669

	RECOVERY %	#/hr	gal/hr
PROPYLENE	42.9	7.85	
C_3 POLY GASO.	87.5	6.87	1.149
C_3 POLY TAR	12.5	0.98	0.130

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	-	-	68.0
C_4 POLY GASO.	5.98	15.81	2.644	1.5
C_4H_{10}	4.86	6.16	1.267	68.0
C_4-FREE GASO.			11.414	5.8
C_4 POLY TAR	7.53	2.26	0.300	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	15.273	0.9682	5249
GAS OIL	0.879	0.0557	302
FUEL OIL	0.669	0.0424	230
POLY TAR	0.430	0.0273	148
TOTAL	17.251	1.0936	5929
W. S. CHEM.	2.060	0.1306	708
TOTAL	19.311	1.2242	6637

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91×#/MCF

*9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

OPERATING CONDITIONS

PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	440	Fresh Feed	16,152
Natural Gas	448	Recycle	15,307
Generator Outlet	416	Combined Feed	31,459
Reactor Inlet	412	Wet Gas—Measured	4,692
Condenser Inlet		Adjusted	5,352
Product Accumulator	360	Loss	660
TEMPERATURES—°F.		Recycle/Fresh Feed	0.95
Oxygen	488	Inlet Velocity—ft./sec.	0.98
Natural Gas	790	Fresh Feed Rate S.C.F.H. H_2+CO	15774
Generator	2283	per Cu. Ft. Dense Bed	1126
Quench Accumulator	150	per Lb. Catalyst	7.31
Reactor Inlet	343	per Sq. Ft.	23900
Condenser Inlet	586		
Product Accumulator	96	Heat Transfer Calculations	
Catalyst No. Height		Steam Rate = 414 #/hr.	
1 See Period A	-	@705 psia & 506°F. =	
2	658	1201 Btu/#	
3	650	Water in @ 70°F. = 38°F.	
4	660	Net Heat Transferred/# steam =	
5	665	= 1163 Btu	
6	665	(1163)(414) = 481,482 Btu/hr.	
7	658	Ave. Bed Temp. = 658°F.	
8	652	dT = 658-506 = 152°F.	
9	644	Tube Area = 37.7 sq. ft.	
10	640	$K = \frac{481,482}{(37.7)(152)}$ =	
11	524	= 84.0 Btu/°F./sq. ft.	

PRODUCT TESTS

	OIL	WATER
°API	51.7	10.8
Neut. No.	44.8	34.6
Sap. No.	55.6	35.6
Hydrox. No.		
Bromine No.	86	
Pour °F.		
Chemicals, % by K_2CO_3		12.0
HEMPEL, DIST. %		°API
205 °F.		
400	81.0	54.2
400-550	11.2	35.6
550+	7.8	
A. S. T. M. DIST. ON Naphtha °F.		
IBP	104	
10%	129	
50%	221	
90%	338	
EP	390	
Rec.	97.5	

CATALYST DATA

INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	20.5
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 See Period A	-
1	73
2	87
3	74
4	365
Total	599
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	154
Inventory, Lbs.	2158
Bed Depth, Ft.	21.23
Vol., Cu. Ft.	14.01

PARTICLE SIZE

Screen Analysis Mesh	Microns	%	Sedimentation Microns	%
On 40	419+		80+	
100	150		40—80	
150	105		20—40	
200	74		10—20	
250	62		0—20	
325	44			
<325				

CATALYST	
Bulk Density, Lbs./Cu.Ft.	
Aerated	
Settled	
Compacted	
Particle Density, gm./cc.	
NH_3 Value, ml./gm.	
N_2 Surface, m^2/gm.	
CHEMICAL ANALYSIS	
Fe	
C	
O	
H	
K_2O, W+. % basis Fe	
X-Ray Analysis—	
$Fe_{20}C_9$	
Fe_3O_4	
Fe	

GAS ANALYSES

HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	37.37	37.48	37.16	37.337
H_2 2.016	60.29	60.13	60.55	60.323
CO_2 44.010	1.91	2.08	1.97	1.987
N_2 28.016	0.22	0.24	0.17	0.210
CH_4 16.042	0.21	0.07	0.15	0.143
			M. W.	12.63046
WET GAS				
CO 28.010	7.63	7.62	7.51	7.587
H_2 2.016	38.61	37.05	38.26	37.974
CO_2 44.010	29.98	31.47	30.67	30.707
N_2 28.016	1.58	1.68	2.08	1.780
CH_4 16.042	9.84	0.29	8.95	9.360
C_2H_4 28.052	2.64	2.61	2.64	2.630
C_2H_6 30.068	1.82	1.90	1.78	1.833
C_3H_6 42.078	3.31	2.90	3.04	3.083
C_3H_8 44.094	0.31	0.21	0.23	0.250
C_4H_8 56.104	2.22	2.38	2.24	2.280
C_4H_{10} 58.120	0.57	0.89	0.80	0.753
C_5H_{10} 70.130	1.04	1.23	1.07	1.113
C_5H_{12} 72.146	0.16	0.32	0.19	0.223
C_6H_{12} 84.156	0.29	0.45	0.54	0.427
			M. W.	24.11905

GENERATOR BALANCE

	M/HR	C	H	O
CO	15.891	15.891		15.891
H_2	25.674		51.348	
CO_2	0.846	0.846		1.692
N_2	0.089			
CH_4	0.061	0.061	0.244	
H_2O 18.016			7.406	3.703
		16.798	58.998	21.286
BALANCE		101.34	100.41	99.44

	Mol %	M/Hr	C	H	O
O_2 32.000	0.24	10.503 0.032			21.070
CO_2 44.010	1.27	0.168	0.168		0.336
N_2 28.016	0.37	0.049			
CH_4 16.042	83.23	11.003	11.003	44.012	
C_2H_6 30.068	6.96	0.920	1.840	5.520	
C_3H_8 44.094	5.49	0.726	2.178	5.808	
C_4H_{10} 58.120	1.69	0.223	0.892	2.230	
C_5H_{12} 72.146	0.75	0.099	0.495	1.188	
MW=	20.127959				
TOTAL			16.576	58.758	21.406

WEIGHT BALANCE

	#/hr Measured	At Wt. Balance
WET GAS	298.21	340.15
OIL	55.25	55.25
WATER	142.17	142.17
TOTAL	495.63	537.57
FRESH FEED	537.57	
WEIGHT BALANCE	92.20	
WET GAS FACTOR	1140639	
INDICATED LOSS—S C F H	660	

GAS FLOW RATES

	√H	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED 79.31	6.596	411.6 20.647	73 0.9877	2292078 1.5140	16,152	42.561
WET GAS 158.44	6.783	1.52 4.027	71 0.9896	1200296 1.0956	4,692	12.364
RECYCLE 79.31	8.508	412.3 20.664	128 0.9404	1.0956	14,366	37.855
BLEED 5.02	8.283	20.664	1.0000	1.0956	941	2.480
NATURAL GAS 28.43	7.717	448.2 21.515	202 0.8863	1438297 1.1993	5,017	13.220
OXYGEN 27.07	7.008	440.4 21.333	76 0.9850		3,986	10.503
STEAM 215.7	6.665	29.1 4.7 33.8 0.2882		414 #/hr.		

LIQUID PRODUCT RATES

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#HR GAL HR
OIL	6'10 3/4"	365.68	60	1.0000	365.68	51.7	2351.32	
	3'1 7/8"	169.79	52	1.0039	170.45	6.430	1095.99	
					+11.00		+70.75	55.25
					206.23		1326.08	8.593
WATER	7'3 1/4"	385.32	80	0.99759	384.39	10.8		
	4'7 1/4"	246.74	70	0.99896	246.48	8.282		
	6'4"	336.22	75	0.99832	335.66			
	1'2 1/4"	61.74	80	0.99759	61.59			142.17
					411.98		3412.02	17.166

THE TEXAS COMPANY — MONTEBELLO LABORATORY

YIELD CALCULATIONS

RUN NO. 63-J
HOURS 192-216
CATALYST Mill Scale Red. at Brownsville

FRESH FEED	%	m/hr	#/hr
CO 28.010	37.800	15.878	444.72
H_2 2.016	59.747	25.096	50.59
CO_2 44.010	2.113	0.888	39.08
N_2 28.016	0.207	0.087	2.44
CH_4 16.042	0.133	0.056	0.90
C_2H_4 28.052			
C_3H_6 30.068			
C_4+C_5			
C_3H_8 42.078			
C_4H_8 44.094			
C_4H_8 56.104			
C_4H_{10} 58.120			
C_5H_{10} 70.130			
C_6H_{12} 72.146			
C_6H_{12} 84.156			
C_5-C_6			
TOTAL		42.005	537.73
H_2+CO	97.547	40.974	15550 SCFH
H_2/CO		1.58	Factor 643086

WET GAS	%	At Wt. Balance m/hr	At Wt. Balance #/hr
CO 28.010	8.150	1.204	33.72
H_2 2.016	38.803	5.732	11.56
CO_2 44.010	30.520	4.511	198.52
N_2 28.016	1.466	0.217	6.08
CH_4 16.042	9.366	1.384	22.20
C_2H_4 28.052	2.580	0.381	10.69
C_3H_6 42.078	1.797	0.265	7.97
C_3H_8 44.094	3.037	0.449	18.89
C_4H_8 56.104	0.287	0.042	1.85
C_4H_{10} 58.120	2.017	0.298	16.72
C_5H_{10} 70.130	0.570	0.084	4.88
C_6H_{12} 72.146	0.900	0.133	9.33
C_6H_{12} 84.156	0.247	0.036	2.60
C_7H_{14} 98.182	0.260	0.038	3.20
C_5-C_6			
TOTAL		14.774	348.21
H_2+CO	6.936		
H_2/CO	4.76		

RECYCLE	COMBINED FEED	EFFLUENT
m/hr	m/hr	m/hr
3.342	19.220	4.546
15.910	41.006	21.642
12.514	13.402	17.025
0.601	0.688	0.818
3.940	3.896	5.224
1.058	1.058	1.439
0.737	0.737	1.002
1.245	1.245	1.694
0.118	0.118	0.160
0.827	0.827	1.125
0.234	0.234	0.318
0.369	0.369	0.502
0.101	0.101	0.137
0.107	0.107	0.145
41.003	83.008	63.294
19.252	60.226	26.188
4.76	2.13	4.76

NET CHANGE	
m/hr	#/hr
-14.674	-411.00
-19.364	-39.03
3.623	159.44
1.328	21.30
0.265	7.97
	39.96
0.449	18.89
0.042	1.85
0.298	16.72
0.084	4.88
0.133	9.33
0.036	2.60
0.038	3.20
	57.47
-34.038	
1.32	

YIELD BASIS H_2+CO FED — CONDENSATE			
#/MCF	#/gal	gal/hr	gal/MCF
10.253			
1.370			
0.687			
0.513			
2.570			
1.215	4.32	4.373	0.281
0.119	4.24	0.436	0.028
1.075	5.00	3.344	0.215
0.314	4.86	1.004	0.065
0.600	5.45	1.712	0.110
0.167	5.25	0.495	0.032
0.206	5.54	0.578	0.037
3.696		11.942	0.768
6.936		19.252	60.226
4.76		4.76	2.13

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
400 EP	84.2	6.698	98.0	6.564
400-550	11.2	0.891	91.4	0.814
550 +	4.6	0.366	114.6	0.419
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	40.1	7.57		
C_3 POLY GASO.	87.5	6.62	1.107	
C_3 POLY TAR	12.5	0.95	0.126	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.50	0.100	68.0
C_4 POLY GASO.	5.98	14.19	2.373	1.5
C_4H_{10}	4.86	4.98	1.004	68.0
C_4 FREE GASO.			10.456	5.8
C_4 POLY TAR	7.53	2.03	0.270	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	13.933	0.8960	4858	
GAS OIL	0.814	0.0523	284	
FUEL OIL	0.419	0.0269	146	
POLY TAR	0.396	0.0255	138	
TOTAL	15.562	1.0007	5426	
W. S. CHEM.	1.802	0.1159	628	
TOTAL	17.364	1.1166	6054	

Weight Recovery, %	90.63	Catalyst Age, hrs.	216	Space Velocity, vhv	1112	RECOVERED OIL	0.366**	51.30
Pressure, psig	409	Inlet Velocity, Ft/sec	0.99	Catalyst Vol., CF	13.99	TOTAL OIL		108.77
Temperature, °F	658	Bed Depth, Ft	21.19	Weight, #	2126	WATER SOLUBLE CHEMICALS	0.268**	14.21
Recycle Ratio	0.98	Bed Density, #/CF	152	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$	11.78	TOTAL LIQUID PRODUCTS C_4+		122.98
						NET WATER	6.883**	124.01
						GROSS WATER		138.22
						HYDROCARBON TOTAL—C_1+		162.94

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
64.83	92.42	77.16	83.07	76.35	47.22	56.52	75.48

7.955	0.512
19.897	1.280
1.902	0.116
21.699	1.396
14.987	0.957
16.689	1.073

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91 X #/MCF

*9488 MCFH H_2+CO, Bbl/Day = 5421.6 X gal/MCF

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	439	Fresh Feed	15941
Natural Gas	447	Recycle	15561
Generator Outlet	414	Combined Feed	31502
Reactor Inlet	409	Wet Gas—Measured	4795
Condenser Inlet		Adjusted	5607
Product Accumulator	360	Loss	812
TEMPERATURES—°F.		Recycle/Fresh Feed	0.98
Oxygen	500	Inlet Velocity—ft./sec.	0.99
Natural Gas	791	Fresh Feed Rate—S.C.F.H.	15550
Generator	2270	per Cu. Ft. Dense Bed	1112
Quench Accumulator	147	per Lb. Catalyst	7.31
Reactor Inlet	342	per Sq. Ft.	23561
Condenser Inlet	590		
Product Accumulator	97	Heat Transfer Calculations	
Catalyst No. Height		Steam Rate = 407#/hr.	
1 See Period A		@705 psis & 506°F =	
2	658	1201 Btu/#	
3	650	Water in @69°F = 37 Btu/#	
4	660	Net Heat Trans./#steam	
5	665	1164 Btu	
6	665	(1164)(407) = 473,748 Btu/hr.	
7	660	Ave. Bed Temp.= 658°F.	
8	650	dT = 658-506 = 152°F	
9	646	Tube Area = 37.8 sq. ft.	
10	642	$K = \frac{473,748}{(37.8)(152)}$ =	
11	526	82.5 Btu/°F/sq.ft.	

PRODUCT TESTS	OIL	WATER
°API	51.2	10.8
Neut. No.	49.2	36.4
Sap. No.	61.0	40.2
Hydrox. No.		
Bromine No.	82	
Pour °F.		
Chemicals, % by K_2CO_3		12.0
HEMPEL. DIST. %		°API
205 °F.		
400	83.2	53.0
400-550	11.2	53.8
550+	5.6	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	102	
10%	132	
50%	218	
90%	339	
EP	389	
Rec.	97.0	

CATALYST DATA		PARTICLE SIZE				
INVENTORY DATA		Screen Analysis		Sedimentation		
In Reactor at Start of Period		Mesh	Microns	%	Microns	%
Fresh Catalyst Added		On 40	419+		80+	
Total		100	150		40—80	
Catalyst Recovered	33	150	105		20—40	
In Reactor at End of Period		200	74		10—20	
		250	62		0—20	
REACTOR d-p, Inches H_2O		325	44			
No. Height		<325				
0 See Period A						
1	74	CATALYST				
2	88	Bulk Density, Lbs./Cu.Ft.				
3	68	Aerated				
4	360	Settled				
Total	590	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	152	N_2 Surface, m^2/gm.				
Inventory, Lbs.	2126					
Bed Depth, Ft.	21.19	CHEMICAL ANALYSIS				
Vol., Cu. Ft.	13.99	Fe				
		C				
		O				
		H				
		K.O. W+. % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

GAS ANALYSES				
HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	37.77	37.74	37.89	37.800
H_2 2.016	59.70	59.77	59.77	59.747
CO_2 44.010	2.08	2.17	2.09	2.113
N_2 28.016	0.23	0.20	0.19	0.207
CH_4 16.042	0.22	0.12	0.06	0.133
			M. W	12.80154
			H_2O 18.016	
			BALANCE	

GENERATOR BALANCE	M/HR	C	H	O
FRESH FEED	15.878	15.878		15.878
	25.096		50.192	
	0.888	0.888		1.776
	0.087			
	0.056	0.056	0.224	
			7.510	3.755
		16.822	57.926	21.409
		102.93	99.87	100.17

	Mol %	M/Hr	C	H	O
O_2 32.000	0.26	10.472 0.034			21.012
CO_2 44.010	1.36	0.180	0.180		0.360
N_2 28.016	1.16	0.153			
CH_4 16.042	82.76	10.927	10.927	43.708	
C_2H_4 28.052	6.79	0.897	1.794	5.382	
C_3H_8 44.094	5.34	0.705	2.115	5.640	
C_4H_{10} 58.120	1.61	0.213	0.852	2.130	
C_6H_{12} 72.146	0.72	0.095	0.475	1.140	
MW =	20.13450				
TOTAL				16.343	58.000	21.372

WEIGHT BALANCE	#/hr Measured	At Wt. Balance
WET GAS	297.80	348.21
OIL	51.30	51.30
WATER	138.22	138.22
TOTAL	487.32	537.73
FRESH FEED	537.73	
WEIGHT BALANCE	90.63	
WET GAS FACTOR	1169274	
INDICATED LOSS—S C F H	812	

WET GAS				
CO 28.010	7.86	8.20	8.39	8.150
H_2 2.016	38.81	38.83	38.77	38.803
CO_2 44.010	30.22	30.62	30.72	30.520
N_2 28.016	1.49	1.45	1.46	1.466
CH_4 16.042	9.64	0.39	9.07	0.366
C_2H_4 28.052	2.53	2.57	2.64	2.580
C_3H_6 33.068	1.85	1.79	1.75	1.797
C_3H_8 42.078	3.14	2.98	2.99	3.037
C_4H_8 44.094	0.29	0.29	0.28	0.287
C_4H_8 56.104	2.13	1.94	1.98	2.017
C_4H_{10} 58.120	0.57	0.57	0.57	0.570
C_5H_{10} 70.130	0.96	0.87	0.87	0.900
C_6H_{12} 72.146	0.25	0.24	0.25	0.247
C_6H_{12} 84.156	0.26	0.26	0.26	0.260
			M. W.	23.569744

GAS FLOW RATES						
	V-H	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED		408.8	71	2261446		
	6.563	20.579	0.9896	1.5038	15,941	42.005
WET GAS		1.51	71	1228269		
	6.854	4.026	0.9896	1.1083	4,795	12.635
RECYCLE		410.8	128			
	8.529	20.628	0.9404	1.1083	14,543	38.321
BLEED						
	8.867	20.628	1.0000	1.1083	1,018	2.682
NATURAL GAS		446.9	200	1437830		
	7.708	21.485	0.8876	1.1991	5,011	13.204
OXYGEN		439.3	74			
	6.983	21.307	0.9868		3,974	10.472
STEAM		28.7 4.7 33.4				
	6.579	0.2866		407 #/hr.		

LIQUID PRODUCT RATES						
HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.
OIL	7'1¾"	390.78	63	0.9985	390.19	51.2
	6'10 31/64"	365.68	60	1.0000	365.68	6.448
	3'1"	179.09	60	1.0000	179.09	
	0'1"	17.70	68	0.9961	17.63	
					+4.96	
					190.93	
WATER	7'3½"	386.41	74	0.99846	385.81	10.8
	6'1"	336.22	75	0.99832	335.66	8.282
	7'1½"	377.68	77	0.99804	376.94	
	1'8 3/64"	90.37	69	0.99907	90.29	
	2'12½"	115.92	76	0.99819	115.71	
	1'0"	52.00	64	0.99963	51.98	

#	# HR GAL HR
+32.00	51.30
1231.12	7.955
	138.22
3317.19	16.689

THE TEXAS COMPANY — MONTEBELLO LABORATORY

YIELD CALCULATIONS

RUN NO. 63-K
HOURS 216-240
CATALYST Mill Scale Red. at Brownsville

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
CO 28.010	36.430	15.432	432.28	8.256	1.210	33.89	3.435	18.867	4.645	-14.222	-398.39
H_2 2.016	61.240	25.943	52.30	40.136	5.880	11.85	16.701	42.644	22.581	-20.063	-40.45
CO_2 44.010	1.927	0.816	35.91	28.863	4.229	186.08	12.010	12.826	16.239	3.413	150.17
N_2 28.016	0.263	0.111	3.11	1.397	0.205	5.74	0.581	0.692	0.786		
CH_4 16.042	0.140	0.059	0.95	9.376	1.374	22.04	3.901	3.960	5.275	1.315	21.09
C_2H_4 28.052				2.527	0.370	10.38	1.051	1.051	1.421	0.370	10.36
C_3H_6 42.078				1.837	0.269	8.09	0.764	0.764	1.033	0.269	8.09
C_4+C_5											39.56
C_3H_6 42.078				3.140	0.460	19.36	1.307	1.307	1.767	0.460	19.36
C_3H_8 44.094				0.327	0.048	2.12	0.136	0.136	0.184	0.048	2.12
C_4H_8 56.104				2.077	0.304	17.06	0.864	0.864	1.168	0.304	17.06
C_4H_{10} 58.120				0.647	0.095	5.52	0.269	0.269	0.364	0.095	5.52
C_5H_{10} 70.130				0.940	0.138	9.68	0.391	0.391	0.529	0.138	9.66
C_5H_{12} 72.146				0.177	0.026	1.88	0.074	0.074	0.100	0.026	1.88
C_5H_{12} 84.156				0.300	0.044	3.70	0.125	0.125	0.169	0.044	3.70
C_5+C_6											59.32
TOTAL		42.361	524.55		14.652	337.39	41.610	83.971	63.698		
H_2+CO	97.670	41.375	15701	SCFH	7.090		20.136	61.511	27.226	-34.285	
H_2/CO		1.63	Factor	636902	4.86		4.86	2.26	4.86	1.41	

YIELD BASIS H_2+CO FED — CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
9.564			
1.343			
0.661			
0.515			
2.519			
1.233	4.32	4.481	0.285
0.135	4.24	0.500	0.032
1.087	5.00	3.412	0.217
0.352	4.86	1.136	0.072
0.617	5.45	1.776	0.113
0.120	5.25	0.358	0.023
0.236	5.54	0.668	0.043
3.780		12.331	0.785

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	85.0	6.605	98.0	6.473
400-550	10.4	0.808	91.4	0.739
550 +	4.6	0.357	114.6	0.409
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	40.8	7.90		
C_3 POLY GASO.	87.5	6.91	1.156	
C_3 POLY TAR	12.5	0.99	0.131	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	-	-	68.0
C_4 POLY GASO.	5.98	14.93	2.496	i.5
C_4H_{10}	4.86	(5.52 5.45	(1.156) 1.121	68.0
C_4 FREE GASO.			10.431	5.8
C_4 POLY TAR	7.53	2.13	0.283	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	14.048	0.8947	4851	
GAS OIL	0.739	0.0471	255	
FUEL OIL	0.409	0.0260	141	
POLY TAR	0.414	0.0264	143	
TOTAL	15.610	0.9942	5390	
W. S. CHEM.	1.920	0.1159	628	
TOTAL	17.430	1.1101	6018	

Weight Recovery, %	92.84	Catalyst Age, hrs.	240	Space Velocity, vhv	1133	RECOVERED OIL	0.357**	50.08	3.190	7.770	0.495
Pressure, psig	409	Inlet Velocity, Ft/sec	1.01	Catalyst	Vol., CF 13.86	TOTAL OIL		109.40	6.970	20.101	1.280
Temperature, °F	661	Bed Depth, Ft	21.00	Weight, #	2079	WATER SOLUBLE CHEMICALS	0.272**	14.45	0.920	1.820	0.116
Recycle Ratio	0.99	Bed Density, #/CF	150	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	11.60	TOTAL LIQUID PRODUCTS C_5+		123.85	7.890	21.921	1.396
						NET WATER	6.807**	122.63	7.810	14.722	0.938
						GROSS WATER		137.08	8.730	16.542	1.054
						HYDROCARBON TOTAL—C_1+		163.41	10.409		

FRESH FEED CONVERSION — % Contraction	CO	H_2	H_2+CO	TOTAL FEED CONVERSION — % CO	H_2	CO+H_2	SELECTIVITY C_3+/C_1+
65.41	92.16	77.33	82.86	75.38	47.05	55.74	75.79

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF

*9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

OPERATING CONDITIONS		RATES S.C.F.H.	
PRESSURES PSIG			
Oxygen	438	Fresh Feed	16,076
Natural Gas	450	Recycle	15,891
Generator Outlet	414	Combined Feed	31,967
Reactor Inlet	409	Wet Gas—Measured	4,941
Condenser Inlet		Adjusted	5,560
Product Accumulator	359	Loss	619
		Recycle/Fresh Feed	0.99
TEMPERATURES—°F.		Inlet Velocity—ft./sec.	1.01
Oxygen	481	Fresh Feed Rate—S.C.F.H. H_2 + CO	15701
Natural Gas	787	per Cu. Ft. Dense Bed	1133
Generator	2294	per Lb. Catalyst	7.55
Quench Accumulator	124	per Sq. Ft.	23789
Reactor Inlet	358		
Condenser Inlet	593		
Product Accumulator	95	Heat Transfer Calculations	
Catalyst No. Height		Steam Rate = 404#/hr.	
1 See Period A	-	@705 psia & 506°F. =	
2	660	1201 Btu/#	
3	652	Water in @62°F = 30 Btu/#	
4	662	Net Heat Trans/# steam =	
5	668	1171 Btu	
6	667	(1171)(404) = 473,084 Btu/hr.	
7	662	Ave. Bed Temp. = 661°F.	
8	656	dT = 661-506 = 155°F.	
9	650	Tube Area = 37.6 sq. ft.	
10	646	K = 473,084 / (37.6)(155) =	
11	528	81.2 Btu/°F/sq.ft.	

PRODUCT TESTS	OIL	WATER
°API	51.3	10.7
Neut. No.	49.3	35.2
Sap. No.	61.0	39.0
Hydrox. No.		
Bromine No.	78	
Pour °F.		
Chemicals, % by K_2CO_3		11.0
HEMPEL. DIST. %		°API
205 °F.		
400	84.0	53.5
400-550	10.4	34.0
550+	5.6	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	98	
10%	130	
50%	220	
90%	334	
EP	394	
Rec.	37.4	

CATALYST DATA — INVENTORY DATA		PARTICLE SIZE Screen Analysis Mesh	Microns	%	Sedimentation Microns	%
In Reactor at Start of Period						
Fresh Catalyst Added		On 40	419+		80+	
Total		100	150		40—80	
Catalyst Recovered	39.5	150	105		20—40	
In Reactor at End of Period		200	74		10—20	
		250	62		0—20	
REACTOR d-p, Inches H_2O		325	44			
No. Height		<325				
0 See Period A						
1	72	CATALYST				
2	87	Bulk Density, Lbs./Cu.Ft.				
3	68	Aerated				
4	350	Settled				
Total	577	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	150	N_2 Surface, m^2./gm.				
Inventory, Lbs.	2079					
Bed Depth, Ft.	21.00	CHEMICAL ANALYSIS				
Vol., Cu. Ft.	13.86	Fe				
		C				
		O				
		H				
		K_2O, W+, % basis Fe				
		X-Ray Analysis—				
		Fe_2C_6				
		Fe_3O_4				
		Fe				

GAS ANALYSES HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	36.51	36.50	36.28	36.430
H_2 2.016	61.00	61.27	61.45	61.240
CO_2 44.010	2.06	1.79	1.93	1.927
N_2 28.016	0.34	0.24	0.21	0.263
CH_4 16.042	0.09	0.20	0.13	0.140
			M. W.	12.38286
			H_2O 18.016	
			BALANCE	
WET GAS	8.20	7.98	8.59	8.256
H_2 2.016	39.74	40.53	40.14	40.136
CO_2 44.010	29.38	28.77	28.44	28.863
N_2 28.016	1.39	1.32	1.48	1.397
CH_4 16.042	9.23	9.69	9.21	9.376
C_2H_4 28.052	2.54	2.56	2.48	2.527
C_3H_6 33.056	1.86	1.81	1.84	1.837
C_3H_6 42.078	3.15	3.16	3.11	3.140
C_3H_8 44.094	0.33	0.33	0.32	0.327
C_4H_8 56.104	2.09	2.00	2.14	2.077
C_4H_{10} 58.120	0.58	0.57	0.79	0.647
C_5H_{10} 70.130	1.00	0.88	0.94	0.940
C_5H_{12} 72.146	0.14	0.14	0.25	0.177
C_5H_{12} 84.156	0.37	0.26	0.27	0.300
			M. W.	23.0271

GENERATOR BALANCE M/HR	C	H	O		Mol %	M/Hr	C	H	O
				O_2 32.000	0.21	10.406 0.028			20.872
15.432	15.432		15.432	CO_2 44.010	1.31	0.173	0.173		0.346
25.943		51.886		N_2 28.016	1.41	0.187			
0.816	0.816		1.632	CH_4 16.042	82.79	10.952	10.952	43.808	
0.111				C_2H_4 28.052	6.79	0.898	1.796	5.388	
0.059	0.059	0.236		C_3H_8 44.094	5.31	0.702	2.106	5.616	
				C_4H_{10} 58.120	1.56	0.206	0.824	2.060	
		7.021	3.511	C_5H_{12} 72.146	0.62	0.082	0.410	0.984	
	16.307	59.143	20.575	MW = 20.056914					
	100.28	102.22	96.97	TOTAL				16.261	57.856	21.218

WEIGHT BALANCE	#/hr Measured	At Wt. Balance
WET GAS	299.81	337.39
OIL	50.08	50.08
WATER	137.08	137.08
TOTAL	486.97	524.55
FRESH FEED	524.55	
WEIGHT BALANCE	92.84	
WET GAS FACTOR	1125346	
INDICATED LOSS—S C F H	619	

GAS FLOW RATES						
	VR	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED		408.7	68	2337909		
	6.492	20.577	0.9924	1.5290	16,076	42.361
WET GAS		1.50	68	1257214		
	6.963	4.025	0.9924	1.1213	4,941	13.020
RECYCLE		409.5	124			
	8.554	20.596	0.9436	1.1213	14,784	38.957
BLEED						
	8.688	20.596	1.0000	1.1213	1,007	2.653
NATURAL GAS		450.2	198	1443392		
	7.667	21.562	0.8890	1.2014	5,020	13.228
OXYGEN		437.9	89			
	6.917	21.274	0.9915		3,950	10.408
STEAM		29.1 4.7 33.8				
215.7	6.504	0.2882		404 #/hr.		

LIQUID PRODUCT RATES HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
OIL	6'9⅜"	360.22	57	1.0015	360.76	51.3		
	3'4"	179.09	60	1.0000	179.09	6.445		
					44.81		431.00	50.08
					186.48		1201.86	7.770
WATER	7'2¾"	383.14	78	0.99788	382.33	10.7		
	2'2½"	115.92	76	0.99819	115.71	8.287		
	3'7½"	193.28	71	0.99883	193.05			
	1'2½"	62.73	70	0.99896	62.66			137.08
					397.01		3290.02	16.542

THE TEXAS COMPANY — MONTEBELLO LABORATORY

YIELD CALCULATIONS

RUN NO. 63-L
HOURS 240-264
CATALYST

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE	
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr
CO 28.010	37.170	15.763	441.53	9.120	1.408	39.44	3.825	19.588	5.233	-14.355	-402.09
H_2 2.016	60.604	25.701	51.81	41.153	6.354	12.81	17.260	42.961	23.614	-19.347	-39.00
CO_2 44.010	1.790	0.759	33.40	27.710	4.278	188.26	11.621	12.380	15.899	3.519	154.86
N_2 28.016	0.173	0.073	2.05	1.493	0.231	6.47	0.626	0.699	0.857		
CH_4 16.042	0.263	0.112	1.80	9.313	1.438	23.07	3.906	4.018	5.344	1.326	21.27
C_2H_6 28.052				2.417	0.373	10.46	1.014	1.014	1.387	0.373	10.46
C_3H_8 30.068				1.767	0.273	8.21	0.741	0.741	1.014	0.273	8.21
C_1+C_2											39.24
C_2H_4 42.078				2.790	0.431	18.14	1.170	1.170	1.601	0.431	18.14
C_3H_6 44.094				0.287	0.044	1.94	0.120	0.120	0.164	0.044	1.94
C_4H_8 56.104				1.863	0.288	16.16	0.781	0.781	1.069	0.288	16.16
C_5H_{10} 58.120				0.740	0.114	6.63	0.310	0.310	0.424	0.114	6.63
C_5H_{10} 70.130				0.830	0.128	8.98	0.348	0.348	0.476	0.128	8.98
C_6H_{12} 72.146				0.260	0.040	2.89	0.109	0.109	0.149	0.040	2.89
C_6H_{12} 84.156				0.257	0.040	3.37	0.108	0.108	0.148	0.040	3.37
C_3-C_6											58.11
TOTAL		42.408	530.59		15.440	346.83	41.939	84.347	64.543		
H_2+CO	97.774	41.464	15736	SCFH	7.762		21.085	62.549	28.847	-33.702	
H_2/CO		1.63	Factor 635485		4.51		4.51	2.19	4.51	1.35	

Weight Recovery, %	92.18	Catalyst Age, hrs.	264	Space Velocity, vhv	1149	RECOVERED OIL	0.35788	50.02	3.179	7.757	0.493
Pressure, psig	408	Inlet Velocity, Ft/sec	1.01	Catalyst Vol., CF	13.70	TOTAL OIL		108.13	6.872	19.816	1.260
Temperature, °F	661	Bed Depth, Ft	20.76	Weight, #	2041	WATER SOLUBLE CHEMICALS	0.31668	16.79	1.067	2.098	0.133
Recycle Ratio	0.99	Bed Density, #/CF	149	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$	11.05	TOTAL LIQUID PRODUCTS C_5+		124.92	7.939	21.914	1.393
						TOTAL WATER	6.49188	116.95	7.432	14.040	0.892
						GROSS WATER		133.74	8.499	16.138	1.025
						HYDROCARBON TOTAL—C_1+		164.86	10.478		

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+
63.59	91.07	75.28	81.28	73.29	45.03	53.88	75.77

YIELD BASIS H_2+CO FED

CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
9.841			
1.352			
0.665			
0.522			
2.539			
1.153	4.32	4.199	0.267
0.123	4.24	0.458	0.029
1.027	5.00	3.232	0.205
0.421	4.86	1.364	0.087
0.571	5.45	1.648	0.105
0.184	5.25	0.550	0.035
0.214	5.54	0.608	0.039
3.693		12.059	0.767

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED MONPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	86.2	6.687	98.0	6.553
400-550	3.2	0.636	91.4	0.581
550 +	5.6	0.434	114.6	0.497

	RECOVERY %	#/hr	gal/hr
PROPYLENE	38.6	7.00	
C_3 POLY GASO.	87.5	6.12	1.023
C_3 POLY TAR	12.5	0.88	0.117

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	-	-	68.0
C_4 POLY GASO.	5.98	14.14	2.365	i.5
C_4H_{10}	4.86	(5.53) 5.54	(1.354) 1.098	68.0
C_4 FREE GASO.			10.382	5.8
C_4 POLY TAR	7.53	2.02	0.268	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	13.845	0.8798	4770
GAS OIL	0.581	0.0369	200
FUEL OIL	0.497	0.0316	171
POLY TAR	0.385	0.0245	133
TOTAL	15.308	0.9728	5274
W. S. CHEM.	2.098	0.1333	723
TOTAL	17.406	1.1061	5997

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF

*9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	436	Fresh Feed	16,094
Natural Gas	459	Recycle	15,916
Generator Outlet	413	Combined Feed	32,010
Reactor Inlet	408	Wet Gas—Measured	5,159
Condenser Inlet		Adjusted	5,860
Product Accumulator	358	Loss	701
TEMPERATURES—°F.		Recycle/Fresh Feed	0.99
Oxygen	492	Inlet Velocity—ft./sec.	1.01
Natural Gas	765	Fresh Feed Rate—S.C.F.H. / 32 × 60	15,736
Generator	2264	per Cu. Ft. Dense Bed	1149
Quench Accumulator	109	per Lb. Catalyst	7.71
Reactor Inlet	353	per Sq. Ft.	23842
Condenser Inlet	597		
Product Accumulator	91	Heat Transfer Calculations	
Catalyst No. Height		Steam Rate = 399#/hr.	
1 See Period A	-	@705 psia & 506°F.=	
2	661	1201 Btu/#	
3	650	Water in @56°F = 24 Btu/#	
4	660	Net Heat Trans/# steam=	
5	668	1177 Btu	
6	668	(1177)(399) = 469,623 Btu/hr.	
7	663	Ave. Bed Temp. = 661°F.	
8	659	dT = 661-506 = 155°F.	
9	651	Tube AREA = 37.5 Sq. ft.	
10	648	K = 469,623 / (37.5)(155) = 80.8 Btu/°F.sq.ft.	
11			

PRODUCT TESTS	OIL	WATER
°API	51.2	10.7
Neut. No.	48.5	37.4
Sap. No.	65.1	39.2
Hydrox. No.		
Bromine No.	76	
Pour °F.		
Chemicals, % by K_2CO_3		13.0
HEMPEL. DIST. %		°API
205 °F.		
400	85.2	52.8
400-550	8.2	34.0
550+	6.6	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	98	
10%	128	
50%	210	
90%	330	
EP	394	
Rec.	97.9	

CATALYST DATA					
INVENTORY DATA		PARTICLE SIZE			
In Reactor at Start of Period		Screen Analysis		Sedimentation	
Fresh Catalyst Added		Mesh	Microns %	Microns	%
Total		On 40	419+	80+	
Catalyst Recovered	11	100	150	40—80	
In Reactor at End of Period		150	105	20—40	
		200	74	10—20	
REACTOR d-p, Inches H_2O		250	62	0—20	
No. Height		325	44		
0 See Period A	-	<325			
1	71	CATALYST			
2	90	Bulk Density, Lbs./Cu.Ft.			
3	65	Aerated			
4	340	Settled			
Total	566	Compacted			
		Particle Density, gm./cc.			
CALCULATED FROM dp		NH_3 Value, ml./gm.			
Density, Lbs./Cu.Ft.	149	N_2 Surface, m^2./gm.			
Inventory, Lbs.	2041				
Bed Depth, Ft.	20.76	CHEMICAL ANALYSIS			
Vol., Cu. Ft.	13.70	Fe			
		C			
		O			
		H			
		K_2O, W+, % basis Fe			
		X-Ray Analysis—			
		$Fe_{2.2}C_9$			
		Fe_3O_4			
		Fe			

GAS ANALYSES	1400	2200	0600	AVERAGE
HOUR				
FRESH FEED				
CO 28.010	37.12	37.44	36.95	37.170
H_2 2.016	60.55	60.41	60.85	60.604
CO_2 44.010	1.78	1.81	1.78	1.790
N_2 28.016	0.14	0.19	0.19	0.173
CH_4 16.042	0.41	0.15	0.23	0.263
			M. W	12.51153
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	9.76	8.62	8.98	9.120
H_2 2.016	40.62	40.93	41.91	41.153
CO_2 44.010	27.21	28.32	27.60	27.710
N_2 28.016	1.26	1.71	1.51	1.493
CH_4 16.042	9.84	9.12	8.98	9.313
C_2H_6 28.052	2.39	2.38	2.48	2.417
C_2H_4 28.036	1.76	1.75	1.79	1.767
C_2H_2 26.078	2.75	2.83	2.79	2.790
C_3H_8 44.094	0.27	0.29	0.30	0.287
C_4H_8 56.104	1.94	1.90	1.75	0.863
C_5H_{12} 58.120	0.78	0.77	0.67	0.740
C_5H_{10} 70.130	0.89	0.85	0.75	0.830
C_6H_{14} 72.146	0.26	0.26	0.26	0.260
C_6H_{12} 84.156	0.27	0.27	0.23	0.257
			M. W.	22.46269

GENERATOR BALANCE							
	Mol %	M/Hr	C	H	O	M/HR	
O_2 32.000	0.23	10.472 / 0.031			21.006	15.763	15.763		15.763
CO_2 44.010	1.19	0.160	0.160		0.320	25.701		51.402	
N_2 28.016	1.39	0.186				0.759	0.759		1.518
CH_4 16.042	82.49	11.062	11.062	44.248		0.073			
C_2H_6 30.068	7.35	0.986	1.972	5.916		0.112	0.112	0.448	
C_3H_8 44.094	5.34	0.716	2.148	5.728					
C_4H_{10} 58.120	1.48	0.198	0.792	1.980					
C_6H_{12} 72.146	0.53	0.071	0.355	0.852				7.482	3.741
MW = 20.026955						16.634	59.332	21.022	
TOTAL			16.489	58.724	21.326	100.88	101.04	98.57	

GAS FLOW RATES						
	V	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED		407.9	65	2313865		
WET GAS	6.521	20.557	0.9952	1.5211	16,094	42.408
		1.57	66	1288803		
RECYCLE	7.150	4.034	0.9943	1.1353	5,159	13.594
		407.9	123			
BLEED	8.546	20.557	0.9444	1.1353	14,939	39.365
NATURAL GAS	8.338	20.557	1.0000	1.1353	977	2.574
		458.6	202	1445551		
OXYGEN	7.721	21.755	0.8863	1.2023	5,089	13.410
	6.963	435.8	67			
STEAM		21.225	0.9933		3,974	10.472
		29.5 / 4.7 / 34.2				
	6,392	0.2897		399 #/hr.		

WEIGHT BALANCE	#/hr Measured	At Wt. Balance
WET GAS	305.36	346.83
OIL	50.02	50.02
WATER	133.74	133.74
TOTAL	489.12	530.59
FRESH FEED	530.59	
WEIGHT BALANCE	92.18	
WET GAS FACTOR	1135806	
INDICATED LOSS—S C F H	701	

LIQUID PRODUCT RATES						
HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
OIL	7'10"	371.14	54	1.0030	372.25	51.2		
	6'9½"	360.22	57	1.0015	360.76	6.448		
	3'7½"	193.28	54	1.0030	193.86			
	0'5½"	24.34	50	1.0049	24.46			
					45.27		+34.00	50.02
					186.16		120036	7.757
WATER	7'3⅝"	387.50	76	0.99819	386.80	10.7		
	3'7½"	193.28	71	0.99883	193.05	8.287		
	4'7⅝"	247.83	66	0.99942	247.69			
	1'0½"	54.14	63	0.99973	54.13			133.74
					387.31		3209.64	16.138

THE TEXAS COMPANY — MONTEBELLO LABORATORY

YIELD CALCULATIONS

RUN NO. 63-M
HOURS 264-288
CATALYST

FRESH FEED	%	m/hr	#/hr
CO 28.010	37.023	15.813	442.90
H_2 2.016	60.677	25.915	52.24
CO_2 44.010	1.673	0.715	31.47
N_2 28.016	0.227	0.097	2.72
CH_4 16.042	0.400	0.171	2.74
C_2H_4 28.052			
C_2H_6 30.068			
C_3+C_4			
C_3H_8 42.078			
C_3H_6 44.094			
C_4H_8 56.104			
C_4H_{10} 58.120			
C_5H_{10} 70.130			
C_5H_{12} 72.146			
C_6H_{12} 84.156			
C_5-C_6			
TOTAL		42.711	532.07
H_2+CO	97.700	41.728	15836 SCFH
H_2/CO		1.64	Factor 631472

WET GAS	%	At Wt. Balance m/hr	At Wt. Balance #/hr
CO 28.010	9.103	1.453	40.70
H_2 2.016	42.147	6.729	13.57
CO_2 44.010	27.133	4.333	190.70
N_2 28.016	1.507	0.241	6.75
CH_4 16.042	8.957	1.430	22.94
C_2H_4 28.052	2.423	0.387	10.86
C_2H_6 30.068	1.737	0.277	8.33
C_3H_8 42.078	2.807	0.448	18.35
C_3H_6 44.094	0.310	0.049	2.16
C_4H_8 56.104	1.893	0.302	16.94
C_4H_{10} 58.120	0.627	0.100	5.81
C_5H_{10} 70.130	0.873	0.139	9.75
C_5H_{12} 72.146	0.203	0.032	2.31
C_6H_{12} 84.156	0.280	0.045	3.79
C_5-C_6			
TOTAL		15.965	353.46
H_2+CO	8.182		
H_2/CO	4.63		

RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
3.878	19.691	5.331	-14.360	-402.20
17.956	43.071	24.685	-19.186	-38.67
11.559	12.274	16.607	3.618	159.23
0.642	0.739	0.980		
3.816	3.987	5.417	1.259	20.20
1.032	1.032	1.419	0.387	10.86
0.740	0.740	1.017	0.277	8.33
				39.39
1.196	1.196	1.644	0.448	18.85
0.132	0.132	0.181	0.049	2.16
0.806	0.806	1.108	0.302	16.94
0.267	0.267	0.367	0.100	5.81
0.372	0.372	0.511	0.139	9.75
0.086	0.086	0.118	0.032	2.31
0.119	0.119	0.164	0.045	3.79
				59.61
42.601	85.312	65.635		
21.834	63.562	55.931	-33.546	
4.63	2.23	4.63	1.34	

YIELD BASIS H_2+CO FED — CONDENSATE	#/MCF	#/gal	gal/hr	gal/MCF
	10.055			
	0.980			
	1.276			
	0.686			
	0.526			
	2.488			
	1.190	4.32	4.363	0.276
	0.136	4.24	0.509	0.032
	1.070	5.00	3.388	0.214
	0.367	4.86	1.195	0.075
	0.616	5.45	1.789	0.113
	0.146	5.25	0.440	0.028
	0.239	5.54	0.684	0.043
	3.764		12.368	0.781

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
400 EP	83.5	6.173	98.0	6.050
400-550	11.2	0.828	91.4	0.757
550 +	5.3	0.392	114.6	0.449
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	37.6	7.09		
C_3 POLY GASO.	87.5	6.20	1.037	
C_3 POLY TAR	12.5	0.89	0.118	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	-	-	68.0
C_4 POLY GASO.	5.98	14.82	2.479	1.5
C_4H_{10}	4.86	(5.81) 5.28	(1.195) 1.087	68.0
C_4 FREE GASO.			10.000	5.8
C_4 POLY TAR	7.53	2.12	0.282	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	13.566	0.8567	4645
GAS OIL	0.757	0.0478	259
FUEL OIL	0.449	0.0284	154
POLY TAR	0.400	0.0253	137
TOTAL	15.172	0.9582	5195
W. S CHEM.	1.902	0.1201	651
TOTAL	17.074	1.0783	5846

Weight Recovery, %	90.70	Catalyst Age, hrs.	288	Space Velocity, vhv	1187	RECOVERED OIL	0.338##	47.46	2.997	7.393	0.467
Pressure, psig	406	Inlet Velocity, Ft/sec	1.02	Catalyst Vol., CF	13.34	TOTAL OIL		107.07	6.761	19.761	1.248
Temperature, °F	658	Bed Depth, Ft	20.21	Weight, #	1961	WATER SOLUBLE CHEMICALS	0.283##	14.99	0.947	1.902	0.120
Recycle Ratio	1.00	Bed Density, #/CF	147	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ = 11.93		TOTAL LIQUID PRODUCTS C_5^+		122.06	7.708	21.663	1.368
						WET WATER	6.448##	116.16	7.335	13.945	0.881
						GROSS WATER		131.15	8.282	15.847	1.001
						HYDROCARBON TOTAL—C_1^+		161.45	10.196		

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3^+/C_1^+
62.62	90.81	74.03	80.39	72.93	43.73	52.78	75.60

Form ML—11

##Included in Reactor Effluent Total

g/NCM = 16.91 × ¢/MCF ©9488 MCFH H_2+CO. Bbl/Day = 5421.6 × gal/MCF

OPERATING CONDITIONS		RATES S.C.F.H.	
PRESSURES PSIG			
Oxygen	435	Fresh Feed	16,209
Natural Gas	471	Recycle	16,167
Generator Outlet	411	Combined Feed	32,376
Reactor Inlet	406	Wet Gas—Measured	5,210
Condenser Inlet		Adjusted	6,058
Product Accumulator	356	Loss	848
TEMPERATURES—°F.		Recycle/Fresh Feed	1.00
Oxygen	511	Inlet Velocity—ft./sec.	1.02
Natural Gas	771	Fresh Feed Rate—S.C.F.H. H_2+CO	15836
Generator	2277	per Cu. Ft. Dense Bed	1187
Quench Accumulator	110	per Lb. Catalyst	8.08
Reactor Inlet	354	per Sq. Ft.	23994
Condenser Inlet	590		
Product Accumulator	87		
Catalyst No. Height			
1 See Period A	-		
2	656		
3	649		
4	659		
5 Ave. 658	663		
6	664		
7	660		
8	655		
9	647		
10	645		
11	523		

PRODUCT TESTS	OIL	WATER
°API	52.0	10.9
Neut. No.	49.6	37.2
Sap. No.	65.0	40.5
Hydrox. No.		
Bromine No.	73	
Pour °F.		
Chemicals, % by K_2CO_3		12.0
Recycle/Fresh Feed		
Inlet Velocity—ft./sec.		
Fresh Feed Rate—S.C.F.H. H_2+CO		
HEMPEL. DIST. %		°API
205 °F.		
400	82.5	53.6
400-550	11.2	34.9
550+	6.3	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	92	
10%	124	
50%	198	
90%	328	
EP	384	
Rec.	97.0	

CATALYST DATA — INVENTORY DATA		PARTICLE SIZE	Screen Analysis		Sedimentation	
In Reactor at Start of Period		Mesh	Microns	%	Microns	%
Fresh Catalyst Added		On 40	419+		80+	
Total		100	150		40—80	
Catalyst Recovered	33	150	105		20—40	
In Reactor at End of Period		200	74		10—20	
		250	62		0—20	
REACTOR d-p, Inches H_2O		325	44			
No. Height		<325				
0 See Period A						
1	70	CATALYST				
2	88	Bulk Density, Lbs./Cu.Ft.				
3	65	Aerated				
4	320	Settled				
Total	543	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	147	N_2 Surface, m^2 gm.				
Inventory, Lbs.	1961					
Bed Depth, Ft.	20.21	CHEMICAL ANALYSIS				
Vol., Cu. Ft.	13.34	Fe				
		C				
		O				
		H				
		K₂O. W+. % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

GAS ANALYSES — HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	37.13	37.02	36.92	37.023
H_2 2.016	60.29	60.94	60.80	60.677
CO_2 44.010	1.79	1.43	1.80	1.673
N_2 28.016	0.19	0.20	0.29	0.227
CH_4 16.042	0.60	0.41	0.19	0.400
			M. W	12.45744
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	8.99	9.29	9.03	9.103
H_2 2.016	42.62	42.56	41.26	42.147
CO_2 44.010	26.87	26.72	27.81	27.133
N_2 28.016	1.37	1.56	1.59	1.507
CH_4 16.042	9.23	9.07	8.57	8.957
C_2H_4 28.052	2.37	2.37	2.53	2.423
C_2H_6 30.068	1.69	1.74	1.78	1.737
C_3H_8 42.078	2.81	2.65	2.96	2.807
C_3H_6 44.094	0.33	0.28	0.32	0.310
C_4H_8 56.104	1.83	1.80	2.05	1.893
C_4H_{10} 58.120	0.58	0.65	0.65	0.627
C_5H_{10} 70.130	0.87	0.81	0.94	0.873
C_5H_{12} 72.146	0.17	0.22	0.22	0.203
C_6H_{12} 84.156	0.27	0.28	0.29	0.280
			M. W.	22.1403

GENERATOR BALANCE	M/HR	C	H	O
FRESH FEED				
CO 28.010	15.813	15.813		15.813
H_2 2.016	25.915		51.830	
CO_2 44.010	0.715	0.715		1.430
N_2 28.016	0.097			
CH_4 16.042	0.171	0.171	0.684	
			6.717	3.359
		16.699	59.231	20.602
TOTAL	102.84	102.93	96.07	

	Mol %	M/Hr	C	H	O
O_2 32.000	0.26	10.495 0.035			21.060
CO_2 44.010	1.44	0.192	0.192		0.384
N_2 28.016	2.53	0.350			
CH_4 16.042	81.30	10.815	10.815	43.260	
C_2H_6 30.068	6.87	0.914	1.828	5.484	
C_3H_8 44.094	5.15	0.685	2.055	5.480	
C_4H_{10} 58.120	1.63	0.217	0.868	2.170	
C_5H_{12} 72.146	0.72	0.096	0.480	1.152	
MW =	20.29923				
TOTAL			16.238	57.546	21.444

GAS FLOW RATES	V/H	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED		406.1	69	23.23912		
	6.592	20.513	0.9915	1.5244	16,209	42.711
WET GAS		1.68	67	1307567		
	7.154	4.047	0.9933	1.1435	5,210	13.729
RECYCLE		406.0	122			
	8.600	20.511	0.9452	1.1435	15,121	39.845
BLEED						
	8.883	20.511	1.0000	1.1435	1,046	2.756
NATURAL GAS		470.9	201	1426162		
	7.608	22.036	0.8870	1.1942	5,049	13.304
OXYGEN		435.4	73			
	7.021	21.216	0.9877		3,983	10.495
STEAM						
	6.142					

WEIGHT BALANCE	# hr Measured	At Wt. Balance
WET GAS	303.96	353.46
OIL	47.46	47.46
WATER	131.15	131.15
TOTAL	482.57	532.07
FRESH FEED	532.07	
WEIGHT BALANCE	90.70	
WET GAS FACTOR	1162850	
INDICATED LOSS—S C F H	848	

LIQUID PRODUCT RATES	HOUR	GAGE	GAL	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR. GAL HR
OIL		6'10"	362.41	57	1.0015	362.95	52.0		
		3'7½"	193.28	54	1.0030	193.86	6.420		
						48.33		453.50	47.46
						177.42		1139.04	7.393
WATER		7'11¾"	377.68	80	0.99759	376.77	10.9		
		4'7½"	247.83	66	0.99942	247.69	8.276		
		6'5½"	342.76	67	0.99932	342.53			
		1'9"	91.50	80	0.99759	91.28			131.15
						380.33		3147.61	15.847

THE TEXAS COMPANY — MONTEBELLO LABORATORY

YIELD CALCULATIONS

RUN NO. 63-N
HOURS 288-312
CATALYST Mill Scale Red. at Brownsville

FRESH FEED	%	m/hr	#/hr	WET GAS	At Wt. Balance m/hr	At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
CO 28.010	37.337	15.892	445.13	10.000	1.656	46.38	4.217	20.109	5.873	-14.236	-398.75
H_2 2.016	60.276	25.656	51.72	42.387	7.022	14.16	17.875	43.531	24.897	-18.634	-37.56
CO_2 44.010	1.970	0.839	36.92	26.920	4.459	196.27	11.352	12.191	15.811	3.620	159.35
N_2 28.016	0.207	0.088	2.47	1.353	0.224	6.28	0.571	0.659	0.795		
CH_4 16.042	0.210	0.089	1.43	8.390	1.390	22.30	3.538	3.627	4.928	1.301	20.87
C_2H_4 28.052				2.380	0.394	11.05	1.004	1.004	1.398	0.394	11.05
C_2H_6 30.068				1.680	0.278	8.36	0.708	0.708	0.986	0.278	8.36
C_3+C_4											40.28
C_3H_6 42.078				2.683	0.444	18.68	1.131	1.131	1.575	0.444	18.68
C_3H_8 44.094				0.277	0.046	2.03	0.117	0.117	0.163	0.046	2.03
C_4H_8 56.104				1.873	0.310	17.39	0.790	0.790	1.100	0.310	17.39
C_4H_{10} 58.120				0.647	0.107	6.22	0.273	0.273	0.380	0.107	6.22
C_5H_{10} 70.130				0.903	0.150	10.52	0.381	0.381	0.531	0.150	10.52
C_5H_{12} 72.146				0.210	0.035	2.53	0.089	0.089	0.124	0.035	2.53
C_6H_{12} 84.156				0.297	0.049	4.12	0.125	0.125	0.174	0.049	4.12
C_5-C_6											61.49
TOTAL		42.564	537.67		16.564	366.29	42.171	84.735	65.554		
H_2+CO	97.613	41.548	15767 SCFH		8.678		22.092	63.640	30.770	-32.870	
H_2/CO		1.61	Factor 634236		4.24		4.24	2.16	4.24	1.31	

CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
0.701			
0.530			
2.555			
1.185	4.32	4.324	0.274
0.129	4.24	0.479	0.030
1.103	5.00	3.478	0.221
0.394	4.86	1.280	0.081
0.667	5.45	1.930	0.122
0.160	5.25	0.482	0.031
0.261	5.54	0.744	0.047
3.899		12.717	0.806

YIELD BASIS H_2+CO FED

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	83.5	5.793	98.0	5.677
400-550	11.0	0.763	91.4	0.697
550 +	5.5	0.382	114.6	0.438

	RECOVERY %	#/hr	gal/hr
PROPYLENE	36.1	6.74	
C_3 POLY GASO.	87.5	5.90	0.987
C_3 POLY TAR	12.5	0.84	0.116

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	-	-	68.0
C_4 POLY GASO.	5.98	15.22	2.545	1.5
C_4H_{10}	4.86	(6.22) 5.27	(1.280) 1.084	68.0
C_4-FREE GASO.			9.820	5.8
C_4 POLY TAR	7.53	2.17	0.288	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	13.449	0.8530	4625
GAS OIL	0.697	0.0442	240
FUEL OIL	0.438	0.0278	151
POLY TAR	0.404	0.0256	139
TOTAL	14.988	0.9506	5155
W. S. CHEM.	1.837	0.1165	632
TOTAL	16.825	1.0671	5787

Weight Recovery, %	90.99	Catalyst Age, hrs.	312	Space Velocity, vhv	1218	RECOVERED OIL	0.31988	44.76	2.839
Pressure, psig	404	Inlet Velocity, Ft/sec	1.02	Catalyst Vol., CF	12.94	TOTAL OIL		106.25	6.738
Temperature, °F	658	Bed Depth, Ft	19.61	Weight, #	1876	WATER SOLUBLE CHEMICALS	0.27188	14.39	0.913
Recycle Ratio	0.99	Bed Density, #/CF	145	Effluent $\frac{(H_2)(CO_2)}{\text{Shift Ratio } (H_2O)(CO)}$ =	10.76	TOTAL LIQUID PRODUCTS C_5+		120.64	7.651
						NET WATER	6.22988	112.23	7.118
						GROSS WATER		126.62	8.031
						HYDROCARBON TOTAL—C, +		160.92	10.206

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
61.08	89.58	72.63	79.11	70.79	42.81	51.65	74.97

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF

*9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

OPERATING CONDITIONS				
PRESSURES PSIG		RATES S.C.F.H.		
Oxygen	433	Fresh Feed	16,153	
Natural Gas	472	Recycle	16,004	
Generator Outlet	408	Combined Feed	32,157	
Reactor Inlet	404	Wet Gas—Measured	5,455	
Condenser Inlet		Adjusted	6,286	
Product Accumulator	354	Loss	831	
TEMPERATURES—°F.		Recycle/Fresh Feed	0.99	
Oxygen	463	Inlet Velocity—ft./sec.	1.02	
Natural Gas	780	Fresh Feed Rate—S.C.F.H.	15767	
Generator	2283	per Cu. Ft. Dense Bed	1218	
Quench Accumulator	126	per Lb. Catalyst	8.40	
Reactor Inlet	362	per Sq. Ft.	23889	
Condenser Inlet	598			
Product Accumulator	87			

Catalyst No.	Height	
1	See Period A	-
2		656
3		650
4		660
5	Ave.	663
6		664
7		660
8		654
9		646
10		645
11		530

PRODUCT TESTS	OIL	WATER
°API	51.1	11.0
Neut. No.	49.5	37.6
Sap. No.	64.6	41.0
Hydrox. No.		
Bromine No.	73	
Pour °F.		
Chemicals, % by K_2CO_3		12.0
HEMPEL. DIST. %		°API
205 °F.		
400	82.5	53.4
400-550	11.0	31.2
550+	6.5	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	93	
10%	127	
50%	200	
90%	326	
EP	386	
Rec.	96.2	

CATALYST DATA — INVENTORY DATA		
In Reactor at Start of Period		
Fresh Catalyst Added		
Total		
Catalyst Recovered	42	
In Reactor at End of Period		
REACTOR d-p, Inches H_2O		
No. Height		
0 See Period A		
1	69	
2	85	
3	65	
4	300	
Total	519	
CALCULATED FROM dp		
Density, Lbs./Cu.Ft.	145	
Inventory, Lbs.	1876	
Bed Depth, Ft.	19.61	
Vol., Cu. Ft.	12.94	

PARTICLE SIZE				
	Screen Analysis		Sedimentation	
Mesh	Microns	%	Microns	%
On 40	419+		80+	
100	150		40—80	
150	105		20—40	
200	74		10—20	
250	62		0—20	
325	44			
<325				

CATALYST

Bulk Density, Lbs./Cu.Ft.

Aerated

Settled

Compacted

Particle Density, gm./cc.

NH_3 Value, ml./gm.

N_2 Surface, m^2/gm.

CHEMICAL ANALYSIS

Fe

C

O

H

K_2O. W+. % basis Fe

X-Ray Analysis—

$Fe_{22}C_9$

Fe_3O_4

Fe

GAS ANALYSES	1400	2200	0600	AVERAGE
HOUR				
FRESH FEED				
CO 28.010	37.42	37.27	37.32	37.337
H_2 2.016	60.30	60.30	60.23	60.276
CO_2 44.010	1.71	2.07	2.13	1.970
N_2 28.016	0.19	0.22	0.21	0.207
CH_4 16.042	0.38	0.14	0.11	0.210
			M. W	12.631936
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	9.48	9.74	10.78	10.000
H_2 2.016	43.06	41.46	42.64	42.387
CO_2 44.010	26.05	27.66	27.05	26.920
N_2 28.016	1.43	1.34	1.29	1.353
CH_4 16.042	9.34	7.77	8.06	8.390
C_2H_4 28.052	2.31	2.43	2.40	2.380
C_2H_6 30.068	1.68	1.69	1.67	1.680
C_3H_6 42.078	2.57	2.94	2.54	2.683
C_3H_8 44.094	0.27	0.26	0.30	0.277
C_4H_8 56.104	1.73	2.25	1.64	1.873
C_4H_{10} 58.120	0.72	0.77	0.45	0.647
C_5H_{10} 70.130	0.86	1.07	0.78	0.903
C_5H_{12} 72.146	0.22	0.25	0.16	0.210
C_6H_{12} 84.156	0.28	0.37	0.24	0.297
			M. W.	22.113455

GENERATOR BALANCE	M/HR	C	H	O
FRESH FEED	15.892	15.892		15.892
	25.656		51.312	
	0.839	0.839		1.678
	0.088			
	0.089	0.089	0.356	
			7.472	3.736
		16.820	59.140	21.306
		101.99	100.94	98.72

	Mol %	M/Hr	C	H	O
O_2 32.000	0.24	10.564 0.032			21.192
CO_2 44.010	1.45	0.195	0.195		0.390
N_2 28.016	1.60	0.215			
CH_4 16.042	82.28	11.058	11.058	44.232	
C_2H_4 30.068	6.98	0.938	1.876	5.628	
C_3H_8 44.094	5.33	0.716	2.148	5.728	
C_4H_{10} 58.120	1.56	0.210	0.840	2.100	
C_6H_{12} 72.146	0.56	0.075	0.375	0.900	
MW =	20.122205				
TOTAL			16.492	58.588	21.582

WEIGHT BALANCE	#/hr Measured	At Wt. Balance
WET GAS	317.86	366.29
OIL	44.76	44.76
WATER	126.62	126.62
TOTAL	489.24	537.67
FRESH FEED	537.67	
WEIGHT BALANCE	90.99	
WET GAS FACTOR	1152362	
INDICATED LOSS—S C F H	831	

GAS FLOW RATES

	$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
		404.3	68	2291810		
FRESH FEED	6,623	20.469	0.9924	1.5139	16,153	42.564
		1.74	66	1309157		
WET GAS	7.463	4.055	0.9943	1.1442	5,455	14.374
		403.3	124			
RECYCLE	8.558	20.445	0.9436	1.1442	14,982	39.478
BLEED	8.700	20.445	1.0000	1.1442	1,022	2.693
		471.9	205	1438709		
NATURAL GAS	7.667	22.059	0.8843	1.1995	5,100	13.439
		432.8	71			
OXYGEN	7.075	21.154	0.9896		4,009	10.564
		28.8				
STEAM	6.263					

LIQUID PRODUCT RATES

HOUR	GAGE	GAL	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
OIL	7'0"	371.14	55	1.0025	372.07	51.1		
	6'10"	362.41	57	1.0015	362.95	6.451		
	3'10½"	206.37	51	1.0044	207.28			
	1'0"	52.00	49	1.0054	52.28			
					+2.40		+15.50	44.76
					166.52		1074.22	6.938
WATER	6'9"	358.04	66	0.99942	357.83	11.0		
	6'5½"	342.76	67	0.99932	342.53	8.870		
	7'6½"	399.50	69	0.99907	399.13			
	1'3½"	67.20	62	0.99982	67.19			
	1'11"	100.59	63	0.99973	100.56			
	1'6½"	80.37	63	0.99973	80.35			186.6
					367.45		3038.81	15.310

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 63-0
HOURS 312-336
CATALYST Mill Scale Red. at Brownsville

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO 28.010	36.943	15.856	444.13	9.794	1.672	46.82	4.151	20.007	5.823	-14.184	-397.31				
H_2 2.016	60.620	26.018	52.45	43.860	7.487	15.09	18.591	44.609	26.078	-18.531	-37.36				
CO_2 44.010	1.890	0.811	35.69	26.064	4.448	195.72	11.048	11.859	15.496	3.637	160.03	10.070			
N_2 28.016	0.217	0.093	2.61	1.223	0.209	5.86	0.518	0.611	0.727						
CH_4 16.042	0.330	0.142	2.28	8.320	1.420	22.78	3.526	3.668	4.946	1.278	20.50	1.290			
C_2H_4 28.052				2.290	0.391	10.97	0.971	0.971	1.362	0.391	10.97	0.690			
C_2H_6 30.068				1.593	0.272	8.18	0.675	0.675	0.947	0.272	8.18	0.515			
C_1+C_2											39.65	2.495			
C_3H_6 42.078				2.693	0.460	19.36	1.141	1.141	1.601	0.460	19.36	1.218	4.32	4.481	0.282
C_3H_8 44.094				0.290	0.050	2.20	0.123	0.123	0.173	0.050	2.20	0.138	4.24	0.519	0.033
C_4H_8 56.104				1.937	0.331	18.57	0.821	0.821	1.152	0.331	18.57	1.169	5.00	3.714	0.234
C_4H_{10} 58.120				0.497	0.085	4.94	0.211	0.211	0.296	0.085	4.94	0.311	4.86	1.016	0.064
C_5H_{10} 70.130				0.923	0.158	11.08	0.391	0.391	0.549	0.158	11.08	0.697	5.45	2.033	0.128
C_5H_{12} 72.146				0.213	0.036	2.60	0.090	0.090	0.126	0.036	2.60	0.164	5.25	0.495	0.031
C_6H_{12} 84.156				0.303	0.052	4.38	0.128	0.128	0.180	0.052	4.38	0.276	5.54	0.791	0.050
C_3-C_6											63.13	3.973		13.049	0.822
TOTAL		42.920	537.16		17.071	368.55	42.385	85.305	59.456						
H_2+CO	97.563	41.874	15891	SCFH	9.159		22.742	64.616	31.901	-32.715					
H_2/CO		1.64	Factor 629287		4.48		4.48	2.23	4.48	1.31					

								m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF
Weight Recovery, %	92.67	Catalyst Age, hrs.	336	Space Velocity, vhv	1265		RECOVERED OIL	0.321**	45.04	2.834		6.985	0.440
Pressure, psig	402	Inlet Velocity, Ft/sec	1.04	Catalyst Vol., CF	12.56		TOTAL OIL		108.17	6.807		20.034	1.262
Temperature, °F	660	Bed Depth, Ft	19.03	Weight, #	1796		WATER SOLUBLE CHEMICALS	0.264**	14.03	0.883		1.793	0.113
Recycle Ratio	0.99	Bed Density, #/CF	143	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$	= 11.41		TOTAL LIQUID PRODUCTS C_3+		122.20	7.690		21.827	1.375
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %		SELECTIVITY	NET WATER	6.080**	109.54	6.893		13.150	0.828
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$ / C_3+/C_1+	GROSS WATER		123.57	7.776		14.943	0.941
60.23	89.46	71.22	78.13	70.90	41.54	50.63 / 75.50	HYDROCARBON TOTAL—C_1+		161.85	10.185			

YIELD BASIS H_2+CO FED — YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*

	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	84.6	5.910	98.0	5.792
400-550	11.2	0.782	91.4	0.715
550 +	4.2	0.293	114.6	0.336
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	35.2	6.81		
C_3 POLY GASO.	87.5	5.96	0.997	
C_3 POLY TAR	12.5	0.85	0.113	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.51	0.102	68.0
C_4 POLY GASO.	5.98	15.80	2.643	1.5
C_4H_{10}	4.86	4.94	1.016	68.0
C_4-FREE GASO.			10.108	5.8
C_4 POLY TAR	7.53	2.26	0.300	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	13.869	0.8728	4732	
GAS OIL	0.715	0.0450	244	
FUEL OIL	0.336	0.0211	114	
POLY TAR	0.413	0.0260	141	
TOTAL	15.333	0.9649	5231	
W. S. CHEM.	1.793	0.1128	612	
TOTAL	17.126	1.0777	5843	

Form ML—11 **Included in Reactor Effluent Total g/NCM = 16.91 × #/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

OPERATING CONDITIONS

PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	432	Fresh Feed	16,288
Natural Gas	474	Recycle	16,085
Generator Outlet	406	Combined Feed	32,373
Reactor Inlet	402	Wet Gas—Measured	5,786
Condenser Inlet		Adjusted	6,479
Product Accumulator	352	Loss	693
TEMPERATURES—°F.		Recycle/Fresh Feed	0.99
Oxygen	408	Inlet Velocity—ft./sec.	1.04
Natural Gas	788	Fresh Feed Rate—S.C.F.H. H_2+CO	15891
Generator	2280	per Cu. Ft. Dense Bed	1265
Quench Accumulator	140	per Lb. Catalyst	8.85
Reactor Inlet	363	per Sq. Ft.	24077
Condenser Inlet	601		
Product Accumulator	90		
Catalyst No. Height			
1 See Period A	-		
2	659		
3	650		
4	660		
5	667		
6 Ave. 660	667		
7	662		
8	656		
9	647		
10	647		
11	528		

PRODUCT TESTS

	OIL	WATER
°API	51.2	11.0
Neut. No.	49.5	37.6
Sap. No.	64.8	39.7
Hydrox. No.		
Bromine No.	75	
Pour °F.		
Chemicals, % by K_2CO_3		12.0
HEMPEL. DIST. %		°API
205 °F.		
400	83.6	53.8
400-550	11.2	34.0
550+	5.2	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	96	
10%	130	
50%	219	
90%	338	
EP	402	
Rec.	96.3	

CATALYST DATA

INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	48
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 See Period A	-
1	69
2	84
3	63
4	280
Total	496
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	143
Inventory, Lbs.	1796
Bed Depth, Ft.	19.03
Vol., Cu. Ft.	12.56

PARTICLE SIZE

Screen Analysis Mesh	Microns	%	Sedimentation Microns	%
On 40	419+		80+	
100	150		40—80	
150	105		20—40	
200	74		10—20	
250	62		0—20	
325	44			
<325				

CATALYST	
Bulk Density, Lbs./Cu.Ft.	
Aerated	
Settled	
Compacted	
Particle Density, gm./cc.	
NH_3 Value, ml./gm.	
N_2 Surface, m^2/gm.	
CHEMICAL ANALYSIS	
Fe	
C	
O	
H	
K_2O, Wt. % basis Fe	
X-Ray Analysis—	
$Fe_{20}C_9$	
Fe_3O_4	
Fe	

GAS ANALYSES / GENERATOR BALANCE

HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O
FRESH FEED								
CO 28.010	36.98	36.95	36.90	36.943	15,856	15.856		15.856
H_2 2.016	60.58	60.66	60.62	60.620	26.018		52.036	
CO_2 44.010	1.78	1.88	2.01	1.890	0.811	0.811		1.622
N_2 28.016	0.20	0.19	0.26	0.217	0.093			
CH_4 16.042	0.46	0.32	0.21	0.330	0.142	0.142	0.568	
			M. W	12.515356				
			H_2O 18.016				7.462	3.731
						16.809	60.066	21.209
			BALANCE			99.96	100.71	99.01

	Mol %	M/Hr	C	H	O
O_2 32.000	0.26	10.495 0.035			21.060
CO_2 44.010	1.34	0.181	0.181		0.362
N_2 28.016	0.86	0.116			
CH_4 16.042	82.79	11.192	11.192	44.768	
C_2H_6 30.068	7.03	0.950	1.900	5.700	
C_3H_8 44.094	5.36	0.725	2.175	5.800	
C_4H_{10} 58.120	1.69	0.228	0.912	2.280	
C_5H_{12} 72.146	0.67	0.091	0.455	1.092	
MW =	20.137868				
TOTAL			16.815	59.640	21.422

WEIGHT BALANCE

	#/hr Measured	At Wt. Balance
WET GAS	329.15	368.55
OIL	45.04	45.04
WATER	123.57	123.57
TOTAL	497.76	537.16
FRESH FEED	537.16	
WEIGHT BALANCE	92.67	
WET GAS FACTOR	1119702	
INDICATED LOSS—S C F H	693	

WET GAS	1400	2200	0600	AVERAGE
CO 28.010	9.22	9.81	10.35	9.794
H_2 2.016	42.70	43.83	45.05	43.860
CO_2 44.010	26.41	26.37	25.41	26.064
N_2 28.016	1.13	1.23	1.31	1.223
CH_4 16.042	8.61	8.24	8.11	8.320
C_2H_4 28.052	2.43	2.26	2.18	2.290
C_2H_6 30.068	1.65	1.57	1.56	1.593
C_3H_6 42.078	2.97	2.57	2.54	2.693
C_3H_8 44.094	0.28	0.31	0.28	0.290
C_4H_8 56.104	2.29	1.88	1.64	1.937
C_4H_{10} 58.120	0.54	0.50	0.45	0.497
C_5H_{10} 70.130	1.15	0.86	0.76	0.923
C_5H_{12} 72.146	0.24	0.28	0.12	0.213
C_6H_{12} 84.156	0.38	0.29	0.24	0.303
			M. W.	21.58958

GAS FLOW RATES

	$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED 79.31	6.675	401.6 / 20.403	69 / 0.9915	2313158 / 1.5209	16,288	42.920
WET GAS 158.44	7,842	1.75 / 4.056	69 / 0.9915	1340924 / 1.1580	5,786	15.246
RECYCLE 79.31	8.517	401.3 / 20.396	124 / 0.9436	1.1580	15,054	39.668
BLEED 5.02	8.692	20.396	1.0000	1.1580	1,031	2.717
NATURAL GAS 28.43	7.663	474.0 / 22.107	199 / 0.8883	1437590 / 1.1990	5,130	13.518
OXYGEN 27.07	7.042	431.9 / 21.133	72 / 0.9887		3,983	10.495
STEAM 215.7	6.254					

LIQUID PRODUCT RATES

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
OIL	7'0"	371.14	58	1.0010	371.51	51.2		
	3'10¼"	206.37	51	1.0044	207.28	6.448		
					÷3.41		÷22.00	45.04
					167.64		1080.94	6.985
WATER	7'3"	384.23	74	0.99846	383.64	11.0		
	1'11"	100.59	63	0.99973	100.56	8.270		
	2'8½"	145.02	70	0.99896	144.87			
	1'4"	69.39	68	0.99920	69.33			123.57
					358.62		2965.79	14.943

RUN NO. 64-0 (A-E)
HOURS 0-106
CATALYST Mill Scale Red. @800°F. at Montebello

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

FRESH FEED	%	m/hr	#/hr	WET GAS	At Wt. Balance m/hr	At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
CO 28.010	36.987	14.801	414.58	7.826	1.030	28.85	3.273	18.074	4.303	-13.771	-385.73
H_2 2.016	60.031	24.022	48.43	39.385	5.182	10.45	16.473	40.495	21.655	-18.840	-37.98
CO_2 44.010	2.317	0.927	40.80	30.573	4.023	177.05	12.787	13.714	16.810	3.096	136.25
N_2 28.016	0.236	0.094	2.63	1.762	0.232	6.50	0.737	0.831	0.969		
CH_4 16.042	0.429	0.172	2.76	9.413	1.239	19.88	3.937	4.109	5.176	1.067	17.12
C_2H_4 28.052				2.323	0.306	8.58	0.972	0.972	1.278	0.306	8.58
C_2H_6 30.068				1.692	0.223	6.71	0.708	0.708	0.931	0.223	6.71
C_1+C_2											32.41
C_3H_6 42.078				2.712	0.357	15.02	1.134	1.134	1.491	0.357	15.02
C_3H_8 44.094				0.290	0.038	1.68	0.121	0.121	0.159	0.038	1.68
C_4H_8 56.104				1.961	0.258	14.47	0.820	0.820	1.078	0.258	14.47
C_4H_{10} 58.120				0.662	0.087	5.06	0.277	0.277	0.364	0.087	5.06
C_5H_{10} 70.130				0.909	0.120	8.42	0.380	0.380	0.500	0.120	8.42
C_5H_{12} 72.146				0.218	0.029	2.09	0.091	0.091	0.120	0.029	2.09
C_6H_{12} 84.156				0.274	0.036	3.03	0.115	0.115	0.151	0.036	3.03
C_3-C_6											49.77
TOTAL		40.016	509.20		13.160	307.79	41.825	81.841	62.508		
H_2+CO	97.018	38.823	14733 SCFH		6.212		19.746	58.569	25.958	-32.611	
H_2/CO		1.62	Factor 678748		5.03		5.03	2.24	5.03	1.37	

Weight Recovery, %	99.95	Catalyst Age, hrs.	53	Space Velocity, vhv	1176
Pressure, psig	416	Inlet Velocity, Ft/sec		Catalyst	
Temperature, °F	654	Bed Depth, Ft	18.98	Weight, #	1933
Recycle Ratio	1.05	Bed Density, #/CF	154	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	12.6

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3^+/C_1^+
67.11	93.04	78.43	84.00	76.19	46.52	55.68	80.18

	RECOVERED OIL	TOTAL OIL	WATER SOLUBLE CHEMICALS	TOTAL LIQUID PRODUCTS C_3+	SELECTIVITY	NET WATER	GROSS WATER	HYDROCARBON TOTAL—C_1+
	0.433**		0.387**			6.703**		
		60.78	20.55	131.10		120.76	141.31	163.51

YIELD BASIS H_2+CO FED — CONDENSATE	#/MCF	#/gal	gal/hr	gal/MCF
	9.248			
	1.162			
	0.582			
	0.455			
	2.199			
	1.019	4.32	3.477	0.236
	0.114	4.24	0.396	0.027
	0.982	5.00	2.894	0.196
	0.343	4.86	1.041	0.071
	0.572	5.45	1.545	0.105
	0.142	5.25	0.398	0.027
	0.206	5.54	0.547	0.037
	3.378		10.298	0.699
	0.433**	60.78	4.125	9.460	0.642
		110.55	7.503	19.758	1.341
	0.387**	20.55	1.395	7.941	2.588	0.176
		131.10	8.898	22.346	1.517
	6.703**	120.76	8.197	14.497	0.984
		141.31	9.591	17.085	1.160
		163.51	11.098		

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	81.90	7.748	98.0	7.593
400-550	12.40	1.173	91.4	1.072
550 +	5.70	0.539	114.6	0.618

	RECOVERY %	#/hr	gal/hr
PROPYLENE	43.2	6.49	
C_3 POLY GASO.	87.5	5.68	0.950
C_3 POLY TAR	12.5	0.81	0.108

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.31	0.062	68.0
C_4 POLY GASO.	5.98	12.39	2.072	1.5
C_4H_{10}	4.86	5.06	1.041	68.0
C_4-FREE GASO.			11.033	5.8
C_4 POLY TAR	7.53	1.77	0.235	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	14.208	0.9644	5229
GAS OIL	1.072	0.0728	395
FUEL OIL	0.618	0.0419	227
POLY TAR	0.343	0.0233	126
TOTAL	16.241	1.1024	5977
W. S. CHEM.	2.588	0.1757	953
TOTAL	18.829	1.2781	6930

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91×#/MCF

*9488 MCFH H_2 + CO, Bbl/Day = 5421.6×gal/MCF

RUN NO. 64-1 (F-J)
HOURS 106-194
CATALYST Mill Scale Red. @ 800°F. at Montebello

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

FRESH FEED	%	m/hr	#/hr	WET GAS	At Wt. Balance m/hr	At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
CO 28.010	37.372	15.454	432.87	9.575	1.388	38.88	4.030	19.484	5.418	-14.066	-393.99
H_2 2.016	59.956	24.794	49.98	39.290	5.697	11.49	16.539	41.333	22.236	-19.097	- 38.49
CO_2 44.010	2.411	0.997	43.88	30.107	4.366	192.15	12.672	13.669	17.038	3.369	148.27
N_2 28.016	0.146	0.060	1.68	1.429	0.207	5.80	0.601	0.661	0.808		
CH_4 16.042	0.115	0.048	0.77	8.436	1.223	19.62	3.551	3.599	4.774	1.175	18.85
C_2H_4 28.052				2.305	0.334	9.37	0.970	0.970	1.304	0.334	9.37
C_2H_6 30.068				1.671	0.242	7.28	0.703	0.703	0.945	0.242	7.28
C_1+C_2											35.50
C_3H_6 42.078				2.963	0.430	18.09	1.247	1.247	1.677	0.430	18.09
C_3H_8 44.094				0.272	0.039	1.72	0.114	0.114	0.153	0.039	1.72
C_4H_8 56.104				1.971	0.286	16.05	0.830	0.830	1.116	0.286	16.05
C_4H_{10} 58.120				0.650	0.094	5.46	0.274	0.274	0.368	0.094	5.46
C_5H_{10} 70.130				0.879	0.127	8.91	0.370	0.370	0.497	0.127	8.91
C_5H_{12} 72.146				0.199	0.029	2.09	0.084	0.084	0.113	0.029	2.09
C_6H_{12} 84.156				0.253	0.037	3.11	0.106	0.106	0.143	0.037	3.11
C_3-C_6											55.43
TOTAL		41.353	529.18		14.499	340.02	42.091	83.444	63.720		
H_2+CO	97.328	40.248	15274 SCFH		7.085		20.569	60.817	27.654	- 33.163	
H_2/CO		1.60	Factor 654707		4.10		4.10	2.12	4.10	1.36	

Weight Recovery, %	93.16	Catalyst Age, hrs.	150	Space Velocity, vhv	1177
Pressure, psig	416	Inlet Velocity, Ft/sec		Catalyst	
Temperature, °F	658	Bed Depth, Ft	19.67	Weight, #	2012
Recycle Ratio	1.02	Bed Density, #/CF	155	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	11.0

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3^+/C_1^+
64.94	91.02	77.02	82.40	72.19	46.20	54.53	78.56

	RECOVERED OIL	TOTAL OIL	WATER SOLUBLE CHEMICALS	TOTAL LIQUID PRODUCTS C_3+	SELECTIVITY	NET WATER	GROSS WATER	HYDROCARBON TOTAL—C_1+
	**0.385		**0.388			**6.357		
		54.03	20.59	130.05		114.52	135.11	165.55

YIELD BASIS H_2+CO FED — CONDENSATE	#/MCF	#/gal	gal/hr	gal/MCF
	9.707			
	1.234			
	0.613			
	0.477			
	2.324			
	1.184	4.32	4.188	0.274
	0.113	4.24	0.406	0.027
	1.051	5.00	3.210	0.210
	0.357	4.86	1.123	0.074
	0.583	5.45	1.635	0.107
	0.137	5.25	0.398	0.026
	0.204	5.54	0.561	0.037
	3.629		11.521	0.755
	**0.385	54.03	3.537	8.418	0.551
		109.46	7.166	19.959	1.306
	**0.388	20.59	1.348	7.971	2.583	0.169
		130.05	8.514	22.522	1.475
	**6.357	114.52	7.498	13.748	0.900
		135.11	8.846	16.331	1.069
		165.55	10.839		

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	82.35	6.932	98.0	6.793
400-550	11.00	0.926	91.4	0.846
550 +	6.65	0.560	114.6	0.642

	RECOVERY %	#/hr	gal/hr
PROPYLENE	40.5	7.29	
C_3 POLY GASO.	87.5	6.38	1.067
C_3 POLY TAR	12.5	0.91	0.121

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	--	--	68.0
C_4 POLY GASO.	5.98	14.04	2.348	1.5
C_4H_{10}	4.86	(5.46) 5.35	(1.123) 1.101	68.0
C_4-FREE GASO.			10.454	5.8
C_4 POLY TAR	7.53	2.01	0.267	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	13.903	0.9102	4935
GAS OIL	0.846	0.0554	300
FUEL OIL	0.642	0.0420	228
POLY TAR	0.388	0.0254	138
TOTAL	15.779	1.0330	5601
W. S. CHEM.	2.583	0.1691	917
TOTAL	18.362	1.2021	6518

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91×#/MCF

*9488 MCFH H_2 + CO, Bbl/Day = 5421.6×gal/MCF

RUN NO. 64-2 (K-N)
HOURS 194-290
CATALYST Mill Scale Red. @ 800°F. at Montebello.

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS	At Wt. Balance		RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		CONDENSATE				YIELD BASIS H_2+CO FED
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*
CO 28.010	37.111	15.146	424.24	9.900	1.491	41.76	4.359	19.505	5.850	-13.655	-382.48					
H_2 2.016	60.097	24.528	49.45	41.319	6.221	12.54	18.190	42.718	24.411	-18.307	-36.91					400 EP
CO_2 44.010	2.335	.953	41.94	29.065	4.377	192.63	12.796	13.749	17.173	3.424	150.69	10.008				400-550
N_2 28.016	0.300	0.122	3.42	1.203	0.181	5.07	0.530	0.652	0.711							550 +
CH_4 16.042	0.157	0.064	1.03	8.090	1.218	19.54	3.562	3.626	4.780	1.154	18.51	1.229				
C_2H_4 28.052				2.419	0.364	10.21	1.065	1.065	1.429	0.364	10.21	0.678				
C_2H_6 30.068				1.519	0.229	6.89	0.669	0.669	0.898	0.229	6.89	0.458				PROPYLENE
C_1+C_2											35.61	2.365				C_3 POLY GASO.
C_3H_6 42.078				2.836	0.427	17.97	1.249	1.249	1.676	0.427	17.97	1.193	4.32	4.160	0.276	C_3 POLY TAR
C_3H_8 44.094				0.260	0.039	1.72	0.114	0.114	0.153	0.039	1.72	0.114	4.24	0.406	0.027	
C_4H_8 56.104				1.733	0.261	14.64	0.763	0.763	1.024	0.261	14.64	0.972	5.00	2.928	0.194	
C_4H_{10} 58.120				0.570	0.086	5.00	0.251	0.251	0.337	0.086	5.00	0.332	4.86	1.029	0.068	C_4H_8
C_5H_{10} 70.130				0.722	0.109	7.64	0.318	0.318	0.427	0.109	7.64	0.507	5.45	1.402	0.093	C_4 POLY GASO.
C_5H_{12} 72.146				0.168	0.025	1.80	0.074	0.074	0.099	0.025	1.80	0.120	5.25	0.343	0.023	C_4H_{10}
C_6H_{12} 84.156				0.196	0.030	2.52	0.086	0.086	0.116	0.030	2.52	0.167	5.54	0.455	0.030	C_4-FREE GASO.
C_5-C_6											51.29	3.405		10.723	0.712	C_4 POLY TAR
TOTAL		40.813	520.08		15.058	339.93	44.026	84.839	65.906							
H_2+CO	97.208	39.674	15057 SCFH		7.712		22.549	62.223	30.261	- 31.962						
H_2/CO		1.62	Factor 664142		4.17		4.17	2.19	4.17	1.34						10 # RVP 400 EP GASOLINE

Weight Recovery, %	93.55	Catalyst Age, hrs.	242	Space Velocity, vhv	1112	RECOVERED OIL	0.364**	51.06	3.391		7.984	0.530
Pressure, psig	414	Inlet Velocity, Ft/sec		Catalyst		TOTAL OIL		102.35	6.796		18.707	1.242
Temperature, °F	656	Bed Depth, Ft	20.52	Weight, #	1974	WATER SOLUBLE CHEMICALS	0.374**	19.84	1.318	7.938	2.499	0.166
Recycle Ratio	1.08	Bed Density, #/CF	146	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	11.8	TOTAL LIQUID PRODUCTS C_3+		122.19	8.114		21.206	1.408

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY				
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	NET WATER	6.084**	109.61	7.280		13.158	0.874
63.10	90.16	74.64	80.56	70.01	42.86	51.37	77.43	GROSS WATER		129.45	8.597		15.657	1.040
								HYDROCARBON TOTAL—C_1+		157.80	10.480			

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
	gal/hr	gal/MCF	Bbl/Day	
GAS OIL	0.728	0.0483	262	
FUEL OIL	0.606	0.0402	218	
POLY TAR	0.357	0.0237	128	
TOTAL	14.578	0.9681	5248	
W. S. CHEM.	2.499	0.1660	900	
TOTAL	17.077	1.1341	6148	

Form ML—11

**Included in Reactor Effluent total

g/NCM = 16.91 × #/MCF

*9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

RUN NO. 64-3 (O-R)
HOURS 290-386
CATALYST Mill Scale Red. @ 800° F. at Montebello

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS	At Wt. Balance		RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		CONDENSATE				YIELD BASIS H_2+CO FED
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*
CO 28.010	36.924	15.141	424.10	10.528	1.669	46.75	4.625	19.766	6.294	-13.472	-377.35					
H_2 2.016	60.269	24.713	49.82	41.899	6.642	13.39	18.407	43.120	25.049	-18.071	-36.43					400 EP
CO_2 44.010	2.345	0.962	42.34	28.086	4.452	195.93	12.338	13.300	16.790	3.490	153.59	10.155				400-550
N_2 28.016	0.198	0.081	2.27	1.124	0.178	4.99	0.494	0.575	0.672							550 +
CH_4 16.042	0.264	0.108	1.73	8.189	1.298	20.82	3.597	3.705	4.895	1.190	19.09	1.262				
C_2H_4 28.052				2.252	0.357	10.01	0.989	0.989	1.346	0.357	10.01	0.662				
C_2H_6 30.068				1.621	0.257	7.73	0.712	0.712	0.969	0.257	7.73	0.511				PROPYLENE
C_1+C_2											36.83	2.435				C_3 POLY GASO.
C_3H_6 42.078				2.644	0.419	17.63	1.162	1.162	1.581	0.419	17.63	1.166	4.32	4.081	0.270	C_3 POLY TAR
C_3H_8 44.094				0.281	0.045	1.98	0.123	0.123	0.168	0.045	1.98	0.131	4.24	0.467	0.031	
C_4H_8 56.104				1.712	0.271	15.20	0.752	0.752	1.023	0.271	15.20	1.005	5.00	3.040	0.201	
C_4H_{10} 58.120				0.564	0.089	5.17	0.248	0.248	0.337	0.089	5.17	0.342	4.86	1.064	0.070	C_4H_8
C_5H_{10} 70.130				0.718	0.114	7.99	0.315	0.315	0.429	0.114	7.99	0.528	5.45	1.466	0.097	C_4 POLY GASO.
C_5H_{12} 72.146				0.157	0.025	1.80	0.069	0.069	0.094	0.025	1.80	0.119	5.25	0.343	0.023	C_4H_{10}
C_6H_{12} 84.156				0.225	0.036	3.03	0.099	0.099	0.135	0.036	3.03	0.200	5.54	0.547	0.036	C_4-FREE GASO.
C_5-C_6											52.80	3.491		11.008	0.728	C_4 POLY TAR
TOTAL		41.005	520.26		15.852	352.42	43.930	84.935	66.165							
H_2+CO	97.193	39.854	15124 SCFH		8.311		23.032	62.886	31.343	-31.543						
H_2/CO		1.63	Factor 661200		3.98		3.98	2.18	3.98	1.34						10 # RVP 400 EP GASOLINE

Weight Recovery, %	92.84	Catalyst Age, hrs.	338	Space Velocity, vhv	1112	RECOVERED OIL	0.320**	44.86	2.966		6.974	0.461
Pressure, psig	413	Inlet Velocity, Ft/sec		Catalyst		TOTAL OIL		97.66	6.457		17.982	1.189
Temperature, °F	658	Bed Depth, Ft	20.61	Weight, #	1833	WATER SOLUBLE CHEMICALS	0.393**	20.86	1.379	7.930	2.631	0.174
Recycle Ratio	1.07	Bed Density, #/CF	135	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	11.8	TOTAL LIQUID PRODUCTS C_3+		118.52	7.836		20.613	1.363

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY				
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	NET WATER	5.670**	102.15	6.754		12.263	0.811
61.34	88.98	73.12	79.15	68.16	41.91	50.16	76.29	GROSS WATER		123.01	8.133		14.894	0.985
								HYDROCARBON TOTAL—C_1+		155.35	10.272			

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
	gal/hr	gal/MCF	Bbl/Day	
GAS OIL	0.593	0.0392	213	
FUEL OIL	0.641	0.0424	230	
POLY TAR	0.358	0.0237	128	
TOTAL	13.733	0.9081	4923	
W. S. CHEM.	2.631	0.1740	943	
TOTAL	16.364	1.0821	5866	

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF

*9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 64-A
HOURS 0-10
CATALYST 800°F Mill Scale Red. at Mont.

Basis Generator Carbon Balance

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY,%	gal/hr
CO 28.010	36.760	14.724	412.42	8.615	1.224	34.28	3.774	18.498	4.998	-13.500	-378.14									
H_2 2.016	59.685	23.907	48.20	43.495	6.182	12.46	19.056	42.963	25.238	-17.725	-35.74					400 EP	80.9	7.752	98.0	7.597
CO_2 44.010	2.240	0.897	39.48	27.345	3.887	171.06	11.980	12.877	15.867	2.990	131.58	8.975				400-550	13.3	1.275	91.4	1.165
N_2 28.016	0.180	0.072	2.02	1.635	0.232	6.50	0.716	0.788	0.948							550 +	5.8	0.556	114.6	0.637
CH_4 16.042	1.135	0.455	7.30	9.710	1.380	22.14	4.254	4.709	5.634	0.925	14.84	1.012								
C_2H_2 26.052				2.170	0.308	8.64	0.951	0.951	1.259	0.308	8.64	0.589					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.360	0.193	5.80	0.596	0.596	0.789	0.193	5.80	0.396				PROPYLENE	39.8	5.26		
C_1+C_2											29.28	1.997				C_3 POLY GASO.	87.5	4.60	0.769	
C_2H_2 42.078				2.210	0.314	13.21	0.968	0.968	1.282	0.314	13.21	0.901	4.32	3.058	0.209	C_3 POLY TAR	12.5	0.66	0.088	
C_3H_8 44.094				0.245	0.035	1.54	0.107	0.107	0.142	0.035	1.54	0.105	4.24	0.363	0.025					
C_4H_8 56.104				1.525	0.217	12.17	0.668	0.668	0.885	0.217	12.17	0.830	5.00	2.434	0.166		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.560	0.080	4.65	0.245	0.245	0.325	0.080	4.65	0.317	4.86	0.957	0.065	C_4H_8	5.00	0.30	0.060	68.0
C_5H_{10} 70.130				0.730	0.104	7.29	0.320	0.320	0.424	0.104	7.29	0.497	5.45	1.338	0.091	C_4 POLY GASO.	5.98	10.39	17.37	1.5
C_6H_{12} 72.146				0.175	0.025	1.80	0.077	0.077	0.102	0.025	1.80	0.123	5.25	0.343	0.023	C_4H_{10}	4.86	4.65	0.957	68.0
C_6H_{12} 84.156				0.225	0.032	2.69	0.099	0.099	0.131	0.032	2.69	0.183	5.54	0.486	0.033	C_4-FREE GASO.			10.533	5.8
C_3-C_6											43.35	2.957		8.979	0.612	C_4 POLY TAR	7.53	1.48	0.197	
TOTAL		40.055	509.42		14.213	304.23	43.811	83.866	65.743											
H_2+CO	96.445	38.631	14660 SCFH		7.406		22.830	61.461	30.236	31.225							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.62	Factor 682128		5.05		5.05	2.32	5.05	1.31						10 # RVP 400 EP GASOLINE	13.287	0.9063	4914	
									RECOVERED OIL	0.440	61.73	4.211		9.583	0.654	GAS OIL	1.165	0.0795	431	
									TOTAL OIL		105.08	7.168		18.562	1.266	FUEL OIL	0.637	0.0435	236	
									WATER SOLUBLE CHEMICALS	0.351	18.65	1.272		2.338	0.159	POLY TAR	0.285	0.0194	105	
									TOTAL LIQUID PRODUCTS C_3+		123.73	8.440		20.900	1.425	TOTAL	15.374	1.0487	5686	
									NET WATER	6.928	124.81	8.514		14.983	1.022	W. S. CHEM.	2.338	0.1595	865	
									GROSS WATER		143.46	9.786		17.321	1.182	TOTAL	17.712	1.2082	6551	
									HYDROCARBON TOTAL—C_1+		153.01	10.437								

Weight Recovery, % 100.73	Catalyst Age, hrs.	Space Velocity, vhv 1250
Pressure, psig 416	Inlet Velocity, Ft/sec 0.99	Catalyst Vol CF 11.73
Temperature, °F 643	Bed Depth, Ft 17.77	Weight, # 1771
Recycle Ratio 1.04	Bed Density, #/CF 151	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
64.52	91.69	74.14	80.83	72.98	41.26	50.80	80.86

Form ML—11

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-A
HOURS 0-10

Basis Generator Carbon Balance

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA		
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE
Oxygen	440	Fresh Feed	15935	°API	51.4	10.8	In Reactor at Start of Period		Screen Analysis: Mesh / Microns / % — Sedimentation: Microns / %
Natural Gas	436	Recycle	16626	Neut. No.	49.0	37.8	Fresh Catalyst Added		
Generator Outlet	419	Combined Feed	32561	Sap. No.	65.2	43.3	Total		On 40 / 419+ / 80+
Reactor Inlet	416	Wet Gas—Measured	5460	Hydrox. No.			Catalyst Recovered	41.5	100 / 150 / 40—80
Condenser Inlet		Adjusted	5830	Bromine No.	92		In Reactor at End of Period		150 / 105 / 20—40
Product Accumulator	370	Loss	370	Pour °F.					200 / 74 / 10—20
				Chemicals, % by K_2CO_3		13.5	REACTOR d-p, Inches H_2O		250 / 62 / 0—20
							No. Height		325 / 44
TEMPERATURES—°F.		Recycle/Fresh Feed	1.04				0 0-21 3/8		<325
Oxygen	470	Inlet Velocity—ft./sec.	0.99				1 21 3/8-52 3/4	72	CATALYST
Natural Gas	731	Fresh Feed Rate—S.C.F.H.	14660	HEMPEL, DIST. %		°API	2 52 3/4-84	79	Bulk Density, Lbs./Cu.Ft.
Generator	2034	per Cu. Ft. Dense Bed	1250	205 °F.			3 84-115 3/8	76	Aerated
Quench Accumulator	169	per Lb. Catalyst	8.28	400	79.9	55.7	4 115 3/8-353 1/8	260	Settled
Reactor Inlet	315		22212	400-550	13.3	30.6	Total	487	Compacted
Condenser Inlet	590			550+	6.8				Particle Density, gm./cc.
Product Accumulator	86						CALCULATED FROM dp		NH_3 Value, ml./gm.
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	151	N_2 Surface, m^2/gm.
1 0'0"	--			Naphtha °F.			Inventory, Lbs.	1771	
2 0'9"	636			IBP	98		Bed Depth, Ft.	17.77	CHEMICAL ANALYSIS
3 1'9"	629			10%	134			11.73	Fe
4 4'5"	645			50%	222				C
5 7'0"	651			90%	340				O
6 12'3"	652			EP	396				H
7 17'5"	647				97.3				K_2O, W+, % basis Fe
8 20'0"	631								X-Ray Analysis—
9 22'7"	636								$Fe_{20}C_9$
10 25'2"	638								Fe_3O_4
11 26'11"	644								Fe

RUN NO. 64-B
HOURS 10-34
CATALYST 800°F Mill Scale Red. at Mont.

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

Basis Generator Carbon Balance

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE: #/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY,%	gal/hr
CO 28.010	37.267	14.790	414.28	6.910	0.887	24.80	2.874	17.664	3.761	-13.903	-389.48									
H_2 2.016	59.953	23.792	47.96	38.507	4.947	9.97	16.016	39.808	20.963	-18.845	-37.99					400 EP	82.2	7.574	98.0	7.423
CO_2 44.010	2.163	0.858	37.76	30.867	3.965	174.50	12.838	13.696	16.803	3.107	136.74	9.339				400-550	12.7	1.170	91.4	1.069
N_2 28.016	0.160	0.063	1.77	1.897	0.244	6.84	0.789	0.852	1.033							550 +	5.1	0.470	114.6	0.539
CH_4 16.042	0.457	0.181	2.90	10.293	1.322	21.21	4.281	4.462	5.603	1.141	18.31	1.251								
C_2H_4 28.052				2.387	0.307	8.61	0.993	0.993	1.300	0.307	8.61	0.588					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.733	0.223	6.71	0.721	0.721	0.944	0.223	6.71	0.458				PROPYLENE	44.0	6.67		
C_1+C_2											33.63	2.297				C_3 POLY GASO.	87.5	5.84	0.977	
C_3H_6 42.078				2.803	0.360	15.15	1.166	1.166	1.526	0.360	15.15	1.035	4.32	3.507	0.240	C_3 POLY TAR	12.5	0.83	0.110	
C_3H_8 44.094				0.297	0.038	1.68	0.124	0.124	0.162	0.038	1.68	0.115	4.24	0.396	0.027					
C_4H_8 56.104				2.093	0.269	15.09	0.871	0.871	1.140	0.269	15.09	1.031	5.00	3.018	0.206		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.690	0.089	5.17	0.287	0.287	0.376	0.089	5.17	0.353	4.86	1.064	0.073	C_4H_8	5.00	0.27	0.054	68.0
C_5H_{10} 70.130				0.990	0.127	8.91	0.412	0.412	0.539	0.127	8.91	0.609	5.45	1.635	0.112	C_5 POLY GASO.	5.98	12.97	2.168	1.5
C_5H_{12} 72.146				0.233	0.030	2.16	0.097	0.097	0.127	0.030	2.16	0.148	5.25	0.411	0.028	C_4H_{10}	4.86	5.17	1.064	68.0
C_6H_{12} 84.156				0.300	0.039	3.28	0.125	0.125	0.164	0.039	3.28	0.224	5.54	0.592	0.040	C_4-FREE GASO.			11.038	5.8
C_3-C_6											51.44	3.513		10.623	0.726	C_4 POLY TAR	7.53	1.85	0.246	
TOTAL		39.684	504.67		12.847	304.08	41.594	81.278	62.122											
H_2+CO		38.582	14642 SCFH		5.834		18.890	57.472	24.724	32.747								gal/hr	gal/MCF	Bbl/Day
H_2/CO		1.61	Factor 682967		5.58		5.57	2.25	5.57	1.36						10 # RVP 400 EP GASOLINE		14.324	0.9783	5304
									RECOVERED OIL	0.425	59.64	4.073		9.214	0.629	GAS OIL		1.069	0.0730	396
									TOTAL OIL		111.08	7.586		19.837	1.355	FUEL OIL		0.539	0.0368	200
									WATER SOLUBLE CHEMICALS	0.292	15.49	1.058		1.957	0.134	POLY TAR		0.356	0.0243	132
									TOTAL LIQUID PRODUCTS C_5+		126.57	8.644		21.794	1.489	TOTAL		16.288	1.1124	6032
									NET WATER	6.964	125.46	8.569		15.061		W. S. CHEM.		1.957	0.1337	725
									GROSS WATER		140.95	9.626		17.018		TOTAL		18.245	1.2461	6757
									HYDROCARBON TOTAL—C_1+		160.20	10.941								

Weight Recovery, % 99.82 | Catalyst Age, hrs. | Space Velocity, vhv 1179
Pressure, psig 415 | Inlet Velocity, Ft/sec 0.99 | Catalyst Vol CF 12.42
Temperature, °F 661 | Bed Depth, Ft 18.82 | Weight, # 1901
Recycle Ratio 1.05 | Bed Density, #/CF 153 | Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
67.63	94.00	79.21	84.88	78.71	47.34	56.98	79.01

Form ML—11

g/NCM = 16.91×#/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6×gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-B
HOURS 10-34

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE			
Oxygen	442	Fresh Feed	15060	°API	50.5	10.8	In Reactor at Start of Period		Screen Analysis			Sedimentation
Natural Gas	436	Recycle	15785	Neut. No.	47.4	35.2	Fresh Catalyst Added		Mesh	Microns	%	Microns %
Generator Outlet	420	Combined Feed	30845	Sap. No.	61.5	37.5	Total		On 40	419+		80+
Reactor Inlet	415	Wet Gas—Measured	4861	Hydrox. No.			Catalyst Recovered	61	100	150		40—80
Condenser Inlet		Adjusted	4875	Bromine No.			In Reactor at End of Period		150	105		20—40
Product Accumulator	370	Loss	14	Pour °F.					200	74		10—20
				Chemicals, % by K_2CO_3		11.5	REACTOR d-p, Inches H_2O		250	62		0—20
							No. Height		325	44		
TEMPERATURES—°F.		Recycle/Fresh Feed	1.05				0 See Per. A	52	<325			
Oxygen	468	Inlet Velocity—ft./sec.	0.99				1	73	CATALYST			
Natural Gas	768	Fresh Feed Rate—S.C.F.H.	14642	HEMPEL. DIST. %		°API	2	81	Bulk Density, Lbs./Cu.Ft.			
Generator	2195	per Cu.Ft. Dense Bed	1179	205 °F.			3	78	Aerated			
Quench Accumulator	172	per Lb. Catalyst	7.70	400	81.2	53.9	4	270	Settled			
Reactor Inlet	339		22185	400-550	12.7	34.4	Total	554	Compacted			
Condenser Inlet	618			550+	6.1				Particle Density, gm./cc.			
Product Accumulator	95	Heat Transfer Calculations					CALCULATED FROM dp		NH_3 Value, ml./gm.			
Catalyst No. Height		Steam Rate=390#/hr		A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	153	N_2 Surface, m^2/gm.			
1 See Per. A	--	@ 706 psia & 505°F		Naphtha °F.			Inventory, Lbs.	1901				
2	653	=1201 BTU/#		IBP	101		Bed Depth, Ft.	18.82	CHEMICAL ANALYSIS			
3	648	Water in @ 58°F=26 BTU/#		10%	134			12.42	Fe			
4	664	Net Heat Trans/# steam=1175	BTU	50%	227				C			
5	670	(1175)(390)=458250		90%	354				O			
6	669	Ave. Bed Temp=661°F		EP	408				H			
7	660	dP=661-505=156°F			96.2				K_2O, W+, % basis Fe			
8	642	Tube Area=33.8 sq ft							X-Ray Analysis—			
9	648	$K = \frac{458250}{(33.8)(156)} = 86.9$ BTU/°F/sq ft							$Fe_{20}C_9$			
10	656								Fe_3O_4			
11	692								Fe			

RUN NO. 64-C
HOURS 34-58
CATALYST Mill Scale Red. at Mont.

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED				
					At Wt. Balance							CONDENSATE				
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	
CO 28.010	37.360	14.808	414.78	7.220	0.898	25.15	2.943	17.751	3.841	-13.910	-389;63					
H_2 2.016	59.953	23.762	47.90	37.160	4.621	9.32	15.145	38.907	19.766	-19.141	-38.58					
CO_2 44.010	2.307	0.914	40.23	39.370	4.027	177.22	13.194	14.108	17.221	3.113	136.99	9.359				
N_2 28.016	0.230	0.091	2.55	1.993	0.248	6.95	0.812	0.903	1.060							
CH_4 16.042	0.150	0.060	0.96	9.337	1.161	18.62	3.806	3.866	4.967	1.101	17.66	1.207				
C_2H_4 28.052				2.383	0.296	8.30	0.971	0.971	1.267	0.296	8.30	0.567				
C_2H_6 30.068				1.810	0.225	6.77	0.738	0.738	0.963	0.225	6.77	0.463				
C_1+C_2											32.73	2.237				
C_3H_6 42.078				2.817	0.350	14.73	1.148	1.148	1.498	0.350	14.73	1.006	4.32	3.410	0.233	
C_3H_8 44.094				0.310	0.039	1.72	0.126	0.126	0.165	0.039	1.72	0.118	4.24	0.406	0.028	
C_4H_8 56.104				2.207	0.274	15.37	0.900	0.900	1.174	0.274	15.37	1.050	5.00	3.074	0.210	
C_4H_{10} 58.120				0.733	0.091	5.29	0.299	0.299	0.390	0.091	5.29	0.361	4.86	1.088	0.074	
C_5H_{10} 70.130				1.070	0.133	9.33	0.436	0.436	0.569	0.133	9.33	0.637	5.45	1.712	0.117	
C_5H_{12} 72.146				0.250	0.031	2.24	0.102	0.102	0.133	0.031	2.24	0.153	5.25	0.427	0.029	
C_6H_{12} 84.156				0.340	0.042	3.53	0.139	0.139	0.181	0.042	3.53	0.241	5.54	0.637	0.044	
C_3-C_6											52.21	3.566		10.754	0.735	
TOTAL		39.635	506.42		12.436	304.54	40.759	80.394	60.846							
H_2+CO		38.570	14637 SCFH		5.519		18.088	56.658	23.607	-33.051						
H_2/CO		1.60	Factor 683200		5.15		5.15	2.19	5.15	1.38						

Weight Recovery, % 100.38	Catalyst Age, hrs.	Space Velocity, vhv 1164	RECOVERED OIL	0.449	62.92	4.299	9.768 0.667
Pressure, psig 415	Inlet Velocity, Ft/sec 0.94	Catalyst Vol CF 12.58	TOTAL OIL		115.13	7.865	20.522 1.402
Temperature, °F 656	Bed Depth, Ft 19.06	Weight, # 1963	WATER SOLUBLE CHEMICALS	0.263	13.95	0.953	1.761 0.120
Recycle Ratio 1.03	Bed Density, #/CF 156	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	TOTAL LIQUID PRODUCTS C_3+		129.08	8.818	22.283 1.522

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY				
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	NET WATER	6.939	125.01	8.511
68.62	93.94	80.55	85.69	78.36	49.20	58.33	79.76	GROSS WATER		138.96	9.494
								HYDROCARBON TOTAL—C_1+		161.81	11.055

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	81.0	7.912	98.0	7.754
400-550	13.6	1.328	91.4	1.214
550 +	5.4	0.528	114.6	0.605
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	45.4	6.69		
C_3 POLY GASO.	87.5	5.85	0.978	
C_3 POLY TAR	12.5	0.84	0.112	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.34	0.068	68.0
C_4 POLY GASO.	5.98	13.15	2.199	1.5
C_4H_{10}	4.86	5.29	1.088	68.0
C_4-FREE GASO.			11.508	5.8
C_4 POLY TAR	7.53	1.88	0.250	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	14.863	1.0154	5505	
GAS OIL	1.214	0.0829	449	
FUEL OIL	0.605	0.0413	224	
POLY TAR	0.362	0.0247	134	
TOTAL	17.044	1.1643	6312	
W. S. CHEM.	1.761	0.1203	652	
TOTAL	18.805	1.2846	6964	

Form ML—11

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-C
HOURS 34-58

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA				
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE		
Oxygen	443	Fresh Feed	15041	°API	51.4	10.7	In Reactor at Start of Period		Screen Analysis		Sedimentation
Natural Gas	436	Recycle	15468	Neut. No.	47.4	35.2	Fresh Catalyst Added		Mesh	Microns %	Microns %
Generator Outlet	419	Combined Feed	30509	Sap. No.	59.5	37.5	Total		On 40	419+	80+
Reactor Inlet	415	Wet Gas—Measured	4749	Hydrox. No.			Catalyst Recovered	40	100	150	40—80
Condenser Inlet		Adjusted	4719	Bromine No.	96		In Reactor at End of Period		150	105	20—40
Product Accumulator	370	Loss	-30	Pour °F.					200	74	10—20
				Chemicals, % by K_2CO_3		10.5	REACTOR d-p. Inches H_2O		250	62	0—20
							No. Height		325	44	
TEMPERATURES—°F.		Recycle/Fresh Feed	1.03				0 See Per. A	53	<325		
Oxygen	488	Inlet Velocity—ft./sec.	0.94				1	74	CATALYST		
Natural Gas	780	Fresh Feed Rate—S.C.F.H.	14637	HEMPEL. DIST. %		°API	2	83	Bulk Density, Lbs./Cu.Ft.		
Generator	2300	per Cu. Ft. Dense Bed	1164	205 °F.			3	80	Aerated		
Quench Accumulator	173	per Lb. Catalyst	7.46	400	80.0	54.8	4	282	Settled		
Reactor Inlet	333	per Sq. Ft.	22177	400-550	13.6	34.4	Total	572	Compacted		
Condenser Inlet	620			550+	6.4				Particle Density, gm./cc.		
Product Accumulator	96						CALCULATED FROM dp		NH_3 Value, ml./gm.		
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	156	N_2 Surface, m^2/gm.		
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	1963			
2	650			IBP	104		Bed Depth, Ft.	19.06	CHEMICAL ANALYSIS		
3	647			10%	134		Vol., Cu. Ft.	12.58	Fe		
4	659			50%	222				C		
5	664			90%	342				O		
6	663			EP	394				H		
7	655			Rec.	96.8				K_2O. W+, % basis Fe		
8	639								X-Ray Analysis—		
9	642								$Fe_{20}C_9$		
10	654								Fe_3O_4		
11	682								Fe		

RUN NO. 64-D
HOURS 58-82
CATALYST Mill Scale Red. at Mont.

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
					At Wt. Balance							CONDENSATE								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	36.633	14.700	411.74	7.653	0.980	27.45	3.142	17.842	4.122	-13.720	-384.29						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
H_2 2.016	60.330	24.209	48.81	38.003	4.867	9.81	15.603	39.812	20.470	-19.342	-39.00					400 EP	82.6	7.792	98.0	7.636
CO_2 44.010	2.497	1.002	44.10	32.060	4.106	180.67	13.163	14.165	17.269	3.104	136.57	9.249				400-550	11.3	1.066	91.4	0.974
N_2 28.016	0.370	0.148	4.15	1.717	0.220	6.16	0.705	0.853	0.925							550 +	6.1	0.575	114.6	0.659
CH_4 16.042	0.170	0.068	1.09	8.930	1.144	18.35	3.666	3.734	4.810	1.076	17.26	1.169								
C_2H_4 28.052				2.367	0.303	8.50	0.972	0.972	1.275	0.303	8.50	0.576					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.813	0.232	6.98	0.744	0.744	0.976	0.232	6.98	0.473				PROPYLENE	44.6	7.10		
C_1+C_2											32.74	2.218				C_3 POLY GASO.	87.5	6.21	1.038	
C_2H_4 42.078				2.950	0.378	15.91	1.211	1.211	1.589	0.378	15.91	1.077	4.32	3.683	0.249	C_3 POLY TAR	12.5	0.89	0.118	
C_3H_8 44.094				0.317	0.041	1.81	0.130	0.130	0.171	0.041	1.81	0.123	4.24	0.427	0.029					
C_4H_8 56.104				2.087	0.267	14.98	0.857	0.857	1.124	0.267	14.98	1.014	5.00	2.996	0.203		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.707	0.091	5.29	0.290	0.290	0.381	0.091	5.29	0.358	4.86	1.088	0.074	C_4H_8	5.00	0.16	0.032	68.0
C_5H_{10} 70.130				0.913	0.117	8.21	0.375	0.375	0.492	0.117	8.21	0.556	5.45	1.506	0.102	C_4 POLY GASO.	5.98	12.97	2.168	1.5
C_5H_{12} 72.146				0.220	0.028	2.02	0.090	0.090	0.118	0.028	2.02	0.137	5.25	0.385	0.026	C_4H_{10}	4.86	5.29	1.088	68.0
C_6H_{12} 84.156				0.263	0.034	2.86	0.108	0.108	0.142	0.034	2.86	0.194	5.54	0.516	0.035	C_4-FREE GASO.			11.081	5.8
C_5-C_6											51.08	3.459		10.601	0.718	C_4 POLY TAR	7.53	1.85	0.246	
TOTAL		40.127	509.89		12.808	309.00	41.056	81.183	61.583											
H_2+CO	96.963	38.909	14766 SCFH		5.847		18.745	57.654	24.592	-33.062							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.65	Factor 677231		4.97		4.97	2.23	4.97	1.41						10 # RVP 400 EP GASOLINE	14.369	0.9731	5276	
										0.429	60.23	4.079		9.433	0.639	GAS OIL	0.974	0.0660	358	
											111.31	7.538		20.034	1.357	FUEL OIL	0.659	0.0446	242	
										0.266	14.12	0.956		1.782	0.121	POLY TAR	0.364	0.0247	134	
											125.43	8.494		21.816	1.478	TOTAL	16.366	1.1084	6010	
										7.024	126.54	8.570		15.191	1.029	W. S. CHEM.	1.782	0.1207	654	
											140.66	9.526		16.973	1.150	TOTAL	18.148	1.2291	6664	
											158.17	10.712								

Weight Recovery, % 99.78 | Catalyst Age, hrs. | Space Velocity, vhv 1144 | RECOVERED OIL
Pressure, psig 416 | Inlet Velocity, Ft/sec 0.95 | Catalyst Vol CF 12.91 | TOTAL OIL
Temperature, °F 655 | Bed Depth, Ft 19.56 | Weight, # 2001 | WATER SOLUBLE CHEMICALS
Recycle Ratio 1.02 | Bed Density, #/CF 155 | Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ = | TOTAL LIQUID PRODUCTS C_3+

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	GROSS WATER
68.08	93.33	79.90	84.97	76.90	48.58	57.35	79.30	HYDROCARBON TOTAL—C_1+

Form ML—11

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

RUN NO. 64-D
HOURS 58-82

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA				
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE		
Oxygen	444	Fresh Feed	15228	°API	53.0	10.7	In Reactor at Start of Period		Screen Analysis		Sedimentation
Natural Gas	437	Recycle	15581	Neut. No.	44.2	34.0	Fresh Catalyst Added		Mesh / Microns / %		Microns / %
Generator Outlet	420	Combined Feed	30809	Sap. No.	60.0	37.9	Total		On 40 / 419+		80+
Reactor Inlet	416	Wet Gas—Measured	4843	Hydrox. No.			Catalyst Recovered	20	100 / 150		40—80
Condenser Inlet		Adjusted	4860	Bromine No.	92		In Reactor at End of Period		150 / 105		20—40
Product Accumulator	369	Loss	17	Pour °F.					200 / 74		10—20
				Chemicals, % by K_2CO_3		10.5	REACTOR d-p, Inches H_2O		250 / 62		0—20
							No. Height		325 / 44		
TEMPERATURES—°F.		Recycle/Fresh Feed	1.02				0 See Per. A	53	<325		
Oxygen	512	Inlet Velocity—ft./sec.	0.95				1	73	CATALYST		
Natural Gas	792	Fresh Feed Rate—S.C.F.H.	14766	HEMPEL. DIST. %		°API	2	84	Bulk Density, Lbs./Cu.Ft.		
Generator	2324	per Cu. Ft. Dense Bed	1144	205 °F.			3	78	Aerated		
Quench Accumulator	172	per Lb. Catalyst	7.38	400	81.6	56.1	4	295	Settled		
Reactor Inlet	344	per Sq. Ft.	22373	400-550	11.3	35.3	Total	583	Compacted		
Condenser Inlet	616			550+	7.1				Particle Density, gm./cc.		
Product Accumulator	88						CALCULATED FROM dp		NH_3 Value, ml./gm.		
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	155	N_2 Surface, m^2/gm.		
1 See Per. A				Naphtha °F.			Inventory, Lbs.	2001			
2	650			IBP	100		Bed Depth, Ft.	19.56	CHEMICAL ANALYSIS		
3	646			10%	130		Vol., Cu. Ft.	12.91	Fe		
4	658			50%	218				C		
5	662			90%	348				O		
6	661			EP	400				H		
7	654			Rec.	97.0				K_2O, W+, % basis Fe		
8	638								X-Ray Analysis—		
9	638								$Fe_{20}C_9$		
10	652								Fe_3O_4		
11	685								Fe		

RUN NO. 64-E
HOURS 82-106
CATALYST Mill Scale Red. at Mont.

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS	At Wt. Balance		RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		CONDENSATE				YIELD BASIS H_2+CO FED				
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	36.913	14.978	419.52	8.730	1.178	33.00	3.658	18.636	4.836	-13.800	-386.52						CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
H_2 2.016	60.237	24.442	49.28	39.760	5.366	10.82	16.662	41.104	22.028	-19.076	-38.46					400 EP	82.8	7.703	98.0	7.549
CO_2 44.010	2.377	0.965	42.47	30.224	4.081	179.61	12.665	13.630	16.746	3.116	137.14	9.167				400-550	11.1	1.033	91.4	0.944
N_2 28.016	0.240	0.097	2.72	1.567	0.211	5.91	0.657	0.754	0.868							550 +	6.1	0.567	114.6	0.650
CH_4 16.042	0.233	0.095	1.52	8.794	1.187	19.04	3.685	3.780	4.872	1.092	17.52	1.171								
C_2H_4 28.052				2.310	0.312	8.75	0.968	0.968	1.280	0.312	8.75	0.585					RECOVERY %	#/hr	gal/hr	
C_3H_6 30.068				1.743	0.235	7.07	0.730	0.730	0.965	0.235	7.07	0.473				PROPYLENE	42.7	6.76		
C_1+C_2											33.34	2.229				C_3 POLY GASO.	87.5	5.91	0.988	
C_3H_6 42.078				2.783	0.376	15.82	1.166	1.166	1.542	0.376	15.82	1.057	4.32	3.662	0.245	C_3 POLY TAR	12.5	0.85	0.113	
C_3H_8 44.094				0.283	0.088	1.68	0.119	0.119	0.157	0.038	1.68	0.112	4.24	0.396	0.026					
C_4H_8 56.104				1.893	0.255	14.31	0.793	0.793	1.048	0.255	14.31	0.957	5.00	2.862	0.191		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.620	0.084	4.88	0.260	0.260	0.344	0.084	4.88	0.326	4.86	1.004	0.067	C_4H_8	5.00	0.41	0.082	68.0
C_5H_{10} 70.130				0.843	0.114	7.99	0.353	0.353	0.467	0.114	7.99	0.534	5.45	1.466	0.098	C_4 POLY GASO.	5.98	12.16	2.034	1.5
C_5H_{12} 72.146				0.210	0.028	2.02	0.088	0.088	0.116	0.028	2.02	0.135	5.25	0.385	0.026	C_4H_{10}	4.86	4.88	1.004	68.0
C_6H_{12} 84.156				0.240	0.032	2.69	0.101	0.101	0.133	0.032	2.69	0.180	5.54	0.486	0.032	C_4-FREE GASO.			10.874	5.8
C_3-C_6											49.39	3.301		10.261	0.685	C_4 POLY TAR	7.53	1.74	0.231	
TOTAL		40.577	515.51		13.497	313.59	41.905	82.482	63.159											
H_2+CO	97.150	39.420	14960 SCFH	6.544			20.320	59.740	26.864	-32.876							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.63	Factor 668449	4.56			4.55	2.21	4.56	1.38						10 # RVP 400 EP GASOLINE	13.994	0.9354	5071	
Weight Recovery, % 99.05			Catalyst Age, hrs.			Space Velocity, vhv 1151			RECOVERED OIL	0.423	59.40	3.971		9.303	0.622	GAS OIL	0.944	0.0631	342	
Pressure, psig 416			Inlet Velocity, Ft/sec 0.96			Catalyst Vol CF 13.00			TOTAL OIL		108.79	7.272		19.564	1.307	FUEL OIL	0.650	0.0434	235	
Temperature, °F 655			Bed Depth, Ft 19.7			Weight, # 2028			WATER SOLUBLE CHEMICALS	0.297	15.74	1.052		1.978	0.132	POLY TAR	0.344	0.0230	125	
Recycle Ratio 1.03			Bed Density, #/CF 156			Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ = Shift Ratio			TOTAL LIQUID PRODUCTS C_5+		124.53	8.324		21.542	1.439	TOTAL	15.932	1.0649	5773	
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY		NET WATER	7.037	126.78	8.475	8.33	15.220	1.017	W. S. CHEM.	1.978	0.1322	717	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+		GROSS WATER		142.52	9.527		17.198	1.149	TOTAL	17.910	1.1971	6490	
66.74	92.14	78.05	83.40	74.05	46.41	55.03	78.88		HYDROCARBON TOTAL—C_1+		157.87	10.553								

Form ML—11

g/NCM = 16.91 × #/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-E
HOURS 82-106

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA				
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE		
Oxygen	444	Fresh Feed	15399	°API	53.0	10.7	In Reactor at Start of Period		Screen Analysis		Sedimentation
Natural Gas	435	Recycle	15903	Neut. No.	43.5	33.4	Fresh Catalyst Added		Mesh	Microns %	Microns %
Generator Outlet	420	Combined Feed	31302	Sap. No.	61.0	38.8	Total		On 40	419+	80+
Reactor Inlet	416	Wet Gas—Measured	5042	Hydrox. No.			Catalyst Recovered	27	100	150	40—80
Condenser Inlet		Adjusted	5122	Bromine No.	94		In Reactor at End of Period		150	105	20—40
Product Accumulator	370	Loss	80	Pour °F.					200	74	10—20
				Chemicals, % by K_2CO_3		11.5	REACTOR d-p, Inches H_2O		250	62	0—20
							No. Height		325	44	
TEMPERATURES—°F.		Recycle/Fresh Feed	1.03				0 See Per. A	54	<325		
Oxygen	518	Inlet Velocity—ft./sec.	0.96				1	73	CATALYST		
Natural Gas	812	Fresh Feed Rate—S.C.F.H.	14960	HEMPEL. DIST. %		°API	2	86	Bulk Density, Lbs./Cu.Ft.		
Generator	2324	per Cu. Ft. Dense Bed	1151	205 °F.			3	78	Aerated		
Quench Accumulator	173	per Lb. Catalyst	7.38	400	81.8	56.2	4	300	Settled		
Reactor Inlet	359	per Sq. Ft.	22667	400-550	11.1	35.2	Total	591	Compacted		
Condenser Inlet	608			550+	7.1				Particle Density, gm./cc.		
Product Accumulator	90						CALCULATED FROM dp		NH_3 Value, ml./gm.		
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	156	N_2 Surface, m^2/gm.		
1 See Per. A	---			Naphtha °F.			Inventory, Lbs.	2028			
2	651			IBP	100		Bed Depth, Ft.	19.70	CHEMICAL ANALYSIS		
3	649			10%	130		Vol., Cu. Ft.	13.00	Fe		
4	659			50%	220				C		
5	660			90%	350				O		
6	659			EP	400				H		
7	652			Rec.	97.0				K_2O, W+, % basis Fe		
8	637								X-Ray Analysis—		
9	633								$Fe_{20}C_9$		
10	647								Fe_3O_4		
11	665								Fe		

RUN NO. 64-F
HOURS 106-128
CATALYST M.S. Reduced at Montebello

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

By Carbon Balance

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED				
					At Wt. Balance							CONDENSATE				
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	
CO 28.010	37.377	15.144	424.17	9.827	1.407	39.41	4.091	19.235	5.498	-13.737	-384.76					
H_2 2.016	59.813	24.234	48.86	39.666	5.679	11.45	16.511	40.745	22.190	-18.555	37.41					
CO_2 44.010	2.540	1.029	45.29	29.687	4.252	187.13	12.358	13.387	16.610	3.223	141.84	9.491				
N_2 28.016	0.140	0.057	1.60	1.450	0.208	5.83	0.604	0.661	0.812							
CH_4 16.042	0.130	0.053	0.85	8.390	1.201	19.27	3.492	3.545	4.693	1.148	18.42	1.233				
C_2H_4 28.052				2.400	0.344	9.65	0.999	0.999	1.343	0.344	9.65	0.646				
C_2H_6 30.068				1.760	0.252	7.58	0.733	0.733	0.988	0.252	7.58	0.507				
C_3+C_3											35.65	2.386				
C_3H_6 42.078				2.640	0.378	15.91	1.099	1.099	1.477	0.378	15.91	1.065	4.32	3.683	0.248	
C_3H_8 44.094				0.303	0.043	1.90	0.126	0.126	0.169	0.043	1.90	0.127	4.24	0.448	0.030	
C_4H_8 56.104				1.903	0.272	15.26	0.792	0.792	1.064	0.272	15.26	1.021	5.00	3.052	0.204	
C_4H_{10} 58.120				0.553	0.079	4.59	0.230	0.230	0.309	0.079	4.59	0.307	4.86	0.944	0.063	
C_5H_{10} 70.130				0.917	0.131	9.19	0.382	0.382	0.513	0.131	9.19	0.615	5.45	1.686	0.113	
C_5H_{12} 72.146				0.217	0.031	2.24	0.090	0.090	0.121	0.031	2.24	0.150	5.25	0.427	0.029	
C_6H_{12} 84.156				0.287	0.041	3.45	0.119	0.119	0.160	0.041	3.45	0.231	5.54	0.623	0.042	
C_5-C_6											52.54	3.516		10.863	0.727	
TOTAL		40.517	520.77		14.318	332.86	41.626	82.143	63.194							
H_2+CO	97.190	39.378	14944	SCFH	7.086		20.602	59.980	27.688	-32.292						
H_2/CO		1.60	Factor	669164	4.04		4.04	2.12	4.04	1.35						

Weight Recovery, %	94.17	Catalyst Age, hrs.		Space Velocity, vhv	1158	RECOVERED OIL	0.389	54.62	3.655		8.526	0.571
Pressure, psig	416	Inlet Velocity, Ft/sec	0.96	Catalyst	Vol CF 12.90	TOTAL OIL		107.16	7.171		19.389	1.298
Temperature, °F	653	Bed Depth, Ft	19.54	Weight, #	2025	WATER SOLUBLE CHEMICALS	0.276	14.65	0.980		1.851	0.124
Recycle Ratio	1.03	Bed Density, #/CF	157	Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ Shift Ratio =		TOTAL LIQUID PRODUCTS C_3+		121.81	8.151		21.240	1.422

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY						
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	NET WATER	6.585	118.64	7.939		14.243	0.953
64.66	90.71	76.57	82.01	71.42	45.54	53.84	77.36	GROSS WATER		133.29	8.919		16.094	1.077
								HYDROCARBON TOTAL—C_1+		157.46	10.537			

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
400 EP	83.5	7.119	98.0	6.977
400-550	11.6	0.989	91.4	0.904
550 +	4.9	0.418	114.6	0.479
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	40.0	6.36		
C_3 POLY GASO.	87.5	5.56	0.930	
C_3 POLY TAR	12.5	0.80	0.106	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.69	0.138	68.0
C_4 POLY GASO.	5.98	12.75	2.132	1.5
C_4H_{10}	4.86	4.59	0.944	68.0
C_4-FREE GASO.			10.643	5.8
C_4 POLY TAR	7.53	1.82	0.242	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	13.857	0.9273	5027	
GAS OIL	0.904	0.0605	328	
FUEL OIL	0.479	0.0321	174	
POLY TAR	0.348	0.0233	126	
TOTAL	15.588	1.0432	5655	
W.S CHEM.	1.851	0.1239	672	
TOTAL	17.439	1.1671	6327	

Form ML—11

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-F
HOURS 106-128

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	442	Fresh Feed	15376
Natural Gas	435	Recycle	15797
Generator Outlet	420	Combined Feed	31173
Reactor Inlet	416	Wet Gas—Measured	4938
Condenser Inlet		Adjusted	5434
Product Accumulator	370	Loss	496
TEMPERATURES—°F.		Recycle/Fresh Feed	1.03
Oxygen	472	Inlet Velocity—ft./sec.	0.96
Natural Gas	789	Fresh Feed Rate—S.C.F.H.	14944
Generator	2341	per Cu. Ft. Dense Bed	1158
Quench Accumulator	179	per Lb. Catalyst	7.38
Reactor Inlet	355	per Sq. Ft.	22642
Condenser Inlet	596		
Product Accumulator	92		
Catalyst No. Height			
1 See Per. A	--		
2	650		
3	647		
4	657		
5	657		
6	657		
7	650		
8	636		
9	630		
10	641		
11	645		

PRODUCT TESTS		
	OIL	WATER
° API	52.4	10.8
Neut. No.	43.5	33.4
Sap. No.	61.8	38.9
Hydrox. No.		
Bromine No.	94	
Pour °F.		
Chemicals, % by K_2CO_3		11.5
HEMPEL, DIST. %		°API
205 °F.		
400	82.5	54.3
400-550	11.6	35.3
550+	5.9	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	104	
10%	134	
50%	218	
90%	354	
EP	402	
Rec.	97.0	

CATALYST DATA						
INVENTORY DATA		PARTICLE SIZE				
		Screen Analysis			Sedimentation	
In Reactor at Start of Period		Mesh	Microns	%	Microns	%
Fresh Catalyst Added		On 40	419+		80+	
Total		100	150		40—80	
Catalyst Recovered		150	105		20—40	
In Reactor at End of Period	24	200	74		10—20	
		250	62		0—20	
REACTOR d-p, Inches H_2O		325	44			
No. Height		<325				
0 See Per. A	54					
1	71	CATALYST				
2	88	Bulk Density, Lbs./Cu.Ft.				
3	79	Aerated				
4	298	Settled				
Total	590	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	157	N_2 Surface, m^2/gm.				
Inventory, Lbs.	2025					
Bed Depth, Ft.	19.54	CHEMICAL ANALYSIS				
Vol., Cu. Ft.	12.90	Fe				
		C				
		O				
		H				
		K_2O, W+, % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 64-G
HOURS 128-141
CATALYST Mill Scale Red. at Mont.

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
					At Wt. Balance							CONDENSATE								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	36.575	15.213	426.11	9.160	1.300	36.41	3.802	19.015	5.102	-13.913	-389.70						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
H_2 2.016	60.860	25.314	51.03	39.455	5.595	11.29	16.378	41.692	21.973	-19.719	-39.74					400 EP	78.7	6.688	98.0	6.554
CO_2 44.010	2.255	0.938	41.28	29.785	4.229	186.13	12.364	13.302	16.593	3.291	144.85	9.418				400-550	11.6	0.986	91.4	0.901
N_2 28.016	0.170	0.071	1.99	1.490	0.211	5.91	0.618	0.689	0.829							550 +	9.7	0.824	114.6	0.944
CH_4 16.042	0.140	0.058	0.93	8.815	1.251	20.07	3.659	3.717	4.910	1.193	19.14	1.244								
C_2H_4 28.052				2.395	0.340	9.54	0.994	0.994	1.334	0.340	9.54	0.620					RECOVERY %	#/hr	gal/hr	
C_3H_6 30.068				1.670	0.237	7.13	0.693	0.693	0.930	0.237	7.13	0.464				PROPYLENE	41.5	7.56		
C_1+C_2											35.81	2.328				C_3 POLY GASO.	87.5	6.61	1.105	
C_3H_6 42.078				3.055	0.433	18.22	1.268	1.268	1.701	0.433	18.22	1.185	4.32	4.218	0.274	C_3 POLY TAR	12.5	0.95	0.126	
C_3H_8 44.094				0.305	0.043	1.90	0.127	0.127	0.170	0.043	1.90	0.124	4.24	0.448	0.029					
C_4H_8 56.104				1.965	0.279	15.65	0.816	0.816	1.095	0.279	15.65	1.018	5.00	3.130	0.204		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.645	0.092	5.16	0.268	0.268	0.360	0.092	5.16	0.336	4.86	1.062	0.069	C_4H_8	5.00	0.01	0.002	68.0
C_5H_{10} 70.130				0.855	0.121	8.49	0.355	0.355	0.476	0.121	8.49	0.552	5.45	1.558	0.101	C_5 POLY GASO.	5.98	13.69	2.288	1.5
C_5H_{12} 72.146				0.180	0.026	1.88	0.075	0.075	0.101	0.026	1.88	0.122	5.25	0.358	0.023	C_4H_{10}	4.86	5.16	1.062	68.0
C_6H_{12} 84.156				0.225	0.032	2.69	0.093	0.093	0.125	0.032	2.69	0.175	5.54	0.486	0.032	C_4-FREE GASO.			10.061	5.8
C_3-C_6											53.99	3.512		11.260	0.732	C_4 POLY TAR	7.53	1.95	0.259	
TOTAL		41.594	521.34		14.189	330.47	41.510	83.104	63.121											
H_2+CO	97.435	40.527	15380 SCFH		6.895		20.180	60.707	27.075	-33.632							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.66	Factor 650195		4.30		4.31	2.19	4.31	1.42						10 # RVP 400 EP GASOLINE	13.413	0.8721	4728	
									RECOVERED OIL	0.390	54.64	3.553		8.498	0.553	GAS OIL	0.901	0.0586	318	
									TOTAL OIL		108.63	7.065		19.758	1.285	FUEL OIL	0.944	0.0614	333	
									WATER SOLUBLE CHEMICALS	0.272	14.44	0.939		1.807	0.117	POLY TAR	0.385	0.0250	136	
									TOTAL LIQUID PRODUCTS C_5+		123.07	8.004		21.565	1.402	TOTAL	15.643	1.0171	5515	
									NET WATER	6.760	121.79	7.919		14.621	0.951	W. S. CHEM.	1.807	0.1175	637	
									GROSS WATER		136.23	8.858		16.428	1.068	TOTAL	17.450	1.1346	6152	
									HYDROCARBON TOTAL—C_1+		158.88	10.332								

Weight Recovery, % 94.77	Catalyst Age, hrs.	Space Velocity, vhv 1184
Pressure, psig 415	Inlet Velocity, Ft/sec 0.98	Catalyst Vol CF 12.99
Temperature, °F 657	Bed Depth, Ft 19.68	Weight, # 2039
Recycle Ratio 1.00	Bed Density, #/CF 157	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
65.89	91.45	77.90	82.99	73.17	47.30	55.40	77.46

Form ML—11

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-G
HOURS 128-141

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA				
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE		
Oxygen	443	Fresh Feed	15785	°API	51.7	10.6	In Reactor at Start of Period		Screen Analysis		Sedimentation
Natural Gas	435	Recycle	15753	Neut. No.	43.5	33.4	Fresh Catalyst Added		Mesh	Microns %	Microns %
Generator Outlet	420	Combined Feed	31538	Sap. No.	63.2	40.5	Total		On 40	419+	80+
Reactor Inlet	415	Wet Gas—Measured	4940	Hydrox. No.			Catalyst Recovered	7	100	150	40—80
Condenser Inlet		Adjusted	5385	Bromine No.	91		In Reactor at End of Period		150	105	20—40
Product Accumulator	370	Loss	445	Pour °F.					200	74	10—20
				Chemicals, % by K_2CO_3		11.0	REACTOR d-p, Inches H_2O		250	62	0—20
							No. Height		325	44	
TEMPERATURES—°F.		Recycle/Fresh Feed	1.00				0 See Per. A	56	<325		
Oxygen	491	Inlet Velocity—ft./sec.	0.98				1	71	CATALYST		
Natural Gas	793	Fresh Feed Rate—S.C.F.H.	15380	HEMPEL, DIST. %		°API	2	93	Bulk Density, Lbs./Cu.Ft.		
Generator	2336	per Cu. Ft. Dense Bed	1184	205 °F.			3	74	Aerated		
Quench Accumulator	186	per Lb. Catalyst	7.54	400	77.7	53.8	4	300	Settled		
Reactor Inlet	353	per sq ft	23303	400-550	11.6	34.9	Total	594	Compacted		
Condenser Inlet	597			550+	10.7				Particle Density, gm./cc.		
Product Accumulator	94						CALCULATED FROM dp		NH_3 Value, ml./gm.		
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	157	N_2 Surface, m^2/gm.		
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	2039			
2	656			IBP	106		Bed Depth, Ft.	19.68	CHEMICAL ANALYSIS		
3	649			10%	140		Vol. cu. ft.	12.99	Fe		
4	659			50%	224				C		
5	662			90%	340				O		
6	662			EP	394				H		
7	654				97.5				K_2O, W+. % basis Fe		
8	639								X-Ray Analysis—		
9	634								$Fe_{20}C_9$		
10	643								Fe_3O_4		
11	648								Fe		

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 64-H&I
HOURS 141-170
CATALYST MS Reduced at Montebello

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	37.855	15.759	441.39	9.867	1.442	40.38	4.187	19.946	5.629	-14.317	-401.01						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
H_2 2.016	59.365	24.714	49.82	38.337	5.602	11.28	16.269	40.983	21.871	-19.112	-38.54					400 EP	83.0	6.965	98.0	6.845
CO_2 44.010	2.495	1.039	45.73	30.807	4.500	198.03	13.074	14.113	17.574	3.461	152.30	9.915				400-550	11.2	0.943	91.4	0.862
N_2 28.016	0.187	0.078	2.19	1.425	0.208	5.83	0.605	0.685	0.813							550 +	5.8	0.488	114.6	0.559
CH_4 16.042	0.098	0.041	0.66	8.213	1.200	19.25	3.485	3.526	4.685	1.159	18.59	1.210								
C_2H_6 28.052				2.263	0.331	9.29	0.960	0.960	1.291	0.331	9.29	0.605					RECOVERY %	#/hr	gal/hr	
C_3H_8 30.068				1.615	0.236	7.10	0.685	0.685	0.921	0.236	7.10	0.462				PROPYLENE	40.3	7.44		
C_1+C_2											34.98	2.277				C_3 POLY GASO.	87.5	6.51	1.089	
C_2H_4 42.078				3.005	0.439	18.47	1.275	1.275	1.714	0.439	18.47	1.202	4.32	4.275	0.278	C_3 POLY TAR	12.5	0.93	0.124	
C_3H_8 44.094				0.243	0.036	1.59	0.103	0.103	0.139	0.036	1.59	0.104	4.24	0.375	0.024					
C_4H_8 56.104				2.102	0.307	17.22	0.892	0.892	1.199	01307	17.22	1.121	5.00	3.444	0.224		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.740	0.108	6.28	0.314	0.314	0.422	0.108	6.28	0.409	4.86	1.292	0.084	C_4H_8	5.00	--	--	68.0
C_5H_{10} 70.130				0.915	0.134	9.40	0.388	0.388	0.522	0.134	9.40	0.612	5.48	1.725	0.112	C_4 POLY GASO.	5.98	1.507	2.520	1.5
C_5H_{12} 72.146				0.210	0.031	2.24	0.089	0.089	0.120	0.031	2.24	0.146	5.25	0.427	0.028	C_4H_{10}	4.86	(6.28) 5.55	(1.292) 1.142	68.0
C_6H_{12} 84.156				0.258	0.038	3.20	0.109	0.109	0.147	0.038	3.20	0.208	5.54	0.578	0.038	C_4 FREE GASO.			10.664	5.8
C_3-C_6											58.40	3.802		12.116	0.788	C_4 POLY TAR	7.53	12.153	0.286	
TOTAL		41.631	539.79		14.612	349.56	42.435	83.066	64.421											
H_2+CO	97.220	40.473	15360 SCFH	7.044			20.456	60.929	27.500	-33.429							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.57	Factor 651041	3.89			3.89	2.05	3.89	1.33						10 # RVP 400 EP GASOLINE	14.326	0.9327	5057	
										0.385	53.93	3.511		8.416	0.548	GAS OIL	0.862	0.0561	304	
											112.33	7.313		20.532	1.336	FUEL OIL	0.559	0.0364	197	
										0.296	15.71	1.023	12.0	1.974	0.129	POLY TAR	0.410	0.0267	145	
											128.04	8.336		22.506	1.465	TOTAL	16.157	1.0519	5703	
										6.693	120.59	7.851	8.33	14.476	0.942	W. S. CHEM.	1.974	0.1285	697	
											136.30	8.874		16.450	1.071	TOTAL	18.131	1.1804	6400	
											163.02	10.613								

Weight Recovery, % 91.96	Catalyst Age, hrs.	Space Velocity, vhv 1193
Pressure, psig 416	Inlet Velocity, Ft/sec 0.99	Catalyst VolCF 12.88
Temperature, °F 660	Bed Depth, Ft 19.52	Weight, # 1984
Recycle Ratio 1.02	Bed Density, #/CF 154	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	
64.90	90.85	77.33	82.60	71.78	46.63	54.87	78.54	

NET WATER 6.693 120.59
GROSS WATER 136.30
HYDROCARBON TOTAL—C_1+ 163.02

Form ML—11

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-H&I
HOURS 141-170

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE			
Oxygen	443	Fresh Feed	15799	°API	52.3	10.7	In Reactor at Start of Period		Screen Analysis			Sedimentation
Natural Gas	438	Recycle	16104	Neut. No.	52.2	37.4	Fresh Catalyst Added		Mesh	Microns	%	Microns %
Generator Outlet	420	Combined Feed	31903	Sap. No.	64.7	40.9	Total		On 40	419+		80+
Reactor Inlet	416	Wet Gas—Measured	4857	Hydrox. No.			Catalyst Recovered	19	100	150		40—80
Condenser Inlet		Adjusted	5545	Bromine No.	94		In Reactor at End of Period		150	105		20—40
Product Accumulator	368	Loss	688	Pour °F.					200	74		10—20
				Chemicals, % by K_2CO_3		12.0	REACTOR d-p, Inches H_2O		250	62		0—20
							No. Height		325	44		
TEMPERATURES—°F.		Recycle/Fresh Feed	1.02				0 See Per. A	54	<325			
Oxygen	483	Inlet Velocity—ft./sec.	0.99				1	70	CATALYST			
Natural Gas	741	Fresh Feed Rate—S.C.F.H.	15360	HEMPEL, DIST. %		°API	2	88	Bulk Density, Lbs./Cu.Ft.			
Generator	2317	per Cu.Ft. Dense Bed	1193	205 °F.			3	76	Aerated			
Quench Accumulator	187	per Lb. Catalyst	7.74	400	82.0	54.0	4	290	Settled			
Reactor Inlet	355		23273	400-550	11.2	34.1	Total	578	Compacted			
Condenser Inlet	594			550+	6.8				Particle Density, gm./cc.			
Product Accumulator	88						CALCULATED FROM dp		NH_3 Value, ml./gm.			
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	154	N_2 Surface, m^2/gm.			
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	1984				
2	661			IBP	100		Bed Depth, Ft.	19.52	CHEMICAL ANALYSIS			
3	651			10%	132			12.88	Fe			
4	660			50%	218				C			
5	664			90%	350				O			
6	665			EP	392				H			
7	658				96.5				K_2O, W+, % basis Fe			
8	643								X-Ray Analysis—			
9	638								$Fe_{20}C_9$			
10	639								Fe_3O_4			
11	628								Fe			

RUN NO. 64-J
HOURS 170-194
CATALYST MS Reduced at Montebello

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED				
					At Wt. Balance							CONDENSATE				
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*
CO 28.010	37.680	15.701	439.77	9.447	1.406	39.38	4.042	19.743	5.448	-14.295	-400.39					
H_2 2.016	59.784	24.910	50.22	39.700	5.906	11.91	16.988	41.898	22.894	-19.004	-38.31					400 EP
CO_2 44.010	2.353	0.980	43.13	30.150	4.486	197.42	12.901	13.881	17.387	3.506	154.29	10.011				400-550
N_2 28.016	0.090	0.038	1.06	1.350	0.201	5.63	0.578	0.616	0.779							550 +
CH_4 16.042	0.093	0.039	0.63	8.324	1.238	19.86	3.562	3.601	4.800	1.199	19.23	1.248				
C_2H_6 28.052				2.163	0.322	9.03	0.926	0.926	1.248	0.322	9.03	0.586				
C_2H_6 30.068				1.640	0.244	7.34	0.702	0.702	0.946	0.244	7.34	0.476				PROPYLENE
C_1+C_2											35.60	2.310				C_3 POLY GASO.
C_3H_6 42.078				3.153	0.469	19.73	1.349	1.349	1.818	0.469	19.73	1.280	4.32	4.567	0.296	C_3 POLY TAR
C_3H_8 44.094				0.237	0.035	1.54	0.101	0.101	0.136	0.035	1.54	0.100	4.24	0.363	0.024	
C_4H_8 56.104				1.913	0.285	15.99	0.819	0.819	1.104	0.285	15.99	1.038	5.00	3.198	0.208	
C_4H_{10} 58.120				0.663	0.099	5.75	0.284	0.284	0.383	0.099	5.75	0.373	4.86	1.183	0.077	C_4H_8
C_5H_{12} 70.130				0.830	0.123	8.63	0.355	0.355	0.478	0.123	8.63	0.560	5.45	1.583	0.103	C_4 POLY GASO.
C_5H_{12} 72.146				0.187	0.028	2.02	0.080	0.080	0.108	0.028	2.02	0.131	5.25	0.385	0.025	C_4H_{10}
C_6H_{12} 84.156				0.243	0.036	3.03	0.104	0.104	0.140	0.036	3.03	0.197	5.54	0.547	0.035	C_4-FREE GASO.
C_3-C_6											56.69	3.679		11.826	0.768	C_4 POLY TAR
TOTAL		41.668	534.81		14.878	347.26	42.791	84.459	64.960							
H_2+CO	97.464	40.611	15412 SCFH		7.312		21.030	61.641	28.342	-33.299						
H_2/CO		1.59	Factor 648845		4.20		4.20	2.12	4.20	1.33						10 # RVP 400 EP GASOLINE

Weight Recovery, % 91.75	Catalyst Age, hrs.	Space Velocity, vhv 1171	RECOVERED OIL	0.377	52.94	3.435	8.233	0.534
Pressure, psig 415	Inlet Velocity, Ft/sec 1.00	Catalyst Vol CF 13.16	TOTAL OIL		109.63	7.114	20.059	1.302
Temperature, °F 662	Bed Depth, Ft 19.94	Weight, # 2001	WATER SOLUBLE CHEMICALS	0.287	15.22	0.988	1.899	0.123
Recycle Ratio 1.03	Bed Density, #/CF 152	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	TOTAL LIQUID PRODUCTS C_3+		124.85	8.102	21.958	1.425
			NET WATER	6.627	119.39	7.747	14.333	0.930
			GROSS WATER		134.61	8.735	16.232	1.053
			HYDROCARBON TOTAL—C_1+		160.45	10.412		

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
64.29	91.05	76.29	82.00	72.41	45.36	54.02	77.81

GAS OIL	0.722	0.0468	254
FUEL OIL	0.586	0.0380	206
POLY TAR	0.395	0.0256	139
TOTAL	15.590	1.0115	5484
W.S. CHEM.	1.899	0.1232	668
TOTAL	17.489	1.1347	6152

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	13.887	0.9011	885

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	39.5	7.79		
C_3 POLY GASO.	87.5	6.82	1.140	
C_3 POLY TAR	12.5	0.97	0.129	

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	--	--	68.0
C_4 POLY GASO.	5.98	13.99	2.340	1.5
C_4H_{10}	4.86	(5.75) 5.34	(1.183) 1.099	68.0
C_4-FREE GASO.			10.448	5.8
C_4 POLY TAR	7.53	2.00	0.266	

Form ML—11

g/NCM = 16.91 × #/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-J
HOURS 170-194

OPERATING CONDITIONS		RATES S.C.F.H.	
PRESSURES PSIG			
Oxygen	443	Fresh Feed	15813
Natural Gas	437	Recycle	16239
Generator Outlet	419	Combined Feed	32052
Reactor Inlet	415	Wet Gas—Measured	4929
Condenser Inlet		Adjusted	5646
Product Accumulator	369	Loss	717
TEMPERATURES—°F.		Recycle/Fresh Feed	1.03
Oxygen	495	Inlet Velocity—ft./sec.	1.00
Natural Gas	752	Fresh Feed Rate—S.C.F.H.	15412
Generator	2335	per Cu. Ft. Dense Bed	1171
Quench Accumulator	190	per Lb. Catalyst	7.70
Reactor Inlet	341	per sq ft	23352
Condenser Inlet	591		
Product Accumulator	89		
Catalyst No. Height			
1 See Per. A	--		
2	662		
3	652		
4	662		
5	667		
6	667		
7	660		
8	646		
9	641		
10	639		
11	613		

PRODUCT TESTS	OIL	WATER
° API	51.7	10.6
Neut. No.	50.2	36.9
Sap. No.	66.4	43.3
Hydrox. No.		
Bromine No.	93	
Pour °F.		
Chemicals, % by K_2CO_3		11.7
HEMPEL, DIST. %		°API
205 °F.		
400	83.2	55.4
400-550	9.6	35.0
550+	7.2	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	98	
10%	128	
50%	218	
90%	343	
EP	370	
Rec.	95.5	

CATALYST DATA		PARTICLE SIZE				
INVENTORY DATA		Screen Analysis			Sedimentation	
		Mesh	Microns	%	Microns	%
In Reactor at Start of Period						
Fresh Catalyst Added						
Total		On 40	419+		80+	
Catalyst Recovered	18	100	150		40—80	
In Reactor at End of Period		150	105		20—40	
		200	74		10—20	
REACTOR d-p, Inches H_2O		250	62		0—20	
No. Height		325	44			
0 See Per. A	53	<325				
1	69	CATALYST				
2	86	Bulk Density, Lbs./Cu.Ft.				
3	76	Aerated				
4	299	Settled				
Total	583	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	152	N_2 Surface, m^2/gm.				
Inventory, Lbs.	2001					
Bed Depth, Ft.	19.94	CHEMICAL ANALYSIS				
Vol. Cu. Ft.	13.16	Fe				
		C				
		O				
		H				
		K_2O, W+, % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 64-K
HOURS 194-218
CATALYST MS Reduced at Montebello

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
					At Wt. Balance							CONDENSATE								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	37.303	14.929	418.18	9.673	1.394	39.05	4.228	19.157	5.622	-13.535	+379.13						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
H_2 2.016	59.804	23.935	48.26	40.417	5.823	11.74	17.663	41.598	23.486	-18.112	36.52					400 EP	82.5	6.896	98.0	6.758
CO_2 44.010	2.337	0.935	41.15	29.687	4.277	188.23	12.975	13.910	17.252	3.342	147.08	9.972				400-550	11.0	0.919	91.4	0.840
N_2 28.016	0.493	0.197	5.52	1.377	0.198	5.55	0.602	0.799	0.800							550 +	6.5	0.544	114.6	0.623
CH_4 16.042	0.063	0.025	0.40	8.307	1.197	19.20	3.631	3.656	4.828	1.172	18.80	1.275								
C_2H_4 28.052				2.257	0.325	9.12	0.986	0.986	1.311	0.325	9.12	0.618					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.633	0.235	7.07	0.714	0.714	0.949	0.235	7.07	0.479				PROPYLENE	39.2	6.88		
C_1+C_2											34.99	2.372				C_3 POLY GASO.	87.5	6.02	1.007	
C_3H_6 42.078				2.893	0.417	17.55	1.264	1.264	1.681	0.417	17.55	1.190	4.32	4.063	0.276	C_3 POLY TAR	12.5	0.86	0.114	
C_3H_8 44.094				0.253	0.036	1.59	0.111	0.111	0.147	0.036	1.59	0.108	4.24	0.375	0.026					
C_4H_8 56.104				1.760	0.254	14.25	0.769	0.769	1.023	0.254	14.25	0.966	5.00	2.850	0.193		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.643	0.093	5.41	0.281	0.281	0.374	0.093	5.41	0.367	4.86	1.113	0.075	C_4H_8	5.00	--	--	68.0
C_5H_{10} 70.130				0.737	0.106	7.43	0.322	0.322	0.428	0.106	7.43	0.504	5.45	1.363	0.092	C_4 POLY GASO.	5.98	12.47	2.085	1.5
C_5H_{12} 72.146				0.160	0.023	1.66	0.070	0.070	0.093	0.023	1.66	0.113	5.25	0.316	0.021	C_4H_{10}	4.86	(5.41) 4.96	(1.113) 1.021	68.0
C_6H_{12} 84.156				0.203	0.029	2.44	0.089	0.089	0.118	0.029	2.44	0.165	5.54	0.440	0.030	C_4 FREE GASO.			9.884	5.8
C_3-C_6											50.33	3.413		10.520	0.713	C_4 POLY TAR	7.53	1.78	0.236	
TOTAL		40.021	513.51		14.407	330.29	43.705	83.726	65.150											
H_2+CO	97.107	38.864	14749 SCFH		7.217		21.891	60.755	29.108	-31.647										
H_2/CO		1.60	Factor 678012		4.18		4.18	2.17	4.18	1.34							gal/hr	gal/MCF	Bbl/Day	
																10 # RVP 400 EP GASOLINE	12.990	0.8807	4775	
									RECOVERED OIL	0.381	53.43	3.623		8.359	0.567	GAS OIL	0.940	0.0570	309	
									TOTAL OIL		103.76	7.036		18.879	1.280	FUEL OIL	0.623	0.0422	229	
									WATER SOLUBLE CHEMICALS	0.281	14.92	1.012		1.881	0.128	POLY TAR	0.350	0.0237	128	
									TOTAL LIQUID PRODUCTS C_3+		118.68	8.048		20.760	1.408	TOTAL	14.803	1.0036	5441	
									NET WATER	6.376	114.87	7.788		13.790	0.935	W. S. CHEM.	1.881	0.1275	691	
									GROSS WATER		129.79	8.800		15.671	1.063	TOTAL	16.684	1.1311	6132	
									HYDROCARBON TOTAL—C_1+		153.67	10.420								

Weight Recovery, % 95.05 | Catalyst Age, hrs. | Space Velocity, vhv 1106
Pressure, psig 413 | Inlet Velocity, Ft/sec 0.99 | Catalyst Vol CF 13.34
Temperature, °F 658 | Bed Depth, Ft 20.21 | Weight, # 2001
Recycle Ratio 1.09 | Bed Density, #/CF 150 | Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
64.00	90.66	75.67	81.43	70.65	43.54	52.09	77.23

Form ML—11

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-K
HOURS 194-218

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA				
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE		
Oxygen	441	Fresh Feed	15188	° API	52.8	10.8	In Reactor at Start of Period		Screen Analysis		Sedimentation
Natural Gas	436	Recycle	16586	Neut. No.	46.2	36.6	Fresh Catalyst Added		Mesh / Microns	%	Microns / %
Generator Outlet	418	Combined Feed	31774	Sap. No.	64.7	41.2	Total		On 40 / 419+		80+
Reactor Inlet	413	Wet Gas—Measured	5047	Hydrox. No.			Catalyst Recovered	14	100 / 150		40—80
Condenser Inlet		Adjusted	5468	Bromine No.	86		In Reactor at End of Period		150 / 105		20—40
Product Accumulator	368	Loss	421	Pour °F.					200 / 74		10—20
				Chemicals, % by K_2CO_3		12.0	REACTOR d-p, Inches H_2O		250 / 62		0—20
							No. Height		325 / 44		
TEMPERATURES—°F.		Recycle/Fresh Feed	1.09				0 See Period A	51	<325		
Oxygen	500	Inlet Velocity—ft./sec.	0.99				1	69	CATALYST		
Natural Gas	752	Fresh Feed Rate—S.C.F.H.	14749	HEMPEL, DIST. %		°API	2	82	Bulk Density, Lbs./Cu.Ft.		
Generator	2357	per Cu. Ft. Dense Bed	1106	205 °F.			3	76	Aerated		
Quench Accumulator	185	per Lb. Catalyst	7.37	400	81.5	54.9	4	305	Settled		
Reactor Inlet	314		22347	400-550	11.0	33.9	Total	583	Compacted		
Condenser Inlet	583			550+	7.5				Particle Density, gm./cc.		
Product Accumulator	83						CALCULATED FROM dp		NH_3 Value, ml./gm.		
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	150	N_2 Surface, m^2/gm.		
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	2001			
2	657			IBP	97		Bed Depth, Ft.	20.21	CHEMICAL ANALYSIS		
3	651			10%	120		Vol. cu. ft.	13.34	Fe		
4	661			50%	212				C		
5	661			90%	331				O		
6	663			EP	391				H		
7	657			Rec.	97.0				K_2O, W+, % basis Fe		
8	646								X-Ray Analysis—		
9	640								$Fe_{20}C_9$		
10	636								Fe_3O_4		
11	608								Fe		

RUN NO. 64-L
HOURS 218-242
CATALYST MS Reduced at Montebello

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED			
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO 28.010	37.037	15.250	427.14	10.005	1.488	41.68	4.400	19.650	5.888	-13.762	-385.46				
H_2 2.016	60.223	24.796	49.99	40.895	6.080	12.26	17.983	42.779	24.063	-18.716	-37.73				
CO_2 44.010	2.380	0.980	43.13	29.930	4.450	195.82	13.161	14.141	17.611	3.470	152.69	10.047			
N_2 28.016	0.243	0.100	2.80	1.175	0.175	4.90	0.517	0.617	0.692						
CH_4 16.042	0.117	0.048	0.77	7.750	1.152	18.48	3.408	3.456	4.560	1.104	17.71	1.165			
C_2H_4 28.052				2.505	0.372	10.44	1.102	1.102	1.474	0.372	10.44	0.687			
C_2H_6 30.068				1.410	0.210	6.31	0.620	0.620	0.830	0.210	6.31	0.415			
C_1+C_2											34.46	2.267			
C_3H_6 42.078				2.855	0.424	17.84	1.255	1.255	1.679	0.424	17.84	1.174	4.32	4.130	0.272
C_3H_8 44.094				0.240	0.026	1.59	0.106	0.106	0.142	0.036	1.59	0.105	4.24	0.375	0.025
C_4H_8 56.104				1.690	0.251	14.08	0.743	0.743	0.994	0.251	14.08	0.926	5.00	2.816	0.185
C_4H_{10} 58.120				0.540	0.080	4.65	0.237	0.237	0.317	0.080	4.65	0.306	4.86	0.957	0.063
C_5H_{10} 70.130				0.680	0.101	7.08	0.299	0.299	0.400	0.101	7.08	0.466	5.45	1.299	0.085
C_5H_{12} 72.146				0.145	0.022	1.59	0.064	0.064	0.086	0.022	1.59	0.105	5.25	0.303	0.020
C_6H_{12} 84.156				0.180	0.027	2.27	0.079	0.079	0.106	0.027	2.27		5.54		
C_3-C_6											49.10	3.231		10.290	0.677
TOTAL		41.174	523.83		14.868	338.99	43.974	85.148	65.971						
H_2+CO	97.260	40.046	15198 SCFH		7.568		22.383	62.429	29.951	-32.478					
H_2/CO		1.63	Factor 657981		4.09		4.09	2.18	4.09	1.36					

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
400 EP	83.5	6.926	98.0	6.787
400-550	11.3	0.937	91.4	0.856
550 +	5.2	0.431	114.6	0.494

	RECOVERY %	#/hr	gal/hr
PROPYLENE	39.1	6.98	
C_3 POLY GASO.	87.5	6.11	1.022
C_3 POLY TAR	12.5	0.87	0.116

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.25	0.050	68.0
C_4 POLY GASO.	5.98	12.10	2.024	1.5
C_4H_{10}	4.86	4.65	0.957	68.0
C_4-FREE GASO.			9.821	5.8
C_4 POLY TAR	7.53	1.73	0.230	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	12.852	0.8456	4585
GAS OIL	0.856	0.0563	305
FUEL OIL	0.494	0.0325	176
POLY TAR	0.346	0.0228	124
TOTAL	14.548	0.9572	5190
W. S. CHEM.	1.907	0.1255	680
TOTAL	16.455	1.0827	5870

RECOVERED OIL	0.380	53.25	3.504		8.294	0.546
TOTAL OIL		102.35	6.735		18.584	1.223
WATER SOLUBLE CHEMICALS	0.285	15.12	0.995		1.907	0.125
TOTAL LIQUID PRODUCTS C_3+		117.47	7.730		20.491	1.348
NET WATER	6.464	116.47	7.664		13.982	0.920
GROSS WATER		131.59	8.659		15.889	1.047
HYDROCARBON TOTAL—C_1+		151.93	9.997			

Weight Recovery, % 93.65 | Catalyst Age, hrs. | Space Velocity, vhv 1126
Pressure, psig 414 | Inlet Velocity, Ft/sec 1.00 | Catalyst Vol CF 13.50
Temperature, °F 656 | Bed Depth, Ft 20.45 | Weight, # 2011
Recycle Ratio 1.07 | Bed Density, #/CF 149 | Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
63.89	90.24	75.48	81.10	70.04	43.75	52.02	77.32

Form ML—11

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-L
HOURS 218-242

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA		PARTICLE SIZE				
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		Screen Analysis			Sedimentation	
Oxygen	444	Fresh Feed	15626	°API	52.0	10.8	In Reactor at Start of Period		Mesh	Microns	%	Microns	%
Natural Gas	438	Recycle	16688	Neut. No.	50.0	36.6	Fresh Catalyst Added		On 40	419+		80+	
Generator Outlet	418	Combined Feed	32314	Sap. No.	64.4	41.9	Total		100	150		40—80	
Reactor Inlet	414	Wet Gas—Measured	5089	Hydrox. No.			Catalyst Recovered	16	150	105		20—40	
Condenser Inlet		Adjusted	5642	Bromine No.	86		In Reactor at End of Period		200	74		10—20	
Product Accumulator	368	Loss	553	Pour °F.					250	62		0—20	
				Chemicals, % by K_2CO_3		12.0	REACTOR d-p, Inches H_2O		325	44			
							No. Height		<325				
TEMPERATURES—°F.		Recycle/Fresh Feed	1.07				0 See Per. A	51					
Oxygen	510	Inlet Velocity—ft./sec.	1.00				1	68	CATALYST				
Natural Gas	768	Fresh Feed Rate—S.C.F.H.	15198	HEMPEL. DIST. %		°API	2	81	Bulk Density, Lbs./Cu.Ft.				
Generator	2356	per Cu. Ft. Dense Bed	1126	205 °F.			3	76	Aerated				
Quench Accumulator	187	per Lb. Catalyst	7.56	400	82.5	54.3	4	310	Settled				
Reactor Inlet	307	per sq ft	23027	400-550	11.3	34.0	Total	586	Compacted				
Condenser Inlet	582			550+	6.2				Particle Density, gm./cc.				
Product Accumulator	84						CALCULATED FROM dp		NH_3 Value, ml./gm.				
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	149	N_2 Surface, m^2/gm.				
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	2011					
2	656			IBP	98		Bed Depth, Ft.	20.45	CHEMICAL ANALYSIS				
3	648			10%	128		Vol. cu. ft.	13.50	Fe				
4	658			50%	211				C				
5	659			90%	331				O				
6	660			EP	388				H				
7	656			Rec.	97.0				K_2O, W+, % basis Fe				
8	646								X-Ray Analysis—				
9	639								$Fe_{20}C_9$				
10	634								Fe_3O_4				
11	607								Fe				

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 64-M
HOURS 242-266
CATALYST MS Reduced at Montebello

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED				
					At Wt. Balance							CONDENSATE				
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*
CO 28.010	37.23	15.171	424.91	10.055	1.499	41.99	4.382	19.553	5.881	-13.672	-382.92					
H_2 2.016	59.90	24.409	49.21	40.620	6.055	12.21	17.705	42.114	23.760	-18.354	-37.00					
CO_2 44.010	2.50	1.019	44.85	29.805	4.443	195.53	12.991	14.010	17.434	3.424	150.68	10.032				
N_2 28.016	0.26	0.106	2.97	1.090	0.162	4.54	0.475	0.581	0.637							
CH_4 16.042	0.11	0.045	0.72	7.705	1.149	18.43	3.358	3.403	4.507	1.104	17.71	1.179				
C_2H_4 28.052				2.495	0.372	10.44	1.087	1.087	1.459	0.372	10.44	0.695				
C_2H_6 30.068				1.455	0.217	6.52	0.634	0.634	0.851	0.217	6.52	0.434				
C_3+C_4											34.67	2.308				
C_3H_6 42.078				2.885	0.430	18.09	1.257	1.257	1.687	0.430	18.09	1.204	4.32	4.188	0.279	
C_3H_8 44.094				0.295	0.044	1.94	0.129	0.129	0.173	0.044	1.94	0.129	4.24	0.458	0.1030	
C_4H_8 56.104				1.820	0.271	15.20	0.793	0.793	1.064	0.271	15.20	1.012	5.00	3.040	0.202	
C_4H_{10} 58.120				0.595	0.089	5.17	0.259	0.259	0.348	0.089	5.17	0.344	4.86	1.064	0.071	
C_5H_{10} 70.130				0.765	0.114	7.99	0.333	0.333	0.447	0.114	7.99	0.532	5.45	1.466	0.098	
C_5H_{12} 72.146				0.195	0.029	2.09	0.085	0.085	0.114	0.029	2.09	0.139	5.25	0.398	0.026	
C_6H_{12} 84.156				0.220	0.033	2.78	0.096	0.096	0.129	0.033	2.78	0.185	5.54	0.502	0.034	
C_5-C_6											53.26	3.545		11.116	0.740	
TOTAL		40.749	522.66		14.907	342.92	43.584	84.333	65.410							
H_2+CO	97.13	39.580	15020 SCFH		7.554		22.087	61.667	29.641	-32.026						
H_2/CO		1.61	Factor 665778		4.04		4.04	2.15	4.04	1.34						

Weight Recovery, % 94.07	Catalyst Age, hrs.	Space Velocity, vhv 1100	RECOVERED OIL	0.366	51.32	3.417	8.073	0.537
Pressure, psig 415	Inlet Velocity, Ft/sec 0.99	Catalyst Vol CF 13.66	TOTAL OIL		104.58	6.962	19.189	1.277
Temperature, °F 655	Bed Depth, Ft 20.69	Weight, # 1953	WATER SOLUBLE CHEMICALS	0.295	15.67	1.043	1.969	0.131
Recycle Ratio 1.07	Bed Density, #/CF 143	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	TOTAL LIQUID PRODUCTS C_5+		120.25	8.005	21.158	1.408
			NET WATER	6.258	112.75	7.507	13.536	0.901
			GROSS WATER		128.42	8.550	15.505	1.032
			HYDROCARBON TOTAL—C_1+		154.92	10.313		

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
63.42	90.12	75.19	80.91	69.92	43.58	51.93	77.62

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	86.6	6.991	98.0	6.851
400-550	8.0	0.646	91.4	0.590
550 +	5.4	0.436	114.6	0.500

	RECOVERY %	#/hr	gal/hr
PROPYLENE	38.4	6.95	
C_3 POLY GASO.	87.5	6.08	1.017
C_3 POLY TAR	12.5	0.87	0.116

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.01	0.002	68.0
C_4 POLY GASO.	5.98	13.29	2.223	1.5
C_4H_{10}	4.86	5.17	1.064	68.0
C_4-FREE GASO.			10.234	5.8
C_4 POLY TAR	7.53	1.90	0.252	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	13.523	0.9003	4881
GAS OIL	0.590	0.0393	213
FUEL OIL	0.500	0.0333	181
POLY TAR	0.368	0.0245	133
TOTAL	14.981	0.9974	5408
W.S. CHEM.	1.969	0.1311	711
TOTAL	16.950	1.1285	6119

Form ML—11

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-M
HOURS 242-266

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA				
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE		
Oxygen	443	Fresh Feed	15464	°API	53.8	10.8	In Reactor at Start of Period		Screen Analysis		Sedimentation
Natural Gas	437	Recycle	16540	Neut. No.	47.6	38.0	Fresh Catalyst Added		Mesh / Microns / %		Microns / %
Generator Outlet	418	Combined Feed	32004	Sap. No.	65.5	38.7	Total		On 40 / 419+		80+
Reactor Inlet	415	Wet Gas—Measured	5146	Hydrox. No.			Catalyst Recovered	16	100 / 150		40—80
Condenser Inlet		Adjusted	5657	Bromine No.	96		In Reactor at End of Period		150 / 105		20—40
Product Accumulator	369	Loss	511	Pour °F.					200 / 74		10—20
				Chemicals, % by K_2CO_3		12.7	REACTOR d-p, Inches H_2O		250 / 62		0—20
							No. Height		325 / 44		
TEMPERATURES—°F.		Recycle/Fresh Feed	1.07				0 See Per. A	50	<325		
Oxygen	469	Inlet Velocity—ft./sec.	0.99				1	67	CATALYST		
Natural Gas	772	Fresh Feed Rate—S.C.F.H. H_2+CO	15020	HEMPEL, DIST. %		°API	2	80	Bulk Density, Lbs./Cu.Ft.		
Generator	2557	per Cu. Ft. Dense Bed	1100	205 °F.			3	70	Aerated		
Quench Accumulator	182	per Lb. Catalyst	7.69	400	85.6	56.4	4	302	Settled		
Reactor Inlet	318	per sq ft	22758	400-550	8.0	33.8	Total	569	Compacted		
Condenser Inlet	582			550+	6.4				Particle Density, gm./cc.		
Product Accumulator	84						CALCULATED FROM dp		NH_3 Value, ml./gm.		
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	143	N_2 Surface, m^2/gm.		
1 See Per. A	---			Naphtha °F.			Inventory, Lbs.	1953			
2	654			IBP	96		Bed Depth, Ft.	20.69	CHEMICAL ANALYSIS		
3	650			10%	128		Vol Cu Ft	13.66	Fe		
4	660			50%	204				C		
5	657			90%	336				O		
6	658			EP	380				H		
7	653			Rec.	96.0				K_2O, W+. % basis Fe		
8	646								X-Ray Analysis—		
9	637								$Fe_{20}C_9$		
10	633								Fe_3O_4		
11	697								Fe		

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 64-N
HOURS 266-290
CATALYST MS Reduced at Montebello

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
CO 28.010	36.874	15.231	426.62	9.867	1.583	44.34	4.424	19.655	6.007	-13.648	-382.28
H_2 2.016	60.460	24.974	50.35	43.346	6.956	14.02	19.437	44.411	26.393	-18.018	-36.33
CO_2 44.010	2.123	0.877	38.60	26.840	4.307	189.55	12.035	12.912	16.342	3.430	150.95
N_2 28.016	0.203	0.084	2.35	1.170	0.188	5.27	0.525	0.609	0.713		
CH_4 16.042	0.340	0.140	2.25	8.597	1.380	22.14	3.855	3.995	5.235	1.240	19.89
C_2H_4 28.052				2.417	0.388	10.88	1.084	1.084	1.472	0.388	10.88
C_2H_6 30.068				1.577	0.253	7.61	0.707	0.707	0.960	0.253	7.61
C_1+C_2											38.38
C_3H_6 42.078				2.710	0.435	18.30	1.215	1.215	1.650	0.435	18.30
C_3H_8 44.094				0.250	0.040	1.76	0.112	0.112	0.152	0.040	1.76
C_4H_8 56.104				1.663	0.267	14.98	0.746	0.746	1.013	0.267	14.98
C_4H_{10} 58.120				0.503	0.081	4.71	0.226	0.226	0.307	0.081	4.71
C_5H_{10} 70.130				0.707	0.113	7.92	0.317	0.317	0.430	0.113	7.92
C_5H_{12} 72.146				0.173	0.028	2.02	0.077	0.077	0.105	0.028	2.02
C_6H_{12} 84.156				0.180	0.029	2.44	0.081	0.081	0.110	0.029	2.44
C_3-C_4											52.13
TOTAL		41.306	520.17		16.048	345.94	44.841	86.147	67.798		
H_2+CO	97.334	40.205	15258 SCFH		8.539		23.861	64.066	32.400	-31.666	
H_2/CO		1.64	Factor 655393		4.39		4.39	2.26	4.39	1.32	

YIELD BASIS H_2+CO FED — CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
9.893			
1.304			
0.713			
0.499			
2.516			
1.199	4.32	4.236	0.278
0.115	4.24	0.415	0.027
0.982	5.00	2.996	0.196
0.309	4.86	0.969	0.064
0.519	5.46	1.453	0.095
0.132	5.25	0.385	0.025
0.160	5.54	0.440	0.029
3.416		10.894	0.714

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*

	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY,%	gal/hr
400 EP	81.0	5.840	98.0	5.723
400-550	9.6	0.692	91.4	0.632
550 +	9.4	0.678	114.6	0.777

	RECOVERY %	#/hr	gal/hr
PROPYLENE	36.3	6.64	
C_3 POLY GASO.	87.5	5.81	0.972
C_3 POLY TAR	12.5	0.83	0.110

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.01	0.002	68.0
C_4 POLY GASO.	5.98	13.10	2.190	1.5
C_4H_{10}	4.86	4.71	0.969	68.0
C_4-FREE GASO.			8.973	5.8
C_4 POLY TAR	7.53	1.87	0.248	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	12.134	0.7953	4312
GAS OIL	0.632	0.0414	224
FUEL OIL	0.777	0.0509	276
POLY TAR	0.358	0.0235	127
TOTAL	13.901	0.9111	4939
W. S. CHEM.	1.808	0.1185	642
TOTAL	15.709	1.0296	5581

								RECOVERED OIL	0.330	46.24	3.031		7.210	0.473
Weight Recovery, % 91.44		Catalyst Age, hrs.		Space Velocity, vhv 1115				TOTAL OIL		98.37	6.447		18.104	1.187
Pressure, psig 414		Inlet Velocity, Ft/sec 1.01		Catalyst Vol CR 13.68				WATER SOLUBLE CHEMICALS	0.270	14.32	0.939		1.808	0.118
Temperature, °F 657		Bed Depth, Ft 20.73		Weight, # 1929				TOTAL LIQUID PRODUCTS C_3+		112.69	7.386		19.912	1.305
Recycle Ratio 1.09		Bed Density, #/C.F 141		Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ =				NET WATER	6.309	113.67	7.450		13.646	0.894
								GROSS WATER		127.99	8.389		15.454	1.012
								HYDROCARBON TOTAL—C_1+		151.07	9.902			

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3 + /C_1 +
61.15	89.61	72.15	78.76	69.44	40.57	49.43	74.59

Form ML—11

g/NCM = 16.91 × #/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-N
HOURS 266-290

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	441	Fresh Feed	15676
Natural Gas	435	Recycle	17017
Generator Outlet	417	Combined Feed	32693
Reactor Inlet	414	Wet Gas—Measured	5306
Condenser Inlet		Adjusted	6090
Product Accumulator	368	Loss	784
TEMPERATURES—°F.		Recycle/Fresh Feed	1.09
Oxygen	482	Inlet Velocity—ft./sec.	1.01
Natural Gas	769	Fresh Feed Rate—S.C.F.H.	15258
Generator	2504	per Cu. Ft. Dense Bed	1115
Quench Accumulator	182	per Lb. Catalyst	7.91
Reactor Inlet	323	per sq ft	23118
Condenser Inlet	585		
Product Accumulator	88		
Catalyst No. Height			
1 See Per. A	--		
2	655		
3	651		
4	661		
5	658		
6	660		
7	655		
8	648		
9	640		
10	636		
11	610		

PRODUCT TESTS	OIL	WATER
° API	52.2	10.8
Neut. No.	51.0	37.9
Sap. No.	65.2	40.8
Hydrox. No.		
Bromine No.	84	
Pour °F. Below +30		
Chemicals, % by K_2CO_3		11.7
HEMPEL. DIST. %		°API
205 °F.		
400	80.0	54.0
400-550	9.6	35.0
550+	10.4	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	100	
10%	138	
50%	216	
90%	330	
EP	388	
Rec	97.5	

CATALYST DATA					
INVENTORY DATA		PARTICLE SIZE			
In Reactor at Start of Period		Screen Analysis			Sedimentation
Fresh Catalyst Added		Mesh	Microns	%	Microns %
Total		On 40	419+		80+
Catalyst Recovered	14	100	150		40—80
In Reactor at End of Period		150	105		20—40
		200	74		10—20
REACTOR d-p, Inches H_2O		250	62		0—20
No. Height		325	44		
0 See Per. A	48	<325			
1	65	CATALYST			
2	77	Bulk Density, Lbs./Cu.Ft.			
3	72	Aerated			
4	300	Settled			
Total	562	Compacted			
		Particle Density, gm./cc.			
CALCULATED FROM dp		NH_3 Value, ml./gm.			
Density, Lbs./Cu.Ft.	141	N_2 Surface, m^2/gm.			
Inventory, Lbs.	1929				
Bed Depth, Ft.	20.73	CHEMICAL ANALYSIS			
Vol Cu Ft	13.68	Fe			
		C			
		O			
		H			
		K_2O, W+, % basis Fe			
		X-Ray Analysis—			
		$Fe_{20}C_9$			
		Fe_3O_4			
		Fe			

RUN NO. 64-0
HOURS 290-314
CATALYST MS Reduced at Montebello

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

FRESH FEED				WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	At Wt. Balance m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	36.830	15.078	422.33	10.925	1.675	46.92	4.764	19.842	6.439	-13.403	-375.41						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
H_2 2.016	60.533	24.782	49.96	40.465	6.203	12.51	17.648	42.430	23.851	-18.579	37.45					400 EP	80.6	5.632	98.0	5.519
CO_2 44.010	2.033	0.832	36.62	28.415	4.356	191.71	12.393	13.225	16.749	3.524	155.09	10.253				400-550	10.8	0.755	91.4	0.690
N_2 28.016	0.267	0.109	3.05	1.010	0.155	4.34	0.440	0.549	0.595							550 +	8.6	0.600	114.6	0.688
CH_4 16.042	0.337	0.138	2.21	8.860	1.358	21.79	3.864	4.002	5.222	1.220	19.58	1.294								
C_2H_4 28.052				2.500	0.383	10.74	1.090	1.090	1.473	0.383	10.74	0.710					RECOVERY %	#/hr	gal/hr	
C_3H_6 30.068				1.585	0.243	7.31	0.691	0.691	0.943	0.243	7.31	0.483				PROPYLENE	37.5	6.326		
C_1+C_2											37.63	2.487				C_3 POLY GASO.	87.5	5.535	0.926	
C_3H_4 42.078				2.615	0.401	16.87	1.140	1.140	1.541	0.401	16.87	1.115	4.32	3.905	0.258	C_3 POLY TAR	12.5	0.791	0.105	
C_3H_8 44.094				0.250	0.038	1.68	0.109	0.109	0.147	0.038	1.68	0.111	4.24	0.396	0.026					
C_4H_8 56.104				1.625	0.249	13.97	0.709	0.709	0.958	0.249	13.97	0.924	5.00	2.794	0.185		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.595	0.091	5.29	0.259	0.259	0.350	0.091	5.29	0.350	4.86	1.088	0.072	C_4H_8	5.00	--	--	68.0
C_5H_{10} 70.130				0.760	0.117	8.21	0.331	0.331	0.448	0.117	8.21	0.543	5.45	1.506	0.100	C_4 POLY GASO.	5.98	12.22	2.044	1.5
C_6H_{12} 72.146				0.150	0.023	1.66	0.065	0.065	0.088	0.023	1.66	0.110	5.25	0.316	0.021	C_4H_{10}	4.86	4.57	0.941	68.0
C_6H_{12} 84.156				0.245	0.038	3.20	0.107	0.107	0.145	0.038	3.20	0.212	5.54	0.578	0.038	C_4-FREE GASO.			8.845	5.8
C_3-C_6											50.88	3.364		10.583	0.700	C_4 POLY TAR	7.53	1.75	0.232	
TOTAL		40.939			15.330	346.12	43.610	84.549	65.525											
H_2+CO	97.363	39.860	15127 SCFH		7.878		22.412	62.272	30.290	31.982							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.64	Factor 661069		3.70		3.70	2.14	3.70	1.39						10 # RVP 400 EP GASOLINE	11.830	0.7820	4240	
									RECOVERED OIL	0.321	45.07	2.979		6.987	0.462	GAS OIL	0.690	0.0456	247	
									TOTAL OIL		95.95	6.343		17.570	1.162	FUEL OIL	0.688	0.0455	247	
									WATER SOLUBLE CHEMICALS	0.290	15.38	1.017		1.931	0.128	POLY TAR	0.337	0.0223	121	
									TOTAL LIQUID PRODUCTS C_3+		111.33	7.360		19.501	1.290	TOTAL	13.545	0.8954	4855	
									WET WATER	5.974	107.62	7.114		12.920		W. S. CHEM.	1.931	0.1277	692	
									GROSS WATER		123.00	8.131		14.851		TOTAL	15.476	1.0231	5547	
									HYDROCARBON TOTAL—C_1+		148.96	9.847							

Weight Recovery, % 93.56	Catalyst Age, hrs.	Space Velocity, vhv 1118
Pressure, psig 413	Inlet Velocity, Ft/sec 0.99	Catalyst Vol CF 13.53
Temperature, °F 654	Bed Depth, Ft 20.50	Weight, # 1881
Recycle Ratio 1.07	Bed Density, #/CF 139	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
62.55	88.89	74.97	80.24	67.55	43.79	51.36	74.7%

Form ML—11

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-0
HOURS 290-314

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE			
Oxygen	441	Fresh Feed	15536	° API	51.1	10.8	In Reactor at Start of Period		Screen Analysis			Sedimentation
Natural Gas	436	Recycle	16550	Neut. No.	50.0	38.4	Fresh Catalyst Added	0	Mesh	Microns	%	Microns %
Generator Outlet	418	Combined Feed	32086	Sap. No.	67.5	42.8	Total		On 40	419+		80+
Reactor Inlet	413	Wet Gas—Measured	5261	Hydrox. No.			Catalyst Recovered	14	100	150		40—80
Condenser Inlet		Adjusted	5817	Bromine No.	80		In Reactor at End of Period		150	105		20—40
Product Accumulator	369	Loss	556	Pour °F.					200	74		10—20
				Chemicals, % by K_2CO_3		13.0	REACTOR d-p, Inches H_2O		250	62		0—20
							No. Height		325	44		
TEMPERATURES—°F.		Recycle/Fresh Feed	1.07				0 See Per. A	48	<325			
Oxygen	475	Inlet Velocity—ft./sec.	0.99				1	66	CATALYST			
Natural Gas	776	Fresh Feed Rate—S.C.F.H.	15127	HEMPEL. DIST. %		°API	2	74	Bulk Density, Lbs./Cu.Ft.			
Generator	2300	per Cu. Ft. Dense Bed	1118	205 °F.			3	70	Aerated			
Quench Accumulator	184	per Lb. Catalyst	8.04	400	79.6	52.0	4	290	Settled			
Reactor Inlet	317	per sq ft	22920	400-550	10.8	35.0	Total	548	Compacted			
Condenser Inlet	589			550+	9.6				Particle Density, gm./cc.			
Product Accumulator	89						CALCULATED FROM dp		NH_3 Value, ml./gm.			
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	139	N_2 Surface, m^2/gm.			
1 See Per.A	--			Naphtha °F.			Inventory, Lbs.	1881				
2	653			IBP	110		Bed Depth, Ft.	20.50	CHEMICAL ANALYSIS			
3	648			10%	144		Vol cu ft	13.53	Fe			
4	658			50%	224				C			
5	656			90%	334				O			
6	658			EP	392				H			
7	655			Rec	97.5				K_2O, W+, % basis Fe			
8	649								X-Ray Analysis—			
9	641								$Fe_{20}C_9$			
10	638								Fe_3O_4			
11	612								Fe			

RUN NO. 64-P
HOURS 314-338
CATALYST MS Reduced at Montebello

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
					At Wt. Balance							CONDENSATE								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	36.780	14.926	418.08	10.490	1.659	46.47	4.611	19.537	6.270	-13.267	-371.61						CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
H_2 2.016	60.087	24.384	49.16	42.327	6.693	13.49	18.607	42.991	25.300	-17.691	-35.67					400 EP	83.0	5.739	98.0	5.624
CO_2 44.010	2.633	1.068	47.00	27.877	4.408	194.00	12.255	13.323	16.663	3.340	147.00	9.854				400-550	9.0	0.622	91.4	0.569
N_2 28.016	0.187	0.076	2.13	1.420	0.225	6.30	0.624	0.700	0.849							550 +	8.0	0.553	114.6	0.634
CH_4 16.042	0.313	0.127	2.04	7.853	1.242	19.92	3.452	3.579	4.694	1.115	17.88	1.199								
C_2H_4 28.052				2.103	0.333	9.34	0.924	0.924	1.257	0.333	9.34	0.626					RECOVERY %	#/hr	gal/hr	
C_3H_6 30.068				1.477	0.234	7.04	0.649	0.649	0.883	0.234	7.04	0.472				PROPYLENE	36.0	6.210		
C_1+C_2											34.26	2.297				C_3 POLY GASO.	87.5	5.434	0.909	
C_2H_2 42.078				2.590	0.410	17.25	1.139	1.139	1.549	0.410	17.25	1.156	4.32	3.993	0.268	C_3 POLY TAR	12.5	0.776	0.103	
C_3H_8 44.094				0.237	0.037	1.63	0.104	0.104	0.141	0.037	1.63	0.109	4.24	0.384	0.026					
C_4H_8 56.104				1.953	0.309	17.34	0.859	0.859	1.168	0.309	17.34	1.162	5.00	3.468	0.232		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.593	0.094	5.46	0.261	0.261	0.355	0.094	5.46	0.366	4.86	1.123	0.075	C_4H_8	5.00	--	--	68.0
C_5H_{10} 70.130				0.693	0.110	7.71	0.305	0.305	0.415	0.110	7.71	0.517	5.45	1.415	0.095	C_4 POLY GASO.	5.98	15.17	2.537	1.5
C_6H_{12} 72.146				0.187	0.030	2.16	0.082	0.082	0.112	0.030	2.16	0.145	5.25	0.411	0.028	C_4H_{10}	4.86	(5.46) 4.92	(1.123) 1.012	68.0
C_8H_{17} 84.156				0.200	0.032	2.69	0.088	0.088	0.120	0.032	2.69	0.180	5.54	0.486	0.033	C_4 FREE GASO.			8.845	5.8
C_5-C_8											54.24	3.636		11.280	0.756	C_4 POLY TAR	7.53	2.17	0.288	
TOTAL		40.581	518.41	[illegible]	15.812	350.65	43.960	84.541	66.562											
H_2+CO		39.310	14918 SCFH		8.352		23.218	62.528	31.570	-30.958							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.63	Factor 670331		4.04		4.04	2.20	4.04	1.33						10 # RVP 400 EP GASOLINE	12.394	0.8308	4504	
Weight Recovery, % 92.76		Catalyst Age, hrs.		Space Velocity, vhv 1113		RECOVERED OIL		0.315	44.15	2.960		6.914	0.463	GAS OIL	0.569	0.0381	207	
Pressure, psig 413		Inlet Velocity, Ft/sec 0.99		Catalyst Vol CF 13.40		TOTAL OIL			98.39	6.595		18.194	1.219	FUEL OIL	0.634	0.0425	230	
Temperature, °F 656		Bed Depth, Ft 20.30		Weight, # 1836		WATER SOLUBLE CHEMICALS		0.301	15.99	1.072		2.016	0.135	POLY TAR	0.391	0.0262	142	
Recycle Ratio 1.08		Bed Density, #/CF 137		Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =		TOTAL LIQUID PRODUCTS C_3+			114.38	7.667		20.210	1.354	TOTAL	13.988	0.9376	5083	
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %		SELECTIVITY	NET WATER	5.974	107.62	7.214		12.920	0.866	W. S. CHEM.	2.015	0.1351	732	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3 + /C_1 +	GROSS WATER		123.61	8.286		14.936	1.001	TOTAL	16.003	1.0727	5815	
61.04	88.89	72.55	78.75	67.91	41.15	49.51	76.95	HYDROCARBON TOTAL—C_1+		148.64	9.964									

Form ML—11

g/NCM = 16.91 × #/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-P
HOURS 314-338

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA				
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE		
Oxygen	442	Fresh Feed	15400	°API	53.0	10.9	In Reactor at Start of Period		Screen Analysis		Sedimentation
Natural Gas	437	Recycle	16683	Neut. No.	53.5	37.8	Fresh Catalyst Added	0	Mesh / Microns / %		Microns / %
Generator Outlet	418	Combined Feed	32083	Sap. No.	66.9	41.5	Total		On 40 / 419+		80+
Reactor Inlet	413	Wet Gas—Measured	5358	Hydrox. No.			Catalyst Recovered	15	100 / 150		40—80
Condenser Inlet		Adjusted	6000	Bromine No.	87		In Reactor at End of Period		150 / 105		20—40
Product Accumulator	369	Loss	642	Pour °F.					200 / 74		10—20
				Chemicals, % by K_2CO_3		13.5	REACTOR d-p, Inches H_2O		250 / 62		0—20
							No. Height		325 / 44		
TEMPERATURES—°F.		Recycle/Fresh Feed	1.08				0 See Per. A	47	<325		
Oxygen	463	Inlet Velocity—ft./sec.	0.99				1	65	CATALYST		
Natural Gas	783	Fresh Feed Rate—S.C.F.H.	14918	HEMPEL, DIST. %		°API	2	74	Bulk Density, Lbs./Cu.Ft.		
Generator	2324	per Cu.Ft. Dense Bed	1113	205 °F.			3	69	Aerated		
Quench Accumulator	180	per Lb. Catalyst	8.13	400	82.0	53.8	4	280	Settled		
Reactor Inlet	319	per sq ft	22603	400-550	9.0	34.4	Total	535	Compacted		
Condenser Inlet	591			550+	9.0				Particle Density, gm./cc.		
Product Accumulator	90						CALCULATED FROM dp		NH_3 Value, ml./gm.		
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	137	N_2 Surface, m^2/gm.		
1 See Per. A	---			Naphtha °F.			Inventory, Lbs.	1836			
2	655			IBP	110		Bed Depth, Ft.	20.30	CHEMICAL ANALYSIS		
3	648			10%	134		Vol Cu. Ft	13.40	Fe		
4	658			50%	214				C		
5	657			90%	334				O		
6	658			EP	394				H		
7	657			Rec.	97.0				K_2O, W+, % basis Fe		
8	651								X-Ray Analysis—		
9	642								$Fe_{2.2}C_9$		
10	639								Fe_3O_4		
11	612								Fe		

RUN NO. 64-Q
HOURS 338-362
CATALYST MS Reduced at Montebello

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
CO 28.010	37.200	15.294	428.39	10.380	1.661	46.51	4.560	19.854	6.221	-13.633	381.88									
H_2 2.016	60.194	24.748	49.89	42.264	6.762	13.63	18.568	43.316	25.330	-17.986	-36.26					400 EP	82.6	5.760	98.0	5.645
CO_2 44.010	2.333	0.959	42.21	28.347	4.536	199.60	12.453	13.412	16.989	3.577	157.39	10.358				400-550	10.4	0.725	91.4	0.663
N_2 28.016	0.110	0.045	1.26	0.950	0.152	4.26	0.417	0.462	0.569							550 +	7.0	0.488	114.6	0.559
CH_4 16.042	0.163	0.067	1.08	7.930	1.269	20.36	3.484	3.551	4.753	1.202	19.28	1.269								
C_2H_4 28.052				2.190	0.350	9.82	0.962	0.962	1.312	0.350	9.82	0.646					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.730	0.277	8.33	0.760	0.760	1.037	0.277	8.33	0.548				PROPYLENE	36.2	6.57		
C_1+C_2											37.43	2.462				C_3 POLY GASO.	87.5	5.75	0.962	
C_3H_6 42.078				2.693	0.431	18.14	1.183	1.183	1.614	0.431	18.14	1.194	4.32	4.199	0.276	C_3 POLY TAR	12.5	0.82	0.109	
C_3H_8 44.094				0.333	0.053	2.34	0.146	0.146	0.199	0.053	2.34	0.154	4.24	0.552	0.036					
C_4H_8 56.104				1.613	0.258	14.47	0.709	0.709	0.967	0.258	14.47	0.952	5.00	2.894	0.190		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.550	0.088	5.11	0.242	0.242	0.330	0.088	5.11	0.336	4.86	1.051	0.069	C_4H_8	5.00	--	--	68.0
C_5H_{10} 70.130				0.697	0.112	7.85	0.306	0.306	0.418	0.112	7.85	0.517	5.45	1.440	0.095	C_5 POLY GASO.	5.98	12.66	2.117	1.5
C_5H_{12} 72.146				0.123	0.020	1.44	0.054	0.054	0.074	0.020	1.44	0.095	5.25	0.274	0.018	C_4H_{10}	4.86	(5.11) 4.61	(1.051) 0.948	68.0
C_6H_{12} 84.156				0.200	0.032	2.69	0.088	0.088	0.120	0.032	2.69	0.177	5.54	0.486	0.032	C_4-FREE GASO.			8.807	5.8
C_3-C_6											52.04	3.425		10.896	0.716	C_4 POLY TAR	7.53	1.81	0.240	
TOTAL		41.113	522.83		16.001	354.55	43.932	85.045	66.542											
H_2+CO	97.394	40.042	15195 SCFH		8.423		23.128	63.170	31.551	-31.619								gal/hr	gal/MCF	Bbl/Day
H_2/CO		1.62	Factor 658111		4.07		4.07	2.18	4.07	1.32						10 # RVP 400 EP GASOLINE	11.872	0.7813	4236	
																GAS OIL	0.663	0.0436	236	
																FUEL OIL	0.559	0.0368	200	
																POLY TAR	0.349	0.0230	125	
																TOTAL	13.443	0.8847	4797	
																W. S. CHEM.	1.939	0.1276	692	
																TOTAL	15.382	1.0123	5489	

Weight Recovery, % 92.73	Catalyst Age, hrs.	Space Velocity, vhv 1109	RECOVERED OIL	0.320	44.83	2.950		6.973	0.459
Pressure, psig 413	Inlet Velocity, Ft/sec 1.00	Catalyst Vol CF 13.70	TOTAL OIL		96.87	6.375		17.869	1.175
Temperature, °F 659	Bed Depth, Ft 20.75	Weight, # 1822	WATER SOLUBLE CHEMICALS	0.289	15.35	1.010		1.939	0.128
Recycle Ratio 1.07	Bed Density, #/CF 133	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	TOTAL LIQUID PRODUCTS C_3+		112.22	7.385		19.808	1.303
			NET WATER	6.000	108.10	7.114		12.977	0.854
			GROSS WATER		123.45	8.124		14.916	0.982
			HYDROCARBON TOTAL—C_1+		149.65	9.848			

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
61.08	89.14	72.68	78.96	68.67	41.52	50.05	74.99

Form ML—11

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-Q
HOURS 338-362

OPERATING CONDITIONS		RATES S.C.F.H.	
PRESSURES PSIG			
Oxygen	443	Fresh Feed	15602
Natural Gas	438	Recycle	16672
Generator Outlet	418	Combined Feed	-32.274
Reactor Inlet	413	Wet Gas—Measured	5421
Condenser Inlet		Adjusted	6072
Product Accumulator	369	Loss	651
TEMPERATURES—°F.		Recycle/Fresh Feed	1.07
Oxygen	474	Inlet Velocity—ft./sec.	1.00
Natural Gas	779	Fresh Feed Rate—S.C.F.H.	15195
Generator	2354	per Cu. Ft. Dense Bed	1109
Quench Accumulator	180	per Lb. Catalyst	8.34
Reactor Inlet	320	per sq ft	23023
Condenser Inlet	596		
Product Accumulator	91		
Catalyst No. Height			
1 See Per. A	--		
2	659		
3	650		
4	660		
5	661		
6	664		
7	661		
8	656		
9	648		
10	643		
11	617		

PRODUCT TESTS	OIL	WATER
° API	51.7	10.9
Neut. No.	54.6	3913
Sap. No.	68.5	41.7
Hydrox. No.		
Bromine No.	89	
Pour °F.		
Chemicals, % by K_2CO_3		13.0
HEMPEL, DIST. %		°API
205 °F.		
400	81.6	53.6
400-550	10.4	34.0
550+	8.0	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	100	
10%	136	
50%	218	
90%	364	
EP	400	
Rec.	97.0	

CATALYST DATA		PARTICLE SIZE				
INVENTORY DATA		Screen Analysis			Sedimentation	
In Reactor at Start of Period		Mesh	Microns	%	Microns	%
Fresh Catalyst Added		On 40	419+		80+	
Total		100	150		40—80	
Catalyst Recovered	26	150	105		20—40	
In Reactor at End of Period		200	74		10—20	
		250	62		0—20	
REACTOR d-p, Inches H_2O		325	44			
No. Height		<325				
0 See Per.A	46	CATALYST				
1	64	Bulk Density, Lbs./Cu.Ft.				
2	72	Aerated				
3	66	Settled				
4	283	Compacted				
Total	531	Particle Density, gm./cc.				
		NH_3 Value, ml./gm.				
CALCULATED FROM dp		N_2 Surface, m^2/gm.				
Density, Lbs./Cu.Ft.	133					
Inventory, Lbs.	1822					
Bed Depth, Ft.	20.75	CHEMICAL ANALYSIS				
Vol Cu. Ft.	13.70	Fe				
		C				
		O				
		H				
		K_2O, W+, % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

RUN NO. 64-R
HOURS 362-386
CATALYST MS Reduced at Montebello

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED				
					At Wt. Balance							CONDENSATE				
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*
CO 28.010	36.887	15.266	427.61	10.316	1.678	47.00	4.561	19.827	6.239	-13.588	-380.61					
H_2 2.016	60.260	24.940	50.28	42.540	6.918	13.95	18.809	43.749	25.727	-18.022	-36.33					400 EP
CO_2 44.010	2.380	0.985	43.35	27.703	4.505	198.22	12.249	13.234	16.754	3.520	154.87	10.150				400-550
N_2 28.016	0.230	0.095	2.66	1.117	0.182	5.10	0.494	0.589	0.676							550 +
CH_4 16.042	0.243	0.101	1.62	8.113	1.320	21.18	3.587	3.688	4.907	1.219	19.56	1.282				
C_2H_4 28.052				2.217	0.361	10.13	0.980	0.980	1.341	0.361	10.13	0.664				
C_2H_6 30.068				1.690	0.275	8.27	0.747	0.747	1.022	0.275	8.27	0.542				PROPYLENE
C_1+C_2											37.96	2.488				C_3 POLY GASO.
C_3H_6 42.078				2.680	0.436	18.35	1.185	1.185	1.621	0.436	18.35	1.203	4.32	4.248	0.278	C_3 POLY TAR
C_3H_8 44.094				0.303	0.049	2.16	0.134	0.134	0.183	0.049	2.16	0.142	4.24	0.509	0.033	
C_4H_8 56.104				1.657	0.270	15.15	0.733	0.733	1.003	0.270	15.15	0.993	5.00	3.030	0.199	
C_4H_{10} 58.120				0.517	0.084	4.88	0.229	0.229	0.313	0.084	4.88	0.320	4.86	1.004	0.066	C_4H_8
C_5H_{10} 70.130				0.723	0.118	8.28	0.320	0.320	0.438	0.118	8.28	0.543	5.45	1.519	0.100	C_5 POLY GASO.
C_5H_{12} 72.146				0.167	0.027	1.95	0.074	0.074	0.101	0.027	1.95	0.128	5.25	0.371	0.024	C_4H_{10}
C_6H_{12} 84.156				0.257	0.042	3.53	0.114	0.114	0.156	0.042	3.53	0.231	5.54	0.637	0.042	C_4-FREE GASO.
C_3-C_6											58.30	3.560		11.318	0.742	C_4 POLY TAR
TOTAL		41.387	525.52		16.265	358.15	44.216	85.603	67.042							
H_2+CO	97.147	40.206	15258 SCFH		8.596		23.370	63.576	31.966	-31.710						
H_2/CO		1.63	Factor 655393		4.12		4.12	2.21	4.12	1.33						10 # RVP 400 EP GASOLINE
Weight Recovery, % 92.30			Catalyst Age, hrs.			Space Velocity, vhv 1107			RECOVERED OIL	0.324	45.38	2.974		7.023	0.460	GAS OIL
Pressure, psig 414			Inlet Velocity, Ft/sec 1.01			Catalyst VolCF 13.78			TOTAL OIL		99.68	6.534		18.341	1.202	FUEL OIL
Temperature, °F 661			Bed Depth, Ft 20.88			Weight, # 1792			WATER SOLUBLE CHEMICALS	0.274	14.56	0.954		1.843	0.121	POLY TAR
Recycle Ratio 1.07			Bed Density, #/CF 130			Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ =			TOTAL LIQUID PRODUCTS C_5+		114.24	7.488		20.184	1.323	TOTAL
									WET WATER	5.963	107.43	7.041		12.897	0.845	W. S. CHEM.
									GROSS WATER		121.99	7.995		14.740	0.966	TOTAL
									HYDROCARBON TOTAL—C_1+		152.20	9.976				

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
60.70	89.01	72.26	78.87	68.53	41.19	49.88	75.06

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	84.5	5.934	98.0	5.815
400-550	7.0	0.492	91.4	0.450
550 +	8.5	0.597	114.6	0.684

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	35.7	6.55		
C_3 POLY GASO.	87.5	5.73	0.958	
C_3 POLY TAR	12.5	0.82	0.109	

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	--	--	68.0
C_5 POLY GASO.	5.98	13.26	2.217	1.5
C_4H_{10}	4.86	(4.88) 4.85	(1.004) 0.998	68.0
C_4-FREE GASO.			9.300	5.8
C_4 POLY TAR	7.53	1.89	0.251	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	12.515	0.8202	4447
GAS OIL	0.450	0.0293	160
FUEL OIL	0.684	0.0448	243
POLY TAR	0.360	0.0236	128
TOTAL	14.009	0.9181	4978
W. S. CHEM.	1.843	0.1208	655
TOTAL	15.852	1.0389	5633

Form ML—11

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-R
HOURS 362-386

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA		PARTICLE SIZE					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA							
Oxygen	444	Fresh Feed	15706	°API	50.8	10.9	In Reactor at Start of Period		Screen Analysis			Sedimentation		
Natural Gas	437	Recycle	16780	Neut. No.			Fresh Catalyst Added		Mesh	Microns	%	Microns	%	
Generator Outlet	418	Combined Feed	32486	Sap. No.			Total		On 40	419+		80+		
Reactor Inlet	414	Wet Gas—Measured	5475	Hydrox. No.			Catalyst Recovered	29	100	150		40—80		
Condenser Inlet		Adjusted	6173	Bromine No.			In Reactor at End of Period		150	105		20—40		
Product Accumulator	370	Loss	698	Pour °F.	below -30				200	74		10—20		
				Chemicals, % by K_2CO_3		12.5	REACTOR d-p, Inches H_2O		250	62		0—20		
							No. Height		325	44				
TEMPERATURES—°F.		Recycle/Fresh Feed	1.07				0 See Per. A	45	<325					
Oxygen	456	Inlet Velocity—ft./sec.	1.01				1	63	CATALYST					
Natural Gas	780	Fresh Feed Rate—S.C.F.H.	15258	HEMPEL, DIST. %		°API	2	70	Bulk Density, Lbs./Cu.Ft.					
Generator	2360	per Cu. Ft. Dense Bed	1107	205 °F.			3	64	Aerated					
Quench Accumulator	170	per Lb. Catalyst	8.51	400	83.5	53.8	4	280	Settled					
Reactor Inlet	316	per sq ft	23118	400-550	7.0	33.7	Total	522	Compacted					
Condenser Inlet	598			550+	9.5				Particle Density, gm./cc.					
Product Accumulator	88						CALCULATED FROM dp		NH_3 Value, ml./gm.					
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	130	N_2 Surface, m^2/gm.					
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	1792						
2	661			IBP	100		Bed Depth, Ft.	20.88	CHEMICAL ANALYSIS					
3	652			10%	136		Vol. Cu. Ft.	13.78	Fe					
4	661			50%	225				C					
5	662			90%	346				O					
6	665			EP	400				H					
7	663			Rec.	97.0				K_2O, W+, % basis Fe					
8	658								X-Ray Analysis—					
9	651								$Fe_{20}C_9$					
10	646								Fe_3O_4					
11	620								Fe					

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-A
HOURS 0-10

Basis Generator Carbon Balance

	GAS ANALYSES			
HOUR	0200	0600		AVERAGE
FRESH FEED				
$CO_{28.010}$	37.15	36.37		36.760
$H_{2\ 2.016}$	59.23	60.14		59.685
$CO_{2\ 44.010}$	2.32	2.16		2.240
$N_{2\ 28.016}$	0.20	0.16		0.180
$CH_{4\ 16.042}$	1.10	1.17		1.135
			M. W	12.718055
			H_2O 18.016	
			BALANCE	
WET GAS				
$CO_{28.010}$	8.83	8.40		8.615
$H_{2\ 2.016}$	43.95	43.04		43.495
$CO_{2\ 44.010}$	27.16	27.53		27.345
$N_{2\ 28.016}$	1.55	1.72		1.635
$CH_{4\ 16.042}$	9.48	9.94		9.710
$C_2H_{4\ 28.052}$	2.12	2.22		2.170
$C_2H_{6\ 30.068}$	1.36	1.36		1.360
$C_3H_{6\ 42.078}$	2.21	2.21		2.210
$C_3H_{8\ 44.094}$	0.24	0.25		0.245
$C_4H_{8\ 56.104}$	1.50	1.55		1.525
$C_4H_{10\ 58.120}$	0.52	0.60		0.560
$C_5H_{10\ 70.130}$	0.69	0.77		0.730
$C_5H_{12\ 72.146}$	0.17	0.18		0.175
$C_6H_{12\ 84.156}$	0.22	0.23		0.225
			M. W.	21.404416

GENERATOR BALANCE

M/HR	C	H	O		Mol %	M/Hr	C	H	O
				$O_{2\ 32.000}$	0.25	10.332 0.033			20.730
14.724	14.724		14.724	$CO_{2\ 44.010}$	1.19	0.158	0.158		0.316
23.907		47.814		$N_{2\ 28.016}$	2.56	0.339			
0.897	0.897		1.794	$CH_{4\ 16.042}$	81.46	10.786	10.786	43.144	
0.072				$C_2H_{6\ 30.068}$	7.32	0.969	1.938	5.814	
0.455	0.455	1.820		$C_3H_{8\ 44.094}$	5.27	0.698	2.094	5.584	
		7.626	4.528	$C_4H_{10\ 58.120}$	1.43	0.189	0.756	1.890	
		8.342	4.171	$C_5H_{12\ 72.146}$	0.52	0.069	0.345	0.828	
	16.853	57.976	20.689		20.119748				
	100.00	101.25	98.30	TOTAL			16.077	57.260	21.046

GAS FLOW RATES

	$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED 79.31	6.400	415.8 20.748	57 1.0029	2276291 1.5087	15201 15935	40.055 41.989
WET GAS 158.44	7.340	1.53 4.029	58 1.0019	1352524 1.1630	5460	14.387
RECYCLE 79.31	8.510	415.0 20.729	101 0.9628	1.1630	15666	41.281
BLEED 5.02	7.930	20.729	1.0000	1.1630	960	2.530
NATURAL GAS 28.43	7.750	435.7 21.223	188 0.8958	1438884 1.1995	5025	13.241
OXYGEN 27.07	6.760	440.1 21.326	55 1.0048		3921	10.332
STEAM 215.7	5.963					

WEIGHT BALANCE

	#/hr Measured	At Wt. Balance
WET GAS	307.95	304.23
OIL	61.73	61.73
WATER	143.46	143.46
TOTAL	513.14	509.42
FRESH FEED	509.42	
WEIGHT BALANCE	100.73	
WET GAS FACTOR	0.98792	
INDICATED LOSS—S C F H		

LIQUID PRODUCT RATES Basis 6 hours

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL/HR
OIL	2'3-3/4	123.13	54	1.0030	123.50	51.4 6.441		
	1'4"	69.39	59	1.0005	69.42	"		
					43.42		422.00	61.73
					57.50		370.36	9.583
Basis 8 hours								
WATER	6'2½"	328.58	64	0.99963	328.46	10.8 8.282		
	3'6½"	190.00	66	0.99942	189.89	"		143.46
					138.57		1147.64	17.321

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-B
HOURS 10-34

Basis Generator Carbon Balance

	GAS ANALYSES			
HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
$CO_{28.010}$	37.00	36.89	37.91	37.267
$H_{2\ 2.016}$	60.00	60.46	59.40	59.953
$CO_{2\ 44.010}$	1.96	2.21	2.32	2.163
$N_{2\ 28.016}$	0.18	0.15	0.15	0.160
$CH_{4\ 16.042}$	0.86	0.29	0.22	0.457
			M. W	12.7172
			H_2O 18.016	
			BALANCE	
WET GAS				
$CO_{28.010}$	7.01	6.74	6.98	6.910
$H_{2\ 2.016}$	39.63	37.88	38.01	38.507
$CO_{2\ 44.010}$	30.21	30.71	31.68	30.867
$N_{2\ 28.016}$	1.64	2.00	2.05	1.897
$CH_{4\ 16.042}$	10.82	10.35	9.71	10.293
$C_2H_{4\ 28.052}$	2.46	2.26	2.44	2.387
$C_2H_{6\ 30.068}$	1.63	1.81	1.76	1.733
$C_3H_{6\ 42.078}$	2.55	2.95	2.91	2.803
$C_3H_{8\ 44.094}$	0.28	0.28	0.33	0.297
$C_4H_{8\ 56.104}$	1.89	2.29	2.10	2.093
$C_4H_{10\ 58.120}$	0.57	0.83	0.67	0.690
$C_5H_{10\ 70.130}$	0.88	1.16	0.93	0.990
$C_5H_{12\ 72.146}$	0.17	0.36	0.17	2.333
$C_6H_{12\ 84.156}$	0.26	0.38	0.26	0.300
			M. W.	23.67025

GENERATOR BALANCE

M/HR	C	H	O		Mol %	M/Hr	C	H	O
				$O_{2\ 32.000}$	0.28	10.690 0.037			21.454
14.790	14.790		14.790	$CO_{2\ 44.010}$	1.56	0.205	0.205		0.410
23.792		47.584		$N_{2\ 28.016}$	3.37	0.442			
0.858	0.858		1.716	$CH_{4\ 16.042}$	80.49	10.550	10.550	42.200	
0.063				$C_2H_{6\ 30.068}$	6.96	0.912	1.824	5.472	
0.181	0.181	0.724		$C_3H_{8\ 44.094}$	5.20	0.682	2.046	5.456	
				$C_4H_{10\ 58.120}$	1.54	0.202	0.808	2.020	
		9.117	4.559	$C_5H_{12\ 72.146}$	0.60	0.079	0.395	0.948	
39.684	15.828	102.85	21.065	MW	20.346046				
	100.00	102.85	96.345	TOTAL			15.828	56.096	21.864

GAS FLOW RATES

	$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED 79.31	6.558	414.5 20.717	67 0.9933	2276442 1.5088	15060	39.684
WET GAS 158.44	6.900	1.65 4.044	66 0.9943	1223054 1.1059	4861	12.809
RECYCLE 79.31	8.513	415.5 20.741	109 0.9560	1.1059	14805	39.012
BLEED 5.02	8.513	20.741	1.0000	1.1059	980	2.582
NATURAL GAS 28.43	7.708	436.0 21.230	187 0.8965	1422880 1.1928	4975	13.109
OXYGEN 27.07	7.071	441.5 21.359	68 0.9924	--	4057	10.690
STEAM 215.7	6.121	30.9 0.2951		390#/hr		

WEIGHT BALANCE

	#/hr Measured	At Wt. Balance
WET GAS	303.19	304.08
OIL	59.64	59.64
WATER	140.95	140.95
TOTAL	503.78	504.67
FRESH FEED	504.67	
WEIGHT BALANCE	99.82	
WET GAS FACTOR	100.293	
INDICATED LOSS—S C F H	14	
	4875	

LIQUID PRODUCT RATES

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL/HR
OIL	6'4"	336.22	55	1.0025	337.06	50.5		
	2'3-3/4	123.13	54	1.0030	123.50	6.473		
					+ 7.57		449.00	59.64
					221.13		1431.37	9.214
WATER	7'1-3/4	378.77	65	0.99953	378.59	10.8		
	6'2½"	328.58	64	0.99963	328.46	8.282		
	7'1½"	377.68	52	0.99872	377.20			
	1'4½"	71.58	60	1.00000	71.58			
	2'1-3/4	113.46	67	0.99932	113.38			
	1'2"	60.66	54	1.00047	60.69			140.95
					408.44		3382.70	17.018

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-C
HOURS 34-58

	GAS ANALYSES			
HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	37.42	37.41	37.25	37.360
H_2 2.016	59.78	59.92	60.16	59.953
CO_2 44.010	2.25	2.35	2.32	2.307
N_2 28.016	0.31	0.19	0.19	0.230
CH_4 16.042	0.24	0.13	0.08	0.150
			M. W	12.776999
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	7.09	7.24	7.33	7.220
H_2 2.016	37.79	35.77	37.92	37.160
CO_2 44.010	31.87	32.92	32.32	32.370
N_2 28.016	2.06	1.92	2.00	1.993
CH_4 16.042	9.82	8.95	9.24	9.337
C_2H_4 28.052	2.39	2.47	2.29	2.383
C_2H_6 30.068	1.82	1.84	1.77	1.810
C_3H_6 42.078	2.74	3.28	2.43	2.817
C_3H_8 44.094	0.30	0.34	0.29	0.310
C_4H_8 56.104	2.04	2.61	1.97	2.207
C_4H_{10} 58.120	0.64	0.80	0.76	0.733
C_5H_{10} 70.130	0.92	1.24	1.05	1.070
C_5H_{12} 72.146	0.25	0.25	0.25	0.250
C_6H_{12} 84.156	0.27	0.37	0.38	0.340
			M. W.	24.489565

GENERATOR BALANCE										
M/HR	C	H	O		Mol %	M/Hr	C	H	O
				O_2 32.000	0.21	10.659 0.028			21.374
14.808	14.808		14.808	CO_2 44.010	1.27	0.167	0.167		0.334
23.762		47.524		N_2 28.016	3.21	0.422			
0.914	0.914		1.828	CH_4 16.042	81.43	10.710	10.710	42.840	
0.091				C_2H_6 30.068	6.79	0.893	1.786	5.358	
0.060	0.060	0.240		C_3H_8 44.094	5.14	0.676	2.028	5.408	
		8.536	6.900	C_4H_{10} 58.120	1.44	0.189	0.756	1.890	
5.584		11.168	5.584	C_5H_{12} 72.146	0.51	0.067	0.335	0.804	
45.219	15.782	58.932	22.220	MW	20.101363				
	100.00	104.67	102.36	TOTAL			15.782	56.300	21.708

WEIGHT BALANCE		
	#/hr Measured	At Wt. Balance
WET GAS	306.46	304.54
OIL	62.92	62.92
WATER	138.96	138.96
TOTAL	508.34	506.42
FRESH FEED	506.42	
WEIGHT BALANCE	100.38	
WET GAS FACTOR	993734	
INDICATED LOSS—S C F H	-30	

GAS FLOW RATES							
	$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED 79.31	6.571	415.0 20.729	67 0.9933	2265790 1.5053	(15,041) 16153	(39.635) 42.564
WET GAS 158.44	6.883	1.56 4.032	67 0.9933	1182136 1.0873	4749	12.514
RECYCLE 79.31	8.496	414.9 20.727	109 0.9560	1.0873	14517	38.253
BLEED 5.02	8.404	20.727	1.0000	1.0873	951	2.506
NATURAL GAS 28.43	7.700	436.4 21.239	190 0.8944	1440200 1.2001	4991	13.152
OXYGEN 27.07	7.038	442.9 21.392	68 0.9924		4045	10.659
STEAM 215.7	6.171	30.2				

LIQUID PRODUCT RATES							
HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
OIL	7'12½"	382.05	58	1.0010	382.43	51.4		
	6'4"	336.22	55	1.0025	337.06	6.441		
	4'8⅝"	251.11	52	1.0039	252.09	"		
	1'2-¾	63.92	60	1.0000	63.92	"		
					+0.89		+5.75	62.92
					234.43		1509.96	9.768
WATER	7'1½"	377.68	78	0.99788	376.88	10.7		
	2'1-¾	113.46	67	0.99932	113.38	8.287		
	3'6-¾	191.09	68	0.99920	190.94	"		
	1'0"	52.00	58	1.00018	52.01	"		138.96
					402.43		3334.94	16.768

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-D
HOURS 58-82

Calculated by Carbon Balance

	GAS ANALYSES			
HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	36.55	36.88	36.47	36.633
H_2 2.016	60.53	60.08	60.38	60.330
CO_2 44.010	2.18	2.60	2.71	2.497
N_2 28.016	0.37	0.37	0.37	0.370
CH_4 16.042	0.37	0.07	0.07	0.170
			M. W	12.707016
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	7.23	7.98	7.75	7.653
H_2 2.016	38.78	38.70	36.53	38.003
CO_2 44.010	30.91	32.17	33.10	32.060
N_2 28.016	1.59	1.69	1.87	1.717
CH_4 16.042	9.52	8.84	8.43	8.930
C_2H_4 28.052	2.44	2.36	2.30	2.367
C_2H_6 30.068	1.83	1.78	1.83	1.813
C_3H_6 42.078	3.13	2.66	3.06	2.950
C_3H_8 44.094	0.39	0.27	0.29	0.317
C_4H_8 56.104	2.21	1.78	2.27	2.087
C_4H_{10} 58.120	0.56	0.56	1.00	0.707
C_5H_{10} 70.130	0.98	0.76	1.00	0.913
C_5H_{12} 72.146	0.17	0.24	0.25	0.220
C_6H_{12} 84.156	0.26	0.21	0.32	0.263
			M. W.	24.125277

GENERATOR BALANCE										
M/HR	C	H	O		Mol %	M/Hr	C	H	O
				O_2 32.000	0.21	10.690 0.028			21.436
14.700	14.700		14.700	CO_2 44.010	1.31	0.174	0.174		0.348
24.209		48.418		N_2 28.016	3.40	0.451			
1.002	1.002		2.004	CH_4 16.042	81.63	10.821	10.821	43.284	
0.148				C_2H_6 30.068	6.63	0.879	1.758	5.274	
0.068	0.068	0.272		C_3H_8 44.094	4.98	0.660	1.980	5.280	
				C_4H_{10} 58.120	1.38	0.183	0.732	1.830	
		8.935	4.468	C_5H_{12} 72.146	0.46	0.061	0.305	0.732	
	15.770	57.625	21.172		20.014677				
	100.00	102.17	97.19	TOTAL			15.770	56.400	21.784

WEIGHT BALANCE		
	#/hr Measured	At Wt. Balance
WET GAS	307.89	309.00
OIL	60.23	60.23
WATER	140.66	140.66
TOTAL	508.78	509.89
FRESH FEED	509.89	
WEIGHT BALANCE	99.78	
WET GAS FACTOR	1003605	
INDICATED LOSS—S C F H	17	
	4860	

GAS FLOW RATES							
	$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED 79.31	6.563	415.5 20.741	64 0.9962	2278268 1.5094	(15228) 16233	(40.127) 42.775
WET GAS 158.44	6.946	1.50 4.025	62 0.9981	1199986 1.0954	4843	12.762
RECYCLE 79.31	8.479	415.2 20.734	106 0.9585	1.0954	14639	38.574
BLEED 5.02	8.263	20.734	1.0000	1.0954	942	2.482
NATURAL GAS 28.43	7.700	436.8 21.249	182 0.9000	1446438 1.2017	5031	13.257
OXYGEN 27.07	7.042	444.4 21.426	67 0.9933	—	4057	10.690
STEAM 215.7	6.258	28.9				

LIQUID PRODUCT RATES							
HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
OIL	7'2"	379.86	64	0.9980	379.10	53.0		
	4'8½"	251.11	52	1.0039	252.09	6.385		
	2'9½"	149.62	49	1.0054	150.43			
	1'0"	52.00	60	1.0000	52.00		1445.44	
					+0.94		+6.00	60.23
					226.38			9.433
WATER	7'1"	375.50	79	0.99775	374.66	10.7		
	3'6-¾	191.09	68	0.99920	190.94	8.287		
	5'1-⅛	271.29	62	0.99982	271.24			
	0'11"	47.65	70	0.99896	47.60			140.66
					407.36		3375.79	16.973

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-E
HOURS 82-106

	GAS ANALYSES			
HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
$CO_{28.010}$	36.88	37.28	36.58	36.913
$H_{2\ 2.016}$	60.26	59.78	60.67	60.237
$CO_{2\ 44.010}$	2.15	2.51	2.47	2.377
$N_{2\ 28.016}$	0.15	0.37	0.20	0.240
$CH_{4\ 16.042}$	0.56	0.06	0.08	0.233
			M. W	12.70444
			H_2O 18.016	
			BALANCE	
WET GAS				
$CO_{28.010}$	8.18	8.75	9.26	8.730
$H_{2\ 2.016}$	40.04	39.80	39.44	39.760
$CO_{2\ 44.010}$	29.77	30.49	30.41	30.224
$N_{2\ 28.016}$	1.47	1.77	1.46	1.567
$CH_{4\ 16.042}$	9.35	8.59	8.44	8.794
$C_2H_{4\ 28.052}$	2.35	2.30	2.28	2.310
$C_2H_{6\ 30.068}$	1.72	1.75	1.76	1.743
$C_3H_{6\ 42.078}$	2.81	2.72	2.82	2.783
$C_3H_{8\ 44.094}$	0.34	0.24	0.27	0.283
$C_4H_{8\ 56.104}$	2.00	1.75	1.93	1.893
$C_4H_{10\ 58.120}$	0.55	0.65	0.66	0.620
$C_5H_{10\ 70.130}$	0.93	0.77	0.83	0.843
$C_5H_{12\ 72.146}$	0.21	0.21	0.21	0.210
$C_6H_{12\ 84.156}$	0.28	0.21	0.23	0.240
			M. W.	23.233134

GENERATOR BALANCE										
M/HR	C	H	O		Mol %	M/Hr	C	H	O	
				$O_{2\ 32.000}$	0.20	10.593 0.027			21.240	WET GAS
14.978	14.978		14.978	$CO_{2\ 44.010}$	1.36	0.180	0.180		0.360	OIL
24.442		48.884		$N_{2\ 28.016}$	2.15	0.285				WATER
0.965	0.965		1.930	$CH_{4\ 16.042}$	82.59	10.960	10.960	43.840		TOTAL
0.097				$C_2H_{6\ 30.068}$	6.66	0.884	1.768	5.304		FRESH FEED
0.095	0.095	0.380		$C_3H_{8\ 44.094}$	5.07	0.673	2.019	5.384		WEIGHT BALANCE
		8.006	4.692	$C_4H_{10\ 58.120}$	1.47	0.195	0.780	1.950		
		8.695	4.348	$C_5H_{12\ 72.146}$	0.50	0.066	0.330	0.792		WET GAS FACTOR
	16.038	57.959	21.256	MW	19.9671564					INDICATED LOSS—S C F H
	100.01	101.20	98.41	TOTAL			16.037	57.270	21.600	

WEIGHT BALANCE		
	#/hr Measured	At Wt. Balance
WET GAS	308.68	313.59
OIL	59.40	59.40
WATER	142.52	142.52
TOTAL	510.60	515.51
FRESH FEED	515.51	
WEIGHT BALANCE	99.05	
WET GAS FACTOR	1015906	
INDICATED LOSS—S C F H	80	
	5122	

GAS FLOW RATES							
	$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	
FRESH FEED		415.8	67	2278730	(15399)	(40.577)	
79.31	6.571	20.748	0.9933	1.5095	16212	42.719	
WET GAS		1.50	65	1246065			
158.44	7.117	4.025	0.9952	1.1163	5042	13.286	
RECYCLE		416.2	109				
79.31	8.504	20.758	0.9560	1.1163	14941	39.370	
BLEED							
5.02	8.271	20.758	1.0000	1.1163	962	2.535	
NATURAL GAS		435.0	182	1449880			
28.43	7.708	21.206	0.9000	1.2041	5036	13.270	
OXYGEN		444.3	71				
27.07	7.004	21.424	0.9896	--	4020	10.593	
STEAM		31.1					
215.7	6.125						

LIQUID PRODUCT RATES						
HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
OIL	7'0-1/8	371.68	56	1.0020	372.42	53.0		
	2'9½"	149.62	49	1.0054	150.43	6.385		
					+1.29		+8.25	59.40
					223.28		1425.64	9.303
WATER	7'1½"	377.68	70	0.99896	377.29	10.7		
	5'1-1/8	271.29	62	0.99982	271.24	8.287		
	7'5½"	395.14	69	0.99907	394.77			
	2'0"	105.19	66	0.99942	105.13			
	2'0"	105.19	63	0.99973	105.16			
	1'8½"	88.12	64	0.99963	88.09			142.52
					412.76		3420.54	17.198

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-F
HOURS 106-128

	GAS ANALYSES			
HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
$CO_{28.010}$	37.34	37.51	37.28	37.377
$H_{2\ 2.016}$	59.88	59.58	59.98	59.813
$CO_{2\ 44.010}$	2.32	2.70	2.60	2.540
$N_{2\ 28.016}$	0.20	0.16	0.06	0.140
$CH_{4\ 16.042}$	0.26	0.05	0.08	0.130
			M. W	12.85306
			H_2O 18.016	
			BALANCE	
WET GAS				
$CO_{28.010}$	9.77	9.86	9.85	9.827
$H_{2\ 2.016}$	40.60	38.94	39.46	39.666
$CO_{2\ 44.010}$	28.52	30.52	30.02	29.687
$N_{2\ 28.016}$	1.28	1.56	1.51	1.450
$CH_{4\ 16.042}$	9.02	7.93	8.22	8.390
$C_2H_{4\ 28.052}$	2.37	2.38	2.45	2.400
$C_2H_{6\ 30.068}$	1.82	1.76	1.70	1.760
$C_3H_{6\ 42.078}$	2.66	2.73	2.53	2.640
$C_3H_{8\ 44.094}$	0.31	0.28	0.32	0.303
$C_4H_{8\ 56.104}$	1.80	1.99	1.92	1.903
$C_4H_{10\ 58.120}$	0.54	0.60	0.52	0.553
$C_5H_{10\ 70.130}$	0.89	0.94	0.92	0.917
$C_5H_{12\ 72.146}$	0.14	0.22	0.29	0.217
$C_6H_{12\ 84.156}$	0.28	0.29	0.29	0.287
			M. W.	23.246762

GENERATOR BALANCE										
M/HR	C	H	O		Mol %	M/Hr	C	H	O	
				$O_{2\ 32.000}$	0.22	10.659 0.029			21.376	WET GAS
15.144	15.144		15.144	$CO_{2\ 44.010}$	1.46	0.192	0.192		0.384	OIL
24.234		48.468		$N_{2\ 28.016}$	1.22	0.161				WATER
1.029	1.029		2.058	$CH_{4\ 16.042}$	82.60	10.886	10.886	43.544		TOTAL
0.057				$C_2H_{4\ 28.052}$	7.09	0.934	1.868	5.604		FRESH FEED
0.053	0.053	0.212		$C_3H_{6\ 42.078}$	5.29	0.697	2.091	5.576		WEIGHT BALANCE
		8.978	4.558	$C_4H_{10\ 58.120}$	1.57	0.207	0.828	2.070		
		9.047	4.524	$C_5H_{12\ 72.146}$	0.55	0.072	0.360	0.864		WET GAS FACTOR
	16.226	57.727	21.726	MW	20.0791114					INDICATED LOSS—S C F H
	100.00	100.12	99.84	TOTAL			16.225	57.658	21.760	

WEIGHT BALANCE		
	#/hr Measured	At Wt. Balance
WET GAS	302.49	332.86
OIL	54.62	54.62
WATER	133.29	133.29
TOTAL	490.40	520.77
FRESH FEED	520.77	
WEIGHT BALANCE	94.17	
WET GAS FACTOR	1100400	
INDICATED LOSS—S C F H	496	
	5434	

GAS FLOW RATES							
	$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	
FRESH FEED		415.7	65	2252381	(15376)	(40.517)	
79.31	6.424	20.746	0.9952	1.5008	15787	41.599	
WET GAS		1.53	64	1245334			
158.44	6.959	4.029	0.9962	1.1159	4938	13.012	
RECYCLE		414.9	108				
79.31	8.438	20.727	0.9568	1.1159	14810	39.025	
BLEED							
5.02	8.500	20.727	1.0000	1.1159	987	2.601	
NATURAL GAS		434.7	184	1441796			
28.43	7.691	21.199	0.8986	1.2007	5001	13.178	
OXYGEN		441.8	65				
27.07	7.027	21.366	0.9952		4045	10.659	
STEAM		27.7					
215.7	6.359						

LIQUID PRODUCT RATES Basis 17 hours								
HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
OIL	5'2-3/4	278.39	53	1.0035	279.36	52.4		
	2'6½"	135.80	69	0.9956	135.20	6.406		
					+0.78		+5.00	54.62
					144.94		928.49	8.526
WATER	7'1½"	377.68	73	0.99858	377.14	10.8		
	3'4½"	181.27	73	0.99858	181.01	8.282		
	3'3½"	176.91	66	0.99942	176.81			
	1'10¾	99.44	69	0.99907	99.35			133.29
					273.59		2265.87	16.094

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-G
HOURS 128-141

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	1800		AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.14	10.569 0.018			21.174	WET GAS	303.18	330.47
CO 28.010	35.95	37.20		36.575	15.213	15.213		15.213	CO_2 44.010	1.26	0.165	0.165		0.330	OIL	54.64	54.64
H_2 2.016	61.32	60.40		60.860	25.314		50.628		N_2 28.016	1.32	0.173				WATER	136.23	136.23
CO_2 44.010	2.29	2.22		2.255	0.938	0.938		1.876	CH_4 16.042	81.74	10.732	10.732	42.928		TOTAL	494.05	521.34
N_2 28.016	0.26	0.08		0.170	0.071				C_2H_4 30.068	7.40	0.971	1.942	5.826		FRESH FEED	521.34	
CH_4 16.042	0.18	0.10		0.140	0.058	0.058	0.232		C_2H_6 44.094	5.78	0.759	2.277	6.072		WEIGHT BALANCE	94.77	
			M. W	12.534107			7.244	4.415	C_4H_{10} 58.120	1.68	0.221	0.884	2.210				
			H_2O 18.016				8.037	4.019	C_5H_{12} 72.146	0.68	0.089	0.445	1.068		WET GAS FACTOR	1090012	
						16.209	58.897	21.108	MW	20.322542					INDICATED LOSS—S C F H	445	
			BALANCE			98.56	101.36	98.16	TOTAL			16.445	58.104	21.504		5385	

WET GAS					GAS FLOW RATES											LIQUID PRODUCT RATES					Basis 13 hours
CO 28.010	9.17	9.15		9.160		$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	40.14	38.77		39.455	FRESH FEED		415.4	70	2309697			OIL	7'4"	388.59	60	1.0000	388.59	51.7		
CO_2 44.010	29.26	30.31		29.785	79.31	6.375	20.739	0.9905	1.5198	15785	41594		5'2-3/4	278.39	53	1.0035	279.36	6.430		
N_2 28.016	1.42	1.56		1.490			1.50	69	1242961								•1.24		•8.00	54.64
CH_4 16.042	8.93	8.70		8.815	WET GAS 158.44	7.008	4.025	0.9915	1.1149	4940	13.017						110.47		710.32	8.498
C_2H_4 28.052	2.39	2.40		2.395			414.2	111												
C_2H_6 33.068	1.64	1.70		1.670	RECYCLE 79.31	8.500	20.710	0.9543	1.1149	14854	39.141									
C_3H_8 42.078	3.01	3.10		3.055																
C_3H_8 44.094	0.34	0.27		0.305	BLEED 5.02	7.754	20.710	1.0000	1.1149	899	2.369	WATER	7'4½"	390.78	70	0.99896	390.37	10.6		
C_4H_8 56.104	1.90	2.03		1.965			435.4	181	1424526				3'3½"	176.91	66	0.99942	176.81	8.293		136.23
C_4H_{10} 58.120	0.63	0.66		0.645	NATURAL GAS 28.43	7.683	21.216	0.9007	1.1935	4982	13.128						213.56		1771.05	16.428
C_5H_{10} 70.130	0.81	0.90		0.855			442.8	71												
C_5H_{12} 72.146	0.18	0.18		0.180	OXYGEN 27.07	7.000	21.389	0.9896	--	4011	10.569									
C_6H_{12} 84.156	0.18	0.27		0.225			31.9													
			M. W.	23.291145	STEAM 215.7	6.308														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-H&I
HOURS 141-170

H		GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
0600	HOUR	I 1400	I 2200	I 0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
	FRESH FEED									O_2 32.000	0.205	10.896 0.027			21.846	WET GAS	306.17	349.56
37.16	CO 28.010	38.35	38.28	37.63	37.855	15.759	15.759		15.759	CO_2 44.010	1.370	0.180	0.180		0.360	OIL	53.93	53.93
60.02	H_2 2.016	58.89	59.02	59.53	59.365	24.714		49.428		N_2 28.016	1.220	0.161				WATER	136.30	136.30
2.62	CO_2 44.010	2.41	2.43	2.52	2.495	1.039	1.039		2.078	CH_4 16.042	82.345	10.842	10.842	43.368		TOTAL	496.40	539.79
0.14	N_2 28.016	0.20	0.17	0.24	0.187	0.078				C_2H_6 30.068	7.320	0.964	1.928	5.784		FRESH FEED	539.79	
0.06	CH_4 16.042	0.15	0.10	0.08	0.098	0.041	0.041	0.164		C_2H_6 44.094	5.205	0.685	2.055	5.480		WEIGHT BALANCE	91.96	
				M. W	12.966145					C_4H_{10} 58.120	1.600	0.211	0.844	2.110				
				H_2O 18.016				8.526	4.263	C_5H_{12} 72.146	0.735	0.097	0.485	1.164		WET GAS FACTOR	1141718	
						16.839	58.118	22.100	MW	20.17638						INDICATED LOSS—S C F H	688	
				BALANCE		103.09	100.37	99.52	TOTAL			16.334	57.906	22.206		5545		

0600	WET GAS					GAS FLOW RATES											LIQUID PRODUCT RATES					Basis 29 hours
9.48	CO 28.010	10.10	10.17	9.72	9.867		$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
35.13	H_2 2.016	39.56	38.56	40.10	38.337	FRESH FEED		415.5	62	2232737			OIL	6'4½"	338.40	49	1.0054	340.23	52.3 6.410	2180.87	
32.60	CO_2 44.010	30.41	30.80	29.42	30.807	79.31	6.440	20.741	0.9981	1.4942	15799	41.631		1'10-3/8	97.73	55	1.0025	97.97	52.2 6.413	628.28	
1.44	N_2 28.016	1.08	1.73	1.45	1.425			1.54	60	1210119								•1.79		•11.50	53.93
7.56	CH_4 16.042	8.74	8.15	8.40	8.213	WET GAS 158.44	6.914	4.030	1.0000	1.1001	4857	12.798						244.05		1564.09	8.416
2.35	C_2H_4 28.052	2.21	2.24	2.25	2.263			415.0	71												
1.72	C_2H_6 33.068	1.54	1.56	1.64	1.615	RECYCLE 79.31	8.460	20.729	0.9896	1.1001	15141	39.897									
3.71	C_3H_8 42.078	2.71	2.89	2.71	3.005																
0.23	C_3H_8 44.094	0.25	0.26	0.23	0.243	BLEED 5.02	8.415	20.729	1.0000	1.1001	963	2.538	WATER	7'4½"	390.78	69	0.99907	390.42	10.7 8.287	3235.41	
2.86	C_4H_8 56.104	1.75	1.91	1.89	2.102			438.2	188	1434846				1'5-5/8	76.52	58	1.00018	76.53	10.6 8.293	634.66	
1.10	C_4H_{10} 58.120	0.51	0.54	0.81	0.740	NATURAL GAS 28.43	7.697	21.281	0.8958	1.1979	4997	13.167		4'3"	227.10	62	0.99982	227.06	10.7	1881.65	
1.24	C_5H_{10} 70.130	0.75	0.81	0.86	0.915			443.3	60					1'2-3/4	63.92	61	0.99992	63.91	8.287	529.62	136.30
0.25	C_5H_{12} 72.146	0.17	0.17	0.25	0.210	OXYGEN 27.07	7.137	21.401	1.0000	--	4135	10.896						477.04		3952.78	16.450
0.33	C_6H_{12} 84.156	0.22	0.21	0.27	0.258			28.7													
				M. W.	23.923259	STEAM 215.7	6.521														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-J
HOURS 170-194

	GAS ANALYSES			
HOUR	1400	1800	0200	AVERAGE
FRESH FEED				
CO 28.010	38.26	37.32	37.46	37.680
H_2 2.016	59.22	60.22	59.91	59.784
CO_2 44.010	2.30	2.35	2.41	2.353
N_2 28.016	0.09	0.03	0.15	0.090
CH_4 16.042	0.13	0.08	0.07	0.093
			M. W	12.83510
			H_2O 18.016	
			BALANCE	
WET GAS	1400	2200		
CO 28.010	9.51	9.37	9.46	9.447
H_2 2.016	38.91	40.60	39.59	39.700
CO_2 44.010	30.71	29.41	30.33	30.150
N_2 28.016	1.18	1.06	1.81	1.350
CH_4 16.042	8.60	8.39	7.98	8.324
C_2H_4 28.052	2.26	2.45	1.78	2.163
C_2H_6 30.068	1.62	1.68	1.62	1.640
C_3H_6 42.078	3.04	2.94	3.48	3.153
C_3H_8 44.094	0.27	0.28	0.16	0.237
C_4H_8 56.104	2.03	1.90	1.81	1.913
C_4H_{10} 58.120	0.63	0.58	0.78	0.663
C_5H_{10} 70.130	0.86	0.87	0.76	0.830
C_5H_{12} 72.146	0.17	0.17	0.22	0.187
C_6H_{12} 84.156	0.21	0.30	0.22	0.243
			M. W.	23.34022

GENERATOR BALANCE

M/HR	C	H	O		Mol %	M/Hr	C	H	O
				O_2 32.000	0.17	10.780 0.022			21.604
15.701	15.701		15.701	CO_2 44.010	1.27	0.167	0.167		0.334
24.910		49.820		N_2 28.016	0.96	0.126			
0.980	0.980		1.960	CH_4 16.042	82.98	10.934	10.934	43.736	
0.038				C_2H_6 30.068	7.00	0.922	1.844	5.532	
0.039	0.039	0.156		C_3H_8 44.094	5.48	0.722	2.166	5.776	
				C_4H_{10} 58.120	1.57	0.207	0.828	2.070	
		8.296	4.148	C_5H_{12} 72.146	0.57	0.075	0.375	0.900	
	16.720	58.272	21.809	MW	20.03876				
	102.49	100.44	99.41	TOTAL			16.314	58.014	21.938

GAS FLOW RATES

	$\sqrt{P}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
		414.5	64	2255533		
FRESH FEED 79.31	6.433	20.717	0.9962	1.5018	15813	41.668
		1.53	62	1240348		
WET GAS 158.44	6.946	4.029	0.9981	1.1137	4929	12.988
		414.4	73			
RECYCLE 79.31	8.471	20.715	0.9877	1.1137	15309	40.340
BLEED 5.02	8.029	20.715	1.0000	1.1137	930	2.451
		437.2	190	1444700		
NATURAL GAS 28.43	7.696	21.258	0.8944	1.2020	5000	13.175
		442.6	63			
OXYGEN 27.07	7.088	21.385	0.9971		4091	10.780
		28.6				
STEAM 215.7	6.488					

WEIGHT BALANCE

	# /hr Measured	At Wt. Balance
WET GAS	303.14	347.26
OIL	52.94	52.94
WATER	134.61	134.61
TOTAL	490.69	534.81
FRESH FEED	534.81	
WEIGHT BALANCE	91.75	
WET GAS FACTOR	1145543	
INDICATED LOSS—S C F H	717	
	5646	

LIQUID PRODUCT RATES

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
OIL	6'6"	344.95	48	1.0059	346.99	51.7		
	6'4½"	338.40	49	1.0054	340.23	6.430		
	5'0½"	268.57	50	1.0049	269.89	"		
	1'6½"	80.37	46	1.0069	80.92	"		
					41.87		412.00	52.94
					197.60		1270.57	8.233
WATER	7'1"	375.50	67	0.99932	375.24	10.6		
	4'5"	227.10	62	0.99982	227.06	8.293		
	6'2"	327.49	66	0.99942	327.30	"		
	1'7-3/4	85.91	60	1.0000	85.91	"		134.61
					389.57		3230.70	16.232

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-K
HOURS 194-218

	GAS ANALYSES			
HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	37.65	37.08	37.18	37.303
H_2 2.016	59.69	59.93	59.79	59.804
CO_2 44.010	2.32	2.30	2.39	2.337
N_2 28.016	0.30	0.59	0.59	0.493
CH_4 16.042	0.04	0.10	0.05	0.063
			M. W	12.83096
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	9.45	10.08	9.49	9.673
H_2 2.016	40.39	40.66	40.20	40.417
CO_2 44.010	30.10	28.83	30.13	29.687
N_2 28.016	0.78	1.57	1.78	1.377
CH_4 16.042	8.90	8.05	7.97	8.307
C_2H_4 28.052	2.31	2.21	2.25	2.257
C_2H_6 30.068	1.63	1.62	1.65	1.633
C_3H_6 42.078	2.86	3.01	2.81	2.893
C_3H_8 44.094	0.29	0.26	0.21	0.253
C_4H_8 56.104	1.69	1.88	1.71	1.760
C_4H_{10} 58.120	0.53	0.69	0.71	0.643
C_5H_{10} 70.130	0.71	0.78	0.72	0.737
C_5H_{12} 72.146	0.16	0.16	0.16	0.160
C_6H_{12} 84.156	0.20	0.20	0.21	0.203
			M. W.	22.92514

GENERATOR BALANCE

M/HR	C	H	O		Mol %	M/Hr	C	H	O
				O_2 32.000	0.23	10.777 0.030			21.614
14.929	14.929		14.929	CO_2 44.010	1.39	0.182	0.182		0.364
23.935		47.870		N_2 28.014	2.10	0.276			
0.935	0.935		1.870	CH_4 16.042	82.20	10.787	10.787	43.148	
0.197				C_2H_6 30.068	7.04	0.924	1.848	5.544	
0.025	0.025	0.100		C_3H_8 44.094	5.18	0.680	2.040	5.440	
		8.714	5.179	C_4H_{10} 58.120	1.43	0.188	0.752	1.880	
		9.536	4.768	C_5H_{12} 72.146	0.43	0.056	0.280	0.672	
	15.889	57.506	21.567	MW	20.0024				
	100.00	101.45	98.13	TOTAL			15.889	56.684	21.978

GAS FLOW RATES

	$\sqrt{P}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
		413.0	59	2256261	(15188)	(40.021)
FRESH FEED 79.31	6.454	20.681	1.0010	1.5021	15917	41.942
		1.57	56	1262805		
WET GAS 158.44	7.000	4.034	1.0039	1.1237	5047	13.299
		413.5	66			
RECYCLE 79.31	8.525	20.693	0.9943	1.1237	15632	41.191
BLEED 5.02	8.171	20.693	1.0000	1.1237	954	2.514
		436.3	180	1447326		
NATURAL GAS 28.43	7.692	21.000	0.9014	1.2030	4980	13.123
		441.4	59			
OXYGEN 27.07	7.067	21.356	1.0010	--	4090	10.777
		27.6				
STEAM 215.7	6.050					

WEIGHT BALANCE

	# /hr Measured	At Wt. Balance
WET GAS	304.88	330.29
OIL	53.43	53.43
WATER	129.79	129.79
TOTAL	488.10	513.51
FRESH FEED	513.51	
WEIGHT BALANCE	95.05	
WET GAS FACTOR	1083344	
INDICATED LOSS—S C F H	421	
	5468	

LIQUID PRODUCT RATES

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
OIL	7'0-3/4	374.41	57	1.0015	374.97	52.8		
	5'0½"	268.57	50	1.0049	269.89	6.392		
	3'6½"	188.91	44	1.0079	190.40			
	1'10"	96.02	58	1.0010	96.12			
					41.25		48.00	53.43
					200.61		1282.30	8.359
WATER	6'5"	340.58	65	0.99953	340.42	10.8		
	6'2"	327.49	66	0.99942	327.30	8.282		
	7'4"	388.59	61	0.99992	388.56			
	1'8"	87.01	60	1.0000	87.01			
	2'1-3/4	113.46	57	1.00025	113.49			
	1'0"	52.00	43	1.00114	52.06			129.79
					376.10		3114.86	15.671

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-L
HOURS 218-242

	GAS ANALYSES			
HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	37.22	37.08	36.81	37.037
H_2 2.016	60.12	60.12	60.43	60.223
CO_2 44.010	2.27	2.46	2.41	2.380
N_2 28.016	0.26	0.23	0.24	0.243
CH_4 16.042	0.13	0.11	0.11	0.117
			M. W	12.722445
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010		9.92	10.09	10.005
H_2 2.016		40.55	41.24	40.895
CO_2 44.010		30.23	29.63	29.930
N_2 28.016		1.20	1.15	1.175
CH_4 16.042		7.73	7.77	7.750
C_2H_4 28.052		2.46	2.55	2.505
C_2H_6 33.068		1.39	1.43	1.410
C_3H_6 42.078		2.83	2.88	2.855
C_3H_8 44.094		0.22	0.26	0.240
C_4H_8 56.104		1.75	1.63	1.690
C_4H_{10} 58.120		0.65	0.43	0.540
C_5H_{10} 70.130		0.71	0.65	0.680
C_5H_{12} 72.146		0.16	0.13	0.145
C_6H_{12} 84.156		0.20	0.16	0.180
			M. W.	22.800276

GENERATOR BALANCE										
M/HR	C	H	O		Mol %	M/Hr	C	H	O	
				O_2 32.000	0.12	10.835 0.016			21.702	
15.250	15.250		15.250	CO_2 44.010	1.16	0.154	0.154		0.308	
24.796		49.592		N_2 28.016	1.43	0.190				
0.980	0.980		1.960	CH_4 16.042	82.83	10.994	10.994	43.976		
0.100				C_2H_4 30.068	7.20	0.956	1.912	5.736		
0.048	0.048	0.192		C_2H_6 44.094	5.25	0.697	2.091	5.576		
		8.288	4.800	C_4H_{10} 58.120	1.54	0.204	0.816	2.040		
		8.944	4.472	C_5H_{12} 72.146	0.47	0.062	0.310	0.744		
	16.278	58.728	21.682	MW	19.9510986					
	100.00	101.13	98.51	TOTAL			16.277	58.072	22.010	

GAS FLOW RATES								
	$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE
FRESH FEED	6.388	413.9 20.703	59 1.0010	2275506 1.5085	(15626) 15838	(41.174) 41.734	OIL	7'3½" 3'6½"
WET GAS	7.046	1.54 4.030	56 1.0039	1269721 1.1268	5089	13.410		
RECYCLE	8.558	413.8 20.700	67 0.9933	1.1268	15725	41.436		
BLEED	8.225	20.700	1.0000	1.1268	963	2.538	WATER	7'2½"
NATURAL GAS	7.700	437.9 21.274	185 0.8979	1451047 1.2046	5037	13.273		2'1-3/4 3'2½"
OXYGEN	7.092	444.0 21.417	60 1.0000	--	4112	10.835		1'1-3/4
STEAM	5.958	27.6 215.7						

WEIGHT BALANCE		
	#/hr Measured	At Wt. Balance
WET GAS	305.75	338.99
OIL	53.25	53.25
WATER	131.59	131.59
TOTAL	490.59	523.83
FRESH FEED	523.83	
WEIGHT BALANCE	93.65	
WET GAS FACTOR	1108716	
INDICATED LOSS—S C F H	553	
	5642	

LIQUID PRODUCT RATES					
GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
386.41	44	1.0079	389.46	52.0		
188.91	44	1.0079	190.40	6.420		53.25
			199.06		1277.97	8.294
382.05	66	0.99942	381.83	10.8		
113.46	57	1.00025	113.49	8.282		
172.54	57	1.00025	172.58			
59.56	56	1.00033	59.58			131.59
			381.34		3158.26	15.889

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-M
HOURS 242-266

	GAS ANALYSES			
HOUR		2200		AVERAGE
FRESH FEED				
CO 28.010		37.23		37.23
H_2 2.016		59.90		59.90
CO_2 44.010		2.50		2.50
N_2 28.016		0.26		0.26
CH_4 16.042		0.11		0.11
			M. W	12.82644
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010		10.51	9.60	10.055
H_2 2.016		42.06	39.18	40.620
CO_2 44.010		28.74	30.87	29.805
N_2 28.016		1.14	1.04	1.090
CH_4 16.042		7.83	7.58	7.705
C_2H_4 28.052		2.42	2.57	2.495
C_2H_6 33.068		1.40	1.51	1.455
C_3H_6 42.078		2.38	3.39	2.885
C_3H_8 44.094		0.20	0.39	0.295
C_4H_8 56.104		1.51	2.13	1.820
C_4H_{10} 58.120		0.63	0.56	0.595
C_5H_{10} 70.130		0.71	0.82	0.765
C_5H_{12} 72.146		0.23	0.16	0.195
C_6H_{12} 84.156		0.24	0.20	0.220
			M. W.	23.004539

GENERATOR BALANCE										
M/HR	C	H	O		Mol %	M/Hr	C	H	O	
				O_2 32.000	0.17	10.785 0.023			21.616	
15.171	15.171		15.171	CO_2 44.010	0.94	0.125	0.125		0.250	
24.409		48.818		N_2 28.016	1.28	0.170				
1.019	1.019		2.038	CH_4 16.042	83.41	11.104	11.104	44.416		
0.106				C_2H_4 30.068	7.24	0.964	1.928	5.784		
0.045	0.045	0.180		C_2H_6 44.094	5.14	0.684	2.052	5.472		
		9.261	4.631	C_4H_{10} 58.120	1.39	0.185	0.740	1.850		
				C_5H_{12} 72.146	0.43	0.057	0.285	0.684		
	16.235	58.259	21.840	MW	19.768782					
	100.00	100.09	99.88	TOTAL			16.234	58.206	21.866	

GAS FLOW RATES								
	$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE
FRESH FEED	6.396	414.8 20.724	61 0.9990	2257056 1.5024	(15464) 15778	(40.749) 41.576	OIL	5'4½" 1'9½"
WET GAS	7.171	1.54 4.030	58 1.0019	1258447 1.1218	5146	13.560		
RECYCLE	8.533	413.6 20.695	68 0.9924	1.1218	15592	41.086		
BLEED	8.138	20.695	1.0000	1.1218	948	2.498	WATER	7'1-5/8
NATURAL GAS	7.700	437.2 21.258	186 0.8972	1464430 1.2101	5052	13.312		3'2½" 3'5"
OXYGEN	7.083	442.8 21.389	62 0.9981	--	4093	10.785		0'3-3/4
STEAM	6.075	27.3 215.7						

WEIGHT BALANCE		
	#/hr Measured	At Wt. Balance
WET GAS	311.94	342.92
OIL	51.32	51.32
WATER	128.42	128.42
TOTAL	491.68	522.66
FRESH FEED	522.66	
WEIGHT BALANCE	94.07	
WET GAS FACTOR	1099313	
INDICATED LOSS—S C F H	511	
	5657	

LIQUID PRODUCT RATES					
GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
286.02	45	1.0074	288.14	53.8		
93.76	43	1.0084	94.55	6.357		
			80.16		41.00	51.32
			193.75		1231.67	8.073
378.23	70	0.99896	377.84	10.8		
172.54	57	1.00025	172.58	8.282		
183.46	59	1.00009	183.48			
16.60	54	1.00047	16.61			128.42
			372.13		3081.98	15.505

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-B
HOURS 265-290

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.18	10.498 0.024			21.044	WET GAS	301.41	345.94
CO 28.010	37.20	36.51	36.91	36.874	15.231	15.231		15.231	CO_2 44.010	1.12	0.147	0.147		0.294	OIL	45.24	46.24
H_2 2.016	59.93	60.92	60.53	60.460	24.974		49.948		N_2 28.016	1.31	0.172				WATER	127.99	127.99
CO_2 44.010	2.05	2.17	2.15	2.123	0.877	0.877		1.754	CH_4 16.042	82.41	10.843	10.843	43.372		TOTAL	475.64	520.17
N_2 28.016	0.22	0.20	0.19	0.203	0.084				C_2H_6 30.068	7.58	0.997	1.994	5.982		FRESH FEED	520.17	
CH_4 16.042	0.60	0.20	0.22	0.340	0.140	0.140	0.560		C_3H_8 44.094	5.33	0.701	2.103	5.608		WEIGHT BALANCE	91.44	
			M. W	12.593029					C_4H_{10} 58.120	1.54	0.203	0.812	2.030				
			H_2O 18.016				8.015	4.008	C_5H_{12} 72.146	0.53	0.070	0.350	0.840		WET GAS FACTOR	1147738	
						16.248	58.523	20.993	MW	20.04452					INDICATED LOSS—S C F H	784	
			BALANCE			100.00	101.19	98.38	TOTAL			16.249	57.832	21.338		6090	

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES								
CO 28.010	9.77	9.32	10.51	9.867		V/R	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	42.63	42.49	44.92	43.346	FRESH FEED		413.9	66	2298890	(15676)	(41.306)	OIL	7'2-3/4	383.14	63	0.9985	382.57	52.2		
CO_2 44.010	27.66	28.51	24.35	26.840	79.31	6.458	20.703	0.9943	1.5162	15986	42.124		5'4-1/2"	286.02	45	1.0074	288.14	6.413		
N_2 28.016	1.02	1.23	1.26	1.170			1.53	64	1342950				2'9-1/2"	149.62	51	1.0044	150.28			
CH_4 16.042	9.02	8.39	8.38	8.597	WET GAS 158.44	7.200	4.029	0.9962	1.1589	5306	13.982		1'4-3/4	72.68	64	0.9980	72.53			
C_2H_6 28.052	2.20	2.49	2.56	2.417			413.1	74									40.86		45.50	46.24
C_2H_6 30.068	1.52	1.56	1.65	1.577	RECYCLE 79.31	8.550	20.683	0.9868	1.1589	16039	42.264						173.04		1109.71	7.210
C_3H_8 42.078	2.63	2.58	2.92	2.710																
C_3H_8 44.094	0.21	0.25	0.29	0.250	BLEED 5.02	8.125	20.683	1.0000	1.1589	978	2.577	WATER	7'3-1/2"	386.41	72	0.99872	385.92	10.8		
C_4H_8 56.104	1.71	1.59	1.69	1.663			434.8	189	1444285				3'5"	183.46	59	1.00009	183.48	8.282		
C_4H_{10} 58.120	0.49	0.54	0.48	0.503	NATURAL GAS 28.43	7.700	21.201	0.8951	1.2018	4993	13.157		4'1-1/2"	220.55	65	0.99953	220.45			
C_5H_{10} 70.130	0.77	0.66	0.69	0.707			441.2	68					1'0"	52.00	60	1.00000	52.00			127.99
C_5H_{12} 72.146	0.16	0.23	0.13	0.173	OXYGEN 27.07	6.946	21.352	0.9924	---	3984	10.498						370.89		3071.71	15.454
C_6H_{12} 84.156	0.21	0.16	0.17	0.180			26.2													
			M. W.	21.557008	STEAM 215.7	6.096														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-0
HOURS 290-314

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR				AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.23	10.487 0.030			21.034	WET GAS	313.03	346.12
CO 28.010	37.06	36.98	36.45	36.830	15.078	15.078		15.078	CO_2 44.010	1.38	0.181	0.181		0.362	OIL	45.07	45.07
H_2 2.016	59.97	60.70	60.93	60.533	24.782		49.564		N_2 28.016	1.78	0.234				WATER	123.00	123.00
CO_2 44.010	2.00	1.95	2.15	2.033	0.832	0.832		1.664	CH_4 16.042	82.21	10.812	10.812	43.248		TOTAL	481.10	514.19
N_2 28.016	0.28	0.21	0.31	0.267	0.109				C_2H_6 30.068	7.35	0.967	1.934	5.802		FRESH FEED	514.19	
CH_4 16.042	0.69	0.16	0.16	0.337	0.138	0.138	0.552		C_3H_8 44.094	5.01	0.659	1.977	5.272		WEIGHT BALANCE	93.56	
			M. W	12.5600	41.931				C_4H_{10} 58.120	1.50	0.197	0.788	1.970				
			H_2O 18.016				8.168	4.084	C_5H_{12} 72.146	0.54	0.071	0.355	0.852		WET GAS FACTOR		1105708
						16.048	58.284	20.826		20.0482					INDICATED LOSS—S C F H		556
			BALANCE			100.00	101.99	97.34	TOTAL			16.047	57.144	21.396			5817

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES								
CO 28.010	11.04	10.81		10.925		V/R	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	39.02	41.91		40.465	FRESH FEED		413.1	67	2.304936	(15536)	(40.939)	OIL	5'11-1/2"	316.58	51	1.0044	317.97	51.1		
CO_2 44.010	28.70	28.13		28.415	79.31	6.433	20.683	0.9933	1.5182	15913	41.931		2'9-1/2"	149.62	51	1.0044	150.28	6.451		45.07
N_2 28.016	0.62	1.40		1.010			1.58	64	1.28217								167.69		1081.77	6.987
CH_4 16.042	9.83	7.89		8.860	WET GAS 158.44	7.296	4.035	0.9962	1.1323	5261	13.864									
C_2H_6 28.052	2.55	2.45		2.500			413.3	75												
C_2H_6 30.068	1.64	1.53		1.585	RECYCLE 79.31	8.513	20.688	0.9859	1.1323	15593	41.088									
C_3H_8 42.078	2.60	2.63		2.615																
C_3H_8 44.094	0.23	0.27		0.250	BLEED 5.02	8.133	20.688	1.0000	1.1323	957	2.522	WATER	7'0"	371.14	70	0.99896	370.75	10.8		
C_4H_8 56.104	1.75	1.50		1.625			435.6	192	1.44402		43.610		4'1-1/2"	220.55	65	0.99953	220.45	8.282		
C_4H_{10} 58.120	0.73	0.46		0.595	NATURAL GAS 28.43	7.708	21.220	0.8931	1.2017	4991	13.152		4'2"	222.74	62	0.99982	222.70			
C_5H_{10} 70.130	0.84	0.68		0.760			441.3	66					0'3-3/4	16.60	75	0.99832	16.57			123.00
C_5H_{12} 72.146	0.20	0.10		0.150	OXYGEN 27.07	6.925	21.354	0.9943	---	3980	10.487						356.43		2951.95	14.851
C_6H_{12} 84.156	0.25	0.24		0.245			25.5													
			M. W.	22.5789	STEAM 215.7	6.050														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-P
HOURS 314-338

	GAS ANALYSES			
HOUR	1400	2200	0545	AVERAGE
FRESH FEED				
CO 28.010	36.57	37.02	36.75	36.780
H_2 2.016	60.53	60.35	59.38	60.087
CO_2 44.010	1.99	2.34	3.57	2.633
N_2 28.016	0.20	0.16	0.20	0.187
CH_4 16.042	0.71	0.13	0.10	0.313
			M. W	12.7748
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	10.39	10.63	10.45	10.490
H_2 2.016	42.85	42.93	41.20	42.327
CO_2 44.010	26.99	27.73	28.91	27.877
N_2 28.016	1.81	1.21	1.24	1.420
CH_4 16.042	8.18	7.71	7.67	7.853
C_2H_4 28.052	2.30	2.32	1.69	2.103
C_2H_6 30.068	1.48	1.57	1.38	1.477
C_3H_6 42.078	2.72	2.44	2.61	2.590
C_3H_8 44.094	0.26	0.26	0.19	0.237
C_4H_8 56.104	1.64	1.52	2.70	1.953
C_4H_{10} 58.120	0.44	0.62	0.72	0.593
C_5H_{10} 70.130	0.68	0.71	0.69	0.693
C_5H_{12} 72.146	0.10	0.13	0.33	0.187
C_6H_{12} 84.156	0.16	0.22	0.22	0.200
			M. W.	22.175784

	GENERATOR BALANCE									
M/HR	C	H	O		Mol %	M/Hr	C	H	O
				O_2 32.000	0.23	10.451 0.030			20.962
14.926	14.926		14.926	CO_2 44.010	1.38	0.182	0.182		0.364
24.384		48.768		N_2 28.016	1.78	0.235			
1.068	1.068		2.136	CH_4 16.042	82.21	10.864	10.864	43.456	
0.076				C_2H_6 30.068	7.35	0.971	1.942	5.826	
0.127	0.127	0.508		C_3H_8 44.094	5.01	0.662	1.986	5.296	
				C_4H_{10} 58.120	1.50	0.198	0.792	1.980	
		8.331	4.166	C_5H_{12} 72.146	0.54	0.071	0.355	0.852	
	16.121	57.607	21.228		20.0482				
	100.00	100.34	99.54	TOTAL		13.215	16.121	57.410	21.326

GAS FLOW RATES						
	$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED 79.31	6.413	413.3 20.688	64 0.9962	2.26618 1.5054	(15400) 15780	(40.581) 41.581
WET GAS 158.44	7.346	1.63 4.041	63 0.9971	1.30548 1.1426	5358	14.120
RECYCLE 79.31	8.492	413.7 20.698	74 0.9868	1.1426	15718	41.417
BLEED 5.02	8.129	20.698	1.000	1.1426	965	2.543
NATURAL GAS 28.43	7.708	437.3 21.260	188 0.8958	1.2017	5015	43.960 13.215
OXYGEN 27.07	6.879	442.3 21.378	64 0.9962		3966	10.451
STEAM 215.7	6.046	25.9				

WEIGHT BALANCE		
	#/hr Measured	At Wt. Balance
WET GAS	313.12	350.65
OIL	44.15	44.15
WATER	123.61	123.61
TOTAL	480.88	518.41
FRESH FEED	518.41	
WEIGHT BALANCE	92.76	
WET GAS FACTOR	1.119858	
INDICATED LOSS—S C F H	642	
	6000	

LIQUID PRODUCT RATES						
HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
OIL	7'3-3/8	385.87	66	0.9970	384.71	53.0		
	5'11-1/2"	316.58	51	1.0044	317.97	6.385		
	3'3"	174.73	47	1.0064	175.85			
	1'5-7/8	77.62	65	0.9975	77.43			
					+0.78		+5.00	44.15
					165.94		1059.53	6.914
WATER	7'0-3/4	374.41	73	0.99858	373.88	10.9		
	4'2"	222.74	62	0.99982	222.70	8.276		
	4'11"	262.02	65	0.99953	261.90			
	1'0-5/8	54.68	72	0.99872	54.61			123.61
					358.47		2966.70	14.936

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-Q
HOURS 338-362

	GAS ANALYSES			
HOUR	1400	1800	0600	AVERAGE
FRESH FEED				
CO 28.010	37.13	37.74	36.73	37.200
H_2 2.016	60.40	59.71	60.47	60.194
CO_2 44.010	2.15	2.37	2.48	2.333
N_2 28.016	0.10	0.06	0.17	0.110
CH_4 16.042	0.22	0.12	0.15	0.163
			M. W	12.71695
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	10.27	10.78	10.09	10.380
H_2 2.016	41.73	42.65	42.41	42.264
CO_2 44.010	27.93	28.23	28.88	28.347
N_2 28.016	0.97	0.92	0.96	0.950
CH_4 16.042	8.18	7.68	7.93	7.930
C_2H_4 28.052	2.19	2.16	2.22	2.190
C_3H_6 33.068	1.74	1.71	1.74	1.730
C_3H_6 42.078	3.04	2.48	2.56	2.693
C_3H_8 44.094	0.41	0.30	0.29	0.333
C_4H_8 56.104	1.86	1.51	1.47	1.613
C_4H_{10} 58.120	0.57	0.55	0.53	0.550
C_5H_{10} 70.130	0.76	0.69	0.64	0.697
C_5H_{12} 72.146	0.13	0.13	0.11	0.123
C_6H_{12} 84.156	0.22	0.21	0.17	0.200
			M. W.	22.15826

	GENERATOR BALANCE									
M/HR	C	H	O		Mol %	M/Hr	C	H	O
				O_2 32.000	0.20	10.677 0.027			21.408
15.294	15.294		15.294	CO_2 44.010	1.45	0.192	0.192		0.348
24.748		49.496		N_2 28.016	0.80	0.106			
0.959	0.959		1.918	CH_4 16.042	83.44	11.072	11.072	44.288	
0.045				C_2H_6 30.068	6.81	0.904	1.808	5.424	
0.067	0.067	0.268		C_3H_8 44.094	5.26	0.698	2.094	5.584	
				C_4H_{10} 58.120	1.52	0.202	0.808	2.020	
		8.734	4.367	C_5H_{12} 72.146	0.52	0.069	0.345	0.828	
	16.320	58.498	21.579	MW	19.93728				
	100.00	100.61	99.19	TOTAL			16.319	58.144	21.756

GAS FLOW RATES						
	$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED 79.31	6.479	413.1 20.683	66 0.9943	2276489 1.5088	(15602) 15944	(41.113) 42.013
WET GAS 158.44	7.425	1.71 4.051	65 0.9952	1306510 1.1430	5421	14.285
RECYCLE 79.31	8.521	412.8 20.676	78 0.9831	1.1430	15701	41.373
BLEED 5.02	8.188	20.676	1.0000	1.1430	971	2.559
NATURAL GAS 28.43	7.700	438.1 21.279	186 0.8972	1452053 1.2050	5036	13.270
OXYGEN 27.07	7.042	443.3 21.401	67 0.9933	--	4052	10.677
STEAM 215.7	6.050	25.4				

WEIGHT BALANCE		
	#/hr Measured	At Wt. Balance
WET GAS	316.53	354.55
OIL	44.83	44.83
WATER	123.45	123.45
TOTAL	484.81	522.83
FRESH FEED	522.83	
WEIGHT BALANCE	92.73	
WET GAS FACTOR	1120114	
INDICATED LOSS—S C F H	651	
	6072	

LIQUID PRODUCT RATES						
HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
OIL	6'5"	340.58	54	1.0030	341.60	51.7		
	3'3"	174.73	47	1.0064	175.85	6.430		
					+1.59		+10.25	44.83
					167.34		1076.00	6.973
WATER	7'3"	384.23	70	0.99896	383.83	10.9		
	4'11"	262.02	65	0.99953	261.90	8.276		
	5'10-1/2"	312.21	67	0.99932	312.00			
	1'5-1/2"	75.97	64	0.99963	75.94			123.45
					357.99		2962.73	14.916

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-R

HOURS 362-386

	GAS ANALYSES			
HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	36.81	36.94	36.91	36.887
H_2 2.016	60.28	60.21	60.29	60.260
CO_2 44.010	2.26	2.43	2.45	2.380
N_2 28.016	0.29	0.25	0.15	0.230
CH_4 16.042	0.36	0.17	0.20	0.243
			M. W	12.69775
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	10.17	10.80	9.98	10.316
H_2 2.016	42.26	42.50	42.86	42.540
CO_2 44.010	27.84	27.77	27.50	27.703
N_2 28.016	1.20	1.01	1.14	1.117
CH_4 16.042	8.02	8.04	8.28	8.113
C_2H_4 28.052	2.16	2.23	2.26	2.217
C_2H_6 30.068	1.65	1.69	1.73	1.690
C_3H_6 42.078	2.67	2.58	2.79	2.680
C_3H_8 44.094	0.30	0.31	0.30	0.303
C_4H_8 56.104	1.79	1.54	1.64	1.657
C_4H_{10} 58.120	0.59	0.46	0.50	0.517
C_5H_{10} 70.130	0.85	0.70	0.62	0.723
C_6H_{12} 72.146	0.20	0.13	0.17	0.167
C_6H_{12} 84.156	0.30	0.24	0.23	0.257
			M. W.	22.01892

GENERATOR BALANCE										
M/HR	C	H	O		Mol %	M/Hr	C	H	O	
				O_2 32.000	0.23	10.646 0.030			21.352	
15.266	15.266		15.266	CO_2 44.010	1.55	0.204	0.204		0.408	
24.940		49.880		N_2 28.016	1.11	0.146				
0.985	0.985		1.970	CH_4 16.042	82.41	10.863	10.863	43.452		
0.095				C_2H_4 30.068	6.84	0.902	1.804	5.412		
0.101	0.101	0.404		C_2H_6 44.094	5.62	0.741	2.223	5.928		
				C_4H_{10} 58.120	1.65	0.217	0.868	2.170		
		8.331	4.166	C_5H_{12} 72.146	0.59	0.078	0.390	0.936		
	16.352	58.615	21.402	MW	20.20632					
	100.00	101.24	98.35	TOTAL			16.352	57.898	21.760	

WEIGHT BALANCE		
	#/hr Measured	At Wt. Balance
WET GAS	317.67	358.15
OIL	45.38	45.38
WATER	121.99	121.99
TOTAL	485.04	525.52
FRESH FEED	525.52	
WEIGHT BALANCE	92.30	
WET GAS FACTOR	1127427	
INDICATED LOSS—S C F H	698	
	6173	

GAS FLOW RATES

	√h	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED 79.31	6.458	413.7 20.698	60 1.0000	2279931 1.5099	(15706) 16007	(41.387) 42.179
WET GAS 158.44	7.442	1.70 4.050	60 1.0000	1314778 1.1466	5475	14.427
RECYCLE 79.31	8.500	413.7 20.698	73 0.9877	1.1466	15802	41.639
BLEED 5.02	8.213	20.698	1.0000	1.1456	978	2.577
NATURAL GAS 28.43	7.700	437.3 21.260	185 0.8979	1432720 1.1970	5002	13.181
OXYGEN 27.07	6.971	443.6 21.408	60 1.0000		4040	10.646
STEAM 215.7	6.008	24.6				

LIQUID PRODUCT RATES

	HOUR	GAGE	GAL.	°F	FACTOR	GAL AT 60	API° #/GAL.	#	# HR GAL HR
	OIL	6'6½"	347.13	53	1.0035	348.34	50.8		
		6'5"	340.58	54	1.0030	341.60	6.462		
		4'5"	235.83	50	1.0049	236.99			
		1'5½"	75.97	52	1.0039	76.27			
						1.08		7.00	45.38
						168.54		1089.11	7.023
	WATER	7'6-3/4	400.60	65	0.99953	400.41	10.9		
		5'10½"	312.21	67	0.99932	312.00	8.276		
		6'8½"	355.86	64	0.99963	355.73			
		1'8-3/4	90.37	60	1.00000	90.37			121.99
						353.77		2927.80	14.740

RUN NO. 65-0 (A-E)
HOURS 0-112
CATALYST

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS	At Wt. Balance		RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	37.004	15.435	432.33	7.633	1.023	28.65	3.262	18.697	4.285	-14.412	-403.68						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
H_2 2.016	60.439	25.211	50.83	37.541	5.032	10.14	16.040	41.251	21.072	-20.179	- 40.69					400 EP	82.52	8.013	98.0	7.853
CO_2 44.010	2.003	0.835	36.75	30.639	4.106	180.71	13.092	13.927	17.198	3.271	143.96	9.333				400-550	12.72	1.235	91.4	1.129
N_2 28.016	0.159	0.066	1.85	1.567	0.210	5.88	0.670	0.736	0.880							550 +	4.76	0.462	114.6	0.529
CH_4 16.042	0.395	0.165	2.65	11.090	1.486	23.84	4.739	4.904	6.225	1.321	21.19	1.374								
C_2H_4 28.052				2.377	0.319	8.95	1.016	1.016	1.335	0.319	8.95	0.580					RECOVERY %	#/hr	gal/hr	
C_3H_6 30.068				1.779	0.238	7.16	0.760	0.760	0.998	0.238	7.16	0.464				PROPYLENE	44.3	7.18		
C_1+C_2											37.30	2.418				C_3 POLY GASO.	87.5	6.28	1.050	
C_3H_8 42.078				2.873	0.385	16.20	1.228	1.228	1.613	0.385	16.20	1.050	4.32	3.750	0.243	C_3 POLY TAR	12.5	0.90	0.120	
C_3H_6 44.094				0.269	0.036	1.59	0.115	0.115	0.151	0.036	1.59	0.103	4.24	0.375	0.024					
C_4H_8 56.104				2.002	0.268	15.04	0.855	0.855	1.123	0.268	15.04	0.975	5.00	3.008	0.195		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.777	0.104	6.04	0.332	0.332	0.436	0.104	6.04	0.392	4.86	1.243	0.081	C_4H_8	5.00	--	--	68.0
C_5H_{10} 70.130				0.917	0.123	8.63	0.392	0.392	0.515	0.123	8.63	0.559	5.45	1.583	0.103	C_4 POLY GASO.	5.98	13.16 (6.04)	2.201 (1.243)	1.5
C_5H_{12} 72.146				0.244	0.033	2.38	0.104	0.104	0.137	0.033	2.38	0.154	5.25	0.453	0.029	C_4H_{10}	4.86	5.63	1.158	68.0
C_6H_{12} 84.156				0.292	0.039	3.28	0.125	0.125	0.164	0.039	3.28	0.213	5.54	0.592	0.038	C_4 FREE GASO.			11.531	5.8
C_5-C_6											53.16	3.446		11.004	0.713	C_4 POLY TAR	7.53	1.88	0.250	
TOTAL		41.712	524.41		13.402	318.49	42.730	84.442	63.841											
H_2+CO	97.443	40.646	15425	SCFH	6.055		19.302	59.948	25.357	-34.591							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.63	Factor 648298		4.92		4.92	2.21	4.92	1.40						10 # RVP 400 EP GASOLINE	14.890	0.9653	5233	
Weight Recovery, %	88.09	Catalyst Age, hrs.	56	Space Velocity, vhv	1281	RECOVERED OIL	0.445**	62.44	4.048		9.710	0.629	GAS OIL	1.129	0.0732	397				
Pressure, psig	416	Inlet Velocity, Ft/sec	0.99	Catalyst		TOTAL OIL		115.60	7.494		20.714	1.342	FUEL OIL	0.529	0.0343	186				
Temperature, °F	663	Bed Depth, Ft	18.26	Weight, #	1981	WATER SOLUBLE CHEMICALS	0.378**	20.08	1.302	7.926	2.533	0.164	POLY TAR	0.370	0.0240	130				
Recycle Ratio	1.02	Bed Density, #/CF	164	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$	= 12.3	TOTAL LIQUID PRODUCTS C_5+		135.68	8.796		23.247	1.506	TOTAL	16.918	1.0968	5946				
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY	NET WATER	6.886**	124.05	8.042		14.892	0.965	W. S. CHEM.	2.533	0.1642	890		
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	GROSS WATER		144.13	9.344		17.425	1.130	TOTAL	19.451	1.2610	6836		
67.87	93.37	80.04	85.10	77.08	48.92	57.70	78.44	HYDROCARBON TOTAL—C_1+		172.98	11.214									

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

RUN NO. 65-1 (F-J)
HOURS 112-232
CATALYST

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS	At Wt. Balance		RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	37.359	15.248	427.10	9.124	1.296	36.30	3.917	19.165	5.213	-13.952	-390.80						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
H_2 2.016	60.124	24.540	49.47	39.130	5.560	11.21	16.798	41.338	22.358	-18.980	- 38.26					400 EP	80.76	6.581	98.0	6.449
CO_2 44.010	2.084	0.851	37.45	29.208	4.150	182.64	12.538	13.389	16.688	3.299	145.19					400-550	11.36	0.926	91.4	0.846
N_2 28.016	0.193	0.079	2.21	1.509	0.214	6.00	0.648	0.727	0.862							550 +	7.88	0.642	114.6	0.736
CH_4 16.042	0.240	0.098	1.57	9.768	1.388	22.27	4.194	4.292	5.582	1.290	20.70	1.371								
C_2H_4 28.052				2.292	0.326	9.14	0.984	0.984	1.310	0.326	9.14	0.605					RECOVERY %	#/hr	gal/hr	
C_3H_6 30.068				1.725	0.245	7.37	0.741	0.741	0.986	0.245	7.37	0.488				PROPYLENE	4.06	7.07		
C_1+C_2											37.21	2.464				C_3 POLY GASO.	87.5	6.19	1.035	
C_3H_8 42.078				2.913	0.414	17.42	1.251	1.251	1.665	0.414	17.42	1.154	4.32	4.032	0.267	C_3 POLY TAR	12.5	0.88	0.117	
C_3H_6 44.094				0.277	0.039	1.72	0.119	0.119	0.158	0.039	1.72	0.114	4.24	0.406	0.027					
C_4H_8 56.104				1.893	0.269	15.09	0.813	0.813	1.082	0.269	15.09	0.999	5.00	3.018	0.200		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.727	0.103	5.99	0.312	0.312	0.415	0.103	5.99	0.397	4.86	1.233	0.082	C_4H_8	5.00	--	--	68.0
C_5H_{10} 70.130				0.931	0.132	9.26	0.400	0.400	0.532	0.132	9.26	0.613	5.45	1.699	0.113	C_4 POLY GASO.	5.98	13.20 (5.99)	2.208 (1.233)	1.5
C_5H_{12} 72.146				0.244	0.035	2.53	0.105	0.105	0.140	0.035	2.53	0.168	5.25	0.482	0.032	C_4H_{10}	4.86	5.17	1.064	68.0
C_6H_{12} 84.156				0.259	0.037	3.11	0.111	0.111	0.148	0.037	3.11	0.206	5.84	0.561	0.037	C_4 FREE GASO.			10.226	5.8
C_5-C_6											55.12	3.651		11.431	0.758	C_4 POLY TAR	7.53	1.89	0.251	
TOTAL		40.816	517.80		14.208	330.05	42.931	83.747	64.316											
H_2+CO	97.483	39.788	15100	SCFH	6.856		20.715	60.503	27.571	-32.932							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.61	Factor 662251		4.29		4.29	2.16	4.29	1.36						10 # RVP 400 EP GASOLINE	13.498	0.8939	4846	
Weight Recovery, %	89.09	Catalyst Age, hrs.		Space Velocity, vhv	1214	RECOVERED OIL	0.373**	52.25	3.460		8.149	0.540	GAS OIL	0.846	0.0560	304				
Pressure, psig	414	Inlet Velocity, Ft/sec	0.99	Catalyst		TOTAL OIL		107.37	7.111		19.580	1.298	FUEL OIL	0.736	0.0487	264				
Temperature, °F	665	Bed Depth, Ft	18.84	Weight, #	1954	WATER SOLUBLE CHEMICALS	0.375**	19.89	1.317	7.935	2.507	0.166	POLY TAR	0.368	0.0244	132				
Recycle Ratio	1.05	Bed Density, #/CF	157	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$	= 11.1	TOTAL LIQUID PRODUCTS C_5+		127.26	8.428		22.087	1.464	TOTAL	15.448	1.0830	5546				
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY	NET WATER	6.429**	115.82	7.670		13.904	0.921	W. S. CHEM.	2.507	0.1660	900		
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	GROSS WATER		135.71	8.987		16.411	1.087	TOTAL	17.955	1.1890	6446		
65.19	91.50	77.34	82.77	72.80	45.91	54.43	77.38	HYDROCARBON TOTAL—C_1+		164.47	10.898									

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

RUN NO. 65-2 (K-N)
HOURS 232-326
CATALYST

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
CO 28.010	37.164	15.125	423.65	10.849	1.718	48.12	4.580	19.705	6.298	- 13.407	-375.53									
H_2 2.016	60.285	24.534	49.46	41.618	6.591	13.29	17.569	42.103	24.160	- 17.943	- 36.17					400 EP	80.75	5.168	98.0	5.065
CO_2 44.010	2.142	0.872	38.37	27.228	4.312	189.77	11.494	12.366	15.806	3.440	151.40	10.059				400-550	10.65	0.682	91.4	0.623
N_2 28.016	0.215	0.088	2.47	1.363	0.216	6.05	0.575	0.663	0.791							550 +	8.60	0.550	114.6	0.630
CH_4 16.042	0.194	0.079	1.27	8.745	1.385	22.22	3.692	3.771	5.077	1.306	20.95	1.392								
C_2H_4 28.052				2.009	0.318	8.92	0.848	0.848	1.166	0.318	8.92	0.593					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.646	0.261	7.85	0.695	0.695	0.956	0.261	7.85	0.522				PROPYLENE	36.1	5.85		
C_1+C_2											37.72	2.507				C_3 POLY GASO.	87.5	5.12	0.856	
C_3H_6 42.078				2.429	0.385	16.20	1.025	1.025	1.410	0.385	16.20	1.076	4.32	3.750	0.249	C_3 POLY TAR	12.5	0.73	0.097	
C_3H_8 44.094				0.231	0.037	1.63	0.098	0.098	0.135	0.037	1.63	0.108	4.24	0.384	0.026					
C_4H_8 56.104				1.709	0.271	15.20	0.721	0.721	0.992	0.271	15.20	1.010	5.00	3.040	0.202		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.699	0.111	6.45	0.295	0.295	0.406	0.111	6.45	0.429	4.86	1.327	0.088	C_4H_8	5.00	--	--	68.0
C_5H_{10} 70.130				0.925	0.146	10.24	0.390	0.390	0.536	0.146	10.24	0.680	5.45	1.879	0.125	C_5 POLY GASO.	5.98	13.30	2.224	1.5
C_5H_{12} 72.146				0.263	0.042	3.03	0.111	0.111	0.153	0.042	3.03	0.201	5.25	0.577	0.038	C_4H_{10}	4.86	(6.45 4.77	(1.327) 0.982	68.0
C_6H_{12} 84.156				0.286	0.045	3.79	0.121	0.121	0.166	0.045	3.79	0.252	5.54	0.684	0.045	C_4-FREE GASO.			9.061	5.8
C_3-C_6											56.54	3.756		11.641	0.773	C_4 POLY TAR	7.53	1.90	0.252	
TOTAL		40.698	515.22		15.838	352.76	42.214	82.912	58.052											
H_2+CO	97.449	39.659	15.051 SCFH				22.149	61.808	30.458	-31.350							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.62	Factor 664407				3.84	2.14	3.84	1.34						10 # RVP 400 EP GASOLINE	12.267	0.8150	4419	
Weight Recovery, %	79.66	Catalyst Age, hrs.	279	Space Velocity, vhv	1222	RECOVERED OIL	**0.296		41.47	2.755		6.400	0.425	GAS OIL	0.623	0.0414	224	
Pressure, psig	410	Inlet Velocity, Ft/sec	1.00	Catalyst Vol.CF	12.32	TOTAL OIL			98.01	6.511		18.041	1.198	FUEL OIL	0.630	0.0419	227	
Temperature, °F	667	Bed Depth, Ft	18.67	Weight, #	1725	WATER SOLUBLE CHEMICALS	**0.365		19.38	1.288	7.982	2.428	0.161	POLY TAR	0.349	0.0232	126	
Recycle Ratio	1.04	Bed Density, #/CF	140	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$	= 10.7	TOTAL LIQUID PRODUCTS C_5+			117.39	7.799		20.469	1.360	TOTAL	13.869	0.9215	4996	
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %		SELECTIVITY	NET WATER	**5.642		101.65	6.754		12.203	0.811	W. S. CHEM.	2.428	0.1613	875	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	GROSS WATER		121.03	8.041		14.631	0.972	TOTAL	16.297	1.0828	5871	
61.08	88.64	73.14	79.05	68.04	42.62	50.72	75.68	HYDROCARBON TOTAL—C_1+		155.11	10.306									

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

RUN NO. 65-A
HOURS 0-16
CATALYST Bethlehem Mill Scale Red. 800°F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO 28.010	37.280	15.667	438.83	5.210	0.644	18.04	2.218	17.885	2.862	-15.023	-420.79				
H_2 2.016	60.307	25.345	51.10	37.416	4.623	9.32	15.927	41.272	20.550	-20.722	-41.78				
CO_2 44.010	2.093	0.880	38.73	32.177	3.974	174.91	13.697	14.577	17.671	3.094	136.18	8.750			
N_2 28.016	0.107	0.045	1.26	1.697	0.210	5.88	0.722	0.767	0.932						
CH_4 16.042	0.213	0.090	1.44	11.293	1.395	22.38	4.807	4.897	6.202	1.305	20.94	1.345			
C_2H_4 28.052				2.570	0.318	8.92	1.094	1.094	1.412	0.318	8.92	0.573			
C_2H_6 30.068				1.803	0.223	6.71	0.768	0.768	0.991	0.223	6.71	0.431			
C_1+C_2											36.57	2.349			
C_3H_6 42.078				2.817	0.348	14.64	1.199	1.199	1.547	0.348	14.64	0.941	4.32	3.389	0.218
C_3H_8 44.094				0.283	0.035	1.54	0.120	0.120	0.155	0.035	1.54	0.099	4.24	0.363	0.023
C_4H_8 56.104				2.147	0.265	14.87	0.914	0.914	1.179	0.265	14.87	0.955	5.00	2.974	0.191
C_4H_{10} 58.120				0.900	0.111	6.45	0.383	0.383	0.494	0.111	6.45	0.414	4.86	1.327	0.085
C_5H_{10} 70.130				1.027	0.127	8.91	0.437	0.437	0.564	0.127	8.91	0.572	5.45	1.635	0.105
C_5H_{12} 72.146				0.297	0.037	2.67	0.126	0.126	0.163	0.037	2.67	0.172	5.25	0.509	0.033
C_6H_{12} 84.156				0.363	0.045	3.79	0.155	0.155	0.200	0.045	3.79	0.244	5.54	0.684	0.044
C_3-C_6											52.87	3.397		10.881	0.699
TOTAL		42.026			12.355	299.03	42.568	84.494	63.619						
H_2+CO	97.587	41.012	15564 SCFH		5.267		18.145	59.157	23.412	-35.745					
H_2/CO		1.62	Factor 642508		7.18		7.18	2.31	7.18	1.38					

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	81.9	9.281	98.0	9.095
400-550	12.8	1.451	91.4	1.326
550 +	5.3	0.601	114.6	0.689

	RECOVERY %	#/hr	gal/hr
PROPYLENE	48.6	7.12	
C_3 POLY GASO.	87.5	6.23	1.042
C_3 POLY TAR	12.5	0.89	0.118

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00			68.0
C_4 POLY GASO.	5.98	13.01	2.176	1.5
C_4H_{10}	4.86	(6.45) 6.11	1.327 1.258	68.0
C_4-FREE GASO.			12.965	5.8
C_4 POLY TAR	7.53	1.86	0.247	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	16.399	1.0536	5712
GAS OIL	1.326	0.0852	462
FUEL OIL	0.689	0.0443	240
POLY TAR	0.365	0.0235	127
TOTAL	18.779	1.2066	6541
W. S. CHEM.	2.309	0.1484	805
TOTAL	21.088	1.3550	7346

Weight Recovery, %	92.97	Catalyst Age, hrs.		Space Velocity, vhv	1335	RECOVERED OIL **	0.519	72.84	4.680
Pressure, psig	416	Inlet Velocity, Ft/sec	1.00	Catalyst	Vol CF 11.66	TOTAL OIL		125.71	8.077
Temperature, °F	664	Bed Depth, Ft	17.67	Weight, #	1877	WATER SOLUBLE CHEMICALS **	0.347	18.41	1.183
Recycle Ratio	1.01	Bed Density, #/CF	161	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$	= 17.65	TOTAL LIQUID PRODUCTS C_5+		144.12	9.260
						NET WATER **	7.830	141.06	9.063
						GROSS WATER		159.47	10.246
						HYDROCARBON TOTAL—C_1+		180.69	11.609

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
69.00	95.67	80.77	86.46	83.80	49.60	59.94	78.44

	gal	Microns	%
On 40	419+		
100	150		
150	105		
200	74		
250	62		
325	44		
<325			

1	21-3/8-52-3/4	79	
2	52-3/4-84	75	
3	84-115 3/8	87	
4	115 3/8-353 1/8	275	

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-A
HOURS 0-16

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	440	Fresh Feed	15949
Natural Gas	436	Recycle	16155
Generator Outlet	420	Combined Feed	32104
Reactor Inlet	416	Wet Gas—Measured	3936
Condenser Inlet		Adjusted	4689
Product Accumulator	387	Loss	753
TEMPERATURES—°F.		Recycle/Fresh Feed	1.01
Oxygen	483	Inlet Velocity—ft./sec.	1.00
Natural Gas	804	Fresh Feed Rate—S.C.F.H.	15564
Generator	2469	per Cu. Ft. Dense Bed	1355
Quench Accumulator	112	per Lb. Catalyst	8.29
Reactor Inlet	279	per Sq. Ft.	23581
Condenser Inlet	601		
Product Accumulator	92	Heat Transfer Calculations	
Catalyst No. Height		Steam Rate = 386#/hr	
1 0'0"		@ 707 psia & 505°F=	
2 0'9"	658	1201 BTU/#	
3 1'9"	656	Water in @ 53°F = 21 BTU/#	
4 4'5"	670	Net Heat Transferred/# Steam	
5 7'0"	669	= 1180 BTU	
6 12'3"	669	(1180)(386) = 455480 BTU/hr	
7 17'5"	663	Ave. Bed Temp. = 664	
8 20'0"	647	dT=664-505=159°F	
9 22'7"	645	Tube Area = 32.1 sq ft	
10 25'2"	655	K= 455480 / (32.1)(159) =	
11 26'11"	657	89.2 BTU/°F/sq ft	

PRODUCT TESTS	OIL	WATER
°API	51.8	10.7
Neut. No.	47.9	33.1
Sap. No.	61.4	35.9
Hydrox. No.		
Bromine No.	91	
Pour °F.		
Chemicals, % by K_2CO_3		12.0
HEMPEL. DIST. %		°API
205 °F.		
400	80.9	54.9
400-550	12.8	34.3
550+	6.3	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	101	
10%	124	
50%	216	
90%	341	
EP	391	
Rec.	97.5	

CATALYST DATA		
INVENTORY DATA		
In Reactor at Start of Period		
Fresh Catalyst Added		
Total		
Catalyst Recovered	70½	
In Reactor at End of Period		
REACTOR d-p, Inches H_2O		
No. Height		add one ft.
0 0-21-3/8		
CALCULATED FROM dp		
Density, Lbs./Cu.Ft.	161	
Inventory, Lbs.	1877	
Bed Depth, Ft.	17.67	
Vol., Cu. Ft.	11.66	

PARTICLE SIZE					
	Screen Analysis			Sedimentation	
	Mesh	Microns	%	Microns	%
	On 40	419+		80+	
	100	150		40—80	
	150	105		20—40	
	200	74		10—20	
	250	62		0—20	
	325	44			
	<325				

CATALYST	
Bulk Density, Lbs./Cu.Ft.	
Aerated	
Settled	
Compacted	
Particle Density, gm./cc.	
NH_3 Value, ml./gm.	
N_2 Surface, m^2/gm.	
CHEMICAL ANALYSIS	
Fe	
C	
O	
H	
K_2O, W+, % basis Fe	
X-Ray Analysis—	
$Fe_{2.2}C_3$	
Fe_3O_4	
Fe	

RUN NO. 65-B
HOURS 16-40
CATALYST Bethlehem Mill Scale Reduced @ 800°F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
CO 28.010	36.954	15.470	533.30	6.433	0.794	22.24	2.726	18.196	3.520	-14.676	-411.06									
H_2 2.016	60.510	25.331	51.07	36.301	4.483	9.04	15.381	40.712	19.864	-20.848	42.03					400 EP	80.6	8.664	98.0	8.491
CO_2 44.010	2.090	0.875	38.51	31.453	3.884	170.93	13.327	14.202	17.211	3.009	132.42	8.552				400-550	12.8	1.376	91.4	1.258
N_2 28.016	0.133	0.056	1.57	1.660	0.205	5.74	0.703	0.759	0.908							550 +	6.6	0.709	114.6	0.813
CH_4 16.042	0.313	0.131	2.10	12.040	1.487	23.85	5.102	5.233	6.589	1.356	21.75	1.405								
C_2H_4 28.052				2.463	0.304	8.53	1.044	1.044	1.348	0.304	8.53	0.551					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.930	0.238	7.16	0.818	0.818	1.056	0.238	7.16	0.462				PROPYLENE	48.5	7.77		
C_1+C_2											37.44	2.418				C_3 POLY GASO.	87.5	6.80	1.137	
C_3H_6 42.078				3.083	0.381	16.03	1.306	1.306	1.687	0.381	16.03	1.035	4.32	3.711	0.240	C_3 POLY TAR	12.5	0.97	0.129	
C_3H_8 44.094				0.283	0.035	1.54	0.120	0.120	0.155	0.035	1.54	0.099	4.24	0.363	0.023					
C_4H_8 56.104				2.090	0.258	14.47	0.886	0.886	1.144	0.258	14.47	0.935	5.00	2.894	0.187		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.800	0.099	5.75	0.339	0.339	0.438	0.099	5.75	0.371	4.86	1.183	0.076	C_4H_8	5.00			68.0
C_5H_{10} 70.130				0.937	0.116	8.14	0.397	0.397	0.513	0.116	8.14	0.526	5.45	1.494	0.096	C_4 POLY GASO.	5.98	12.66	2.117	1.5
C_5H_{12} 72.146				0.237	0.029	2.09	0.100	0.100	0.129	0.029	2.09	0.135	5.25	0.398	0.026	C_4H_{10}	4.86	5.75	1.183	68.0
C_6H_{12} 84.156				0.290	0.036	3.03	0.123	0.123	0.159	0.036	3.03	0.196	5.54	0.547	0.035	C_4 FREE GASO.			12.067	5.8
C_3-C_6											51.05	3.297		10.590	0.683	C_4 POLY TAR	7.53	1.81	0.240	
TOTAL		41.863	526.55		12.349	298.53	42.372	84.235	53.472											
H_2+CO	97.464	40.801	15484 SCFH		5.277		18.107	58.908	23.384	-35.524								gal/hr	gal/MCF	Bbl/Day
H_2/CO		1.64	Factor 645827		5.64		5.64	2.24	5.64	1.42						10 # RVP 400 EP GASOLINE	15.367	0.9924	5380	
Weight Recovery, % 90.39		Catalyst Age, hrs.		Space Velocity, vhv 1292			RECOVERED OIL**			0.493	69.16	4.467		10.749	0.694	GAS OIL	1.258	0.0812	440	
Pressure, psig 416		Inlet Velocity, Ft/sec 0.96		Catalyst Vol CF 11.98			TOTAL OIL				120.21	7.764		21.339	1.377	FUEL OIL	0,813	0.0525	285	
Temperature, °F 661		Bed Depth, Ft 18.15		Weight, # 1964			WATER SOLUBLE CHEMICALS **			0.287	15.25	0.985		1.916	0.124	POLY TAR	0.369	0.0238	129	
Recycle Ratio 1.01		Bed Density, #/CF 164		Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ = 12.18			TOTAL LIQUID PRODUCTS C_5+				135.46	8.749		23.255	1.501	TOTAL	17.807	1.1499	6234	
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY			NET WATER **		7.971	143.61	9.275		17.240	1.113	W. S. CHEM.	1.916	0.1237	671	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+			GROSS WATER			158.86	10.260		19.156	1.237	TOTAL	19.723	1.2736	6905	
70.50	94.87	82.30	87.07	80.66	51.21	60.30	78.35			HYDROCARBON TOTAL—C_1+			172.90	11.166						

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-B
HOURS 16-40

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE			
Oxygen	442	Fresh Feed	15887	° API	51.6	10.6	In Reactor at Start of Period		Screen Analysis			Sedimentation
Natural Gas	436	Recycle	15159	Neut. No.	45.4	32.0	Fresh Catalyst Added		Mesh	Microns	%	Microns %
Generator Outlet	421	Combined Feed	31046	Sap. No.	61.0	33.8	Total		On 40	419+		80+
Reactor Inlet	416	Wet Gas—Measured	3813	Hydrox. No.			Catalyst Recovered	63½	100	150		40—80
Condenser Inlet		Adjusted	4686	Bromine No.	98		In Reactor at End of Period		150	105		20—40
Product Accumulator	386	Loss	873	Pour °F.					200	74		10—20
				Chemicals, % by K_2CO_3		10.0	REACTOR d-p, Inches H_2O		250	62		0—20
							No. Height		325	44		
TEMPERATURES—°F.		Recycle/Fresh Feed	1.01				0 See Period A	add 1 for 325				
Oxygen	491	Inlet Velocity—ft./sec.	0.96				1	80	CATALYST			
Natural Gas	800	Fresh Feed Rate—S.C.F.H. $CO+H_2$	15484	HEMPEL, DIST. %		°API	2	76	Bulk Density, Lbs./Cu.Ft.			
Generator		per Cu. Ft. Dense Bed	1292	205 °F.			3	90	Aerated			
Quench Accumulator	115	per Lb. Catalyst	7.88	400	79.6	55.2	4	295	Settled			
Reactor Inlet	268	per Sq. Ft.	23460	400-550	12.8	32.0	Total	541	Compacted			
Condenser Inlet	604			550+	7.6				Particle Density, gm./cc.			
Product Accumulator	94						CALCULATED FROM dp		NH_3 Value, ml./gm.			
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	164	N_2 Surface, m^2/gm.			
1 See Per. A				Naphtha °F.			Inventory, Lbs.	1964				
2	655			IBP	96		Bed Depth, Ft.	18.15	CHEMICAL ANALYSIS			
3	653			10%	130		Vol., Cu. Ft.	11.98	Fe			
4	668			50%	222				C			
5	666			90%	350				O			
6	667			EP	396				H			
7	659			Rec.	96.0				K_2O, W+, % basis Fe			
8	645								X-Ray Analysis—			
9	642								$Fe_{20}C_9$			
10	656								Fe_3O_4			
11	674								Fe			

RUN NO. 65-C
HOURS 40-64
CATALYST Bethlehem Mill
Scale Reduced @ 800°F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS	At Wt. Balance		RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	36.456	15.297	428.47	8.320	1.053	29.49	3.581	18.878	4.634	-14.244	-398.98						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
H_2 2.016	60.903	25.555	51.52	37.816	4.786	9.65	16.274	41.829	21.060	-20.769	41.87					400 EP	83.3	9.053	98.0	8.872
CO_2 44.010	1.957	0.821	36.13	30.057	3.804	167.44	12.935	13.756	16.739	2.983	131.31	8.470				400-550	12.4	1.348	91.4	1.232
N_2 28.016	0.197	0.083	2.33	1.620	0.205	5.74	0.697	0.780	0.902							550 +	4.3	0.467	114.6	0.535
CH_4 16.042	0.487	0.204	3.27	11.090	1.404	22.52	4.773	4.977	6.177	1.200	19.25	1.242								
C_2H_4 28.052				2.293	0.290	8.14	0.987	0.987	1.277	0.290	8.14	0.525					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.730	0.219	6.58	0.745	0.745	0.964	0.219	6.58	0.424				PROPYLENE	47.4	7.08		
C_1+C_2											33.97	2.191				C_3 POLY GASO.	87.5	6.19	1.035	
C_3H_6 42.078				2.807	0.355	14.94	1.208	1.208	1.563	0.355	14.94	0.964	4.32	3.458	0.223	C_3 POLY TAR	12.5	0.89	0.118	
C_3H_8 44.094				0.267	0.034	1.50	0.115	0.115	0.149	0.034	1.50	0.097	4.24	0.354	0.023					
C_4H_8 56.104				1.897	0.240	13.46	0.816	0.816	1.056	0.240	13.46	0.868	5.00	2.692	0.174		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.750	0.095	5.52	0.323	0.323	0.418	0.095	5.52	0.356	4.86	1.136	0.073	C_4H_8	5.00	0.17	0.034	68.0
C_5H_{10} 70.130				0.843	0.107	7.50	0.363	0.363	0.470	0.107	7.50	0.484	5.45	1.376	0.089	C_4 POLY GASO.	5.98	11.63	1.945	1.5
C_5H_{12} 72.146				0.247	0.031	2.24	0.106	0.106	0.137	0.031	2.24	0.144	5.25	0.427	0.028	C_4H_{10}	4.86	5.52	1.136	68.0
C_6H_{12} 84.156				0.263	0.033	2.78	0.113	0.113	0.146	0.033	2.78	0.179	5.54	0.502	0.032	C_4 FREE GASO.			12.212	5.8
C_3-C_6											47.94	3.092		9.945	0.642	C_4 POLY TAR	7.53	1.66	0.220	
TOTAL		41.960	521.72		12.656	297.51	43.035	84.995	64.217											
H_2+CO	97.359	40.852	15503 SCFH	5.839			19.855	60.707	25.694	-35.013							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.67	Factor 645036	4.54			4.54	2.22	4.54	1.46						10 # RVP 400 EP GASOLINE	15.327	0.9886	5360	
Weight Recovery, %	93.59	Catalyst Age, hrs.		Space Velocity, vhv	1275	RECOVERED OIL**	0.498	69.85	4.506		10.868	0.701	GAS OIL	1.232	0.0795	431				
Pressure, psig	416	Inlet Velocity, Ft/sec	1.00	Catalyst Vol CF	12.16	TOTAL OIL		117.79	7.598		20.813	1.343	FUEL OIL	0.535	0.0345	187				
Temperature, °F	659	Bed Depth, Ft	18.43	Weight, #	2006	WATER SOLUBLE CHEMICALS **	0.277	14.72	0.949		1.863	0.120	POLY TAR	0.338	0.0218	118				
Recycle Ratio	1.03	Bed Density, #/CF	165	Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ Shift Ratio	= 9.81	TOTAL LIQUID PRODUCTS C_3+		132.51	8.547		22.676	1.463	TOTAL	17.432	1.1244	6096				
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY	NET WATER **	7.751	139.64	9.007		16.764	1.081	W. S. CHEM.	1.863	0.1202	651		
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	GROSS WATER		154.36	9.957		18.627	1.202	TOTAL	19.295	1.2446	6747		
69.84	93.12	81.27	85.71	75.45	49.65	57.68	79.60	HYDROCARBON TOTAL—C_1+		166.48	10.739									

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-C
HOURS 40-64

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA						
PRESSURES PSIG		RATES S.C.F.H.			OIL *	WATER	INVENTORY DATA		PARTICLE SIZE				
Oxygen	444	Fresh Feed	15924	°API	51.8	10.7	In Reactor at Start of Period		Screen Analysis			Sedimentation	
Natural Gas	436	Recycle	16332	Neut. No.	46.8	35.5	Fresh Catalyst Added		Mesh	Microns	%	Microns	%
Generator Outlet	421	Combined Feed	32256	Sap. No.	58.7	38.3	Total		On 40	419+		80+	
Reactor Inlet	416	Wet Gas—Measured	4072	Hydrox. No.			Catalyst Recovered	62½	100	150		40—80	
Condenser Inlet		Adjusted	4803	Bromine No.	101		In Reactor at End of Period		150	105		20—40	
Product Accumulator	386	Loss	731	Pour °F.					200	74		10—20	
				Chemicals, % by K_2CO_3		10.0	REACTOR d-p, Inches H_2O		250	62		0—20	
							No. Height		325	44			
TEMPERATURES—°F.		Recycle/Fresh Feed	1.03				0 See Period A		<325				
Oxygen	466	Inlet Velocity—ft./sec.	1.00				1	80	CATALYST				
Natural Gas	796	Fresh Feed Rate—S.C.F.H. $CO+H_2$	15503	HEMPEL, DIST. %		°API	2	76	Bulk Density, Lbs./Cu.Ft.				
Generator		per Cu. Ft. Dense Bed	1275	205 °F.			3	92	Aerated				
Quench Accumulator	141	per Lb. Catalyst	7.73	400	82.3	54.6	4	305	Settled				
Reactor Inlet	271	per Sq. Ft.	23489	400-550	12.4	35.1	Total	553	Compacted				
Condenser Inlet	594			550+	5.3				Particle Density, gm./cc.				
Product Accumulator	89						CALCULATED FROM dp		NH_3 Value, ml./gm.				
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	165	N_2 Surface, m^2/gm.				
1 See Per. A				Naphtha °F.			Inventory, Lbs.	2006					
2	654			IBP	100		Bed Depth, Ft.	18.43	CHEMICAL ANALYSIS				
3	651			10%	132		Vol., Cu. Ft.	12.16	Fe				
4	664			50%	212				C				
5	663			90%	354				O				
6	664			EP	398				H				
7	656			Rec.	96.0				K_2O, W+, % basis Fe				
8	646								X-Ray Analysis—				
9	639								$Fe_{20}C_9$				
10	641								Fe_3O_4				
11	663								Fe				

RUN NO. 65-D
HOURS 64-88
CATALYST Bethlehem Mill Scale Reduced @ 800°F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
					At Wt. Balance							CONDENSATE								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	37.330	15.454	432.86	8.717	1.134	31.76	3.722	19.176	4.856	-14.320	-401.10						CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
H_2 2.016	60.063	24.864	50.13	37.554	4.887	9.85	16.036	40.900	20.923	-19.977	-40.28					400 EP	83.4	8.342	98.0	8.175
CO_2 44.010	1.957	0.810	35.65	30.263	3.939	173.38	12.923	13.733	16.862	3.129	137.73	9.002				400-550	12.8	1.280	91.4	1.170
N_2 28.016	0.163	0.067	1.88	1.410	0.183	5.13	0.602	0.669	0.785							550 +	3.8	0.380	114.6	0.435
CH_4 16.042	0.487	0.202	3.24	10.893	1.418	22.75	4.652	4.854	6.070	1.216	19.15	1.275								
C_2H_4 28.052				2.363	0.307	8.61	1.009	1.009	1.316	0.307	8.61	0.563					RECOVERY %	#/hr	gal/hr	
C_3H_6 30.068				1.740	0.226	6.80	0.743	0.743	0.969	0.226	6.80	0.444				PROPYLENE	45.3	6.80		
C_1+C_2											34.92	2.282				C_3 POLY GASO.	87.5	5.95	0.995	
C_3H_8 42.078				2.740	0.357	15.02	1.170	1.170	1.527	0.357	15.02	0.982	4.32	3.477	0.227	C_3 POLY TAR	12.5	0.85	0.113	
C_3H_8 44.094				0.213	0.028	1.23	0.091	0.091	0.119	0.028	1.23	0.080	4.24	0.290	0.019					
C_4H_8 56.104				1.917	0.249	13.97	0.819	0.819	1.068	0.249	13.97	0.913	5.00	2.794	0.183		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.760	0.099	5.75	0.325	0.325	0.424	0.099	5.75	0.376	4.86	1.183	0.077	C_4H_8	5.00			68.0
C_5H_{10} 70.130				0.883	0.115	8.06	0.377	0.377	0.492	0.115	8.06	0.527	5.45	1.479	0.097	C_4 POLY GASO.	5.98	12.22	2.044	1.5
C_6H_{12} 72.146				0.260	0.034	2.45	0.111	0.111	0.145	0.034	2.45	0.160	5.25	0.467	0.031	C_4H_{10}	4.86	(5.75) 5.56	(1.183) 1.145	68.0
C_6H_{12} 84.156				0.287	0.037	3.11	0.123	0.123	0.160	0.037	3.11	0.203	5.54	0.561	0.037	C_4-FREE GASO.			11.677	5.8
C_5-C_6											49.59	3.241		10.251	0.671	C_4 POLY TAR	7.53	1.75	0.232	
TOTAL		41.397	523.76		13.013	307.87	42.703	84.100	64.064											
H_2+CO	97.393	40.318	15300 SCFH		6.021		19.758	60.076	25.779	-34.297							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.61	Factor 653594		4.31		4.31	2.13	4.31	1.40						10 # RVP 400 EP GASOLINE	14.866	0.9716	5268	
									RECOVERED OIL**	0.458	64.21	4.197		10.002	0.654	GAS OIL	1.170	0.0765	415	
									TOTAL OIL		113.90	7.438		20.253	1.325	FUEL OIL	0.435	0.0284	154	
									WATER SOLUBLE CHEMICALS **	0.273	14.46	0.945		1.830	0.120	POLY TAR	0.345	0.0225	122	
									TOTAL LIQUID PRODUCTS C_3+		128.26	8.383		22.083	1.445	TOTAL	16.816	1.0990	5959	
									NET WATER **	7.617	137.22	8.969		16.473	1.077	W. S. CHEM.	1.830	0.1196	648	
									GROSS WATER		151.68	9.914		18.303	1.196	TOTAL	18.646	1.2186	6607	
									HYDROCARBON TOTAL—C_1+		163.18	10.665								

Weight Recovery, % 93.46 | Catalyst Age, hrs. | Space Velocity, vhv 1248
Pressure, psig 417 | Inlet Velocity, Ft/sec 0.99 | Catalyst Vol CF 12.26
Temperature, °F 661 | Bed Depth, Ft 18.58 | Weight, # 2023
Recycle Ratio 1.03 | Bed Density, #/CF 165 | Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ Shift Ratio = 9.54

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
68.57	92.66	80.35	85.07	74.68	48.84	57.09	78.60

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-D
HOURS 64-88

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA				
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE		
Oxygen	445	Fresh Feed	15710	°API	52.0	10.7	In Reactor at Start of Period		Screen Analysis		Sedimentation
Natural Gas	436	Recycle	16206	Neut. No.	48.5	35.9	Fresh Catalyst Added		Mesh	Microns %	Microns %
Generator Outlet	421	Combined Feed	31916	Sap. No.	61.0	38.6	Total		On 40	419+	80+
Reactor Inlet	417	Wet Gas—Measured	4192	Hydrox. No.			Catalyst Recovered	47	100	150	40—80
Condenser Inlet		Adjusted	4939	Bromine No.			In Reactor at End of Period		150	105	20—40
Product Accumulator	386	Loss	747	Pour °F.					200	74	10—20
				Chemicals, % by K_2CO_3		10.0	REACTOR d-p, Inches H_2O		250	62	0—20
							No. Height		325	44	
TEMPERATURES—°F.		Recycle/Fresh Feed	1.03				0 See Period A	add 1 ft	<325		
Oxygen	437	Inlet Velocity—ft./sec.	0.99				1	81	CATALYST		
Natural Gas	813	Fresh Feed Rate—S.C.F.H.	15300	HEMPEL. DIST. %		°API	2	76	Bulk Density, Lbs./Cu.Ft.		
Generator		per Cu. Ft. Dense Bed	1248	205 °F.			3	91	Aerated		
Quench Accumulator	126	per Lb. Catalyst	7.56	400	82.4	55.1	4	310	Settled		
Reactor Inlet	286	per Sq. Ft.	23182	400-550	12.8	34.2	Total	559	Compacted		
Condenser Inlet	586			550+	4.8				Particle Density, gm./cc.		
Product Accumulator	92	Heat Transfer Calculations					CALCULATED FROM dp		NH_3 Value, ml./gm.		
Catalyst No. Height		Steam Rate = 379#/hr		A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	165	N_2 Surface, m^2/gm.		
1 See Per. A		@ 707 psia & 505°F=		Naphtha °F.			Inventory, Lbs.	2023			
2	658	1201 BTU/#		IBP	100		Bed Depth, Ft.	18.58	CHEMICAL ANALYSIS		
3	656	Water in @ 57°F=25 BTU/#		10%	130		Vol., Cu. Ft.	12.26	Fe		
4	668	Net Heat Transferred/# Steam		50%	210				C		
5	665	= 1176 BTU		90%	348				O		
6	665	(1176)(379)=445704		EP	396				H		
7	655	Ave. Bed Temp=661°F		Rec.	96.5				K_2O, W+, % basis Fe		
8	646	dT=661-505=156°F							X-Ray Analysis—		
9	638	Tube Area= 33.8 sq ft							$Fe_{20}C_9$		
10	635	K= $\frac{445704}{(33.8)(156)}$ =							Fe_3O_4		
11	633	84.5 BTU/°F/sq ft							Fe		

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 65-E
HOURS 88-112
CATALYST Bethlehem Mill Scale Reduced @ 800°F

FRESH FEED				WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED									
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	37.000	15.287	428.19	9.487	1.267	35.49	4.077	19.364	5.344	-14.020	-392.70						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
H_2 2.016	60.413	24.960	50.32	38.616	5.158	10.40	16.593	41.553	21.751	-19.802	-39.92					400 EP	83.4	7.636	98.0	7.483
CO_2 44.010	1.917	0.792	34.86	29.243	3.908	171.97	12.566	13.358	16.474	3.116	137.11	8.977				400-550	12.8	1.172	91.4	1.071
N_2 28.016	0.197	0.081	2.27	1.447	0.193	5.41	0.622	0.703	0.815							550 +	3.8	0.348	114.6	0.399
CH_4 16.042	0.473	0.195	3.13	10.136	1.354	21.72	4.355	4.550	5.709	1.159	18.59	1.217								
C_2H_4 28.052				2.197	0.293	8.22	0.944	0.944	1.237	0.293	8.22	0.538					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.693	0.226	6.80	0.727	0.727	0.953	0.226	6.80	0.445				PROPYLENE	44.0	7.22		
C_1+C_2											33.61	2.200				C_3 POLY GASO.	87.5	6.32	1.057	
C_3H_6 42.078				2.920	0.390	16.41	1.255	1.255	1.645	0.390	16.41	1.074	4.32	3.799	0.249	C_3 POLY TAR	12.5	0.90	0.120	
C_3H_8 44.094				0.297	0.040	1.76	0.128	0.128	0.168	0.040	1.76	0.115	4.24	0.415	0.027					
C_4H_8 56.104				1.960	0.262	14.70	0.842	0.842	1.104	0.262	14.70	0.962	5.00	2.940	0.192		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.677	0.090	5.23	0.291	0.291	0.381	0.090	5.23	0.342	4.86	1.076	0.070	C_4H_8	5.00	0.13	0.026	68.0
C_5H_{10} 70.130				0.893	0.119	8.35	0.384	0.384	0.503	0.119	8.35	0.547	5.45	1.532	0.100	C_4 POLY GASO.	5.98	12.75	2.132	1.5
C_5H_{12} 72.146				0.177	0.024	1.73	0.076	0.076	0.100	0.024	1.73	0.113	5.25	0.330	0.022	C_4H_{10}	4.86	5.23	1.076	68.0
C_6H_{12} 84.156				0.257	0.034	2.86	0.110	0.110	0.144	0.034	2.86	0.187	5.54	0.516	0.034	C_4 FREE GASO.			10.918	5.8
C_3-C_6											51.04	3.340		10.608	0.694	C_4 POLY TAR	7.53	1.82	0.242	
TOTAL		41.315	518.77		13.358	311.05	42.970	84.285	64.482											
H_2+CO	97.413	40.247	15273 SCFH		6.425		20.670	60.917	27.095	-33.822							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.65	Factor 654750		4.07		4.07	2.15	4.07	1.41						10 # RVP 400 EP GASOLINE	14.152	0.9266	5024	
Weight Recovery, % 95.88			Catalyst Age, hrs.			Space Velocity, vhv 1253			RECOVERED OIL**	0.421	59.04	3.866		9.156	0.599	GAS OIL	1.071	0.0701	380	
Pressure, psig 416			Inlet Velocity, Ft/sec 1.00			Catalyst Vol CF 12.19			TOTAL OIL		110.08	7.206		19.764	1.293	FUEL OIL	0.399	0.0261	142	
Temperature, °F 668			Bed Depth, Ft 18.47			Weight, # 2035			WATER SOLUBLE CHEMICALS **	0.267	14.18	0.928		1.794	0.117	POLY TAR	0.362	0.0237	128	
Recycle Ratio 1.04			Bed Density, #/CF 167			Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ Shift Ratio = 8.98			TOTAL LIQUID PRODUCTS C_3+		124.26	8.134		21.558	1.410	TOTAL	15.984	1.0465	5674	
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY		NET WATER **	7.466	134.50	8.806		16.147	1.057	W. S. CHEM.	1.794	0.1175	637	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+		GROSS WATER		148.68	9.735		17.941	1.175	TOTAL	17.778	1.1640	6311	
67.67	91.71	79.33	84.04	72.40	47.65	55.52	78.71		HYDROCARBON TOTAL—C_1+		157.87	10.337								

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-E
HOURS 88-112

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA						
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE				
Oxygen	445	Fresh Feed	15679	°API	51.2	10.7	In Reactor at Start of Period		Screen Analysis			Sedimentation	
Natural Gas	436	Recycle	16307	Neut. No.	46.6	33.3	Fresh Catalyst Added		Mesh	Microns	%	Microns	%
Generator Outlet	420	Combined Feed	31986	Sap. No.	61.6	37.1	Total		On 40	419+		80+	
Reactor Inlet	416	Wet Gas—Measured	4438	Hydrox. No.			Catalyst Recovered		100	150		40—80	
Condenser Inlet		Adjusted	5070	Bromine No.	91		In Reactor at End of Period		150	105		20—40	
Product Accumulator		Loss	632	Pour °F.					200	74		10—20	
				Chemicals, % by K_2CO_3		10.0	REACTOR d-p, Inches H_2O		250	62		0—20	
							No. Height		325	44			
TEMPERATURES—°F.		Recycle/Fresh Feed	1.04				0 See Period A		<325				
Oxygen	484	Inlet Velocity—ft./sec.	1.00				1	81	CATALYST				
Natural Gas	804	Fresh Feed Rate—S.C.F.H. CO+H2	15273	HEMPEL, DIST. %		°API	2	77	Bulk Density, Lbs./Cu.Ft.				
Generator		per Cu. Ft. Dense Bed	1253	205 °F.			3	93	Aerated				
Quench Accumulator	127	per Lb. Catalyst	7.51	400	82.4	54.2	4	310	Settled				
Reactor Inlet	288	per Sq. Ft.	23140	400-550	12.8	34.4	Total	561	Compacted				
Condenser Inlet	586			550+	4.8				Particle Density, gm./cc.				
Product Accumulator	94						CALCULATED FROM dp		NH_3 Value, ml./gm.				
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	167	N_2 Surface, m^2/gm.				
1 See Per. A				Naphtha °F.			Inventory, Lbs.	2035					
2	368			IBP	98		Bed Depth, Ft.	18.47	CHEMICAL ANALYSIS				
3	662			10%	130		Vol., Cu. Ft.	12.19	Fe				
4	674			50%	210				C				
5	672			90%	350				O				
6	672			EP	398				H				
7	662			Rec.	96.5				K_2O, W+, % basis Fe				
8	652								X-Ray Analysis—				
9	644								$Fe_{20}C_9$				
10	640								Fe_3O_4				
11	628								Fe				

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

Forced on Wet Gas, Oil and Water

RUN NO. 65-F
HOURS 112-136
CATALYST Bethlehem Mill Scale Reduced @ 800°F

	FRESH FEED			WET GAS	At Wt. Balance		RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
CO 28.010	37.165	15.325	429.25	8.793	1.177	32.96	3.801	19.126	4.978	-14.148	-396.29									
H_2 2.016	60.534	24.962	50.32	39.343	5.266	10.62	17.005	41.967	22.271	-19.696	-39.70					400 EP	84.2	7.680	98.0	7.526
CO_2 44.010	1.743	0.719	31.64	28.860	3.863	170.00	12.474	13.193	16.337	3.144	138.36	9.064				400-550	11.6	1.058	91.4	0.967
N_2 28.016	0.183	0.075	2.10	1.857	0.248	6.95	0.803	0.879	1.051							550 +	4.2	0.383	114.6	0.439
CH_4 16.042	0.377	0.155	2.49	10.230	1.369	21.95	4.422	4.577	5.791	1.214	19.46	1.277								
C_2H_6 28.052				2.310	0.309	8.67	0.998	0.998	1.307	0.309	8.67	0.569					RECOVERY %	#/hr	gal/hr	
C_2H_4 30.068				1.693	0.227	6.83	0.732	0.732	0.959	0.227	6.83	0.448				PROPYLENE	43.8	6.06		
C_1+C_2											34.96	2.294				C_3 POLY GASO.	87.5	5.30	0.886	
C_3H_6 42.078				2.457	0.329	13.84	1.062	1.062	1.391	0.329	13.84	0.908	4.32	3.204	0.210	C_3 POLY TAR	12.5	0.76	0.101	
C_3H_8 44.094				0.213	0.029	1.28	0.092	0.092	0.121	0.029	1.28	0.084	4.24	0.302	0.020					
C_4H_8 56.104				1.863	0.249	13.97	0.805	0.805	1.054	0.249	13.97	0.917	5.00	2.794	0.183		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.840	0.113	6.57	0.363	0.363	0.476	0.113	6.57	0.431	4.86	1.352	0.089	C_4H_8	5.00			68.0
C_5H_{10} 70.130				0.927	0.124	8.70	0.401	0.401	0.525	0.124	8.70	0.571	5.45	1.596	0.105	C_4 POLY GASO.	5.98	12.22	2.044	1.5
C_6H_{12} 72.146				0.277	0.037	2.67	0.120	0.120	0.157	0.037	2.67	0.175	5.25	0.509	0.033	C_4H_{10}	4.86	(6.57) 5.40	(1.352) 1.112	68.0
C_6H_{12} 84.156				0.337	0.045	3.79	0.146	0.146	0.191	0.045	3.79	0.249	5.54	0.684	0.045	C_4 FREE GASO.			11.201	5.8
C_3-C_6											50.82	3.334		10.441	0.685	C_4 POLY TAR	7.53	1.75	0.232	
TOTAL		41.236	515.80		13.385	308.80	43.223	84.459	64.728											
H_2+CO	97.697	40.287	15242 SCFH		6.443		20.806	61.093	27.249	-33.844							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.65	Factor 65608		4.47		4.47	2.19	4.47	1.39						10 # RVP 400 EP GASOLINE	14.357	0.9419	5107	
Weight Recovery, % 94.14		Catalyst Age, hrs.			Space Velocity, vhv 1244		RECOVERED OIL**			0.416	58.34	3.828		9.121	0.598	GAS OIL	0.967	0.0634	344	
Pressure, psig 415		Inlet Velocity, Ft/sec 1.00			Catalyst Vol CF 12.25		TOTAL OIL				109.16	7.162		19.562	1.283	FUEL OIL	0.439	0.0288	156	
Temperature, °F 668		Bed Depth, Ft 1856			Weight, # 2021		WATER SOLUBLE CHEMICALS**			0.281	14.92	0.979		1.884	0.124	POLY TAR	0.333	0.0218	118	
Recycle Ratio 1.05		Bed Density, #/CF 165			Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ Shift Ratio = 9.85		TOTAL LIQUID PRODUCTS C_2+				124.08	8.141		21.446	1.407	TOTAL	16.096	1.0559	5725	
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY			NET WATER **		7.423	133.74	8.774		16.055	1.053	W. S. CHEM.	1.884	0.1236	670	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+			GROSS WATER			148.66	9.753		17.939	1.177	TOTAL	17.980	1.1795	6395	
67.54	92.32	78.90	82.07	73.97	46.93	55.40	78.02			HYDROCARBON TOTAL—C_1+			159.04	10.434						

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-F
HOURS 112-136

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA			
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE	
Oxygen	445	Fresh Feed	15649	°API	52.7	10.7	In Reactor at Start of Period		Screen Analysis	Sedimentation
Natural Gas	435	Recycle	16403	Neut. No.	48.3	35.6	Fresh Catalyst Added		Mesh / Microns / %	Microns / %
Generator Outlet	420	Combined Feed	32052	Sap. No.	60.8	37.4	Total		On 40 / 419+	80+
Reactor Inlet	415	Wet Gas—Measured	4359	Hydrox. No.			Catalyst Recovered	12	100 / 150	40—80
Condenser Inlet		Adjusted	5080	Bromine No.			In Reactor at End of Period		150 / 105	20—40
Product Accumulator	385	Loss	721	Pour °F.	Below -30				200 / 74	10—20
				Chemicals, % by K_2CO_3		10.5	REACTOR d-p, Inches H_2O		250 / 62	0—20
							No. Height		325 / 44	
TEMPERATURES—°F		Recycle/Fresh Feed	1.05				0 See Period A		<325	
Oxygen	470	Inlet Velocity—ft./sec.	1.00				1	79	CATALYST	
Natural Gas	786	Fresh Feed Rate—S.C.F.H.	15242	HEMPEL DIST. %		°API	2	76	Bulk Density, Lbs./Cu.Ft.	
Generator		per Cu.Ft. Dense Bed	1244	205 °F.			3	92	Aerated	
Quench Accumulator	110	per Lb. Catalyst	7.54	400	83.2	53.8	4	310	Settled	
Reactor Inlet	285	per Sq. Ft.	23094	400-550	11.6	34.3	Total	557	Compacted	
Condenser Inlet	589			550+	5.2				Particle Density, gm./cc.	
Product Accumulator	93						CALCULATED FROM dp		NH_3 Value, ml./gm.	
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	165	N_2 Surface, m^2/gm.	
1 See Per. A				Naphtha °F.			Inventory, Lbs.	2021		
2	669			IBP	96		Bed Depth, Ft.	18.56	CHEMICAL ANALYSIS	
3	663			10%	128		Vol., Cu. Ft.	12.25	Fe	
4	674			50%	208				C	
5	675			90%	346				O	
6	675			EP	390				H	
7	665			Rec.	96.5				K_2O, W+, % basis Fe	
8	655								X-Ray Analysis—	
9	646								$Fe_{2.2}C_2$	
10	643								Fe_3O_4	
11	627								Fe	

RUN NO. 65-G
HOURS 136-160
CATALYST Bethlehem Mill Scale Reduced @ 800°F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

Forced

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
CO 28.010	37.470	15.289	428.24	8.483	1.132	31.70	3.622	18.911	4.754	-14.157	-396.54									
H_2 2.016	60.126	24.535	49.46	38.272	5.108	10.30	16.342	40.877	21.450	-19.427	-39.16					400 EP	80.9	7.431	98.0	7.282
CO_2 44.010	2.150	0.877	38.60	30.663	4.092	180.07	13.094	13.971	17.186	3.215	141.47	9.361				400-550	12.0	1.102	91.4	1.007
N_2 28.016	0.177	0.072	2.02	1.507	0.201	5.63	0.644	0.716	0.845							550 +	7.1	0.652	114.6	0.747
CH_4 16.042	0.077	0.031	0.50	9.793	1.307	20.96	4.182	4.213	5.489	1.276	20.46	1.354								
C_2H_4 28.052				2.350	0.314	8.80	1.004	1.004	1.318	0.314	8.80	0.582					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.747	0.233	7.01	0.746	0.746	0.979	0.233	7.01	0.464				PROPYLENE	43.3	7.75		
C_1+C_2											36.27	2.400				C_3 POLY GASO.	87.5	6.78	1.134	
C_3H_6 42.078				3.187	0.425	17.90	1.361	1.361	1.786	0.425	17.90	1.184	4.32	4.144	0.274	C_3 POLY TAR	12.5	0.97	0.129	
C_3H_8 44.094				0.287	0.038	1.67	0.123	0.123	0.161	0.038	1.67	0.111	4.24	0.394	0.026					
C_4H_8 56.104				1.860	0.249	13.95	0.794	0.794	1.043	0.249	13.95	0.923	5.00	2.790	0.185		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.640	0.085	4.96	0.273	0.273	0.358	0.085	4.96	0.328	4.86	1.021	0.068	C_4H_8	5.00	0.20	0.040	68.0
C_5H_{10} 70.130				0.867	0.116	8.11	0.370	0.370	0.486	0.116	8.11	0.537	5.45	1.488	0.098	C_4 POLY GASO.	5.98	12.03	2.012	1.5
C_5H_{12} 72.146				0.157	0.021	1.54	0.067	0.067	0.088	0.021	1.54	0.102	5.25	0.293	0.019	C_4H_{10}	4.86	4.96	1.021	68.0
C_6H_{12} 84.156				0.187	0.025	2.13	0.080	0.080	0.105	0.025	2.13	0.141	5.54	0.384	0.025	C_4 FREE GASO.			10.581	5.8
C_5-C_6														10.514	0.695	C_4 POLY TAR	7.53	1.72	0.228	
TOTAL		40.804			13.346	314.71	42.703	83.507	63.972		50.26	3.326								
H_2+CO	97.596	39.824	15113 SCFH		6.240		19.964	59.788	26.204	-33.584							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.60	Factor 661681		4.51		4.51	2.16	4.51							10 # RVP 400 EP GASOLINE	13.654	0.9035	4898	
									RECOVERED OIL**	0.420	58.84	3.893		9.185	0.608	GAS OIL	1.007	0.0666	361	
									TOTAL OIL		109.10	7.219		19.699	1.303	FUEL OIL	0.747	0.0494	268	
									WATER SOLUBLE CHEMICALS**	0.289	15.32	1.014		1.929	0.128	POLY TAR	0.357	0.0236	128	
									TOTAL LIQUID PRODUCTS C_5+		124.42	8.233		21.628	1.431	TOTAL	15.765	1.0431	5655	
									NET WATER **	7.215	129.98	8.601		15.604	1.032	W. S. CHEM.	1.929	0.1276	692	
									GROSS WATER		145.30	9.614		17.533	1.160	TOTAL	17.694	1.1707	6347	
									HYDROCARBON TOTAL—C_1+		160.67	10.631							

Weight Recovery, %	90.40	Catalyst Age, hrs.		Space Velocity, vhv	1208			
Pressure, psig	415	Inlet Velocity, Ft/sec	0.99	Catalyst Vol CF	12.52			
Temperature, °F	665	Bed Depth, Ft	18.97	Weight, #	2003			
Recycle Ratio	1.05	Bed Density, #/CF	160	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$	= 10.75			

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3 + /C_1 +
67.29	92.60	79.18	84.33	74.86	47.53	56.17	77.44

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-G
HOURS 136-160

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA						
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE				
Oxygen	446	Fresh Feed	15485				In Reactor at Start of Period		Screen Analysis			Sedimentation	
Natural Gas	437	Recycle	16206	°API	52.4	10.7	Fresh Catalyst Added		Mesh	Microns	%	Microns	%
Generator Outlet	419	Combined Feed	31691	Neut. No.	51.1	36.2	Total		On 40	419+		80+	
Reactor Inlet	415	Wet Gas—Measured	4412	Sap. No.	62.0	38.7	Catalyst Recovered	27	100	150		40—80	
Condenser Inlet		Adjusted	5065	Hydrox. No.			In Reactor at End of Period		150	105		20—40	
Product Accumulator	385	Loss	653	Bromine No.	96				200	74		10—20	
				Pour °F.			REACTOR d-p, Inches H_2O		250	62		0—20	
				Chemicals, % by K_2CO_3		11.0	No. Height		325	44			
TEMPERATURES—°F.		Recycle/Fresh Feed	1.05				0 See Period A		<325				
Oxygen	485	Inlet Velocity—ft./sec.	0.99				1	78	CATALYST				
Natural Gas	792	Fresh Feed Rate—S.C.F.H.	15113	HEMPEL, DIST. %		°API	2	75	Bulk Density, Lbs./Cu.Ft.				
Generator		per Cu.Ft. Dense Bed	1207	205 °F.			3	90	Aerated				
Quench Accumulator	127	per Lb. Catalyst	7.55	400	79.9	54.5	4	310	Settled				
Reactor Inlet	261	per Sq. Ft.	22898	400-550	12.0	32.5	Total	553	Compacted				
Condenser Inlet	587			550+	8.1				Particle Density, gm./cc.				
Product Accumulator	90	Heat Transfer Calculations					CALCULATED FROM dp		NH_3 Value, ml./gm.				
Catalyst No. Height		Steam Rate = 363 #/hr		A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	160	N_2 Surface, m^2/gm.				
1 See Per. A		@ 705 psia & 506°Fs		Naphtha °F.			Inventory, Lbs.	2003					
2	663	1201 BTU/#		IBP	99		Bed Depth, Ft.	18.97	CHEMICAL ANALYSIS				
3	657	Water in @ 61°F=29 BTU/#		10%	126		Vol., Cu. Ft.	12.52	Fe				
4	669	Net Heat Transferred/# Steam		50%	210				C				
5	670	= 1172 BTU		90%	340				O				
6	671	(1172)(363)=425436 BTU/hr		EP					H				
7	661	Ave. Bed Temp.= 663°F		Rec.	96				K_2O, W+, % basis Fe				
8	653	dT=663-506=157°F							X-Ray Analysis—				
9	645	Tube Area=34.4 sq ft							Fe_2C_6				
10	641	K= 425436 / (34.4)(157) =78.8 BTU/°F/sq ft							Fe_3O_4				
11	623								Fe				

RUN NO. 65-H
HOURS 160-184
CATALYST Bethlehem Mill
Scale Reduced @ 800°F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

Forced

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	37.737	15.461	433.01	8.007	1.111	31.12	3.460	18.921	4.571	-14.350	-401.89						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
H_2 2.016	59.823	24.508	49.41	40.100	5.567	11.23	17.329	41.837	22.896	-18.951	-38.18					400 EP	79.0	6.841	98.0	6.704
CO_2 44.010	1.993	0.817	35.96	29.800	4.137	182.08	12.877	13.694	17.014	3.320	146.12	9.633				400-550	10.8	0.935	91.4	0.855
N_2 28.016	0.177	0.073	2.05	1.333	0.185	5.18	0.576	0.649	0.761							550 +	10.2	0.883	114.6	1.012
CH_4 16.042	0.270	0.111	1.78	9.654	1.340	21.49	4.172	4.283	5.512	1.229	19.71	1.299								
C_2H_4 28.052				2.213	0.307	8.62	0.956	0.956	1.263	0.307	8.62	0.568					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.670	0.232	6.97	0.722	0.722	0.964	0.232	6.97	0.459				PROPYLENE	41.8	7.45		
C_3+C_4											35.30	2.326				C_3 POLY GASO.	87.5	6.52	1.090	
C_3H_6 42.079				3.053	0.423	17.82	1.319	1.319	1.742	0.423	17.82	1.174	4.32	4.125	0.272	C_3 POLY TAR	12.5	0.93	0.124	
C_3H_8 44.094				0.323	0.045	1.98	0.140	0.140	0.185	0.045	1.98	0.131	4.24	0.467	0.031					
C_4H_8 56.104				1.790	0.248	13.92	0.773	0.773	1.021	0.248	13.92	0.918	5.00	2.784	0.184		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.697	0.097	5.62	0.301	0.301	0.398	0.097	5.62	0.370	4.86	1.156	0.076	C_4H_8	5.00			68.0
C_5H_{10} 70.130				0.827	0.115	8.07	0.357	0.357	0.472	0.115	8.07	0.532	5.45	1.481	0.098	C_4 POLY GASO.	5.98	12.18	2.037	1.5
C_6H_{12} 72.146				0.320	0.044	3.18	0.138	0.138	0.182	0.044	3.18	0.210	5.25	0.606	0.040	C_4H_{10}	4.86	(5.62) 5.09	(1.156) 1.047	68.0
C_6H_{12} 84.156				0.213	0.030	2.50	0.092	0.092	0.122	0.030	2.50	0.165	5.54	0.451	0.030	C_4 FREE GASO.			10.332	5.8
C_5-C_6											53.09	3.500		11.070	0.731	C_4 POLY TAR	7.53	1.74	0.231	
TOTAL		40.970	522.21		13.881	319.79	43.212	84.182	65.117											
H_2+CO	97.560	39.969	15169 SCFH		6.678		20.789	60.758	27.119	-33.301							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.59	Factor 65924		5.01		5.01	2.21	5.01	1.32						10 # RVP 400 EP GASOLINE	13.416	0.8844	4795	
Weight Recovery, %	88.14	Catalyst Age, hrs.		Space Velocity, vhv	1243	RECOVERED OIL**	0.395	55.41	3.653		8.659	0.571	GAS OIL	0.855	0.0564	306				
Pressure, psig	414	Inlet Velocity, Ft/sec	1.00	Catalyst Vol CF	12.20	TOTAL OIL		108.50	7.153		19.729	1.302	FUEL OIL	1.012	0.0667	362				
Temperature, °F	663	Bed Depth, Ft	18.49	Weight, #	1928	WATER SOLUBLE CHEMICALS**	0.278	14.75	0.972		1.863	0.123	POLY TAR	0.355	0.0234	127				
Recycle Ratio	1.05	Bed Density, #/CF	158	Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ Shift Ratio	=11.61	TOTAL LIQUID PRODUCTS C_5+		123.25	8.125		21.592	1.425	TOTAL	15.638	1.0309	5590				
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY	NET WATER **	7.341	132.26	8.719		15.877	1.047	W. S. CHEM.	1.863	0.1228	666		
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3 + /C_1 +	GROSS WATER		147.01	9.691		17.740	1.169	TOTAL	17.501	1.1537	6256		
66.12	92.81	77.33	83.32	75.84	45.30	54.81	77.74	HYDROCARBON TOTAL—C_1+		158.55	10.452									

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91×#/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6× gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-H
HOURS 160-184

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE			
Oxygen	446	Fresh Feed	15548				In Reactor at Start of Period		Screen Analysis			Sedimentation
Natural Gas	435	Recycle	16399	°API	52.6	10.7	Fresh Catalyst Added		Mesh	Microns	%	Microns %
Generator Outlet	419	Combined Feed	31947	Neut. No.	50.9	35.7	Total		On 40	419+		80+
Reactor Inlet	414	Wet Gas—Measured	4479	Sap. No.	64.4	38.4	Catalyst Recovered	19	100	150		40—80
Condenser Inlet		Adjusted	5268	Hydrox. No.			In Reactor at End of Period		150	105		20—40
Product Accumulator	384	Loss	789	Bromine No.	96				200	74		10—20
				Pour °F.			REACTOR d-p, Inches H_2O		250	62		0—20
				Chemicals, % by K_2CO_3		10.5			325	44		
TEMPERATURES—°F.		Recycle/Fresh Feed	1.05				No. Height		<325			
Oxygen	505	Inlet Velocity—ft./sec.	1.00				0 See Period A					
Natural Gas	784	Fresh Feed Rate—S.C.F.H.	15169				1	77	CATALYST			
Generator		per Cu. Ft. Dense Bed	1243	HEMPEL, DIST. %		°API	2	74	Bulk Density, Lbs./Cu.Ft.			
Quench Accumulator	128	per Lb. Catalyst	7.87	205 °F.			3	89	Aerated			
Reactor Inlet	253	per Sq. Ft.	22983	400	78.0	54.4	4	315	Settled			
Condenser Inlet	588			400-550	10.8	34.2	Total	555	Compacted			
Product Accumulator	90			550+	11.2				Particle Density, gm./cc.			
Catalyst No. Height							CALCULATED FROM dp		NH_3 Value, ml./gm.			
1 See Per. A				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	158	N_2 Surface, m^2/gm.			
2	664			Naphtha °F.			Inventory, Lbs.	1928				
3	654			IBP	102		Bed Depth, Ft.	18.49	CHEMICAL ANALYSIS			
4	666			10%	138		Vol., Cu. Ft.	12.20	Fe			
5	669			50%	220				C			
6	671			90%	340				O			
7	663			EP	390				H			
8	654			Rec.	97.0				K_2O, W+, % basis Fe			
9	646								X-Ray Analysis—			
10	643								$Fe_{2.2}C_2$			
11	622								Fe_3O_4			
									Fe			

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 65-I
HOURS 184-208
CATALYST Bethlehem Mill Scale Reduced @ 800°F

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
CO 28.010	37.014	15.113	423.30	7.957	1.063	29.76	3.367	18.480	4.430	-14.050	-393.54
H_2 2.016	60.150	24.559	49.51	37.503	5.008	10.10	15.871	40.430	20.879	-19.551	-39.41
CO_2 44.010	2.280	0.931	40.97	30.513	4.075	179.29	12.913	13.844	16.988	3.144	138.32
N_2 28.016	0.313	0.128	3.59	1.480	0.198	5.54	0.626	0.754	0.824		
CH_4 16.042	0.243	0.099	1.59	10.327	1.379	22.12	4.370	4.469	5.749	1.280	20.53
C_2H_4 28.052				2.480	0.331	9.29	1.049	1.049	1.380	0.331	9.29
C_2H_6 30.068				1.843	0.246	7.40	0.780	0.780	1.026	0.246	7.40
C_1+C_2											37.22
C_3H_6 42.078				3.210	0.429	18.05	1.358	1.358	1.787	0.429	18.05
C_3H_8 44.094				0.280	0.038	1.67	0.118	0.118	0.156	0.038	1.67
C_4H_8 56.104				2.057	0.275	15.43	0.870	0.870	1.145	0.275	15.43
C_4H_{10} 58.120				0.837	0.111	6.47	0.354	0.354	0.465	0.111	6.47
C_5H_{10} 70.130				1.027	0.138	9.65	0.435	0.435	0.573	0.138	9.65
C_5H_{12} 72.146				0.213	0.028	2.02	0.090	0.090	0.118	0.028	2.02
C_6H_{12} 84.156				0.273	0.037	3.10	0.116	0.116	0.153	0.037	3.10
C_3-C_4											56.39
TOTAL		40.830	518.96		13.355	319.90	42.317	83.147	63.453		
H_2+CO	97.164	39.672	15056 SCFH		6.071		19.238	58.910	25.309	-33.601	
H_2/CO		1.63	Factor 664187		4.71		4.71	2.19	4.71	1.39	

CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
6.364			
0.617			
0.491			
2.472			
1.199	4.32	4.178	0.277
0.111	4.24	0.394	0.026
1.025	5.00	3.086	0.205
0.430	4.86	1.331	0.088
0.641	5.48	1.771	0.118
0.134	5.25	0.386	0.026
0.206	5.54	0.560	0.037
3.746		11.705	0.777
0.405	56.86	3.777	8.876	0.590
	113.25	7.523	20.581	1.367
0.281	14.91	0.990	1.889	0.125
	128.16	8.513	22.470	1.492
7.065	127.28	8.454	15.280	1.015
	142.19	9.444	17.169	1.140
	165.38	10.984		

YIELD BASIS H_2+CO FED

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*

	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	79.0	7.012	98.0	6.872
400-550	11.2	0.994	91.4	0.909
550 +	9.8	0.870	114.6	0.997

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	43.3	7.82		
C_3 POLY GASO.	87.5	6.84	1.144	
C_3 POLY TAR	12.5	0.98	0.130	

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00			68.0
C_4 POLY GASO.	5.98	13.50	2.258	1.5
C_4H_{10}	4.86	(6.47) 5.39	(1.331) 1.110	68.0
C_4-FREE GASO.			10.732	5.8
C_4 POLY TAR	7.53	1.93	0.256	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	14.100	0.9365	5077
GAS OIL	0.909	0.0604	327
FUEL OIL	0.997	0.0662	359
POLY TAR	0.386	0.0256	139
TOTAL	16.392	1.0887	5902
W.S. CHEM.	1.889	0.1255	680
TOTAL	18.281	1.2142	6582

Weight Recovery, %	94.79
Pressure, psig	414
Temperature, °F	667
Recycle Ratio	1.04

Catalyst Age, hrs.	
Inlet Velocity, Ft/sec	0.99
Bed Depth, Ft	19.30
Bed Density, #/C F	152

Space Velocity, vhv	1182
Catalyst Vol CF	12.74
Weight, #	1936
Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	11.33

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3 + /C_1 +
67.29	92.97	79.61	84.70	76.03	48.36	57.04	77.49

RECOVERED OIL **	0.405
TOTAL OIL	
WATER SOLUBLE CHEMICALS **	0.281
TOTAL LIQUID PRODUCTS C_3+	
NET WATER **	7.065
GROSS WATER	
HYDROCARBON TOTAL—C_1+	

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-I
HOURS 184-208

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	444	Fresh Feed	15495
Natural Gas	436	Recycle	16059
Generator Outlet	418	Combined Feed	31554
Reactor Inlet	414	Wet Gas—Measured	4381
Condenser Inlet		Adjusted	5068
Product Accumulator	383	Loss	687
TEMPERATURES—°F.		Recycle/Fresh Feed	1.04
Oxygen	478	Inlet Velocity—ft./sec.	0.99
Natural Gas	784	Fresh Feed Rate—S.C.F.H.	15056
Generator		per Cu. Ft. Dense Bed	1182
Quench Accumulator	128	per Lb. Catalyst	7.78
Reactor Inlet	267	per Sq. Ft.	22812
Condenser Inlet	589		
Product Accumulator	89		
Catalyst No. Height			
1 See Per. A			
2	669		
3	659		
4	671		
5	674		
6	675		
7	667		
8	657		
9	649		
10	644		
11	624		

PRODUCT TESTS	OIL	WATER
°API	52.4	10.8
Neut. No.	48.8	36.0
Sap. No.	63.6	38.4
Hydrox. No.		
Bromine No.	96	
Pour °F.		
Chemicals, % by K_2CO_3		11.0
HEMPEL. DIST. %		°API
205 °F.		
400	78.0	52.6
400-550	11.2	33.5
550+	10.8	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	112	
10%	140	
50%	224	
90%	348	
EP	392	
Rec.	96.5	

CATALYST DATA		
INVENTORY DATA		
In Reactor at Start of Period		
Fresh Catalyst Added		
Total		
Catalyst Recovered	14	
In Reactor at End of Period		
REACTOR d-p, Inches H_2O		
No. Height		
0 See Period A		
1	73	
2	72	
3	85	
4	305	
Total	535	
CALCULATED FROM dp		
Density, Lbs./Cu.Ft.	152	
Inventory, Lbs.	1936	
Bed Depth, Ft.	19.30	
Vol., Cu. Ft.	12.74	

PARTICLE SIZE					
	Screen Analysis			Sedimentation	
	Mesh	Microns	%	Microns	%
	On 40	419+		80+	
	100	150		40—80	
	150	105		20—40	
	200	74		10—20	
	250	62		0—20	
	325	44			
	<325				

CATALYST	
Bulk Density, Lbs./Cu.Ft.	
Aerated	
Settled	
Compacted	
Particle Density, gm./cc.	
NH_3 Value, ml./gm.	
N_2 Surface, m^2/gm.	
CHEMICAL ANALYSIS	
Fe	
C	
O	
H	
K_2O, W+, % basis Fe	
X-Ray Analysis—	
$Fe_{20}C_9$	
Fe_3O_4	
Fe	

RUN NO. 65-J
HOURS 208-232
CATALYST Bethlehem Mill Scale Reduced @ 800°F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED							
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*			
CO 28.010	37.413	15.055	421.69	12.380	1.800	50.41	5.348	20.403	7.148	-13.255	-371.28						CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
H_2 2.016	59.984	24.137	48.66	40.427	5.876	11.85	17.464	41.611	23.340	-18.261	-36.81					400 EP	80.7	6.003	98.0	5.883
CO_2 44.010	2.253	0.907	39.92	26.203	3.809	167.63	11.319	12.226	15.128	2.902	127.71	8.587				400-550	11.2	0.833	91.4	0.761
N_2 28.016	0.117	0.047	1.32	1.370	0.199	5.58	0.592	0.639	0.791							550 +	8.1	0.603	114.6	0.691
CH_4 16.042	0.233	0.094	1.51	8.837	1.284	20.60	3.817	3.911	5.101	1.190	19.09	1.284								
C_2H_6 28.052				2.107	0.306	8.58	0.910	0.910	1.216	0.306	8.58	0.577					RECOVERY %	#/hr	gal/hr	
C_2H_4 28.036				1.673	0.243	7.32	0.723	0.723	0.966	0.243	7.32	0.492				PROPYLENE	39.0	6.33		
C_1+C_2											34.99	2.353				C_3 POLY GASO.	87.5	5.54	0.926	
C_3H_4 42.078				2.657	0.386	16.23	1.148	1.148	1.534	0.386	16.23	1.091	4.32	3.757	0.253	C_3 POLY TAR	12.5	0.79	0.105	
C_3H_8 44.094				0.283	0.041	1.83	0.122	0.122	0.163	0.041	1.83	0.123	4.24	0.432	0.029					
C_4H_8 56.104				1.897	0.276	15.49	0.819	0.819	1.095	0.276	15.49	1.041	5.00	3.098	0.208		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.623	0.090	5.25	0.269	0.269	0.359	0.090	5.25	0.353	4.86	1.080	0.073	C_4H_8	5.00			68.0
C_5H_{10} 70.130				1.007	0.146	10.25	0.435	0.435	0.581	0.146	10.25	0.689	5.45	1.881	0.126	C_4 POLY GASO.	5.98	13.55	2.267	1.5
C_6H_{12} 72.146				0.253	0.037	2.64	0.109	0.109	0.146	0.037	2.64	0.178	5.25	0.503	0.034	C_4H_{10}	4.86	(5.25) 5.07	(1.080) 1.043	68.0
C_4H_{12} 84.156				0.283	0.041	3.48	0.122	0.122	0.163	0.041	3.48	0.234	5.54	0.628	0.042	C_4-FREE GASO.			9.821	5.8
C_5-C_6						340.09					55.17	3.709		11.379	0.765	C_4 POLY TAR	7.53	1.94	0.258	
TOTAL		40.240	513.07		14.535	327.12	43.199	83.439	65.167											
H_2+CO	97.397	39.192	14873 SCFH		7.676		22.812	62.014	30.488	-31.516							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.60	Factor 672359		3.27		3.27	2.04	3.27	1.38						10 # RVP 400 EP GASOLINE	13.131	0.8829	4787	
GAS OIL												0.761	0.0512	278						
FUEL OIL												0.691	0.0465	252						
POLY TAR												0.363	0.0244	132						
TOTAL												14.946	1.0050	5449						
W. S. CHEM.												1.912	0.1286	697						
TOTAL												16.858	1.1336	6146						

Weight Recovery, %	93.02	Catalyst Age, hrs.		Space Velocity, vhv	1195	RECOVERED OIL **	0.343	48.05	3.231
Pressure, psig	413	Inlet Velocity, Ft/sec	0.99	Catalyst Vol CF	12.45	TOTAL OIL		103.22	6.940
Temperature, °F	663	Bed Depth, Ft	18.87	Weight, #	1880	WATER SOLUBLE CHEMICALS **	0.289	15.32	1.030
Recycle Ratio	1.07	Bed Density, #/CF	151	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	7.26	TOTAL LIQUID PRODUCTS C_5+		118.54	7.970
						NET WATER **	6.804	122.58	8.242
						GROSS WATER		137.90	9.272
						HYDROCARBON TOTAL—C_1+		153.53	10.323

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
63.88	80.04	75.66	80.41	64.97	43.89	50.82	77.21

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-J
HOURS 208-232

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE			
Oxygen	442	Fresh Feed	15271	°API	50.9	10.6	In Reactor at Start of Period		Screen Analysis			Sedimentation
Natural Gas	433	Recycle	16394	Neut. No.	54.0	37.4	K_2CO_3 ~~Catalyst~~ Added	20	Mesh	Microns	%	Microns %
Generator Outlet	416	Combined Feed	31665	Sap. No.	69.1	40.4	Total		On 40	419+		80+
Reactor Inlet	413	Wet Gas—Measured	4708	Hydrox. No.			Catalyst Recovered	123	100	150		40—80
Condenser Inlet		Adjusted	5516	Bromine No.	91		In Reactor at End of Period		150	105		20—40
Product Accumulator	383	Loss	808	Pour °F.	Below -30				200	74		10—20
				Chemicals, % by K_2CO_3		11.5	REACTOR d-p, Inches H_2O		250	62		0—20
							No. Height		325	44		
TEMPERATURES—°F.		Recycle/Fresh Feed	1.07				0 See Period A		<325			
Oxygen	498	Inlet Velocity—ft./sec.	0.99				1	72	CATALYST			
Natural Gas	791	Fresh Feed Rate—S.C.F.H.	14873	HEMPEL, DIST. %		°API	2	72	Bulk Density, Lbs./Cu.Ft.			
Generator		per Cu. Ft. Dense Bed	1195	205 °F.			3	85	Aerated			
Quench Accumulator	125	per Lb. Catalyst	7.91	400	79.7	54.4	4	290	Settled			
Reactor Inlet	285	per Sq. Ft.	22535	400-550	11.2	33.1	Total	519	Compacted			
Condenser Inlet	591			550+	9.1				Particle Density, gm./cc.			
Product Accumulator	93						CALCULATED FROM dp		NH_3 Value, ml./gm.			
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	151	N_2 Surface, m^2/gm.			
1 See Per. A				Naphtha °F.			Inventory, Lbs.	1880				
2	661			IBP	100		Bed Depth, Ft.	18.87	CHEMICAL ANALYSIS			
3	653			10%	130		Vol., Cu. Ft.	12.45	Fe			
4	666			50%	222				C			
5	666			90%	340				O			
6	669			EP	386				H			
7	663			Rec.	96.0				K_2O, W+, % basis Fe			
8	654								X-Ray Analysis—			
9	647								$Fe_{2.2}C_2$			
10	643								Fe_3O_4			
11	625								Fe			

RUN NO. 65-K
HOURS 232-256
CATALYST Bethlehem Mill Scale Reduced @ 800°F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
					At Wt. Balance							CONDENSATE								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	37.517	15.240	426.88	11.453	1.691	47.35	4.904	20.144	6.595	-13.549	-379.53						CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
H_2 2.016	59.813	24.297	48.98	40.560	5.990	12.08	17.369	41.666	23.359	-18.307	-36.90					400 EP	80.3	5.929	98.0	5.810
CO_2 44.010	2.213	0.899	39.56	27.090	3.999	176.03	11.601	12.500	15.600	3.100	136.47	9.096				400-550	11.2	0.827	91.4	0.756
N_2 28.016	0.187	0.076	2.13	1.320	0.195	5.46	0.565	0.641	0.760							550 +	8.5	0.628	114.6	0.720
CH_4 16.042	0.270	0.110	1.76	8.950	1.321	21.20	3.833	3.943	5.154	1.211	19.44	1.296								
C_2H_4 28.052				1.990	0.294	8.24	0.852	0.852	1.146	0.294	8.24	0.549					RECOVERY %	#/hr	gal/hr	
C_3H_6 30.068				1.653	0.244	7.35	0.708	0.708	0.952	0.244	7.35	0.490				PROPYLENE	38.8	6.08		
C_1+C_2											35.03	2.335				C_3 POLY GASO.	87.5	5.32	0.890	
C_3H_4 42.078				2.517	0.372	15.66	1.078	1.078	1.450	0.372	15.66	1.044	4.32	3.625	0.242	C_3 POLY TAR	12.5	0.76	0.101	
C_3H_8 44.094				0.247	0.036	1.60	0.106	0.106	0.142	0.036	1.60	0.107	4.24	0.377	0.025					
C_4H_8 56.104				1.827	0.270	15.15	0.782	0.782	1.052	0.270	15.15	1.010	5.00	3.030	0.202		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.783	0.115	6.71	0.335	0.335	0.450	0.115	6.71	0.447	4.86	1.381	0.092	C_4H_8	5.00			68.0
C_5H_{10} 70.130				0.983	0.145	10.17	0.421	0.421	0.566	0.145	10.17	0.678	5.45	1.866	0.124	C_4 POLY GASO.	5.98	13.26	2.217	1.5
C_5H_{12} 72.146				0.330	0.049	3.51	0.141	0.141	0.190	0.049	3.51	0.234	5.25	0.669	0.045	C_4H_{10}	4.86	(6.71) 5.06	(1.381) 1.041	68.0
C_6H_{12} 84.156				0.297	0.044	3.69	0.127	0.127	0.171	0.044	3.69	0.246	5.84	0.666	0.044	C_4-FREE GASO.			9.901	5.8
C_5-C_6											56.49	3.766		11.614	0.774	C_4 POLY TAR	7.53	1.89	0.251	
TOTAL		40.622	51.931		14.765	334.20	42.822	83.444	64.963											
H_2+CO	97.330	39.537	15004 SCFH		7.681		22.273	61.810	29.954	-31.856							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.59	Factor 666488		3.54		3.54	2.07	3.54	1.35						10 # RVP 400 EP GASOLINE	13.159	0.8770	4755	
									RECOVERED OIL **	0.341	47.85	3.189		7.384	0.492	GAS OIL	0.756	0.0504	273	
									TOTAL OIL		104.34	6.955		18.998	1.266	FUEL OIL	0.720	0.0480	260	
									WATER SOLUBLE CHEMICALS **	0.300	15.93	1.062		1.986	0.132	POLY TAR	0.352	0.0235	127	
									TOTAL LIQUID PRODUCTS C_3+		120.27	8.017		20.984	1.398	TOTAL	14.987	0.9989	5415	
									NET WATER **	6.735	121.33	8.086		14.565	0.971	W. S. CHEM.	1.986	0.1324	718	
									GROSS WATER		137.26	9.148		16.551	1.103	TOTAL	16.973	1.1313	6133	
									HYDROCARBON TOTAL—C_1+		155.30	10.351								

Weight Recovery, % 91.31 | Catalyst Age, hrs. | Space Velocity, vhv 1198
Pressure, psig 412 | Inlet Velocity, Ft/sec 0.99 | Catalyst VolCF 12.52
Temperature, °F 664 | Bed Depth, Ft 18.97 | Weight, # 1840
Recycle Ratio 1.05 | Bed Density, #/CF 147 | Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ = 8.20

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
63.65	88.90	75.35	80.57	67.26	43.94	51.54	77.44

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-K
HOURS 232-256

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE			
Oxygen	441	Fresh Feed	15416	°API	50.3	10.6	In Reactor at Start of Period		Screen Analysis			Sedimentation
Natural Gas	434	Recycle	16251	Neut. No.	54.3	38.4	Fresh Catalyst Added		Mesh	Microns	%	Microns %
Generator Outlet	415	Combined Feed	31667	Sap. No.	70.1	40.4	Total		On 40	419+		80+
Reactor Inlet	412	Wet Gas—Measured	4693	Hydrox. No.			Catalyst Recovered	22	100	150		40—80
Condenser Inlet		Adjusted	5603	Bromine No.	91		In Reactor at End of Period		150	105		20—40
Product Accumulator	382	Loss	910	Pour °F.					200	74		10—20
				Chemicals, % by K_2CO_3		12.0	REACTOR d-p, Inches H_2O		250	62		0—20
							No. Height		325	44		
TEMPERATURES—°F.		Recycle/Fresh Feed	1.05				0 See Period A		<325			
Oxygen	503	Inlet Velocity—ft./sec.	0.99				1	70	CATALYST			
Natural Gas	805	Fresh Feed Rate—S.C.F.H.	15004	HEMPEL, DIST. %		°API	2	71	Bulk Density, Lbs./Cu.Ft.			
Generator		per Cu. Ft. Dense Bed	1198	205 °F.			3	82	Aerated			
Quench Accumulator	134	per Lb. Catalyst	8.15	400	79.3	51.6	4	285	Settled			
Reactor Inlet	278	per Sq. Ft.	22733	400-550	11.2	34.0	Total	508	Compacted			
Condenser Inlet	589			550+	9.5				Particle Density, gm./cc.			
Product Accumulator	93						CALCULATED FROM dp		NH_3 Value, ml./gm.			
Catalyst No. Height				A. S. T. M. DIST. ON	Naphtha		Density, Lbs./Cu.Ft.	147	N_2 Surface, m^2/gm.			
1 See Per. A				Naphtha °F.	°F		Inventory, Lbs.	1840				
2	663			IBP	112		Bed Depth, Ft.	18.97	CHEMICAL ANALYSIS			
3	658			10%	142		Vol., Cu. Ft.	12.52	Fe			
4	669			50%	228				C			
5	667			90%	346				O			
6	670			EP	396				H			
7	664			Rec.	97.0				K_2O, W+, % basis Fe			
8	654								X-Ray Analysis—			
9	646								$Fe_{23}C_6$			
10	642								Fe_3O_4			
11	625								Fe			

RUN NO. 65-L
HOURS 256-280
CATALYST Bethlehem Mill
Scale Reduced @ 800°F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS	At Wt. Balance		RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED							
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
CO 28.010	37.033	15.112	423.27	11.187	1.646	46.10	4.606	19.718	6.252	-13.466	-377.17									
H_2 2.016	60.557	24.710	49.81	48.044	6.185	12.47	17.315	42.085	23.498	-18.585	-37.34					400 EP	80.7	5.739	98.0	5.624
CO_2 44.010	2.010	0.820	36.09	26.613	3.914	172.26	10.958	11.778	14.672	3.094	136.17	9.010				400-550	10.8	0.768	91.4	0.702
N_2 28.016	0.183	0.075	2.10	1.860	0.185	5.18	0.519	0.594	0.704							550 +	8.5	0.604	114.6	0.692
CH_4 16.042	0.817	0.089	1.43	8.613	1.267	80.55	3.546	3.635	4.813	1.178	18.90	1.851								
C_2H_4 28.052				2.023	0.298	8.36	0.853	0.853	1.151	0.298	8.36	0.555					RECOVERY %	#/hr	gal/hr	
C_3H_6 38.068				1.630	0.240	7.88	0.671	0.671	0.911	0.240	7.88	0.478				PROPYLENE	39.1	5.54		
C_1+C_2											54.48	3.888				C_3 POLY GASO.	87.5	4.85	0.811	
C_3H_8 42.078				2.893	0.337	14.18	0.944	0.944	1.881	0.337	14.18	0.938	4.38	3.882	0.217	C_3 POLY TAR	12.5	0.69	0.092	
C_3H_8 44.094				0.193	0.028	1.23	0.079	0.079	0.107	0.028	1.23	0.081	4.84	0.290	0.019					
C_4H_8 56.104				1.787	0.863	14.76	0.736	0.736	0.999	0.263	14.76	0.877	8.00	2.952	0.195		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.730	0.106	6.16	0.896	0.896	0.402	0.106	6.16	0.408	4.88	1.867	0.084	C_4H_8	5.00			68.0
C_5H_{10} 70.130				1.057	0.155	10.75	0.487	0.487	0.580	0.155	10.75	0.710	8.45	1.969	0.130	C_4 POLY GASO.	5.98	18.98	2.160	1.5
C_5H_{12} 72.146				0.875	0.040	2.89	0.118	0.118	0.158	0.040	2.89	0.191	8.88	0.550	0.036	C_4H_{10}	4.86	(8.16) 4.84	(1.867) 1.017	68.0
C_5H_{12} 84.156				0.327	0.048	4.04	0.135	0.135	0.185	0.048	4.04	0.267	8.84	0.789	0.048	C_4 FREE GASO.			0.683	5.8
C_3-C_6											53.99	3.578		11.039	0.729	C_4 POLY TAR	7.53	1.84	0.244	
TOTAL		40.806	518.70																	
H_2+CO	97.590	39.822	15113 SCFH		7.831		21.919	61.741	29.750	-31.991										
H_2/CO		1.64	Factor 661681		3.76		3.76	2.13	3.76	1.38							gal/hr	gal/MCF	Bbl/Day	
																10 # RVP 400 EP GASOLINE	18.860	0.8509	4613	
																GAS OIL	0.702	0.0465	252	
																FUEL OIL	0.692	0.0458	248	
																POLY TAR	0.336	0.0222	120	
																TOTAL	14.590	0.9654	5233	
																W. S. CHEM.	2.036	0.1347	730	
																TOTAL	16.626	1.1001	5963	

Weight Recovery, %	84.03	Catalyst Age, hrs.		Space Velocity, vhv	1851	RECOVERED OIL**	0.329	46.18
Pressure, psig	410	Inlet Velocity, Ft/sec	0.98	Catalyst Vol CF	18.88	TOTAL OIL		100.17
Temperature, °F	667	Bed Depth, Ft	18.60	Weight, #	1756	WATER SOLUBLE CHEMICALS ***	0.306	16.23
Recycle Ratio	1.01	Bed Density, #/CF	143	Effluent $\frac{(H_2)(CO_2)}{\text{Shift Ratio } (H_2O)(CO)}$ =	8.10	TOTAL LIQUID PRODUCTS C_4+		116.40

FRESH FEED CONVERSION = %				TOTAL FEED CONVERSION = %			SELECTIVITY			
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	NET WATER ***	6.804	124.38
63.95	89.11	74.97	80.35	68.29	44.08	51.81	77.15	GROSS WATER		140.61
								HYDROCARBON TOTAL $=C_1+$		150.68

GROSS WATER		140.61	9.304		16.968	1.133
HYDROCARBON TOTAL $=C_1+$		150.68	9.983			

	8.830		14.932	0.988
TOTAL	16.626	1.1001	5963	
W. S. CHEM.	2.036	0.1347	730	

Form ML—11

** Included in Reactor Effluent Total

#/NCM = 16.91 × #/MCF

*94## MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-L
HOURS 256-280

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA			
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE	
Oxygen	439	Fresh Feed	15486						Screen Analysis	Sedimentation
Natural Gas	438	Recycle	15626	°API	49.9	10.7	In Reactor at Start of Period		Mesh / Microns / %	Microns / %
Generator Outlet	414	Combined Feed	31112	Neut. No.	54.6	38.4	Fresh Catalyst Added		On 40 / 419+ /	80+
Reactor Inlet	410	Wet Gas—Measured		Sap. No.	70.0	48.7	Total		100 / 150 /	40—80
Condenser Inlet		Adjusted		Hydrox. No.			Catalyst Recovered	18	150 / 105 /	20—40
Product Accumulator	388	Loss	1314	Bromine No.	91		In Reactor at End of Period		200 / 74 /	10—20
				Pour °F.					250 / 62 /	0—20
				Chemicals, % by K_2CO_3		18.0	REACTOR d-p, Inches H_2O		325 / 44 /	
TEMPERATURES—°F.		Recycle/Fresh Feed	1.01				No. Height		<325	
Oxygen	479	Inlet Velocity—ft./sec.	0.98				0 See Period A		CATALYST	
Natural Gas	804	Fresh Feed Rate—S.C.F.H.	15113				1	68	Bulk Density, Lbs./Cu.Ft.	
Generator		per Cu. Ft. Dense Bed	1231	HEMPEL DIST. %		°API	2	69	Aerated	
Quench Accumulator	184	per Lb. Catalyst	8.61	205 °F.			3	79	Settled	
Reactor Inlet	281	per Sq. Ft.	22888	400	79.7	50.4	4	268	Compacted	
Condenser Inlet	589			400-550	10.8	35.1	Total	484	Particle Density, gm./cc.	
Product Accumulator	96			550+	9.5				NH_3 Value, ml./gm.	
Catalyst No. Height							CALCULATED FROM dp		N_2 Surface, m^2/gm.	
1 See Per. A				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	143		
2	666			Naphtha °F.			Inventory, Lbs.	1756		
3	661			IBP	116		Bed Depth, Ft.	18.60	CHEMICAL ANALYSIS	
4	672			10%	146		Vol., Cu. Ft.	18.88	Fe	
5	671			50%	226				C	
6	674			90%	346				O	
7	668			EP	398				H	
8	655			Rec.	97.5				K_2O, W+, % basis Fe	
9	647								X-Ray Analysis—	
10	644								Fe_5C_2	
11	625								Fe_3O_4	
									Fe	

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 65-M
HOURS 280-304
CATALYST Bethlehem Mill Scale Reduced @ 800°F

	FRESH FEED			WET GAS	At Wt. Balance		RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED				
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*
CO 28.010	37.100	15.042	421.32	10.757	1.568	43.92	4.709	19.751	6.277	-13.474	-377.40					
H_2 2.016	60.257	24.431	49.25	41.897	6.106	12.31	18.342	42.773	24.448	-18.325	36.94					400 EP
CO_2 44.010	2.200	0.892	39.26	27.333	3.984	175.34	11.966	12.858	15.950	3.092	136.08	9.084				400-550
N_2 28.016	0.290	0.118	3.31	1.400	0.204	5.72	0.613	0.731	0.817							550 +
CH_4 16.042	0.153	0.062	0.99	8.757	1.276	20.47	3.833	3.895	5.109	1.214	19.48	1.300				
C_2H_4 28.052				2.013	0.293	8.22	0.881	0.881	1.174	0.293	8.22	0.549				
C_2H_6 30.068				1.643	0.239	7.19	0.719	0.719	0.958	0.239	7.19	0.480				PROPYLENE
C_1+C_2											34.89	2.329				C_3 POLY GASO.
C_3H_6 42.078				2.447	0.357	15.02	1.071	1.071	1.428	0.357	15.02	1.003	4.32	3.477	0.232	C_3 POLY TAR
C_3H_8 44.094				0.253	0.037	1.63	0.111	0.111	0.148	0.037	1.63	0.109	4.24	0.384	0.026	
C_4H_8 56.104				1.600	0.233	13.07	0.700	0.700	0.933	0.233	13.07	0.872	5.00	2.614	0.174	
C_4H_{10} 58.120				0.620	0.090	5.23	0.271	0.271	0.361	0.090	5.23	0.349	4.86	1.076	0.072	C_4H_8
C_5H_{10} 70.130				0.843	0.123	8.63	0.369	0.369	0.492	0.123	8.63	0.576	5.45	1.583	0.106	C_4 POLY GASO.
C_6H_{12} 72.146				0.190	0.028	2.02	0.083	0.083	0.111	0.028	2.02	0.135	5.25	0.385	0.026	C_4H_{10}
C_6H_{12} 84.156				0.247	0.036	3.03	0.108	0.108	0.144	0.036	3.03	0.202	5.54	0.547	0.037	C_4-FREE GASO.
C_5-C_6											48.63	3.246		10.066	0.673	C_4 POLY TAR
TOTAL		40.545	514.13		14.574	321.75	43.776	84.321	65.988							
H_2+CO	97.357	39.473	14980 SCFH		7.674		23.051	62.524	30.725	-31.799						
H_2/CO		1.62	Factor 667556		3.89		3.90	2.17	3.89	1.36						10 # RVP 400 EP GASOLINE
									RECOVERED OIL **	0.359	50.42	3.366		7.769	0.519	GAS OIL
									TOTAL OIL		99.05	6.612		17.835	1.192	FUEL OIL
									WATER SOLUBLE CHEMICALS **	0.309	16.39	1.094		2.056	0.137	POLY TAR
									TOTAL LIQUID PRODUCTS C_3+		115.44	7.706		19.891	1.329	TOTAL
									NET WATER **	6.970	125.57	8.383		15.074	1.006	W. S. CHEM.
									GROSS WATER		141.96	9.477		17.130	1.144	TOTAL
									HYDROCARBON TOTAL—C_1+		150.33	10.035				

Weight Recovery, %	81.20	Catalyst Age, hrs.		Space Velocity, vhv	1220
Pressure, psig	408	Inlet Velocity, Ft/sec	1.02	Catalyst	Vol CF 12.28
Temperature, °F	667	Bed Depth, Ft	18.61	Weight, #	1682
Recycle Ratio	1.08	Bed Density, #/CF	137	Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ Shift Ratio	= 8.91

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3 + /C_1 +
64.05	89.58	75.01	80.56	68.22	42.84	50.86	76.79

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91×#/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6× gal/MCF

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	39.2	5.89		
C_3 POLY GASO.	87.5	5.15	0.861	
C_3 POLY TAR	12.5	0.74	0.098	

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00			68.0
C_4 POLY GASO.	5.98	11.44	1.912	1.5
C_4H_{10}	4.86	(5.23) 4.72	(1.076) 0.972	68.0
C_4-FREE GASO.			9.543	5.8
C_4 POLY TAR	7.53	1.63	0.216	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	12.427	0.8296	4498
GAS OIL	0.639	0.0427	232
FUEL OIL	0.890	0.0594	322
POLY TAR	0.314	0.0210	114
TOTAL	14.270	0.9527	5166
W. S. CHEM.	2.056	0.1372	744
TOTAL	16.326	1.0899	5910

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-M
HOURS 280-304

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA				
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE		
Oxygen	440	Fresh Feed	15387	° API	50.0	10.7	In Reactor at Start of Period		Screen Analysis		Sedimentation
Natural Gas	431	Recycle	16613	Neut. No.	53.7	36.9	Fresh Catalyst Added		Mesh	Microns %	Microns %
Generator Outlet	413	Combined Feed	32000	Sap. No.	69.5	40.7	Total		On 40	419+	80+
Reactor Inlet	408	Wet Gas—Measured	4068	Hydrox. No.			Catalyst Recovered	33	100	150	40—80
Condenser Inlet		Adjusted	5531	Bromine No.	93		In Reactor at End of Period		150	105	20—40
Product Accumulator	381	Loss	1463	Pour °F.					200	74	10—20
				Chemicals, % by K_2CO_3		12.0	REACTOR d-p, Inches H_2O		250	62	0—20
							No. Height		325	44	
TEMPERATURES—°F.		Recycle/Fresh Feed	1.08				0 See Period A		<325		
Oxygen	484	Inlet Velocity—ft./sec.	1.02				1	66	CATALYST		
Natural Gas	806	Fresh Feed Rate—S.C.F.H.	14980	HEMPEL. DIST. %		°API	2	66	Bulk Density, Lbs./Cu.Ft.		
Generator		per Cu.Ft. Dense Bed	1220	205 °F.			3	75	Aerated		
Quench Accumulator	128	per Lb. Catalyst	8.91	400	80.0	50.8	4	257	Settled		
Reactor Inlet	278	per Sq. Ft.	22697	400-550	9.0	33.9	Totsl	464	Compacted		
Condenser Inlet	589			550+	11.0				Particle Density, gm./cc.		
Product Accumulator	92						CALCULATED FROM dp		NH_3 Value, ml./gm.		
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	137	N_2 Surface, m^2/gm.		
1 See Per. A				Naphtha °F.			Inventory, Lbs.	1682			
2	666			IBP	112		Bed Depth, Ft.	18.61	CHEMICAL ANALYSIS		
3	661			10%	142		Vol., Cu. Ft.	12.28	Fe		
4	673			50%	226				C		
5	670			90%	346				O		
6	674			EP	388				H		
7	668			Rec.	97.0				K_2O, W+, % basis Fe		
8	656								X-Ray Analysis—		
9	648								Fe_2OC_3		
10	646								Fe_3O_4		
11	626								Fe		

RUN NO. 65-N
HOURS 304-326
CATALYST Bethlehem Mill Scale Reduced @ 800°F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

Overall Effluent Forced

	FRESH FEED			WET GAS	At Wt Balance		RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		CONDENSATE				YIELD BASIS H_2+CO FED				
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
CO 28.010	37.007	15.106	423.08	10.000	1.388	38.88	4.108	19.214	5.496	-13.718	384.20									
H_2 2.016	60.513	24.700	49.80	41.973	5.826	11.75	17.242	41.942	23.068	-18.874	38.05					400 EP	81.0	6.542	98.0	6.411
CO_2 44.010	2.143	0.875	38.51	27.877	3.869	170.27	11.452	12.327	15.321	2.994	131.76	8.722				400-550	11.6	0.937	91.4	0.856
N_2 28.016	0.200	0.082	2.30	1.470	0.204	5.72	0.604	0.686	0.808							550 +	7.4	0.598	114.6	0.685
CH_4 16.042	0.137	0.056	0.90	8.660	1.202	19.28	3.558	3.614	4.760	1.146	18.38	1.217								
C_2H_4 28.052				2.010	0.279	7.83	0.826	0.826	1.105	0.279	7.83	0.518					RECOVERY %	#/hr	gal/hr	
C_3H_6 30.068				1.657	0.230	6.92	0.681	0.681	0.911	0.230	6.92	0.458				PROPYLENE	40.1	5.75		
C_1+C_2											33.13	2.193				C_3 POLY GASO.	87.5	5.03	0.841	
C_3H_4 42.078				2.460	0.341	14.35	1.011	1.011	1.352	0.341	14.35	0.950	4.32	3.322	0.220	C_3 POLY TAR	12.5	0.72	0.096	
C_3H_8 44.094				0.230	0.032	1.41	0.094	0.094	0.126	0.032	1.41	0.093	4.24	0.333	0.022					
C_4H_8 56.104				1.623	0.225	12.62	0.667	0.667	0.892	0.225	12.62	0.835	5.00	2.524	0.167		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.673	0.093	5.41	0.276	0.276	0.369	0.093	5.41	0.358	4.86	1.113	0.074	C_4H_8	5.00			68.0
C_5H_{10} 70.130				0.837	0.116	8.14	0.344	0.344	0.460	0.116	8.14	0.539	5.45	1.494	0.099	C_4 POLY GASO.	5.98	11.04	1.846	1.5
C_5H_{12} 72.146				0.257	0.036	2.60	0.106	0.106	0.142	0.036	2.60	0.172	5.25	0.495	0.033	C_4H_{10}	4.86	4.77	0.982	68.0
C_6H_{12} 84.156				0.273	0.038	3.19	0.112	0.112	0.150	0.038	3.19	0.211	5.54	0.576	0.038	C_4 FREE GASO.		12.644	9.817	5.8
C_3-C_6											47.72	3.159		9.857	0.652	C_4 POLY TAR	7.53	1.58	0.210	
TOTAL		40.819	514.59		13.879	308.40	41.081	81.900	63.214											
H_2+CO	97.520	39.806	15107 SCFH		7.214		21.350	61.156	28.564	-32.592							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.64	Factor 661944		4.20		4.20	2.18	4.20	1.38						10 # RVP 400 EP GASOLINE	12.645	0.8370	4538	
GAS OIL																	0.856	0.0567	307	
FUEL OIL																	0.685	0.0453	246	
POLY TAR																	0.306	0.0203	110	
TOTAL																	14.492	0.9593	5201	
W. S. CHEM.																	2.286	0.1513	820	
TOTAL																	16.778	1.1106	6021	

Weight Recovery, %	81.36	Catalyst Age, hrs.		Space Velocity, vhv	1238	RECOVERED OIL**	0.372	52.14	3.451		8.077	0.535
Pressure, psig	408	Inlet Velocity, Ft/sec	0.99	Catalyst Vol CF	12.20	TOTAL OIL		99.86	6.610		17.934	1.187
Temperature, °F	668	Bed Depth, Ft	18.48	Weight, #	1623	WATER SOLUBLE CHEMICALS**	0.344	18.24	1.207		2.286	0.151
Recycle Ratio	1.01	Bed Density, #/CF	133	Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ / Shift Ratio = 8.53		TOTAL LIQUID PRODUCTS C_5+		118.10	7.817		20.220	1.338
						NET WATER **	7.538	135.81	8.990		16.303	1.079
						GROSS WATER		154.05	10.197		18.589	1.230
						HYDROCARBON TOTAL—C_1+		151.23	10.010			

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
65.00	90.81	76.41	81.88	71.40	45.00	53.29	78.09

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-N
HOURS 304-326

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE			
Oxygen	440	Fresh Feed	15491	° API	51.0	10.7	In Reactor at Start of Period		Screen Analysis			Sedimentation
Natural Gas	432	Recycle	15590	Neut. No.	54.5	36.0	Fresh Catalyst Added		Mesh	Microns	%	Microns %
Generator Outlet	412	Combined Feed	31081	Sap. No.	70.1	40.4	Total		On 40	419+		80+
Reactor Inlet	408	Wet Gas—Measured	3862	Hydrox. No.			Catalyst Recovered	64	100	150		40—80
Condenser Inlet		Adjusted	5267	Bromine No.	93		In Reactor at End of Period		150	105		20—40
Product Accumulator	381	Loss	1405	Pour °F.					200	74		10—20
				Chemicals, % by K_2CO_3		12.3	REACTOR d-p, Inches H_2O		250	62		0—20
							No. Height		325	44		
TEMPERATURES—°F.		Recycle/Fresh Feed	1.01				0 See Period A		<325			
Oxygen	468	Inlet Velocity—ft./sec.	0.99				1	65	CATALYST			
Natural Gas	787	Fresh Feed Rate—S.C.F.H.	15107	HEMPEL, DIST. %		°API	2	65	Bulk Density, Lbs./Cu.Ft.			
Generator		per Cu. Ft. Dense Bed	1238	205 °F.			3	72	Aerated			
Quench Accumulator	130	per Lb. Catalyst	9.31	400	80.0	52.0	4	245	Settled			
Reactor Inlet	275	per Sq. Ft.	22889	400-550	11.6	32.8	Total	447	Compacted			
Condenser Inlet	592			550+	8.4				Particle Density, gm./cc.			
Product Accumulator	86						CALCULATED FROM dp		NH_3 Value, ml./gm.			
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	133	N_2 Surface, m^2/gm.			
1 See Per. A				Naphtha °F.			Inventory, Lbs.	1623				
2	666			IBP	102		Bed Depth, Ft.	18.48	CHEMICAL ANALYSIS			
3	662			10%	136		Vol., Cu. Ft.	12.20	Fe			
4	674			50%	226				C			
5	671			90%	340				O			
6	676			EP	386				H			
7	671			Rec.	97.0				K_2O, W+, % basis Fe			
8	659								X-Ray Analysis—			
9	651								$Fe_{20}C_9$			
10	648								Fe_3O_4			
11	629								Fe			

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-A
HOURS 0-16

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1800	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.23	10.569 0.031			21.200	WET GAS	26.99 251.03	299.03
CO 28.010	37.04	37.54	37.26	37.280	15.667	15.667		15.667	CO_2 44.010	1.28	0.171	0.171		0.342	OIL	67.72	72.84
H_2 2.016	60.52	59.90	60.50	60.307	25.345		50.690		N_2 28.016	1.76	0.235				WATER	148.26	159.47
CO_2 44.010	1.98	2.26	2.04	2.093	0.880	0.880		1.760	CH_4 16.042	82.60	11.033	11.033	44.132		TOTAL	494.00	531.34
N_2 28.016	0.08	0.14	0.10	0.107	0.045				C_2H_6 30.068	6.71	0.896	1.792	5.376		FRESH FEED	531.34	
CH_4 16.042	0.38	0.16	0.10	0.213	0.090	0.090	0.360		C_2H_4 44.052	5.22	0.697	2.091	5.576		WEIGHT BALANCE	92.97	
			M. W	12.6432			51.050	17.427	C_4H_{10} 58.120	1.61	0.215	0.860	2.150		Forced Factor	1075587	
			H_2O 18.016				7.682	3.841	C_5H_{12} 72.146	0.59	0.079	0.395	0.948		WET GAS FACTOR	1191212	
					42.026	16.637	58.732	21.268	MW	20.0614					INDICATED LOSS—S C F H	1009	
			BALANCE		101.805		100.945	98.728	TOTAL			16.342	58.182	21.542			

WET GAS					GAS FLOW RATES										LIQUID PRODUCT RATES					
CO 28.010	6.23	5.69	3.71	5.210		$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
H_2 2.016	38.83	37.14	36.28	37.416	FRESH FEED		415.5	48	2.28976			OIL	4'8½"	251.11	36	1.0119	254.10	51.8		
CO_2 44.010	30.34	32.83	33.36	32.177	79.31	6.333	20.7412	1.0117	1.51319	15949	42.026		1'9½"	93.76	55	1.0025	93.99	6.427		
N_2 28.016	1.74	1.32	2.03	1.697	WET GAS		1.38	52	1.19615								48.48		454.5	
CH_4 16.042	11.19	10.82	11.87	11.293	158.44	5.621	4.010	1.0078	1.09368	3936	10.372						168.59		1083.53	67.72
C_2H_6 28.052	2.49	2.68	2.54	2.570	RECYCLE		415.2	64				16 hrs								10.537
C_2H_4 33.068	1.63	1.78	2.00	1.803	79.31	8.513	20.734	0.9962	1.09368	15252	40.189									
C_3H_6 42.078	2.70	3.23	2.52	2.817	BLEED		415.2	64												
C_3H_8 44.094	0.28	0.33	0.24	0.283	5.02	7.960	20.734	0.9962	1.09368	903	2.379	WATER								
C_4H_8 56.104	2.10	2.10	2.24	2.147	NATURAL GAS		436.1	173	1.44306		42.568		6'11¼"	367.86	58	1.0010	368.23	10.7		
C_4H_{10} 58.120	0.85	0.64	1.21	0.900	28.43	7.713	21.232	0.9064	1.2013	5069	13.357		2'2½"	117.17	62	0.9990	117.05	8.287		
C_5H_{10} 70.130	0.99	0.95	1.14	1.027	OXYGEN		440.2	46					2'4"	124.28	52	1.0049	124.89			
C_5H_{12} 72.146	0.29	0.18	0.42	0.297	27.07	6.853	21.3283	1.0137		4011	10.569		1'8½"	89.24	47	1.0064	89.81			
C_6H_{12} 84.156	0.34	0.31	0.44	0.363	STEAM		30.1										286.26		2372.24	148.26
			M. W.	24.2026	215.7	6.129	0.2920	386#/hr				15 hrs								17.891

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-B
HOURS 16-40

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.21	10.445 0.028			20.946	WET GAS	26.96 242.89	298.53
CO 28.010	36.87	37.22	36.77	36.954	15.470	15.470		15.470	CO_2 44.010	1.40	0.186	0.186		0.372	OIL	62.51	69.16
H_2 2.016	60.32	60.50	60.71	60.510	25.331		50.662		N_2 28.016	1.04	0.138				WATER	143.59	158.86
CO_2 44.010	1.96	2.01	2.30	2.090	0.875	0.875		1.750	CH_4 16.042	83.15	11.021	11.021	44.084		TOTAL	475.95	526.55
N_2 28.016	0.13	0.13	0.14	0.133	0.056				C_2H_6 30.068	6.74	0.893	1.786	5.358		FRESH FEED	526.55	
CH_4 16.042	0.72	0.14	0.08	0.313	0.131	0.131	0.524		C_2H_4 44.052	5.33	0.706	2.118	5.648		WEIGHT BALANCE	90.39	
			M. W	12.5780					C_4H_{10} 58.120	1.60	0.212	0.848	2.120		Forced Factor	1106313	
			H_2O 18.016				8.030	4.015	C_5H_{12} 72.146	0.53	0.070	0.350	0.840		WET GAS FACTOR	1229074	
					41.863	16.476	59.216	21.235	MW	20.0027					INDICATED LOSS—S C F H	1218	
			BALANCE		101.023		102.008	99.610	TOTAL			16.309	58.050	21.318			

WET GAS					GAS FLOW RATES										LIQUID PRODUCT RATES					
CO 28.010	5.91	6.49	6.90	6.433		$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
H_2 2.016	36.06	36.55	36.29	36.301	FRESH FEED		416.0	52	2.30163			OIL	7'5½"	395.14	46	1.0069	397.87	51.6		
CO_2 44.010	31.34	30.72	32.30	31.453	79.31	6.313	20.7533	1.0078	1.51711	15887	41.863		4'8½"	251.11	35	1.0124	254.22	6.434		
N_2 28.016	1.36	1.84	1.78	1.660	WET GAS		1.43	55	1.19748											
CH_4 16.042	13.65	11.62	10.85	12.040	158.44	5.450	4.0162	1.0048	1.09429	3813	10.047		2'1"	109.84	35	1.0124	111.20			
C_2H_6 28.052	2.46	2.48	2.45	2.463	RECYCLE		415.4	67					0'5½"	24.34	35	1.0124	24.64			62.51
C_2H_4 33.068	1.88	2.01	1.90	1.930	79.31	8.479	20.7388	0.9933	1.09429	15159	39.945						230.21			9.715
C_3H_6 42.078	2.89	3.48	2.88	3.083	BLEED		415.4	67									42.95 233.16		419.00 1500.15	
C_3H_8 44.094	0.23	0.30	0.32	0.283	5.02	8.138	20.7388	0.9933	1.09429	921	2.427	WATER	7'3"	384.23	67	0.9993	383.96	10.6		
C_4H_8 56.104	2.04	2.22	2.01	2.090	NATURAL GAS		435.8	182	1.44730				2'4"	124.28	52	1.0006	124.35	8.293		
C_4H_{10} 58.120	0.70	0.92	0.78	0.800	28.43	7.700	21.2249	0.9000	1.20303	5030	13.254									
C_5H_{10} 70.130	0.93	0.94	0.94	0.937	OXYGEN		442.6	51				7 AM	3'1-3/4	169.21	58	1.0002	169.24			
C_5H_{12} 72.146	0.27	0.18	0.26	0.237	27.07	6.788	21.3845	1.0088		3964	10.445		0'3"	13.28	37	1.0010	13.29			143.59
C_6H_{12} 84.156	0.28	0.25	0.34	0.290	STEAM												415.56			17.315
			M. W.	24.1757	215.7	6.017														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-C
HOURS 40-64

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.21	10.422 0.028			20.800	WET GAS	26.21 252.23	297.51
CO 28.010	36.14	36.84	36.39	36.456	15.297	15.297		15.297	CO_2 44.010	1.39	0.186	0.186		0.372	OIL	65.37	69.85
H_2 2.016	60.70	60.94	61.07	60.903	25.555		51.110		N_2 28.016	1.54	0.206				WATER	144.46	154.36
CO_2 44.010	1.81	1.87	2.19	1.957	0.821	0.821		1.642	CH_4 16.042	83.73	11.205	11.205	44.820		TOTAL	488.27	521.72
N_2 28.016	0.19	0.12	0.28	0.197	0.083				C_2H_6 30.068	6.80	0.910	1.820	5.460		FRESH FEED	521.72	
CH_4 16.042	1.16	0.23	0.07	0.487	0.204	0.204	0.816		C_3H_8 44.094	4.72	0.632	1.896	5.056		WEIGHT BALANCE	93.59	
			M. W	12.43372			5.662	4.333	C_4H_{10} 58.120	1.27	0.170	0.680	1.700		Forced Factor	1068507	
			H_2O 18.016				7.164	3.582	C_5H_{12} 72.146	0.34	0.046	0.230	0.552		WET GAS FACTOR	1179518	
						16.322	59.090	20.521	MW	19.65163					INDICATED LOSS—S C F H	963	
			BALANCE			101.90	102.61	96.47	TOTAL			16.017	57.588	21.272			

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES								
CO 28.010	7.36	8.30	9.30	8.320		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
H_2 2.016	37.04	38.25	38.16	37.816	FRESH FEED		416.2	53	2328346			OIL	6'4½"	338.40	38	1.0109	342.09	51.8		
CO_2 44.010	29.98	29.57	30.62	30.057	79.31	6.296	20.758	1.0068	1.5259	15924	41.960		2'1"	109.84	35	1.0124	111.20	6.427		
N_2 28.016	1.42	1.83	1.61	1.620	WET GAS		1.39	52	1231548								+13.23		485.00	65.37
CH_4 16.042	13.18	10.63	9.46	11.090	158.44	5.729	4.011	1.0078	1.1098	4072	10.730						244.12		1568.96	10.172
C_2H_6 28.052	2.31	2.24	2.33	2.293	RECYCLE		415.9	68												
C_3H_8 33.068	1.68	1.78	1.73	1.730	79.31	8.488	20.751	0.9924	1.1098	15385	40.540									
C_4H_{10} 42.078	2.89	2.63	2.90	2.807	BLEED															
C_5H_{12} 44.094	0.27	0.25	0.28	0.267	5.02	8.192	20.751	1.0000	1.1098	947	2.495	WATER	7'5½"	394.05	65	0.99953	393.86	10.7		
C_4H_8 56.104	1.90	1.97	1.82	1.897	NATURAL GAS		435.8	179	1473160		43.035		3'1-3/4	169.21	58	1.00018	169.24	8.287		
C_5H_{10} 58.120	0.67	0.97	0.61	0.750	28.43	7.688	21.225	0.9021	1.2137	5079	13.383		4'9½"	254.38	58	1.00018	254.43			
C_5H_{10} 70.130	0.83	0.94	0.76	0.843	OXYGEN		444.0	53					1'2"	60.66	54	1.00047	60.69			144.46
C_5H_{12} 72.146	0.21	0.32	0.21	0.247	27.07	6.775	21.417	1.0068		3955	10.422						418.36		3466.95	17.432
C_6H_{12} 84.156	0.26	0.32	0.21	0.263	STEAM		30.2													
			M. W.	23.50699	215.7	5.913														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-D
HOURS 64-88

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.22	10.427 0.029			20.912	WET GAS	26.38 261.33	307.87
CO 28.010	37.38	37.25	37.36	37.330	15.454	15.454		15.454	CO_2 44.010	1.17	0.155	0.155		0.310	OIL	60.01	64.21
H_2 2.016	59.62	60.28	60.29	60.063	24.864		49.728		N_2 28.016	0.43	0.057				WATER	141.76	151.68
CO_2 44.010	1.84	2.14	1.89	1.957	0.810	0.810		1.620	CH_4 16.042	83.51	11.033	11.033	44.132		TOTAL	489.48	523.76
N_2 28.016	0.13	0.16	0.20	0.163	0.067				C_2H_6 30.068	6.80	0.898	1.796	5.388		FRESH FEED	523.76	
CH_4 16.042	1.03	0.17	0.26	0.487	0.202	0.202	0.808		C_3H_8 44.094	5.51	0.728	2.184	5.824		WEIGHT BALANCE	93.46	
			M. W	12.652069					C_4H_{10} 58.120	1.67	0.221	0.884	2.210		Forced Factor	1070033	
			H_2O 18.016				8.203	4.102	C_5H_{12} 72.146	0.69	0.091	0.455	1.092		WET GAS FACTOR	1178089	
						16.466	58.739	21.176	MW	20.045075					INDICATED LOSS—S C F H	973	
			BALANCE			99.75	100.16	99.78	TOTAL			16.507	58.646	21.222		5165	

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES								
CO 28.010	8.99	8.71	8.45	8.717		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
H_2 2.016	38.23	37.48	36.95	37.554	FRESH FEED		416.5	59	2288163			OIL	7'2¼"	380.96	46	1.0069	383.59	52.0		
CO_2 44.010	28.93	30.99	30.87	30.263	79.31	6.300	20.765	1.0010	1.5127	15710	41.397		6'4½"	338.40	38	1.0109	342.09	6.420		
N_2 28.016	1.24	1.55	1.44	1.410	WET GAS		1.40	58	1223664				4'11¼"	263.11	43	1.0084	265.32			
CH_4 16.042	11.91	10.16	10.61	10.893	158.44	5.950	4.012	1.0019	1.1062	4192	11.046		1'8"	87.01	42	1.0089	87.78			
C_2H_6 28.052	2.29	2.36	2.44	2.363	RECYCLE		415.8	72									+5.30		+34.00	60.01
C_3H_8 33.068	1.62	1.79	1.81	1.740	79.31	8.471	20.748	0.9887	1.1062	15245	40.171						224.34		1440.26	9.348
C_4H_{10} 42.078	2.57	2.71	2.94	2.740	BLEED															
C_5H_{12} 44.094	0.20	0.21	0.23	0.213	5.02	8.342	20.748	1.0000	1.1062	961	2.532	WATER	7'1¼"	376.59	67	0.99932	376.33	10.7		
C_4H_8 56.104	1.83	1.86	2.06	1.917	NATURAL GAS		435.9	185	1444245				4'9¼"	254.38	58	1.00018	254.43	8.287		
C_5H_{10} 58.120	0.75	0.75	0.78	0.760	28.43	7.700	21.227	0.8979	1.2018	5014	13.212		6'7"	349.31	61	0.99992	349.28			
C_5H_{10} 70.130	0.90	0.85	0.90	0.883	OXYGEN		444.6	60					1'2"	60.66	67	0.99932	60.62			141.76
C_5H_{12} 72.146	0.23	0.29	0.26	0.260	27.07	6.821	21.431	1.0000		3957	10.427						410.56		3402.31	17.107
C_6H_{12} 84.156	0.31	0.29	0.26	0.287	STEAM		29.4													
			M. W.	23.65843	215.7	6.071	0.2893	379#/hr												

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-E
HOURS 88-112

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.20	10.411 0.027			20.849	WET GAS	25.96 272.30	311.05
CO 28.010	37.08	36.77	37.15	37.000	15.287	15.287		15.287	CO_2 44.010	1.40	0.186	0.186		0.372	OIL	56.61	59.04
H_2 2.016	60.35	60.49	60.40	60.413	24.960		49.920		N_2 28.016	0.73	0.097				WATER	142.57	148.68
CO_2 44.010	1.91	1.92	1.92	1.917	0.792	0.792		1.584	CH_4 16.042	82.74	10.989	10.989	43.956		TOTAL	497.44	518.77
N_2 28.016	0.12	0.33	0.14	0.197	0.081				C_2H_6 30.068	7.01	0.931	1.862	5.586		FRESH FEED	518.77	
CH_4 16.042	0.54	0.49	0.39	0.473	0.195	0.195	0.780		C_3H_8 44.094	5.61	0.745	2.235	5.960		WEIGHT BALANCE	95.88	
			M. W	12.5564					C_4H_{10} 58.120	1.67	0.222	0.888	2.220		Forced Factor	1042879	
			H_2O 18.016				8.372	4.186	C_5H_{12} 72.146	0.64	0.085	0.425	1.020		WET GAS FACTOR	1142306	
						16.274	59.072	21.057	MW	20.1716					INDICATED LOSS—S C F H 632		
			BALANCE			98.12	100.56	99.23	TOTAL			16.585	58.742	21.221			

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES								
CO 28.010	9.08	9.76	9.62	9.487		$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
H_2 2.016	38.73	38.72	38.40	38.616	FRESH FEED		415.8	60	2.30559			OIL	7'3¼"	385.32	51	1.0044	387.02	51.2		
CO_2 44.010	29.38	29.15	29.20	29.243	79.31	6.275	20.7484	1.0000	1.5184	15679	41.315		4'11¼"	263.11	43	1.0084	265.32	6.448		
N_2 28.016	1.50	1.47	1.37	1.447			1.5	60	1.24326				2'9¾"	149.62	51	1.0044	150.28			
CH_4 16.042	10.52	9.86	10.03	10.136	WET GAS 158.44	6.242	4.0249	1.0000	1.1150	4438	11.694		1'4½"	71.58	51	1.0044	71.89			
C_2H_6 28.052	2.23	2.13	2.23	2.197			415.0	76									200.09		1290.18	56.61
C_3H_8 33.068	1.69	1.65	1.74	1.693	RECYCLE 79.31	8.488	20.7292	0.9850	1.1150	15326	40.385						+10.62 210.71		+68.50 1358.68	8.780
C_3H_6 42.078	2.83	2.96	2.97	2.920			415.0	60										10.7		
C_3H_8 44.094	0.30	0.30	0.29	0.297	BLEED 5.02	8.454	20.7292	1.0000	1.1150	981	2.585	WATER	7'3½"	386.41	62	0.9998	386.33	8.287		
C_4H_8 56.104	1.87	1.98	2.03	1.960			435.5	175	1.43518		42.970		6'7"	349.31	61	0.9999	349.28			
C_4H_{10} 58.120	0.59	0.69	0.75	0.677	NATURAL GAS 28.43	7.700	21.2530	0.9049	1.19798	5044	13.281		7'3½"	386.41	63	0.9997	386.29			
C_5H_{10} 70.130	0.92	0.86	0.90	0.893			444.7	61					1'6½"	79.27	53	1.0005	79.31			
C_5H_{12} 72.146	0.13	0.20	0.20	0.177	OXYGEN 27.07	6.817	21.4336	0.9990		2951	10.411		2'8"	142.71	63	0.9997	142.67			
C_6H_{12} 84.156	0.23	0.27	0.27	0.257									1'5"	73.78	55	1.0004	73.81			142.57
			M. W.	23.2854	STEAM 215.7	6.142											412.89		3421.62	17.204

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-F
HOURS 112-136

Forced

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.20	10.377 0.026			20.806	WET GAS	264.99 25.72	308.80
CO 28.010	37.11	37.26	37.12	37.163	15.325	15.235		15.235	CO_2 44.010	1.30	0.171	0.171		0.342	OIL	54.92	58.34
H_2 2.016	60.29	60.58	60.73	60.534	24.962		49.924		N_2 28.016	1.02	0.134				WATER	139.95	148.66
CO_2 44.010	1.59	1.79	1.85	1.743	0.719	0.719		1.438	CH_4 16.042	83.34	10.985	10.985	43.940		TOTAL	485.58	515.80
N_2 28.016	0.25	0.17	0.13	0.183	0.075				C_2H_6 30.068	6.86	0.904	1.808	5.424		FRESH FEED	515.80	
CH_4 16.042	0.76	0.20	0.17	0.377	0.155	0.155	0.620		C_3H_8 44.094	5.21	0.687	2.061	5.496		WEIGHT BALANCE	94.14	
			M. W	12.5086					C_4H_{10} 58.120	1.54	0.203	0.812	2.030		Force Factor	1062234	
			H_2O 18.016				7.384	3.692	C_5H_{12} 72.146	0.53	0.070	0.350	0.840		WET GAS FACTOR	116533	
						16.109	57.928	20.365	MW	19.9287		16.187	57.730	20.464	INDICATED LOSS—S C F H 721		
			BALANCE			99.52	100.34	99.52	TOTAL								

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES								
CO 28.010	8.64	8.86	8.88	8.793		$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
H_2 2.016	39.25	39.89	38.89	39.343	FRESH FEED		415.4	60	2.31440			OIL	6'7"	349.31	48	1.0059	351.37	52.7		
CO_2 44.010	28.61	28.49	29.48	28.860	79.31	6.254	20.739	1.0000	1.5213	15649	41.236		2'9¾"	149.62	51	1.0044	150.28	6.396		
N_2 28.016	1.64	1.86	2.07	1.857			1.5	61	1.25484								201.09		1286.17	54.92
CH_4 16.042	11.11	10.02	9.56	10.230	WET GAS 158.44	6.108	4.0249	0.9990	1.12019	4359	11.486						+5.00 206.09		+32.00 1318.17	8.587
C_2H_6 28.052	2.37	2.34	2.22	2.310			414.0	75												
C_3H_8 33.068	1.60	1.69	1.79	1.693	RECYCLE 79.31	8.500	20.705	0.9859	1.12019	15414	40.617									
C_3H_6 42.078	2.68	2.60	2.09	2.457			414.0													
C_3H_8 44.094	0.24	0.23	0.17	0.213	BLEED 5.02	8.496	20.705	1.0000	1.1209	989	2.606	WATER	7'5½"	395.14	70	0.99896	394.73	10.7		
C_4H_8 56.104	1.88	1.82	1.89	1.863			435.1	191	1.45267		43.223		2'8"	142.71	63	0.9997	142.67	8.287		
C_4H_{10} 58.120	0.59	0.77	1.16	0.840	NATURAL GAS 28.43	7.700	21.208	0.8938	1.2053	5002	13.181		3'11"	209.64	64	0.99963	209.56			
C_5H_{10} 70.130	0.88	0.89	1.01	0.927			444.7	62					1'1"	56.30	56	1.00033	56.32			139.95
C_5H_{12} 72.146	0.22	0.23	0.38	0.277	OXYGEN 27.07	6.800	21.434	0.9981		3938	10.377						405.30			16.888
C_6H_{12} 84.156	0.29	0.31	0.41	0.337																
			M. W.	23.0705	STEAM 215.7	6.096														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-G
HOURS 136-160

Forced

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1800	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.23	10.540 0.031			21.142	WET GAS	26.29 274.16	314.71
CO 28.010	37.42	37.57	37.42	37.470	15.289	15.289		15.289	CO_2 44.010	1.30	0.173	0.173		0.346	OIL	56.17	58.84
H_2 2.016	60.30	60.02	60.06	60.126	24.535		49.070		N_2 28.016	1.83	0.243				WATER	138.72	145.30
CO_2 44.010	1.97	2.24	2.24	2.150	0.877	0.877		1.754	CH_4 16.042	83.20	11.062	11.062	44.248		TOTAL	495.34	
N_2 28.016	0.21	0.10	0.22	0.177	0.072				C_2H_6 30.068	6.65	0.884	1.768	5.304		FRESH FEED	518.85	
CH_4 16.042	0.10	0.07	0.06	0.077	0.031	0.031	0.124		C_3H_8 44.094	5.01	0.666	1.998	5.328		WEIGHT BALANCE	95.47	
			M. W	12.7156					C_4H_{10} 58.120	1.34	0.178	0.712	1.780		Forced Factor	1047462	
			H_2O 18.016				8.192	4096	C_5H_{12} 72.146	0.44	0.059	0.295	0.708		WET GAS FACTOR	1147906	
						16.197	57.386	21.139	MW	19.8102	13.296	16.0082	57.368	21.448	INDICATED LOSS—SCFH	801	
			BALANCE			98.94	100.03	98.56	TOTAL								

WET GAS 1400					GAS FLOW RATES										LIQUID PRODUCT RATES						
CO 28.010	8.29	8.61	8.55	8.483		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	37.99	39.20	37.63	38.272	FRESH FEED		414.5	60	2.27673			OIL	7'5"	392.96	53	1.0035	394.34	52.4		
CO_2 44.010	30.11	30.54	31.34	30.663	79.31	6.246	20.7171	1.0000	1.50888	15485	40.804		6'7"	349.31	48	1.0059	351.37	6.406		
N_2 28.016	1.54	1.38	1.60	1.507	WET GAS		1.5	59					3'9½"	203.10	42	1.0089	204.91			
CH_4 16.042	10.81	9.26	9.31	9.793	158.44	6.238	4.0249	1.0010	1.10798	4412	11.626		0'9½"	41.26	63	0.9985	41.20			
C_2H_4 28.052	2.43	2.33	2.29	2.350	RECYCLE		412.6	74									3.75		+24.00	56.17
C_2H_6 33.068	1.75	1.77	1.72	1.747	79.31	8.496	20.6712	0.9868	1.10798	15229	40.129						210.43			8.768
C_3H_6 42.078	3.31	3.10	3.15	3.187	BLEED		412.6	60												
C_3H_8 44.094	0.30	0.29	0.27	0.287	5.02	8.500	20.6712	1.0000	1.10798	977	2.574	WATER	7'6"	397.32	71	0.99883	396.86	10.7		
C_4H_8 56.104	1.84	1.75	1.99	1.860	NATURAL GAS		437.0	186	1.46136				3'11"	209.64	64	0.99963	209.56	8.287		
C_4H_{10} 58120	0.53	0.60	0.79	0.640	28.43	7.700	21.2532	0.8972	1.20886	5046	13.296		5'6"	292.57	60	1.00000	292.57			
C_5H_{10} 70.130	0.83	0.79	0.98	0.867	OXYGEN		446.0	61					1'6"	78.16	64	0.99963	78.13			138.72
C_5H_{12} 72.146	0.09	0.19	0.19	0.157	27.07	6.892	20.14639	0.9990		4000	10.540						401.74			16.739
C_6H_{12} 84.156	0.18	0.19	0.19	0.187	STEAM		27.4													
			M. W.	23.5819	215.7	5.988	0.2811		363#/hr											

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-H
HOURS 160-184

Forced

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.29	10.551 0.038			21.178	WET GAS	25.69 271.89	319.79
CO 28.010	37.76	37.85	37.60	37.737	15.461	15.461		15.461	CO_2 44.010	1.32	0.175	0.175		0.350	OIL	51.56	55.41
H_2 2.016	59.75	59.91	59.81	59.823	24.508		49.016		N_2 28.016	1.17	0.155				WATER	136.80	147.01
CO_2 44.010	1.78	1.99	2.21	1.993	0.817	0.817		1.634	CH_4 16.042	83.76	11.116	11.116	44.464		TOTAL	485.94	522.21
N_2 28.016	0.11	0.11	0.31	0.177	0.073				C_2H_6 30.068	6.65	0.883	1.766	5.298		FRESH FEED	522.21	
CH_4 16.042	0.60	0.14	0.07	0.270	0.111	0.111	0.444		C_3H_8 44.094	4.96	0.658	1.974	5.264		WEIGHT BALANCE	93.05	
			M. W	12.746186					C_4H_{10} 58.120	1.41	0.187	0.748	1.870		Forced Factor	1074638	
			H_2O 18.016				8.499	4.250	C_5H_{12} 72.146	0.44	0.058	0.290	0.696		WET GAS FACTOR	1176174	
						16.389	57.959	21.345	MW	19.761817					INDICATED LOSS—SCFH	1021	
			BALANCE			101.99	100.64	99.15	TOTAL			16.069	57.592	21.528		5500	

WET GAS					GAS FLOW RATES										LIQUID PRODUCT RATES						
CO 28.010	8.20	8.95	6.87	8.007		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	40.31	40.36	39.63	40.100	FRESH FEED		414.1	61	2271267			OIL	7'3"	384.23	46	1.0069	386.88	52.6		
CO_2 44.010	28.25	29.96	31.19	29.800	79.31	6.288	20.707	0.9990	1.5071	15548	40.970		3'9½"	203.10	42	1.0089	204.91	6.399		
N_2 28.016	0.97	1.35	1.68	1.333	WET GAS		1.50	61	1256633				1'2"	60.66	44	1.0079	61.14			
CH_4 16.042	11.03	8.79	9.14	9.654	158.44	6.271	4.025	0.9990	1.1210	4479	11.802		0'11½"	49.82	41	1.0094	50.29			
C_2H_4 28.052	2.04	2.27	2.33	2.213	RECYCLE		412.4	75									+0.55		3.50	51.56
C_2H_6 33.068	1.56	1.69	1.76	1.670	79.31	8.504	20.666	0.9859	1.1210	15404	40.590						193.37		1237.37	8.057
C_3H_6 42.078	3.24	2.93	2.99	3.053	BLEED															
C_3H_8 44.094	0.38	0.33	0.26	0.323	5.02	8.558	20.666	1.0000	1.1210	995	2.622	WATER	7'5½"	395.14	68	0.99920	394.82	10.7		
C_4H_8 56.104	1.76	1.69	1.92	1.790	NATURAL GAS		434.8	187	1464946				5'6"	292.57	60	1.00000	292.57	8.287		
C_4H_{10} 58120	0.85	0.46	0.78	0.697	28.43	7.700	21.201	0.8965	1.2103	5036	13.270		7'2"	379.86	60	1.00000	379.86			
C_5H_{10} 70.130	0.69	0.84	0.95	0.827	OXYGEN		446.0	64					1'7-3/4	85.91	60	1.00000	85.91			136.80
C_5H_{12} 72.146	0.56	0.14	0.26	0.320	27.07	6.917	21.464	0.9962		4004	10.551						396.20		3283.31	16.508
C_6H_{12} 84.156	0.16	0.24	0.24	0.213	STEAM		26.8													
			M. W.	23.037749	215.7	5.942														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-I
HOURS 184-208

HOUR	GAS ANALYSES 1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	36.83	37.11	37.10	37.014
H_2 2.016	60.38	60.19	59.88	60.150
CO_2 44.010	2.04	2.37	2.43	2.280
N_2 28.016	0.18	0.26	0.50	0.313
CH_4 16.042	0.57	0.07	0.09	0.243
			M. W	12.71035
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	7.74	8.41	7.72	7;957
H_2 2.016	39.71	37.11	35.69	37.503
CO_2 44.010	27.35	31.74	32.45	30.513
N_2 28.016	1.29	1.50	1.65	1.480
CH_4 16.042	11.92	9.16	9.90	10.327
C_2H_4 28.052	2.56	2.39	2.49	2.480
C_2H_6 30.068	1.84	1.82	1.87	1.843
C_3H_6 42.078	3.54	3.02	3.07	3.210
C_3H_8 44.094	0.36	0.27	0.21	0.280
C_4H_8 56.104	2.05	2.11	2.01	2.057
C_4H_{10} 58.120	0.55	0.78	1.18	0.837
C_5H_{10} 70.130	0.83	1.16	1.09	1.027
C_5H_{12} 72.146	0.13	0.23	0.28	0.213
C_6H_{12} 84.156	0.13	0.30	0.39	0.273
			M. W.	23.95306

GENERATOR BALANCE	M/HR	C	H	O
FRESH FEED				
CO 28.010	15.113	15.113		15.113
H_2 2.016	24.559		49.118	
CO_2 44.010	0.931	0.931		1.862
N_2 28.016	0.128			
CH_4 16.042	0.099	0.099	0.396	
		M. W		12.71035
		H_2O 18.016		
		BALANCE		
WET GAS				
CO 28.010				
H_2 2.016				
CO_2 44.010				
N_2 28.016				
CH_4 16.042				
C_2H_4 28.052				
C_2H_6 30.068				
C_3H_6 42.078				
C_3H_8 44.094				
C_4H_8 56.104				
C_4H_{10} 58.120				
C_5H_{10} 70.130				
C_5H_{12} 72.146				
C_6H_{12} 84.156				

	Mol %	M/Hr	C	H	O
O_2 32.000	0.23	10.535 0.030			21.130
CO_2 44.010	1.37	0.182	0.182		0.364
N_2 28.016	2.25	0.298			
CH_4 16.042	83.05	11.007	11.007	44.028	
C_2H_6 30.068	6.47	0.857	1.714	5.142	
C_3H_8 44.094	4.80	0.636	1.908	5.088	
C_4H_{10} 58.120	1.39	0.184	0.736	1.840	
C_5H_{12} 72.146	0.44	0.058	0.290	0.696	
MW	19.81700				
TOTAL			15.837	56.794	21.494

GAS FLOW RATES	$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
		413.8	58	2277671		
FRESH FEED 79.31	6.242	20.700	1.0019	1.5092	15495	40.830
		1.50	59	1208613		
WET GAS 158.44	6.242	4.025	1.0010	1.0994	4381	11.544
		411.7	74			
RECYCLE 79.31	8.492	20.649	0.9868	1.0994	15088	39.758
BLEED 5.02	8.517	20.649	1.0000	1.0994	971	2.559
		435.5	188	1460866		
NATURAL GAS 28.43	7.700	21.218	0.8958	1.2087	5029	13.252
		444.2	62			
OXYGEN 27.07	6.908	21.422	0.9981		3998	10.535
		27.1				
STEAM 215.7	5.917					

WEIGHT BALANCE	#/hr Measured	At Wt. Balance
WET GAS	26.71 276.51	319.90
OIL	53.90	56.86
WATER	134.78	142.19
TOTAL	491.90	
FRESH FEED	518.96	
WEIGHT BALANCE	94.79	
Forced Factor	105501	
WET GAS FACTOR	1156920	
INDICATED LOSS—S C F H	852	
	5233	

LIQUID PRODUCT RATES

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
OIL	4'10½"	259.84	42	1.0089	262.15	52.4		
	1'2"	60.66	44	1.0079	61.14	6.406		
					+0.94		+6.00	53.90
					201.95		1293.69	8.415
WATER	7'6"	397.32	60	1.00000	397.32	10.8		
	7'2"	379.86	60	1.00000	379.86	8.282		
	7'3½"	386.41	60	1.00000	386.41			
	0'3"	13.28	44	1.00106	13.29			134.78
					390.58		3234.78	16.274

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-J
HOURS 208-232

HOUR	GAS ANALYSES 1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	37.36	37.62	37.26	37.413
H_2 2.016	59.97	59.88	60.10	59.984
CO_2 44.010	2.12	2.28	2.36	2.253
N_2 28.016	0.06	0.11	0.18	0.117
CH_4 15.042	0.49	0.11	0.10	0.233
			M. W	12.75036
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	12.03	12.68	12.43	12.380
H_2 2.016	41.15	39.38	40.75	40.427
CO_2 44.010	24.71	27.17	26.73	26.203
N_2 28.016	1.33	1.23	1.55	1.370
CH_4 16.042	10.18	8.08	8.25	8.837
C_2H_4 28.052	2.22	2.12	1.98	2.107
C_2H_6 30.068	1.72	1.70	1.60	1.673
C_3H_6 42.078	2.83	2.87	2.27	2.657
C_3H_8 44.094	0.28	0.29	0.28	0.283
C_4H_8 56.104	1.77	2.14	1.78	1.897
C_4H_{10} 58.120	0.50	0.65	0.72	0.623
C_5H_{10} 70.130	0.81	1.15	1.06	1.007
C_5H_{12} 72.146	0.24	0.23	0.29	0.253
C_6H_{12} 84.156	0.23	0.31	0.31	0.283
			M. W.	22.50621

GENERATOR BALANCE	M/HR	C	H	O
FRESH FEED				
CO 28.010	15.055	15.055		15.055
H_2 2.016	24.137		48.274	
CO_2 44.010	0.907	0.907		1.814
N_2 28.016	0.047			
CH_4 16.042	0.094	0.094	0.376	
		M. W	9.360	4.519
		H_2O 18.016	9.199	4.600
		BALANCE		
WET GAS				
CO 28.010				
H_2 2.016				
CO_2 44.010				
N_2 28.016				
CH_4 16.042				
C_2H_4 28.052				
C_2H_6 30.068				
C_3H_6 42.078				
C_3H_8 44.094				
C_4H_8 56.104				
C_4H_{10} 58.120				
C_5H_{10} 70.130				
C_5H_{12} 72.146				
C_6H_{12} 84.156				

	Mol %	M/Hr	C	H	O
O_2 32.000	0.19	10.472 0.025			20.994
CO_2 44.010	1.49	0.197	0.197		0.394
N_2 28.016	0.21	0.028			
CH_4 16.042	84.70	11.211	11.211	44.844	
C_2H_6 30.068	6.45	0.854	1.708	5.124	
C_3H_8 44.094	4.95	0.655	1.965	5.240	
C_4H_{10} 58.120	1.47	0.195	0.780	1.950	
C_5H_{12} 72.146	0.54	0.071	0.355	0.852	
MW	19.728948				
TOTAL			16.216	58.010	21.388

GAS FLOW RATES	$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
		412.6	61	2270524		
FRESH FEED 79.31	6.188	20.671	0.9990	1.5068	15271	40.240
		1.50	62	1286311		
WET GAS 158.44	6.521	4.025	0.9981	1.1342	4708	12.406
		411.9	77			
RECYCLE 79.31	8.450	20.654	0.9840	1.1342	15448	40.706
BLEED 5.02	8.046	20.654	1.0000	1.1342	946	2.493
		432.7	187	1467386		
NATURAL GAS 28.43	7.692	21.152	0.8965	1.2114	5023	13.236
		441.6	63			
OXYGEN 27.07	6.892	21.361	0.9971		3974	10.472
		26.0				
STEAM 215.7	5.750					

WEIGHT BALANCE	#/hr Measured	At Wt. Balance
WET GAS	25.09 279.21	327.12
OIL	44.70	48.05
WATER	128.28	137.90
TOTAL	477.28	
FRESH FEED	513.07	
WEIGHT BALANCE	93.02	
Forced Factor	1074987	
WET GAS FACTOR	1171591	
INDICATED LOSS—S C F H	808	
	5735	

LIQUID PRODUCT RATES 21 hours basis

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
OIL	4'7½"	246.74	49	1.0054	248.07	50.9		
	2'0½"	106.35	43	1.0084	107.24	6.459		
					+4.49		+29.00	44.70
					145.32		938.62	6.920
WATER	7'3-3/4	387.50	68	0.99920	387.19	10.6		
	1'9"	91.50	62	0.99982	91.48	8.293		
	1'7"	82.59	61	0.99992	82.58			
	1'0½"	54.14	50	1.00070	54.18			
					+0.72		+6.00	128.28
					324.83		2693.82	15.468

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-K
HOURS 232-256

Forced

HOUR	GAS ANALYSES 1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	37.11	38.12	37.32	37.517
H_2 2.016	60.39	58.93	60.12	59.813
CO_2 44.010	1.79	2.58	2.27	2.213
N_2 28.016	0.13	0.26	0.17	0.187
CH_4 16.042	0.59	0.11	0.12	0.270
			M. W	12.783986
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	10.99	11.84	11.53	11.453
H_2 2.016	39.85	41.34	40.49	40.560
CO_2 44.010	26.81	26.99	27.47	27.090
N_2 28.016	1.26	1.27	1.43	1.320
CH_4 16.042	9.66	8.61	8.58	8.950
C_2H_4 28.052	2.02	2.07	1.88	1.990
C_2H_6 30.068	1.66	1.66	1.64	1.653
C_3H_6 42.078	2.58	2.55	2.42	2.517
C_3H_8 44.094	0.28	0.27	0.19	0.247
C_4H_8 56.104	2.04	1.64	1.80	1.827
C_4H_{10} 58.120	0.88	0.52	0.95	0.793
C_5H_{10} 70.130	1.16	0.84	0.95	0.983
C_5H_{12} 72.146	0.41	0.18	0.40	0.330
C_6H_{12} 84.156	0.40	0.22	0.27	0.297
			M. W.	22.634331

	M/HR	C	H	O
FRESH FEED	79.31	6.263		
WET GAS	158.44	6.496		
RECYCLE	79.31	8.392		
BLEED	5.02	8.046		
NATURAL GAS	28.43	7.713		
OXYGEN	27.07	6.883		
STEAM	215.7	5.696		
	99.98	99.45	100.76	
	15.240	15.240		15.240
	24.297		48.594	
	0.899	0.899		1.798
	0.076			
	0.110	0.110	0.440	
			8.858	4.268 / 4.429
		16.249	57.892	21.467

	Mol %	M/Hr	C	H	O
O_2 32.000	0.26	10.440 / 0.035			20.950
CO_2 44.010	1.34	0.178	0.178		0.356
N_2 28.016	0.38	0.051			
CH_4 16.042	84.43	11.225	11.225	44.900	
C_2H_4 30.068	6.69	0.890	1.780	5.340	
C_2H_6 44.094	4.98	0.662	1.986	5.296	
C_4H_{10} 58.120	1.44	0.191	0.764	1.910	
C_5H_{12} 72.146	0.48	0.064	0.320	0.768	
MW	19.71431				
TOTAL			16.253	58.214	21.306

	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED	411.5	61	2264551		
WET GAS	1.65	63	1279030		
RECYCLE	410.9	75			
BLEED	434.0	187	1468476		
NATURAL GAS	440.9	64			
OXYGEN	21.345	0.9962		3962	10.440
STEAM	26.5				
	20.645	0.9990	1.5048	15416	40.622
	4.044	0.9971	1.1309	4693	12.366
	20.630	0.9859	1.1309	15309	40.340
	20.630	1.0000	1.1309	942	2.482
	21.183	0.8965	1.2118	5046	13.296

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
OIL	7'3½"	385.32	48	1.0059	387.59	50.3		
	4'7⅞"	246.74	49	1.0054	248.07	6.480		
	1'4½"	70.49	45	1.0074	71.01			
	1'0½"	53.06	40	1.0099	53.59			
					+4.86		+31.50	43.69
					161.80		1048.46	6.742
WATER	7'7-1/8	402.23	65	0.99953	402.04	10.6		
	1'7"	82.59	61	0.99992	82.58	8.293		
	1'7½"	84.80	59	1.00009	84.81			
	0'9-3/4	42.31	44	1.00106	42.35			
					+0.78		+6.50	125.33
					362.70		3007.87	15.113

WEIGHT BALANCE	#/hr Measured	At Wt. Balance
WET GAS	25.24 / 279.90	334.20
OIL	43.69	47.85
WATER	125.33	137.26
TOTAL	474.16	519.31
FRESH FEED	519.31	
WEIGHT BALANCE	91.31	
Forced Factor	1095221	
WET GAS FACTOR	1193997	
INDICATED LOSS—S C F H	1180	
	5873	

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-L
HOURS 256-280

Forced

HOUR	GAS ANALYSES 1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	37.35	36.93	36.82	37.033
H_2 2.016	60.45	60.53	60.69	60.557
CO_2 44.010	1.73	2.13	2.11	2.010
N_2 28.016	0.17	0.24	0.14	0.133
CH_4 16.042	0.30	0.11	0.24	0.217
			M. W	12.56445
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	10.26	11.50	11.80	11.187
H_2 2.016	40.40	42.11	43.62	42.044
CO_2 44.010	27.49	26.60	25.75	26.613
N_2 28.016	1.24	1.47	1.07	1.260
CH_4 16.042	8.98	8.34	8.52	8.613
C_2H_4 28.052	2.15	1.97	1.95	2.023
C_2H_6 30.068	1.74	1.58	1.57	1.630
C_3H_6 42.078	2.67	1.97	2.24	2.293
C_3H_8 44.094	0.21	0.16	0.21	0.193
C_4H_8 56.104	2.13	1.77	1.46	1.787
C_4H_{10} 58.120	0.81	0.82	0.53	0.720
C_5H_{10} 70.130	1.25	1.06	0.80	1.037
C_5H_{12} 72.146	0.26	0.34	0.22	0.273
C_6H_{12} 84.156	0.41	0.31	0.26	0.327
			M. W.	22.156156

	M/HR	C	H	O
FRESH FEED	79.31	6.246		
WET GAS	158.44	5.883		
RECYCLE	79.31	7.992		
BLEED	5.02	8.096		
NATURAL GAS	28.43	7.700		
OXYGEN	27.07	6.900		
STEAM	215.7	5.521		
	99.98	99.45	100.76	
	15.112	15.112		15.112
	24.710		49.420	
	0.820	0.820		1.640
	0.075			
	0.089	0.089	0.356	

	Mol %	M/Hr	C	H	O
O_2 32.000	0.22	10.451 / 0.029			20.960
CO_2 44.010	1.29	0.170	0.170		0.340
N_2 28.016	0.62	0.082			
CH_4 16.042	83.77	11.039	11.039	44.156	
C_2H_6 30.068	6.78	0.893	1.786	5.358	
C_3H_8 44.094	5.19	0.684	2.052	5.472	
C_4H_{10} 58.120	1.55	0.204	0.816	2.040	
C_5H_{12} 72.146	0.58	0.077	0.385	0.924	
MW	19.896607				
TOTAL					21.300

	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED	410.3	61	2304119		
WET GAS	1.50	65	1306634		
RECYCLE	410.1	79			
BLEED	432.3	188	1455021		
NATURAL GAS	438.8	63			
OXYGEN	21.296	0.9971		3966	10.451
STEAM	28.1				
	20.616	0.9990	1.5179	15486	40.806
	4.025	0.9952	1.1431	4268	11.246
	20.611	0.9822	1.1431	14668	38.651
	20.611	1.0000	1.1431	958	2.524
	21.142	0.8958	1.2062	5001	13.178

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
OIL	3'11½"	211.83	51	1.0044	212.76	49.9		
	1'4½"	70.49	45	1.0074	71.01	6.494		
					+1.69		+11.00	38.81
					143.44		931.50	5.977
WATER	7'2½"	382.05	67	0.99932	381.79	10.7		
	1'7½"	84.80	59	1.00009	84.81	8.287		
	2'0"	105.19	62	0.99982	105.17			
	1'2"	60.66	58	1.00018	60.67			
					+0.72		+6.00	118.16
					342.20		2835.81	14.258

WEIGHT BALANCE	#/hr Measured	At Wt. Balance
WET GAS	24.70 / 249.17	325.91
OIL	38.81	46.18
WATER	118.16	140.61
TOTAL	430.84	
FRESH FEED	512.70	
WEIGHT BALANCE	84.03	
Forced Factor	11900	
WET GAS FACTOR	1307982	
INDICATED LOSS—S C F H	1825	
	6093	

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-M

HOURS 280-304

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.26	10.543 0.034			21.154	WET GAS	24.62 236.65	321.75
CO 28.010	36.97	37.12	37.21	37.100	15.042	15.042		15.042	CO_2 44.010	1.62	0.214	0.214		0.428	OIL	40.94	50.42
H_2 2.016	60.47	60.33	59.97	60.257	24.431		48.863		N_2 28.016	1.70	0.224				WATER	115.28	141.96
CO_2 44.010	2.02	2.15	2.43	2.200	0.892	0.892		1.784	CH_4 16.042	83.55	11.026	11.026	44.104		TOTAL	417.49	
N_2 28.016	0.22	0.33	0.32	0.290	0.118				C_2H_6 30.068	6.17	0.814	1.628	4.884		FRESH FEED	514.13	
CH_4 16.042	0.32	0.07	0.07	0.153	0.062	0.062	0.248		C_3H_8 44.094	4.72	0.623	1.869	4.984		WEIGHT BALANCE	81.20	
			M. W	12.680502					C_4H_{10} 58.120	1.48	0.195	0.780	1.950		Forced Factor	1231478	
			H_2O 18.016				8.558	4.279	C_6H_{12} 72.146	0.50	0.066	0.330	0.792		WET GAS FACTOR	1359602	
						15.996	57.668	21.105	MW	19.832863					INDICATED LOSS—SCFH	2084	
			BALANCE			100.94	101.68	97.80	TOTAL			15.847	56.714	21.582		6152	

WET GAS					GAS FLOW RATES										LIQUID PRODUCT RATES						
CO 28.010	10.32	11.35	10.60	10.757		$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	42.34	41.98	41.37	41.897	FRESH FEED		408.3	57	2283032			OIL	6'8½"	355.86	43	1.0084	358.85	50.0		
CO_2 44.010	26.70	27.05	28.25	27.333	79.31	6.225	20.567	1.0029	1.5110	15387	40.545		3'11½"	211.83	51	1.0044	212.76	6.490		
N_2 28.016	1.26	1.54	1.40	1.400	WET GAS		1.50	60	1311259								+5.32		+34.50	40.94
CH_4 16.042	9.49	8.28	8.50	8.757	158.44	5.571	4.025	1.0000	1.1451	4068	10.719						151.41		982.65	6.309
C_2H_6 28.052	2.02	1.88	2.14	2.013	RECYCLE		407.9	74												
C_2H_6 33.068	1.67	1.59	1.67	1.643	79.31	8.500	20.557	0.9868	1.1451	15660	41.265									
C_3H_6 42.078	2.37	2.35	2.62	2.447	BLEED															
C_3H_8 44.094	0.23	0.24	0.29	0.253	5.02	8.063	20.557	1.0000	1.1451	953	2.511	WATER	7'2⅛"	382.05	63	0.99973	381.95	10.7		
C_4H_8 56.104	1.58	1.65	1.57	1.600	NATURAL GAS		431.3	187	1459698				2'0"	105.19	62	0.99982	105.17	8.287		
C_4H_{10} 58.120	0.67	0.74	0.45	0.620	28.43	7.700	21.119	0.8965	1.2082	5008	13.196		2'5-¾	132.34	56	1.00033	132.38			
C_5H_{10} 70.130	0.89	0.85	0.79	0.843	OXYGEN		439.5	56					1'5⅛"	75.97	54	1.00047	76.01			
C_5H_{12} 72.146	0.20	0.24	0.13	0.190	27.07	6.908	21.312	1.0039		4001	10.543						+0.72		+6.00	115.28
C_6H_{12} 84.156	0.26	0.26	0.22	0.247	STEAM		27.4										333.87		2766.78	13.911
			M. W.	22.078012	215.7	5.450														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-N

HOURS 304-326

Forced

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0200	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.23	10.522 0.030			21.104	WET GAS	226.13 24.77	308.40
CO 28.010	37.13	37.01	36.88	37.007	15.106	15.106		15.106	CO_2 44.010	1.24	0.162	0.162		0.324	OIL	42.42	52.14
H_2 2.016	60.53	60.46	60.55	60.513	24.700		49.400		N_2 28.016	1.85	0.242				WATER	125.33	154.05
CO_2 44.010	1.89	2.28	2.26	2.143	0.875	0.875		1.750	CH_4 16.042	82.28	10.747	10.747	42.988		TOTAL	418.65	514.59
N_2 28.016	0.23	0.16	0.21	0.200	0.082				C_2H_6 30.068	6.70	0.875	1.750	5.250		FRESH FEED	514.59	
CH_4 16.042	0.22	0.09	0.10	0.137	0.056	0.056	0.224		C_3H_8 44.094	5.27	0.688	2.064	5.504		WEIGHT BALANCE	81.36	
			M. W	12.60675					C_4H_{10} 58.120	1.72	0.225	0.900	2.250		Forced Factor	1229165	
			H_2O 18.016				8.314	4.157	C_6H_{12} 72.146	0.71	0.093	0.465	1.116		WET GAS FACTOR	1363817	
						16.037	57.938	21.013	MW	20.187188					INDICATED LOSS—SCFH	1405	
			BALANCE			99.68	101.45	9.806	TOTAL			16.088	57.108	21.428		5924	

WET GAS					GAS FLOW RATES										LIQUID PRODUCT RATES Basis 21 hours						
CO 28.010	9.96	10.57	9.47	10.000		$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	42.33	41.68	41.91	41.973	FRESH FEED		408.4	57	2296388			OIL	7'5"	392.96	52	1.0039	394.49	51.0		
CO_2 44.010	27.35	27.89	28.39	27.877	79.31	6.248	20.569	1.0029	1.5154	15491	40.819		6'8½"	355.86	43	1.0084	358.85	6.455		
N_2 28.016	1.47	1.52	1.42	1.470	WET GAS		1.50	59	1302916				3'4"	179.09	40	1.0099	180.86			
CH_4 16.042	8.93	8.15	8.90	8.660	158.44	5.300	4.025	1.0010	1.1415	3862	10.177		1'6½"	80.37	50	1.0049	80.76			
C_2H_6 28.052	1.99	1.83	2.21	2.010	RECYCLE		406.9	78									+2.25		+14.50	42.42
C_2H_6 33.068	1.63	1.64	1.70	1.657	79.31	8.010	20.533	0.9831	1.1415	14638	38.572						137.99		890.73	6.571
C_3H_6 42.078	2.28	2.38	2.72	2.460	BLEED															
C_3H_8 44.094	0.20	0.23	0.26	0.230	5.02	8.095	20.533	1.0000	1.1415	952	2.509	WATER	7'2½"	382.05	62	0.99982	381.98	10.7		
C_4H_8 56.104	1.67	1.70	1.50	1.623	NATURAL GAS		432.2	190	1434077				2'0"	105.19	62	0.99982	105.17	8.287		
C_4H_{10} 58.120	0.74	0.86	0.42	0.673	28.43	7.700	21.140	0.8944	1.1975	4957	13.062		1'6-¾	81.48	55	1.0039	81.51			
C_5H_{10} 70.130	0.91	0.89	0.71	0.837	OXYGEN		440.0	59					0'9⅛"	41.26	42	1.00116	41.31			
C_5H_{12} 72.146	0.26	0.31	0.20	0.257	27.07	6.910	21.324	1.0010		3993	10.522						+0.60		+5.00	125.33
C_6H_{12} 84.156	0.28	0.35	0.19	0.273	STEAM		25.7										317.61		2632.03	15.124
			M. W.	22.219367	215.7	5.548														

RUN NO. 66-0 (A-E)
HOURS 0-94
CATALYST Brownsville Trtd Mill Scale @ 660° F.

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED				
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*
CO 28.010	36.086	15.575	436.26	8.905	1.253	35.10	3.605	19.180	4.858	-14.322	-401.16					
H_2 2.016	60.971	26.317	53.06	41.033	5.843	11.78	16.802	43.119	22.645	-20.474	-41.28					400 EP
CO_2 44.010	2.168	0.936	41.19	29.503	4.201	184.99	12.081	13.017	16.282	3.265	143.70	9.039				400-550
N_2 28.016	0.668	0.288	8.07	1.715	0.244	6.84	0.702	0.990	0.946							550 +
CH_4 16.042	0.107	0.046	0.74	9.083	1.294	20.76	3.719	3.765	5.013	1.248	20.02	1.259				
C_2H_4 28.052				2.236	0.318	8.92	0.916	0.916	1.234	0.318	8.92	0.561				
C_2H_6 30.068				1.399	0.199	5.98	0.573	0.573	0.722	0.199	5.98	0.376				PROPYLENE
C_1+C_2											34.92	2.196				C_3 POLY GASO.
C_3H_6 42.078				2.905	0.414	17.42	1.189	1.189	1.603	0.414	17.42	1.096	4.32	4.032	0.254	C_3 POLY TAR
C_3H_8 44.094				0.313	0.046	2.03	0.128	0.128	0.174	0.046	2.03	0.128	4.24	0.479	0.030	
C_4H_8 56.104				1.598	0.228	12.79	0.654	0.654	0.882	0.228	12.79	0.805	5.00	2.558	0.161	
C_4H_{10} 58.120				0.494	0.070	4.07	0.202	0.202	0.272	0.070	4.07	0.256	4.86	0.837	0.053	C_4H_8
C_5H_{10} 70.130				0.609	0.087	6.10	0.249	0.249	0.336	0.087	6.10	0.384	5.45	1.119	0.070	C_4 POLY GASO.
C_5H_{12} 72.146				0.137	0.020	1.44	0.056	0.056	0.076	0.020	1.44	0.091	5.25	0.274	0.017	C_4H_{10}
C_6H_{12} 84.156				0.170	0.024	2.02	0.070	0.070	0.094	0.024	2.02	0.127	5.54	0.365	0.023	C_4 FREE GASO.
C_3-C_4											45.87	2.887		9.664	0.608	C_4 POLY TAR
TOTAL		43.162	53.932		14.241	320.14	40.946	84.108	63.058							
H_2+CO	97.057	41.892	15898 SCFH		7.096		20.407	62.299	27.503	-34.796						
H_2/CO		1.69	Factor 629009		4.66		4.66	2.25	4.66	1.43						10 # RVP 400 EP GASOLINE
GAS OIL										0.517**	72.50	4.560		11.456	0.721	
FUEL OIL											118.37	7.447		21.120	1.329	
POLY TAR										0.408**	21.65	1.362	2.967	2.717	0.171	
TOTAL											140.02	8.809		23.837	1.500	
W. S CHEM.										6.946**	125.14	7.871				
TOTAL											146.79	9.233				
											174.94	11.004				

																	gal/hr	gal/MCF	Bbl/Day	
																	14.653	0.9217	4997	
																	1.007	0.0633	343	
																	1.318	0.0829	449	
																	0.315	0.0198	107	
																	17.293	1.0877	5896	
																	2.717	0.1709	927	
																	20.010	1.2586	6823	

Weight Recovery, %		Catalyst Age, hrs. 47	Space Velocity, vhv 1271	RECOVERED OIL
Pressure, psig	404	Inlet Velocity, Ft/sec	Catalyst	TOTAL OIL
Temperature, °F	662	Bed Depth, Ft 18.95	Weight, # 1931	WATER SOLUBLE CHEMICALS
Recycle Ratio	0.95	Bed Density, #/CF 154	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ = 10.9	TOTAL LIQUID PRODUCTS C_3+

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	GROSS WATER
67.01	91.96	77.80	83.06	74.67	47.48	55.85	80.04	HYDROCARBON TOTAL—C_1+

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF

*9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

RUN NO. 66-1 (F-J)
HOURS 94-207
CATALYST Brownsville Trtd Mill Scale @ 660° F.

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED				
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*
CO 28.010	37.165	15.400	431.35	9.025	1.342	37.59	3.631	19.031	4.973	-14.058	-393.76					
H_2 2.016	59.995	24.859	50.12	40.444	6.015	12.13	16.273	41.132	22.288	-18.844	-37.99					400 EP
CO_2 44.010	2.191	0.908	39.96	29.700	4.417	194.39	11.950	12.858	16.367	3.509	154.43	10.108				400-550
N_2 28.016	0.572	0.237	6.64	1.859	0.276	7.73	0.748	0.985	1.024							550 +
CH_4 16.042	0.077	0.032	0.51	8.536	1.270	20.37	3.435	3.467	4.705	1.238	19.86	1.300				
C_2H_4 28.052				2.225	0.331	9.29	0.895	0.895	1.226	0.331	9.29	0.608				
C_2H_6 30.068				1.641	0.244	7.34	0.660	0.660	0.904	0.244	7.34	0.480				PROPYLENE
C_1+C_2											36.49	2.388				C_3 POLY GASO.
C_3H_6 42.078				3.075	0.457	19.23	1.237	1.237	1.694	0.457	19.23	1.259	4.32	4.451	0.291	C_3 POLY TAR
C_3H_8 44.094				0.336	0.050	2.20	0.135	0.135	0.185	0.050	2.20	0.144	4.24	0.519	0.034	
C_4H_8 56.104				1.705	0.254	14.25	0.686	0.686	0.940	0.254	14.25	0.933	5.00	2.850	0.187	
C_4H_{10} 58.120				0.502	0.075	4.36	0.202	0.202	0.277	0.075	4.36	0.285	4.86	0.897	0.059	C_4H_8
C_5H_{10} 70.130				0.631	0.094	6.59	0.254	0.254	0.348	0.094	6.59	0.431	5.45	1.209	0.079	C_4 POLY GASO.
C_5H_{12} 72.146				0.147	0.022	1.59	0.059	0.059	0.081	0.022	1.59	0.104	5.25	0.303	0.020	C_4H_{10}
C_6H_{12} 84.156				0.174	0.026	2.19	0.070	0.070	0.096	0.026	2.19	0.143	5.54	0.395	0.026	C_4 FREE GASO.
C_3-C_4											50.41	3.299		10.624	0.696	C_4 POLY TAR
TOTAL		41.436	528.58		14.873	339.25	40.236	81.672	62.166							
H_2+CO	97.160	40.259	15278 SCFH		7.357		19.904	60.163	27.261	-32.902						
H_2/CO		1.61	Factor 654535		4.48		4.48	2.16	4.48	1.34						10 # RVP 400 EP GASOLINE
GAS OIL										0.394**	55.21	3.614		8.763	0.574	
FUEL OIL											105.62	6.913		19.387	1.270	
POLY TAR										0.408**	21.63	1.416	7.943	2.723	0.178	
TOTAL											127.25	8.329		22.110	1.448	
W. S CHEM.										6.255**	112.69	7.376		13.528	0.885	
TOTAL											134.32	8.792		16.251	1.063	
											163.74	10.717				

																	gal/hr	gal/MCF	Bbl/Day	
																	13.021	0.8523	4621	
																	0.696	0.0456	247	
																	0.990	0.0648	351	
																	0.353	0.0231	125	
																	15.060	0.9858	5344	
																	2.723	0.1782	966	
																	17.783	1.1640	6310	

Weight Recovery, %		Catalyst Age, hrs. 150	Space Velocity, vhv 1241	RECOVERED OIL
Pressure, psig	403	Inlet Velocity, Ft/sec	Catalyst	TOTAL OIL
Temperature, °F	662	Bed Depth, Ft 18.66	Weight, # 1909	WATER SOLUBLE CHEMICALS
Recycle Ratio	0.97	Bed Density, #/CF 155	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ = 11.7	TOTAL LIQUID PRODUCTS C_3+

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	GROSS WATER
64.11	91.29	75.80	81.73	73.87	45.81	54.69	77.71	HYDROCARBON TOTAL—C_1+

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF

*9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

RUN NO. 66-2 (K-0)
HOURS 207-296
CATALYST Brownsville Trtd
Mill Scale @ 660° F.

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED							
					At Wt. Balance							CONDENSATE							
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	36.778	14.575	408.25	8.823	1.309	36.67	3.589	18.164	4.898	-13.266	-371.58						CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
H_2 2.016	60.197	23.855	48.09	41.463	6.151	12.40	16.865	40.720	23.016	-17.704	-35.69					400 EP	82.48	6.446	98.0	6.317
CO_2 44.010	2.325	0.921	40.53	28.801	4.273	188.05	11.715	12.636	15.988	3.352	147.52	10.115				400-550	8.48	0.663	91.4	0.606
N_2 28.016	0.602	0.239	6.70	1.630	0.242	6.78	0.663	0.902	0.905							550 +	9.04	0.706	114.6	0.809
CH_4 16.042	0.098	0.039	0.63	8.949	1.328	21.30	3.640	3.679	4.968	1.289	20.67	1.417								
C_2H_4 28.052				2.328	0.345	9.68	0.947	0.947	1.292	0.345	9.68	0.664					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.832	0.272	8.18	0.745	0.745	1.017	0.272	8.18	0.561				PROPYLENE	37.6	6.58		
C_1+C_2											38.53	2.642				C_3 POLY GASO.	87.5	5.76	0.963	
C_3H_6 42.078				2.805	0.416	17.50	1.141	1.141	1.557	0.416	17.50	1.200	4.32	4.051	0.278	C_3 POLY TAR	12.5	0.82	0.109	
C_3H_8 44.094				0.320	0.047	2.07	0.130	0.130	0.177	0.047	2.07	0.142	4.24	0.488	0.033					
C_4H_8 56.104				1.587	0.235	13.18	0.646	0.646	0.881	0.235	13.18	0.904	5.00	2.636	0.181		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.491	0.073	4.24	0.200	0.200	0.273	0.073	4.24	0.291	4.86	0.872	0.060	C_4H_8	5.00	0.36	0.072	68.0
C_5H_{10} 70.130				0.635	0.094	6.59	0.258	0.258	0.352	0.094	6.59	0.452	5.45	1.209	0.083	C_4 POLY GASO.	5.98	11.22	1.876	1.5
C_5H_{12} 72.146				0.147	0.022	1.59	0.060	0.060	0.082	0.022	1.59	0.109	5.25	0.303	0.021	C_4H_{10}	4.86	4.24	0.872	68.0
C_6H_{12} 84.156				0.189	0.028	2.36	0.077	0.077	0.105	0.028	2.36	0.162	5.54	0.426	0.029	C_4-FREE GASO.			9.218	5.8
C_3-C_6											47.53	3.260		9.985	0.685	C_4 POLY TAR	7.53	1.60	0.212	
TOTAL		39.629	504.20		14.835	330.59	40.676	80.305	61.993											
H_2+CO	96.975	38.430	14584 SCFH		7.460		20.454	58.884	27.914	-30.970							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.64	Factor 685682		4.70		4.70	2.24	4.70	1.33						10 # RVP 400 EP GASOLINE	12.038	0.8254	4475	
Weight Recovery, %		Catalyst Age, hrs. 252		Space Velocity, vhv 1179			RECOVERED OIL	0.353**	49.45	3.391		7.815	0.536	GAS OIL	0.606	0.0416	226	
Pressure, psig 403		Inlet Velocity, Ft/sec		Catalyst			TOTAL OIL		96.98	6.651		17.800	1.221	FUEL OIL	0.809	0.0555	301	
Temperature, °F 661		Bed Depth, Ft 18.74		Weight, # 1837			WATER SOLUBLE CHEMICALS	0.399**	21.15	1.450	7.857	2.692	0.185	POLY TAR	0.321	0.0220	119	
Recycle Ratio 1.03		Bed Density, #/CF 149		Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ = 13.1			TOTAL LIQUID PRODUCTS C_5+		118.13	8.101		20.492	1.406	TOTAL	13.774	0.9445	5121	
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY	NET WATER	5.730**	103.24	7.079		12.394	0.850	W. S. CHEM.	2.692	0.1846	1001	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	GROSS WATER		124.39	8.529		15.086	1.035	TOTAL	16.466	1.1291	6122	
62.57	91.02	74.22	80.59	73.03	43.48	52.59	75.41	HYDROCARBON TOTAL—C_1+		156.66	10.742									

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF

*9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

RUN NO. 66-3 (P-T)
HOURS 296-416
CATALYST Brownsville Trtd
Mill Scale @ 660° F.

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED							
					At Wt. Balance							CONDENSATE							
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	36.921	13.906	389.51	9.352	1.364	38.21	3.772	17.678	5.136	-12.542	-351.30						CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
H_2 2.016	59.712	22.490	45.34	41.133	5.996	12.09	16.591	39.081	22.587	-16.494	-33.25					400 EP	80.98	5.500	98.0	5.390
CO_2 44.010	2.315	0.872	38.38	28.565	4.164	183.26	11.521	12.393	15.685	3.292	144.88	10.489				400-550	8.70	0.591	91.4	0.540
N_2 28.016	0.932	0.351	9.83	2.246	0.327	9.16	0.906	1.257	1.233							550 +	10.32	0.701	114.6	0.803
CH_4 16.042	0.120	0.045	0.72	8.477	1.236	19.83	3.419	3.464	4.655	1.191	19.11	1.384								
C_2H_4 28.052				2.255	0.329	9.23	0.910	0.910	1.239	0.329	9.23	0.668					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.739	0.254	7.64	0.701	0.701	0.955	0.254	7.64	0.553				PROPYLENE	36.3	6.32		
C_1+C_2											35.98	2.605				C_3 POLY GASO.	87.5	5.53	0.925	
C_3H_6 42.078				2.837	0.414	17.42	1.144	1.144	1.558	0.414	17.42	1.261	4.32	4.032	0.292	C_3 POLY TAR	12.5	0.79	0.105	
C_3H_8 44.094				0.302	0.044	1.94	0.122	0.122	0.166	0.044	1.94	0.140	4.24	0.458	0.033					
C_4H_8 56.104				1.638	0.239	13.41	0.661	0.661	0.900	0.239	13.41	0.971	5.00	2.682	0.194		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.484	0.071	4.13	0.195	0.195	0.266	0.071	4.13	0.299	4.86	0.850	0.062	C_4H_8	5.00	0.15	0.030	68.0
C_5H_{10} 70.130				0.643	0.094	6.59	0.259	0.259	0.353	0.094	6.59	0.477	5.45	1.209	0.088	C_4 POLY GASO.	5.98	11.60	1.940	1.5
C_5H_{12} 72.146				0.154	0.022	1.59	0.062	0.062	0.084	0.022	1.59	0.115	5.25	0.303	0.022	C_4H_{10}	4.86	4.13	0.850	68.0
C_6H_{12} 84.156				0.175	0.026	2.19	0.071	0.071	0.097	0.026	2.19	0.159	5.54	0.395	0.029	C_4-FREE GASO.			8.222	5.8
C_3-C_6											47.27	3.422		9.929	0.720	C_4 POLY TAR	7.53	1.66	0.220	
TOTAL		37.664	483.78		14.580	326.69	40.334	77.998	60.797											
H_2+CO	96.633	36.396	13812 SCFH		7.360		20.363	56.759	27.723	-29.036							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.62	Factor 724008		4.40		4.40	2.21	4.40	1.32						10 # RVP 400 EP GASOLINE	11.042	0.7994	4334	
Weight Recovery, %		Catalyst Age, hrs. 356		Space Velocity, vhv 1124			RECOVERED OIL	0.307**	43.10	3.120		6.792	0.492	GAS OIL	0.540	0.0391	212	
Pressure, psig 401		Inlet Velocity, Ft/sec		Catalyst			TOTAL OIL		90.37	6.542		16.721	1.212	FUEL OIL	0.803	0.0581	315	
Temperature, °F 661		Bed Depth, Ft 18.61		Weight, # 1698			WATER SOLUBLE CHEMICALS	0.386**	20.46	1.482	7.913	2.586	0.187	POLY TAR	0.325	0.0235	127	
Recycle Ratio 1.07		Bed Density, #/CF 138		Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ = 13.3			TOTAL LIQUID PRODUCTS C_5+		110.83	8.024		19.307	1.399	TOTAL	12.710	0.9201	4988	
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY	NET WATER	5.190**	93.50	6.769		11.224	0.813	W. S. CHEM.	2.586	0.1872	1015	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	GROSS WATER		113.96	8.251		13.810	1.000	TOTAL	15.296	1.1073	6003	
61.29	90.19	73.34	79.78	70.95	42.20	51.16	75.49	HYDROCARBON TOTAL—C_1+		146.81	10.629									

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF

*9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

13.82%

RUN NO. 66-4 (U-X)
HOURS 416-500
CATALYST Brownsville Trtd Mill Scale @ 660° F.

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED							
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
CO 28.010	36.320	14.578	408.33	11.784	2.124	59.49	4.966	19.544	7.090	-12.454	-348.84									
H_2 2.016	60.450	24.264	48.92	46.748	8.425	16.98	19.701	43.965	28.126	-15.839	-31.94									
CO_2 44.010	2.255	0.905	39.83	24.836	4.476	196.99	10.466	11.371	14.942	3.571	157.16	10.662				400 EP	81.35	4.916	98.0	4.816
N_2 28.016	0.835	0.335	9.39	1.910	0.344	9.64	0.805	1.140	1.149							400-550	7.83	0.473	91.4	0.432
CH_4 16.042	0.140	0.056	0.90	6.954	1.253	20.10	2.930	2.986	4.183	1.197	19.20	1.303				550 +	10.82	0.654	114.6	0.749
C_2H_4 28.052				1.744	0.314	8.81	0.735	0.735	1.049	0.314	8.81	0.598					RECOVERY %	#/hr	gal/hr	
C_3H_6 30.068				1.261	0.227	6.83	0.531	0.531	0.758	0.227	6.83	0.463				PROPYLENE	31.5	5.01		
C_1+C_2											34.84	2.364				C_3 POLY GASO.	87.5	4.38	0.732	
C_3H_6 42.078				2.096	0.378	15.91	0.883	0.883	1.261	0.378	15.91	1.079	4.32	3.683	0.250	C_3 POLY TAR	12.5	0.63	0.084	
C_3H_8 44.094				0.227	0.041	1.81	0.096	0.096	0.137	0.041	1.81	0.123	4.24	0.427	0.029					
C_4H_8 56.104				1.201	0.216	12.12	0.506	0.506	0.722	0.216	12.12	0.823	5.00	2.424	0.164		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.378	0.068	3.95	0.159	0.159	0.227	0.068	3.95	0.268	4.86	0.813	0.055	C_4H_8	5.00	0.0	0.0	68.0
C_5H_{10} 70.130				0.541	0.097	6.80	0.228	0.228	0.325	0.097	6.80	0.461	5.45	1.248	0.085	C_4 POLY GASO.	5.98	10.61	1.773	1.5
C_5H_{12} 72.146				0.149	0.027	1.95	0.063	0.063	0.090	0.027	1.95	0.132	5.25	0.371	0.023	C_4H_{10}	4.86	3.95	0.813	68.0
C_6H_{12} 84.156				0.171	0.031	2.61	0.072	0.072	0.103	0.031	2.61	0.177	5.54	0.471	0.032	C_4-FREE GASO.			7.640	5.8
C_5-C_6											45.15	3.063		9.437	0.640	C_5 POLY TAR	7.53	1.51	0.201	
TOTAL		40.138	507.37		18.021	363.99	42.141	82.279	65.469											
H_2+CO	96.770	38.942	14740 SCFH		10.549		24.667	63.509	35.216	-28.293							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.66	Factor 678426		3.97		3.97	2.25	3.97	1.27						10 # RVP 400 EP GASOLINE	10.226	0.6938	3762	
Weight Recovery, %		Catalyst Age, hrs. 458		Space Velocity, vhv 1369		RECOVERED OIL	0.277**	38.89	2.638		6.043	0.410	GAS OIL	0.432	0.0293	159				
Pressure, psig 398		Inlet Velocity, Ft/sec		Catalyst		TOTAL OIL		84.04	5.701		15.480	1.050	FUEL OIL	0.749	0.0508	275				
Temperature, °F 662		Bed Depth, Ft 16.31		Weight, # 1433		WATER SOLUBLE CHEMICALS	0.368**	19.53	1.325	7.889	2.746	0.168	POLY TAR	0.285	0.0193	105				
Recycle Ratio 1.05		Bed Density, #/CF 133		Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ = 12.6		TOTAL LIQUID PRODUCTS C_5+		103.57	7.026		17.956	1.218	TOTAL	11.692	0.7932	4301				
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %		SELECTIVITY	NET WATER	4.717**	84.98	6.444		10.202	0.692	W.S CHEM.	2.476	0.1680	911				
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	GROSS WATER		104.51	7.090		12.678	0.960	TOTAL	14.168	0.9612	5212		
55.10	85.43	65.28	72.84	63.72	36.03	44.55	74.83	HYDROCARBON TOTAL—C_1+		138.41	9.390									

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF

*9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

RUN NO. 66-5 (Y-CC)
HOURS 500-619
CATALYST Brownsville Trtd Mill Scale @ 660° F.

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

14.18%

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED							
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
CO 28.010	36.320	14.370	402.50	14.801	2.552	71.48	12.255	26.625	14.807	-11.818	-331.02									
H_2 2.016	60.323	23.866	48.11	46.671	8.047	16.22	38.642	62.508	46.689	-15.819	-31.89									
CO_2 44.010	2.230	0.882	38.82	22.824	3.935	173.18	18.897	19.779	22.832	3.053	134.36	9.259				400 EP	76.44	5.537	98.0	5.426
N_2 28.016	0.738	0.292	8.18	1.742	0.300	8.40	1.442	1.734	1.742							400-550	12.06	0.874	91.4	0.799
CH_4 16.042	0.389	0.154	2.47	6.356	1.096	17.58	5.263	5.417	6.359	0.942	15.11	1.041				550 +	11.50	0.833	114.6	0.955
C_2H_4 28.052				1.766	0.304	8.53	1.462	1.462	1.766	0.304	8.53	0.588					RECOVERY %	#/hr	gal/hr	
C_3H_6 30.068				0.989	0.171	5.14	0.819	0.819	0.990	0.171	5.14	0.354				PROPYLENE	32.4	4.73		
C_1+C_2											28.78	1.983				C_3 POLY GASO.	87.5	4.14	0.692	
C_3H_6 42.078				2.013	0.347	14.60	1.667	1.667	2.014	0.347	14.60	1.006	4.32	3.380	0.233	C_3 POLY TAR	12.5	0.59	0.078	
C_3H_8 44.094				0.203	0.035	1.54	0.168	0.168	0.203	0.035	1.54	0.106	4.24	0.363	0.025					
C_4H_8 56.104				1.326	0.229	12.85	1.098	1.098	1.327	0.229	12.85	0.886	5.00	2.570	0.177		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.401	0.069	4.01	0.332	0.332	0.401	0.069	4.01	0.276	4.86	0.825	0.057	C_4H_8	5.00	0.21	0.042	68.0
C_5H_{10} 70.130				0.586	0.101	7.08	0.485	0.485	0.586	0.101	7.08	0.488	5.45	1.299	0.090	C_4 POLY GASO.	5.98	11.06	1.849	1.5
C_5H_{12} 72.146				0.137	0.024	1.73	0.113	0.113	0.137	0.024	1.73	0.119	5.25	0.330	0.023	C_4H_{10}	4.86	4.01	0.825	68.0
C_6H_{12} 84.156				0.185	0.032	2.69	0.153	0.153	0.185	0.032	2.69	0.185	5.54	0.486	0.033	C_4-FREE GASO.			8.233	5.8
C_5-C_6											44.50	3.066		9.253	0.638	C_5 POLY TAR	7.53	1.58	0.210	
TOTAL		39.564	500.08		17.242	345.03	82.796	122.360	105.696											
H_2+CO	96.643	38.236	14511 SCFH		10.599		50.897	89.133	61.496	-27.637							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.66	Factor 689132		3.15		3.15	2.35	3.15	1.34						10 # RVP 400 EP GASOLINE	10.949	0.7545	4091	
Weight Recovery, %		Catalyst Age, hrs. 560		Space Velocity, vhv 2668		RECOVERED OIL	0.334**	46.88	3.231		7.244	0.499	GAS OIL	0.799	0.0551	299				
Pressure, psig 404		Inlet Velocity, Ft/sec		Catalyst		TOTAL OIL		91.38	6.297		16.497	1.137	FUEL OIL	0.955	0.0658	357				
Temperature, °F 663		Bed Depth, Ft 8.24		Weight, # 596		WATER SOLUBLE CHEMICALS	0.390**	20.67	1.424	8.005	2.582	0.178	POLY TAR	0.288	0.0198	107				
Recycle Ratio 2.09		Bed Density, #/CF 109.		Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ = 14.6		TOTAL LIQUID PRODUCTS C_5+		112.05	7.721		19.079	1.315	TOTAL	12.991	0.8952	4854				
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %		SELECTIVITY	NET WATER	4.934**	88.89	6.126		10.671	0.735	W.S CHEM.	2.582	0.1779	965				
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	GROSS WATER		109.56	7.550		13.253	0.913	TOTAL	15.573	1.0731	5819		
56.42	82.24	66.28	72.28	44.39	25.31	31.01	79.56	HYDROCARBON TOTAL—C_1+		140.83	9.705									

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF

*9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

RUN NO. 66-A
HOURS 0-9
CATALYST Brownsville Treated Mill Scale Reduced at 660°F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

FRESH FEED				WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
					At Wt. Balance							CONDENSATE								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	36.129	14.989	419.86	7.445	0.978	27.39	3.014	18.003	3.992	-14.011	-392.47						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
H_2 2.016	60.855	25.255	50.91	40.855	5.368	10.82	16.540	41.795	21.908	-19.887	-40.09					400 EP	79.1	9.857	98.0	9.660
CO_2 44.010	2.410	1.000	44.01	31.375	4.123	181.42	12.702	13.702	16.825	3.123	137.41	8.997				400-550	11.6	1.445	91.4	1.321
N_2 28.016	0.535	0.222	6.22	1.840	0.242	6.78	0.745	0.967	0.987							550 +	9.3	1.159	114.6	1.328
CH_4 16.042	0.080	0.033	0.53	8.770	1.152	18.48	3.551	3.584	4.703	1.119	17.95	1.175								
C_2H_4 28.052				2.260	0.297	8.33	0.915	0.915	1.212	0.297	8.33	0.545					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.180	0.155	4.66	0.478	0.478	0.633	0.155	4.66	0.305				PROPYLENE	44.9	7.01		
C_1+C_2											30.94	2.025				C_3 POLY GASO.	87.5	6.13	1.025	
C_3H_6 42.078				2.820	0.371	15.61	1.142	1.142	1.513	0.371	15.61	1.022	4.32	3.613	0.237	C_3 POLY TAR	12.5	0.88	0.117	
C_3H_8 44.094				0.290	0.038	1.68	0.117	0.117	0.155	0.038	1.68	0.110	4.24	0.396	0.026					
C_4H_8 56.104				1.545	0.203	11.39	0.625	0.625	0.828	0.203	11.39	0.746	5.00	2.278	0.149		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.595	0.078	4.53	0.241	0.241	0.319	0.078	4.53	0.297	4.86	0.932	0.061	C_4H_8	5.00	0.99	0.198	68.0
C_5H_{10} 70.130				0.635	0.083	5.82	0.257	0.257	0.340	0.083	5.82	0.381	5.45	1.068	0.070	C_4 POLY GASO.	5.98	9.10	1.522	1.5
C_5H_{12} 72.146				0.180	0.024	1.73	0.073	0.073	0.097	0.024	1.73	0.113	5.25	0.330	0.022	C_4H_{10}	4.86	4.53	0.932	68.0
C_6H_{12} 84.156				0.210	0.028	2.36	0.085	0.085	0.113	0.028	2.36	0.155	5.54	0.426	0.028	C_4 FREE GASO.			12.509	5.8
C_3-C_4											43.12	2.824		9.043	0.593	C_4 POLY TAR	7.53	1.30	0.173	
TOTAL		41.499	521.53		13.140	301.00	40.485	81.984	61.492											
H_2+CO	96.975	40.244	15273 SCFH	6.346			19.554	59.798	25.900	-33.898							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.68	Factor 654750	5.49			5.49	2.32	5.49	1.42						10 # RVP 400 EP GASOLINE	15.161	0.9927	5382	

Weight Recovery, %	92.95	Catalyst Age, hrs.		Space Velocity, vhv	1209	RECOVERED OIL **	0.563	78.97	5.171		12.461	0.816	GAS OIL	1.321	0.0865	469				
Pressure, psig	402	Inlet Velocity, Ft/sec	1.00	Catalyst	Vol CF 12.63	TOTAL OIL		122.09	7.995		21.504	1.409	FUEL OIL	1.328	0.0870	472				
Temperature, °F	661	Bed Depth, Ft	19.13	Weight, #	1970	WATER SOLUBLE CHEMICALS **	0.284	15.09	0.988		1.876	0.123	POLY TAR	0.290	0.0190	103				
Recycle Ratio	0.98	Bed Density, #/CF	156	Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ = Shift Ratio		TOTAL LIQUID PRODUCTS C_3+		137.18	8.983		23.380	1.532	TOTAL	18.100	1.1852	6426				
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY	MET WATER **	7.020	126.47	8.281		15.182	0.994	W. S. CHEM.	1.876	0.1228	666		
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	GROSS WATER		141.56	9.269		17.058	1.117	TOTAL	19.976	1.3080	7092		
68.34	93.48	78.74	84.23	77.83	47.58	56.69	81.60	HYDROCARBON TOTAL—C_1+		168.12	11.008									

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-A
HOURS 0-9

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE			
Oxygen	431	Fresh Feed	15749	°API	54.4	10.5	In Reactor at Start of Period		Screen Analysis			Sedimentation
Natural Gas	454	Recycle	15364	Neut. No.	45.4		Fresh Catalyst Added		Mesh	Microns	%	Microns %
Generator Outlet	406	Combined Feed	31113	Sap. No.	57.1		Total		On 40	419+	0.8	80+
Reactor Inlet	402	Wet Gas—Measured	4377	Hydrox. No.			Catalyst Recovered	12	100	150	63.8	40—80
Condenser Inlet		Adjusted	4986	Bromine No.	98		In Reactor at End of Period		150	105	21.0	20—40
Product Accumulator	375	Loss	609	Pour °F.					200	74	9.6	10—20
				Chemicals, % by K_2CO_3		11.0	REACTOR d-p, Inches H_2O		250	62	4.0	0—20
							No. Height		325	44	0.4	
TEMPERATURES—°F.		Recycle/Fresh Feed	0.98				0 0-21-3/8		<325		0.4	
Oxygen	478	Inlet Velocity—ft./sec.	1.00				1 21-3/8-52-3/4	74	CATALYST			
Natural Gas	763	Fresh Feed Rate—S.C.F.H.	15273	HEMPEL, DIST. %		°API	2 52-3/4-84	73	Bulk Density, Lbs./Cu.Ft.			
Generator	2497	per Cu. Ft. Dense Bed	1209	205 °F.			3 84-115-3/8	90	Aerated			146
Quench Accumulator	137	per Lb. Catalyst	7.75	400	78.1	53.0	4 115-3/8-353-1/8	307	Settled			148
Reactor Inlet	196	per sq ft	23141	400-550	11.6	34.0	Total	544	Compacted			180
Condenser Inlet	562			550+	10.3				Particle Density, gm./cc.			4.98
Product Accumulator	54						CALCULATED FROM dp		NH_3 Value, ml./gm.			
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	156	N_2 Surface, m^2/gm.			
1 0'8"	---			Naphtha °F.			Inventory, Lbs.	1970				
2 0'9"	661			IBP	100		Bed Depth, Ft.	19.13	CHEMICAL ANALYSIS			
3 1'9"	648			10%	121		Vol cu ft	12.63	Fe			
4 4'5"	661			50%	213				C			
5 7'10"	663			90%	370				O			
6 12'3"	668			EP	397				H			
7 17'5"	662			Rec	97.0				K_2O, W+. % basis Fe			
8 20'0"	648								X-Ray Analysis—			
9 22'7"	641								$Fe_{20}C_9$			
10 25'2"	638								Fe_3O_4			
11 26'11"	615								Fe			

RUN NO. 66-B
HOURS 9-22
CATALYST Brownsville Treated MS Red. @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

FRESH FEED				WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
CO 28.010	35.085	15.689	439.46	8.650	1.268	35.52	3.619	19.308	4.887	-14.421	-403.94									
H_2 2.016	61.980	27.716	55.88	43.075	6.313	12.73	18.021	45.737	24.334	-21.403	-43.15					400 EP	80.2	9.941	98.0	9.742
CO_2 44.010	2.060	0.921	40.53	28.625	4.195	184.63	11.976	12.897	16.171	3.274	144.10	8.748				400-550	7.7	0.954	91.4	0.872
N_2 28.016	0.720	0.322	9.02	1.785	0.262	7.34	0.747	1.069	1.331							550 +	12.1	1.500	114.6	1.719
CH_4 16.042	0.155	0.069	1.11	8.805	1.290	20.69	3.684	3.753	5.043	1.221	19.58	1.189								
C_2H_4 28.052				2.150	0.315	8.84	0.899	0.899	1.214	0.315	8.84	0.537					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.230	0.180	5.41	0.515	0.515	0.695	0.180	5.41	0.328				PROPYLENE	43.3	6.98		
C_1+C_2											33.85	2.054				C_3 POLY GASO.	87.5	6.11	1.022	
C_3H_6 42.078				2.615	0.383	16.12	1.094	1.094	1.477	0.383	16.12	0.979	4.32	3.731	0.227	C_3 POLY TAR	12.5	0.87	0.116	
C_3H_8 44.094				0.290	0.042	1.85	0.121	0.121	0.163	0.042	1.85	0.112	4.24	0.436	0.026					
C_4H_8 56.104				1.510	0.221	12.40	0.632	0.632	0.853	0.221	12.40	0.753	5.00	2.480	0.151		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.435	0.064	3.72	0.182	0.182	0.246	0.064	3.72	0.226	4.86	0.765	0.046	C_4H_8	5.00	2.16	0.432	68.0
C_5H_{10} 70.130				0.550	0.081	5.68	0.230	0.230	0.311	0.081	5.68	0.345	5.48	1.042	0.063	C_4 POLY 6850	5.98	12.22	2.043	1.5
C_5H_{12} 72.146				0.155	0.023	1.66	0.065	0.065	0.088	0.023	1.66	0.101	5.25	0.316	0.019	C_4H_{10}	4.86	3.72	0.765	68.0
C_6H_{12} 84.156				0.125	0.018	1.51	0.052	0.052	0.070	0.018	1.51	0.092	5.54	0.273	0.017	C_4-FREE GASO.			12.395	5.8
C_3-C_6											42.94	2.608		9.043	0.549	C_4 POLY TAR	7.53	1.74	0.231	
TOTAL		44.717	546.00		14.655	318.10	41.837	86.554	64.751											
H_2+CO	97.065	43.405	16472 SCFH		7.581		21.640	65.045	29.221	-35.824							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.77	Factor 607090		4.98		4.98	2.37	4.97	1.48						10 # RVP 400 EP GASOLINE	15.635	0.9492	5146	

Weight Recovery, %	94.63	Catalyst Age, hrs.		Space Velocity, vhv	1366	RECOVERED OIL **	0.562	78.79	4.783		12.395	0.752	GAS OIL	0.872	0.0529	287	
Pressure, psig	405	Inlet Velocity, Ft/sec	1.04	Catalyst Vol CF	12.06	TOTAL OIL		121.73	7.391		21.438	1.301	FUEL OIL	1.719	0.1044	566	
Temperature, °F	661	Bed Depth, Ft	18.27	Weight, #	1881	WATER SOLUBLE CHEMICALS **	0.298	15.81	0.960		1.978	0.120	POLY TAR	0.347	0.0211	114	
Recycle Ratio	0.94	Bed Density, #/CF	156	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =		TOTAL LIQUID PRODUCTS C_3+		137.54	8.351		23.416	1.421	TOTAL	18.573	1.1276	6113	
						NET WATER **	7.399	133.30	8.093		16.002	0.971	W. S. CHEM.	1.978	0.1201	651	
						GROSS WATER		149.11	9.053		17.980	1.091	TOTAL	20.551	1.2477	6764	
						TOTAL—C_1+		171.37	10.404								

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
67.23	91.92	77.22	82.53	74.69	46.80	55.08	80.26

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF

*9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66B
HOURS 9-22

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA				
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE		
Oxygen	435	Fresh Feed	16970	°API	53.3	10.6	In Reactor at Start of Period		Screen Analysis		Sedimentation
Natural Gas	430	Recycle	15877	Neut. No.	43.2	35.7	Fresh Catalyst Added		Mesh / Microns	%	Microns / %
Generator Outlet	410	Combined Feed	32847	Sap. No.	56.2	38.6	Total		On 40 / 419+		80+
Reactor Inlet	405	Wet Gas—Measured	5049	Hydrox. No.			Catalyst Recovered	5	100 / 150		40—80
Condenser Inlet		Adjusted	5562	Bromine No.	99		In Reactor at End of Period		150 / 105		20—40
Product Accumulator	376	Loss	513	Pour °F.					200 / 74		10—20
				Chemicals, % by K_2CO_3		11.0	REACTOR d-p, Inches H_2O		250 / 62		0—20
							No. Height		325 / 44		
TEMPERATURES—°F.		Recycle/Fresh Feed	0.94				0 See Per. A		<325		
Oxygen	498	Inlet Velocity—ft./sec.	1.04				1	74	CATALYST		
Natural Gas	787	Fresh Feed Rate—S.C.F.H.	16472	HEMPEL. DIST. %		°API	2	76	Bulk Density, Lbs./Cu.Ft.		
Generator	2498	per Cu. Ft. Dense Bed	1366	205 °F.			3	83	Aerated		
Quench Accumulator	135	per Lb. Catalyst	8.76	400	79.2	54.0	4	285	Settled		
Reactor Inlet	185	per sq ft	24958	400-550	7.7	35.7	Total	518	Compacted		
Condenser Inlet	571			550+	13.1				Particle Density, gm./cc.		
Product Accumulator	57						CALCULATED FROM dp		NH_3 Value, ml./gm.		
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	156	N_2 Surface, m^2/gm.		
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	1881			
2	661			IBP	101		Bed Depth, Ft.	18.27	CHEMICAL ANALYSIS		
3	647			10%	121		Vol. Cu. Ft.	12.06	Fe		
4	662			50%	211				C		
5	664			90%	358				O		
6	669			EP	400				H		
7	663			Rec	97.5				K_2O. W+. % basis Fe		
8	649								X-Ray Analysis—		
9	644								$Fe_{20}C_9$		
10	639								Fe_3O_4		
11	619								Fe		

RUN NO. 66-C
HOURS 1-22-46
CATALYST Brownsville Treated MS Red. @ 550F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED			
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO 28.010	36.607	15.923	446.03	9.250	1.326	37.14	3.769	19.692	5.095	-14.597	408.89				
H_2 2.016	60.516	26.323	53.07	40.377	5.786	11.66	16.454	42.777	22.240	-20.537	41.41				
CO_2 44.010	2.070	0.900	39.61	29.514	4.229	186.14	12.027	12.927	16.256	3.329	146.53	9.140			
N_2 28.016	0.670	0.291	8.15	1.640	0.235	6.58	0.668	0.959	0.903						
CH_4 16.042	0.137	0.060	0.96	9.153	1.312	21.05	3.730	3.790	5.042	1.252	20.09	1.253			
C_2H_4 28.052				2.247	0.322	9.03	0.916	0.916	1.238	0.322	9.03	0.563			
C_2H_6 30.068				1.440	0.206	6.19	0.587	0.587	0.793	0.206	6.19	0.386			
C_1+C_2											35.31	2.202			
C_3H_6 42.078				2.973	0.426	17.93	1.212	1.212	1.638	0.426	17.93	1.118	4.32	4.150	0.259
C_3H_8 44.094				0.320	0.046	2.03	0.130	0.130	0.176	0.046	2.03	0.127	4.24	0.479	0.030
C_4H_8 56.104				1.683	0.241	13.52	0.686	0.686	0.927	0.241	13.52	0.943	5.00	2.704	0.169
C_4H_{10} 58.120				0.470	0.067	3.89	0.192	0.192	0.259	0.067	3.89	0.243	4.86	0.800	0.050
C_5H_{10} 70.130				0.663	0.095	6.66	0.270	0.270	0.365	0.095	6.66	0.415	5.45	1.222	0.076
C_5H_{12} 72.146				0.103	0.015	1.08	0.042	0.042	0.057	0.015	1.08	0.067	5.25	0.206	0.013
C_6H_{12} 84.156				0.167	0.024	2.02	0.068	0.068	0.092	0.024	2.02	0.126	5.54	0.365	0.023
C_3-C_6											47.13	2.939		9.926	0.620
TOTAL		43.497	547.82		14.330	324.92	40.751	84.248	63.380						
H_2+CO	97.123	42.246	16032 SCFH		7.112		20.223	62.469	27.335	-35.134					
H_2/CO		1.65	Factor 623752		4.36		4.37	2.17	4.37	1.41					

Weight Recovery, %	95.36	Catalyst Age, hrs.		Space Velocity, vhv	1268	RECOVERED OIL **
Pressure, psig	405	Inlet Velocity, Ft/sec	1.02	Catalyst	Vol CF 12.64	TOTAL OIL
Temperature, °F	661	Bed Depth, Ft	19.15	Weight, #	19.34	WATER SOLUBLE CHEMICALS **
Recycle Ratio	0.94	Bed Density, #/CF	153	Effluent Shift Ratio	$\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ =	TOTAL LIQUID PRODUCTS C_3+
						NET WATER **
						GROSS WATER
						HYDROCARBON TOTAL—C_1+

	RECOVERED OIL **	WATER SOLUBLE CHEMICALS **	TOTAL LIQUID PRODUCTS C_3+	NET WATER **	GROSS WATER	HYDROCARBON TOTAL—C_1+
	0.524	73.46	4.582		11.605	0.724
		120.59	7.521		21.531	1.344
	0.267	14.17	0.884		1.804	0.113
		134.76	8.405	7.508	23.335	1.457
		135.27	8.437		16.239	1.013
		149.44	9.321		18.043	1.126
		170.07	10.608			

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
67.06	91.67	78.02	83.17	74.13	48.01	56.24	79.24

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
400 EP	80.3	9.319	98.0	9.133
400-550	10.8	1.253	91.4	1.145
550 +	8.9	1.033	114.6	1.184
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	43.1	7.73		
C_3 POLY GASO.	87.5	6.76	1.130	
C_3 POLY TAR	12.5	0.97	0.129	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	1.64	0.328	68.0
C_4 POLY GASO.	5.98	10.40	1.738	1.5
C_4H_{10}	4.86	3.89	0.800	68.0
C_4-FREE GASO.			12.056	5.8
C_4 POLY TAR	7.53	1.48	0.197	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	14.922	0.9308	5046	
GAS OIL	1.145	0.0714	387	
FUEL OIL	1.184	0.0739	401	
POLY TAR	0.326	0.0203	110	
TOTAL	17.577	1.0964	5944	
W. S. CHEM.	1.804	0.1125	610	
TOTAL	19.381	1.2089	6554	

Form ML—11

** INCLUDED in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-C
HOURS 22-46

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA						
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE				
Oxygen	438	Fresh Feed	16507	° API	54.6	10.8	In Reactor at Start of Period		Screen Analysis			Sedimentation	
Natural Gas	430	Recycle	15465	Neut. No.	39.9	32.2	Fresh Catalyst Added		Mesh	Microns	%	Microns	%
Generator Outlet	410	Combined Feed	31972	Sap. No.	53.3	37.1	Total		On 40	419+	1.0	80+	
Reactor Inlet	405	Wet Gas—Measured	5013	Hydrox. No.			Catalyst Recovered	12	100	150	68.4	40—80	
Condenser Inlet		Adjusted	5438	Bromine No.	99		In Reactor at End of Period		150	105	19.2	20—40	
Product Accumulator	376	Loss	425	Pour °F.	below -30				200	74	7.8	10—20	
				Chemicals, % by K_2CO_3		10.0	REACTOR d-p, Inches H_2O		250	62	2.6	0—20	
							No. Height		325	44	0.6		
TEMPERATURES—°F.		Recycle/Fresh Feed	0.94				0 See Per. A	--	<325		0.4		
Oxygen	498	Inlet Velocity—ft./sec.	1.02				1	74	CATALYST				
Natural Gas	797	Fresh Feed Rate—S.C.F.H.	16032	HEMPEL, DIST. %		°API	2	77	Bulk Density, Lbs./Cu.Ft.				
Generator	2500	per Cu. Ft. Dense Bed	1268	205 °F.			3	81	Aerated			140	
Quench Accumulator	147	per Lb. Catalyst	8.29	400	79.3	56.1	4	302	Settled			141	
Reactor Inlet	211	per sq ft	24291	400-550	10.8	34.8	Total	534	Compacted			174	
Condenser Inlet	579	Heat Transfer Calculations		550+	9.9				Particle Density, gm./cc.			3.66	
Product Accumulator	65	Steam Rate=376 #/hr @ 706					CALCULATED FROM dp		NH_3 Value, ml./gm.				
Catalyst No. Height		psia & 505°F=1201 BTU/#		A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	153	N_2 Surface, m^2/gm.				
1 See Per. A	--	Water in @ 58°F=26 BTU/#		Naphtha °F.			Inventory, Lbs.	1934					
2	658	Net Heat Trans/# steam		IBP	100		Bed Depth, Ft.	19.15	CHEMICAL ANALYSIS				
3	648	=1175 BTU		10%	130		Vol Cu. Ft.	12.64	Fe				
4	660	(1175)(376)=441800 BTU/hr		50%	222				C				
5	665	Ave. Bed Temp=661		90%	362				O				
6	670	dT=661-505=156°F		EP	398				H				
7	663	Tube Area=34.6 sq ft		Rec	96.0				K_2O, W+. % basis Fe				
8	650	$K=\frac{441800}{(34.6)(156)}=$							X-Ray Analysis—				
9	644	81.9 BTU/°F/sq ft							$Fe_{20}C_9$				
10	641								Fe_3O_4				
11	622								Fe				

RUN NO. 66-D
HOURS 46-70
CATALYST Brownsville Treated MS Red @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

FRESH FEED				WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	At Wt. Balance m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	36.367	15.810	442.84	9.070	1.342	37.59	3.740	19.550	5.082	-14.468	-405.25						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
H_2 2.016	60.673	26.376	53.17	41.224	6.098	12.29	16.998	43.374	23.096	-20.278	-40.88					400 EP	82.6	8.864	98.0	8.687
CO_2 44.010	2.163	0.940	41.37	28.470	4.210	185.29	11.739	12.679	15.949	3.270	143.92	8.989				400-550	9.2	0.987	91.4	0.902
N_2 28.016	0.687	0.299	8.38	1.540	0.228	6.39	0.635	0.934	0.863							550 +	8.2	0.880	114.6	1.008
CH_4 16.042	0.110	0.048	0.77	9.570	1.416	22.72	3.946	3.994	5.362	1.368	21.95	1.371								
C_2H_4 28.052				2.303	0.341	9.57	0.950	0.950	1.291	0.341	9.57	0.598					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.547	0.229	6.89	0.638	0.638	0.867	0.229	6.89	0.430				PROPYLENE	41.6	7.60		
C_1+C_2											38.41	2.399				C_3 POLY GASO.	87.5	6.65	1.112	
C_3H_6 42.078				2.934	0.434	18.26	1.210	1.210	1.644	0.434	18.26	1.141	4.32	4.227	0.264	C_3 POLY TAR	12.5	0.95	0.126	
C_3H_8 44.094				0.303	0.045	1.98	0.125	0.125	0.170	0.045	1.98	0.124	4.24	0.467	0.029					
C_4H_8 56.104				1.573	0.233	13.07	0.649	0.649	0.882	0.233	13.07	0.816	5.00	2.614	0.163		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.540	0.080	4.65	0.223	0.223	0.303	0.080	4.65	0.290	4.86	0.957	0.060	C_4H_8	5.00	0.75	0.150	68.0
C_5H_{10} 70.130				0.603	0.089	6.24	0.248	0.248	0.337	0.089	6.24	0.390	5.48	1.145	0.072	C_4 POLY GASO.	5.98	10.78	1.803	1.5
C_5H_{12} 72.146				0.140	0.021	1.52	0.058	0.058	0.079	0.021	1.52	0.095	5.25	0.290	0.018	C_4H_{10}	4.86	4.65	0.957	68.0
C_6H_{12} 84.156				0.183	0.027	2.27	0.075	0.075	0.102	0.027	2.27	0.142	5.54	0.410	0.026	C_4-FREE GASO.			11.644	5.8
C_3-C_6											47.99	2.998		10.110	0.632	C_4 POLY TAR	7.53	1.54	0.205	
TOTAL		43.473	546.53		14.793	328.73	41.233	84.706	64.201											
H_2+CO	97.040	42.186	16010 SCFH		7.440		20.738	62.924	28.178	-34.746							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.67	Factor 624609		4.54		4.54	2.22	4.54	1.40						10 # RVP 400 EP GASOLINE	14.554	0.9091	4929	
									RECOVERED OIL **	0.483	67.78	4.234		10.731	0.670	GAS OIL	0.902	0.0563	305	
									TOTAL OIL		115.77	7.232		20.841	1.302	FUEL OIL	1.008	0.0630	342	
									WATER SOLUBLE CHEMICALS **	0.326	17.31	1.081		2.172	0.136	POLY TAR	0.331	0.0207	112	
									TOTAL LIQUID PRODUCTS C_5+		133.08	8.313		23.013	1.438	TOTAL	16.795	1.0491	5688	
									NET WATER **	7.366	132.71	8.289		15.931	0.995	W.S. CHEM.	2.172	0.1357	736	
									GROSS WATER		150.02	9.370		18.103	1.131	TOTAL	18.967	1.1848	6424	
									HYDROCARBON TOTAL—C_1+		171.49	10.711								

Weight Recovery, % 95.41 | Catalyst Age, hrs. | Space Velocity, vhv 1248

Pressure, psig 405 | Inlet Velocity, Ft/sec 1.02 | Catalyst Vol CF 12.83

Temperature, °F 664 | Bed Depth, Ft 19.44 | Weight, # 1950

Recycle Ratio 0.95 | Bed Density, #/CF 152 | Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
65.97	91.51	76.88	82.36	74.01	46.75	55.22	77.60

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

RUN NO. 66-D
HOURS 46-70

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE			
Oxygen	439	Fresh Feed	16498				In Reactor at Start of Period		Screen Analysis			Sedimentation
Natural Gas	432	Recycle	15648	° API	55.0	10.7	Fresh Catalyst Added		Mesh	Microns	%	Microns %
Generator Outlet	410	Combined Feed	32146	Neut. No.	41.0	32.5	Total		On 40	419+	0.5	80+
Reactor Inlet	405	Wet Gas—Measured	5186	Sap. No.	49.2	34.1	Catalyst Recovered	20	100	150	57.6	40—80
Condenser Inlet		Adjusted	5614	Hydrox. No.			In Reactor at End of Period		150	105	21.4	20—40
Product Accumulator	375	Loss	428	Bromine No.	99				200	74	13.0	10—20
				Pour °F.					250	62	2.6	0—20
				Chemicals, % by K_2CO_3		12.0	REACTOR d-p, Inches H_2O		325	44	3.8	
							No. Height		<325		0.6	
TEMPERATURES—°F.		Recycle/Fresh Feed	0.95				0 See Per. A					
Oxygen	522	Inlet Velocity—ft./sec.	1.02				1	73	CATALYST			
Natural Gas	793	Fresh Feed Rate—S.C.F.H.	16010	HEMPEL, DIST. %		°API	2	76	Bulk Density, Lbs./Cu.Ft.			
Generator	2500	per Cu.Ft. Dense Bed	1248	205 °F.			3	82	Aerated			155
Quench Accumulator	151	per Lb. Catalyst	8.21	400	81.6	55.4	4	308	Settled			156
Reactor Inlet	221	per sq ft	24258	400-550	9.2	38.0	Total	539	Compacted			182
Condenser Inlet	585			550+	9.2				Particle Density, gm./cc.			5.10
Product Accumulator	63	Heat Transfer Calculations					CALCULATED FROM dp		NH_3 Value, ml./gm.			
Catalyst No. Height		Steam Rate=386#/hr		A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	152	N_2 Surface, m^2/gm.			
1 See Per. A	--	@ 706 psia & 505=		Naphtha °F.			Inventory, Lbs.	1950				
2	662	1201 BTU/#		IBP	100		Bed Depth, Ft.	19.44	CHEMICAL ANALYSIS			
3	652	Water in @ 58°F=26 BTU/#		10%	126		Vol Cu.Ft	12.83	Fe			
4	665	Net Heat Trans/# steam=		50%	212				C			
5	668	1175 BTU		90%	374				O			
6	671	(1175)(386)=453550		EP	406				H			
7	666	Ave. Bed Temp=664°F dT=664-505=159°F		Rec	95.0				K_2O, W+, % basis Fe			
8	656	Tube Area=35.2 sq ft							X-Ray Analysis—			
9	648	$K = \frac{453550}{(35.2)(159)} =$							$Fe_{20}C_9$			
10	643	81.0 BTU/°F/sq ft							Fe_3O_4			
11	625								Fe			

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 66-E
HOURS 70-94
CATALYST Brownsville Treated MS Red.@ 660F

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
CO 28.010	36.250	15.452	432.80	9.610	1.373	38.46	3.885	19.337	5.258	-14.079	-394.34
H_2 2.016	60.833	25.929	52.27	39.633	5.663	11.42	16.021	41.950	21.684	-20.266	-40.85
CO_2 44.010	2.137	0.911	40.09	29.533	4.221	185.76	11.938	12.849	16.159	3.310	145.67
N_2 28.016	0.727	0.310	8.68	1.767	0.252	7.06	0.714	1.024	0.966		
CH_4 16.042	0.053	0.023	0.37	9.117	1.303	20.90	3.685	3.708	4.988	1.280	20.53
C_2H_4 28.052				2.220	0.317	8.89	0.897	0.897	1.214	0.317	8.89
C_2H_6 30.068				1.597	0.228	6.86	0.646	0.646	0.874	0.228	6.86
C_1+C_2											36.28
C_3H_6 42.078				3.183	0.455	19.15	1.287	1.287	1.742	0.455	19.15
C_3H_8 44.094				0.363	0.052	2.29	0.147	0.147	0.199	0.052	2.29
C_4H_8 56.104				1.690	0.240	13.46	0.679	0.679	0.919	0.240	13.46
C_4H_{10} 58.120				0.430	0.061	3.55	0.174	0.174	0.235	0.061	3.55
C_5H_{10} 70.130				0.593	0.085	5.96	0.240	0.240	0.325	0.085	5.96
C_5H_{12} 72.146				0.107	0.015	1.08	0.043	0.043	0.058	0.015	1.08
C_6H_{12} 84.156				0.167	0.024	2.02	0.068	0.068	0.092	0.024	2.02
C_5-C_6											47.51
TOTAL		42.825	534.21		14.289	326.86	40.424	83.049	62.542		
H_2+CO	97.083	41.381	15704 SCFH		7.036	20.106	19.906	61.287	26.942	-34.345	
H_2/CO		1.68	Factor 636780		4.12		4.12	2.17	4.12	1.44	

YIELD BASIS H_2+CO FED	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
	1.307			
	0.566			
	0.437			
	2.310			
	1.219	4.32	4.433	0.282
	0.146	4.24	0.540	0.034
	0.857	5.00	2.692	0.171
	0.226	4.86	0.730	0.046
	0.380	5.45	1.094	0.070
	0.069	5.25	0.206	0.013
	0.129	5.54	0.365	0.023
	3.026		10.060	0.639
	0.453	63.51	4.044		10.087	0.642
		111.02	7.070		20.147	1.281
	0.313	16.60	1.057		2.083	0.133
		127.62	8.127		22.230	1.414
	0.063	127.24	8.102		15.275	0.973
		143.84	9.159		17.358	1.106
		163.90	10.437			

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
400 EP	79.5	8.019	98.0	7.859
400-550	8.8	0.888	91.4	0.812
550 +	11.7	1.180	114.6	1.352

	RECOVERY %	#/hr	gal/hr
PROPYLENE	42.4	8.12	
C_3 POLY GASO.	87.5	7.10	1.187
C_3 POLY TAR	12.5	1.02	0.135

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	1.51	0.302	68.0
C_4 POLY GASO.	5.98	10.46	1.749	1.5
C_4H_{10}	4.86	3.55	0.730	68.0
C_4-FREE GASO.			10.711	5.8
C_4 POLY TAR	7.53	1.49	0.198	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	13.492	0.8591	4658
GAS OIL	0.812	0.0517	280
FUEL OIL	1.352	0.0861	467
POLY TAR	0.333	0.0212	115
TOTAL	15.989	1.0181	5520
W. S. CHEM.	2.083	0.1328	720
TOTAL	18.072	1.1509	6240

Weight Recovery, %	94.29	Catalyst Age, hrs.	
Pressure, psig	404	Inlet Velocity, Ft/sec	1.01
Temperature, °F	663	Bed Depth, Ft	18.78
Recycle Ratio	0.95	Bed Density, #/CF	155
Space Velocity, vhv	1267	Catalyst	Vol CF 12.39
Weight, #	1920		
Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =			

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
66.48	91.11	78.16	83.00	72.81	48.31	56.04	77.86

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-E
HOURS 70-94

OPERATING CONDITIONS		RATES S.C.F.H.	
PRESSURES PSIG			
Oxygen	436	Fresh Feed	16176
Natural Gas	435	Recycle	15341
Generator Outlet	410	Combined Feed	31517
Reactor Inlet	404	Wet Gas—Measured	4917
Condenser Inlet		Adjusted	5423
Product Accumulator	375	Loss	506
TEMPERATURES—°F.		Recycle/Fresh Feed	0.95
Oxygen	518	Inlet Velocity—ft./sec.	1.01
Natural Gas	792	Fresh Feed Rate—S.C.F.H.	15704
Generator	2495	per Cu. Ft. Dense Bed	1267
Quench Accumulator	148	per Lb. Catalyst	8.18
Reactor Inlet	235	per sq ft	23794
Condenser Inlet	581		
Product Accumulator	61		
Catalyst No. Height			
1 See Per. A	--		
2	662		
3	652		
4	664		
5	666		
6	670		
7	663		
8	652		
9	644		
10	642		
11	623		

PRODUCT TESTS	OIL	WATER
°API	55.6	10.7
Neut. No.	42.1	34.2
Sap. No.	53.9	37.2
Hydrox. No.		
Bromine No.	99	
Pour °F.		
Chemicals, % by K_2CO_3		12.0
HEMPEL, DIST. %		°API
205 °F.		
400	78.5	55.0
400-550	8.8	34.5
550+	12.7	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	98	
10%	121	
50%	208	
90%	358	
EP	401	
Rec	96.0	

CATALYST DATA		PARTICLE SIZE				
INVENTORY DATA		Screen Analysis			Sedimentation	
In Reactor at Start of Period		Mesh	Microns	%	Microns	%
Fresh Catalyst Added		On 40	419+		80+	
Total		100	150		40—80	
Catalyst Recovered	12	150	105		20—40	
In Reactor at End of Period		200	74		10—20	
		250	62		0—20	
REACTOR d-p, Inches H_2O		325	44			
No. Height		<325				
0 See Per. A						
1	73	CATALYST				
2	81	Bulk Density, Lbs./Cu.Ft.				
3	81	Aerated				
4	295	Settled				
Total	530	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	155	N_2 Surface, m^2/gm.				
Inventory, Lbs.	1920					
Bed Depth, Ft.	18.78	CHEMICAL ANALYSIS				
Vol Cu. Ft.	12.39	Fe				
		C				
		O				
		H				
		K_2O, W+. % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 66-F
HOURS 94-115
CATALYST Brownsville Treated MS RED. @ 660F

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
CO 28.010	36.775	15.332	429.46	9.210	1.318	36.92	3.699	19.031	5.017	-14.014	-392.54
H_2 2.016	60.385	25.176	50.75	39.375	5.634	11.36	15.812	40.988	21.446	-191542	39.39
CO_2 44.010	2.130	0.888	39.08	29.725	4.253	187.19	11.937	12.825	16.190	3.365	148.11
N_2 28.016	0.625	0.261	7.31	2.025	0.290	8.12	0.813	1.074	1.103		
CH_4 16.042	0.085	0.035	0.56	9.035	1.293	20.74	3.628	3.663	4.921	1.258	20.18
C_2H_4 28.052				2.195	0.314	8.81	0.881	0.881	1.195	0.314	8.81
C_2H_6 30.068				1.640	0.235	7.07	0.659	0.659	0.894	0.235	7.07
C_1+C_2											36.06
C_3H_6 42.078				3.125	0.447	18.81	1.255	1.255	1.702	0.447	18.81
C_3H_8 44.094				0.345	0.049	2.16	0.139	0.139	0.188	0.049	2.16
C_4H_8 56.104				1.765	0.253	14.19	0.709	0.709	0.962	0.253	14.19
C_4H_{10} 58.120				0.555	0.079	4.59	0.223	0.223	0.302	0.079	4.59
C_5H_{10} 70.130				0.670	0.096	6.73	0.269	0.269	0.365	0.096	6.73
C_5H_{12} 72.146				0.140	0.020	1.44	0.056	0.056	0.076	0.020	1.44
C_6H_{12} 84.156				0.195	0.028	2.36	0.078	0.078	0.106	0.028	2.36
C_5-C_6											
TOTAL		41.692	527.16		14.309	330.49	40.158	81.850	61.964		50.28
H_2+CO	97.160	40.508	15373 SCFH		6.952		19.511	60.019	26.463	-33.556	
H_2/CO		1.64	Factor 650491		4.27		4.27	2.15	4.27	1.39	

YIELD BASIS H_2+CO FED — CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
9.634			
1.313			
0.573			
0.460			
2.346			
1.224	4.32	4.354	0.283
0.141	4.24	0.509	0.033
0.923	5.00	2.838	0.185
0.299	4.86	0.944	0.061
0.438	5.45	1.235	0.080
0.094	5.25	0.274	0.018
0.154	5.54	0.426	0.028
3.273		10.580	0.688

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
400 EP	79.7	7.355	98.0	7.208
400-550	9.4	0.868	91.4	0.793
550 +	10.9	1.006	114.6	1.153

	RECOVERY %	#/hr	gal/hr
PROPYLENE	41.2	7.75	
C_3 POLY GASO.	87.5	6.78	1.134
C_3 POLY TAR	12.5	0.97	0.129

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.47	0.094	68.0
C_5 POLY GASO.	5.98	12.01	2.008	1.5
C_4H_{10}	4.86	4.59	0.944	68.0
C_4-FREE GASO.			10.277	5.8
C_4 POLY TAR	7.53	1.71	0.227	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	13.323	0.8666	4698
GAS OIL	0.793	0.0516	280
FUEL OIL	1.153	0.0750	407
POLY TAR	0.356	0.0232	126
TOTAL	15.625	1.0164	5511
W. S. CHEM.	2.092	0.1361	738
TOTAL	17.717	1.1525	6249

Weight Recovery, %	93.29	Catalyst Age, hrs.		Space Velocity, vhv	1243	RECOVERED OIL **	0.414	58.08
Pressure, psig	404	Inlet Velocity, Ft/sec	0.99	Catalyst	Vol CF 12.37	TOTAL OIL		108.36
Temperature, °F	660	Bed Depth, Ft	18.74	Weight, #	1954	WATER SOLUBLE CHEMICALS **	0.313	16.62
Recycle Ratio	0.96	Bed Density, #/C.F	158	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =		TOTAL LIQUID PRODUCTS C_5+		124.98

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY			
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3 + /C_1 +	NET WATER **	6.770	121.97
65.68	91.40	77.62	82.84	73.64	47.68	55.91	77.61	GROSS WATER		138.59
								HYDROCARBON TOTAL—C_1+		161.04

7.778		9.229	0.600
7.051		19.809	1.288
1.081		2.092	0.136
8.132		21.901	1.424
7.934		14.642	0.952
9.015		16.734	1.088
10.478			

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-F
HOURS 94-115

OPERATING CONDITIONS — PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	436	Fresh Feed	15822
Natural Gas	435	Recycle	15240
Generator Outlet	410	Combined Feed	31062
Reactor Inlet	404	Wet Gas—Measured	4849
Condenser Inlet		Adjusted	5431
Product Accumulator	375	Loss	582
TEMPERATURES—°F.		Recycle/Fresh Feed	0.96
Oxygen	494	Inlet Velocity—ft./sec.	0.99
Natural Gas	793	Fresh Feed Rate—S.C.F.H.	15373
Generator	2480	per Cu. Ft. Dense Bed	1243
Quench Accumulator	148	per Lb. Catalyst	7.87
Reactor Inlet	240		23292
Condenser Inlet	577		
Product Accumulator	62		
Catalyst No. Height			
1 See Per. A	--		
2	660		
3	650		
4	661		
5	663		
6	667		
7	661		
8	649		
9	642		
10	640		
11	622		

PRODUCT TESTS	OIL	WATER
° API	55.7	10.8
Neut. No.	42.5	34.3
Sap. No.	51.2	39.4
Hydrox. No.		
Bromine No.	96	
Pour °F.		
Chemicals, % by K_2CO_3		12.5
HEMPEL. DIST. %		°API
205 °F.		
400	78.7	54.7
400-550	9.4	34.9
550+	11.9	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	101	
10%	124	
50%	201	
90%	334	
EP	401	
Rec	97.0	

CATALYST DATA — INVENTORY DATA		PARTICLE SIZE: Screen Analysis Mesh	Microns	%	Sedimentation Microns	%
In Reactor at Start of Period						
Fresh Catalyst Added		On 40	419+		80+	
Total						
Catalyst Recovered	12	100	150		40—80	
In Reactor at End of Period		150	105		20—40	
		200	74		10—20	
REACTOR d-p, Inches H_2O		250	62		0—20	
No. Height		325	44			
0 See Per. A		<325				
1	75	CATALYST				
2	80	Bulk Density, Lbs./Cu.Ft.				
3	84	Aerated				
4	300	Settled				
Total	539	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	158	N_2 Surface, m^2/gm.				
Inventory, Lbs.	1954					
Bed Depth, Ft.	18.74	CHEMICAL ANALYSIS				
Vol. Cu. Ft.	12.37	Fe				
		C				
		O				
		H				
		K_2O, W+, % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

RUN NO. 66-G
HOURS 115-135
CATALYST Brownsville Treated MS Red. @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
CO 28.010	36.980	15.231	426.62	9.203	1.315	36.83	3.675	18.906	4.990	-13.916	-389.79
H_2 2.016	60.237	24.811	50.02	39.574	5.654	11.40	15.803	40.614	21.457	-19.157	-38.62
CO_2 44.010	2.267	0.934	41.11	30.123	4.305	189.43	12.030	12.964	16.335	3.371	148.32
N_2 28.016	0.433	0.178	4.99	1.780	0.254	7.12	0.711	0.889	0.965		
CH_4 16.042	0.083	0.034	0.55	8.750	1.250	20.05	3.494	3.528	4.744	1.216	19.50
C_2H_4 28.052				2.273	0.325	9.12	0.908	0.908	1.233	0.325	9.12
C_3H_6 30.068				1.627	0.232	6.98	0.650	0.650	0.882	0.232	6.98
C_4+C_5											35.60
C_3H_6 42.078				3.097	0.442	18.60	1.237	1.237	1.679	0.442	18.60
C_3H_8 44.094				0.323	0.046	2.03	0.129	0.129	0.175	0.046	2.03
C_4H_8 56.104				1.730	0.247	13.86	0.691	0.691	0.938	0.247	13.86
C_4H_{10} 58.120				0.500	0.071	4.13	0.200	0.200	0.271	0.071	4.13
C_5H_{10} 70.130				0.693	0.099	6.94	0.277	0.277	0.376	0.099	6.94
C_6H_{12} 72.146				0.130	0.019	1.37	0.052	0.019	0.071	0.019	1.37
C_6H_{12} 84.156				0.197	0.028	2.36	0.079	0.028	0.107	0.028	2.36
C_5-C_6											49.29
TOTAL		41.188			14.287	330.22	39.936	81.124	61.624		
H_2+CO	97.217	40.042	15196 SCFH	6.969			19.478	59.520	26.447	-33.073	
H_2/CO		1.63	Factor 658067	4.30			4.30	2.15	4.30	1.38	

Weight Recovery, % 94.30	Catalyst Age, hrs.	Space Velocity, vhv 1232	RECOVERED OIL **	0.404	56.61	3.725
Pressure, psig 401	Inlet Velocity, Ft/sec 0.99	Catalyst Vol CF 12.33	TOTAL OIL		105.90	6.969
Temperature, °F 661	Bed Depth, Ft 18.68	Weight, # 1911	WATER SOLUBLE CHEMICALS **	0.297	15.75	1.036
Recycle Ratio 0.97	Bed Density, #/CF 155	Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ Shift Ratio =	TOTAL LIQUID PRODUCTS C_3+		121.65	8.005
			NET WATER **	6.700	120.71	7.944
			GROSS WATER		136.46	8.980
			HYDROCARBON TOTAL—C_1+		157.25	10.347

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
65.31	91.37	77.21	82.60	73.61	47.17	55.57	77.36

YIELD BASIS H_2+CO FED — CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
9.760			
1.283			
0.600			
0.459			
2.342			
1.224	4.32	4.306	0.283
0.134	4.24	0.479	0.032
0.912	5.00	2.772	0.182
0.272	4.86	0.850	0.056
0.457	5.45	1.273	0.084
0.090	5.25	0.261	0.017
0.155	5.34	0.426	0.028
3.244		10.367	0.682
7.944		14.491	0.954
8.980		16.467	1.084

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*

	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
400 EP	81.0	7.284	98.0	7.138
400-550	9.2	0.827	91.4	0.756
550 +	9.8	0.881	114.6	1.010

	RECOVERY %	#/hr	gal/hr
PROPYLENE	40.7	7.57	
C_3 POLY GASO.	87.5	6.62	1.107
C_3 POLY TAR	12.5	0.95	0.126

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.84	0.168	68.0
C_4 POLY GASO.	5.98	11.39	1.905	1.5
C_4H_{10}	4.86	4.13	0.850	68.0
C_4-FREE GASO.			10.205	5.8
C_4 POLY TAR	7.58	1.63	0.216	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	13.128	0.8639	4684
GAS OIL	0.756	0.0497	269
FUEL OIL	1.010	0.0665	361
POLY TAR	0.342	0.0225	122
TOTAL	15.236	1.0026	5436
W. S. CHEM.	1.976	0.1300	705
TOTAL	17.212	1.1326	6141

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

RUN NO. 66-G
HOURS 115-135

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	430	Fresh Feed	15631
Natural Gas	429	Recycle	15156
Generator Outlet	406	Combined Feed	30787
Reactor Inlet	401	Wet Gas—Measured	4932
Condenser Inlet		Adjusted	5422
Product Accumulator	372	Loss	490
TEMPERATURES—°F.		Recycle/Fresh Feed	0.97
Oxygen	490	Inlet Velocity—ft./sec.	0.99
Natural Gas	811	Fresh Feed Rate—S.C.F.H.	15196
Generator	2453	per Cu. Ft. Dense Bed	1232
Quench Accumulator	158	per Lb. Catalyst	7.95
Reactor Inlet	247	per sq ft	23024
Condenser Inlet	575		
Product Accumulator	63		
Catalyst No. Height			
1 See Per. A	--		
2	661		
3	651		
4	662		
5	664		
6	667		
7	662		
8	648		
9	641		
10	641		
11	618		

PRODUCT TESTS	OIL	WATER
°API	55.6	10.7
Neut. No.	45.6	34.8
Sap. No.	57.4	39.2
Hydrox. No.		
Bromine No.	96	
Pour °F.	below -30	
Chemicals, % by K_2CO_3		12.0
HEMPEL. DIST. %		°API
205 °F.		
400	80.0	55.1
400-550	9.2	37.0
550+	10.8	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	100	
10%	142	
50%	224	
90%	350	
EP	394	
Rec	96.5	

CATALYST DATA		
INVENTORY DATA		
In Reactor at Start of Period		
Fresh Catalyst Added		
Total		
Catalyst Recovered	11	
In Reactor at End of Period		
REACTOR d-p, Inches H_2O		
No. Height		
0 See Per. A		
1	74	
2	81	
3	80	
4	292	
Total	527	
CALCULATED FROM dp		
Density, Lbs./Cu.Ft.	155	
Inventory, Lbs.	1911	
Bed Depth, Ft.	18.68	
Vol cu ft	12.33	

PARTICLE SIZE

Screen Analysis Mesh	Microns	%	Sedimentation Microns	%
On 40	419+		80+	
100	150		40—80	
150	105		20—40	
200	74		10—20	
250	62		0—20	
325	44			
<325				

CATALYST

Bulk Density, Lbs./Cu.Ft.
Aerated
Settled
Compacted
Particle Density, gm./cc.
NH_3 Value, ml./gm.
N_2 Surface, m^2/gm.

CHEMICAL ANALYSIS
Fe
C
O
H
K_2O, W+, % basis Fe
X-Ray Analysis—
$Fe_{20}C_9$
Fe_3O_4
Fe

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 66-H
HOURS 135-159
CATALYST Brownsville Treated MS Red. @ 660F

FRESH FEED	%	m/hr	#/hr	WET GAS	At Wt. Balance m/hr	At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	YIELD BASIS H_2+CO FED CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	37.427	15.519	434.66	9.000	1.319	36.95	3.608	19.127	4.927	-14.200	-397.71				
H_2 2.016	59.876	24.827	50.05	40.620	5.952	12.00	16.286	41.113	22.238	-18.875	-38.05				
CO_2 44.010	2.097	0.870	38.29	30.320	4.444	195.57	12.156	13.026	16.600	3.574	157.28	10.272			
N_2 28.016	0.537	0.223	6.25	1.657	0.243	6.81	0.664	0.887	0.907						
CH_4 16.042	0.063	0.026	0.42	7.770	1.139	18.27	3.115	3.141	4.254	1.113	17.85	1.166			
C_2H_4 28.052				2.343	0.343	9.62	0.939	0.939	1.282	0.343	9.62	0.628			
C_2H_6 30.068				1.663	0.244	7.34	0.667	0.667	0.911	0.244	7.34	0.479			
C_1+C_2											34.81	2.273			
C_3H_6 42.079				2.977	0.436	18.35	1.198	1.198	1.630	0.436	18.35	1.198	4.32	4.248	0.277
C_3H_8 44.094				0.323	0.047	2.07	0.129	0.129	0.176	0.047	2.07	0.135	4.24	0.488	0.032
C_4H_8 56.104				1.743	0.255	14.31	0.699	0.699	0.954	0.255	14.31	0.935	5.00	2.862	0.187
C_4H_{10} 58.120				0.583	0.085	4.94	0.234	0.234	0.319	0.085	4.94	0.323	4.86	1.016	0.066
C_5H_{10} 70.130				0.647	0.095	6.66	0.259	0.259	0.354	0.095	6.66	0.435	5.45	1.222	0.080
C_5H_{12} 72.146				0.177	0.026	1.88	0.071	0.071	0.097	0.026	1.88	0.123	5.25	0.358	0.023
C_6H_{12} 84.156				0.177	0.026	2.19	0.071	0.071	0.097	0.026	2.19	0.143	5.54	0.395	0.026
C_3-C_6											50.40	3.292		10.589	0.691
TOTAL		41.465	529.67		14.654	336.96	40.092	81.557	62.117						
H_2+CO	97.303	40.346	15312 SCFH		7.271		19.894	60.240	27.165	-33.075					
H_2/CO		1.60	Factor 655082		4.51		4.51	2.15	4.51	1.33					

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
400 EP	82.0	7.409	98.0	7.261
400-550	8.0	0.723	91.4	0.661
550 +	10.0	0.904	114.6	1.036

	RECOVERY %	#/hr	gal/hr
PROPYLENE	40.0	7.34	
C_3 POLY GASO.	87.5	6.42	1.074
C_3 POLY TAR	12.5	0.92	0.122

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.17	0.034	68.0
C_4 POLY GASO.	5.98	12.37	2.069	1.5
C_4H_{10}	4.86	4.94	1.016	68.0
C_4-FREE GASO.			10.310	5.8
C_4 POLY TAR	7.53	1.77	0.235	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	13.428	0.8770	4755
GAS OIL	0.661	0.0432	234
FUEL OIL	1.036	0.0677	367
POLY TAR	0.357	0.0233	126
TOTAL	15.483	1.0112	5482
W. S. CHEM.	1.967	0.1285	697
TOTAL	17.450	1.1397	6179

RECOVERED OIL **	0.406	56.89	3.715		9.036	0.590			
TOTAL OIL		107.29	7.007		19.625	1.281			
WATER SOLUBLE CHEMICALS **	0.296	15.68	1.024		1.967	0.128			
TOTAL LIQUID PRODUCTS C_3+		122.97	8.031		21.592	1.409			
NET WATER **	6.669	120.14	7.846		14.422	0.942			
GROSS WATER		135.82	8.870		16.389	1.070			
HYDROCARBON TOTAL—C_1+		157.78	10.304						

Weight Recovery, % 94.00 — Catalyst Age, hrs. — Space Velocity, vhv 1247
Pressure, psig 404 — Inlet Velocity, Ft/sec 0.99 — Catalyst Vol CF 12.28
Temperature, °F 663 — Bed Depth, Ft 18.61 — Weight, # 1903
Recycle Ratio 0.97 — Bed Density, #/CF 155 — Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
64.66	91.50	76.02	81.98	74.24	45.91	54.91	77.94

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-H
HOURS 135-159

OPERATING CONDITIONS		RATES S.C.F.H.	
PRESSURES PSIG			
Oxygen	434	Fresh Feed	15736
Natural Gas	431	Recycle	15215
Generator Outlet	409	Combined Feed	30951
Reactor Inlet	404	Wet Gas—Measured	5037
Condenser Inlet		Adjusted	5561
Product Accumulator	375	Loss	524
TEMPERATURES—°F.		Recycle/Fresh Feed	0.97
Oxygen	498	Inlet Velocity—ft./sec.	0.99
Natural Gas	801	Fresh Feed Rate—S.C.F.H.	15312
Generator	2427	per Cu. Ft. Dense Bed	1247
Quench Accumulator	159	per Lb. Catalyst	8.05
Reactor Inlet	248	per sq ft	23200
Condenser Inlet	580		
Product Accumulator	65		
Catalyst No. Height			
1 See Per. A	—		
2	662		
3	653		
4	664		
5	665		
6	669		
7	663		
8	651		
9	644		
10	645		
11	625		

PRODUCT TESTS	OIL	WATER
° API	55.6	10.7
Neut. No.	45.7	35.7
Sap. No.	59.8	39.2
Hydrox. No.		
Bromine No.	96	
Pour °F.		
Chemicals, % by K_2CO_3		12.0
HEMPEL DIST. %		°API
205 °F.		
400	81.0	54.9
400-550	8.0	37.4
550+	11.0	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	100	
10%	126	
50%	210	
90%	356	
EP	402	
Rec	97.0	

CATALYST DATA		PARTICLE SIZE				
INVENTORY DATA.		Screen Analysis			Sedimentation	
In Reactor at Start of Period		Mesh	Microns	%	Microns	%
Fresh Catalyst Added		On 40	419+		80+	
Total		100	150		40—80	
Catalyst Recovered	10	150	105		20—40	
In Reactor at End of Period		200	74		10—20	
		250	62		0—20	
REACTOR d-p, Inches H_2O		325	44			
No. Height						
0 See Per. A		<325				
1	74	CATALYST				
2	81	Bulk Density, Lbs./Cu.Ft.				
3	80	Aerated				
4	290	Settled				
Total	525	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	155	N_2 Surface, m^2/gm.				
Inventory, Lbs.	1903					
Bed Depth, Ft.	18.61	CHEMICAL ANALYSIS				
Vol cu ft	12.28	Fe				
		C				
		O				
		H				
		K_2O, W+, % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

RUN NO. 66-I
HOURS 159-183
CATALYST Brownsville Treated MS Red. @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

FRESH FEED				WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED				
					At Wt. Balance							CONDENSATE				
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*
CO 28.010	37.730	15.706	439.94	8.320	1.288	36.08	3.357	19.063	4.645	-14.418	-403.86					
H_2 2.016	59.484	24.762	49.92	41.326	6.397	12.90	16.676	41.438	23.073	-18.365	-37.02					400 EP
CO_2 44.010	2.160	0.899	39.56	29.423	4.555	200.42	11.874	12.773	16.429	3.656	160.86	10.474				400-550
N_2 28.016	0.543	0.226	6.33	1.857	0.287	8.04	0.749	0.975	1.036							550 +
CH_4 16.042	0.083	0.035	0.56	8.677	1.343	21.54	3.501	3.536	4.844	1.308	20.98	1.366				
C_2H_4 28.052				2.137	0.331	9.29	0.862	0.862	1.193	0.331	9.29	0.605				
C_2H_6 30.068				1.663	0.257	7.73	0.671	0.671	0.928	0.257	7.73	0.503				PROPYLENE
C_1+C_2											38.00	2.474				C_3 POLY GASO.
C_3H_4 42.078				3.130	0.485	20.41	1.263	1.268	1.748	20.485	20.41	1.329	4.32	4.725	0.308	C_3 POLY TAR
C_3H_8 44.094				0.350	0.054	2.38	0.141	0.141	0.195	0.054	2.38	0.155	4.24	0.561	0.037	
C_4H_8 56.104				1.737	0.269	15.09	0.701	0.701	0.970	0.269	15.09	0.983	5.00	3.018	0.197	
C_4H_{10} 58.120				0.483	0.075	4.36	0.195	0.195	0.270	0.075	4.36	0.284	4.86	0.897	0.058	C_4H_8
C_5H_{10} 70.130				0.640	0.099	6.94	0.258	0.258	0.357	0.099	6.94	0.452	5.48	1.273	0.083	C_4 POLY GASO.
C_5H_{12} 72.146				0.120	0.019	1.37	0.048	0.048	0.067	0.019	1.37	0.089	5.25	0.261	0.017	C_4H_{10}
C_6H_{12} 84.156				0.137	0.021	1.77	0.055	0.055	0.076	0.021	1.77	0.115	5.54	0.319	0.021	C_4-FREE GASO.
C_5-C_6											52.32	3.407		11.054	0.721	C_4 POLY TAR
TOTAL		41.628	536.31		15.480	348.32	40.351	81.979	63.063							
H_2+CO	97.214	40.468	15358 SCFH		7.685		20.033	60.501	27.718	-32.783						
H_2/CO		1.58	Factor 651126		4.97		4.97	2.17	4.97	1.27						10 # RVP 400 EP GASOLINE
GAS OIL																
FUEL OIL																
POLY TAR																
TOTAL																
W. S. CHEM.																
TOTAL																

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
400 EP	82.6	7.080	98.0	6.938
400-550	8.0	0.686	91.4	0.627
550 +	9.4	0.806	114.6	0.924
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	37.8	7.71		
C_3 POLY GASO.	87.5	6.75	1.129	
C_3 POLY TAR	12.5	0.96	0.127	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.65	0.130	68.0
C_4 POLY GASO.	5.98	12.64	2.113	1.5
C_4H_{10}	4.86	4.36	0.897	68.0
C_4-FREE GASO.			9.920	5.8
C_4 POLY TAR	7.53	1.80	0.239	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	13.060	0.8504	4611	
GAS OIL	0.627	0.0408	221	
FUEL OIL	0.924	0.0602	326	
POLY TAR	0.366	0.0238	129	
TOTAL	14.977	0.9752	5287	
W. S. CHEM.	2.022	0.1317	714	
TOTAL	16.999	1.1069	6001	

Weight Recovery, %	93.54	Catalyst Age, hrs.		Space Velocity, vhv	1245	RECOVERED OIL **	0.385	54.03	3.518
Pressure, psig	404	Inlet Velocity, Ft/sec	0.99	Catalyst Vol CF	12.34	TOTAL OIL		106.35	6.925
Temperature, °F	663	Bed Depth, Ft	18.69	Weight, #	1900	WATER SOLUBLE CHEMICALS **	0.303	16.07	1.046
Recycle Ratio	0.97	Bed Density, #/CF	154	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =		TOTAL LIQUID PRODUCTS C_4+		122.42	7.971
						NET WATER **	6.544	117.89	7.676
						GROSS WATER		133.96	8.722
						HYDROCARBON TOTAL—C_1+		160.42	10.445

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
62.81	91.80	74.17	81.01	75.63	44.32	54.19	76.31

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-I
HOURS 159-183

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE			
Oxygen	435	Fresh Feed	15798	° API	55.4	10.8	In Reactor at Start of Period		Screen Analysis			Sedimentation
Natural Gas	431	Recycle	15313	Neut. No.	46.5	35.4	Fresh Catalyst Added		Mesh	Microns	%	Microns %
Generator Outlet	408	Combined Feed	31111	Sap. No.	60.2	39.8	Total		On 40	419+		80+
Reactor Inlet	404	Wet Gas—Measured	5290	Hydrox. No.			Catalyst Recovered	13	100	150		40—80
Condenser Inlet		Adjusted	5875	Bromine No.	96		In Reactor at End of Period		150	105		20—40
Product Accumulator	375	Loss	585	Pour °F.					200	74		10—20
				Chemicals, % by K_2CO_3		12.5	REACTOR d-p, Inches H_2O		250	62		0—20
							No. Height		325	44		
TEMPERATURES—°F.		Recycle/Fresh Feed	0.97				0 See Per. A		<325			
Oxygen	495	Inlet Velocity—ft./sec.	0.99				1	74	CATALYST			
Natural Gas	795	Fresh Feed Rate—S.C.F.H.	15358	HEMPEL, DIST. %		°API	2	80	Bulk Density, Lbs./Cu.Ft.			
Generator	2411	per Cu.Ft. Dense Bed	1245	205 °F.			3	80	Aerated			
Quench Accumulator	161	per Lb. Catalyst	8.08	400	81.6	54.6	4	290	Settled			
Reactor Inlet	244	per sq ft	23270	400-550	8.0	37.2	Total	524	Compacted			
Condenser Inlet	576			550+	10.4				Particle Density, gm./cc.			
Product Accumulator	66						CALCULATED FROM dp		NH_3 Value, ml./gm.			
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	154	N_2 Surface, m^2/gm.			
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	1900				
2	662			IBP	100		Bed Depth, Ft.	18.69	CHEMICAL ANALYSIS			
3	652			10%	126		Vol Cu. Ft.	12.34	Fe			
4	664			50%	208				C			
5	667			90%	340				O			
6	670			EP	398				H			
7	664			Red.	97.0				K_2O, W+, % basis Fe			
8	652								X-Ray Analysis—			
9	645								$Fe_{20}C_9$			
10	647								Fe_3O_4			
11	625								Fe			

RUN NO. 66-J
HOURS 183-207
CATALYST Brownsville
Treated MS Red. @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED				
					At Wt. Balance							CONDENSATE				
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*
CO 28.010	36.915	15.212	426.05	9.393	1.469	41.15	34818	19.030	5.287	-13.743	-384.90					
H_2 2.016	59.995	24.721	49.84	41.326	6.462	13.03	16.796	41.517	23.258	-18.259	36.81					
CO_2 44.010	2.300	0.948	41.72	28.907	4.521	198.96	11.749	12.697	16.270	3.573	157.24	10.375				
N_2 28.016	0.720	0.297	8.32	1.973	0.308	8.63	0.802	1.099	1.110							
CH_4 16.042	0.070	0.029	0.47	8.447	1.321	21.19	3.433	3.462	4.754	1.292	20.72	1.367				
C_2H_2 26.052				2.177	0.340	9.54	0.885	0.885	1.225	0.340	9.54	0.629				
C_2H_6 30.068				1.613	0.252	7.58	0.656	0.656	0.908	0.252	7.58	0.500				
C_1+C_2											37.84	2.496				
C_3H_6 42.078				3.047	0.476	20.03	1.238	1.238	1.714	0.476	20.03	1.322	4.32	4.637	0.306	
C_3H_8 44.094				0.340	0.053	2.34	0.138	0.138	0.191	0.053	2.34	0.154	4.24	0.552	0.036	
C_4H_8 56.104				1.550	0.242	13.58	0.630	0.630	0.872	0.242	13.58	0.896	5.00	2.716	0.179	
C_4H_{10} 58.120				0.387	0.061	3.55	0.157	0.157	0.218	0.061	3.55	0.234	4.86	0.730	0.048	
C_5H_{10} 70.130				0.507	0.079	5.54	0.206	0.206	0.285	0.079	5.54	0.366	5.45	1.017	0.067	
C_5H_{12} 72.146				0.170	0.027	1.95	0.069	0.069	0.096	0.027	1.95	0.129	5.25	0.371	0.028	
C_6H_{14} 84.156				0.163	0.025	2.10	0.066	0.066	0.091	0.025	2.10	0.139	5.54	0.379	0.025	
C_3-C_6											49.09	3.240		10.402	0.685	
TOTAL		41.207	526.40		15.636	349.17	40.643	81.950	63.078							
H_2+CO	96.910	39.933	15155 SCFH		7.931		20.614	60.547	28.545	-32.002						
H_2/CO		1.63	Factor 659848		4.40		4.40	2.18	4.40	1.33						

Weight Recovery, % 92.31	Catalyst Age, hrs.	Space Velocity, vhv 1236	RECOVERED OIL **	0.360	50.45	3.329	7.987 0.527
Pressure, psig 404	Inlet Velocity, Ft/sec 0.99	Catalyst Vol CF 12.26	TOTAL OIL		99.54	6.569	18.389 1.212
Temperature, °F 662	Bed Depth, Ft 18.57	Weight, # 1876	WATER SOLUBLE CHEMICALS **	0.308	16.32	1.077	2.070 0.137
Recycle Ratio 0.99	Bed Density, #/CF 153	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	TOTAL LIQUID PRODUCTS C_4+		115.86	7.646	20.459 1.349
			NET WATER **	6.131	110.46	7.289	13.260 0.875
			GROSS WATER		126.78	8.366	15.330 1.012
			HYDROCARBON TOTAL—C_1+		153.70	10.142	

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
62.05	90.34	73.86	80.14	72.22	43.98	52.85	75.38

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	82.0	6.549	98.0	6.418
400-550	8.8	0.703	91.4	0.643
550 +	9.2	0.735	114.6	0.842

	RECOVERY %	#/hr	gal/hr
PROPYLENE	37.0	7.41	
C_3 POLY GASO.	87.5	6.48	1.084
C_3 POLY TAR	12.5	0.93	0.124

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	1.05	0.210	68.0
C_4 POLY GASO.	5.98	10.96	1.833	1.5
C_4H_{10}	4.86	3.55	0.730	68.0
C_4-FREE GASO.			9.269	5.8
C_4 POLY TAR	7.53	1.57	0.208	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	12.042	0.7946	4308
GAS OIL	0.643	0.0424	230
FUEL OIL	0.842	0.0556	301
POLY TAR	0.332	0.0219	119
TOTAL	13.859	0.9145	4958
W. S. CHEM.	2.070	0.1366	741
TOTAL	15.929	1.0511	5699

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF

*9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-J
HOURS 183-207

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA				
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE		
Oxygen	435	Fresh Feed	15638	°API	55.0	11.0	In Reactor at Start of Period		Screen Analysis		Sedimentation
Natural Gas	430	Recycle	15424	Neut. No.	47.0	36.2	Fresh Catalyst Added		Mesh / Microns / %		Microns / %
Generator Outlet	407	Combined Feed	31052	Sap. No.	65.3	39.8	Total		On 40 / 419+		80+
Reactor Inlet	404	Wet Gas—Measured	5246	Hydrox. No.			Catalyst Recovered	9	100 / 150		40—80
Condenser Inlet		Adjusted	5934	Bromine No.	96		In Reactor at End of Period		150 / 105		20—40
Product Accumulator	375	Loss	688	Pour °F.					200 / 74		10—20
				Chemicals, % by K_2CO_3		13.5	REACTOR d-p, Inches H_2O		250 / 62		0—20
							No. Height		325 / 44		
TEMPERATURES—°F.		Recycle/Fresh Feed	0.99				0 See Per. A		<325		
Oxygen	490	Inlet Velocity—ft./sec.	0.99				1	73	CATALYST		
Natural Gas	801	Fresh Feed Rate—S.C.F.H.	15155	HEMPEL. DIST. %		°API	2	79	Bulk Density, Lbs./Cu.Ft.		
Generator	2438	per Cu. Ft. Dense Bed	1236	205 °F.			3	80	Aerated		
Quench Accumulator	163	per Lb. Catalyst	8.08	400	81.0	56.4	4	285	Settled		
Reactor Inlet	248	per sq ft	22962	400-550	8.8	37.4	Total	517	Compacted		
Condenser Inlet	581			550+	10.2				Particle Density, gm./cc.		
Product Accumulator	65						CALCULATED FROM dp		NH_3 Value, ml./gm.		
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	153	N_2 Surface, $m^2/gm.$		
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	1876			
2	662			IBP	100		Bed Depth, Ft.	18.57	CHEMICAL ANALYSIS		
3	650			10%	126		Vol cu ft	12.26	Fe		
4	662			50%	210				C		
5	666			90%	340				O		
6	670			EP	394				H		
7	664			Rec.	96.5				K_2O, W+, % basis Fe		
8	652								X-Ray Analysis—		
9	645								$Fe_{20}C_9$		
10	650								Fe_3O_4		
11	631								Fe		

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 66-K
HOURS 207-231
CATALYST Brownsville Treated MS Red. @ 660F

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED							
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
CO 28.010	37.140	15.277	427.89	9.107	1.446	40.50	3.705	18.982	5.151	-13.831	-387.39								
H_2 2.016	59.723	24.565	49.52	41.793	6.634	13.37	17.003	41.568	23.637	-17.931	-36.15					400 EP	84.3	6.629	98.0	6.496
CO_2 44.010	2.350	0.967	42.56	28.653	4.548	200.19	11.657	12.624	16.205	3.581	157.63	10.425				400-550	8.0	0.629	91.4	0.575
N_2 28.016	0.710	0.292	8.18	1.900	0.302	8.46	0.773	1.065	1.075							550 +	7.7	0.606	114.6	0.694
CH_4 16.042	0.077	0.032	0.51	8.553	1.358	21.79	3.480	3.512	4.838	1.326	21.28	1.407								
C_2H_4 28.052				2.317	0.368	10.32	0.943	0.943	1.311	0.368	10.32	0.683					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.700	0.270	8.12	0.692	0.692	0.962	0.270	8.12	0.537				PROPYLENE	36.4	6.43		
C_1+C_2											39.72	2.627				C_3 POLY GASO.	87.5	5.63	0.941	
C_3H_6 42.078				2.647	0.420	17.67	1.077	1.077	1.497	0.420	17.67	1.169	4.32	4.090	0.271	C_3 POLY TAR	12.5	0.80	0.106	
C_3H_8 44.094				0.240	0.038	1.68	0.098	0.098	0.138	0.038	1.68	0.111	4.24	0.396	0.026					
C_4H_8 56.104				1.573	0.250	14.03	0.640	0.640	0.890	0.250	14.03	0.928	5.00	2.806	0.186		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.557	0.088	5.11	0.227	0.227	0.315	0.088	5.11	0.338	4.86	1.051	0.070	C_4H_8	5.00	--	--	68.0
C_5H_{10} 70.130				0.610	0.097	6.80	0.248	0.248	0.345	0.097	6.80	0.450	5.45	1.248	0.083	C_4 POLY GASO.	5.98	12.28	2.053	1.5
C_5H_{12} 72.146				0.160	0.025	1.80	0.065	0.065	0.090	0.025	1.80	0.119	5.25	0.343	0.023	C_4H_{10}	4.86	(5.11) 4.80	(1.051) 0.988	68.0
C_6H_{12} 84.156				0.190	0.030	2.52	0.077	0.077	0.107	0.030	2.52	0.167	5.54	0.455	0.030	C_4-FREE GASO.			9.483	5.8
C_5-C_6											49.61	3.282		10.389	0.689	C_4 POLY TAR	7.53	1.75	0.232	
TOTAL		41.133	528.66		15.874	352.36	40.685	81.818	63.342											
H_2+CO	96.863	39.842	15120 SCFH		8.080		20.708	60.550	28.788	-31.762								gal/hr	gal/MCF	Bbl/Day
H_2/CO		1.61	Factor 661375		4.59		4.59	2.19	4.59	1.30						10 # RVP 400 EP GASOLINE		12.524	0.8283	4491
									RECOVERED OIL **	0.355	49.73	3.289		7.864	0.520	GAS OIL		0.575	0.0380	206
									TOTAL OIL		99.34	6.571		18.253	1.209	FUEL OIL		0.694	0.0459	249
									WATER SOLUBLE CHEMICALS **	0.307	16.29	1.077		2.066	0.137	POLY TAR		0.338	0.0224	121
									TOTAL LIQUID PRODUCTS C_5+		115.63	7.648		20.319	1.346	TOTAL		14.131	0.9346	5067
									NET WATER **	6.121	110.28	7.294		13.239	0.876	W. S. CHEM.		2.066	0.1366	741
									GROSS WATER		126.57	8.371		15.305	1.013	TOTAL		16.197	1.0712	5808
									HYDROCARBON TOTAL—C_1+		155.35	10.274								

Weight Recovery, % 92.40	Catalyst Age, hrs.	Space Velocity, vhv 1240
Pressure, psig 403	Inlet Velocity, Ft/sec 0.99	Catalyst Vol CF 12.19
Temperature, °F 663	Bed Depth, Ft 18.47	Weight, # 1865
Recycle Ratio 0.99	Bed Density, #/CF 153	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
61.41	90.53	72.99	79.72	72.86	43.14	52.46	74.43

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-K
HOURS 207-231

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA			
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE	
Oxygen	435	Fresh Feed	15610	°API	54.8	11.0	In Reactor at Start of Period		Screen Analysis	Sedimentation
Natural Gas	431	Recycle	15440	Neut. No.	48.7	37.2	Fresh Catalyst Added		Mesh / Microns / %	Microns / %
Generator Outlet	407	Combined Feed	31050	Sap. No.	65.6	41.1	Total		On 40 / 419+	80+
Reactor Inlet	403	Wet Gas—Measured	5337	Hydrox. No.			Catalyst Recovered	13	100 / 150	40—80
Condenser Inlet		Adjusted	6024	Bromine No.	96		In Reactor at End of Period		150 / 105	20—40
Product Accumulator	375	Loss	687	Pour °F.	Below -30				200 / 74	10—20
				Chemicals, % by K_2CO_3		13.5	REACTOR d-p, Inches H_2O		250 / 62	0—20
							No. Height		325 / 44	
TEMPERATURES—°F.		Recycle/Fresh Feed	0.99				0 See Per. A		<325	
Oxygen	501	Inlet Velocity—ft./sec.	0.99				1	73	CATALYST	
Natural Gas	791	Fresh Feed Rate—S.C.F.H.	15120	HEMPEL. DIST. %		°API	2	79	Bulk Density, Lbs./Cu.Ft.	
Generator	2418	per Cu.Ft. Dense Bed	1240	205 °F.			3	80	Aerated	
Quench Accumulator	160	per Lb. Catalyst	8.11	400	83.3	55.8	4	282	Settled	
Reactor Inlet	255	per sq ft	22909	400-550	8.0	37.4	Total	514	Compacted	
Condenser Inlet	583			550+	8.7				Particle Density, gm./cc.	
Product Accumulator	66						CALCULATED FROM dp		NH_3 Value, ml./gm.	
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	153	N_2 Surface, m^2/gm.	
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	1865		
2	662			IBP	100		Bed Depth, Ft.	18.47	CHEMICAL ANALYSIS	
3	653			10%	126		Vol cu ft	12.19	Fe	
4	664			50%	210				C	
5	666			90%	350				O	
6	670			EP	408				H	
7	665			Rec.	96.5				K_2O, W+. % basis Fe	
8	652								X-Ray Analysis—	
9	645								$Fe_{20}C_9$	
10	652								Fe_3O_4	
11	644								Fe	

RUN NO. 66-L
HOURS 231-238
CATALYST Brownsville Treated MS Red. @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

FRESH FEED				WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
					At Wt. Balance							CONDENSATE								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	37.260	15.242	426.90	9.305	1.505	42.16	3.804	19.046	5.309	-13.737	-384.74						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
H_2 2.016	59.210	24.219	48.82	41.815	6.761	13.63	17.095	41.314	23.856	-17.458	-35.19					400 EP	82.8	6.519	98.0	6.389
CO_2 44.010	2.815	1.152	50.69	28.795	4.656	204.90	11.772	12.924	16.428	3.504	154.21	10.297				400-550	8.3	0.654	91.4	0.598
N_2 28.016	0.635	0.260	7.28	1.640	0.265	7.42	0.670	0.930	0.935							550 +	8.9	0.701	114.6	0.803
CH_4 16.042	0.090	0.033	0.53	8.425	1.362	21.85	3.444	3.477	4.806	1.329	21.32	1.424								
C_2H_4 28.052				2.260	0.365	10.24	0.924	0.924	1.289	0.365	10.24	0.684					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.795	0.290	8.72	0.734	0.734	1.024	0.290	8.72	0.582				PROPYLENE	35.5	6.39		
C_1+C_2											40.28	2.690				C_3 POLY GASO.	87.5	5.59	0.935	
C_3H_6 42.078				2.645	0.428	18.01	1.081	1.081	1.509	0.428	18.01	1.203	4.32	4.169	0.278	C_3 POLY TAR	12.5	0.80	0.106	
C_3H_8 44.094				0.300	0.049	2.16	0.123	0.123	0.172	0.049	2.16	0.144	4.24	0.509	0.034					
C_4H_8 56.104				1.545	0.250	14.03	0.632	0.632	0.882	0.250	14.03	0.937	5.00	2.806	0.187		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.495	0.080	4.65	0.202	0.202	0.282	0.080	4.65	0.310	4.86	0.957	0.064	C_4H_8	5.00	0.13	0.026	68.0
C_5H_{10} 70.130				0.645	0.104	7.29	0.264	0.264	0.368	0.104	7.29	0.487	5.45	1.338	0.089	C_4 POLY GASO.	5.98	12.16	2.034	1.5
C_5H_{12} 72.146				0.145	0.023	1.66	0.059	0.059	0.082	0.023	1.66	0.111	5.25	0.316	0.021	C_4H_{10}	4.86	4.65	0.957	68.0
C_6H_{12} 84.156				0.190	0.031	2.61	0.078	0.078	0.109	0.031	2.61	0.174	5.54	0.471	0.031	C_4-FREE GASO.			9.449	5.8
C_3-C_6											50.41	3.366		10.566	0.704	C_4 POLY TAR	7.53	1.74	0.231	
TOTAL		40.906	534.22		16.169	359.33	40.882	81.788	63.759											
H_2+CO	96.470	39.461	14976 SCFH	8.266			20.899	60.360	29.165	-31.195							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.59	Factor 667735	4.49			4.49	2.17	4.49	1.27						10 # RVP 400 EP GASOLINE	12.466	0.8324	4513	
Weight Recovery, % 92.07			Catalyst Age, hrs.		Space Velocity, vhv 1224		RECOVERED OIL **			0.355	49.84	3.328		7.874	0.526	GAS OIL	0.598	0.0399	216	
Pressure, psig 401			Inlet Velocity, Ft/sec 1.00		Catalyst Vol CF 12.24		TOTAL OIL				100.25	6.694		18.440	1.230	FUEL OIL	0.803	0.0536	291	
Temperature, °F 662			Bed Depth, Ft 18.55		Weight, # 1860		WATER SOLUBLE CHEMICALS **			0.302	16.03	1.070		2.043	0.136	POLY TAR	0.337	0.0225	122	
Recycle Ratio 1.00			Bed Density, #/C.F 152		Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ = Shift Ratio		TOTAL LIQUID PRODUCTS C_5+ **				116.28	7.764		20.483	1.366	TOTAL	14.204	0.9484	5142	
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY			NET WATER **		6.051	109.02	7.280		13.088	0.874	W. S. CHEM.	2.043	0.1364	740	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+			GROSS WATER			125.05	8.350		15.131	1.010	TOTAL	16.247	1.0848	5882	
60.47	90.13	72.08	79.05	72.13	42.26	51.68	74.27			HYDROCARBON TOTAL—C_1+			156.56	10.454						

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-L
HOURS 231-238

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE			
Oxygen	435	Fresh Feed	15524	°API	54.6	11.1	In Reactor at Start of Period		Screen Analysis			Sedimentation
Natural Gas	431	Recycle	15515	Neut. No.	49.4	36.7	Fresh Catalyst Added		Mesh	Microns	%	Microns %
Generator Outlet	406	Combined Feed	31039	Sap. No.	66.2	40.3	Total		On 40	419+		80+
Reactor Inlet	401	Wet Gas—Measured	5413	Hydrox. No.			Catalyst Recovered	2	100	150		40—80
Condenser Inlet		Adjusted	6136	Bromine No.	96		In Reactor at End of Period		150	105		20—40
Product Accumulator	374	Loss	723	Pour °F.					200	74		10—20
				Chemicals, % by K_2CO_3		13.5	REACTOR d-p, Inches H_2O		250	62		0—20
							No. Height		325	44		
TEMPERATURES—°F.		Recycle/Fresh Feed	1.00				0 See Per. A		<325			
Oxygen	508	Inlet Velocity—ft./sec.	1.00				1	73	CATALYST			
Natural Gas	773	Fresh Feed Rate—S.C.F.H.	14976	HEMPEL DIST. %		°API	2	78	Bulk Density, Lbs./Cu.Ft.			
Generator	2441	per Cu. Ft. Dense Bed	1224	205 °F.			3	80	Aerated			
Quench Accumulator	158	per Lb. Catalyst	8.05	400	81.8	55.5	4	282	Settled			
Reactor Inlet	255	per sq ft	22691	400-550	8.3	36.8	Total	513	Compacted			
Condenser Inlet	583			550+	9.9				Particle Density, gm./cc.			
Product Accumulator	65						CALCULATED FROM dp		NH_3 Value, ml./gm.			
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	152	N_2 Surface, m^2/gm.			
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	1860				
2	661			IBP	104		Bed Depth, Ft.	18.55	CHEMICAL ANALYSIS			
3	653			10%	130		Vol cu ft	12.24	Fe			
4	663			50%	214				C			
5	664			90%	353				O			
6	668			EP	404				H			
7	665			Rec	97				K_2O, W+. % basis Fe			
8	655								X-Ray Analysis—			
9	650								$Fe_{20}C_9$			
10	653								Fe_3O_4			
11	656								Fe			

RUN NO. 66-M
HOURS 238-248
CATALYST Brownsville Treated MS Red. @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

FRESH FEED				WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	At Wt. Balance m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	36.025	13.788	386.22	9.085	1.248	34.96	3.720	17.508	4.968	-12.540	-351.26						CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY,%	gal/hr
H_2 2.016	61.185	23.419	47.21	41.785	5.738	11.57	17.110	40.529	22.848	-17.681	-35.64					400 EP	82.7	6.582	98.0	6.450
CO_2 44.010	2.135	0.817	35.96	28.505	3.915	172.29	11.673	12.490	15.588	3.098	136.33	9.655				400-550	8.0	0.637	91.4	0.582
N_2 28.016	0.560	0.214	6.00	1.335	0.183	5.13	0.547	0.761	0.730							550 +	9.3	0.740	114.6	0.848
CH_4 16.042	0.095	0.036	0.58	8.990	1.235	19.81	3.681	3.717	4.916	1.199	19.23	1.362								
C_2H_4 28.052				2.325	0.319	8.95	0.952	0.952	1.271	0.319	8.95	0.634					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.730	0.238	7.16	0.708	0.708	0.946	0.238	7.16	0.507				PROPYLENE	39.3	6.60		
C_1+C_2											35.34	2.503				C_3 POLY GASO.	87.5	5.77	0.965	
C_3H_6 42.078				2.905	0.399	16.79	1.190	1.190	1.589	0.399	16.79	1.189	4.32	3.387	0.275	C_3 POLY TAR	12.5	0.83	0.110	
C_3H_8 44.094				0.360	0.049	2.16	0.147	0.147	0.196	0.049	2.16	0.153	4.24	0.509	0.036					
C_4H_8 56.104				1.595	0.219	12.29	0.653	0.653	0.872	0.219	12.29	0.870	5.00	2.458	0.174		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.425	0.058	3.37	0.174	0.174	0.232	0.058	3.37	0.239	4.86	0.693	0.049	C_4H_8	5.00	1.06	0.212	68.0
C_5H_{10} 70.130				0.625	0.086	6.03	0.256	0.256	0.342	0.086	6.03	0.427	5.45	1.106	0.078	C_4 POLY GASO.	5.98	9.83	1.643	1.5
C_5H_{12} 72.146				0.160	0.022	1.59	0.066	0.066	0.088	0.022	1.59	0.113	5.25	0.303	0.021	C_4H_{10}	4.86	3.37	0.693	68.0
C_6H_{12} 84.156				0.175	0.024	2.02	0.072	0.072	0.096	0.024	2.02	0.143	5.54	0.365	0.026	C_4-FREE GASO.			9.189	5.8
C_3-C_6											44.25	3.134		9.321	0.659	C_4 POLY TAR	7.53	1.40	0.186	
TOTAL		38.274	475.97		13.733	304.12	40.949	79.223	61.183											
H_2+CO	97.210	37.207	14120 SCFH		6.986		20.830	58.037	47.816	-30.221							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.70	Factor 708215		4.60		4.60	2.31	4.60	1.41						10 # RVP 400 EP GASOLINE	11.737	0.8312	4506	
Weight Recovery, % 95.09			Catalyst Age, hrs.			Space Velocity, vhv 1138			RECOVERED OIL **	0.360	50.54	3.579		7.959	0.564	GAS OIL	0.582	0.0412	223	
Pressure, psig 403			Inlet Velocity, Ft/sec 0.96			Catalyst Vol CF 12.41			TOTAL OIL		94.79	6.713		17.280	1.223	FUEL OIL	0.848	0.0601	326	
Temperature, °F 656			Bed Depth, Ft 18.80			Weight, # 1849			WATER SOLUBLE CHEMICALS **	0.304	16.15	1.144		2.055	0.146	POLY TAR	0.296	0.0210	114	
Recycle Ratio 1.07			Bed Density, #/CF 149			Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =			TOTAL LIQUID PRODUCTS C_5+ **		110.94	7.857		19.335	1.369	TOTAL	13.463	0.9535	5169	
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY		NET WATER	5.837	105.16	7.448		12.624	0.894	W. S. CHEM.	2.055	0.1455	789	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+		GROSS WATER		121.31	8.592		14.679	1.040	TOTAL	15.518	1.0990	5958	
64.12	90.95	75.50	81.22	71.62	43.63	52.07	75.84		HYDROCARBON TOTAL—C_1+		146.28	10.360								

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-M
HOURS 238-248

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE			
Oxygen	425	Fresh Feed	14525	°API	54.0	11.1	In Reactor at Start of Period		Screen Analysis			Sedimentation
Natural Gas	420	Recycle	15540	Neut. No.	48.3	37.0	Fresh Catalyst Added		Mesh	Microns	%	Microns %
Generator Outlet	406	Combined Feed	30065	Sap. No.	66.1	40.8	Total		On 40	419+		80+
Reactor Inlet	403	Wet Gas—Measured	4811	Hydrox. No.			Catalyst Recovered		100	150		40—80
Condenser Inlet		Adjusted	5212	Bromine No.	96		In Reactor at End of Period		150	105		20—40
Product Accumulator	375	Loss	401	Pour °F.					200	74		10—20
				Chemicals, % by K_2CO_3		14.0	REACTOR d-p, Inches H_2O		250	62		0—20
							No. Height		325	44		
TEMPERATURES—°F.		Recycle/Fresh Feed	1.07				0 See Per. A		<325			
Oxygen	473	Inlet Velocity—ft./sec.	0.96				1	70	CATALYST			
Natural Gas	776	Fresh Feed Rate—S.C.F.H.	14120	HEMPEL. DIST. %		°API	2	77	Bulk Density, Lbs./Cu.Ft.			
Generator	2502	per Cu. Ft. Dense Bed	1138	205 °F.			3	78	Aerated			
Quench Accumulator	140	per Lb. Catalyst	7.64	400	81.7	54.7	4	285	Settled			
Reactor Inlet	296	per sq ft	21394	400-550	8.0	37.0	Total	510	Compacted			
Condenser Inlet	563			550+	10.3				Particle Density, gm./cc.			
Product Accumulator	67						CALCULATED FROM dp		NH_3 Value, ml./gm.			
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	149	N_2 Surface, m^2/gm.			
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	1849				
2	658			IBP	104		Bed Depth, Ft.	18.80	CHEMICAL ANALYSIS			
3	647			10%	130		Vol cu ft	12.41	Fe			
4	657			50%	214				C			
5	658			90%	353				O			
6	661			EP	404				H			
7	657			Rec.	97				K_2O, W+, % basis Fe			
8	641								X-Ray Analysis—			
9	637								$Fe_{20}C_9$			
10	638								Fe_3O_4			
11	615								Fe			

RUN NO. 66-N
HOURS 248-272
CATALYST Brownsville Treated MS Red. @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	YIELD BASIS H_2+CO FED CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	36.820	14.459	405.00	8.517	1.208	33.84	3.433	17.892	4.641	-13.251	-371.16				
H_2 2.016	60.497	23.757	47.89	40.760	5.780	11.65	16.430	40.187	22.210	-17.977	-36.24				
CO_2 44.010	2.213	0.869	38.24	29.333	4.160	183.06	11.824	12.693	15.984	3.291	144.82	9.986			
N_2 28.016	0.353	0.139	3.89	1.313	0.186	5.21	0.529	0.668	0.715						
CH_4 16.042	0.117	0.046	0.74	9.406	1.334	21.40	3.791	3.837	5.125	1.288	20.66	1.425			
C_2H_4 28.052				2.397	0.340	9.54	0.966	0.966	1.306	0.340	9.54	0.658			
C_2H_6 30.068				1.930	0.274	8.24	0.778	0.778	1.052	0.274	8.24	0.568			
C_1+C_2											38.44	2.651			
C_3H_6 42.078				2.997	0.425	17.88	1.208	1.208	1.633	0.425	17.88	1.233	4.32	4.139	0.285
C_3H_8 44.094				0.393	0.056	2.47	0.158	0.158	0.214	0.056	2.47	0.170	4.24	0.583	0.040
C_4H_8 56.104				1.587	0.225	12.62	0.640	0.640	0.865	0.225	12.62	0.870	5.00	2.524	0.174
C_4H_{10} 58.120				0.420	0.060	3.49	0.169	0.169	0.229	0.060	3.49	0.241	4.86	0.718	0.049
C_5H_{10} 70.130				0.637	0.090	6.31	0.257	0.257	0.347	0.090	6.31	0.435	5.45	1.158	0.079
C_5H_{12} 72.146				0.100	0.014	1.01	0.040	0.040	0.054	0.014	1.01	0.070	5.25	0.192	0.013
C_6H_{12} 84.156				0.210	0.030	2.52	0.085	0.085	0.115	0.030	2.52	0.174	5.84	0.455	0.031
C_3-C_6											46.30	3.193		9.769	0.671
TOTAL		39.270	495.76		14.182	319.24	40.308	79.578	61.297						
H_2+CO	97.317	38.216	14503 SCFH		6.988		19.863	58.079	26.851	-31.228					
H_2/CO		1.64	Factor 689512		4.79		4.79	2.25	4.79	1.36					
									** RECOVERED OIL	0.356	49.96	3.445		7.915	0.546
									TOTAL OIL		96.26	6.638		17.684	1.217
									WATER SOLUBLE CHEMICALS **	0.295	15.65	1.079		1.989	0.137
									TOTAL LIQUID PRODUCTS C_5+		111.91	7.717		19.673	1.354
									NET WATER **	6.156	110.91	7.647		13.314	0.918
									GROSS WATER		126.56	8.726		15.303	1.055
									HYDROCARBON TOTAL—C_1+		150.35	10.367			

Weight Recovery, % 94.13 | Catalyst Age, hrs. | Space Velocity, vhv 1171
Pressure, psig 404 | Inlet Velocity, Ft/sec 0.97 | Catalyst Vol CF 12.38
Temperature, °F 665 | Bed Depth, Ft 18.76 | Weight, # 1820
Recycle Ratio 1.03 | Bed Density, #/CF 147 | Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
63.89	91.65	75.67	81.71	74.06	44.73	53.77	74.43

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	81.0	6.411	98.0	6.283
400-550	9.1	0.720	91.4	0.658
550 +	9.9	0.784	114.6	0.898

	RECOVERY %	#/hr	gal/hr
PROPYLENE	39.0	6.97	
C_3 POLY GASO.	87.5	6.10	1.020
C_3 POLY TAR	12.5	0.87	0.116

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.96	0.192	68.0
C_4 POLY GASO.	5.98	10.20	1.706	1.5
C_4H_{10}	4.86	3.49	0.718	68.0
C_4 FREE GASO.			9.108	5.8
C_4 POLY TAR	7.53	1.46	0.194	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	11.724	0.8084	4383
GAS OIL	0.658	0.0454	246
FUEL OIL	0.898	0.0619	336
POLY TAR	0.310	0.0214	116
TOTAL	13.590	0.9371	5081
W. S. CHEM.	1.989	0.1371	743
TOTAL	15.579	1.0742	5824

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF

*9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

RUN NO. 66-N
HOURS 248-272

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	428	Fresh Feed	14903
Natural Gas	425	Recycle	15297
Generator Outlet	407	Combined Feed	30200
Reactor Inlet	404	Wet Gas—Measured	4891
Condenser Inlet		Adjusted	5382
Product Accumulator	375	Loss	491
TEMPERATURES—°F.		Recycle/Fresh Feed	1.03
Oxygen	487	Inlet Velocity—ft./sec.	0.97
Natural Gas	768	Fresh Feed Rate—S.C.F.H.	14503
Generator	2406	per Cu. Ft. Dense Bed	1171
Quench Accumulator	141	per Lb. Catalyst	7.97
Reactor Inlet	271	per sq ft	21974
Condenser Inlet	560		
Product Accumulator	66		
Catalyst No. Height			
1 See Per. A	--		
2	664		
3	658		
4	667		
5	666		
6	668		
7	664		
8	648		
9	643		
10	647		
11	624		

PRODUCT TESTS	OIL	WATER
	OIL	WATER
°API	55.1	11.0
Neut. No.	46.5	35.2
Sap. No.	62.9	39.7
Hydrox. No.		
Bromine No.	80	
Pour °F.		
Chemicals, % by K_2CO_3		13.0
HEMPEL, DIST. %		°API
205 °F.		
400	80.0	53.6
400-550	9.1	36.0
550+	10.9	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	100	
10%	137	
50%	210	
90%	344	
EP	373	
Rec	96	

CATALYST DATA		
INVENTORY DATA		
In Reactor at Start of Period		
Fresh Catalyst Added		
Total		
Catalyst Recovered	12	
In Reactor at End of Period		
REACTOR d-p, Inches H_2O		
No. Height		
0 See Per. A		
1	69	
2	75	
3	78	
4	280	
Total	502	
CALCULATED FROM dp		
Density, Lbs./Cu.Ft.	147	
Inventory, Lbs.	1820	
Bed Depth, Ft.	18.76	
Vol cu ft	12.38	

PARTICLE SIZE					
	Screen Analysis			Sedimentation	
	Mesh	Microns	%	Microns	%
	On 40	419+		80+	
	100	150		40—80	
	150	105		20—40	
	200	74		10—20	
	250	62		0—20	
	325	44			
	<325				

CATALYST	
Bulk Density, Lbs./Cu.Ft.	
Aerated	
Settled	
Compacted	
Particle Density, gm./cc.	
NH_3 Value, ml./gm.	
N_2 Surface, m^2/gm.	
CHEMICAL ANALYSIS	
Fe	
C	
O	
H	
K_2O, W+, % basis Fe	
X-Ray Analysis—	
$Fe_{20}C_9$	
Fe_3O_4	
Fe	

RUN NO. 66-0
HOURS 272-296
CATALYST

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		CONDENSATE				YIELD BASIS H_2+CO FED				
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
CO 28.010	36.647	14.131	395.82	8.100	1.151	32.24	3.285	17.416	4.436	-12.980	-363.58									
H_2 2.016	60.367	23.279	46.93	41.160	5.851	11.80	16.693	39.972	22.544	-17.428	-35.13					400 EP	81.6	6.089	98.0	5.967
CO_2 44.010	2.113	0.815	35.87	28.720	4.083	179.66	11.648	12.463	15.731	3.268	143.79	10.128				400-550	9.0	0.672	91.4	0.614
N_2 28.014	0.750	0.289	8.10	1.963	0.279	7.82	0.796	1.085	1.075							550 +	9.4	0.702	114.6	0.804
CH_4 16.042	0.123	0.047	0.75	9.370	1.332	21.37	3.800	3.847	5.132	1.285	20.62	1.452								
C_2H_6 28.052				2.343	0.333	9.34	0.950	0.950	1.283	0.333	9.34	0.658					RECOVERY %	#/hr	gal/hr	
C_3H_8 30.068				2.003	0.285	8.57	0.812	0.812	1.097	0.285	8.57	0.604				PROPYLENE	38.1	6.45		
C_1+C_2											38.53	2.714				C_3 POLY GASO.	87.5	5.64	0.943	
C_2H_4 42.079				2.830	0.402	16.92	1.148	1.148	1.550	0.402	16.92	1.192	4.32	3.917	0.276	C_3 POLY TAR	12.5	0.81	0.108	
C_3H_8 44.094				0.307	0.044	1.94	0.125	0.125	0.169	0.044	1.94	0.137	4.24	0.458	0.032					
C_4H_8 56.104				1.637	0.233	13.07	0.664	0.664	0.897	0.233	13.07	0.921	5.00	2.614	0.184		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.560	0.080	4.65	0.227	0.227	0.307	0.080	4.65	0.328	4.86	0.957	0.067	C_4H_8	5.00	--	--	68.0
C_5H_{10} 70.130				0.657	0.093	6.52	0.266	0.266	0.359	0.093	6.52	0.459	5.45	1.196	0.084	C_4 POLY GASO.	5.98	11.44	1.912	1.5
C_6H_{12} 72.146				0.170	0.024	1.73	0.069	0.069	0.093	0.024	1.73	0.122	3.25	0.330	0.023	C_4H_{10}	4.86	(4.65) 4.47	(0.9571) 0.920	68.0
C_6H_{12} 84.156				0.180	0.026	2.19	0.073	0.073	0.099	0.026	2.19	0.154	5.54	0.395	0.028	C_4 FREE GASO.			8.831	5.8
C_3-C_6											47.02	3.313		9.867	0.694	C_4 POLY TAR	7.53	1.63	0.216	
TOTAL		38.561	487.47		14.216	317.82	40.556	79.117	61.353											
H_2+CO	97.014	37.410	14197 SCFH		7.002		19.978	57.388	26.980	-30.408							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.65	Factor 704374		5.08		5.08	2.30	5.08	1.34						10 # RVP 400 EP GASOLINE	11.663	0.8215	4454	
GAS OIL												0.336	47.19	3.324		7.463	0.526	0.614	0.0432	234
FUEL OIL												6.637		17.330	1.220					
POLY TAR												0.284	15.07	1.061		1.926	0.136	0.804	0.0566	307
TOTAL													94.21	6.637		17.330	1.220	0.324	0.0228	124
W.S. CHEM.													109.28	7.698		19.256	1.356	13.405	0.9441	5119
TOTAL												5.961	107.39	7.564		12.892	0.908	1.926	0.1358	736
													122.46	8.625		14.818	1.044	15.331	1.0799	5855
													147.81	10.412						

Weight Recovery, % 93.32 | Catalyst Age, hrs. | Space Velocity, vhv 1124
Pressure, psig 403 | Inlet Velocity, Ft/sec 0.96 | Catalyst Vol CF 12.63
Temperature, °F 660 | Bed Depth, Ft 19.13 | Weight, # 1793
Recycle Ratio 1.05 | Bed Density, #/CF 142 | Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =

FRESH FEED CONVERSION — %: Contraction 63.13 | CO 91.85 | H_2 74.87 | H_2+CO 81.28
TOTAL FEED CONVERSION — %: CO 74.53 | H_2 43.60 | $CO+H_2$ 52.99
SELECTIVITY: C_3+/C_1+ 73.93

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

RUN NO. 66-0
HOURS 272-296

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA						
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE				
Oxygen	428	Fresh Feed	14634	° API	54.8	11.1	In Reactor at Start of Period		Screen Analysis			Sedimentation	
Natural Gas	427	Recycle	15391	Neut. No.	48.4	36.2	Fresh Catalyst Added		Mesh	Microns	%	Microns	%
Generator Outlet	407	Combined Feed	30025	Sap. No.	63.0	39.6	Total		On 40	419+		80+	
Reactor Inlet	403	Wet Gas—Measured	4842	Hydrox. No.			Catalyst Recovered		100	150		40—80	
Condenser Inlet		Adjusted	5395	Bromine No.	93		In Reactor at End of Period	5	150	105		20—40	
Product Accumulator	375	Loss	553	Pour °F.					200	74		10—20	
				Chemicals, % by K_2CO_3		13.0	REACTOR d-p, Inches H_2O		250	62		0—20	
							No. Height		325	44			
TEMPERATURES—°F.		Recycle/Fresh Feed	1.05				0 See Per. A		<325				
Oxygen	783	Inlet Velocity—ft./sec.	0.96				1	69	CATALYST				
Natural Gas	465	Fresh Feed Rate—S.C.F.H.	14197	HEMPEL, DIST. %		°API	2	74	Bulk Density, Lbs./Cu.Ft.				
Generator	2501	per Cu. Ft. Dense Bed	1124	205 °F.			3	72	Aerated				
Quench Accumulator	142	per Lb. Catalyst	7.92	400	80.6	53.6	4	280	Settled				
Reactor Inlet	286	per sq ft	21511	400-550	9.0	35.8	Total	495	Compacted				
Condenser Inlet	569			550+	10.4				Particle Density, gm./cc.				
Product Accumulator	70						CALCULATED FROM dp		NH_3 Value, ml./gm.				
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	142	N_2 Surface, m^2/gm.				
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	1793					
2	660			IBP	100		Bed Depth, Ft.	19.13	CHEMICAL ANALYSIS				
3	654			10%	129		Vol cu ft	12.63	Fe				
4	664			50%	213				C				
5	663			90%	348				O				
6	660			EP	392				H				
7	660			Rec	96.5				K_2O, W+, % basis Fe				
8	645								X-Ray Analysis—				
9	640								$Fe_{20}C_9$				
10	643								Fe_3O_4				
11	632								Fe				

RUN NO. 66-P
HOURS 296-320
CATALYST

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
CO 28.010	35.927	13.690	383.45	8.395	1.155	32.35	3.397	17.087	4.552	-12.535	-351.10									
H_2 2.016	60.887	23.201	46.77	40.865	5.623	11.34	16.536	39.737	22.159	-17.578	-35.43					400 EP	82.0	5.999	98.0	5.879
CO_2 44.010	2.223	0.847	37.28	28.830	3.967	174.61	11.666	12.513	15.633	3.120	137.33	9.809				400-550	8.6	0.629	91.4	0.575
N_2 28.016	0.850	0.324	9.08	2.095	0.288	8.07	0.848	1.172	1.136							550 +	9.4	0.688	114.6	0.788
CH_4 16.042	0.113	0.043	0.69	9.075	1.249	20.04	3.672	3.715	4.921	1.206	19.35	1.382								
C_2H_4 28.052				2.365	0.325	9.12	0.957	0.957	1.282	0.325	9.12	0.651					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.780	0.245	7.37	0.720	0.720	0.965	0.245	7.37	0.526				PROPYLENE	39.0	6.48		
C_1+C_2											35.84	2.559				C_3 POLY GASO.	87.5	5.67	0.948	
C_3H_6 42.078				2.870	0.395	16.62	1.161	1.161	1.556	0.395	16.62	1.187	4.32	3.847	0.275	C_3 POLY TAR	12.5	0.81	0.108	
C_3H_8 44.094				0.290	0.040	1.76	0.117	0.117	0.157	0.040	1.76	0.126	4.24	0.415	0.030					
C_4H_8 56.104				1.775	0.244	13.69	0.718	0.718	0.962	0.244	13.69	0.978	5.00	2.738	0.196		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.510	0.070	4.07	0.206	0.206	0.276	0.070	4.07	0.291	4.86	0.837	0.060	C_4H_8	5.00	0.47	0.094	68.0
C_5H_{10} 70.130				0.755	0.104	7.29	0.305	0.305	0.409	0.104	7.29	0.521	5.45	1.338	0.096	C_4 POLY GASO.	5.98	11.57	1.934	1.5
C_5H_{12} 72.146				0.185	0.025	1.80	0.075	0.075	0.100	0.025	1.80	0.129	5.25	0.343	0.024	C_4H_{10}	4.86	4.07	0.837	68.0
C_6H_{12} 84.156				0.210	0.029	2.44	0.085	0.085	0.114	0.029	2.44	0.174	5.54	0.440	0.031	C_4-FREE GASO.			8.948	5.8
C_3-C_6											47.67	3.406		9.958	0.712	C_4 POLY TAR	7.53	1.65	0.219	
TOTAL		38.105	477.27		13.759	310.57	40.463	78.568	60.656											
H_2+CO	96.814	36.891	14000 SCFH		6.778		19.933	56.824	26.731	-30.113								gal/hr	gal/MCF	Bbl/Day
H_2/CO		1.69	Factor 714285		4.87		4.87	2.33	4.87	1.40						10 # RVP 400 EP GASOLINE	11.813	0.8438	4575	
Weight Recovery, % 94.56			Catalyst Age, hrs.			Space Velocity, vhv 1115			RECOVERED OIL **	0.332	46.61	3.329		7.316	0.523	GAS OIL	0.575	0.0411	223	
Pressure, psig 403			Inlet Velocity, Ft/sec 0.95			Catalyst Vol CF 12.56			TOTAL OIL		94.28	6.735		17.274	1.235	FUEL OIL	0.788	0.0563	305	
Temperature, °F 662			Bed Depth, Ft 19.03			Weight, # 1771			WATER SOLUBLE CHEMICALS **	0.290	15.39	1.099		1.962	0.140	POLY TAR	0.327	0.0234	126	
Recycle Ratio 1.06			Bed Density, #/CF 141			Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ = Shift Ratio			TOTAL LIQUID PRODUCTS C_5+		109.67	7.834		19.236	1.375	TOTAL	13.503	0.9646	5229	
FRESH FEED CONVERSION — %					TOTAL FEED CONVERSION — %			SELECTIVITY	NET WATER **	5.812	104.70	7.479		12.569	0.898	W. S. CHEM.	1.962	0.1401	760	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+		GROSS WATER		120.09	8.578		14.531	1.038	TOTAL	15.465	1.0047	5989	
63.89	91.56	75.76	81.63	73.36	44.24	52.99	75.37		HYDROCARBON TOTAL—C_1+		145.51	10.393								

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-P
HOURS 296-320

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE			
Oxygen	428	Fresh Feed	14461	°API	53.4	11.1	In Reactor at Start of Period		Screen Analysis			Sedimentation
Natural Gas	428	Recycle	15356	Neut. No.	46.8	36.4	Fresh Catalyst Added		Mesh	Microns	%	Microns %
Generator Outlet	407	Combined Feed	29817	Sap. No.	63.8	39.6	Total		On 40	419+		80+
Reactor Inlet	403	Wet Gas—Measured	4785	Hydrox. No.			Catalyst Recovered	13	100	150		40—80
Condenser Inlet		Adjusted	5221	Bromine No.	91		In Reactor at End of Period		150	105		20—40
Product Accumulator	375	Loss	436	Pour °F.					200	74		10—20
				Chemicals, % by K_2CO_3		13.5	REACTOR d-p, Inches H_2O		250	62		0—20
							No. Height		325	44		
TEMPERATURES—°F.		Recycle/Fresh Feed	1.06				0 See Per. A		<325			
Oxygen	479	Inlet Velocity—ft./sec.	0.95				1	68	CATALYST			
Natural Gas	793	Fresh Feed Rate—S.C.F.H.	14000	HEMPEL, DIST. %		°API	2	74	Bulk Density, Lbs./Cu.Ft.			
Generator	2473	per Cu. Ft. Dense Bed	1115	205 °F.			3	72	Aerated			
Quench Accumulator	141	per Lb. Catalyst	7.91	400	81.0	53.0	4	275	Settled			
Reactor Inlet	292	per sq ft	21212	400-550	8.6	35.1	Total	489	Compacted			
Condenser Inlet	575			550+	10.4				Particle Density, gm./cc.			
Product Accumulator	69						CALCULATED FROM dp		NH_3 Value, ml./gm.			
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	141	N_2 Surface, m^2/gm.			
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	1771				
2	661			IBP	100		Bed Depth, Ft.	19.03	CHEMICAL ANALYSIS			
3	654			10%	123		Vol cu ft	12.56	Fe			
4	664			50%	200				C			
5	664			90%	333				O			
6	668			EP	379				H			
7	662			Rec	96				K_2O, W+, % basis Fe			
8	648								X-Ray Analysis—			
9	644								$Fe_{20}C_9$			
10	650								Fe_3O_4			
11	651								Fe			

RUN NO. 66-Q
HOURS 320-344
CATALYST Brownsville Treated MS Red. @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
					At Wt. Balance							CONDENSATE								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	37.153	13.914	389.74	9.110	1.308	36.64	3.669	17.583	4.977	12.606	353.10						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
H_2 2.016	59.287	22.204	44.76	40.610	5.829	11.75	16.353	38.557	22.182	16.375	33.01					400 EP	80.7	5.696	98.0	5.582
CO_2 44.010	2.510	0.940	41.37	29.283	4.203	184.98	11.792	12.732	15.995	3.263	143.61	10.477				400-550	10.0	0.706	91.4	0.645
N_2 28.016	0.923	0.346	9.69	2.220	0.319	8.94	0.894	1.240	1.215							550 +	9.3	0.656	114.6	0.752
CH_4 16.042	0.127	0.048	0.77	8.716	1.251	20.07	3.510	3.558	4.761	1.203	19.30	1.486								
C_2H_4 28.052				2.270	0.326	9.15	0.914	0.914	1.240	0.326	9.15	0.668					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.837	0.264	7.94	0.740	0.740	1.004	0.264	7.94	0.579				PROPYLENE	36.5	6.39		
C_1+C_2											36.39	2.655				C_3 POLY GASO.	87.5	5.59	0.935	
C_3H_6 42.078				2.897	0.416	17.50	1.167	1.167	1.583	0.416	17.50	1.277	4.32	4.051	0.296	C_3 POLY TAR	12.5	0.080	0.106	
C_3H_8 44.094				0.300	0.043	1.90	0.121	0.121	0.164	0.043	1.90	0.139	4.24	0.448	0.033					
C_4H_8 56.104				1.487	0.213	11.95	0.599	0.599	0.812	0.213	11.95	0.872	5.00	2.390	0.174		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.497	0.071	4.13	0.200	0.200	0.271	0.071	4.13	0.301	4.86	0.850	0.062	C_4H_8	5.00	--	--	68.0
C_5H_{10} 70.130				0.510	0.073	5.12	0.205	0.205	0.278	0.073	5.12	0.374	5.45	0.939	0.069	C_4 POLY GASO.	5.98	10.46	1.749	1.5
C_5H_{12} 72.146				0.140	0.020	1.44	0.056	0.056	0.076	0.020	1.44	0.105	5.25	0.274	0.020	C_4H_{10}	4.86	(4.13) 4.06	(0.850) 0.836	68.0
C_6H_{12} 84.156				0.123	0.018	1.51	0.050	0.050	0.068	0.018	1.51	0.110	5.54	0.273	0.020	C_4 FREE GASO.			8.003	5.8
C_3-C_6											43.55	3.177		9.225	0.674	C_4 POLY TAR	7.58	1.49	0.198	
TOTAL		37.452	486.33		14.354	323.02	40.269	77.721	60.979											
H_2+CO	96.440	36.118	13707 SCFH	7.137			20.022	56.140	27.159	28.981							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.60	Factor 729554	4.46			4.46	2.19	4.46	1.30						10 # RVP 400 EP GASOLINE	10.588	0.7725	4188	
Weight Recovery, % 93.64			Catalyst Age, hrs.			Space Velocity, vhv 1091			RECOVERED OIL **	0.318	44.64	3.257		7.058	0.515	GAS OIL	0.645	0.0471	255	
Pressure, psig 403			Inlet Velocity, Ft/sec 0.94			Catalyst Vol CF 12.56			TOTAL OIL		88.19	6.434		16.283	1.189	FUEL OIL	0.752	0.0549	298	
Temperature, °F 662			Bed Depth, Ft 19.03			Weight, # 1746			WATER SOLUBLE CHEMICALS ***	0.283	14.99	1.094		1.866	0.136	POLY TAR	0.304	0.0222	120	
Recycle Ratio 1.08			Bed Density, #/CF 139			Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =			TOTAL LIQUID PRODUCTS C_5+		103.18	7.528		18.149	1.325	TOTAL	12.289	0.8967	4861	
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY		NET WATER **	5.755	103.69	7.565		12.484	0.911	W.S. CHEM.	1.866	0.1361	738	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+		GROSS WATER		118.68	8.658		14.350	1.047	TOTAL	14.155	1.0328	5599	
61.67	90.60	73.75	80.24	71.69	42.47	51.62	73.93		HYDROCARBON TOTAL—C_1+		139.57	10.183								

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-Q
HOURS 320-344

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA						
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE				
Oxygen	428	Fresh Feed	14213	°API	54.8	11.0	In Reactor at Start of Period		Screen Analysis			Sedimentation	
Natural Gas	429	Recycle	15282	Neut. No.	48.2	37.6	Fresh Catalyst Added		Mesh	Microns	%	Microns	%
Generator Outlet	407	Combined Feed	29495	Sap. No.	64.5	40.6	Total		On 40	419+		80+	
Reactor Inlet	403	Wet Gas—Measured	4926	Hydrox. No.			Catalyst Recovered		100	150		40—80	
Condenser Inlet		Adjusted	5447	Bromine No.	98		In Reactor at End of Period		150	105		20—40	
Product Accumulator	375	Loss	521	Pour °F.	Below -30				200	74		10—20	
				Chemicals, % by K_2CO_3		13.0	REACTOR d-p, Inches H_2O		250	62		0—20	
							No. Height		325	44			
TEMPERATURES—°F.		Recycle/Fresh Feed	1.08				0 See Per. A		<325				
Oxygen	490	Inlet Velocity—ft./sec.	0.94				1	67	CATALYST				
Natural Gas	802	Fresh Feed Rate—S.C.F.H.	13707	HEMPEL, DIST. %		°API	2	73	Bulk Density, Lbs./Cu.Ft.				
Generator	2478	per Cu.Ft. Dense Bed	1091	205 °F.			3	70	Aerated				
Quench Accumulator	143	per Lb. Catalyst	7.85	400	79.7	53.9	4	272	Settled				
Reactor Inlet	292	per sq ft	20768	400-550	10.0	37.1	Total	482	Compacted				
Condenser Inlet	580			550+	10.3				Particle Density, gm./cc.				
Product Accumulator	68						CALCULATED FROM dp		NH_3 Value, ml./gm.				
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	139	N_2 Surface, m^2/gm.				
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	1746					
2	662			IBP	100		Bed Depth, Ft.	19.03	CHEMICAL ANALYSIS				
3	655			10%	124		Vol cu ft	12.56	Fe				
4	664			50%	208				C				
5	664			90%	339				O				
6	667			EP	373				H				
7	663			Rec	96.5				K_2O, W+, % basis Fe				
8	649								X-Ray Analysis—				
9	646								$Fe_{20}C_9$				
10	655								Fe_3O_4				
11	652								Fe				

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 66-R
HOURS 344-368
CATALYST Brownsville Treated MS Rec. @ 660°F

FRESH FEED	%	m/hr	#/hr	WET GAS	At Wt. Balance m/hr	At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
CO 28.010	36.427	13.634	381.89	9.003	1.310	36.69	3.680	17.314	4.990	-12.324	-345.20
H_2 2.016	60.086	22.489	45.34	41.787	6.080	12.26	17.080	39.569	23.160	-16.409	-33.08
CO_2 44.010	2.250	0.842	37.06	27.963	4.070	179.11	11.430	12.272	15.500	3.228	142.05
N_2 28.014	1.137	0.426	11.93	2.793	0.406	11.37	1.142	1.568	1.548		
CH_4 16.042	0.100	0.037	0.59	8.417	1.225	19.65	3.440	3.477	4.665	1.188	19.06
C_2H_6 28.052				2.223	0.323	9.06	0.909	0.909	1.232	0.323	9.06
C_3H_8 30.068				1.737	0.253	7.61	0.710	0.710	0.963	0.253	7.61
C_1+C_2											35.73
C_3H_6 42.078				2.767	0.403	16.96	1.131	1.131	1.534	0.403	16.96
C_3H_8 44.094				0.300	0.044	1.94	0.123	0.123	0.167	0.044	1.94
C_4H_8 56.104				1.570	0.228	12.79	0.642	0.642	0.870	0.228	12.79
C_4H_{10} 58.120				0.490	0.071	4.13	0.200	0.200	0.271	0.071	4.13
C_5H_{10} 70.130				0.613	0.089	6.24	0.251	0.251	0.340	0.089	6.24
C_5H_{12} 72.146				0.160	0.023	1.66	0.065	0.065	0.088	0.023	1.66
C_6H_{12} 84.156				0.177	0.026	2.19	0.072	0.072	0.098	0.026	2.19
C_3-C_6											45.91
TOTAL		37.428	476.81		14.551	321.66	40.875	78.303	61.381		
H_2+CO	96.513	36.123	13709 SCFH		7.390		20.760	56.883	28.150	-28.733	
H_2/CO		1.65	Factor 729447		4.64		4.64	2.29	4.64	1.33	

YIELD BASIS H_2+CO FED — CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
10.362			
1.390			
0.661			
0.555			
2.606			
1.237	4.32	3.926	0.286
0.142	4.24	0.458	0.033
0.933	5.00	2.558	0.187
0.301	4.86	0.850	0.062
0.455	5.48	1.145	0.084
0.121	5.25	0.316	0.023
0.160	5.54	0.395	0.029
3.349		9.648	0.704
0.306	42.93	3.132	
	88.84	6.481	
0.298	15.81	1.153	
	104.65	7.634	
5.351	96.41	7.033	
	112.22	8.186	
	140.38	10.240	

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
400 EP	80.5	5.480	98.0	5.370
400-550	8.0	0.545	91.4	0.498
550 +	11.5	0.783	114.6	0.897

	RECOVERY %	#/hr	gal/hr
PROPYLENE	36.2	6.14	
C_3 POLY GASO.	87.5	5.33	0.898
C_3 POLY TAR	12.5	0.77	0.102

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.06	0.012	68.0
C_4 POLY GASO.	5.98	11.14	1.863	1.5
C_4H_{10}	4.86	4.13	0.850	68.0
C_4 FREE GASO.			8.124	5.8
C_4 POLY TAR	7.53	1.59	0.211	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	10.849	0.7914	4291
GAS OIL	0.498	0.0363	197
FUEL OIL	0.897	0.0654	355
POLY TAR	0.313	0.0228	124
TOTAL	12.557	0.9159	4967
W. S. CHEM.	1.995	0.1455	789
TOTAL	14.552	1.0614	5756

Weight Recovery, %	93.75	Catalyst Age, hrs.		Space Velocity, vhv	1111	RECOVERED OIL **	0.306	42.93
Pressure, psig	401	Inlet Velocity, Ft/sec	0.95	Catalyst Vol CF	12.34	TOTAL OIL		88.84
Temperature, °F	659	Bed Depth, Ft	18.69	Weight, #	1715	WATER SOLUBLE CHEMICALS **	0.298	15.81
Recycle Ratio	1.09	Bed Density, #/CF	139	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =		TOTAL LIQUID PRODUCTS C_3+		104.65
						NET WATER **	5.351	96.41
						GROSS WATER		112.22
						HYDROCARBON TOTAL—C_1+		140.38

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3 + /C_1 +
61.12	90.39	72.96	79.54	71.18	41.47	50.51	74.55

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-R
HOURS 344-368

OPERATING CONDITIONS		RATES S.C.F.H.	
PRESSURES PSIG			
Oxygen	427	Fresh Feed	14204
Natural Gas	430	Recycle	15512
Generator Outlet	406	Combined Feed	29716
Reactor Inlet	401	Wet Gas—Measured	5011
Condenser Inlet		Adjusted	5522
Product Accumulator	375	Loss	511
TEMPERATURES—°F.		Recycle/Fresh Feed	1.09
Oxygen	479	Inlet Velocity—ft./sec.	0.95
Natural Gas	797	Fresh Feed Rate—S.C.F.H.	13709
Generator	2489	per Cu. Ft. Dense Bed	1111
Quench Accumulator	140	per Lb. Catalyst	7.99
Reactor Inlet	290	per sq ft	20771
Condenser Inlet	572		
Product Accumulator	65		
Catalyst No. Height			
1 See Per. A	--		
2	658		
3	651		
4	661		
5	661		
6	665		
7	660		
8	648		
9	645		
10	654		
11	642		

PRODUCT TESTS	OIL	WATER
°API	55.3	11.0
Neut. No.	49.2	37.8
Sap. No.	66.9	41.5
Hydrox. No.		
Bromine No.	98	
Pour °F.		
Chemicals, % by K_2CO_3		14.7
HEMPEL, DIST. %		°API
205 °F.		
400	79.5	55.6
400-550	8.0	36.0
550+	12.5	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	100	
10%	124	
50%	200	
90%	330	
EP	374	
Rec	96	

CATALYST DATA — INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	21
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 See Per. A	
1	66
2	72
3	73
4	262
Total	473
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	139
Inventory, Lbs.	1715
Bed Depth, Ft.	18.69
Vol cu ft	12.34

PARTICLE SIZE — Screen Analysis			Sedimentation	
Mesh	Microns	%	Microns	%
On 40	419+		80+	
100	150		40—80	
150	105		20—40	
200	74		10—20	
250	62		0—20	
325	44			
<325				

CATALYST	
Bulk Density, Lbs./Cu.Ft.	
Aerated	
Settled	
Compacted	
Particle Density, gm./cc.	
NH_3 Value, ml./gm.	
N_2 Surface, m^2/gm.	
CHEMICAL ANALYSIS	
Fe	
C	
O	
H	
K_2O, W+. % basis Fe	
X-Ray Analysis—	
$Fe_{20}C_9$	
Fe_3O_4	
Fe	

RUN NO. 66-S
HOURS 368-392
CATALYST Brownsville Treated MS Red. @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

FRESH FEED				WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	At Wt. Balance m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
CO 28.010	38.387	13.988	391.80	10.410	1.534	42.97	4.153	18.141	5.687	-12.454	-348.83									
H_2 2.016	57.843	21.078	42.49	39.390	5.802	11.70	15.715	36.793	21.517	-15.276	-30.79					400 EP	80.9	5.090	98.0	4.988
CO_2 44.010	2.420	0.882	38.82	28.890	4.256	187.31	11.526	12.408	15.782	3.374	148.49	11.158				400-550	8.1	0.510	91.4	0.499
N_2 28.016	1.200	0.437	12.24	2.700	0.398	11.15	1.077	1.514	1.475							550 +	11.0	0.692	114.6	0.793
CH_4 16.042	0.150	0.055	0.88	8.367	1.233	19.78	3.338	3.283	4.571	1.178	18.90	1.420								
C_2H_6 28.052				2.327	0.343	9.62	0.928	0.928	1.271	0.343	9.62	0.723					RECOVERY %	#/hr	gal/hr	
C_3H_6 30.068				1.820	0.268	8.06	0.726	0.726	0.994	0.268	8.06	0.606				PROPYLENE	33.0	5.900		
C_1+C_2											36.58	2.749				C_3 POLY GASO.	87.5	5.163	0.863	
C_3H_8 42.078				2.887	0.425	17.88	1.152	1.152	1.577	0.425	17.88	1.344	4.32	4.139	0.311	C_3 POLY TAR	12.5	0.737	0.098	
C_4H_8 44.094				0.323	0.048	2.12	0.129	0.129	0.177	0.048	2.12	0.159	4.24	0.500	0.038					
C_4H_8 56.104				1.563	0.230	12.90	0.624	0.624	0.854	0.230	12.90	0.969	5.00	2.580	0.194		#/gal	#/hr	gal/hr	RVP
C_5H_{10} 58.120				0.460	0.068	3.95	0.184	0.184	0.252	0.068	3.95	0.297	4.86	0.813	0.061	C_4H_8	5.00	0.05	0.010	68.0
C_5H_{10} 70.130				0.573	0.084	5.89	0.229	0.229	0.313	0.084	5.89	0.443	5.45	1.081	0.081	C_4 POLY GASO.	5.98	11.24	1.880	1.5
C_6H_{12} 72.146				0.140	0.021	1.52	0.056	0.056	0.077	0.021	1.52	0.114	5.25	0.290	0.022	C_4H_{10}	4.86	3.95	0.813	68.0
C_6H_{12} 84.156				0.150	0.022	1.85	0.060	0.060	0.082	0.022	1.85	0.139	5.54	0.334	0.025	C_4-FREE GASO.			7.556	5.8
C_5-C_6											46.11	3.465		9.737	0.732	C_4 POLY TAR	7.53	1.61	0.214	
TOTAL	38.410	36.440	486.24		14.732	336.68	39.897	76.337	60.422											
H_2+CO		35.066	13308 SCFH	7.336			19.868	54.934	27.204	-27.730							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.51	Factor 751427	3.78			3.78	2.03	3.78	1.23						10 # RVP 400 EP GASOLINE	10.259	0.7709	4180	
Weight Recovery, % 92.74			Catalyst Age, hrs.			Space Velocity, vhv 1104		RECOVERED OIL **		0.285	39.94	3.001		6.292	0.472	GAS OIL	0.499	0.0375	203	
Pressure, psig 401			Inlet Velocity, Ft/sec 0.93			Catalyst Vol CF 12.05		TOTAL OIL			86.05	6.466		16.029	1.204	FUEL OIL	0.793	0.0596	323	
Temperature, °F 658			Bed Depth, Ft 18.25			Weight, # 1639		WATER SOLUBLE CHEMICALS **		0.295	15.70	1.180		1.990	0.150	POLY TAR	0.312	0.0234	127	
Recycle Ratio 1.09			Bed Density, #/CF 136			Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =		TOTAL LIQUID PRODUCTS C_3+			101.75	7.646		18.019	1.354	TOTAL	11.863	0.8914	4833	
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY	NET WATER **		5.213	93.92	7.057		11.275	0.847	W. S CHEM.	1.990	0.1495	811	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	GROSS WATER			109.62	8.237		13.265	0.997	TOTAL	13.853	1.0409	5644	
59.57	89.03	72.47	79.08	68.65	41.52	50.48	73.56	HYDROCARBON TOTAL—C_1+			138.33	10.394								

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-S
HOURS 368-392

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE			
Oxygen	427	Fresh Feed	13829	° API	54.1	11.1	In Reactor at Start of Period		Screen Analysis			Sedimentation
Natural Gas	426	Recycle	15141	Neut. No.	50.7	38.2	Fresh Catalyst Added		Mesh	Microns	%	Microns %
Generator Outlet	406	Combined Feed	28970	Sap. No.	67.4	41.2	Total		On 40	419+		80+
Reactor Inlet	401	Wet Gas—Measured	5005	Hydrox. No.			Catalyst Recovered	16	100	150		40—80
Condenser Inlet		Adjusted	5591	Bromine No.	100		In Reactor at End of Period		150	105		20—40
Product Accumulator	375	Loss	586	Pour °F.					200	74		10—20
				Chemicals, % by K_2CO_3		15.0	REACTOR d-p, Inches H_2O		250	62		0—20
							No. Height		325	44		
TEMPERATURES—°F.		Recycle/Fresh Feed	1.09				0 See Per. A		<325			
Oxygen	496	Inlet Velocity—ft./sec.	0.93				1	64	CATALYST			
Natural Gas	793	Fresh Feed Rate—S.C.F.H.	13308	HEMPEL, DIST. %			2	73	Bulk Density, Lbs./Cu.Ft.			
Generator	2463	per Cu.Ft. Dense Bed	1104	205 °F.			3	69	Aerated			
Quench Accumulator	139	per Lb. Catalyst	8.12	400	79.9	54.0	4	245	Settled			
Reactor Inlet	300	per sq ft	20164	400-550	8.1	34.5	Total	451	Compacted			
Condenser Inlet	572			550+	12.0				Particle Density, gm./cc.			
Product Accumulator	67						CALCULATED FROM dp		NH_3 Value, ml./gm.			
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	136	N_2 Surface, m^2/gm.			
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	1639				
2	657			IBP	101		Bed Depth, Ft.	18.25	CHEMICAL ANALYSIS			
3	651			10%	121		Vol cu ft	12.05	Fe			
4	660			50%	196				C			
5	660			90%	324				O			
6	663			EP	378				H			
7	659			Rec	97				K_2O, W+, % basis Fe			
8	643								X-Ray Analysis—			
9	647								$Fe_{20}C_9$			
10	656								Fe_3O_4			
11	639								Fe			

RUN NO. 66-T
HOURS 392-416
CATALYST Brownsville Treated MS Red. @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED			
					At Wt. Balance							CONDENSATE			
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr.	gal/MCF
CO 28.010	36.713	14.280	399.97	9.840	1.525	42.72	3.952	18.232	5.477	-12.755	-357.25				
H_2 2.016	60.457	23.515	47.41	43.015	6.669	13.44	17.278	40.793	23.947	-16.846	-33.97				
CO_2 44.010	2.173	0.845	37.19	27.860	4.319	190.11	11.191	12.036	15.510	3.474	152.92	10.662			
N_2 28.016	0.547	0.213	5.97	1.420	0.220	6.16	0.570	0.785	0.790						
CH_4 16.042	0.110	0.043	0.69	7.810	1.211	19.43	3.137	3.180	4.348	1.168	18.74	1.307			
C_2H_4 28.052				2.090	0.324	9.09	0.839	0.839	1.163	0.324	9.09	0.634			
C_2H_6 30.068				1.520	0.236	7.10	0.611	0.611	0.847	0.236	7.10	0.495			
C_1+C_2											34.93	2.436			
C_3H_4 42.078				2.765	0.429	18.05	1.111	1.111	1.540	0.429	18.05	1.258	4.32	4.178	0.291
C_3H_8 44.094				0.295	0.046	2.03	0.118	0.118	0.164	0.046	2.03	0.142	4.24	0.479	0.033
C_4H_8 56.104				1.795	0.278	15.60	0.721	0.721	0.999	0.278	15.60	1.088	5.00	3.120	0.218
C_4H_{10} 58.120				0.465	0.072	4.18	0.187	0.187	0.259	0.072	4.18	0.291	4.86	0.860	0.060
C_5H_{10} 70.130				0.765	0.119	8.35	0.307	0.307	0.426	0.119	8.35	0.582	5.45	1.532	0.107
C_5H_{12} 72.146				0.145	0.022	1.59	0.058	0.058	0.080	0.022	1.59	0.111	5.25	0.303	0.021
C_6H_{12} 84.156				0.215	0.033	2.78	0.086	0.086	0.119	0.033	2.78	0.194	5.54	0.502	0.035
C_3-C_4											52.58	3.666		10.974	0.765
TOTAL		38.896	491.23		15.503	340.63	40.166	79.062	61.464						
H_2+CO	97.170	37.795	14343 SCFH		8.194		21.230	59.025	29.424	-29.601					
H_2/CO		1.65	Factor 697204		4.37		4.37	2.24	4.37	1.32					

Weight Recovery, %	95.45	Catalyst Age, hrs.		Space Velocity, vhv	1203	RECOVERED OIL **	0.295	41.40	2.886		6.484	0.452
Pressure, psig	396	Inlet Velocity, Ft/sec	0.98	Catalyst	Vol CF 11.92	TOTAL OIL		93.98	6.552		17.458	1.217
Temperature, °F	662	Bed Depth, Ft	18.06	Weight, #	1621	WATER SOLUBLE CHEMICALS **	0.288	15.30	1.067		1.942	0.135
Recycle Ratio	1.03	Bed Density, #/C.F	136	Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ = Shift Ratio		TOTAL LIQUID PRODUCTS C_3+		109.28	7.619		19.400	1.352
						NET WATER **	5.212	93.90	6.547		11.272	0.786
						GROSS WATER		109.20	7.614		13.214	0.921
						HYDROCARBON TOTAL—C_1+		144.21	10.055			

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
60.14	89.32	71.64	78.32	69.96	41.30	50.15	75.78

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr.	TREATING RECOVERY.%	gal/hr
400 EP	80.8	5.239	98.0	5.134
400-550	8.8	0.571	91.4	0.522
550 +	10.4	0.674	114.6	0.772

	RECOVERY %	#/hr	gal/hr
PROPYLENE	35.0	6.318	
C_3 POLY GASO.	87.5	5.528	0.924
C_3 POLY TAR	12.5	0.790	0.105

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.37	0.074	68.0
C_4 POLY GASO.	5.98	13.33	2.228	1.5
C_4H_{10}	4.86	4.18	0.860	68.0
C_4-FREE GASO.			8.395	5.8
C_4 POLY TAR	7.53	1.90	0.252	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	11.557	0.8058	4369
GAS OIL	0.522	0.0364	197
FUEL OIL	0.772	0.0538	292
POLY TAR	0.357	0.0249	135
TOTAL	13.208	0.9209	4993
W. S. CHEM.	1.942	0.1354	734
TOTAL	15.150	1.0563	5727

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

RUN NO. 66-T
HOURS 392-416

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	423	Fresh Feed	14761
Natural Gas	425	Recycle	15243
Generator Outlet	401	Combined Feed	30004
Reactor Inlet	396	Wet Gas—Measured	5498
Condenser Inlet		Adjusted	5884
Product Accumulator	371	Loss	386
		Chemicals, % by K_2CO_3	14.7
TEMPERATURES—°F.		Recycle/Fresh Feed	1.03
Oxygen	498	Inlet Velocity—ft./sec.	0.98
Natural Gas	795	Fresh Feed Rate—S.C.F.H.	14343
Generator	2468	per Cu. Ft. Dense Bed	1203
Quench Accumulator	141	per Lb. Catalyst	8.85
Reactor Inlet	291	per sq ft	21732
Condenser Inlet	585		
Product Accumulator	69		
Catalyst No. Height			
1 See Per. A	--		
2	660		
3	654		
4	664		
5	664		
6	668		
7	663		
8	647		
9	653		
10	664		
11	648		

PRODUCT TESTS	OIL	WATER
°API	53.0	11.1
Neut. No.	48.8	38.3
Sap. No.	66.8	41.2
Hydrox. No.		
Bromine No.	99	
Pour °F.		
HEMPEL, DIST. %		°API
205 °F.		
400	79.8	53.0
400-550	8.8	33.7
550+	11.4	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	100	
10%	123	
50%	201	
90%	335	
EP	380	
Red	96.5	

CATALYST DATA		
INVENTORY DATA		
In Reactor at Start of Period		
Fresh Catalyst Added		
Total		
Catalyst Recovered	44	
In Reactor at End of Period		
REACTOR d-p, Inches H_2O		
No. Height		
0 See Per. A		
1	64	
2	73	
3	69	
4	240	
Total	446	
CALCULATED FROM dp		
Density, Lbs./Cu.Ft.	136	
Inventory, Lbs.	1621	
Bed Depth, Ft.	18.06	
Vol cu ft	11.92	

PARTICLE SIZE					
	Screen Analysis			Sedimentation	
	Mesh	Microns	%	Microns	%
	On 40	419+		80+	
	100	150		40—80	
	150	105		20—40	
	200	74		10—20	
	250	62		0—20	
	325	44			
	<325				

CATALYST	
Bulk Density, Lbs./Cu.Ft.	
Aerated	
Settled	
Compacted	
Particle Density, gm./cc.	
NH_3 Value, ml./gm.	
N_2 Surface, m^2/gm.	
CHEMICAL ANALYSIS	
Fe	
C	
O	
H	
K_2O, W+, % basis Fe	
X-Ray Analysis—	
$Fe_{20}C_9$	
Fe_3O_4	
Fe	

RUN NO. 66-U
HOURS 416-440
CATALYST

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
CO 28.010	36.690	14.885	416.94	11.017	1.957	54.82	4.575	19.460	6.532	-12.928	-362.12									
H_2 2.016	60.413	24.509	49.41	45.680	8.113	16.35	18.971	43.480	27.084	-16.396	33.06					400 EP	80.2	4.726	98.0	4.631
CO_2 44.010	2.170	0.880	38.73	25.787	4.579	201.51	10.709	11.589	15.288	3.699	162.78	10.888				400-550	7.9	0.465	91.4	0.425
N_2 28.016	0.647	0.262	7.34	1.893	0.336	9.41	0.786	1.048	1.122							550 +	11.9	0.701	114.6	0.803
CH_4 16.042	0.080	0.033	0.53	7.320	1.300	20.85	3.040	3.073	4.340	1.267	20.32	1.359								
C_2H_4 28.052				1.840	0.327	9.17	0.764	0.764	1.091	0.327	9.17	0.613					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.390	0.247	7.43	0.577	0.577	0.824	0.247	7.43	0.497				PROPYLENE	32.2	5.38		
C_1+C_2											36.92	2.469				C_3 POLY GASO.	87.5	4.71	0.788	
C_3H_6 42.078				2.233	0.397	16.70	0.927	0.927	1.324	0.397	16.70	1.117	4.32	3.866	0.259	C_3 POLY TAR	12.5	0.67	0.089	
C_3H_8 44.094				0.260	0.046	2.03	0.108	0.108	0.154	0.046	2.03	0.136	4.24	0.479	0.032					
C_4H_8 56.104				1.317	0.234	13.13	0.547	0.547	0.781	0.234	13.13	0.878	5.00	2.626	0.176		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.370	0.066	3.84	0.154	0.154	0.220	0.066	3.84	0.257	4.86	0.790	0.053	C_4H_8	5.00	0.18	0.036	68.0
C_5H_{10} 70.130				0.573	0.102	7.15	0.238	0.238	0.340	0.102	7.15	0.478	5.45	1.312	0.088	C_4 POLY GASO.	5.98	11.33	1.895	1.5
C_5H_{12} 72.146				0.130	0.023	1.66	0.054	0.054	0.077	0.023	1.66	0.111	5.25	0.316	0.021	C_4H_{10}	4.86	3.84	0.790	68.0
C_6H_{12} 84.156				0.190	0.034	2.86	0.079	0.079	0.113	0.034	2.86	0.191	5.54	0.516	0.035	C_4-FREE GASO.			7.563	5.8
C_3-C_6											47.37	3.168		9.905	0.664	C_4 POLY TAR	7.53	1.62	0.215	
TOTAL		40.569	512.95		17.761	366.91	41.529	82.098	65.018											
H_2+CO	97.103	39.394	14950 SCFH		10.070		23.546	62.940	33.616	-29.324								gal/hr	gal/MCF	Bbl/Day
H_2/CO		1.65	Factor 668896		4.15		4.15	2.23	4.15	1.27						10 # RVP 400 EP GASOLINE	10.284	0.6879	3730	

Weight Recovery, % 93.24	Catalyst Age, hrs.	Space Velocity, vhv 1276	RECOVERED OIL **	0.270	37.83	2.530		5.892	0.394	GAS OIL	0.425	0.0284	154	
Pressure, psig 395	Inlet Velocity, Ft/sec 1.02	Catalyst Vol CF 11.72	TOTAL OIL		85.20	5.698		15.797	1.058	FUEL OIL	0.803	0.0537	291	
Temperature, °F 664	Bed Depth, Ft 17.75	Weight, # 1547	WATER SOLUBLE CHEMICALS **	0.282	14.96	1.001		1.899	0.127	POLY TAR	0.304	0.0203	110	
Recycle Ratio 1.02	Bed Density, #/CF 132	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	TOTAL LIQUID PRODUCTS C_3+		100.16	6.699		17.696	1.185	TOTAL	11.816	0.7903	4285	
			NET WATER **	5.176	93.25	6.237		11.195	0.749	W. S. CHEM.	1.899	0.1270	689	
			GROSS WATER		108.21	7.238		13.094	0.876	TOTAL	13.715	0.9173	4974	
			HYDROCARBON TOTAL—C_1+		137.08	9.168								

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
56.22	86.85	66.90	74.44	66.43	37.71	46.59	73.07

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-U
HOURS 416-440

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA			
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE	
Oxygen	423	Fresh Feed	15396	°API	52.0	11.1	In Reactor at Start of Period		Screen Analysis	Sedimentation
Natural Gas	434	Recycle	15760	Neut. No.	48.4	38.5	Fresh Catalyst Added		Mesh / Microns / %	Microns / %
Generator Outlet	400	Combined Feed	31156	Sap. No.	66.7	41.3	Total		On 40 / 419+	80+
Reactor Inlet	395	Wet Gas—Measured	6104	Hydrox. No.			Catalyst Recovered	42	100 / 150	40—80
Condenser Inlet		Adjusted	6741	Bromine No.	99		In Reactor at End of Period		150 / 105	20—40
Product Accumulator	370	Loss	637	Pour °F.					200 / 74	10—20
				Chemicals, % by K_2CO_3		14.5	REACTOR d-p, Inches H_2O		250 / 62	0—20
							No. Height		325 / 44	
TEMPERATURES—°F.		Recycle/Fresh Feed	1.02				0 See Per. A		<325	
Oxygen	494	Inlet Velocity—ft./sec.	1.02				1	63	CATALYST	
Natural Gas	800	Fresh Feed Rate—S.C.F.H.	14950	HEMPEL. DIST. %		°API	2	70	Bulk Density, Lbs./Cu.Ft.	
Generator	2473	per Cu. Ft. Dense Bed	1276	205 °F.			3	67	Aerated	
Quench Accumulator	145	per Lb. Catalyst	9.66	400	79.2	53.9	4	225	Settled	
Reactor Inlet	272	per sq ft	22652	400-550	7.9	36.6	Total	425	Compacted	
Condenser Inlet	589			550+	12.9				Particle Density, gm./cc.	
Product Accumulator	70						CALCULATED FROM dp		NH_3 Value, ml./gm.	
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	132	N_2 Surface, m^2/gm.	
1 See Per.A	--			Naphtha °F.			Inventory, Lbs.	1547		
2	661			IBP	108		Bed Depth, Ft.	17.75	CHEMICAL ANALYSIS	
3	654			10%	140		Vol cu ft	11.72	Fe	
4	664			50%	225				C	
5	666			90%	345				O	
6	670			EP	401				H	
7	666			Rec	96.5				K_2O, W+. % basis Fe	
8	649								X-Ray Analysis—	
9	656								$Fe_{20}C_9$	
10	668								Fe_3O_4	
11	652								Fe	

RUN NO. 66-V
HOURS 440-464
CATALYST Brownsville Treated MS Red. @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED							
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
CO 28.010	35.910	14.598	408.87	11.270	1.990	55.74	4.708	19.306	6.698	-12.608	-353.13								
H_2 2.016	60.763	24.700	49.80	46.127	8.145	16.42	19.271	43.971	27.416	-16.555	-33.38					400 EP	82.4	5.067	98.0	4.966
CO_2 44.010	2.253	0.916	40.31	25.437	4.490	197.57	10.627	11.543	15.117	3.574	157.26	10.544				400-550	7.0	0.430	91.4	0.393
N_2 28.016	0.957	0.389	10.90	2.020	0.357	10.00	0.844	1.233	1.201							550 +	10.6	0.652	114.6	0.747
CH_4 16.042	0.117	0.048	0.77	7.080	1.250	20.05	2.958	3.006	4.208	1.202	19.28	1.293								
C_2H_4 28.052				1.717	0.303	8.50	0.717	0.717	1.020	0.303	8.50	0.570					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.283	0.227	6.83	0.536	0.536	0.763	0.227	6.83	0.458				PROPYLENE	32.4	5.22		
C_1+C_2											34.61	2.321				C_3 POLY GASO.	87.5	4.57	0.764	
C_3H_6 42.078				2.167	0.383	16.12	0.905	0.905	1.288	0.383	16.12	1.081	4.32	3.731	0.250	C_3 POLY TAR	12.5	0.65	0.086	
C_3H_8 44.094				0.233	0.041	1.81	0.097	0.097	0.138	0.041	1.81	0.121	4.24	0.427	0.029					
C_4H_8 56.104				1.177	0.208	11.67	0.492	0.492	0.700	0.208	11.67	0.782	5.00	2.334	0.156		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.473	0.084	4.88	0.198	0.198	0.282	0.084	4.88	0.327	4.86	1.004	0.067	C_4H_8	5.00	--	--	68.0
C_5H_{10} 70.130				0.573	0.101	7.08	0.239	0.239	0.340	0.101	7.08	0.475	5.45	1.299	0.087	C_4 POLY GASO.	5.98	10.21	1.708	1.5
C_6H_{12} 72.146				0.253	0.045	3.25	0.106	0.106	0.151	0.045	3.25	0.218	5.25	0.619	0.042	C_4H_{10}	4.86	(4.88) 4.09	(1.004) 0.841	68.0
C_6H_{12} 84.156				0.190	0.034	2.86	0.079	0.079	0.113	0.034	2.86	0.192	5.54	0.516	0.035	C_4-FREE GASO.			8.164	5.8
C_3-C_6											47.67	3.196		9.930	0.666	C_4 POLY TAR	7.53	1.46	0.194	
TOTAL		40.651	510.65		17.658	362.78	41.779	82.430	65.162											
H_2+CO	96.673	39.298	14914 SCFH		10.135		23.979	63.277	34.114	-29.163								gal/hr	gal/MCF	Bbl/Day
H_2/CO		1.69	Factor 670510		4.09		4.09	2.28	4.09	1.31						10 # RVP 400 EP GASOLINE	10.713	0.7183	3894	
Weight Recovery, %	95.05	Catalyst Age, hrs.		Space Velocity, vhv	1348	RECOVERED OIL **				0.282	39.56	2.653		6.149	0.412	GAS OIL	0.393	0.0264	143	
Pressure, psig	396	Inlet Velocity, Ft/sec	1.02	Catalyst	VolCF 11.06	TOTAL OIL					87.23	5.949		16.079	1.078	FUEL OIL	0.747	0.0501	272	
Temperature, °F	662	Bed Depth, Ft	16.76	Weight, #	1460	WATER SOLUBLE CHEMICALS **				0.292	15.51	1.040		1.966	0.132	POLY TAR	0.280	0.0188	102	
Recycle Ratio	1.03	Bed Density, #/CF	132	Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ = Shift Ratio		TOTAL LIQUID PRODUCTS C_3+					102.74	6.889		18.045	1.210	TOTAL	12.133	0.8136	4411	
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY		NET WATER **	5.151	92.80	6.222		11.140	0.747	W. S. CHEM.	1.966	0.1318	715	
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+		GROSS WATER		108.31	7.262		13.106	0.879	TOTAL	14.099	0.9454	5126	
56.56	86.31	67.02	74.21	65.31	37.65	46.09	74.80		HYDROCARBON TOTAL—C_1+		137.35	9.210								

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-V
HOURS 440-464

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA			
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE	
Oxygen	424	Fresh Feed	15427	° API	51.6	11.1	In Reactor at Start of Period		Screen Analysis	Sedimentation
Natural Gas	435	Recycle	15855	Neut. No.	48.4	38.7	Fresh Catalyst Added		Mesh / Microns / %	Microns / %
Generator Outlet	400	Combined Feed	31282	Sap. No.	66.9	42.2	Total		On 40 / 419+	80+
Reactor Inlet	396	Wet Gas—Measured	6234	Hydrox. No.			Catalyst Recovered	65	100 / 150	40—80
Condenser Inlet		Adjusted	6701	Bromine No.	94		In Reactor at End of Period		150 / 105	20—40
Product Accumulator	371	Loss	467	Pour °F.	Below -30				200 / 74	10—20
				Chemicals, % by K_2CO_3		15.0	REACTOR d-p, Inches H_2O		250 / 62	0—20
							No. Height		325 / 44	
TEMPERATURES—°F.		Recycle/Fresh Feed	1.03				0 See Per. A		<325	
Oxygen	486	Inlet Velocity—ft./sec.	1.02				1	63	CATALYST	
Natural Gas	799	Fresh Feed Rate—S.C.F.H.	14914	HEMPEL. DIST. %		°API	2	70	Bulk Density, Lbs./Cu.Ft.	
Generator	2491	per Cu. Ft. Dense Bed	1348	205 °F.			3	67	Aerated	
Quench Accumulator	150	per Lb. Catalyst	10.22	400	81.4	50.8	4	200	Settled	
Reactor Inlet	259	per sq ft	22597	400-550	7.0	36.5	Total	400	Compacted	
Condenser Inlet	590			550+	11.6				Particle Density, gm. cc.	
Product Accumulator	73						CALCULATED FROM dp		NH_3 Value, ml./gm.	
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	132	N_2 Surface, m^2/gm.	
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	1460		
2	659			IBP	103		Bed Depth, Ft.	16.76	CHEMICAL ANALYSIS	
3	652			10%	138		Vol cu ft	11.06	Fe	
4	662			50%	220				C	
5	664			90%	358				O	
6	669			EP	400				H	
7	663			Rec	97.5				K_2O, W+, % basis Fe	
8	645								X-Ray Analysis—	
9	654								$Fe_{20}C_9$	
10	664								Fe_3O_4	
11	648								Fe	

RUN NO. 66-W
HOURS 464-477
CATALYST Brownsville Treated MB Red. @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	YIELD BASIS H_2+CO FED — CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	36.260	14.807	414.75	11.640	2.178	61.01	4.911	19.718	7.089	-12.629	-353.74				
H_2 2.016	60.485	24.699	49.79	46.950	8.786	17.71	19.808	44.507	28.594	-15.913	-32.08				
CO_2 44.010	2.320	0.947	41.68	24.850	4.650	204.65	10.484	11.431	15.134	3.703	162.97	10.870			
N_2 28.016	0.795	0.325	9.11	1.900	0.356	9.97	0.802	1.127	1.158						
CH_4 16.042	0.140	0.057	0.91	6.955	1.301	20.87	2.934	2.991	4.235	1.244	19.96	1.331			
C_2H_4 28.052				1.785	0.334	9.37	0.753	0.753	1.087	0.334	9.37	0.625			
C_2H_6 30.068				1.250	0.234	7.04	0.527	0.527	0.761	0.234	7.04	0.470			
C_1+C_2											36.37	2.426			
C_3H_6 42.078				2.100	0.393	16.54	0.886	0.886	1.279	0.393	16.54	1.103	4.32	3.829	0.255
C_3H_8 44.094				0.235	0.044	1.94	0.099	0.099	0.143	0.044	1.94	0.129	4.24	0.458	0.031
C_4H_8 56.104				1.205	0.225	12.62	0.508	0.508	0.733	0.225	12.62	0.842	5.00	2.524	0.168
C_4H_{10} 58.120				0.330	0.062	3.60	0.139	0.139	0.201	0.062	3.60	0.240	4.86	0.741	0.049
C_5H_{10} 70.130				0.530	0.099	6.94	0.224	0.224	0.323	0.099	6.94	0.463	5.48	1.273	0.085
C_5H_{12} 72.146				0.115	0.022	1.59	0.049	0.049	0.071	0.022	1.59	0.106	5.28	0.303	0.020
C_6H_{12} 84.156				0.155	0.029	2.44	0.065	0.065	0.094	0.029	2.44	0.163	5.64	0.440	0.029
C_3-C_4											45.67	3.046		9.568	0.637
TOTAL		40.835	516.24		18.713	376.29	42.190	83.025	66.292						
H_2+CO	96.745	39.506	14993 SCFH		10.964		24.719	64.225	35.683	-28.542					
H_2/CO		1.67	Factor 666977		4.03		4.03	2.26	4.03	1.26					

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY %	gal/hr
400 EP	81.4	4.835	98.0	4.738
400-550	8.8	0.523	91.4	0.478
550 +	9.8	0.582	114.6	0.667

	RECOVERY %	#/hr	gal/hr
PROPYLENE	31.0	5.13	
C_3 POLY GASO.	87.5	4.49	0.751
C_3 POLY TAR	12.5	0.64	0.085

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.33	0.066	68.0
C_4 POLY GASO.	5.98	10.75	1.798	1.5
C_4H_{10}	4.86	3.60	0.741	68.0
C_4-FREE GASO.			7.505	5.8
C_4 POLY TAR	7.53	1.54	0.205	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	10.110	0.6743	3656
GAS OIL	0.478	0.0319	173
FUEL OIL	0.667	0.0445	241
POLY TAR	0.290	0.0193	105
TOTAL	11.545	0.7700	4175
W. S. CHEM.	1.806	0.1205	653
TOTAL	13.351	0.8905	4828

Weight Recovery, %	92.25	Catalyst Age, hrs.		Space Velocity, vhv	1388	RECOVERED OIL **	0.274	38.41	2.562		5.940	0.396	GAS OIL	0.478	0.0319	173
Pressure, psig	399	Inlet Velocity, Ft/sec	1.02	Catalyst	Vol CF 10.80	TOTAL OIL		84.08	5.608		15.508	1.033	FUEL OIL	0.667	0.0445	241
Temperature, °F	663	Bed Depth, Ft	16.36	Weight, #	1426	WATER SOLUBLE CHEMICALS **	0.268	14.23	0.949		1.806	0.121	POLY TAR	0.290	0.0193	105
Recycle Ratio	1.03	Bed Density, #/CF	132	Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ =		TOTAL LIQUID PRODUCTS C_5+		98.31	6.557		17.314	1.154	TOTAL	11.545	0.7700	4175
						NET WATER **	4.847	87.32	5.824		10.482	0.699	W. S. CHEM.	1.806	0.1205	653
						GROSS WATER		101.55	6.773		12.288	0.820	TOTAL	13.351	0.8905	4828
						HYDROCARBON TOTAL—C_1+		134.68	8.983							

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
54.17	85.29	64.43	72.25	64.05	35.75	44.44	73.00

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-W
HOURS 464-477

OPERATING CONDITIONS — PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	426	Fresh Feed	15497
Natural Gas	438	Recycle	16011
Generator Outlet	403	Combined Feed	31508
Reactor Inlet	399	Wet Gas—Measured	6346
Condenser Inlet		Adjusted	7101
Product Accumulator	373	Loss	755
TEMPERATURES—°F.		Recycle/Fresh Feed	1.03
Oxygen	503	Inlet Velocity—ft./sec.	1.02
Natural Gas	793	Fresh Feed Rate—S.C.F.H.	14993
Generator	2481	per Cu. Ft. Dense Bed	1388
Quench Accumulator	148	per Lb. Catalyst	10.51
Reactor Inlet	254	per sq ft	22717
Condenser Inlet	593		
Product Accumulator	72		
Catalyst No. Height			
1 See Per. A	--		
2	660		
3	654		
4	664		
5	666		
6	671		
7	661		
8	643		
9	655		
10	662		
11	649		

PRODUCT TESTS	OIL	WATER
°API	50.7	11.1
Neut. No.	48.2	38.4
Sap. No.	66.4	41.7
Hydrox. No.		
Bromine No.	94	
Pour °F.		
Chemicals, % by K_2CO_3		14.7
HEMPEL DIST. %		°API
205 °F.		
400	80.4	52.7
400-550	8.8	33.3
550+	10.8	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	102	
10%	141	
50%	221	
90%	351	
EP	399	
Rec	96.0	

CATALYST DATA — INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	39
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 See Per. A	
1	63
2	70
3	67
4	190
Total	390
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	132
Inventory, Lbs.	1426
Bed Depth, Ft.	16.36
Vol cu ft	10.80

PARTICLE SIZE — Screen Analysis			Sedimentation	
Mesh	Microns	%	Microns	%
On 40	419+		80+	
100	150		40—80	
150	105		20—40	
200	74		10—20	
250	62		0—20	
325	44			
<325				

CATALYST
Bulk Density, Lbs./Cu.Ft.
Aerated
Settled
Compacted
Particle Density, gm./cc.
NH_3 Value, ml./gm.
N_2 Surface, m^2/gm.

CHEMICAL ANALYSIS
Fe
C
O
H
K_2O, W+, % basis Fe
X-Ray Analysis—
$Fe_{20}C_9$
Fe_3O_4
Fe

RUN NO. 66-X
HOURS 477-500
CATALYST Brownsville Treated MS Red. @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
					At Wt. Balance							CONDENSATE								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	36.423	14.022	392.74	13.207	2.371	66.41	5.688	19.710	8.059	-11.651	-326.33						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY,%	gal/hr
H_2 2.016	60.137	23.151	46.67	48.233	8.659	17.46	20.772	43.923	29.431	-14.492	-29.21					400 EP	81.4	5.039	98.0	4938
CO_2 44.010	2.277	0.877	38.60	23.270	4.179	183.93	10.022	10.899	14.201	3.302	145.33	10.302				400-550	7.6	0.470	91.4	0.430
N_2 28.016	0.940	0.362	10.14	1.833	0.329	9.22	0.789	1.151	1.118							550 +	11.0	0.681	114.6	0.780
CH_4 16.042	0.223	0.086	1.38	6.460	1.160	18.61	2.782	2.868	3.942	1.074	17.23	1.221								
C_2H_2 26.052				1.633	0.293	8.22	0.703	0.703	0.996	0.293	8.22	0.583					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.120	0.201	6.04	0.482	0.482	0.683	0.201	6.04	0.428				PROPYLENE	30.4	4.32		
C_1+C_2											31.49	2.232				C_3 POLY GASO.	87.5	3.78	0.632	
C_2H_4 42.078				1.883	0.338	14.22	0.811	0.811	1.149	0.338	14.22	1.008	4.32	3.292	0.233	C_3 POLY TAR	12.5	0.54	0.071	
C_3H_8 44.094				0.180	0.032	1.41	0.078	0.078	0.110	0.032	1.41	0.100	4.24	0.333	0.024					
C_4H_8 56.104				1.107	0.199	11.16	0.477	0.477	0.676	0.199	11.16	0.791	5.00	2.232	0.158		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.340	0.061	3.55	0.146	0.146	0.207	0.061	3.55	0.252	4.86	0.730	0.052	C_4H_8	5.00	0.18	0.036	68.0
C_5H_{10} 70.130				0.487	0.087	6.10	0.210	0.210	0.297	0.087	6.10	0.432	5.45	1.119	0.079	C_4 POLY GASO.	5.98	9.61	1.607	1.5
C_5H_{12} 72.146				0.097	0.017	1.23	0.042	0.042	0.059	0.017	1.23	0.087	5.25	0.234	0.017	C_4H_{10}	4.86	3.55	0.730	68.0
C_6H_{12} 84.156				0.150	0.027	2.27	0.065	0.065	0.092	0.027	2.27	0.161	5.54	0.410	0.029	C_4-FREE GASO.			7.333	5.8
C_3-C_6											39.94	2.831		8.350	0.592	C_4 POLY TAR	7.53	1.37	0.182	
TOTAL		38.498	489.53		17.953	349.83	43.067	81.565	66.327											
H_2+CO	96.560	37.173	14107	SCFH	11.030		26.460	63.633	37.490	-26.143							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.65	Factor 708867		3.65		3.65	2.23	3.65	1.24						10 # RVP 400 EP GASOLINE	9.706	0.6880	3730	
									RECOVERED OIL **	0.283	39.74	2.817		6.190	0.439	GAS OIL	0.430	0.0305	165	
									TOTAL OIL		79.68	5.648		14.540	1.031	FUEL OIL	0.780	0.0553	300	
									WATER SOLUBLE CHEMICALS **	0.270	14.32	1.015		1.814	0.129	POLY TAR	0.253	0.0179	97	
									TOTAL LIQUID PRODUCTS C_5+		94.00	6.663		16.354	1.160	TOTAL	11.169	0.7917	4292	
									NET WATER **	4.754	85.64	6.071		10.281	0.729	W. S. CHEM.	1.814	0.1286	697	
									GROSS WATER		99.96	7.086		12.095	0.858	TOTAL	12.983	0.9203	4989	
									HYDROCARBON TOTAL—C_1+		125.49	8.896								

Weight Recovery, % 93.07	Catalyst Age, hrs.	Space Velocity, vhv 1488
Pressure, psig 402	Inlet Velocity, Ft/sec 0.99	Catalyst Vol CF 9.48
Temperature, °F 660	Bed Depth, Ft 14.36	Weight, # 1299
Recycle Ratio 1.12	Bed Density, #/CF 137	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ =

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
53.37	83.09	62.60	70.33	59.11	32.99	41.08	74.91

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2+CO, Bbl/Day = 5421.6 × gal/MCF

RUN NO. 66-X
HOURS 477-500

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE			
Oxygen	424	Fresh Feed	14610	°API	52.0	11.1	In Reactor at Start of Period		Screen Analysis			Sedimentation
Natural Gas	416	Recycle	16344	Neut. No.	48.6	40.5	Fresh Catalyst Added		Mesh	Microns	%	Microns %
Generator Outlet	405	Combined Feed	30954	Sap. No.	66.4	42.7	Total		On 40	419+		80+
Reactor Inlet	402	Wet Gas—Measured	6153	Hydrox. No.			Catalyst Recovered	57	100	150		40—80
Condenser Inlet		Adjusted	6813	Bromine No.	96.5		In Reactor at End of Period		150	105		20—40
Product Accumulator	377	Loss	660	Pour °F.					200	74		10—20
				Chemicals, % by K_2CO_3		15.0	REACTOR d-p, Inches H_2O		250	62		0—20
							No. Height		325	44		
TEMPERATURES—°F.		Recycle/Fresh Feed	1.12				0 See Per. A		<325			
Oxygen	486	Inlet Velocity—ft./sec.	0.99				1	68	CATALYST			
Natural Gas	806	Fresh Feed Rate—S.C.F.H.	14107	HEMPEL, DIST. %		°API	2	70	Bulk Density, Lbs./Cu.Ft.			
Generator	2459	per Cu. Ft. Dense Bed	1488	205 °F.			3	69	Aerated			
Quench Accumulator	141	per Lb. Catalyst	10.86	400	80.4	53.6	4	145	Settled			
Reactor Inlet	307	per sq ft	21378	400-550	7.6	37.1	Total	352	Compacted			
Condenser Inlet	568			550+	12.0				Particle Density, gm./cc.			
Product Accumulator	67						CALCULATED FROM dp		NH_3 Value, ml./gm.			
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	137	N_2 Surface, m^2/gm.			
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	1299				
2	663			IBP	108		Bed Depth, Ft.	14.36	CHEMICAL ANALYSIS			
3	655			10%	131		Vol cu ft	9.48	Fe			
4	664			50%	218				C			
5	664			90%	344				O			
6	668			EP	400				H			
7	647			Rec	97.4				K_2O, W+, % basis Fe			
8	633								X-Ray Analysis—			
9	645								$Fe_{20}C_9$			
10	643								Fe_3O_4			
11	623								Fe			

RUN NO. 66-Y
HOURS 500-523
CATALYST Brownsville Treated MS Red. @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
CO 28.010	36.074	14.108	395.17	12.743	1.943	54.42	10.350	24.458	12.293	-12.165	-340.75
H_2 2.016	60.467	23.648	47.67	44.733	6.821	13.75	36.332	59.980	43.153	-16.827	-33.92
CO_2 44.010	2.153	0.842	37.06	24.047	3.667	161.34	19.531	20.373	23.198	2.825	124.28
N_2 28.016	0.893	0.349	9.78	1.987	0.303	8.49	1.614	1.963	1.917		
CH_4 16.042	0.413	0.162	2.60	7;720	1.177	18.88	6.270	6.432	7.447	1.015	16.28
C_2H_4 28.052				2.057	0.314	8.81	1.671	1.671	1.985	0.314	8.81
C_2H_6 30.068				1.190	0.181	5.44	0.967	0.967	1.148	0.181	5.44
C_1+C_2											30.53
C_3H_6 42.078				2.367	0.361	15.19	1.923	1.923	2.284	0.361	15.19
C_3H_8 44.094				0.250	0.038	1.68	0.203	0.203	0.241	0.038	1.68
C_4H_8 56.104				1.483	0.226	12.68	1.205	1.205	1.431	0.226	12.68
C_4H_{10} 58.120				0.423	0.065	3.78	0.344	0.344	0.409	0.065	3.78
C_5H_{10} 70.130				0.653	0.100	7.01	0.530	0.530	0.630	0.100	7.01
C_5H_{12} 72.146				0.140	0.021	1.52	0.114	0.114	0.135	0.021	1.52
C_6H_{12} 84.156				0.207	0.032	2.69	0.168	0.168	0.200	0.032	2.69
C_5-C_6											44.55
TOTAL		39.109	492.28		15.249	315.68	81.222	120.331	103.115		
H_2+CO	96.541	37.756	14329 SCFH		8.764		46.682	84.438	55.446	-28.992	
H_2/CO		1.68	Factor 697885		3.51		3.51	2.45	3.51	1.38	

Weight Recovery, % 93.15	Catalyst Age, hrs.	Space Velocity, vhv 2174	RECOVERED OIL **	0.382	53.57	3.739
Pressure, psig 403	Inlet Velocity, Ft/sec 1.46	Catalyst Vol CF 6.59	TOTAL OIL		98.12	6.848
Temperature, °F 664	Bed Depth, Ft 9.99	Weight, # 751	WATER SOLUBLE CHEMICALS **	0.291	15.46	1.079
Recycle Ratio 2.08	Bed Density, #/CF 114	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2)(CO)$ =	TOTAL LIQUID PRODUCTS C_3+		113.58	7.927
			NET WATER **	5.971	107.57	7.507
			GROSS WATER		12303	8.586
			HYDROCARBON TOTAL—C_1+		144.11	10.058

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3 + /C_1 +
61.09	86.23	71.16	76.79	49.74	28.05	34.34	78.81

YIELD BASIS H_2+CO FED — CONDENSATE				
	#/MCF	#/gal	gal/hr	gal/MCF
	8.673			
	1.136			
	0.615			
	0.380			
	2.131			
	1.060	4.32	3.516	0.245
	0.117	4.24	0.396	0.028
	0.885	5.00	2.536	0.177
	0.264	4.86	0.778	0.054
	0.489	5.45	1.286	0.090
	0.106	5.25	0.290	0.020
	0.188	5.54	0.486	0.034
	3.109		9.288	0.648
	7.507		12.913	0.901
	8.586		14.842	1.036
	10.058			

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*

	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	77.8	6.444	98.0	6.315
400-550	12.5	1.035	91.4	0.946
550 +	9.7	0.803	114.6	0.920

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	36.2	5.50		
C_3 POLY GASO.	87.5	4.81	0.804	
C_3 POLY TAR	12.5	0.69	0.092	

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.72	0.144	68.0
C_4 POLY GASO.	5.98	10.47	1.750	1.5
C_4H_{10}	4.86	3.78	0.778	68.0
C_4-FREE GASO.			9.181	5.8
C_4 POLY TAR	7.53	1.49	0.198	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	11.853	0.8272	4485
GAS OIL	0.946	0.0660	358
FUEL OIL	0.920	0.0642	348
POLY TAR	0.290	0.0202	110
TOTAL	14.009	0.9776	5301
W. S. CHEM.	1.929	0.1346	730
TOTAL	15.938	1.1122	6031

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91×#/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6× gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-Y
HOURS 500-523

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	427	Fresh Feed	14842
Natural Gas	419	Recycle	30824
Generator Outlet	407	Combined Feed	45666
Reactor Inlet	403	Wet Gas—Measured	5169
Condenser Inlet		Adjusted	5787
Product Accumulator	375	Loss	618
TEMPERATURES—°F.		Recycle/Fresh Feed	2.08
Oxygen	513	Inlet Velocity—ft./sec.	1.46
Natural Gas	804	Fresh Feed Rate—S.C.F.H.	14329
Generator	2446	per Cu. Ft. Dense Bed	2174
Quench Accumulator	141	per Lb. Catalyst	19.08
Reactor Inlet	339	per sq ft	21711
Condenser Inlet	579		
Product Accumulator	73		
Catalyst No. Height			
1 See Per. A	--		
2	662		
3	654		
4	665		
5	669		
6	671		
7	648		
8	634		
9	635		
10	632		
11	618		

PRODUCT TESTS	OIL	WATER
°API	50.6	10.7
Neut. No.	51.5	42.8
Sap. No.	66.4	45.0
Hydrox. No.		
Bromine No.	96.5	
Pour °F.		
Chemicals, % by K_2CO_3		13.0
HEMPEL, DIST. %		°API
205 °F.		
400	76.8	53.7
400-550	12.5	37.1
550+	10.7	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	108	
10%	132	
50%	224	
90%	362	
EP	404	
Rec.	96.5	

CATALYST DATA		
INVENTORY DATA		
In Reactor at Start of Period		
Fresh Catalyst Added		
Total		
Catalyst Recovered	379½	
In Reactor at End of Period		
REACTOR d-p, Inches H_2O		
No. Height		
0 See Per. A		
1	52	
2	62	
3 (est.)	58	
4 (est.)	25	
Total	197	
CALCULATED FROM dp		
Density, Lbs./Cu.Ft.	114	
Inventory, Lbs.	751	
Bed Depth, Ft.	9.99	
Vol cu ft	6.59	

PARTICLE SIZE — Screen Analysis			Sedimentation	
Mesh	Microns	%	Microns	%
On 40	419+		80+	
100	150		40—80	
150	105		20—40	
200	74		10—20	
250	62		0—20	
325	44			
<325				

CATALYST	
Bulk Density, Lbs./Cu.Ft.	
Aerated	
Settled	
Compacted	
Particle Density, gm./cc.	
NH_3 Value, ml./gm.	
N_2 Surface, m^2/gm.	
CHEMICAL ANALYSIS	
Fe	
C	
O	
H	
K_2O, W+, % basis Fe	
X-Ray Analysis—	
$Fe_{20}C_9$	
Fe_3O_4	
Fe	

RUN NO. 66-Z
HOURS 523-547
CATALYST Brownsville Treated MS Red. @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS	At Wt. Balance		RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		CONDENSATE				YIELD BASIS H_2+CO FED
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*
CO 28.010	36.686	14.311	400.82	13.927	2.164	60.61	11.266	25.577	13.430	-12.147	-340.21					
H_2 2.016	59.650	23.268	46.91	43.940	6.828	13.77	35.545	58.813	42.373	-16.440	33.14					400 EP
CO_2 44.010	2.237	0.873	38.42	24.344	3.784	166.55	19.693	20.566	23.477	2.911	128.13	8.984				400-550
N_2 28.016	0.830	0.324	9.08	1.987	0.309	8.66	1.607	1.931	1.916							550 +
CH_4 16.042	0.597	0.233	3.74	7.170	1.114	17.87	5.800	6.033	6.914	0.881	14.13	0.991				
C_2H_6 28.052				1.853	0.288	8.08	1.499	1.499	1.787	0.288	8.08	0.567				
C_3H_8 30.068				1.073	0.167	5.02	0.868	0.868	1.035	0.167	5.02	0.352				PROPYLENE
C_1+C_2											27.23	1.910				C_3 POLY GASO.
C_3H_6 42.076				2.400	0.373	15.70	1.941	1.941	2.314	0.373	15.70	1.101	4.32	3.634	0.255	C_3 POLY TAR
C_3H_8 44.094				0.207	0.032	1.41	0.167	0.167	0.199	0.032	1.41	0.099	4.24	0.333	0.023	
C_4H_8 56.104				1.613	0.251	14.08	1.305	1.305	1.556	0.251	14.08	0.987	5.00	2.816	0.197	
C_4H_{10} 58.120				0.480	0.075	4.36	0.388	0.388	0.463	0.075	4.36	0.306	4.86	0.897	0.063	C_4H_8
C_5H_{10} 70.130				0.640	0.099	6.94	0.518	0.518	0.617	0.099	6.94	0.487	5.45	1.273	0.089	C_4 POLY GASO.
C_5H_{12} 72.146				0.183	0.028	2.02	0.148	0.148	0.176	0.028	2.02	0.142	5.25	0.385	0.027	C_4H_{10}
C_6H_{12} 84.156				0.183	0.028	2.36	0.148	0.148	0.176	0.028	2.36	0.165	5.84	0.426	0.030	C_4-FREE GASO.
C_5-C_6											46.87	3.287		9.764	0.684	C_4 POLY TAR
TOTAL		39.009	498.97		15.540	327.43	80.893	119.902	102.916							
H_2+CO	96.336	37.579	14262 SCFH		8.992		46.811	84.390	55.803	-28.587						
H_2/CO		1.63	Factor 701163		3.16		3.16	2.30	3.16	1.35						10 # RVP 400 EP GASOLINE
									RECOVERED OIL **	0.369	51.80	3.632		8.134	0.570	GAS OIL
									TOTAL OIL		98.67	6.919		17.898	1.254	FUEL OIL
									WATER SOLUBLE CHEMICALS **	0.273	14.50	1.017		1.805	0.127	POLY TAR
									TOTAL LIQUID PRODUCTS C_3+		113.17	7.936		19.703	1.381	TOTAL
									NET WATER **	5.841	105.24	7.379		12.634	0.886	W. S. CHEM.
									GROSS WATER		119.74	8.396		14.439	1.013	TOTAL
									HYDROCARBON TOTAL—C_1+		140.40	9.844				

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

RUN NO. 66-AA
HOURS 547-571
CATALYST Brownsville Treated MS Red. @ 660F

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO 28.010	36.200	14.522	406.76	13.720	2.370	66.38	11.307	25.829	13.677	-12.152	-340.38				
H_2 2.016	60.590	24.306	49.00	46.896	8.099	16.33	38.650	62.956	46.749	-16.207	-32.67				
CO_2 44.010	2.214	0.888	39.08	23.970	4.142	182.30	19.755	20.643	23.897	3.254	143.22	9.720			
N_2 28.016	0.683	0.274	7.68	1.560	0.269	7.54	1.286	1.560	1.829						
CH_4 16.042	0.313	0.126	2.02	6.227	1.075	17.25	5.132	5.258	6.333	0.949	15.23	1.034			
C_2H_4 28.052				1.810	0.313	8.78	1.492	1.492	1.805	0.313	8.78	0.596			
C_2H_6 30.068				1.033	0.178	5.35	0.851	0.851	1.029	0.178	5.35	0.363			
C_1+C_2											29.36	1.993			
C_3H_6 42.078				1.993	0.344	14.47	1.643	1.643	1.987	0.344	14.47	0.982	4.32	3.350	0.227
C_3H_8 44.094				0.227	0.039	1.72	0.187	0.187	0.226	0.039	1.72	0.117	4.24	0.406	0.028
C_4H_8 56.104				1.330	0.230	12.90	1.096	1.096	1.326	0.230	12.90	0.875	5.00	2.580	0.175
C_4H_{10} 58.120				0.337	0.058	3.37	0.278	0.278	0.336	0.058	3.37	0.229	4.86	0.693	0.047
C_5H_{10} 70.130				0.597	0.103	7.22	0.492	0.492	0.595	0.103	7.22	0.490	5.48	1.325	0.090
C_5H_{12} 72.146				0.130	0.022	1.59	0.107	0.107	0.129	0.022	1.59	0.108	5.28	0.303	0.021
C_6H_{12} 84.156				0.170	0.029	2.44	0.140	0.140	0.169	0.029	2.44	0.166	5.54	0.440	0.030
C_3-C_6											43.71	2.967		9.097	0.618
TOTAL		40.116	504.54		17.271	347.64	82.416	122.532	145.689						
H_2+CO	96.790	38.828	14735 SCFH		10.469	49	49.957	88.785	60.426	-28.359					
H_2/CO		1.67	Factor 678656		3.42		3.42	2.44	3.42	1.33					

YIELD BASIS H_2+CO FED — YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY %	gal/hr
400 EP	74.7	5.413	98.0	5.305
400-550	12.6	0.913	91.4	0.834
550 +	12.7	0.920	114.6	1.054

	RECOVERY %	#/hr	gal/hr
PROPYLENE	32.7	4.73	
C_3 POLY GASO.	87.5	4.14	0.692
C_3 POLY TAR	12.5	0.59	0.078

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.76	0.152	68.0
C_4 POLY GASO.	5.98	10.62	1.776	1.5
C_4H_{10}	4.86	3.37	0.693	68.0
C_4-FREE GASO.			8.065	5.8
C_4 POLY TAR	7.53	1.52	0.202	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	10.686	0.7252	3932
GAS OIL	0.834	0.0566	307
FUEL OIL	1.054	0.0715	388
POLY TAR	0.280	0.0190	103
TOTAL	12.854	0.8723	4730
W. S. CHEM.	1.855	0.1259	683
TOTAL	14.709	0.9982	5413

Weight Recovery, %	91.87	Catalyst Age, hrs.		Space Velocity, vhv	2775	RECOVERED OIL **	0.336	47.09	3.196	7.246	0.492
Pressure, psig	403	Inlet Velocity, Ft/sec	1.49	Catalyst	Vol CF 5.31	TOTAL OIL		90.80	6.163	16.343	1.110
Temperature, °F	663	Bed Depth, Ft	8.04	Weight, #	584	WATER SOLUBLE CHEMICALS **	0.281	14.89	1.011	1.855	0.126
Recycle Ratio	2.05	Bed Density, #/CF	110	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =		TOTAL LIQUID PRODUCTS C_5+		105.69	7.174	18.198	1.236
						NET WATER **	5.269	94.92	6.442	11.395	0.773
						GROSS WATER		109.81	7.453	13.250	0.899
						HYDROCARBON TOTAL—C_1+		135.05	9.165		

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3 + /C_1 +
56.95	83.68	66.68	73.04	47.05	25.74	31.94	78.26

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-AA
HOURS 547-571

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	425	Fresh Feed	15224
Natural Gas	418	Recycle	31277
Generator Outlet	407	Combined Feed	46501
Reactor Inlet	403	Wet Gas—Measured	5781
Condenser Inlet		Adjusted	6555
Product Accumulator	374	Loss	774
TEMPERATURES—°F.		Recycle/Fresh Feed	2.05
Oxygen	514	Inlet Velocity—ft./sec.	1.49
Natural Gas	794	Fresh Feed Rate—S.C.F.H.	14735
Generator	2443	per Cu. Ft. Dense Bed	2775
Quench Accumulator	142	per Lb. Catalyst	25.23
Reactor Inlet	311	per sq ft	22326
Condenser Inlet	603		
Product Accumulator	75		
Catalyst No. Height			
1 See Per. A	--		
2	663		
3	655		
4	665		
5	671		
6	660		
7	643		
8	635		
9	650		
10	648		
11	658		

PRODUCT TESTS	OIL	WATER
° API	49.8	10.7
Neut. No.	53.2	46.7
Sap. No.	66.6	49.2
Hydrox. No.		
Bromine No.	95	
Pour °F.		
Chemicals, % by K_2CO_3		14.0
HEMPEL. DIST. %		°API
205 °F.		
400	73.7	54.2
400-550	12.6	36.4
550+	13.7	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	108	
10%	139	
50%	228	
90%	354	
EP	401	
Rec	97.4	

CATALYST DATA							
INVENTORY DATA		PARTICLE SIZE					
In Reactor at Start of Period		Screen Analysis			Sedimentation		
Fresh Catalyst Added		Mesh	Microns	%	Microns	%	
Total		On 40	419+		80+		
Catalyst Recovered	81	100	150		40—80		
In Reactor at End of Period		150	105		20—40		
		200	74		10—20		
REACTOR d-p, Inches H_2O		250	62		0—20		
No. Height		325	44				
0 See Per. A		<325					
1	52	CATALYST					
2	58	Bulk Density, Lbs./Cu.Ft.					
3	39	Aerated					
4	145	Settled					
Total	149	Compacted					
		Particle Density, gm./cc.					
CALCULATED FROM dp		NH_3 Value, ml./gm.					
Density, Lbs./Cu.Ft.	110	N_2 Surface, m^2/gm.					
Inventory, Lbs.	584						
Bed Depth, Ft.	8.04	CHEMICAL ANALYSIS					
Volcu fu	5.31	Fe					
		C					
		O					
		H					
		K_2O, W+, % basis Fe					
		X-Ray Analysis—					
		$Fe_{20}C_9$					
		Fe_3O_4					
		Fe					

RUN NO. 66-BB
HOURS 571-595
CATALYST Brownsville Treated MS Red. @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO 28.010	36.280	14.444	404.56	16.607	3.044	85.26	13.984	28.428	17.028	-11.400	-319.30				
H_2 2.016	60.596	24.125	48.64	48.210	8.837	17.82	40.595	64.720	49.432	-15.288	30.82				
CO_2 44.010	2.167	0.863	37.98	21.343	3.912	172.16	17.972	18.835	21.884	3.049	134.18	9.167			
N_2 28.016	0.657	0.262	7.34	1.623	0.297	8.32	1.367	1.629	1.664						
CH_4 16.042	0.300	0.119	1.91	5.423	0.994	15.95	4.566	4.685	5.560	0.875	14.04	0.959			
C_2H_6 28.052				1.587	0.291	8.16	1.336	1.336	1.627	0.291	8.16	0.557			
C_3H_8 30.068				0.877	0.161	4.84	0.738	0.738	0.899	0.161	4.84	0.331			
C_1+C_2											27.04	1.847			
C_3H_6 42.078				1.667	0.306	12.88	1.404	1.404	1.710	0.306	12.88	0.880	4.32	2.981	0.204
C_3H_8 44.094				0.153	0.028	1.23	0.129	0.129	0.157	0.028	1.23	0.084	4.34	0.290	0.020
C_4H_8 56.104				1.170	0.214	12.01	0.985	0.985	1.199	0.214	12.01	0.821	5.00	2.402	0.164
C_4H_{10} 58.120				0.440	0.081	4.71	0.370	0.370	0.451	0.081	4.71	0.322	4.86	0.969	0.066
C_5H_{10} 70.130				0.563	0.103	7.22	0.474	0.474	0.577	0.103	7.22	0.493	5.45	1.325	0.091
C_5H_{12} 72.146				0.130	0.024	1.73	0.109	0.109	0.133	0.024	1.73	0.118	5.25	0.330	0.023
C_6H_{12} 84.156				0.207	0.038	3.20	0.174	0.174	0.212	0.038	3.20	0.219	5.54	0.578	0.039
C_3-C_6											42.98	2.937		8.875	0.607
TOTAL		39.813	500.43		18.330	355.49	84.203	124.016	107.936						
H_2+CO	96.876	38.569	14637 SCFH	11.881	54.579		34.579	86.148	66.460	-26.688					
H_2/CO		1.67	Factor 683200	2.90			2.90	2.28	2.90	1.34					
Weight Recovery, % 92.02	Catalyst Age, hrs.		Space Velocity, vhv 3049	RECOVERED OIL **	0.310	43.51	2.973		6.670	0.456
Pressure, psig 405	Inlet Velocity, Ft/sec 1.49	Catalyst Vol CF 4.80	TOTAL OIL		86.49	5.910		15.545	1.063
Temperature, °F 658	Bed Depth, Ft 7.27	Weight, # 514	WATER SOLUBLE CHEMICALS **	0.276	14.65	1.001		1.838	0.126
Recycle Ratio 2.11	Bed Density, #/CF 107	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	TOTAL LIQUID PRODUCTS C_5+		101.14	6.911		17.383	1.189
FRESH FEED CONVERSION — %			TOTAL FEED CONVERSION — %			SELECTIVITY	NET WATER **	4.815	86.78	5.929		10.418	0.712
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+	GROSS WATER		101.43	6.930		12.256	0.838
53.96	78.93	63.37	69.20	40.10	23.62	28.65	78.90	HYDROCARBON TOTAL—C_1+		128.18	8.758			

YIELD BASIS H_2+CO FED — YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	76.2	5.083	98.0	4.981
400-550	12.9	0.860	91.4	0.786
550 +	10.9	0.727	114.6	0.833
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	30.8	3.97		
C_3 POLY GASO.	87.5	3.47	0.580	
C_3 POLY TAR	12.5	0.50	0.066	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	--	--	68.0
C_4 POLY GASO.	5.98	10.51	1.757	1.5
C_4H_{10}	4.86	(4.71) 3.99	(0.969) 0.822	68.0
C_4-FREE GASO.			7.794	5.8
C_4 POLY TAR	7.53	1.50	0.199	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	10.373	0.7087	3843	
GAS OIL	0.786	0.0537	291	
FUEL OIL	0.833	0.0569	308	
POLY TAR	0.265	0.0181	98	
TOTAL	12.257	0.8374	4540	
W. S. CHEM.	1.838	0.1256	681	
TOTAL	14.095	0.9630	5221	

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-BB
HOURS 571-595

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	427	Fresh Feed	15109
Natural Gas	421	Recycle	31955
Generator Outlet	409	Combined Feed	47064
Reactor Inlet	405	Wet Gas—Measured	6175
Condenser Inlet		Adjusted	6956
Product Accumulator	375	Loss	781
TEMPERATURES—°F.		Recycle/Fresh Feed	2.11
Oxygen	497	Inlet Velocity—ft./sec.	1.49
Natural Gas	788	Fresh Feed Rate—S.C.F.H.	14637
Generator	2441	per Cu. Ft. Dense Bed	3049
Quench Accumulator	142	per Lb. Catalyst	28.48
Reactor Inlet	313	per sq ft	22177
Condenser Inlet	611		
Product Accumulator	75		
Catalyst No. Height			
1 See Per. A	--		
2	659		
3	652		
4	662		
5	666		
6	652		
7	645		
8	646		
9	653		
10	648		
11	658		

PRODUCT TESTS		
	OIL	WATER
° API	49.1	10.9
Neut. No.	55.4	49.8
Sap. No.	66.6	51.3
Hydrox. No.		
Bromine No.	98	
Pour °F.	Below -20	
Chemicals, % by K_2CO_3		15.0
HEMPEL, DIST. %		°API
205 °F.		
400	75.2	53.7
400-550	12.9	37.6
550+	11.9	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	106	
10%	156	
50%	228	
90%	360	
EP	407	
Rec.	96.0	

CATALYST DATA								
INVENTORY DATA		PARTICLE SIZE						
		Screen Analysis			Sedimentation	
In Reactor at Start of Period		Mesh	Microns	%	Microns	%
Fresh Catalyst Added		On 40	419+		80+	
Total		100	150		40—80	
Catalyst Recovered	75	150	105		20—40	
In Reactor at End of Period		200	74		10—20	
		250	62		0—20	
REACTOR d-p, Inches H_2O		325	44			
No. Height		<325				
0 See Per. A						
1	51	CATALYST				
2 See Per. A	56	Bulk Density, Lbs./Cu.Ft.				
3	22	Aerated				
4	121	Settled				
Total	129	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	107	N_2 Surface, m^2/gm.				
Inventory, Lbs.	514					
Bed Depth, Ft.	7.27	CHEMICAL ANALYSIS				
Vol cu ft	4.80	Fe				
		C				
		O				
		H				
		K_2O, W+, % basis Fe				
		X-Ray Analysis—				
		$Fe_{2.2}C_9$				
		Fe_3O_4				
		Fe				

RUN NO. 66-CC
HOURS 595-619
CATALYST Brownsville
Treated MS Red. @ 660F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY,%	gal/hr
CO 28.010	36.360	14.461	405.08	17.007	3.371	94.42	14.497	28.958	17.868	-11.090	-310.66									
H_2 2.016	60.313	23.989	48.36	49.576	9.826	19.81	42.261	66.250	52.087	-14.163	-28.55					400 EP	77.4	4.557	98.0	4.466
CO_2 44.010	2.377	0.945	41.59	20.417	4.047	178.07	17.404	18.349	21.451	3.102	136.48	9.353				400-550	9.9	0.583	91.4	0.533
N_2 28.016	0.627	0.247	6.98	1.553	0.308	8.63	1.324	1.573	1.632							550 +	12.7	0.748	114.6	0.859
CH_4 16.042	0.323	0.129	2.07	5.240	1.039	16.67	4.467	4.596	5.506	0.910	14.60	1.001								
C_2H_4 28.052				1.523	0.302	8.47	1.298	1.898	1.600	0.302	8.47	0.580					RECOVERY %	#/hr	gal/hr	
C_3H_6 30.068				0.773	0.153	4.60	0.659	0.659	0.812	0.153	4.60	0.315				PROPYLENE	28.8	3.93		
C_1+C_2											27.67	1.896				C_3 POLY GASO.	87.5	3.44	0.575	
C_3H_6 42.078				1.637	0.324	13.63	1.395	1.395	1.719	0.324	13.63	0.934	4.32	3.155	0.216	C_3 POLY TAR	12.5	0.49	0.065	
C_3H_8 44.094				0.180	0.036	1.59	0.153	0.153	0.189	0.036	1.59	0.109	4.24	0.375	0.026					
C_4H_8 56.104				1.033	0.205	11.50	0.881	0.881	1.086	0.205	11.50	0.788	5.00	2.300	0.158		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.327	0.065	3.78	0.279	0.279	0.344	0.065	3.78	0.259	4.86	0.778	0.053	C_4H_8	5.00	0.10	0.020	68.0
C_5H_{10} 70.130				0.477	0.095	6.66	0.407	0.407	0.502	0.095	6.66	0.456	5.45	1.222	0.084	C_4 POLY GASO.	5.98	11.84	1.980	1.5
C_5H_{12} 72.146				0.100	0.020	1.44	0.085	0.085	0.105	0.020	1.44	0.099	5.25	0.274	0.019	C_4H_{10}	4.86	3.78	0.778	68.0
C_6H_{12} 84.156				0.157	0.031	2.61	0.134	0.134	0.165	0.031	2.61	0.179	5.54	0.471	0.032	C_4 FREE GASO.			7.008	5.8
C_3-C_6											41.21	2.824		8.575	0.588	C_4 POLY TAR	7.53	1.69	0.224	
TOTAL		39.773	504.08		19.822	371.88	85.244	125.017	110.049											
H_2+CO	96.673	38.450	14592 SCFH		13.197		56.758	95.208	69.955	-25.253							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.66	Factor 685307		2.92		2.92	2.29	2.92	1.28						10 # RVP 400 EP GASOLINE	9.786	0.6706	3636	
									RECOVERED OIL **	0.274	38.41	2.632		5.888	0.404	GAS OIL	0.533	0.0365	198	
									TOTAL OIL		79.62	5.456		14.463	0.992	FUEL OIL	0.859	0.0589	319	
									WATER SOLUBLE CHEMICALS **	0.255	13.55	0.929		1.700	0.117	POLY TAR	0.289	0.0198	107	
									TOTAL LIQUID PRODUCTS C_3+		93.17	6.385		16.163	1.109	TOTAL	11.467	0.7858	4260	
									NET WATER **	4.454	80.24	5.499		9.633	0.660	W. S. CHEM.	1.700	0.1165	632	
									GROSS WATER		93.79	6.428		11.333	0.777	TOTAL	13.167	0.9023	4892	
									HYDROCARBON TOTAL—C_1+		120.84	8.281							

Weight Recovery, % 92.50 | Catalyst Age, hrs. | Space Velocity, vhv 3450
Pressure, psig 405 | Inlet Velocity, Ft/sec 1.51 | Catalyst Vol CF 4.23
Temperature, °F 664 | Bed Depth, Ft 6.41 | Weight, # 423
Recycle Ratio 2.14 | Bed Density, #/CF 100 | Effluent $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ = Shift Ratio

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3 + /C_1 +
50.16	76.69	59.03	65.68	38.30	21.38	26.52	77.10

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91×#/MCF *9488 MCFH H_2 + CO, Bbl/Day = 5421.6×gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 66-CC
HOURS 595-619

OPERATING CONDITIONS				PRODUCT TESTS			CATALYST DATA					
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER	INVENTORY DATA		PARTICLE SIZE			
Oxygen	428	Fresh Feed	15094						Screen Analysis			Sedimentation
Natural Gas	422	Recycle	32350	° API	49.1	10.9	In Reactor at Start of Period		Mesh	Microns	%	Microns %
Generator Outlet	410	Combined Feed	47444	Neut. No.	59.4	53.8	Fresh Catalyst Added					
Reactor Inlet	405	Wet Gas—Measured	6758	Sap. No.	66.4	54.7	Total		On 40	419+		80+
Condenser Inlet		Adjusted	7522	Hydrox. No.			Catalyst Recovered	89	100	150		40—80
Product Accumulator	374	Loss	764	Bromine No.	91.5		In Reactor at End of Period		150	105		20—40
				Pour °F.					200	74		10—20
				Chemicals, % by K_2CO_3		15.0	REACTOR d-p, Inches H_2O		250	62		0—20
							No. Height		325	44		
TEMPERATURES—°F.		Recycle/Fresh Feed	2.14				0 See Per. A		<325			
Oxygen	483	Inlet Velocity—ft./sec.	1.51				1	50	CATALYST			
Natural Gas	779	Fresh Feed Rate—S.C.F.H.	14592	HEMPEL. DIST. %		°API	2	50	Bulk Density, Lbs./Cu.Ft.			
Generator	2437	per Cu. Ft. Dense Bed	3450	205 °F.			3	4	Aerated			
Quench Accumulator	141	per Lb. Catalyst	34.50	400	76.4	52.6	4	100	Settled			
Reactor Inlet	318	per sq ft	22109	400-550	9.9	36.8	Total	104	Compacted			
Condenser Inlet	595			550+	13.7				Particle Density, gm./cc.			
Product Accumulator	75						CALCULATED FROM dp		NH_3 Value, ml./gm.			
Catalyst No. Height				A. S. T. M. DIST. ON			Density, Lbs./Cu.Ft.	100	N_2 Surface, m^2/gm.			
1 See Per. A	--			Naphtha °F.			Inventory, Lbs.	423				
2	665			IBP	112		Bed Depth, Ft.	6.41	CHEMICAL ANALYSIS			
3	658			10%	140		Vol cu ft	4.23	Fe			
4	668			50%	240				C			
5	671			90%	376				O			
6	654			EP	408				H			
7	643			Rec	97.5				K_2O, W+, % basis Fe			
8	640								X-Ray Analysis—			
9	644								$Fe_{20}C_9$			
10	641								Fe_3O_4			
11	629								Fe			

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-A
HOURS 0-9

HOUR	GAS ANALYSES 0200	0600		AVERAGE
FRESH FEED				
CO 28.010	35.99	36.25		36.120
H_2 2.016	60.95	60.76		60.855
CO_2 44.010	2.42	2.40		2.410
N_2 28.016	0.56	0.51		0.535
CH_4 16.042	0.08	0.08		0.080
			M. W	12.567409
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	7.24	7.65		7.445
H_2 2.016	41.23	40.48		40.855
CO_2 44.010	31.24	31.51		31.375
N_2 28.016	1.94	1.74		1.840
CH_4 16.042	8.83	8.71		8.770
C_2H_6 28.052	2.29	2.23		2.260
C_2H_4 33.068	1.18	1.18		1.180
C_3H_6 42.078	2.78	2.86		2.820
C_3H_8 44.094	0.28	0.30		0.290
C_4H_8 56.104	1.51	1.58		1.545
C_4H_{10} 58.120	0.60	0.59		0.595
C_5H_{10} 70.130	0.56	0.71		0.635
C_6H_{12} /2.146	0.15	0.21		0.180
C_6H_{12} 84.156	0.17	0.25		0.210
			M. W.	22.907283

GENERATOR BALANCE M/HR	C	H	O
14.989	14.989		14.989
25.255		50.510	
1.000	1.000		2.000
0.222			
0.033	0.033	0.132	
		9.252	4.626
	16.022	59.894	21.615
	97.17	100.66	99.10

	Mol %	M/Hr	C	H	O
O_2 32.000	0.26	10.711 0.035			21.492
CO_2 44.010	1.18	0.160			0.320
N_2 28.016	0.71	0.096			
CH_4 16.042	84.92	11.509	11.509	46.036	
C_2H_6 30.068	5.39	0.730	1.460	4.380	
C_2H_4 44.094	5.00	0.678	2.034	5.424	
C_4H_{10} 58.120	1.73	0.234	0.936	2.340	
C_5H_{12} 72.146	0.81	0.110	0.550	1.320	
MW	19.83952				
TOTAL			16.489	59.500	21.812

WEIGHT BALANCE	#/hr Measured	At Wt. Balance
WET GAS	264.21	301.00
OIL	78.97	78.97
WATER	141.56	141.56
TOTAL	484.74	521.53
FRESH FEED	521.53	
WEIGHT BALANCE	92.95	
WET GAS FACTOR	1139245	
INDICATED LOSS—S C F H	609	
	4986	

GAS FLOW RATES

	√h	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED 79.31	6.310	402.1 20.416	44.3 1.0156	2303577 1.5178	15749	41.499
WET GAS 158.44	5.967	1.43 4.016	34.4 1.0255	1263790 1.1242	4377	11.534
RECYCLE 79.31	7.867	403.9 20.460	51 1.0088	1.1242	14477	38.148
BLEED 5.02	7.680	20.460	1.0000	1.1242	887	2.337
NATURAL GAS 28.43	7.700	453.8 21.645	184 0.8986	1459208 1.2080	5143	13.552
OXYGEN 27.07	6.978	430.5 21.100	40 1.0198		4065	10.711
STEAM 215.7	6.450	25.6				

LIQUID PRODUCT RATES Basis 9 hours

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
OIL	3'3"	174.73	30	1.0149	177.33	54.4		
	1'3"	65.01	40	1.0099	65.65	6.337		
					+0.47		+3.00	78.97
					112.15		710.69	12.461
WATER	3'10½"	207.46	40	1.00130	207.73	10.5		
	1'0½"	54.14	40	1.00130	54.21	8.299		141.56
					153.52		1274.06	17.058

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-B
HOURS 9-22

HOUR	GAS ANALYSES 2200	0200		AVERAGE
FRESH FEED				
CO 28.010	36.33	33.84		35.085
H_2 2.016	60.95	63.01		61.980
CO_2 44.010	2.03	2.09		2.060
N_2 28.016	0.61	0.83		0.720
CH_4 16.042	0.08	0.23		0.155
			M. W	12.210012
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	8.85	8.45		8.650
H_2 2.016	43.13	43.02		43.075
CO_2 44.010	28.07	29.18		28.625
N_2 28.016	2.03	1.54		1.785
CH_4 16.042	8.61	9.00		8.805
C_2H_6 28.052	2.13	2.17		2.150
C_2H_4 33.068	1.22	1.24		1.230
C_3H_6 42.078	2.56	2.67		2.615
C_3H_8 44.094	0.28	0.30		0.290
C_4H_8 56.104	1.59	1.43		1.510
C_4H_{10} 58.120	0.56	0.31		0.435
C_5H_{10} 70.130	0.61	0.49		0.550
C_6H_{12} /2.146	0.20	0.11		0.155
C_6H_{12} 84.156	0.16	0.09		0.125
			M. W.	21.705599

GENERATOR BALANCE M/HR	C	H	O
15.689	15.689		15.689
27.716		55.432	
0.921	0.921		1.842
0.322			
0.069	0.069	0.276	
		5.931	2.966
	16.679	61.639	20.497
	104.31	107.48	90.53

	Mol %	M/Hr	C	H	O
O_2 32.000	0.29	11.094 0.038			22.264
CO_2 44.010	1.43	0.189	0.189		0.378
N_2 28.016	1.04	0.138			
CH_4 16.042	84.29	11.158	11.158	44.632	
C_2H_6 30.068	6.12	0.810	1.620	4.860	
C_2H_4 44.094	4.96	0.657	1.971	5.256	
C_4H_{10} 58.120	1.42	0.188	0.752	1.880	
C_5H_{12} 72.146	0.45	0.060	0.300	0.720	
MW	19.712496				
TOTAL			15.990	57.348	22.642

WEIGHT BALANCE	#/hr Measured	At Wt. Balance
WET GAS	288.77	318.10
OIL	78.79	78.79
WATER	149.11	149.11
TOTAL	516.67	546.00
FRESH FEED	546.00	
WEIGHT BALANCE	94.65	
WET GAS FACTOR	1101568	
INDICATED LOSS—S C F H	513	
	5562	

GAS FLOW RATES

	√h	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED 79.31	6.700	405.3 20.494	47.7 1.0120	2371005 1.5398	16970	44.717
WET GAS 158.44	6.708	1.50 4.025	37.8 1.0220	1333757 1.1549	5049	13.304
RECYCLE 79.31	7.917	406.1 20.513	54.8 1.0050	1.1549	14950	39.394
BLEED 5.02	7.792	20.513	1.0000	1.1549	927	2.443
NATURAL GAS 28.43	7.725	430.0 21.088	189 0.8951	1468611 1.2119	5024	13.238
OXYGEN 27.07	7.200	435.4 21.216	41.8 1.0180		4210	11.094
STEAM 215.7	6.225	26.1				

LIQUID PRODUCT RATES Basis 11 hours

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
OIL	6'10"	362.41	34	1.0129	367.09	53.8		78.79
	4'3½"	229.28	47	1.0064	230.75	6.357		12.395
					136.34		866.71	
WATER	7'4"	388.59	48	1.0008	388.90	10.6		
	5'7½"	298.03	51	1.0006	298.21	8.293		
	2'8-3/4"	146.17	44	1.0009	146.30			
	0'9"	39.17	38	1.0010	39.21			149.11
					197.78		1640.19	17.980

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-C
HOURS 22-46

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200.	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.33	11.036 0.045			22.158	WET GAS	299.51	324.92
CO 28.010	36.54	36.88	36.40	36.607	15.923	15.923		15.923	CO_2 44.010	1.32	0.174	0.174		0.348	OIL	73.46	73.46
H_2 2.016	60.61	60.19	60.75	60.516	26.323		52.646		N_2 28.016	1.62	0.213				WATER	149.44	149.44
CO_2 44.010	2.13	1.94	2.14	2.070	0.900	0.900		1.800	CH_4 16.042	83.21	10.948	10.948	43.792		TOTAL	522.41	547.82
N_2 28.016	0.58	0.81	0.62	0.670	0.291				C_2H_4 30.068	6.42	0.845	1.690	5.070		FRESH FEED	547.82	
CH_4 16.042	0.14	0.18	0.09	0.137	0.060	0.060	0.240		C_2H_6 44.094	5.11	0.672	2.016	5.376		WEIGHT BALANCE	95.36	
			M. W	12.59432					C_4H_{10} 58.120	1.49	0.196	0.784	1.960				
			H_2O 18.016				6.835	3.418	C_5H_{12} 72.146	0.50	0.066	0.330	0.792		WET GAS FACTOR	1084838	
						16.883	59.721	21.141	MW	19.899226					INDICATED LOSS—S C F H	425	
			BALANCE			105.90	104.79	93.93	TOTAL			15.942	56.990	22.506		5438	

WET GAS					GAS FLOW RATES									LIQUID PRODUCT RATES						
CO 28.010	8.97	9.45	9.33	9.250		√h	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	40.06	40.76	40.31	40.377	FRESH FEED		405	56	2298655			OIL	7'7"	401.69	36	1.0119	406.47	54.6		
CO_2 44.010	29.95	29.17	29.42	29.514	79.31	6.675	20.487	1.0039	1.5161	16507	43.497		6'10"	362.41	34	1.0129	367.09	6.330		
N_2 28.016	1.72	1.60	1.60	1.640	WET GAS		1.51	48	1276769				5'7½"	298103	42	1.0089	300.68			
CH_4 16.042	9.06	9.29	9.11	9.153	158.44	6.875	4.026	1.0117	1.1299	5013	13.209		1'2½"	62.73	38	1.0109	63.41			
C_2H_4 28.052	2.20	2.15	2.39	2.247	RECYCLE		406	66									+1.86		+11.75	73.46
C_2H_6 33.068	1.41	1.44	1.47	1.440	79.31	7.942	20.511	0.9943	1.1299	14515	38.248						278.51		1762.97	11.605
C_3H_6 42.078	3.09	2.85	2.98	2.973	BLEED															
C_3H_8 44.094	0.32	0.32	0.32	0.320	5.02	8.163	20.511	1.0000	1.2299	950	2.503	WATER	7'2-¾	383.14	53	1.0005	383.33	10.8		
C_4H_8 56.104	1.78	1.54	1.73	1.683	NATURAL GAS		430	188	1454830				2'8-¾	146.17	44	1.0009	146.30	8.282		
C_4H_{10} 58.120	0.52	0.52	0.37	0.470	28.43	7.708	21.088	0.8958	1.2062	4993	13.157		4'9-¾	256.56	52	1.0006	256.71			
C_5H_{10} 70.130	0.67	0.62	0.70	0.663	OXYGEN		438	54					1'2"	60.66	50	1.0007	60.70			149.44
C_5H_{12} 72.146	0.10	0.10	0.11	0.103	27.07	7.229	21.277	1.0058		4188	11.036						433.04		3586.44	18.043
C_6H_{12} 84.156	0.15	0.19	0.16	0.167	STEAM		26.5													
			M. W.	22.674418	215.7	6.292	0.2773		376 #/hr											

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-D
HOURS 46-70

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.27	11.133 0.036			22.338	WET GAS	303.66	328.73
CO 28.010	36.21	36.67	36.22	36.367	15.810	15.810		15.810	CO_2 44.010	1.36	0.180	0.180		0.360	OIL	67.78	67.78
H_2 2.016	60.78	60.53	60.71	60.673	26.376		52.752		N_2 28.016	0.47	0.062				WATER	150.02	150.02
CO_2 44.010	2.12	2.17	2.20	2.163	0.940	0.940		1.880	CH_4 16.042	84.56	11.204	11.204	44.816		TOTAL	521.46	546.53
N_2 28.016	0.71	0.57	0.78	0.687	0.299				C_2H_4 30.068	6.19	0.820	1.640	4.920		FRESH FEED	546.53	
CH_4 16.042	0.18	0.06	0.09	0.110	0.048	0.048	0.192		C_2H_6 44.094	5.20	0.689	2.067	5.512		WEIGHT BALANCE	95.41	
			M. W	12.571617			5.014	5.008	C_4H_{10} 58.120	1.46	0.193	0.772	1.930				
			H_2O 18.016				7.515	3.758	C_5H_{12} 72.146	0.49	0.065	0.325	0.780		WET GAS FACTOR	1082559	
						16.798	60.459	21.448	MW	19.73789					INDICATED LOSS—S C F H	428	
			BALANCE			103.77	104.32	94.49	TOTAL			16.188	57.958	22.698		5614	

WET GAS					GAS FLOW RATES									LIQUID PRODUCT RATES						
CO 28.010	8.70	9.34	9.17	9.070		√h	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	41.33	41.53	40.81	41.224	FRESH FEED		405.2	55	2302806			OIL	7'3½"	386.41	51	1.0044	388.11	55.0		
CO_2 44.010	27.90	28.24	28.27	28.470	79.31	6.658	20.491	1.0048	1.5175	16498	43.473		5'7½"	298.03	42	1.0089	300.68	6.316		
N_2 28.016	1.44	1.65	1.53	1.540	WET GAS		1.61	46	1302791				4'2"	222.74	35	1.0124	225.50			
CH_4 16.042	9.85	9.50	9.36	9.570	158.44	7.004	4.039	1.0137	1.1414	5186	13.665		1'1"	56.30	59	1.0005	56.33			
C_2H_4 28.052	2.37	2.27	2.27	2.303	RECYCLE		406	64									+0.95		+6.0	67.78
C_2H_6 33.068	1.57	1.53	1.54	1.547	79.31	7.938	20.511	0.9962	1.1414	14683	38.690						257.55		1626.69	10.731
C_3H_6 42.078	3.03	2.75	3.02	2.934	BLEED															
C_3H_8 44.094	0.35	0.27	0.29	0.303	5.02	8.213	20.511	1.0000	1.1414	965	2.543	WATER	7'3"	384.23	58	1.0002	384.31	10.7		
C_4H_8 56.104	1.82	1.41	1.49	1.575	NATURAL GAS		431.9	187	1466722				4'9-¾	256.56	52	1.0006	256.71	8.287		
C_4H_{10} 58.120	0.53	0.60	0.49	0.540	28.43	7.708	21.132	0.8965	1.2111	5028	13.249		5'11-¾	317.67	47	1.0008	317.92			
C_5H_{10} 70.130	0.74	0.56	0.51	0.603	OXYGEN		438.6	51					0'2½"	11.06	68	0.9992	11.05			150.02
C_5H_{12} 72.146	0.17	0.14	0.11	0.140	27.07	7.267	21.291	1.0088	4.[illegible]	4225	11.133						434.47		3600.45	18.103
C_6H_{12} 84.156	0.20	0.21	0.14	0.183	STEAM		26.3													
			M. W.	22.221516	215.7	6.471	0.2764		386 #/hr											

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-E
HOURS 70-94

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.31	10.730 0.040			21.540	WET GAS	296.38	326.86
CO 28.010	36.58	36.37	35.80	36.250	15.452	15.452		15.452	CO_2 44.010	1.52	0.194	0.194		0.388	OIL	63.51	63.51
H_2 2.016	60.55	60.75	61.20	60.833	25.929		51.858		N_2 28.016	1.78	0.227				WATER	143.84	143.84
CO_2 44.010	1.99	2.19	2.23	2.137	0.911	0.911		1.822	CH_4 16.042	83.73	10.669	10.669	42.676		TOTAL	503.73	534.21
N_2 28.016	0.82	0.65	0.71	0.727	0.310				C_2H_6 30.068	6.21	0.791	1.582	4.746		FRESH FEED	534.21	
CH_4 16.042	0.06	0.04	0.06	0.053	0.023	0.023	0.092		C_3H_8 44.094	4.77	0.608	1.824	4.864		WEIGHT BALANCE	94.29	
			M. W	12.53269				4654	C_4H_{10} 58.120	1.28	0.163	0.652	1.630				
			H_2O 18.016				5.943	2.972	C_5H_{12} 72.146	0.40	0.051	0.255	0.612		WET GAS FACTOR	1102840	
						16.386	57.893	20.246	MW	19.70183					INDICATED LOSS—S C F H	506	
			BALANCE			107.97	106.17	92.33	TOTAL			15.176	54.528	21.928		5423	

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES								
CO 28.010	9.47	9.86	9.50	9.610		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	40.00	38.97	39.93	39.633	FRESH FEED		404.1	53	2309958			OIL	7'4½"	390.78	41	1.0094	394.45	55.6		
CO_2 44.010	29.35	29.76	29.48	29.583	79.31	6.513	20.465	1.0068	1.5199	16176	42.625		4'2"	222.74	35	1.0124	225.50	6.296		
N_2 28.016	1.67	1.82	1.81	1.767	WET GAS		1.54	44	1265615				2'7⅞"	140.41	32	1.0139	142.36			
CH_4 16.042	9.21	8.96	9.18	9.117	158.44	6.738	4.030	1.0158	1.1250	4917	12.957		1'4"	69.39	42	1.0089	70.01			
C_2H_6 28.052	2.21	2.10	2.35	2.220	RECYCLE		405	62									+0.79 242.09		+5.00 1524.20	63.51
C_2H_4 33.068	1.51	1.61	1.67	1.597	79.31	7.900	20.487	0.9981	1.1250	14413	37.979									10.087
C_3H_6 42.078	3.04	3.26	3.25	3.183	BLEED															
C_3H_8 44.094	0.35	0.37	0.37	0.363	5.02	8.021	20.487	1.0000	1.1250	928	2.445	WATER	7'4"	388.59	50	1.00070	388.86	10.7		
C_4H_8 56.104	1.70	1.81	1.53	1.680	NATURAL GAS		434.5	186	1469406				5'11-3/4	317.67	47	1.00080	317.92	8.287		
C_4H_{10} 58.120	0.52	0.51	0.26	0.430	28.43	7.379	21.194	0.8972	1.2122	4836	12.743		7'5"	392.96	46	1.00090	393.31			
C_5H_{10} 70.130	0.65	0.63	0.50	0.593	OXYGEN		436.3	51					0'11"	47.65	55	1.00039	47.67			143.84
C_5H_{12} 72.146	0.13	0.13	0.06	0.107	27.07	7.021	21.237	1.0088		4072	10.730						416.58		3452.20	17.358
C_6H_{12} 84.156	0.19	0.21	0.10	0.167	STEAM		26.9													
			M. W.	22.87424	215.7	6.175														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-F
HOURS 94-115

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1000	2200		AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.33	10.559 0.041			21.200	WET GAS	295.10	330.49
CO 28.010	36.82	36.73		36.775	15.332	15.332		15.332	CO_2 44.010	1.48	0.182	0.182		0.364	OIL	58.08	58.08
H_2 2.016	60.37	60.40		60.385	25.176		50.352		N_2 28.016	2.08	0.256				WATER	138.59	138.59
CO_2 44.010	2.12	2.14		2.130	0.888	0.888		1.776	CH_4 16.042	82.46	10.133	10.133	40.532		TOTAL	491.77	527.16
N_2 28.016	0.58	0.67		0.625	0.261				C_2H_6 30.068	6.15	0.756	1.512	4.536		FRESH FEED	527.16	
CH_4 16.042	0.11	0.06		0.085	0.035	0.035	0.140		C_3H_8 44.094	5.38	0.661	1.983	5.288		WEIGHT BALANCE	93.29	
			M. W	12.64419					C_4H_{10} 58.120	1.52	0.187	0.748	1.870				
			H_2O 18.016				5.767	2.884	C_5H_{12} 72.146	0.60	0.074	0.370	0.888		WET GAS FACTOR	1119925	
						16.255	56.259	19.992	MW	20.10565					INDICATED LOSS—S C F H	582	
			BALANCE			108.89	105.92	92.71	TOTAL			14.928	53.114	21.564		5431	

WET GAS		1400	2200		GAS FLOW RATES							LIQUID PRODUCT RATES Basis 21 hours								
CO 28.010	8.97	9.45		9.210		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	38.62	40.13		39.375	FRESH FEED		404.1	57	2289589			OIL	6'3"	331.85	40	1.0099	335.14	55.7		
CO_2 44.010	30.00	29.45		29.725	79.31	6.424	20.465	1.0029	1.5131	15822	41.692		2'7⅞"	140.41	32	1.0139	142.36	6.293		
N_2 28.016	2.20	1.85		2.025	WET GAS		1.56	47	1253468								+1.03		+6.50	58.08
CH_4 16.042	8.92	9.15		9.035	158.44	6.695	4.032	1.0227	1.1196	4849	12.777						193.81		1219.65	9.229
C_2H_6 28.052	2.26	2.13		2.195	RECYCLE		405	65												
C_2H_4 33.068	1.65	1.63		1.640	79.31	7.908	20.487	0.9952	1.1196	14317	37.726									
C_3H_6 42.078	3.41	2.84		3.125	BLEED															
C_3H_8 44.094	0.38	0.31		0.345	5.02	8.014	20.487	1.0000	1.1196	923	2.432	WATER	7'0⅜"	373.32	50	1.00070	373.58	10.8		
C_4H_8 56.104	2.01	1.52		1.765	NATURAL GAS		435.2	188	1439893				0'5"	22.13	32	1.00170	22.17	8.282		138.59
C_4H_{10} 58.120	0.51	0.60		0.555	28.43	7.195	21.211	0.8958	1.2000	4664	12.290						351.41		2910.38	16.734
C_5H_{10} 70.130	0.74	0.60		0.670	OXYGEN		435.6	58												
C_5H_{12} 72.146	0.14	0.14		0.140	27.07	6.962	21.220	1.0019		4007	10.559									
C_6H_{12} 84.156	0.19	0.20		0.195	STEAM		25.5													
			M. W.	23.09591	215.7	5.904														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-G
HOURS 115-135

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	1800	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.35	10.711 0.043			21.508	WET GAS	300.39	330.22
CO 28.010	36.93	37.10	36.91	36.980	15.231	15.231		15.231	CO_2 44.010	1.41	0.173	0.173		0.346	OIL	56.61	56.61
H_2 2.016	60.60	59.96	60.15	60.237	24.811		49.622		N_2 28.016	2.07	0.254				WATER	136.46	136.46
CO_2 44.010	2.02	2.42	2.36	2.267	0.934	0.934		1.868	CH_4 16.042	82.88	10.169	10.169	40.676		TOTAL	493.46	523.29
N_2 28.016	0.32	0.46	0.52	0.433	0.178				C_2H_6 30.068	6.26	0.768	1.536	4.608		FRESH FEED	523.29	
CH_4 16.042	0.13	0.06	0.06	0.083	0.034	0.034	0.136		C_3H_8 44.094	5.07	0.622	1.866	4.976		WEIGHT BALANCE	94.30	
			M. W	12.704807					C_4H_{10} 58.120	1.47	0.180	0.720	1.800				
			H_2O 18.016				6.266	3.133	C_5H_{12} 72.146	0.49	0.060	0.300	0.720		WET GAS FACTOR	1099304	
						16.199	56.024	20.232	MW	19.933784					INDICATED LOSS—S C F H	490	
			BALANCE			109.72	106.15	92.58	TOTAL			14.764	52.780	21.854		5422	

WET GAS					GAS FLOW RATES										LIQUID PRODUCT RATES Basis 18 hours						
CO 28.010	9.56	9.65	8.40	9.203		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	39.76	39.18	39.78	39.574	FRESH FEED		401.3	57	2278665			OIL	7'4"	388.59	56	1.0020	389.37	55.6		
CO_2 44.010	29.12	30.53	30.72	30.123	79.31	6.383	20.396	1.0029	1.5095	15631	41.188		6'5½"	341.67	40	1.0099	345.05	6.296		
N_2 28.016	1.58	1.80	1.96	1.780	WET GAS		1.53	47	1252474				1'11⅛"	102.89	45	1.0074	103.65			
CH_4 16.042	8.71	8.61	8.93	8.750	158.44	6.817	4.029	1.0127	1.1191	4932	12.996		1'0¼"	53.06	67	0.9965	52.87			
C_2H_6 28.052	2.34	2.18	2.30	2.273	RECYCLE		402.2	67					3'4¼"	180.18	34	1.0129	182.50			
C_2H_6 33.068	1.66	1.58	1.64	1.627	79.31	7.889	20.418	0.9933	1.1191	14201	37.420		2'2"	114.67	41	1.0094	115.75			56.61
C_3H_6 42.078	3.21	2.85	3.23	3.097	BLEED												161.85		1019.01	8.992
C_3H_8 44.094	0.33	0.30	0.34	0.323	5.02	8.328	20.418	1.0000	1.1191	955	2.516	WATER	4'3⅜"	229.28	59	1.0009	229.30	10.7		
C_4H_8 56.104	2.01	1.62	1.56	1.730	NATURAL GAS		429.2	190	1452308				0'11"	47.65	50	1.00070	47.68	8.287		
C_4H_{10} 58.120	0.47	0.64	0.39	0.500	28.43	7.211	21.069	0.8944	1.2051	4656	12.269		6'11¼"	367.86	48	1.00081	368.16			
C_5H_{10} 70.130	0.87	0.68	0.53	0.693	OXYGEN		430.2	55					4'9"	253.29	56	1.00033	253.37			136.46
C_5H_{12} /2.146	0.14	0.14	0.11	0.130	27.07	7.085	21.093	1.0048		4065	10.711						296.41		2456.35	16.467
C_6H_{12} 84.156	0.24	0.24	0.11	0.197	STEAM		26.4													
			M. W.	23.11425	215.7															

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-H
HOURS 135-159

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.30	10.661 0.036			21.394	WET GAS	305.20	336.96
CO 28.010	37.24	37.41	37.63	37.427	15.519	15.519		15.519	CO_2 44.010	1.71	0.207	0.207		0.414	OIL	56.89	56.89
H_2 2.016	60.08	60.02	59.53	59.876	24.827		49.654		N_2 28.016	0.86	0.104				WATER	135.82	135.82
CO_2 44.010	1.90	2.06	2.33	2.097	0.870	0.870		1.740	CH_4 16.042	81.43	9.878	9.878	39.512		TOTAL	497.91	
N_2 28.016	0.71	0.45	0.45	0.537	0.223				C_2H_6 30.068	7.20	0.873	1.746	5.238		FRESH FEED	529.67	
CH_4 16.042	0.07	0.06	0.06	0.063	0.026	0.026	0.104		C_3H_8 44.094	6.11	0.741	2.223	5.928		WEIGHT BALANCE	94.00	
			M. W	12.773845					C_4H_{10} 58.120	1.76	0.213	0.852	2.130				
			H_2O 18.016				6.536	3.268	C_5H_{12} 72.146	0.63	0.077	0.385	0.924		WET GAS FACTOR	1104062	
						16.415	56.294	20.527	MW	20.48898					INDICATED LOSS—S C F H	524	
			BALANCE			107.35	104.77	94.13	TOTAL			15.291	53.732	21.808		5561	

WET GAS					GAS FLOW RATES										LIQUID PRODUCT RATES						
CO 28.010	8.87	9.46	8.67	9.000		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	40.38	40.63	40.85	40.620	FRESH FEED		404	58	2266349			OIL	7'5⅛"	395.14	44	1.0079	398.26	55.6		
CO_2 44.010	30.62	29.86	30.48	30.320	79.31	6.429	20.462	1.0019	1.5054	15736	41.465		3'4¼"	180.18	34	1.0129	182.50	6.296		
N_2 28.016	1.66	1.65	1.66	1.657	WET GAS		1.50	48	1259033								1.11		17.00	56.89
CH_4 16.042	7.87	7.63	7.81	7.770	158.44	6.958	4.025	1.0117	1.1221	5037	13.273						216.87		1365.41	9.036
C_2H_6 28.052	2.44	2.23	2.36	2.343	RECYCLE		405	69												
C_2H_6 33.068	1.66	1.65	1.68	1.663	79.31	7.908	20.487	0.9915	1.1221	14295	37.668									
C_3H_6 42.078	2.74	2.95	3.24	2.977	BLEED															
C_3H_8 44.094	0.33	0.30	0.34	0.323	5.02	7.975	20.487	1.0000	1.1221	920	2.424	WATER	7'3⅜"	386.41	48	1.00081	386.72	10.7		
C_4H_8 56.104	1.75	1.80	1.68	1.743	NATURAL GAS		431.0	189	1412954				6'11¼"	367.86	48	1.00081	368.16	8.287		
C_4H_{10} 58.120	0.61	0.72	0.42	0.583	28.43	7.208	21.112	0.8951	1.1887	4603	12.129		7'2⅛"	382.05	53	1.00052	382.25			
C_5H_{10} 70.130	0.65	0.71	0.58	0.647	OXYGEN		434.0	56					1'1"	56.30	38	1.00136	56.38			
C_5H_{12} /2.146	0.24	0.19	0.10	0.177	27.07	7.029	21.183	1.0039	--	4046	10.661		2'0"	105.19	52	1.00059	105.25			
C_6H_{12} 84.156	0.18	0.22	0.13	0.177	STEAM		24.5						1'1"	56.30	49	1.00076	56.34			135.82
			M. W.	22.993823	215.7	5.863											393.34		3289.61	16.389

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-I
HOURS 159-183

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		# /hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.28	10.648 0.035			21.366	WET GAS	313.65	348.32
CO 28.010	37.58	37.93	37.68	37.730	15.706	15.706		15.706	CO_2 44.010	1.35	0.168	0.168		0.336	OIL	54.03	54.03
H_2 2.016	59.75	59.05	59.65	59.484	24.762		49.524		N_2 28.016	1.67	0.208				WATER	133.96	133.96
CO_2 44.010	2.01	2.30	2.17	2.160	0.899	0.899		1.798	CH_4 16.042	83.39	10.373	10.373	41.492		TOTAL	501.64	536.31
N_2 28.016	0.57	0.60	0.46	0.543	0.226				C_2H_4 30.068	6.11	0.760	1.520	4.560		FRESH FEED	536.31	
CH_4 16.042	0.09	0.12	0.04	0.083	0.035	0.035	0.140		C_2H_6 44.094	5.12	0.637	1.911	5.096		WEIGHT BALANCE	93.54	
			M. W	12.88343					C_4H_{10} 58.120	1.55	0.193	0.772	1.930				
			H_2O 18.016				6.301	3.151	C_5H_{12} 72.146	0.53	0.066	0.330	0.792		WET GAS FACTOR	1110537	
						16.640	55.965	20.655	MW	19.907027					INDICATED LOSS—S C F H	585	
			BALANCE			110.39	103.89	95.18	TOTAL			15.074	53.870	21.702		5875	

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES								
CO 28.010	8.02	8.28	8.66	8.320		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° # GAL	#	# HR GAL HR
H_2 2.016	40.39	41.60	41.49	41.326	FRESH FEED		403.5	55	2247072			OIL	5'3-3/4	282.75	44	1.0079	284.98	55.4		
CO_2 44.010	29.57	29.11	29.59	29.423	79.31	6.467	20.450	1.0048	1.4990	15798	41.628		1'6¼"	79.27	46	1.0069	79.82	6.303		
N_2 28.016	2.05	1.88	1.64	1.857			1.61	50	1286571								+0.56		+3.50	54.03
CH_4 16.042	8.52	9.01	8.50	8.677	WET GAS 158.44	7.217	4.039	1.0098	1.1343	5290	13.939						205.72		1296.65	8.572
C_2H_4 28.052	2.08	2.19	2.14	2.137			404.5	72												
C_2H_6 30.068	1.67	1.66	1.66	1.663	RECYCLE 79.31	7.892	20.474	0.9887	1.1343	14372	37.871									
C_3H_6 42.078	3.33	3.04	3.02	3.130	BLEED															
C_3H_8 44.094	0.35	0.36	0.34	0.350	5.02	8.071	20.474	1.0000	1.1343	941	2.480	WATER	7'2"	379.86	53	1.00052	380.06	10.8		
C_4H_8 56.104	1.93	1.62	1.66	1.737			430.5	176	1454260				2'0"	105.19	52	1.00059	105.25	8.282		
C_4H_{10} 58.120	0.62	0.43	0.40	0.483	NATURAL GAS 28.43	7.217	21.100	0.9048	1.2059	4721	12.440		2'11½"	158.84	54	1.00047	158.91			
C_5H_{10} 70.130	0.68	0.59	0.65	0.640			434.8	54					0'10½"	45.50	49	1.00076	45.53			133.96
C_5H_{12} 72.146	0.16	0.10	0.10	0.120	OXYGEN 27.07	7.000	21.201	1.0058		4041	10.648						388.19		3214.99	16.175
C_6H_{12} 84.156	0.13	0.13	0.15	0.137			24.3													
			M. W.	22.501667	STEAM 215.7	6.196														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-J
HOURS 183-207

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200		AVERAGE	M HR	C	H	O		Mol %	M/Hr	C	H	O		# hr Measured	At Wt Balance
FRESH FEED									O_2 32.000	0.41	10.659 0.051			21.420	WET GAS	308.69	349.17
CO 28.010	36.88	36.95		36.915	15.212	15.212		15.212	CO_2 44.010	1.32	0.163	0.163		0.326	OIL	50.45	50.45
H_2 2.016	60.14	59.85		59.995	24.721		49.442		N_2 28.016	0.97	0.120				WATER	126.78	126.78
CO_2 44.010	2.16	2.44		2.300	0.948	0.948		1.896	CH_4 16.042	83.87	10.332	10.332	41.328		TOTAL	485.92	526.40
N_2 28.016	0.72	0.72		0.720	0.297				C_2H_4 30.068	6.36	0.784	1.568	4.704		FRESH FEED	526.40	
CH_4 16.042	0.10	0.04		0.070	0.029	0.029	0.116		C_2H_6 44.094	5.52	0.680	2.040	5.440		WEIGHT BALANCE	92.31	
			M. W	12.77457					C_4H_{10} 58.120	1.14	0.140	0.560	1.400				
			H_2O 18.016				6.601	3.301	C_5H_{12} 72.146	0.41	0.051	0.255	0.612		WET GAS FACTOR	1131134	
						16.189	56.159	20.409	MW	19.742993					INDICATED LOSS—S C F H	688	
			BALANCE						TOTAL			14.918	53.484	21.746		5934	

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES								
CO 28.010	8.87	9.76	9.55	9.393		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° # GAL	#	# HR GAL HR
H_2 2.016	41.60	41.33	41.05	41.326	FRESH FEED		403.9	55	2266221			OIL	7'3-3/4	387.50	50	1.0049	389.40	55.0		
CO_2 44.010	28.97	28.39	29.36	28.907	79.31	6.371	20.460	1.0048	1.5054	15638	41.207		5'3-3/4	282.75	44	1.0079	284.98	6.316		
N_2 28.016	1.75	2.05	2.12	1.973			1.61	48	1296372				2'8½"	143.87	47	1.0064	144.79			
CH_4 16.042	8.97	8.03	8.34	8.447	WET GAS 158.44	7.117	4.039	1.0117	1.1386	5246	13.823		1'1¾"	57.39	47	1.0064	57.76			
C_2H_4 28.052	2.25	2.18	2.10	2.177			404	66									+0.24		+1.50	50.45
C_2H_6 30.068	1.64	1.60	1.60	1.613	RECYCLE 79.31	7.879	20.463	0.9943	1.1386	14476	38.145						191.69		1210.71	7.987
C_3H_6 42.078	2.96	3.24	2.94	3.047	BLEED															
C_3H_8 44.094	0.34	0.38	0.30	0.340	5.02	8.108	20.463	1.0000	1.1386	948	2.498	WATER	7'1¼"	376.59	57	1.00025	376.68	11.0		
C_4H_8 56.104	1.51	1.71	1.43	1.550			430.2	190	1466343				2'11⅛"	158.84	54	1.00047	158.91	8.270		
C_4H_{10} 58.120	0.36	0.34	0.46	0.387	NATURAL GAS 28.43	7.200	21.093	0.8944	1.2109	4676	12.321		3'9⅜"	203.10	49	1.00076	203.25			
C_5H_{10} 70.130	0.55	0.54	0.43	0.507			434.8	53					1'0¼"	53.06	48	1.00081	53.10			126.78
C_5H_{12} 72.146	0.10	0.28	0.13	0.170	OXYGEN 27.07	7.000	21.201	1.0068		4045	10.659						367.92		3042.70	15.330
C_6H_{12} 84.156	0.13	0.17	0.19	0.163			23.8													
			M. W.	22.33155	STEAM 215.7	6.079														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-K
HOURS 207-231

HOUR	GAS ANALYSES 1400	2200	0600	AVERAGE
FRESH FEED				
$CO_{28.010}$	37.31	36.79	37.32	37.140
$H_{2\ 2.016}$	59.43	60.07	59.67	59.723
$CO_{2\ 44.010}$	2.38	2.42	2.25	2.350
$N_{2\ 28.016}$	0.79	0.64	0.70	0.710
$CH_{4\ 16.042}$	0.09	0.08	0.06	0.077
			M. W	12.85243
			H_2O 18.016	
			BALANCE	
WET GAS				
$CO_{28.010}$	9.07	9.08	9.17	9.107
$H_{2\ 2.016}$	40.87	41.71	42.80	41.793
$CO_{2\ 44.010}$	29.43	28.96	27.57	28.653
$N_{2\ 28.016}$	2.45	1.63	1.62	1.900
$CH_{4\ 16.042}$	8.61	8.48	8.57	8.553
$C_2H_{4\ 28.052}$	2.48	2.09	2.38	2.317
$C_2H_{6\ 30.068}$	1.62	1.69	1.79	1.700
$C_3H_{6\ 42.078}$	2.21	2.84	2.89	2.647
$C_3H_{8\ 44.094}$	0.25	0.16	0.31	0.240
$C_4H_{8\ 56.104}$	1.53	1.63	1.56	1.573
$C_4H_{10\ 58.120}$	0.48	0.79	0.40	0.557
$C_5H_{10\ 70.130}$	0.65	0.56	0.62	0.610
$C_5H_{12\ 72.146}$	0.16	0.19	0.13	0.160
$C_6H_{12\ 84.156}$	0.19	0.19	0.19	0.190
			M. W.	22.198098

	M/HR	C	H	O
	15.277	15.277		15.277
	24.565		49.130	
	0.967	0.967		1.934
	0.292			
	0.032	0.032	0.128	
			6.589	3.295
		16.276	55.847	20.506
		108.86	104.20	94.79

	Mol %	M/Hr	C	H	O
$O_{2\ 32.000}$	0.28	10.614 0.035			21.298
$CO_{2\ 44.010}$	1.35	0.167	0.167		0.334
$N_{2\ 28.016}$	1.14	0.141			
$CH_{4\ 16.042}$	84.33	10.419	10.419	41.676	
$C_2H_{6\ 30.068}$	5.99	0.740	1.480	4.440	
$C_2H_{8\ 44.094}$	4.88	0.603	1.809	4.824	
$C_4H_{10\ 58.120}$	1.45	0.179	0.716	1.790	
$C_5H_{12\ 72.146}$	0.58	0.072	0.360	0.864	
MW	19.74538				
TOTAL			14.951	53.594	21.632

GAS FLOW RATES		PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED	79.31	6.396	403.3 20.445	57 1.0029	2252492 1.5008	15610	41.133
WET GAS	158.44	7.246	1.55 4.031	50 1.0098	1304165 1.1420	5337	14.063
RECYCLE	79.31	7.904	403.2 20.443	70 0.9905	1.1420	14496	38.198
BLEED	5.02	8.058	20.443	1.0000	1.1420	944	2.487
NATURAL GAS	28.43	7.192	430.8 21.107	186 0.8972	1466165 1.2109	4689	12.356
OXYGEN	27.07	6.992	434.7 21.199	56 1.0039		4028	10.614
STEAM	215.7	6.036	23.7				

WEIGHT BALANCE	#/hr Measured	At Wt. Balance
WET GAS	312.17	352.36
OIL	49.73	49.73
WATER	126.57	126.57
TOTAL	488.47	528.66
FRESH FEED	528.66	
WEIGHT BALANCE	92.40	
WET GAS FACTOR	1128743	
INDICATED LOSS—S C F H	687	
	6024	

LIQUID PRODUCT RATES	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
	OIL	6'2½"	329.67	45	1.0074	332.11	54.8		
		2'8¼"	143.87	47	1.0064	144.79	6.323		
						81.42		49.00	49.73
						188.74		1193.40	7.864
	WATER	7'3½"	386.41	54	1.00047	386.59	11.0		
		3'9½"	203.10	49	1.00076	203.25	8.270		
		4'8½"	250.02	53	1.00052	250.15			
		1'3¼"	66.11	44	1.00103	66.18			126.57
						367.31		3037.65	15.305

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-L
HOURS 231-238

HOUR	GAS ANALYSES 1000	1400		AVERAGE
FRESH FEED				
$CO_{28.010}$	37.08	37.44		37.260
$H_{2\ 2.016}$	59.73	58.69		59.210
$CO_{2\ 44.010}$	2.48	3.15		2.815
$N_{2\ 28.016}$	0.64	0.63		0.635
$CH_{4\ 16.042}$	0.07	0.09		0.080
			M. W	13.059816
			H_2O 18.016	
			BALANCE	
WET GAS	1000	1400		
$CO_{28.010}$	9.45	9.16		9.305
$H_{2\ 2.016}$	41.41	42.22		41.915
$CO_{2\ 44.010}$	29.16	28.43		28.795
$N_{2\ 28.016}$	1.72	1.56		1.640
$CH_{4\ 16.042}$	8.31	8.54		8.425
$C_2H_{4\ 28.052}$	2.21	2.31		2.260
$C_2H_{6\ 30.068}$	1.78	1.81		1.795
$C_3H_{6\ 42.078}$	2.59	2.70		2.645
$C_3H_{8\ 44.094}$	0.28	0.32		0.300
$C_4H_{8\ 56.104}$	1.56	1.53		1.545
$C_4H_{10\ 58.120}$	0.52	0.47		0.495
$C_5H_{10\ 70.130}$	0.66	0.63		0.645
$C_5H_{12\ 72.146}$	0.16	0.13		0.145
$C_6H_{12\ 84.156}$	0.19	0.19		0.190
			M. W.	22.22329

	M/HR	C	H	O
	15.242	15.242		15.242
	24.219		48.438	
	1.152	1.152		2.304
	0.260			
	0.033	0.033	0.132	
			7.065	3.533
		16.427	55.635	21.079
		108.51	102.52	96.86

	Mol %	M/Hr	C	H	O
$O_{2\ 32.000}$	0.28	10.677 0.035			21.424
$CO_{2\ 44.010}$	1.35	0.169	0.169		0.338
$N_{2\ 28.016}$	1.14	0.143			
$CH_{4\ 16.042}$	84.33	10.550	10.550	42.200	
$C_2H_{6\ 30.068}$	5.99	0.749	1.498	4.494	
$C_2H_{8\ 44.094}$	4.88	0.611	1.833	4.888	
$C_4H_{10\ 58.120}$	1.45	0.181	0.724	1.810	
$C_5H_{12\ 72.146}$	0.58	0.073	0.365	0.876	
MW	19.74538				
TOTAL			15.139	54.268	21.762

GAS FLOW RATES		PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED	79.35	6.386	400.9 20.386	50 1.0098	2216723 1.4889	15524	40.906
WET GAS	158.44	7.357	1.50 4.025	49 1.0108	1302687 1.1414	5413	14.264
RECYCLE	79.31	7.914	402.6 20.428	65 0.9952	1.1414	14565	38.379
BLEED	5.02	8.114	20.428	1.0000	1.1414	950	2.503
NATURAL GAS	28.43	7.200	431.3 21.119	172 0.9071	1466165 1.2109	4748	12.511
OXYGEN	27.07	7.000	434.6 21.197	51 1.0088	--	4052	10.677
STEAM	215.7	5.900	23.6				

WEIGHT BALANCE	# hr Measured	At Wt. Balance
WET GAS	316.99	359.33
OIL	49.84	49.84
WATER	125.05	125.05
TOTAL	491.88	534.22
FRESH FEED	534.22	
WEIGHT BALANCE	92.07	
WET GAS FACTOR	1133568	
INDICATED LOSS—S C F H	723	
	6136	

LIQUID PRODUCT RATES Basis 7 hours	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
	OIL	7'3"	384.23	45	1.0074	387.07	54.6		
		6'2"	329.67	45	1.0074	332.11	6.330		
						40.16		41.00	49.94
						55.12		348.91	7.874
	WATER	6'8½"	355.86	52	1.00059	356.07	11.1		
		4'8½"	250.02	53	1.00052	250.15	8.264		125.05
						105.92		875.32	15.131

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-M
HOURS 238-248

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	0200	0600		AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.30	9.773 0.037			19.620	WET GAS	280.73	304.12
CO 28.010	36.09	35.96		36.025	13.788	13.788		13.788	CO_2 44.010	1.56	0.190	0.190		0.380	OIL	50.54	50.54
H_2 2.016	61.03	61.34		61.185	25.419		46.838		N_2 28.016	1.20	0.146				WATER	121.31	121.31
CO_2 44.010	2.27	2.00		2.135	0.817	0.817		1.634	CH_4 16.042	84.44	10.302	10.302	41.208		TOTAL	452.58	475.97
N_2 28.016	0.55	0.57		0.560	0.214				C_2H_4 30.068	5.86	0.715	1.430	4.290		FRESH FEED	475.97	
CH_4 16.042	0.06	0.13		0.095	0.036	0.036	0.144		C_2H_6 44.094	4.80	0.586	1.758	4.688		WEIGHT BALANCE	95.09	
			M. W	12.435835					C_4H_{10} 58.120	1.34	0.163	0.652	1.630				
			H_2O 18.016				7.361	3.681	C_5H_{12} 72.146	0.50	0.061	0.305	0.732		WET GAS FACTOR	1083318	
						14.641	54.343	19.103	MW	19.682648					INDICATED LOSS—S C F H	401	
			BALANCE			100.03	103.42	95.52	TOTAL			14.637	52.548	20.000		5212	

WET GAS	0200	0600			GAS FLOW RATES							LIQUID PRODUCT RATES — Basis 9 hours							
						$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
CO 28.010	9.27	8.90		9.085																
H_2 2.016	41.73	41.84		41.785	FRESH FEED		403.0	56	2327949			OIL	3'1"	165.75	46	1.0069	166.89	54.0		
CO_2 44.010	28.75	28.26		28.505	79.31	5.850	20.438	1.0039	1.5258	14525	38.274		1'10"	96.02	53	1.0035	96.36	6.350		
N_2 28.016	1.34	1.33		1.335			1.50	51	1307309								+1.10		+7.00	50.54
CH_4 16.042	8.88	9.10		8.990	WET GAS 158.44	6.540	4.025	1.0088	1.1434	4811	12.677						71.63		454.85	7.959
C_2H_4 28.052	2.27	2.38		2.325			402.2	66												
C_2H_6 33.068	1.71	1.75		1.730	RECYCLE 79.31	7.930	20.418	0.9943	1.1434	14599	38.469									
C_3H_6 42.078	2.88	2.93		2.905																
C_3H_8 44.094	0.37	0.35		0.360	BLEED 5.02	8.030	20.418	1.0000	1.1434	941	2.480	WATER	4'3"	227.10	54	1.00047	227.21	11.1		
C_4H_8 56.104	1.51	1.68		1.595			420.0	188	1470838				1'10"	96.02	53	1.00052	96.07	8.264		
C_4H_{10} 58.120	0.43	0.42		0.425	NATURAL GAS 28.43	7.190	20.849	0.8958	1.2128	4630	12.200						+0.97		+8.00	121.31
C_5H_{10} 70.130	0.56	0.69		0.625			424.9	56									132.11		1091.76	14.679
C_5H_{12} 72.146	0.16	0.16		0.160	OXYGEN 27.07	6.510	20.967	1.0039	--	3709	9.773									
C_6H_{12} 84.156	0.14	0.21		0.175			22.9													
			M. W.	22.14471	STEAM 215.7	5.680														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-N
HOURS 248-272

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.30	9.802 0.038			19.680	WET GAS	290.12	319.24
CO 28.010	36.46	37.15	36.85	36.820	14.459	14.459		14.459	CO_2 44.010	1.44	0.182	0.182		0.364	OIL	49.96	49.96
H_2 2.016	61.00	60.21	60.28	60.497	23.757		47.514		N_2 28.016	0.82	0.104				WATER	126.56	126.56
CO_2 44.010	1.99	2.17	2.48	2.213	0.869	0.869		1.738	CH_4 16.042	84.72	10.711	10.711	42.844		TOTAL	466.64	495.76
N_2 28.016	0.41	0.31	0.34	0.353	0.139				C_2H_4 30.068	5.97	0.755	1.510	4.530		FRESH FEED	495.76	
CH_4 16.042	0.14	0.16	0.05	0.117	0.046	0.046	0.184		C_2H_6 44.094	4.88	0.617	1.851	4.936		WEIGHT BALANCE	94.13	
			M. W	12.624508				3847	C_4H_{10} 58.120	1.34	0.169	0.676	1.690				
			H_2O 18.016				7.400	3.700	C_5H_{12} 72.146	0.53	0.067	0.335	0.804		WET GAS FACTOR	1100372	
						15.374	55.098	19.897	MW	19.658286					INDICATED LOSS—S C F H	491	
			BALANCE			100.71	100.54	99.27	TOTAL			15.265	54.804	20.044		5382	

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES							
						$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
CO 28.010	8.78	8.20	8.57	8.517																
H_2 2.016	41.07	41.10	40.11	40.760	FRESH FEED		403.5	54	2293158			OIL	6'7-3/4	352.59	46	1.0069	355.02	55.1		
CO_2 44.010	28.61	29.23	30.16	29.333	79.31	6.033	20.450	1.0058	1.5143	14903	39.270		3'1"	165.75	46	1.0069	166.89	6.313		
N_2 28.016	1.53	1.30	1.11	1.313			1.52	49	1286054								+1.82		+11.50	49.96
CH_4 16.042	9.45	9.64	9.13	9.406	WET GAS 158.44	6.688	4.027	1.0108	1.1340	4891	12.88						189.95		1199.15	7.915
C_2H_4 28.052	2.34	2.39	2.46	2.397			404.3	73												
C_2H_6 33.068	1.88	1.95	1.96	1.930	RECYCLE 79.31	7.900	20.469	0.9877	1.1340	14364	37.850									
C_3H_6 42.078	2.97	2.93	3.09	2.997																
C_3H_8 44.094	0.37	0.40	0.41	0.393	BLEED 5.02	8.008	20.469	1.0000	1.1340	933	2.458	WATER	7'2½"	382.05	54	1.00047	382.23	11.0		
C_4H_8 56.104	1.57	1.53	1.66	1.587			425.4	154	1472661				4'3"	227.10	54	1.00047	227.21	8.270		
C_4H_{10} 58.120	0.49	0.41	0.36	0.420	NATURAL GAS 28.43	7.204	20.979	0.9203	1.2135	4798	12.643		5'6½"	294.75	54	1.00047	294.89			
C_5H_{10} 70.130	0.63	0.61	0.67	0.637			427.8	56					1'7"	82.59	52	1.00059	82.64			126.56
C_5H_{12} 72.146	0.10	0.10	0.10	0.100	OXYGEN 27.07	6.508	21.036	1.0039	--	3720	9.802						367.27		3037.32	15.303
C_6H_{12} 84.156	0.21	0.21	0.21	0.210			24.1													
			M. W.	22.510709	STEAM 215.7	6.317														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-0
HOURS 272-296

	GAS ANALYSES			
HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	37.35	36.27	36.32	36.647
H_2 2.016	59.90	60.68	60.52	60.367
CO_2 44.010	2.02	2.11	2.21	2.113
N_2 28.016	0.57	0.81	0.87	0.750
CH_4 16.042	0.16	0.13	0.08	0.123
			M. W	12.641606
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	7.98	8.11	8.21	8.100
H_2 2.016	41.06	41.99	40.43	41.160
CO_2 44.010	28.99	28.24	28.93	28.720
N_2 28.016	1.62	1.89	2.38	1.963
CH_4 16.042	9.55	9.19	9.37	9.370
C_2H_4 28.052	2.36	2.26	2.41	2.343
C_2H_6 30.068	2.05	1.94	2.02	2.003
C_3H_6 42.078	2.85	2.75	2.89	2.830
C_3H_8 44.094	0.31	0.29	0.32	0.307
C_4H_8 56.104	1.67	1.69	1.55	1.637
C_4H_{10} 58.120	0.54	0.57	0.57	0.560
C_5H_{10} 70.130	0.69	0.69	0.59	0.657
C_5H_{12} 72.146	0.16	0.19	0.16	0.170
C_6H_{12} 84.156	0.17	0.20	0.17	0.180
			M. W.	22.355835

	GENERATOR BALANCE												
M/HR	C	H	O		Mol %	M/Hr	C	H	O				
				O_2 32.000	0.35	9.784 0.043			19.654				
14.131	14.131		14.131	CO_2 44.010	1.29	0.157	0.157		0.314				
23.279		46.558		N_2 28.016	1.92	0.234							
0.815	0.815		1.630	CH_4 16.042	83.39	10.176	10.176	40.704					
0.289				C_2H_4 30.068	6.16	0.752	1.504	4.512					
0.047	0.047	0.188		C_3H_8 44.094	4.89	0.597	1.791	4.776					
		5.810	4.207	C_4H_{10} 58.120	1.49	0.182	0.728	1.820					
		7.112	3.556	C_5H_{12} 72.146	0.51	0.062	0.310	0.744					
	14.993	53.858	19.317	MW	19.837378								
	102.23	102.48	96.74	TOTAL			14.666	52.556	19.968				

WEIGHT BALANCE		
	#/hr Measured	At Wt. Balance
WET GAS	285.24	317.82
OIL	47.19	47.19
WATER	122.46	122.46
TOTAL	454.89	487.47
FRESH FEED	487.47	
WEIGHT BALANCE	93.32	
WET GAS FACTOR	1114219	
INDICATED LOSS—S C F H	553	
	5395	

GAS FLOW RATES																		
	$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
FRESH FEED		403.3	59	22 90057			OIL	7'2⅛"	382.05	47	1.0064	384.50	54.8		
79.31	5.958	20.445	1.0010	1.5133	14634	38.561		6'7-3/4	352.59	46	1.0069	355.02	6.323		
WET GAS		1.52	52	1294964				4'3"	227.10	42	1.0089	229.12			
158.44	6.617	4.027	1.0078	1.1380	4842	12.759		1'6½"	80.37	50	1.0049	80.76			
		403.4	71									+1.27		-8.00	47.19
RECYCLE 79.31	7.913	20.447	0.9896	1.1380	14451	38.079						179.11		1132.51	7.463
BLEED 5.02	8.050	20.447	1.0000	1.1380	940	2.477	WATER	7'3"	384.23	56	1.00033	384.36	11.1		
		427.1	195	1459366				5'6½"	294.75	54	1.00047	294.89	8.264		
NATURAL GAS 28.43	7.200	21.019	0.8910	1.2080	4631	12.203		5'6"	292.57	54	1.00047	292.71			
		428.2	56					0'6"	26.55	58	1.00018	26.55			122.46
OXYGEN 27.07	6.392	21.045	1.0039		3713	9.784						355.63		2938.93	14.818
STEAM 215.7	5.850	23.3													

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-P
HOURS 296-320

	GAS ANALYSES			
HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	35.13	36.39	36.26	35.927
H_2 2.016	61.78	60.41	60.47	60.887
CO_2 44.010	2.04	2.25	2.38	2.223
N_2 28.016	0.88	0.85	0.82	0.850
CH_4 16.042	0.17	0.10	0.07	0.113
			M. W	12.52524
			H_2O 18.016	
			BALANCE	
WET GAS	1400	2200		
CO 28.010	8.22	8.57		8.395
H_2 2.016	41.22	40.51		40.865
CO_2 44.010	28.48	29.18		28.830
N_2 28.016	1.97	2.22		2.095
CH_4 16.042	9.23	8.92		9.075
C_2H_4 28.052	2.34	2.39		2.365
C_2H_6 30.068	1.77	1.79		1.780
C_3H_6 42.078	2.95	2.79		2.870
C_3H_8 44.094	0.30	0.28		0.290
C_4H_8 56.104	1.87	1.68		1.775
C_4H_{10} 58.120	0.48	0.54		0.510
C_5H_{10} 70.130	0.78	0.73		0.755
C_5H_{12} 72.146	0.18	0.19		0.185
C_6H_{12} 84.156	0.21	0.21		0.210
			M. W.	22.572196

	GENERATOR BALANCE												
M/HR	C	H	O		Mol %	M/Hr	C	H	O				
				O_2 32.000	0.50	9.715 0.061			19.552				
13.690	13.690		13.690	CO_2 44.010	1.17	0.143	0.143		0.286				
23.201		46.402		N_2 28.016	2.07	0.253							
0.847	0.847		1.694	CH_4 16.042	82.70	10.102	10.102	40.408					
0.324				C_2H_4 30.068	6.53	0.798	1.596	4.788					
0.043	0.043	0.172		C_3H_8 44.094	5.19	0.634	1.902	5.072					
				C_4H_{10} 58.120	1.36	0.166	0.664	1.660					
		7.485	3.743	C_5H_{12} 72.146	0.48	0.059	0.295	0.708					
	14.580	54.059	19.127	MW	19.910234								
	99.17	102.70	96.42	TOTAL			14.702	52.636	19.838				

WEIGHT BALANCE		
	#/hr Measured	At Wt. Balance
WET GAS	284.61	310.57
OIL	46.61	46.61
WATER	120.09	120.09
TOTAL	451.31	477.27
FRESH FEED	477.27	
WEIGHT BALANCE	94.56	
WET GAS FACTOR	1091212	
INDICATED LOSS—S C F H	436	
	5221	

GAS FLOW RATES																		
	$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
FRESH FEED		402.9	59	2311332			OIL	7'3"	384.23	44	1.0079	387.27	53.4		
79.31	5.863	20.435	1.0010	1.5203	14461	38.105		4'3"	227.10	42	1.0089	229.12	6.371		
WET GAS		1.50	51	1282551				2'4½"	126.59	43	1.0084	127.65			
158.44	6.567	4.025	1.0088	1.1325	4785	12.609		2'1"	109.84	46	1.0069	110.60			
		403.2	70									+0.39		+2.50	46.61
RECYCLE 79.31	7.933	20.443	0.9905	1.1325	14428	38.018						175.59		1118.68	7.316
BLEED 5.02	7.983	20.443	1.0000	1.1325	928	2.445	WATER	7'2"	379.86	56	1.00033	379.99	11.1		
		427.5	192	1454026				5'6"	292.57	54	1.00047	292.71	8.264		
NATURAL GAS 28.43	7.200	21.029	0.8931	1.2058	4636	12.216		5'10¼"	311.12	54	1.00047	311.27			
		427.5	57					0'11⅛"	49.82	64	0.99963	49.80			120.09
OXYGEN 27.07	6.458	21.029	1.0029		3687	9.715						348.75		2882.07	14.531
STEAM 215.7	5.808	22.9													

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-Q
HOURS 320-344

	GAS ANALYSES			
HOUR	1400	2200		AVERAGE
FRESH FEED				
CO 28.010	37.65	36.55	37.26	37.153
H_2 2.016	58.47	60.08	59.31	59.287
CO_2 44.010	2.77	2.32	2.44	2.510
N_2 28.016	0.93	0.92	0.92	0.923
CH_4 16.042	0.18	0.13	0.07	0.127
			M. W	12.985383
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	9.01	9.10	9.22	9.110
H_2 2.016	40.21	41.14	40.48	40.610
CO_2 44.010	30.14	28.59	29.12	29.283
N_2 28.016	2.07	2.28	2.31	2.220
CH_4 16.042	8.87	8.85	8.43	8.716
C_2H_4 28.052	2.26	2.31	2.24	2.270
C_3H_6 33.068	1.80	1.84	1.87	1.837
C_3H_8 42.078	3.09	2.86	2.74	2;897
C_3H_8 44.094	0.32	0.30	0.28	0.300
C_4H_8 56.104	1.37	1.45	1.64	1.487
C_4H_{10} 58.120	0.42	0.46	0.61	0.497
C_5H_{10} 70.130	0.30	0.55	0.68	0.510
C_5H_{12} 72.146	0.10	0.13	0.19	0.140
C_6H_{12} 84.156	0.04	0.14	0.19	0.123
			M. W.	22.503746

GENERATOR BALANCE										
M/HR	C	H	O		Mol %	M/Hr	C	H	O	
				O_2 32.000	0.54	9.776 0.066			19.684	WET GAS
13.914	13.914		13.914	CO_2 44.010	1.51	0.186	0.186		0.372	OIL
22.204		44.408		N_2 28.016	2.28	0.280				WATER
0.940	0.940		1.880	CH_4 16.042	82.92	10.186	10.186	40.744		TOTAL
0.346				C_2H_4 30.068	6.11	0.751	1.502	4.506		FRESH FEED
0.048	0.048	0.192		C_2H_6 44.094	4.81	0.591	1.773	4.728		WEIGHT BALANCE
				C_4H_{10} 58.120	1.39	0.171	0.684	1.710		
		8.130	4.065	C_5H_{12} 72.146	0.44	0.054	0.270	0.648		WET GAS FACTOR
37.452	14.902		19.859	MW	19.8615					INDICATED LOSS—S C F H
	102.06	100.75	99.27	TOTAL			14.601	52.336	20.056	

WEIGHT BALANCE		
	#/hr Measured	At Wt. Balance
WET GAS	292.10	323.02
OIL	44.63	
WATER	118.68	
TOTAL	455.41	486.33
FRESH FEED	486.33	
WEIGHT BALANCE	93.64	
WET GAS FACTOR	1105854	
INDICATED LOSS—S C F H	521	

GAS FLOW RATES																		
	$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
		402.7	60	2.22943			OIL	5'6½"	293.66	43	1.0084	296.13	54.8		
FRESH FEED															
79.31	5.875	20.430	1.0000	1.4931	14213	37.452		2'4½"	126.59	43	1.0084	127.65	6.323		
		1.562	51									+0.91		+5.75	44.63
WET GAS															
158.44	6.738	4.0326	1.0088	1.1342	4926	12.980						169.39		1071.05	7.058
		402.6	73												
RECYCLE															
79.31	7.917	20.428	0.9877	1.1342	14369										
						40.269									
BLEED															
5.02	7.946	20.428	0.9877	1.1342	913		WATER	7'5-3/4	396.23	55	1.00039	396.38	11.0		
		428.9	189					5'10½"	311.12	54	1.00047	311.27	8.270		
NATURAL GAS															
28.43	7.204	21.062	0.8951	1.2073	4662	12.285		5'10"	310.03	52	1.00059	310.21			
		427.8	57					0'11-3/4	50.90	57	1.00025	50.91			118.68
OXYGEN															
27.07	6.496	21.036	1.0029	--	3710	9.776						344.41		2848.27	14.350
		22.4													
STEAM															
215.7	5.733														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-R
HOURS 344-368

	GAS ANALYSES			
HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	36.60	36.11	36.57	36.427
H_2 2.016	60.19	60.21	59.86	60.086
CO_2 44.010	2.09	2.34	2.32	2.250
N_2 28.016	1.02	1.21	1.18	1.137
CH_4 16.042	0.10	0.13	0.07	0.100
			M. W	12.73935
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	8.90	9.14	8.97	9.003
H_2 2.016	41.34	42.14	41.88	41.787
CO_2 44.010	28.79	27.09	28.01	27.963
N_2 28.016	2.63	2.84	2.91	2.793
CH_4 16.042	8.17	8.68	8.40	8.417
C_2H_4 28.052	2.20	2.26	2.21	2.223
C_3H_6 33.068	1.66	1.78	1.77	1.737
C_3H_8 42.078	2.76	2.94	2.60	2.767
C_3H_8 44.094	0.27	0.33	0.30	0.300
C_4H_8 56.104	1.68	1.57	1.46	1.570
C_4H_{10} 58.120	0.52	0.38	0.57	0.490
C_5H_{10} 70.130	0.70	0.55	0.59	0.613
C_5H_{12} 72.146	0.16	0.16	0.16	0.160
C_6H_{12} 84.156	0.22	0.14	0.17	0.177
			M. W.	22.105789

GENERATOR BALANCE										
M/HR	C	H	O		Mol %	M/Hr	C	H	O	
				O_2 32.000	0.36	9.639 0.044			19.366	WET GAS
13.634	13.634		13.634	CO_2 44.010	1.39	0.171	0.171		0.342	OIL
22.489		44.978		N_2 28.016	2.25	0.277				WATER
0.842	0.842		1.684	CH_4 16.042	83.24	10.241	10.241	40.964		TOTAL
0.426				C_2H_4 30.068	6.07	0.747	1.494	4.482		FRESH FEED
0.037	0.037	0.148		C_2H_6 44.094	4.82	0.593	1.779	4.744		WEIGHT BALANCE
				C_4H_{10} 58.120	1.36	0.167	0.668	1.670		
		8.135	4.068	C_5H_{12} 72.146	0.51	0.063	0.315	0.756		WET GAS FACTOR
	14.513	53.261	19.386	MW	19.819495					INDICATED LOSS—S C F H
	98.94	101.23	98.37	TOTAL			14.668	52.616	19.708	

WEIGHT BALANCE		
	# hr Measured	At Wt. Balance
WET GAS	291.88	321.66
OIL	42.93	42.93
WATER	112.22	112.22
TOTAL	447.03	476.81
FRESH FEED	476.81	
WEIGHT BALANCE	93.75	
WET GAS FACTOR	1102028	
INDICATED LOSS—S C F H	511	
	5522	

GAS FLOW RATES																		
	$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
		401.3	57	2272486			OIL	7'2½"	382.05	51	1.0044	383.73	55.3		
FRESH FEED															
79.31	5.808	20.396	1.0029	1.5075	14204	37.428		5'6½"	293.66	43	1.0084	296.13	6.306		
		1.55	49	1309611				3'10½"	206.37	40	1.0099	208.41			
WET GAS															
158.44	6.783	4.031	1.0108	1.1444	5011	13.204		2'6"	133.50	54	1.0030	133.90			
		401.9	69									+1.27		+8.00	42.93
RECYCLE															
79.31	7.933	20.411	0.9915	1.1444	14571	38.395						163.38		1030.27	6.808
BLEED															
5.02	8.025	20.411	1.0000	1.1444	941	2.480	WATER	7'4-3/4	391.87	56	1.00033	392.00	11.0		
		429.6	190	1460683				5'10"	310.03	52	1.00059	310.21	8.270		
NATURAL GAS															
28.43	7.209	21.078	0.8944	1.2086	4669	12.303		6'2¼"	328.58	51	1.00064	328.79			
		427.1	56					1'7-3/4	85.91	54	1.00047	85.95			
OXYGEN															
27.07	6.404	21.019	1.0039		3658	9.639						+1.03		+8.50	112.22
		21.9										325.66		2693.21	13.569
STEAM															
215.7	5.629														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-S
HOURS 368-392

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.31	9.584 0.038			19.244	WET GAS	301.39	336.68
CO 28.010	38.57	38.89	37.60	38.387	13.988	13.988		13.988	CO_2 44.010	1.54	0.189	0.189		0.378	OIL	39.94	
H_2 2.016	57.74	57.32	58.47	57.843	21.078		42.156		N_2 28.016	1.32	0.162				WATER	109.62	
CO_2 44.010	2.23	2.51	2.52	2.420	0.882	0.882		1.764	CH_4 16.042	83.98	10.280	10.280	41.120		TOTAL	450.95	486.24
N_2 28.016	1.15	1.18	1.27	1.200	0.437				C_2H_6 30.068	6.10	0.747	1.494	4.482		FRESH FEED	486.24	
CH_4 16.042	0.21	0.10	0.14	0.150	0.055	0.055	0.220		C_3H_8 44.094	4.92	0.602	1.806	4.816		WEIGHT BALANCE	92.74	
			M. W	13.3436					C_4H_{10} 58.120	1.34	0.164	0.656	1.640				
			H_2O 18.016				9.072	4.536	C_5H_{12} 72.146	0.49	0.060	0.300	0.720		WET GAS FACTOR	111709	
						14.925	51.448	20.288	MW	19.7547					INDICATED LOSS—S C F H	586	
			BALANCE			101.36	97.48	103.39	TOTAL			14.725	52.778	19.622		5591	

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES							
CO 28.010	10.34	10.27	10.62	10.410		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	38.90	39.01	40.26	39.390	FRESH FEED		401.3	60	2.16957			OIL	6'8-3/4"	356.95	46	1.0069	359.41	54.1		
CO_2 44.010	28.90	29.09	28.68	28.890	79.31	5.804	20.396	1.000	1.4730	13829	36.440		3'10½"	206.37	40	1.0099	208.41	6.347		39.94
N_2 28.016	2.72	2.77	2.61	2.700			1.57	52	1.26675								151.00			6.292
CH_4 16.042	8.32	8.41	8.37	8.367	WET GAS 158.44	6.904	4.034	1.0078	1.12550	5005	13.188									
C_2H_6 28.052	2.41	2.36	2.21	2.327			401.3	71												
C_3H_8 33.068	1.88	1.79	1.79	1.820	RECYCLE 79.31	7.900	20.396	0.9896	1.12550	14229										
C_3H_6 42.078	3.04	2.96	2.66	2.887			401.3	71			39.897									
C_3H_8 44.094	0.33	0.34	0.30	0.323	BLEED 5.02	8.000	20.396	0.9896	1.12550	912		WATER	7'6¼"	398.41	52	1.00059	398.65	11.1		
C_4H_8 56.104	1.77	1.62	1.30	1.563			426.0	192	1.46547				6'2¼"	328.58	51	1.00064	328.79	8.264		
C_4H_{10} 58.120	0.43	0.46	0.49	0.460	NATURAL GAS 28.43	7.200	20.993	0.8931	1.2106	4646	12.242		5'10¼"	311.12	54	1.00047	311.27			
C_5H_{10} 70.130	0.66	0.59	0.47	0.573			426.5	60					1'2⅜"	62.73	52	1.00059	62.77			109.62
C_5H_{12} 72.146	0.16	0.16	0.10	0.140	OXYGEN 27.07	6.396	21.005	1.000		3637	9.584						318.36			13.265
C_6H_{12} 84.156	0.14	0.17	0.14	0.150																
			M. W.	22.8537	STEAM 215.7	5.533														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-T
HOURS 392-416

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M HR	C	H	O		Mol %	M/Hr	C	H	O		# hr Measured	At Wt Balance
FRESH FEED									O_2 32.000	0.36	9.895 0.043			19.876	WET GAS	318.30	340.63
CO 28.010	36.88	36.75	36.51	36.713	14.280	14.280		14.280	CO_2 44.010	0.67	0.081	0.081		0.162	OIL	41.40	41.40
H_2 2.016	60.47	60.15	60.75	60.457	23.515		47.030		N_2 28.016	2.03	0.245				WATER	109.20	109.20
CO_2 44.010	1.96	2.41	2.15	2.173	0.845	0.845		1.690	CH_4 16.042	81.92	9.877	9.877	39.508		TOTAL	468.90	491.23
N_2 28.016	0.60	0.56	0.48	0.547	0.213				C_2H_6 30.068	6.93	0.836	1.672	5.016		FRESH FEED	491.23	
CH_4 16.042	0.09	0.13	0.11	0.110	0.043	0.043	0.172		C_3H_8 44.094	5.88	0.709	2.127	5.672		WEIGHT BALANCE	95.45	
			M. W	12.62936					C_4H_{10} 58.120	1.64	0.198	0.792	1.980				
			H_2O 18.016				6.969	3.485	C_5H_{12} 72.146	0.57	0.069	0.345	0.828		WET GAS FACTOR	1070153	
						15.168	54.171	19.455	MW	20.161238					INDICATED LOSS—S C F H	386	
			BALANCE			101.84	102.20	97.09	TOTAL			14.894	53.004	20.038		5884	

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES							
CO 28.010	10.10	9.58		9.840		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	44.58	41.45		43.015	FRESH FEED		395.6	64	2292277			OIL	7'3½"	386.41	50	1.0049	388.30	53.0		
CO_2 44.010	26.74	28.98		27.860	79.31	6.092	20.256	0.9962	1.5140	14761	38.896		6'8-3/4"	356.95	46	1.0069	359.41	6.385		
N_2 28.016	1.60	1.24		1.420			1.73	56	1317617				3'11-3/4"	212.92	48	1.0059	214.18			
CH_4 16.042	8.05	7.57		7.810	WET GAS 158.44	7.429	4.053	1.0039	1.1479	5498	14.487		1'8½"	88.12	50	1.0049	88.55			
C_2H_6 28.052	2.02	2.16		2.090			396.1	77									•1.10		•7.00	41.40
C_3H_8 33.068	1.50	1.54		1.520	RECYCLE 79.31	7.875	20.268	0.9840	1.1479	14298	37.676						155.62		993.63	6.484
C_3H_6 42.078	2.40	3.13		2.765																
C_3H_8 44.094	0.26	0.33		0.295	BLEED 5.02	8.088	20.268	1.0000	1.1479	945	2.490	WATER	7'4-3/4"	391.87	57	1.00025	391.97	11.1		
C_4H_8 56.104	1.41	2.18		1.795			425.0	197	1435923				5'10¼"	311.12	54	1.00047	311.27	8.264		
C_4H_{10} 58.120	0.42	0.51		0.465	NATURAL GAS 28.43	7.200	20.969	0.8897	1.1983	4576	12.058		5'7½"	299.12	57	1.00025	299.19			
C_5H_{10} 70.130	0.59	0.94		0.765			422.7	64					1'2⅜"	62.73	56	1.00033	62.75			109.20
C_5H_{12} 72.146	0.16	0.13		0.145	OXYGEN 27.07	6.658	20.914	0.9962	--	3755	9.895						317.14		2620.84	13.214
C_6H_{12} 84.156	0.17	0.26		0.215			22.0													
			M. W.	21.97148	STEAM 215.7	5.479														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-U
HOURS 416-440

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.30	10.308 0.039			20.690	WET GAS	332.26	366.91
CO 28.010	36.87	36.63	36.57	36.690	14.885	14.885		14.885	CO_2 44.010	1.27	0.163	0.163		0.326	OIL	37.83	37.83
H_2 2.016	60.39	60.27	60.58	60.413	24.509		49.018		N_2 28.016	2.31	0.297				WATER	108.21	108.21
CO_2 44.010	2.04	2.31	2.16	2.170	0.880	0.880		1.760	CH_4 16.042	82.76	10.646	10.646	42.584		TOTAL	478.30	512.95
N_2 28.016	0.62	0.72	0.60	0.647	0.262				C_2H_4 30.068	6.14	0.790	1.580	4.740		FRESH FEED	512.95	
CH_4 16.042	0.08	0.07	0.09	0.080	0.033	0.033	0.132		C_2H_6 44.094	5.07	0.652	1.956	5.216		WEIGHT BALANCE	93.24	
			M. W	12.64391				4371	C_4H_{10} 58.120	1.52	0.196	0.784	1.960				
			H_2O 18.016				7.532	3.766	C_3H_6 72.146	0.63	0.081	0.405	0.972		WET GAS FACTOR	1104285	
						15.798	56.682	20.411	MW	19.99814					INDICATED LOSS—S C F H	637	
			BALANCE			101.70	102.18	97.12	TOTAL			15.534	55.472	21.016		6741	

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES							
						$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
CO 28.010	10.48	11.28	11.29	11.017																
H_2 2.016	45.48	45.69	45.87	45.680	FRESH FEED		394.8	61	2289639			OIL	6'8"	353.68	49	1.0054	355.59	52.0		
CO_2 44.010	26.34	25.24	25.78	25.787	79.31	6.346	20.236	0.9990	1.5132	15396	40.569		3'11-3/4	212.92	48	1.0059	214.18	6.420		
N_2 28.016	1.66	2.07	1.95	1.893	WET GAS		1.755	56	1401390								141.41		907.85	37.83
CH_4 16.042	7.66	7.22	7.08	7.320	158.44	7.992	4.056	1.0039	1.1838	6104	16.084									5.892
C_2H_4 28.052	1.89	1.84	1.79	1.840	RECYCLE		395.0	76												
C_2H_6 33.068	1.36	1.39	1.42	1.390	79.31	7.904	20.241	0.9850	1.1838	14795	38.986									
C_3H_6 42.078	2.31	2.27	2.12	2.233	BLEED															
C_3H_8 44.094	0.26	0.26	0.26	0.260	5.02	8.025	20.241	1.0000	1.1838	965	2.543	WATER	7'5-1/8	393.50	57	1.00025	393.60	11.1		
C_4H_8 56.104	1.37	1.35	1.23	1.317	NATURAL GAS		433.8	187	1447616				5'7-1/8"	299.12	57	1.00025	299.19	8.264		
C_4H_{10} 58.120	0.36	0.42	0.33	0.370	28.43	7.517	21.178	0.8965	1.2032	4882	12.864		5'9"	305.66	55	1.00039	305.78			
C_5H_{10} 70.130	0.56	0.62	0.54	0.573	OXYGEN		422.8	62					1'7-3/4	85.91	57	1.00025	85.93			108.21
C_5H_{12} 72.146	0.13	0.13	0.13	0.130	27.07	6.921	20.916	0.9981		3911	10.306						314.26		2597.04	13.094
C_6H_{12} 84.156	0.14	0.22	0.21	0.190	STEAM		21.8													
			M. W.	20.65806	215.7	5.438														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-V
HOURS 440-464

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.34	10.332 0.044			20.752	WET GAS	337.49	362.78
CO 28.010	35.94	35.85	35.94	35.910	14.598	14.598		14.598	CO_2 44.010	1.30	0.169	0.169		0.338	OIL	39.56	39.56
H_2 2.016	60.88	60.71	60.70	60.763	24.700		49.400		N_2 28.016	1.83	0.238				WATER	108.31	108.31
CO_2 44.010	2.17	2.24	2.35	2.253	0.916	0.916		1.832	CH_4 16.042	83.40	10.836	10.836	43.344		TOTAL	485.36	510.65
N_2 28.016	0.84	1.13	0.90	0.957	0.389				C_2H_4 30.068	6.24	0.811	1.622	4.866		FRESH FEED	510.65	
CH_4 16.042	0.17	0.07	0.11	0.117	0.048	0.048	0.192		C_2H_6 44.094	4.93	0.641	1.923	5.128		WEIGHT BALANCE	95.05	
			M. W	12.56180			6.428	4660	C_4H_{10} 58.120	1.41	0.183	0.732	1.830				
			H_2O 18.016				7.874	3.937	C_5H_{12} 72.142	0.55	0.071	0.355	0.852		WET GAS FACTOR	1074935	
						15.562	57.466	20.367	MW	19.83902					INDICATED LOSS—S C F H	467	
			BALANCE			99.52	102.58	96.57	TOTAL			15.637	56.020	21.090		6701	

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES							
						$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
CO 28.010	10.86	11.61	11.34	11.270																
H_2 2.016	46.93	46.42	45.03	46.127	FRESH FEED		396.2	62	2304606			OIL	7'4-5/8	391.32	50	1.0049	393.24	51.6		
CO_2 44.010	25.00	25.41	25.90	25.437	79.31	6.333	20.271	0.9981	1.5181	15427	40.651		6'8"	353.68	49	1.0054	355.59	6.434		
N_2 28.016	1.68	1.97	2.41	2.020	WET GAS		1.74	58	1409123				3'11-1/2"	211.83	52	1.0039	212.66			
CH_4 16.042	7.45	6.92	6.87	7.080	158.44	8.158	4.055	1.0019	1.1871	6234	16.427		1'11-3/4	104.04	52	1.0039	104.45			
C_2H_4 28.052	1.78	1.81	1.56	1.717	RECYCLE		396.0	75									+1.71		+11.00	39.56
C_2H_6 33.068	1.34	1.27	1.24	1.283	79.31	7.913	20.266	0.9859	1.1871	14885	39.223						147.57		949.47	6.149
C_3H_6 42.078	2.06	2.19	2.25	2.167	BLEED															
C_3H_8 44.094	0.23	0.26	0.21	0.233	5.02	8.029	20.266	1.0000	1.1871	970	2.556	WATER	7'8"	406.05	56	1.00033	406.18	11.1		
C_4H_8 56.104	1.33	1.03	1.17	1.177	NATURAL GAS		434.9	195	1459245				5'9"	305.66	55	1.00039	305.78	8.264		
C_4H_{10} 58.120	0.43	0.30	0.69	0.473	28.43	7.600	21.204	0.8910	1.2080	4931	12.993		5'9"	305.66	59	1.00009	305.69			
C_5H_{10} 70.130	0.58	0.54	0.60	0.573	OXYGEN		423.5	59					1'9"	91.50	55	1.00039	91.54			108.31
C_5H_{12} 72.146	0.19	0.10	0.47	0.253	27.07	6.913	20.933	1.0010		3921	10.332						314.55		2599.44	13.106
C_6H_{12} 84.156	0.14	0.17	0.26	0.190	STEAM		21.0													
			M. W.	20.544665	215.7	5.288														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-W
HOURS 464-477

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	1800		AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.32	10.377 0.042			20.838	WET GAS	336.25	376.28
CO 28.010	35.99	36.53		36.260	14.807	14.807		14.807	CO_2 44.010	1.30	0.169	0.169		0.338	OIL	38.41	38.41
H_2 2.016	60.69	60.28		60.485	24.699		49.398		N_2 28.016	3.08	0.400				WATER	101.55	101.55
CO_2 44.010	2.25	2.39		2.320	0.947	0.947		1.894	CH_4 16.042	82.28	10.685	10.685	42.740		TOTAL	476.21	516.24
N_2 28.016	0.89	0.70		0.795	0.325				C_2H_6 30.068	6.07	0.788	1.576	4.728		FRESH FEED	516.24	
CH_4 16.042	0.18	0.10		0.140	0.057	0.057	0.228		C_3H_8 44.094	4.91	0.638	1.914	5.104		WEIGHT BALANCE	92.25	
			M. W	12.64202				4475	C_4H_{10} 58.120	1.49	0.193	0.772	1.930				
			H_2O 18.016				7.339	3.670	C_5H_{12} 72.146	0.55	0.071	0.355	0.852		WET GAS FACTOR	1119048	
						15.811	56.965	20.371	MW	19.989714					INDICATED LOSS—S C F H	755	
			BALANCE			102.20	102.91	96.20	TOTAL			15.471	55.354	21.176		7101	

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES Basis 13 hours								
						$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
CO 28.010	11.46	11.82		11.640																
H_2 2.016	47.10	46.80		46.950	FRESH FEED		398.9	67	2289982			OIL	5'5¼"	289.30	56	1.0020	289.88	50.7		
CO_2 44.010	24.40	25.30		24.850	79.31	6.392	20.337	0.9933	1.5133	15497	40.835		3'11½"	211.83	52	1.0039	212.66	6.466		38.41
N_2 28.016	1.99	1.81		1.900			1.75	61	1439713								77.22		499.30	5.940
CH_4 16.042	7.15	6.76		6.955	WET GAS 158.44	8.238	4.056	0.9990	1.1999	6346	16.722									
C_2H_4 28.052	1.79	1.78		1.785			398.0	78												
C_2H_6 30.068	1.26	1.24		1.250	RECYCLE 79.31	7.908	20.315	0.9831	1.1999	15030	39.605									
C_3H_4 42.078	2.15	2.05		2.100																
C_3H_8 44.094	0.25	0.22		0.235	BLEED 5.02	8.015	20.315	1.0000	1.1999	981	2.585	WATER	7'6"	397.32	62	0.99982	397.25	11.1		
C_4H_8 56.104	1.27	1.14		1.205			437.8	195	1448244				5'9"	305.66	59	1.00009	305.69	8.264		
C_4H_{10} 58.120	0.36	0.30		0.330	NATURAL GAS 28.43	7.600	21.272	0.8910	1.2034	4928	12.986		1'6½"	79.27	64	0.99963	79.24			
C_5H_{10} 70.130	0.55	0.51		0.530			426.0	66					0'2½"	11.06	70	0.99896	11.05			101.55
C_5H_{12} 72.146	0.13	0.10		0.115	OXYGEN 27.07	6.969	20.993	0.9943		3938	10.377						159.75		1320.17	12.288
C_6H_{12} 84.156	0.14	0.17		0.155			21.3													
			M. W.	20.108171	STEAM 215.7	5.462														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-X
HOURS 477-500

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		# hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.29	9.855 0.037			19.784	WET GAS	315.92	349.83
CO 28.010	36.39	36.41	36.47	36.423	14.022	14.022		14.022	CO_2 44.010	1.40	0.177	0.177		0.354	OIL	39.74	39.74
H_2 2.016	60.17	60.13	60.11	60.137	23.151		46.302		N_2 28.016	2.06	0.261				WATER	99.96	99.96
CO_2 44.010	2.18	2.27	2.38	2.277	0.877	0.877		1.754	CH_4 16.042	82.57	10.453	10.453	41.812		TOTAL	455.62	489.53
N_2 28.016	0.99	0.99	0.84	0.940	0.362				C_2H_6 30.068	6.37	0.807	1.614	4.842		FRESH FEED	489.53	
CH_4 16.042	0.27	0.20	0.20	0.223	0.086	0.086	0.344		C_3H_8 44.094	5.23	0.662	1.986	5.296		WEIGHT BALANCE	93.07	
			M. W	12.71568			8.084	4.362	C_4H_{10} 58.120	1.53	0.194	0.776	1.940				
			H_2O 18.016				8.404	4.202	C_5H_{12} 72.146	0.55	0.070	0.350	0.840		WET GAS FACTOR	1107337	
						14.985	55.050	19.978	MW	20.039436					INDICATED LOSS—S C F H	660	
			BALANCE			97.58	100.58	99.21	TOTAL			15.356	54.730	20.138		6813	

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES Basis 22 hours								
						$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
CO 28.010	13.06	12.99	13.57	13.207																
H_2 2.016	47.78	48.15	48.77	48.233	FRESH FEED		401.6	69	2276716			OIL	7'1⅜"	377.68	57	1.0015	378.25	52.0		
CO_2 44.010	23.70	23.58	22.53	23.270	79.31	6.035	20.403	0.9915	1.5089	14610	38.498		5'7¼"	298.03	54	1.0030	298.92	6.420		
N_2 28.016	1.76	1.78	1.96	1.833			1.72	55	1485711				2'8½"	143.87	42	1.0089	145.15			
CH_4 16.042	6.64	6.37	6.37	6.460	WET GAS 158.44	7.825	4.052	1.0048	1.2189	6153	16.213		1'8¾"	88.12	56	1.0020	88.30			39.74
C_2H_4 28.052	1.62	1.64	1.64	1.633			402.3	77									136.18		874.28	6.190
C_2H_6 30.068	1.12	1.13	1.11	1.120	RECYCLE 79.31	7.892	20.421	0.9840	1.2189	15330	40.395									
C_3H_4 42.078	1.93	1.75	1.97	1.883																
C_3H_8 44.094	0.20	0.20	0.14	0.180	BLEED 5.02	8.117	20.421	1.0000	1.2189	1014	2.672	WATER	7'0"	371.14	53	1.00052	371.33	11.1		
C_4H_8 56.104	1.13	1.13	1.06	1.107			415.6	195	1444651				2'0"	105.19	55	1.00039	105.23	8.264		99.96
C_4H_{10} 58.120	0.34	0.42	0.26	0.340	NATURAL GAS 28.43	7.608	20.744	0.8910	1.2019	4805	12.661						266.10		2199.05	12.095
C_5H_{10} 70.130	0.49	0.54	0.43	0.487			423.6	60												
C_5H_{12} 72.146	0.10	0.13	0.06	0.097	OXYGEN 27.07	6.600	20.936	1.0000		3740	9.855									
C_6H_{12} 84.156	0.13	0.19	0.13	0.150			22.8													
			M. W.	19.485608	STEAM 215.7	5.071														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-Y
HOURS 500-523

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.32	9.794 0.041			19.670	WET GAS	281.97	315.68
CO 28.010	35.94	36.03	36.25	36.074	14.108	14.108		14.108	CO_2 44.010	1.55	0.197	0.197		0.394	OIL	53.57	53.57
H_2 2.016	60.40	60.61	60.39	60.467	23.648		47.296		N_2 28.016	1.22	0.155				WATER	123.03	123.03
CO_2 44.010	2.03	2.14	2.29	2.153	0.842	0.842		1.684	CH_4 16.042	82.88	10.537	10.537	42.148		TOTAL	458.57	492.28
N_2 28.016	0.83	1.04	0.81	0.893	0.349				C_6H_6 30.068	6.46	0.821	1.642	4.926		FRESH FEED	492.28	
CH_4 16.042	0.80	0.18	0.26	0.413	0.162	0.162	0.648		C_2H_6 44.094	5.40	0.687	2.061	5.496		WEIGHT BALANCE	93.15	
			M. W	12.58731				4.272	C_4H_{10} 58.120	1.55	0.197	0.788	1.970				
			H_2O 18.016				8.044	4.022	C_5H_{12} 72.146	0.62	0.079	0.395	0.948		WET GAS FACTOR	1119551	
						15.112	55.988	19.814	MW	20.09359					INDICATED LOSS—S C F H	618	
			BALANCE			96.75	100.90	98.75	TOTAL			15.620	55.488	20.064		5787	

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES								
CO 28.010	11.98	12.52	13.73	12.743		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL	#	# HR GAL HR
H_2 2.016	44.43	43.14	46.63	44.733	FRESH FEED		402.6	71	2299935			OIL	6'4"	336.22	46	1.0079	338.88	50.6		
CO_2 44.010	23.80	25.79	22.55	24.047	79.31	6.104	20.428	0.9896	1.5166	14842	39.109		2'9½"	149.62	42	1.0089	150.95	6.469		
N_2 28.016	1.88	2.05	2.03	1.987			1.625	59	1398454								•2.55		•16.50	53.57
CH_4 16.042	9.02	7.08	7.06	7.720	WET GAS 158.44	6.821	4.040	1.0010	1.1826	5169	13.621						190.48		1232.22	8.282
C_2H_4 28.052	2.14	2.03	2.00	2.057			402.9	73												
C_3H_6 33.068	1.28	1.17	1.12	1.190	RECYCLE 158.44	7.896	20.433	0.9877	1.1826	29858	78.677									
C_3H_8 42.078	2.44	2.33	2.33	2.367																
C_4H_8 44.094	0.28	0.24	0.23	0.250	BLEED 5.02	7.964	20.433	1.0000	1.1826	966	2.545	WATER	6'11"	366.77	58	1.00018	366.84	10.7		
C_4H_8 56.104	1.42	1.68	1.35	1.483			418.9	192	1440757				0'5-¾	25.45	44	1.00104	25.48	8.287		123.03
C_4H_{10} 58.120	0.38	0.61	0.28	0.423	NATURAL GAS 28.43	7.604	20.821	0.8931	1.2003	4825	12.714						341.46		2829.68	14.842
C_5H_{10} 70.130	0.61	0.82	0.53	0.653			426.9	60												
C_5H_{12} 72.146	0.13	0.23	0.06	0.140	OXYGEN 27.07	6.535	21.012	1.0000		3717	9.794									
C_6H_{12} 84.156	0.21	0.31	0.10	0.207			21.6													
			M. W.	20.70142	STEAM 215.7	4.591														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-Z
HOURS 523-547

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		# hr Measured	At Wt Balance
FRESH FEED									O_2 32.000	0.41	9.597 0.052			19.298	WET GAS	293.21	327.43
CO 28.010	36.40	36.62	37.04	36.686	14.311	14.311		14.311	CO_2 44.010	1.47	0.187	0.187		0.374	OIL	51.80	51.80
H_2 2.016	59.69	60.00	59.26	59.650	23.268		46.536		N_2 28.016	2.19	0.279				WATER	119.74	119.74
CO_2 44.010	2.11	2.24	2.36	2.237	0.873	0.873		1.746	CH_4 16.042	82.43	10.488	10.488	41.952		TOTAL	464.75	498.97
N_2 28.016	0.79	0.83	0.87	0.830	0.324				C_6H_6 30.068	6.48	0.825	1.650	4.950		FRESH FEED	498.97	
CH_4 16.042	1.01	0.31	0.47	0.597	0.233	0.233	0.932		C_2H_6 44.094	4.73	0.602	1.806	4.816		WEIGHT BALANCE	93.14	
			M. W	12.7911				3.615	C_4H_{10} 58.120	1.71	0.218	0.872	2.180				
			H_2O 18.016				7.274	3.637	C_5H_{12} 72.146	0.58	0.074	0.370	0.888		WET GAS FACTOR	1116708	
						15.417	54.742	19.694	MW	20.06147					INDICATED LOSS—S C F H	616	
			BALANCE			100.29	99.92	100.11	TOTAL			15.373	54.786	19.672		5897	

WET GAS					GAS FLOW RATES							LIQUID PRODUCT RATES								
CO 28.010	14.21	13.74	13.83	13.927		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL	#	# HR GAL HR
H_2 2.016	43.05	43.71	45.06	43.940	FRESH FEED		402	68	2265292			OIL	7'2½"	382.05	46	1.0069	384.69	53.5		
CO_2 44.010	24.26	24.39	24.38	24.344	79.31	6.096	20.413	0.9971	1.5044	14804	39.009		6'4"	336.22	46	1.0069	338.54	6.368		
N_2 28.016	1.87	2.09	2.00	1.987			1.70	58	1374001				3'7½"	194.37	50	1.0049	195.32			
CH_4 16.042	7.93	6.82	6.76	7.170	WET GAS 158.44	7.008	4.050	1.0019	1.1722	5281	13.916		0'11¼"	48.74	52	1.0039	48.93			
C_2H_4 28.052	1.80	1.89	1.87	1.853			402										•2.67		•17.00	51.80
C_3H_6 33.068	1.07	1.11	1.04	1.073	RECYCLE 158.44	7.929	20.413	0.9896	1.1722	29748	78.387						195.21		1243.10	8.134
C_3H_8 42.078	2.35	2.67	2.18	2.400																
C_4H_8 44.094	0.19	0.23	0.20	0.207	BLEED 5.02	7.913	20.413	1.0000	1.1722	951	2.506	WATER	7'3"	384.23	57	1.00025	384.33	10.6		
C_4H_8 56.104	1.67	1.75	1.42	1.613			416	187	1443064				6'11"	366.77	58	1.00018	366.84	8.293		
C_4H_{10} 58.120	0.54	0.55	0.35	0.480	NATURAL GAS 28.43	7.600	20.753	0.8965	1.2013	4829	12.725		7'3"	384.23	57	1.00025	384.33			
C_5H_{10} 70.130	0.70	0.61	0.61	0.640			423	57					1'0-¾	55.23	44	1.00104	55.29			119.74
C_5H_{12} 72.146	0.19	0.23	0.13	0.183	OXYGEN 27.07	6.413	20.921	1.0029		3642	9.597						346.53		2873.77	14.439
C_6H_{12} 84.156	0.17	0.21	0.17	0.183			17.3													
			M. W.	21.069845	STEAM 215.7	4.558														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-AA
HOURS 547-571

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.36	9.866 0.046			19.824	WET GAS	306.61	347.64
CO 28.010	36.24	36.23	36.13	36.200	14.522	14.522		14.522	CO_2 44.010	1.29	0.164	0.164		0.328	OIL	47.09	47.09
H_2 2.016	60.43	60.68	60.66	60.590	24.306		48.612		N_2 28.016	1.72	0.219				WATER	109.81	109.81
CO_2 44.010	2.24	2.15	2.25	2.214	0.888	0.888		1.776	CH_4 16.042	82.39	10.491	10.491	41.964		TOTAL	463.51	504.54
N_2 28.016	0.74	0.60	0.71	0.683	0.274				C_2H_6 30.068	6.73	0.857	1.714	5.142		FRESH FEED	504.54	
CH_4 16.042	0.35	0.34	0.25	0.313	0.126	0.126	0.504		C_3H_8 44.094	5.35	0.681	2.043	5.448		WEIGHT BALANCE	91.87	
			M. W	12.57706				3.854	C_4H_{10} 58.120	1.56	0.199	0.796	1.990				
			H_2O 18.016				7.024	3.512	C_5H_{12} 72.146	0.60	0.076	0.380	0.912		WET GAS FACTOR	1133818	
						15.536	56.140	19.810	MW	20.10396					INDICATED LOSS—S C F H	774	
			BALANCE			99.67	101.23	98.30	TOTAL			15.588	55.456	20.152		6555	

WET GAS					GAS FLOW RATES									LIQUID PRODUCT RATES							
CO 28.010	13.71	13.79	13.66	13.720		$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	45.21	47.62	47.86	46.896	FRESH FEED		402.5	59	2301809			OIL	6'11"	366.77	55	1.0025	367.69	49.8		
CO_2 44.010	24.48	23.83	23.60	23.970	79.31	6.188	20.425	1.0010	1.5172	15224	40.116		3'7⅞"	194.37	50	1.0049	195.32	6.498		
N_2 28.016	1.68	1.67	1.33	1.560	WET GAS		1.74	63	1438280								•1.54		•10.00	47.09
CH_4 16.042	6.36	6.14	6.18	6.227	158.44	7.525	4.055	0.9971	1.1993	5781	15.233						173.91		1130.07	7.246
C_2H_6 28.052	1.90	1.77	1.76	1.810	RECYCLE		402.8	75												
C_2H_4 33.068	1.13	0.97	1.00	1.033	158.44	7.917	20.433	0.9859	1.1993	30305	79.855									
C_3H_6 42.078	2.30	1.74	1.94	1.993	BLEED															
C_3H_8 44.094	0.25	0.20	0.23	0.227	5.02	7.904	20.433	1.0000	1.1993	972	2.561	WATER	7'6¼"	398.41	57	1.00025	398.51	10.7		
C_4H_8 56.104	1.58	1.14	1.27	1.330	NATURAL GAS		417.5	187	1440014				7'3"	384.23	57	1.00025	384.33	8.287		
C_4H_{10} 58.120	0.41	0.30	0.30	0.337	28.43	7.600	20.789	0.8965	1.2000	4832	12.733		6'10-3/4	365.68	62	0.99982	365.61			
C_5H_{10} 70.130	0.62	0.53	0.57	0.597	OXYGEN		425.0	62					1'2½"	61.74	52	1.00059	61.78			109.81
C_5H_{12} 72.146	0.13	0.13	0.13	0.130	27.07	6.608	20.969	0.9981		3744	9.866						318.01		2635.35	13.250
C_6H_{12} 84.156	0.17	0.17	0.17	0.170	STEAM		16.2													
			M. W.	20.128208	215.7	4.133														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-BB
HOURS 571-595

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.35	9.887 0.045			19.864	WET GAS	315.56	355.49
CO 28.010	36.86	36.87	35.11	36.280	14.444	14.444		14.444	CO_2 44.010	1.44	0.184	0.184		0.368	OIL	43.51	43.51
H_2 2.016	59.88	60.01	61.90	60.596	24.125		48.250		N_2 28.016	1.18	0.151				WATER	101.43	101.43
CO_2 44.010	1.97	2.30	2.23	2.167	0.863	0.863		1.726	CH_4 16.042	83.46	10.688	10.688	42.752		TOTAL	460.50	500.43
N_2 28.016	0.62	0.68	0.67	0.657	0.262				C_2H_6 30.068	6.66	0.853	1.706	5.118		FRESH FEED	500.43	
CH_4 16.042	0.67	0.14	0.09	0.300	0.119	0.119	0.476		C_3H_8 44.094	4.98	0.638	1.914	5.104		WEIGHT BALANCE	92.02	
			M. W	12.56953			6.848		C_4H_{10} 58.120	1.42	0.182	0.728	1.820				
			H_2O 18.016				7.486	3.743	C_5H_{12} 72.146	0.51	0.065	0.325	0.780		WET GAS FACTOR	1126536	
						15.426	56.212	19.913	MW	19.85664					INDICATED LOSS—S C F H	781	
			BALANCE			99.23	101.15	98.42	TOTAL			15.545	55.574	20.232		6956	

WET GAS					GAS FLOW RATES									LIQUID PRODUCT RATES							
CO 28.010	16.06	16.83	16.93	16.607		$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	48.07	47.55	49.01	48.210	FRESH FEED		404.9	63	2303188			OIL	7'1"	375.50	56	1.0020	376.25	49.1		
CO_2 44.010	21.18	21.79	21.06	21.343	79.31	6.146	20.484	0.9971	1.5176	15109	39.813		6'11"	366.77	55	1.0025	367.69	6.523		
N_2 28.016	1.41	1.62	1.84	1.623	WET GAS		1.77	63	1492729				4'2½"	224.92	48	1.0059	226.25			
CH_4 16.042	6.46	4.86	4.95	5.423	158.44	7.883	4.058	0.9971	1.2218	6175	16.271		1'5⅜"	75.97	52	1.0039	76.27			
C_2H_6 28.052	1.72	1.62	1.42	1.587	RECYCLE		405.4	73									•1.53		•10.00	43.51
C_2H_4 33.068	1.01	0.82	0.80	0.877	158.44	7.904	20.496	0.9877	1.2218	30,975	81.621						160.07		1044.14	6.670
C_3H_6 42.078	1.81	1.58	1.61	1.667	BLEED															
C_3H_8 44.094	0.17	0.16	0.13	0.153	5.02	7.796	20.496	1.0000	1.2218	980	2.582	WATER	7'2¼"	380.96	61	0.99992	380.93	10.9		
C_4H_8 56.104	1.10	1.35	1.06	1.170	NATURAL GAS		420.6	193	1457950				6'10-3/4	365.68	62	0.99982	365.61	8.276		
C_4H_{10} 58.120	0.26	0.52	0.54	0.440	28.43	7.604	20.864	0.8924	1.2075	4860	12.806		6'4"	336.22	59	1.00009	336.25			
C_5H_{10} 70.130	0.48	0.75	0.46	0.563	OXYGEN		427.2	61					1'1¼"	57.39	54	1.00047	57.42			101.43
C_5H_{12} 72.146	0.10	0.23	0.06	0.130	27.07	6.600	21.021	0.9990		3752	9.887						294.15		2434.39	12.256
C_6H_{12} 84.156	0.17	0.32	0.13	0.207	STEAM		14.8													
			M. W.	19.394001	215.7	3.950														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 66-CC

HOURS 595-619

	GAS ANALYSES			
HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	36.08	36.48	36.52	36.360
H_2 2.016	60.29	60.17	60.48	60.313
CO_2 44.010	2.22	2.48	2.43	2.377
N_2 28.016	0.71	0.74	0.43	0.627
CH_4 16.042	0.70	0.13	0.14	0.323
			M. W	12.67394
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	15.65	17.23	18.14	17.007
H_2 2.016	49.42	48.78	50.53	49.576
CO_2 44.010	20.71	20.92	19.62	20.417
N_2 28.016	1.56	1.61	1.49	1.553
CH_4 16.042	6.35	5.07	4.30	5.240
C_2H_4 28.052	1.57	1.57	1.43	1.523
C_2H_6 30.068	0.80	0.81	0.71	0.773
C_3H_6 42.078	1.65	1.71	1.55	1.637
C_3H_8 44.094	0.20	0.20	0.14	0.180
C_4H_8 56.104	0.99	1.07	1.04	1.033
C_4H_{10} 58.120	0.36	0.32	0.30	0.327
C_5H_{10} 70.130	0.47	0.48	0.48	0.477
C_5H_{12} 72.146	0.10	0.10	0.10	0.100
C_6H_{12} 84.156	0.17	0.13	0.17	0.157
			M. W.	18.760565

GENERATOR BALANCE

M/HR	C	H	O		Mol %	M/Hr	C	H	O
				O_2 32.000	0.36	9.887 0.047			19.868
14.461	14.461		14.461	CO_2 44.010	1.52	0.198	0.198		0.396
23.989		47;978		N_2 28.016	2.55	0.331			
0.945	0.945		1.890	CH_4 16.042	82.84	10.766	10.766	43.064	
0.249				C_2H_6 30.068	6.10	0.793	1.586	4.758	
0.129	0.129	0.516		C_3H_8 44.094	4.75	0.617	1.851	4.936	
				C_4H_{10} 58.120	1.45	0.188	0.752	1.880	
		7.321	3.661	C_5H_{12} 72.146	0.43	0.056	0.280	0.672	
	15.535	55.815	20.012	MW	19.869334				
	100.66	100.91	98.76	TOTAL			15.433	55.310	20.264

WEIGHT BALANCE

	#/hr Measured	At Wt. Balance
WET GAS	334.09	371.88
OIL	38.41	38.41
WATER	93.79	93.79
TOTAL	466.29	504.08
FRESH FEED	504.08	
WEIGHT BALANCE	92.50	
WET GAS FACTOR	1113113	
INDICATED LOSS—S C F H	764	
	7522	

GAS FLOW RATES

	√R	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED		405.4	64	2284214		
79.31	6.167	20.496	0.9962	1.5114	15094	39.773
WET GAS		1.92	65	1543130		
158.44	8.463	4.077	0.9952	1.2422	6758	17.808
RECYCLE		405.4	76			
158.44	7.888	20.496	0.9850	1.2422	31342	82.588
BLEED						
5.02	7.883	20.496	1.0000	1.2422	1008	2.656
NATURAL GAS		421.8	193	1457019		
28.43	7.708	20.893	0.8924	1.2071	4932	12.996
OXYGEN		427.9	64			
27.07	6.614	21.038	0.9962		.3752	9.887
STEAM		14.7				
215.7	3.742					

LIQUID PRODUCT RATES

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
OIL	6'10½"	364.59	51	1.0044	366.19	49.1		
	4'2½"	224.92	48	1.0059	226.25	6.523		
					+1.38		+9.00	38.41
					141.32		921.83	5.888
WATER	7'3½"	386.41	60	1.00000	386.41	10.9		
	6'4"	336.22	59	1.00009	336.25	8.276		
	4'10-¾	260.93	58	1.00018	260.98			
	0'9".	39.17	65	0.99953	39.15			93.79
					271.99	2250.99	2250.99	11.333