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THE TEXAS COMPANY

REFINING DEPARTMENT

TECHNICAL & RESEARCH DIVISION

REPORT ON

REVIEW OF SYNTHESIS OPERATIONS IN MONTEBELLO REACTOR No. 3—RUNS 44 AND 45

ERSONAL AND
ONFIDENTIAL

Laboratory MONTEBELLO

Report No. TDC-802-32-P

Date JUNE 15, 1950

STRICTLY CONFIDENTIAL

BRIEF OF PARTIAL REPORT

Laboratory Montebello
Date Approved May 26, 1950
Work Completed Feb. 2, 1949

Experiment No. TDC-802
Partial Report No. 32
Subject: Hydrocarbon Synthesis

Subject: Review of Synthesis Operations in Montebello Reactor No. 3 - Runs 44 and 45.

Object: To study the synthesis of hydrocarbons from carbon monoxide and hydrogen in Montebello Reactor No. 3 with mill scale catalyst.

History: Three other reactors had been used previously in synthesis work at Montebello. The Montebello Reactor No. 1 was a 10-inch vertical reactor with three 2-inch cooling tubes. Reactor No. 2 was a 12-inch vertical reactor with a 1-inch helically coiled steam cooling tube. The Stratco Reactor (not numbered) was a 16-inch mechanically agitated oil cooled reactor.

Experimental Results: After a shake-down and personnel training period, the Montebello Reactor No. 3, a 12-inch vertical reactor with three 2-inch cooling tubes, was operated satisfactorily at 325 psig pressure with mill scale catalyst promoted with 1.0% K_2O.

Conclusions:

1. The operation of Montebello Reactor No. 3 was considered superior to that of Reactor No. 1 which had relatively greater cooling surface.

2. Both the addition of reduced catalyst to the reactor and the circulation of hot hydrogen through the catalyst bed resulted in temporary increases in yields of C_{3+}.

3. There was a tendency for the yields of oil to decrease with time.

4. During operation with only reduced mill scale catalyst charged to the reactor, (a) the yields of the C_{3+} produce increased with increasing catalyst bed height and catalyst inventory, and (b) the density of the C_{3+} product remained constant with changes in the catalyst inventory.

5. After some unreduced mill scale catalyst (one-fourth of the total in the reactor) had been added, and despite the subsequent addition of reduced catalyst, (a) the yields of the total C_{3+} product increased with increasing bed height and catalyst inventory but the yield levels were relatively lower than before the addition of unreduced catalyst, and (b) the density of the C_{3+} product increased with increasing catalyst inventory. This was traceable to a decline in the yield of the C3-C6 fraction.

HYDROCARBON SYNTHESIS

PARTIAL REPORT NO. 32

Montebello Laboratory Experiment No. TDC-802
Work Completed Feb. 2, 1949 Report Approved May 26, 1950

REVIEW OF SYNTHESIS OPERATIONS IN MONTEBELLO REACTOR NO. 3 - RUNS 44 AND 45

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HYDROCARBON SYNTHESIS

PARTIAL REPORT NO. 32

Montebello Laboratory
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REVIEW OF SYNTHESIS OPERATIONS IN MONTEBELLO REACTOR NO. 3 - RUNS 44 AND 45

I. INTRODUCTION

A. Object

The object of the work described in the present report was to study the synthesis of hydrocarbons from carbon monoxide and hydrogen in Montebello Reactor No. 3 with mill scale catalyst.

B. History

The original Montebello synthesis reactor (No. 1) consisted of a 10" x 30' schedule 60 pipe fitted with three longitudinal 2" steam cooling tubes.1/ This reactor was generally satisfactory but some difficulty was encountered in obtaining the desired temperature levels because of excessive cooling surface and heat loss.

After Run 28 was completed, this reactor was dismantled, and an attempt was made to operate a 12" reactor (No. 2) fitted with a single, helically-coiled 1" steam cooling tube which had been designed to simulate a horizontal reactor proposed for the Carthage Hydrocol plant at Brownsville, Texas. This proved to be inoperable in Runs 29 through 38 because of inadequate performance of the cooling system.2/

Tests were then made on the 16" Stratco reactor.3/ This mechanically-agitated, oil-cooled, draft tube reactor was found to be operable, and catalyst losses were considerably less than those

1/Partial Report Nos. 5 and 13, Experiment No. TDC-802.
2/Partial Report No. 14, Experiment No. TDC-802.
3/Partial Report No. 31, Experiment No. TDC-802.

previously experienced, but conversion and yield levels were generally low as shown by Runs 39 through 43.

C. Scope

The present report discusses the work conducted with promoted mill scale at 300 psig in the Montebello Reactor No. 3, a 12" vessel 19 feet long containing three 2" cooling tubes. Run No. 44 has been considered a shakedown and personnel training run preparatory to Run No. 45, the first sustained experiment on this reactor. Data from Run 44 were considered of insufficient validity to warrant inclusion in the report. The work was done during the period of time extending from December 13, 1948 to February 2, 1949. The report includes operating, yield, and analytical data from both the generator and reactor systems.

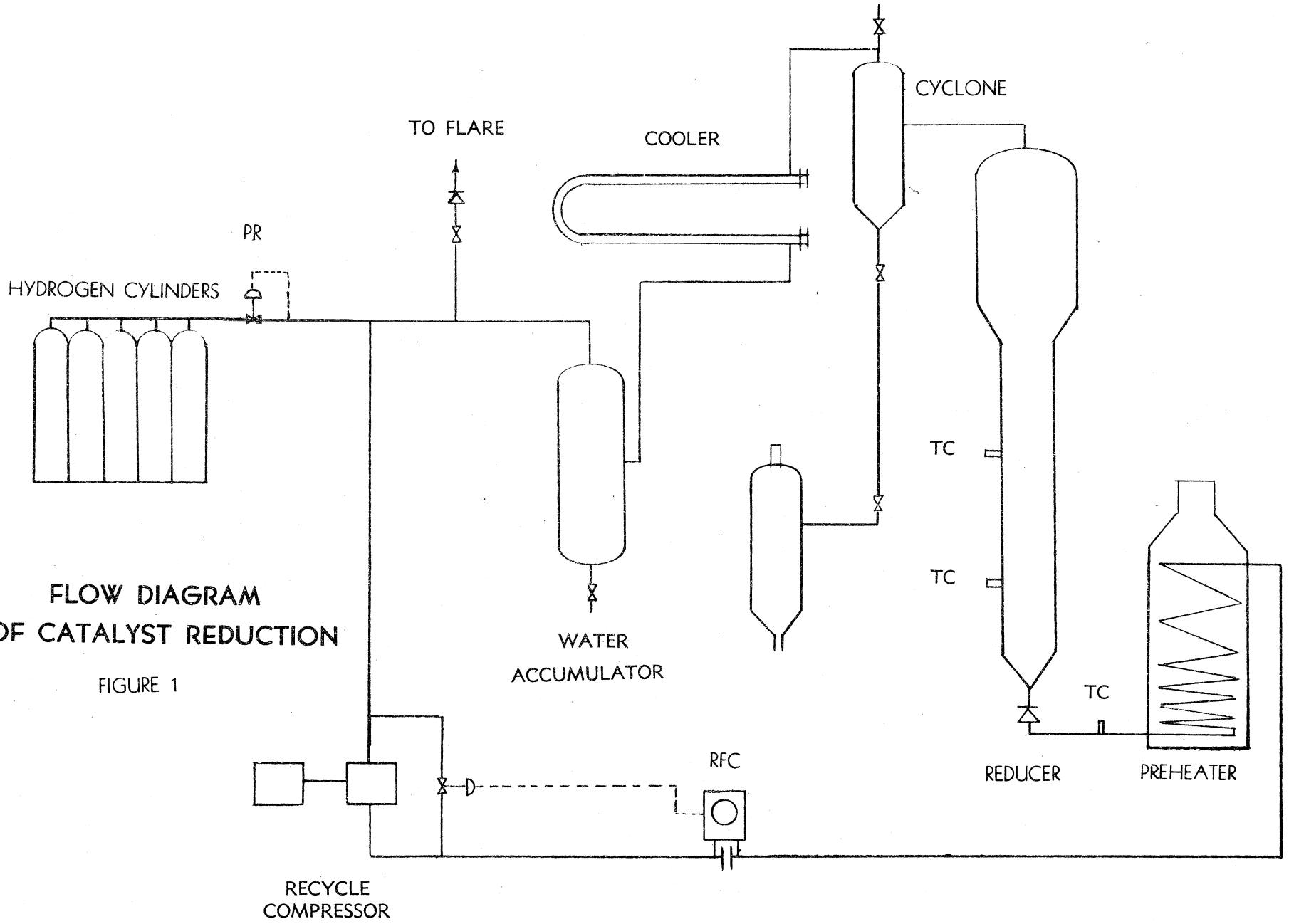
II. EXPERIMENTAL WORK

A. Equipment and Method of Operation

1. Synthesis Gas Generation

The synthesis gas mixture of carbon monoxide and hydrogen was the product of the uncatalyzed reaction between natural gas and oxygen at 325 psig and at temperatures in the 2300°F. range. The natural gas contained approximately 85 per cent methane, 1.5 per cent CO_2, 9.5 per cent ethane, 3.5 per cent propane, and small amounts of butane and nitrogen. The generator product gas was composed of hydrogen and carbon monoxide in the ratio of 1.5-1.7:1 and normally contained less than 4 per cent unconverted methane, 2 per cent carbon dioxide, and less than one per cent nitrogen. The generator system has been described in detail in previous reports[1] and since it serves only as a utility unit for the reactor, no further details are included in the present report.[2]

1/Partial Report Nos. 5, 10, and 13, Experiment No. TDC-802.
2/Data on the synthesis gas generations appear in the Appendix.



FLOW DIAGRAM OF CATALYST REDUCTION

FIGURE 1

2. Catalyst Pretreatment and Reduction

Mill scale resulting from the rerolling of steel railroad rails served as the base material for the catalyst used in the present work. The scale was obtained from the Finkelstein Supply Corporation of Los Angeles, and sent to the Twining Laboratories of Fresno, California, for drying and grinding.

A sieve analysis of the ground material gave the following results:

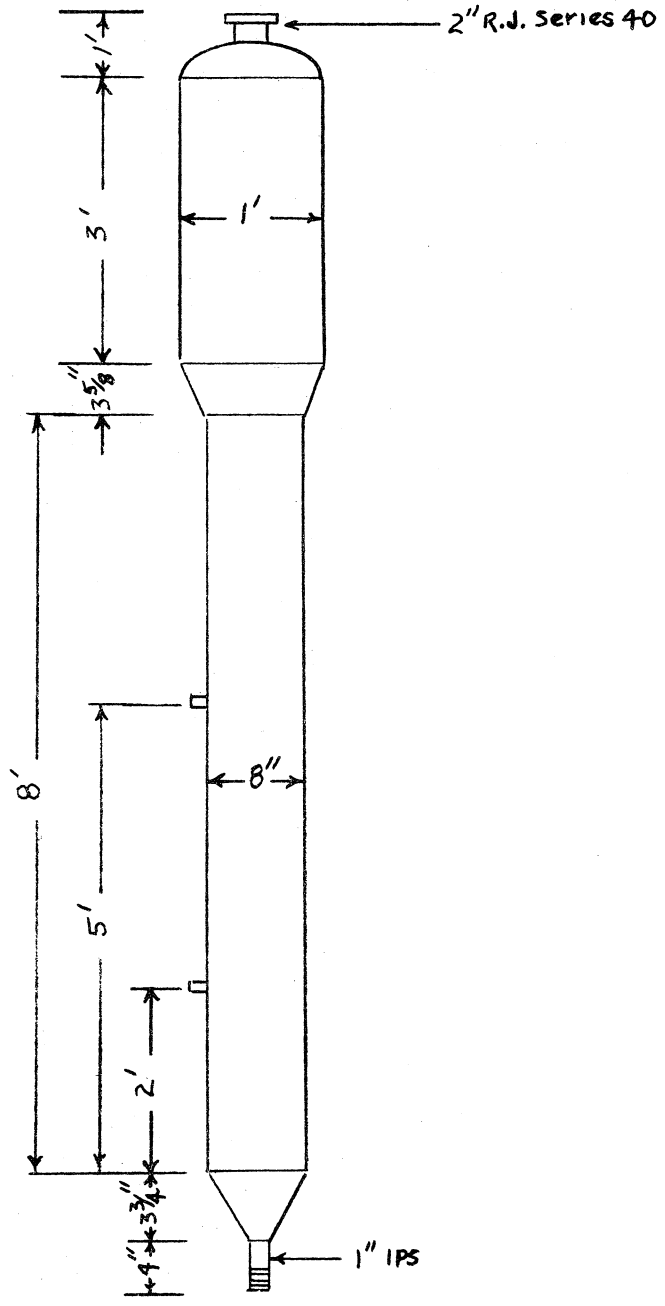
A.S.T.M. Sieve No.	Weight Per Cent
On 40	23.4
100	42.3
140	11.7
200	10.1
230	3.4
325	3.0
Through 325	6.1

The impregnation of the mill scale with potassium carbonate was conducted in a rectangular 3' x 7' x 1' steel gas-heated tray in batches of 250 to 1000 pounds. An amount of carbonate sufficient to provide 1.0 part K_2O/100 Fe was dissolved in steam condensate and poured over the mill scale in the tray. Additional condensate water was added to make a thick slurry, after which the mixture was stirred thoroughly. While being dried by the heat of the gas burners it was raked frequently to prevent caking.

The dried catalyst was transferred to the reduction system, shown in Figure 1, facing, and Figure 2, following, and treated with Linde cylinder hydrogen at 200 psig and at temperatures varying from 625 to 725°F. During the reduction the hydrogen was recycled after being cooled to approximately 80°F. to remove the bulk of the water. Make-up hydrogen was added to the system as required to maintain operating pressure.

CATALYST REDUCER

FIGURE 2



The catalyst was considered sufficiently reduced when water production decreased to approximately one-tenth pound per hour. After reduction and prior to use the catalyst was kept blanketed and handled in an atmosphere of carbon dioxide obtained by the evaporation of "dry ice" furnished by the Pure Carbonic Company of Los Angeles.

Hydrogen was used as a purging medium to remove air from the reactor system. The reduced catalyst was then charged to the reactor, and the bed temperatures were brought to the desired level by circulating hot hydrogen before introducing the synthesis gas.

3. Synthesis System

a. Description of Synthesis Reactor

The reactor consisted of a vertical, cylindrical vessel constructed from a 19-foot section of 12" seamless pipe having a 1/2" wall, and was fitted internally with three 2" schedule 80 steam tubes which extended the full length of the reactor. These tubes were connected with a steam drum at the top and a blow-down drum at the bottom, the boiler circuit being completed by an external 3" downcomer. This reactor had 2.82 square feet of cooling surface per cubic foot of free reactor space compared with 4.36 square feet in the original Montebello reactor.1/

The packing gland, to allow for expansion of the steam tubes, was placed at the top of the reactor instead of at the bottom as on the Reactor No. 1. There had been valves between the steam blow-down drum and the bottom of the steam tubes on the old reactor, but these were eliminated on the new one. The original reactor had been supported by a flared base which rested on the

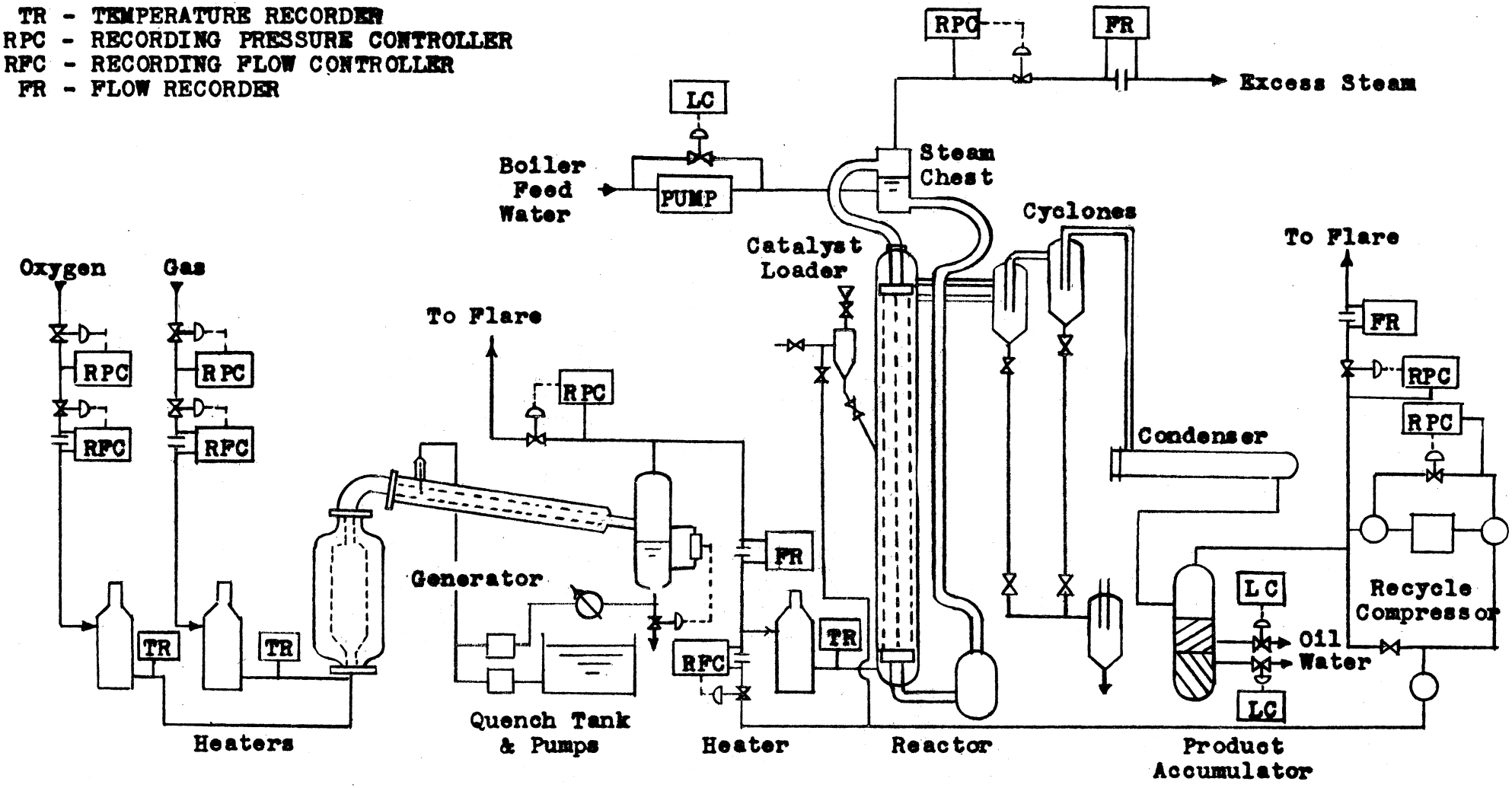
1/The Brownsville Reactor was designed to have 3.71 sq. ft. of cooling surface per cubic foot of free space.

ground, but this base was also discarded and the new reactor was supported from the top by a framework of structural steel. These changes resulted in a more compact reactor system with much less heat loss, and made it possible to reach higher catalyst bed temperatures more quickly than before with less preheat on the feed gases. This was a distinct advantage when circulating hydrogen to raise the catalyst bed temperatures up to operating level prior to introduction of the synthesis gas. It also meant that the steam system could be put on stream before the fresh feed was cut in.

Synthesis gas and recycle gas were combined, preheated, and fed to the bottom of the reactor. The combined feed entered the reaction zone by passing through a 1/8" annulus around the bottom steam header. Two outlets were provided for the effluent gases from the reactor, one above and one below the top steam header. Since there was only a 1/8" annulus around the top steam header, it was deemed necessary to have an alternate outlet below the header in case the annulus became clogged with catalyst. The hot effluent gases passed through two external, cyclone separators to remove entrained catalyst, and then flowed to a condenser and to a separator where oil and water were removed from the gas. Product oil and water were discharged individually to storage while the gas was compressed and recycled, sufficient gas being released to the flare to maintain the desired reactor pressure.

The heat of reaction was removed by the steam system which worked on a thermal siphon principle. Water, which was almost boiling, entered the bottom of the steam tubes, picked up heat from the reaction zone, and bubbled up to the steam chest

LC - LEVEL CONTROLLER
TR - TEMPERATURE RECORDER
RPC - RECORDING PRESSURE CONTROLLER
RFC - RECORDING FLOW CONTROLLER
FR - FLOW RECORDER



FLOW DIAGRAM OF GAS-FIRED GENERATOR
AND MONTEBELLO REACTOR

FIGURE 3

as a mixture of steam and water. Enough steam was released from the steam chest to maintain the steam pressure at the desired level. Slightly cooler water descended through the downcomer to complete the boiler circuit. The water level in the system was maintained by pumping in fresh boiler water at about 170°F. The entire steam system was heavily insulated so that most of the heat removed from the system was in the high pressure steam. Figure 3, facing, and Figure 4, following, illustrate the reactor and steam systems.

The bed temperatures were controlled by varying both the preheat temperature of the feed gas and the pressure in the steam system. The higher the steam pressure, the less the temperature differential between the steam tubes and the catalyst beds, and the cooling effect of the steam diminished. The steam pressure was normally above 650 psi. The feed gas preheat temperature was usually in the range of 400 to 600°F.

The catalyst loader on the reactor consisted of a two-foot section of 8-inch pipe swaged to a 2-inch cock on the bottom and a 3-inch cock on top. The catalyst, blanketed with CO_2, was poured through a funnel into the air-free loader while the bottom cock was closed. After the top cock was closed, the loader was pressured with recycle gas to about 75 psi more than the reactor pressure. When the bottom cock was opened, the catalyst charge was forced into the reactor. The loader remained full of recycle gas when it was not in use.

b. Methods of Sampling and Analysis

Gas samples were taken every four hours in dry aluminum bombs, but normally only every other sample was analyzed and a 24-hour average made of these three analyses.

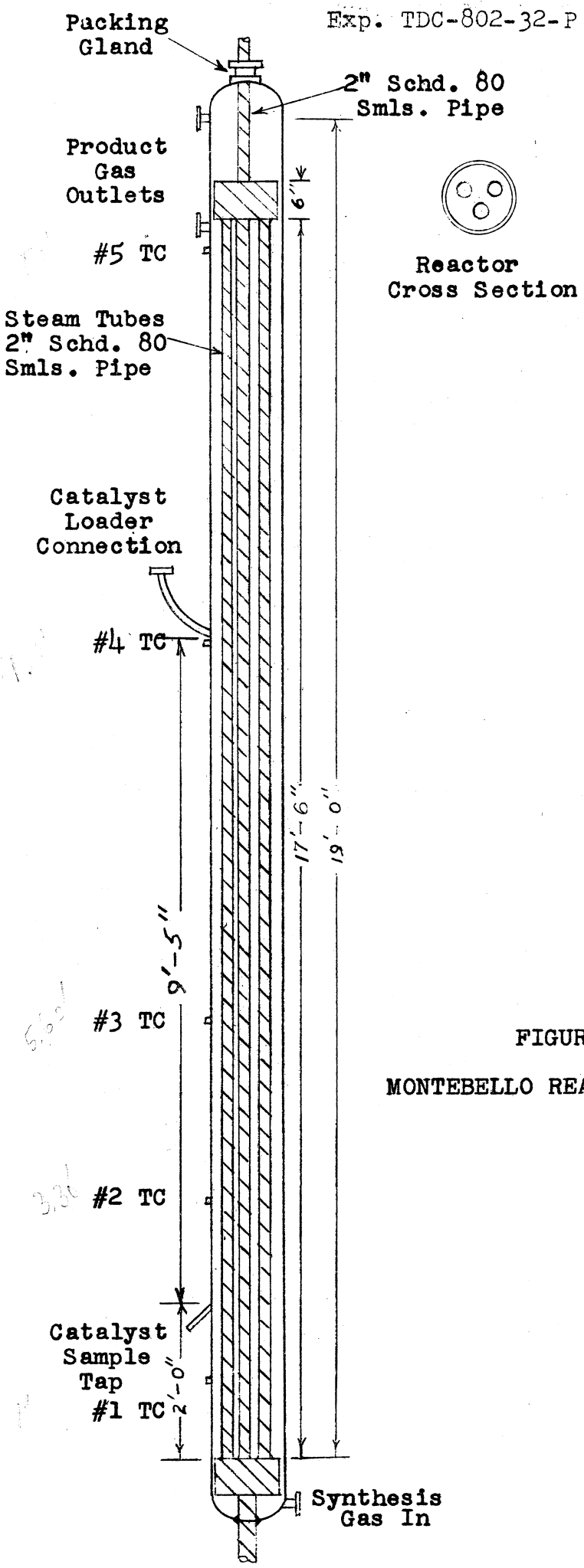


FIGURE 4

MONTEBELLO REACTOR NO. 3

The liquid product samples were drawn directly from the product separator into glass bottles at 12-hour intervals.

The catalyst samples were taken in bombs which were cooled with "dry ice" before being opened. The cooled catalyst was removed to jars containing pieces of "dry ice" to keep a blanket of carbon dioxide on the pyrophoric material. After the catalyst had been stored in the presence of the carbon dioxide, it usually lost its pyrophoricity.

All gas analyses, including those for carbon dioxide, were made with a Consolidated Engineering Corporation mass spectrometer. Orsat analyses were made of the synthesis gas from the generator but these were only for control purposes.

The tests made on catalyst and product were by methods found in either The Texas Company Standard Methods of Test Book or Special Methods of Test Book. The specific surface of the catalyst was determined by ammonia adsorption. It must be pointed out that this method was devised and calibrated using F.C.C.U. catalyst and does not give absolute values for specific surface of iron catalyst. It may, however, give an indication of the change in specific surface of iron catalysts.

The specific gravity of the catalyst was determined by using carbon tetrachloride and a picnometer.

The water-soluble chemicals (alcohols) content of the water was determined by salting out with potassium carbonate at 40°F. to 50°F.1/ These chemicals were predominantly alcohols and did not include the light organic acids.

1/This method is not in The Texas Company Standard Method of Test Book or Special Method of Test Book, but is discussed fully in Partial Report TDC-101-33.

c. Methods of Calculation

The data used in this report were obtained by forcing the weight balances on the assumption that any losses or gains were in wet gas flow measurements. The yields of separated oil and water were based on actually measured quantities. The term "C_{3+}" has been used in this report to denote all hydrocarbons having three or more carbon atoms to the molecule, plus all of the water-soluble chemicals as determined by salting out with K_2CO_3.

B. Experimental Results

Five hours after 610 pounds of reduced catalyst had been charged to the reactor under hydrogen pressure, the fresh feed was cut in to start Run 45. After 39 hours, a charge of 182 pounds of reduced catalyst was loaded. Again after 123 hours another 182-pound charge was loaded. Each time there was a temporary increase in yields of C_{3+}. Between periods 45-H and 45-I there was an interval of 55 hours when the generator was shut down. During this time, hot hydrogen was circulated through the catalyst to keep the bed temperatures about 650°F. This seemed to rejuvenate the catalyst because the yields of C_{3+} were higher for the next 53 hours (150 to 203 hours). The oil yield decreased during period 45-M but was brought up by addition of 161 pounds of reduced catalyst after 229 hours and 170 pounds after 255 hours. The oil yield was declining again after 303 hours when 207 pounds of unreduced catalyst was loaded during period 45-P. The addition of unreduced catalyst was accompanied by difficulty in maintaining the proper bed temperatures, and the yield of C_{3+} continued to decline. There was a three-hour shut-down during period 45-P, during which hydrogen was circulated in the reactor. The yield of

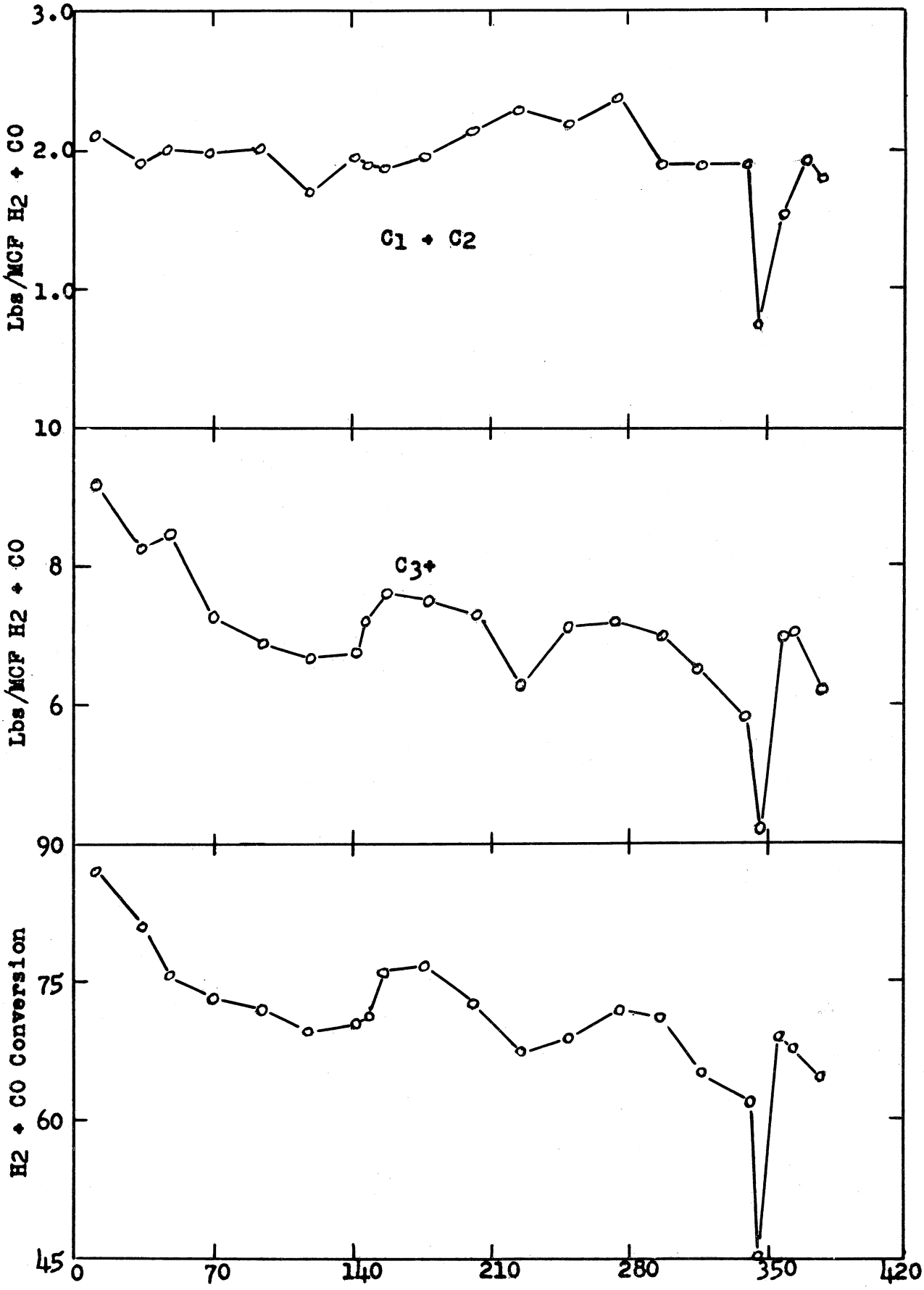


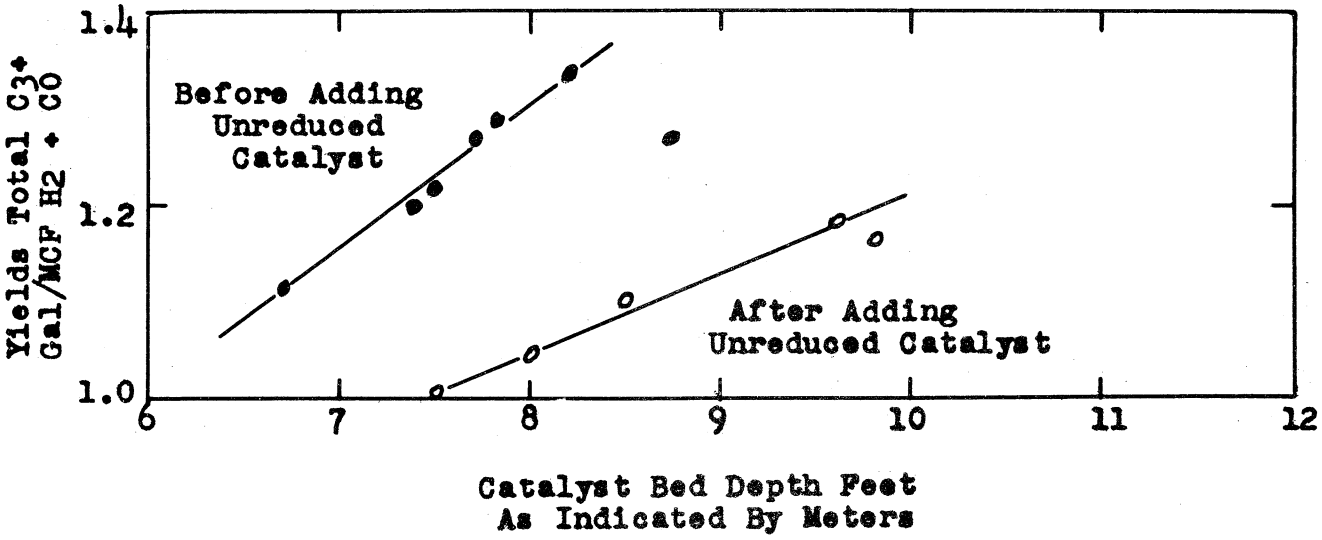
FIGURE 5
RUN 45

C_{3+} declined sharply during period 45-R-1 (343-348 hours) partly because of erratic bed temperatures. At times the temperature gradient of the catalyst bed was as much as 140°F., the bottom being 730°F., and the top being 590°F. During period 45-R-2, 188 pounds of reduced catalyst were loaded. This brought a sharp increase in C_{3+} yields. The bottom of the reactor became plugged, forcing a shut-down after 359 hours, but the run was continued again after a delay of 16 hours. The temperature gradient of the bed was about 600 F. when the feed was first cut in again, but within an hour it was down to about 50°F. Five hours later, a plug in the generator system caused a shut-down which lasted for 24-hours (end of period 45-S). After the unit was back on stream for 15 hours, a partial plug in the reactor terminated the run which had lasted for a total of 379 hours.

The reactor operated satisfactorily from a mechanical aspect. The better insulation and less cooling surface than in the preceding vertical-tube reactor made it possible to put the steam system on stream before cutting in fresh feed. The wild changes in bed temperatures at the beginning of previous runs were not encountered during the start-up of this run. The trouble with plugs in the reactor may have been caused by carbon from the generator or by the sudden addition of a large amount of unreduced catalyst, and could not be attributed to the reactor design.

The many variables such as shut-downs, different kinds of catalyst, circulation of hydrogen, and large bed-temperature gradients tended to prohibit examining the data for long-term trends.

In Figure 5, facing, the chronological yields of $C_1 + C_2$ and C_{3+} have been plotted as pounds per thousand cubic feet of



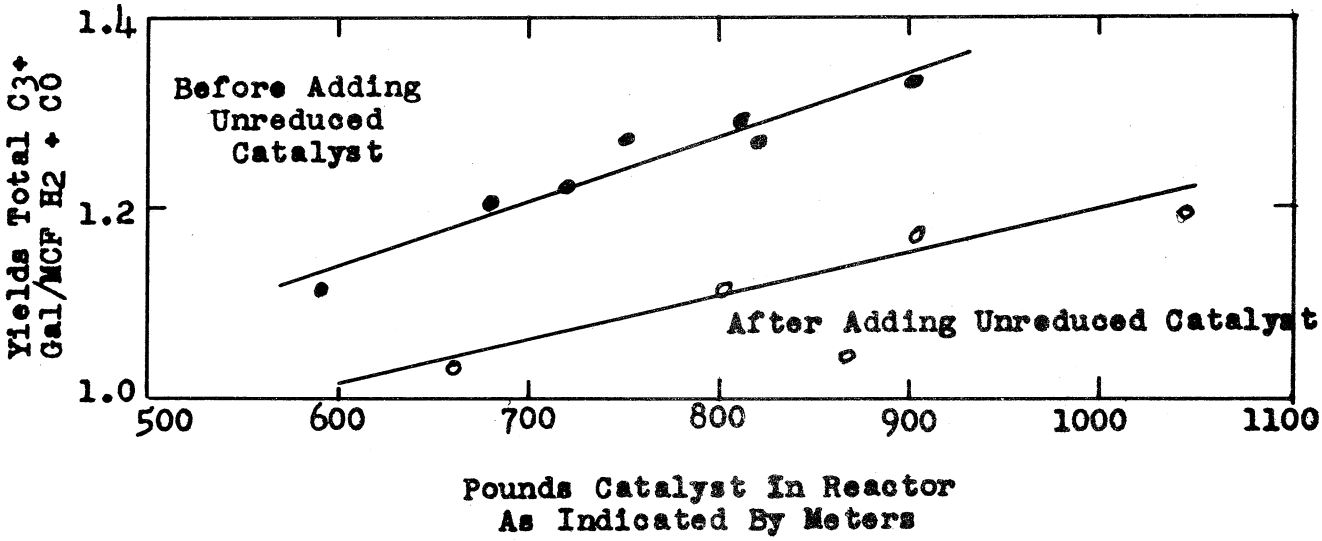
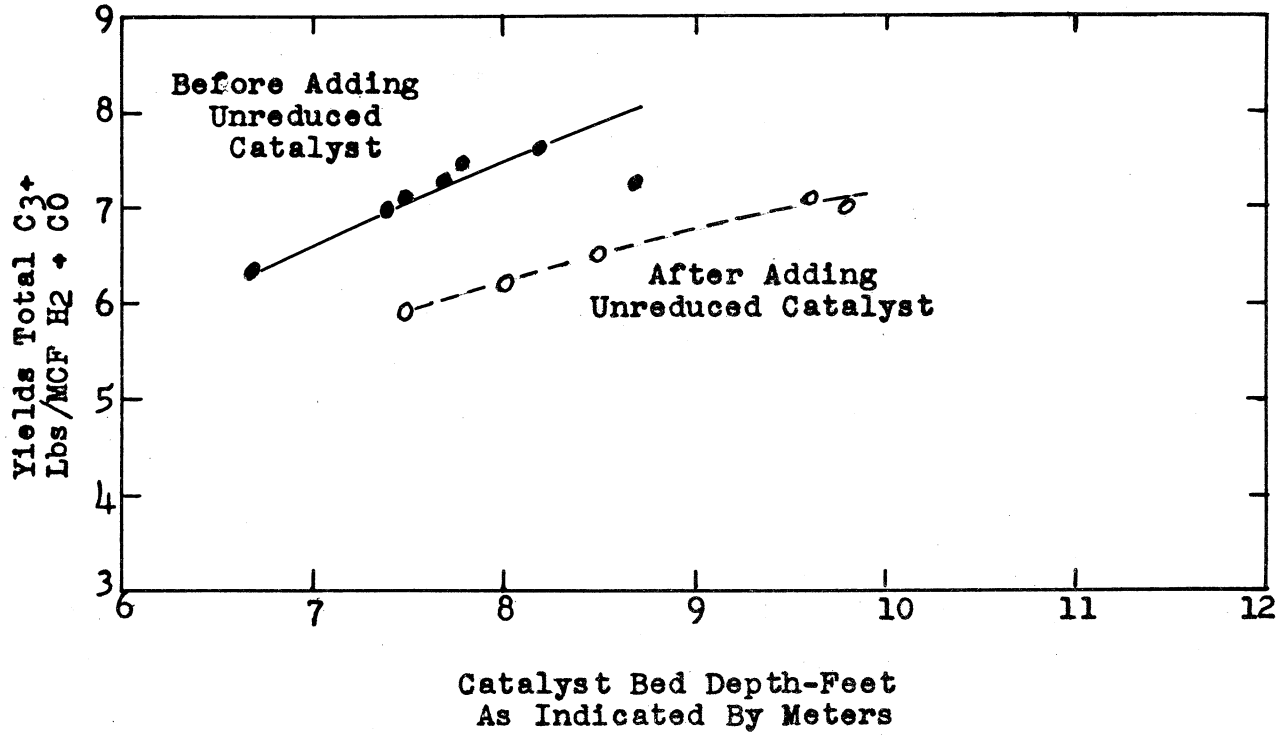


FIGURE 6

RUN 45

$H_2 + CO$ fed. The percentages of $H_2 + CO$ converted have also been plotted in the same figure. These plots show the previously-mentioned changes which reflect additions of catalyst and circulation of hydrogen through the reactor. It is difficult to say whether or not the addition of unreduced catalyst caused the drop in oil yield which occurred in Run 45-R-1 because it appears from the plots that the yields were probably already declining. The poor fluidization of the catalyst bed, as indicated by the large bed temperature gradients and frequent tendencies to plug, may have been caused by the sudden addition of a relatively large quantity of cold, low activity catalyst. Possibly if the unreduced catalyst had been loaded in smaller quantities over a longer period of time, the effects would have been more beneficial.

In Figure 6, facing, the yields of C_{3+} in gallons per thousand cubic feet of hydrogen plus carbon monoxide, have been correlated with catalyst-bed depth and with the weight of catalyst contained in the reactor. The catalyst data from periods 45-A through 45-H were not included because the catalyst meters were not working properly during this time. The data from the periods following the addition of unreduced catalyst gave different plots than the data from the periods before the addition of unreduced catalyst. If it be assumed that the unreduced catalyst acted only as a diluent, then altering the data by subtracting about 2.5 feet of bed depth and 275 pounds of catalyst inventory would make the plots practically coincide; but these figures correspond to a catalyst density of 167 pounds per cubic foot, which is slightly high. The plots diverged with increase in catalyst bed depth and inventory, when it appeared thay should have been parallel or



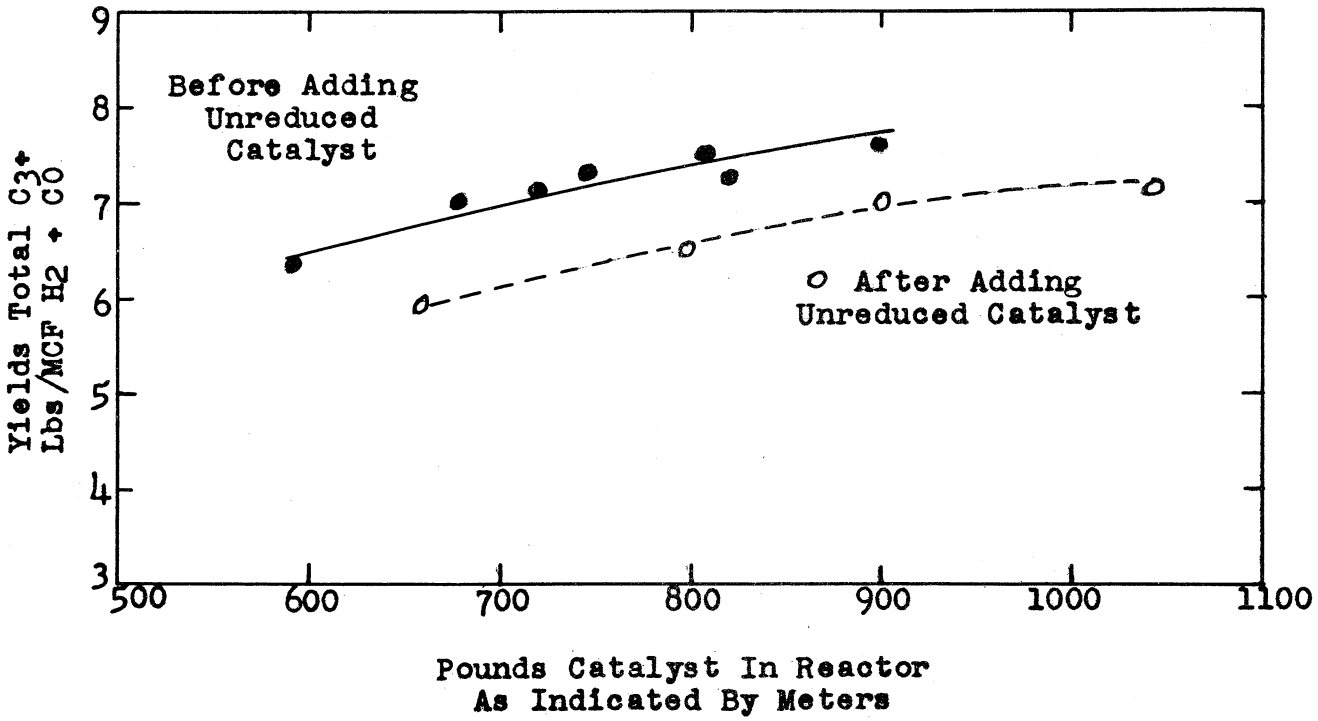


FIGURE 7

RUN 45

slightly convergent.

The same type of data have been plotted in Figure 7, facing, except that the yields have been expressed in pounds per thousand cubic feet of hydrogen plus carbon monoxide in the fresh feed. Two pairs of plots were obtained again, but the pair of lines plotted against catalyst bed height diverged only slightly and the pair plotted against pounds of catalyst in the reactor actually converged slightly. This indicated that the density of the C_{3+} fraction might have been changing with variation of catalyst bed height.

The densities, expressed in pounds per gallon, of the C_{3+} fractions have been plotted against the weight of catalyst in the reactor as shown in Figure 8, following. There seemed to be no indication of change in the density of the C_{3+} fraction with change in catalyst inventory before the addition of unreduced catalyst; but after unreduced catalyst had been added, the density of the C_{3+} fraction increased with catalyst inventory in the reactor, even though the changes in inventory were accomplished by adding reduced catalyst. The age of the catalyst, or any other time factor, cannot be used to explain this phenomenon because the catalyst inventory changes were not related to time, some of the later periods having higher or lower inventories than earlier periods.

In order to ascertain whether or not any particular component of the C_{3+} fraction contributed heavily to these changes in density, the yields (in gallons per MCF H_2 + CO) of the C_3-C_6, 400°E.P., 400°-550°, 550°+, and the water-soluble chemicals fractions have been plotted against weight of catalyst in the

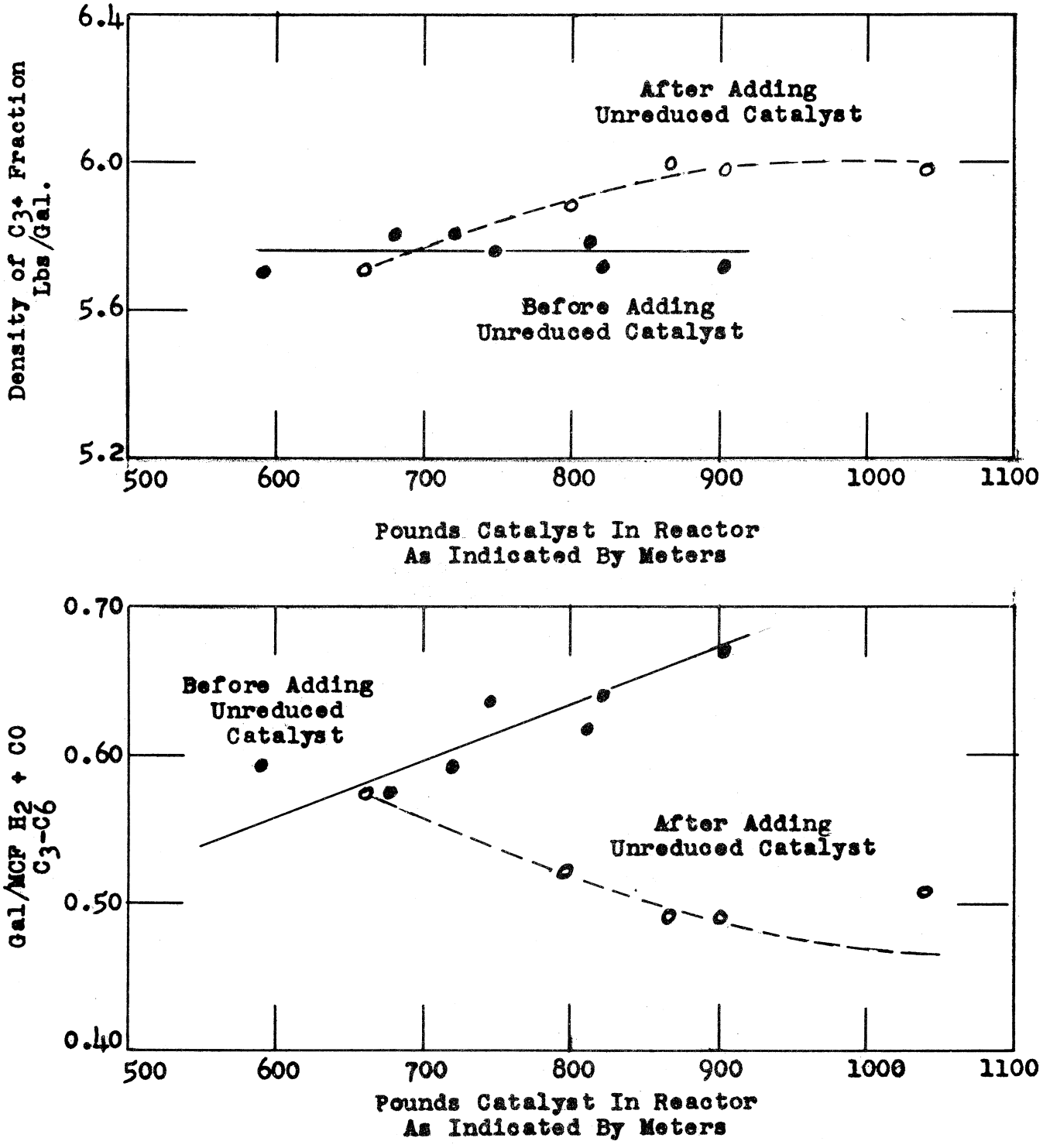


FIGURE 8

RUN 45

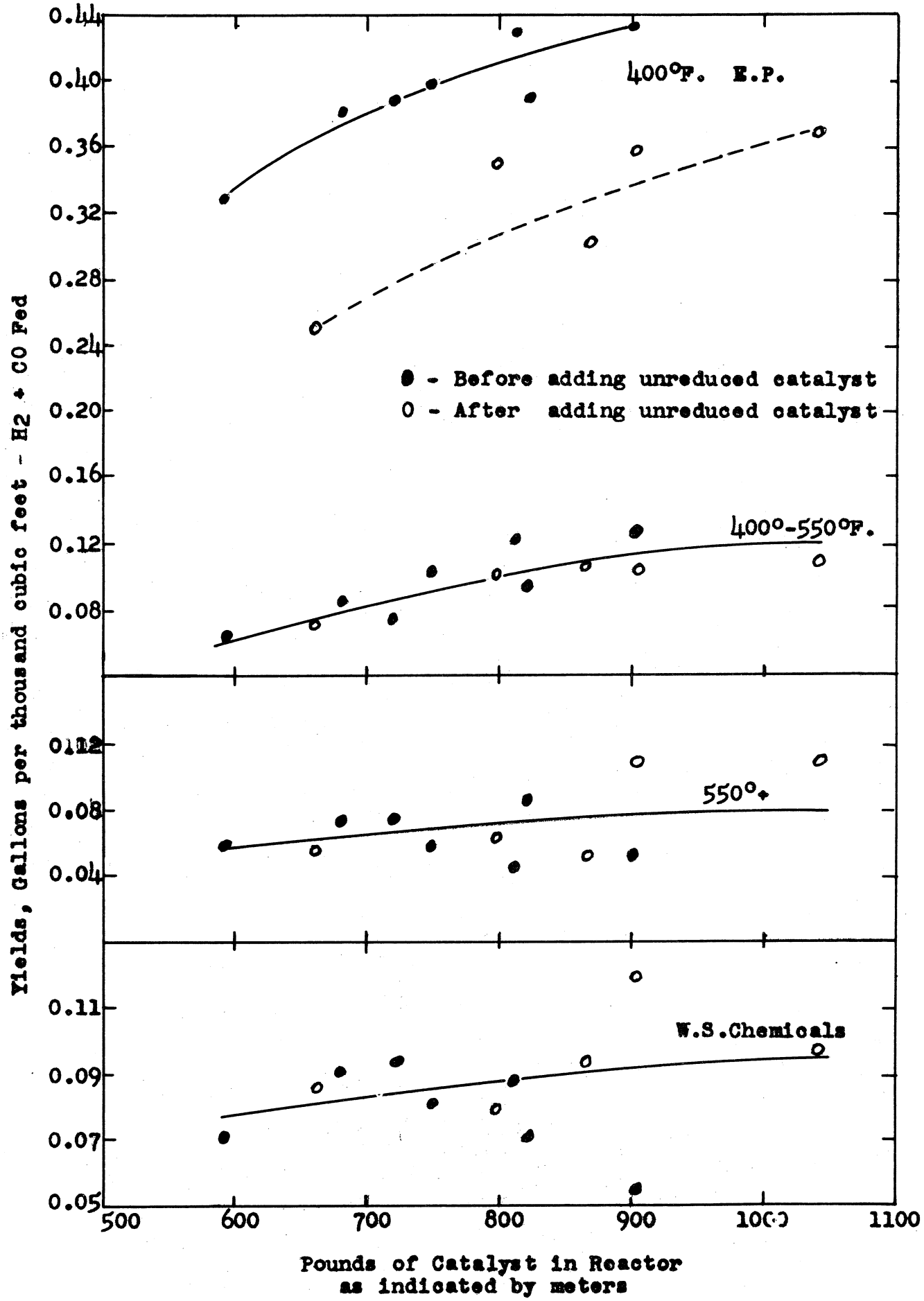


FIGURE 9
RUN 45

reactor and shown in Figure 8, page 19, and Figure 9, page 20. The variation of the density of the C_{3+} fraction after addition of unreduced catalyst seems to have been due primarily to the C_3-C_6 component. Before the addition of unreduced catalyst, the yields of C_3-C_6 increased when the catalyst inventory increased, but once unreduced catalyst had been put in the reactor the yields of C_3-C_6 declined moderately with increasing catalyst inventory.

III. CONCLUSIONS

1. The operation of Montebello Reactor No. 3 was considered superior to that of Reactor No. 1 which had relatively greater cooling surface.

2. Both the addition of reduced catalyst to the reactor and the circulation of hot hydrogen through the catalyst bed resulted in temporary increases in yields of C_{3+}.

3. There was a tendency for the yields of oil to decrease with time.

4. During operation with only reduced mill scale catalyst charged to the reactor, (a) the yields of the C_{3+} product increased with increasing catalyst bed height and catalyst inventory, and (b) the density of the C_{3+} product remained constant with changes in the catalyst inventory.

5. After some unreduced mill scale catalyst (one-fourth of the total in the reactor) had been added, and despite the subsequent addition of reduced catalyst, (a) the yields of the total C_{3+} product increased with increasing bed height and catalyst inventory but the yield levels were relatively lower than before the addition of unreduced catalyst, and (b) the density of the C_{3+} product increased with increasing catalyst inventory. This was traceable to a decline in the yield of the C_3-C_6 fraction.

IV. RECOMMENDATIONS

There are no recommendations to be made at this time.

V. FUTURE WORK

It is planned to continue the study of hydrocarbon synthesis from carbon monoxide and hydrogen, using the Montebello Reactor No. 3 with natural magnetite catalyst in the 400 psig range.

REPORT PREPARED BY W. K. Slater

APPROVED BY Dr. Boris Eastman/RAG

WLS:HV

WEK-LCKJr-CEL-WJC-dBE

WMS-RFB-KGM-JMB

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WEK-LCKJr-CEL-WJC-dBE

WMS-RFB-KGM-JMB

VI. APPENDIX

INDEX TO APPENDIX

A. POUR POINT TESTS ON RECOVERED OIL

POUR POINT TESTS ON RECOVERED OIL

RUN 45-B	Below -40°F.
RUN 45-D	-17°F.
RUN 45-G	+ 5°F.
RUN 45-J	Below -40°F.
RUN 45-M	+ 9°F.
RUN 45-P	+ 9°F.
RUN 45-S	+27°F.

B. DETAILED EXPERIMENTAL DATA

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 A From Hr. 1900 to Hr. 0700 Hrs. 0-12

FLOWS	SCFH	%
Oxygen		
Nat. Gas		
Total		
Fresh Feed		
F. F. by C		
Avg. F. F.	5955	
Wet Gas	1315	
Contraction	4640	
Recycle	13657	
Bleed	774	
Total	14431	
Total Feed	20386	
Recycle/F.F.	2.42	
Inlet Vel.	0.95	
Steam Flow		

RUN CONDITIONS	
Generator Press.	317
O_2 Preheat, °F	400
Gas Preheat, °F	700
Reactor Press.	300
Steam Back Press.	840
Temperatures, °F	
Heater Outlet	420
Catalyst #1	634
#2	632
#3	639
#4	621
#5	580
Average	635
Product Separator	42

DISTILLATIONS — ASTM	
Prod.	Naph
A.P.I.	57.4
I.B.P.	90
5%	
10%	120
20	152
30	171
40	204
50	232
60	256
70	291
80	322
90	360
95	392
E.P.	412
Rec.	96.0
Res.	2.0
Loss.	2.0

Hempel Dist.		
°F	%	A.P.I.
to 400	68.0	57.4
400-550	18.0	36.8
550+	14.0	

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	
Fresh Catalyst Charged	610
Catalyst Recharged	
Total	610
Catalyst Taken Out	87
In Reactor at End of Period	523
Reactor d-P, H_2O	
Pounds in Reactor	
Density, lbs./cu. ft.	159
Bed Height, Feet	
Space Vel. SCFH/lb. cat.	
Inventory Figures	11.4
From d-P Meters	

Montebello Mill Scale- 1.0% added K_2O basis Fe

CATALYST ANALYSIS — Particle Size					
	Screen			Sedimentation	
Frac.	M	%		M	%
On 40	420+	21.1		80+	
100	419-150	42.4		80-40	
150	149-105	12.3		40-20	
200	104-74	11.4		20-10	
250	73-62	4.0		10-0	
325	61-44	3.4			
<325	43-0	5.4			
Density, lbs./cu. ft.				Chem. Anal.	
Aerated	168			% Fe	
Settled	175			% C	
Compacted	180			% Oil	
Sp. Grav.	5.1			Specific Surface	
					m^2/gm
				5.4	ml.NH_3/gm

NATURAL GAS	%
CO_2	1.23
CH_4	84.49
C_2H_6	8.90
C_3H_8	1.89
C_4H_{10}	0.05
N_2	2.97
O_2	0.57

PRODUCT INSPECTION						
	Oil	Water	Product	Pour °F	SUS @ °F	
Neut. No.	45	34				
Sap. No.	47	39				
Hydrox. No.						
Bromine No.	75					
% Fe						
% Alc		8				
API	49.4	10.2				

GENERATOR ELEMENTAL BALANCE

IN	Mol %	SCFH m/hr	C	H	O
O_2					
CO_2					
CH_4					
C_2H_6					
C_3H_8					
C_4H_{10}					
N_2					
Total					

OUT	Mol %	SCFH m/hr	C	H	O
CO_2	2.426				
CO	36.700				
CH_4	1.562				
H_2	58.260				
N_2	1.052				
H_2O					
Total					

	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	36.70	5.766	161.50	8.60	0.394	11.04	3.099	8.865	3.493	-5.372	-150.46
H_2 2.016	58.26	9.154	18.45	32.73	1.502	3.03	11.794	20.948	13.296	-7.652	-15.42
CO_2 44.010	2.43	0.381	16.77	30.43	1.397	61.47	10.965	11.346	12.362	1.016	44.70
N_2 28.016	1.05	0.165	4.62	4.07	0.187	5.22	1.467	1.632	1.654		
CH_4 16.042	1.56	0.246	3.95	13.75	0.631	10.12	4.955	5.201	5.586	0.385	6.17
C_2H_4 28.052				2.92	0.134	3.74	1.052	1.052	1.186	0.134	3.74
C_2H_6 30.068				1.86	0.086	2.58	0.670	0.670	0.756	0.086	2.58
C_1+C_2											12.49
C_3H_6 42.078				3.20	0.147	6.18	1.153	1.153	1.300	0.147	6.18
C_3H_8 44.094											
C_4H_8 56.104				1.32	0.061	3.41	0.476	0.476	0.537	0.061	3.41
C_4H_{10} 58.120				0.44	0.020	1.15	0.159	0.159	0.179	0.020	1.15
C_5H_{10} 70.130				0.44	0.020	1.39	0.159	0.159	0.179	0.020	1.39
C_5H_{12} 72.146				0.08	0.004	0.29	0.029	0.029	0.033	0.004	0.29
C_6H_{12} 84.156				0.16	0.008	0.66	0.058	0.058	0.066	0.008	0.66
C_3-C_6											13.08
TOTAL		15.712			4.590	110.29	36.035	51.747	44.081		
H_2+CO	94.96	14.920	5655 S.C.F.H.		1.896		14.893	29.813	16.789	-13.024	
H_2/CO		1.59	176834		3.81			2.36	3.81	1.42	

YIELD BASIS H_2+CO FED — CONDENSATE	#/MCF	#/gal	gal/hr	gal/MCF
	7.904			
	1.092			
	0.661			
	0.456			
	2.209			
	1.093	4.32	1.431	0.253
		4.24		
	0.603	5.00	0.682	0.121
	0.203	4.86	0.237	0.042
	0.246	5.45	0.255	0.045
	0.051	5.25	0.055	0.010
	0.117	5.54	0.119	0.021
	2.313		2.779	0.492

YIELD BASIS H_2+CO FED — POLYMER	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	% Unsats.
	Distribution of					
	Recovered Oil					
		400 EP			0.625	
		400-550			0.166	
		550+			0.129	
					0.920	61.0
	5.56	0.983	6.25	0.890	0.157	100.0
	3.24	0.573	6.10	0.531	0.094	75.0
	1.15	0.203	4.86	0.237	0.042	
	1.39	0.246	5.45	0.255	0.045	83.0
	0.29	0.051	5.25	0.055	0.010	
	0.66	0.117	5.54	0.119	0.021	
	12.29	2.173		2.087	0.369	

CUMULATIVE TOTALS	H_2+CO MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO								
	RECOVERED OIL	0.241*	33.84	5.984		5.200	0.920	33.84
	TOTAL OIL		46.92	8.297		7.979	1.412	46.13
	WATER SOLUBLE CHEMICALS	0.092*	4.89	0.865		0.590	0.104	4.89
$\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 15.1	TOTAL LIQUID PRODUCTS C_3+		41.81	9.162		8.569	1.516	51.02
	NET WATER	3.123*	56.27	9.950		6.740	1.192	
	GROSS WATER		61.16	10.815		7.330	1.296	
	HYDROCARBON TOTAL—C_1+		64.30	11.370				

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+ / C_1+
70.8	93.2	83.6	87.3	60.6	36.5	43.7	80.6

*Included in Reactor Effluent Total Weight Balance = 86.7%

g/M3 = 16.91 × #/MCF.
cc/M3 = 141.3 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 B From Hr. 0700 to Hr. 0700 Hrs. 12-36

FLOWS	SCFH	%
Oxygen	1587	
Nat. Gas	2531	
Total	4118	
Fresh Feed	5983	
F. F. by C		
Avg. F. F.		
Wet Gas	2008	
Contraction		
Recycle	14853	
Bleed	763	
Total	15616	
Total Feed	21599	
Recycle/F.F.	2.61	
Inlet Vel.	0.89	
Steam Flow		

RUN CONDITIONS	
Generator Press.	315
O_2 Preheat, °F	430
Gas Preheat, °F	713
Reactor Press.	300
Steam Back Press.	800
Temperatures, °F	
Heater Outlet	446
Catalyst #1	630
#2	630
#3	632
#4	640
#5	628
Average	630
Product Separator	48

DISTILLATIONS — A S T M								
Prod.	Naph							
A.P.I.	57.3							
I.B.P.	94							
5%								
10%	128							
20	156							
30	176							
40	202							
50	230							
60	262							
70	280							
80	310							
90	348							
95	378							
E.P.	390							
Rec.	97.0							
Res.	1.5							
Loss	1.5							

Hempel Dist.	°F	%	A.P.I.
to 400	71.6	57.3	
400-550	15.6	36.4	
550+	12.9		

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	523
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	51
In Reactor at End of Period	472
Reactor d-P, H_2O	
Pounds in Reactor	
Density, lbs./cu. ft.	146
Bed Height, Feet	
Space Vel. SCFH/lb. cat.	
Inventory Figures	14.6
From d-P Meters	

CATALYST ANALYSIS — Particle Size				
	Screen		Sedimentation	
Frac.	M	%	M	%
On 40	420+	19.9	80+	
100	419-150	40.9	80-40	
150	149-105	12.3	40-20	
200	104-74	13.3	20-10	
250	73-62	4.6	10-0	
325	61-44	6.4		
<325	43-0	2.6		

Density, lbs./cu. ft.		Chem. Anal.	
Aerated	155	% Fe	
Settled	158	% C	
Compacted	166	% Oil	
Sp. Grav.	4.7	Specific Surface	
			m^2 gm
		7.0	ml.NH_3/gm

NATURAL GAS	%
CO_2	1.57
CH_4	84.44
C_2H_6	8.60
C_3H_8	1.89
C_4H_{10}	0.07
N_2	2.84
O_2	0.59

PRODUCT INSPECTION					
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	45	42			
Sap. No.	50	44			
Hydrox. No.					
Bromine No.	79				
% Fe					
% Alc		8			
°API	50.4	10.0			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	m/hr	C	H	O
O_2		0.04			
		4.19			8.452
CO_2		0.11	0.11		0.210
CH_4		5.64	5.64	22.56	
C_2H_6		0.57	1.15	3.44	
C_3H_8		0.13	0.39	1.01	
C_4H_{10}		0.01	0.02	0.1	
N_2		0.19			
Total			7.29	27.06	8.66

OUT	Mol %	m/hr	C	H	O
CO_2	1.69	0.267	0.27		0.5
CO	35.36	5.582	5.58		5.6
CH_4	3.37	0.532	0.53	2.13	
H_2	58.62	9.254		18.51	
N_2	0.96	0.152			
H_2O				5.76	2.9
Total			6.38	26.39	9.0
			87.53	97.54	103.8

	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	35.36	5.58	156.35	11.57	0.635	17.79	4.765	10.347	5.400	-4.947	-138.56
H_2 2.016	58.63	9.26	18.66	40.05	2.203	4.44	16.503	25.758	18.706	-7.052	-14.22
CO_2 44.010	1.69	0.27	11.75	21.93	1.206	53.08	9.034	9.301	10.240	0.939	41.33
N_2 28.016	0.95	0.15	4.20	2.45	0.135	3.78	1.009	1.159	1.144	0.015	
CH_4 16.042	3.37	0.53	8.53	15.17	0.833	13.37	6.248	6.780	7.081	0.301	4.84
C_2H_4 28.052				2.13	0.117	3.53	0.879	0.879	0.996	0.117	3.53
C_2H_6 30.068				1.17	0.064	1.93	0.482	0.482	0.546	0.064	1.93
C_1+C_2											10.30
C_3H_6 42.078				2.74	0.151	6.33	1.127	1.127	1.278	0.151	6.33
C_3H_8 44.094				0.25	0.013	0.59	0.105	0.105	0.118	0.013	0.59
C_4H_8 56.104				1.45	0.080	4.48	0.595	0.595	0.675	0.080	4.48
C_4H_{10} 58.120				0.40	0.022	1.27	0.166	0.166	0.188	0.022	1.27
C_5H_{10} 70.130				0.56	0.031	2.18	0.229	0.229	0.260	0.031	2.18
C_5H_{12} 72.146											
C_6H_{12} 84.156				0.40	0.008	0.70	0.059	0.059	0.067	0.008	0.70
C_3-C_6											15.55
TOTAL		15.786	199.49	100.00	5.499	144.92	41.202	56.987	50.022		
H_2+CO	93.99	14.837	5623 S.C.F.H.		2.838		21.268	36.105		-11.999	
H_2/CO		1.66	177841		3.47			2.48		1.43	

YIELD BASIS H_2+CO FED — CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	POLYMER #/hr	#/MCF	#/gal	gal/hr	gal/MCF	Unsats.
				Distribution of					
				Recovered Oil					
7.350					400 EP			0.520	
					400-550			0.113	
0.861					550+			0.094	
0.628								0.727	64.6
0.343									
1.832									
1.126	4.32	1.465	0.261	5.70	1.014	6.25	0.911	0.162	91.5
0.105	4.24	0.139	0.025						
0.797	5.00	0.896	0.159	4.26	0.758	6.10	0.698	0.124	78.2
0.226	4.86	0.261	0.046	1.27	0.226	4.86	0.261	0.046	
0.388	5.45	0.400	0.071	2.18	0.388	5.45	0.400	0.071	
	5.25					5.25			
0.124	5.54	0.126	0.022	0.70	0.124	5.54	0.126	0.022	
2.766		3.287	0.584	14.11	2.510		2.396	0.425	

CUMULATIVE TOTALS	H_2+CO,MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 11.7

RECOVERED OIL	0.189*	26.51	4.715	4.090	0.727
TOTAL OIL		42.06	7.481	7.377	1.311
WATER SOLUBLE CHEMICALS	0.091*	4.81	0.855	0.572	0.102
TOTAL LIQUID PRODUCTS C_3+		46.87	8.336	7.949	1.413
NET WATER	3.041*	54.79	9.744	6.578	1.170
GROSS WATER		59.60	10.599	7.150	1.272
HYDROCARBON TOTAL—C_1+		57.17	10.167		

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+ /C_1+
65.2	88.6	76.2	80.9	47.8	27.4	33.2	81.98

*Included in Reactor Effluent Total

Weight Balance = 97.96%

g/M3 = 16.91 × ± MCF

cc/M3 = 141.3 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 C From Hr. 0700 to Hr. 1/14/49 Hrs. 36-48

FLOWS	SCFH	%
Oxygen	2072	
Nat. Gas	2953	
Total	5025	
Fresh Feed	7767	
F. F. by C	8362	
Avg. F. F.	8065	
Wet Gas	2924	
Contraction		
Recycle	14996	
Bleed	825	
Total	15821	
Total Feed	23588	
Recycle/F.F.	2.04	
Inlet Vel.	0.96	
Steam Flow		

RUN CONDITIONS	
Generator Press.	324
O_2 Preheat, °F	480
Gas Preheat, °F	700
Reactor Press.	302
Steam Back Press.	800
Temperatures, °F	
Heater Outlet	349
Catalyst #1	624
#2	623
#3	627
#4	651
#5	612
Average	625
Product Separator	48

DISTILLATIONS A S T M	
Prod.	Naph
A.P.I.	57.7
I.B.P.	100
5%	
10%	136
20	160
30	180
40	206
50	226
60	252
70	280
80	308
90	348
95	382
E.P.	394
Rec.	97.5
Res.	1.0
Loss.	1.5

Hempel Dist.	%	A.P.I.
°F		
to 400	72.0	57.7
400-550	18.6	36.2
550+	9.4	

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	472
Fresh Catalyst Charged	182
Catalyst Recharged	654
Total	
Catalyst Taken Out	26.50
In Reactor at End of Period	627.50
Reactor d-P, H_2O	
Pounds in Reactor	
Density, lbs./cu. ft.	150
Bed Height, Feet	
Space Vel. SCFH/lb. cat.	
Inventory Figures	12.8
From d-P Meters	

CATALYST ANALYSIS — Particle Size				
	Screen		Sedimentation	
Frac.	M	%	M	%
On 40	420+	20.3	80+	
100	419-150	43.4	80-40	
150	149-105	13.1	40-20	
200	104-74	13.2	20-10	
250	73-62	3.8	10-0	
325	61-44	5.2		
<325	43-0	1.0		
Density, lbs./cu. ft.			Chem. Anal.	
Aerated 172			% Fe	
Settled 175			% C	
Compacted 180			% Oil	
Sp. Grav. 4.76			Specific Surface	
				m^2/gm
			1.0	ml. N_2/gm

NATURAL GAS	%
CO_2	1.290
CH_4	84.138
C_2H_6	9.036
C_3H_8	2.322
C_4H_{10}	0.066
N_2	2.606
O_2	0.542

PRODUCT INSPECTION					
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	47	40			
Sap. No.	51	42			
Hydrox. No.					
Bromine No.	79				
% Fe					
% Alc		8			
API	50.8	10.7			

GENERATOR ELEMENTAL BALANCE

IN	#/hr ~~Mol %~~	~~SCFH~~ m/hr	C	H	O
O_2		5.509			11.018
CO_2		0.101	0.101		0.202
CH_4		6.570	6.570	26.280	
C_2H_6		0.706	1.412	4.236	
C_3H_8		0.181	0.543	1.448	
C_4H_{10}		0.005	0.020	0.050	
N_2		0.204			
Total			8.646	32.014	11.22

OUT	Mol %	~~SCFH~~ m/hr	C	H	O
CO_2	1.707	0.350	0.350		0.700
CO	35.770	7.330	7.330		7.330
CH_4	1.440	0.295	0.295	1.180	
H_2	60.243	12.794		25.588	
N_2	0.840	0.172			
H_2O				5.246	5.190
Total					

FRESH FEED	%	m/hr	#/hr
CO 28.010	35.77	7.33	205.31
H_2 2.016	60.24	12.35	24.89
CO_2 44.010	1.71	0.35	15.40
N_2 28.016	0.84	0.17	4.82
CH_4 16.042	1.44	0.30	4.73
C_2H_4 28.052			
C_2H_6 30.068			
C_1+C_2			
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_6H_{12} 72.146			
C_6H_{12} 84.156			
C_3-C_4			
TOTAL		20.493	255.15
H_2+CO	96.01	19.676	7457 S.C.F.H.
H_2/CO		1.69	13410

WET GAS	%	At. Wt. Balance m/hr	At. Wt. Balance #/hr
	12.790	1.052	29.47
	45.670	3.755	7.57
	21.057	1.731	76.17
	2.247	0.184	5.17
	9.330	0.767	12.31
	2.100	0.173	4.84
	1.093	0.090	2.70
	2.717	0.223	9.37
	0.417	0.034	1.50
	1.483	0.121	6.82
	0.330	0.027	1.55
	0.563	0.047	3.29
	0.060	0.005	0.38
	0.137	0.012	0.99
		8.221	162.12
		4.807	
		3.57	

RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr
5.341	12.671	6.393
19.067	31.413	22.822
8.790	9.140	10.521
0.938	1.110	1.122
3.895	4.190	4.662
0.877	0.877	1.050
0.456	0.456	0.546
1.134	1.134	1.357
0.174	0.174	0.208
0.619	0.619	0.740
0.138	0.138	0.165
0.235	0.235	0.282
0.025	0.025	0.030
0.057	0.057	0.069
41.746	62.239	53.269
24.408	44.084	29.215
	2.48	

NET CHANGE m/hr	#/hr
-6.278	-175.84
-8.591	-17.32
1.381	60.77
0.012	
0.472	7.58
0.173	4.84
0.090	2.70
	15.12
0.223	9.37
0.034	1.50
0.121	6.82
0.027	1.55
0.047	3.29
0.005	0.38
0.012	0.99
	23.90
-14.869	
1.37	

YIELD BASIS H_2+CO FED

CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
1.257	4.32	2.169	0.291
0.201	4.24	0.354	0.047
0.915	5.00	1.364	0.183
0.208	4.86	0.319	0.043
0.441	5.45	0.604	0.081
0.051	5.25	0.072	0.010
0.133	5.54	0.179	0.024
3.206		5.061	0.679

POLYMER #/hr	#/MCF	#/gal	gal/hr	gal/MCF	% Unsats.
Distribution of					
Recovered Oil					
400 EP				0.519	
400-550				0.134	
550+				0.068	
				0.721	65.8
8.43	1.130	6.25	1.349	0.181	86.8
6.48	0.869	6.10	1.062	0.142	81.8
1.55	0.208	4.86	0.319	0.043	
3.29	0.441	5.45	0.604	0.081	90.4
0.38	0.051	5.25	0.072	0.010	
0.99	0.133	5.54	0.179	0.024	
21.12	2.832		3.585	0.481	

CUMULATIVE TOTALS	H_2+CO MCF	Catalyst #	C_3^+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 12.7

		#/hr	#/MCF	#/gal	gal/hr	gal/MCF
RECOVERED OIL		0.249*	34.93	4.684		5.380	0.721
TOTAL OIL			58.83	7.890		10.441	1.400
WATER SOLUBLE CHEMICALS		0.088*	4.69	0.629		0.558	0.075
TOTAL LIQUID PRODUCTS C_3+			63.52	8.519		10.999	1.475
NET WATER		2.965*	53.41	7.162		6.412	0.860
GROSS WATER			58.10	7.791		6.970	0.935
HYDROCARBON TOTAL—C_1+			78.64	10.546			

YIELD BASIS H_2+CO FED	#/hr	#/MCF	#/gal	gal/hr	gal/MCF
	34.93	4.684		5.380	0.721
	34.93	4.684		5.380	0.721
	56.05	7.516		8.965	1.202
	4.69	0.629		0.558	0.075
	60.74	8.145		9.523	1.277

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
59.9	85.65	69.59	75.6	49.55	27.35	33.73	80.77

*Included in Reactor Effluent Total

Weight Balance = 96.1%

g./M3 = 16.91 × ± MCF.
cc./M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 D From· Hr. 0700 to Hr. 0700 Hrs. 48-72

FLOWS	SCFH	%
Oxygen	2096	
Nat. Gas	3342	
Total	5438	
Fresh Feed	8606	
F. F. by C	9259	
Avg. F. F.	9033	
Wet Gas	3197	
Contraction		
Recycle	15174	
Bleed	851	
Total	16025	
Total Feed	24631	
Recycle/F.F.	1.86	
Inlet Vel.	1.01	
Steam Flow		

RUN CONDITIONS	
Generator Press.	325
O_2 Preheat, °F	477
Gas Preheat, °F	720
Reactor Press.	300
Steam Back Press.	750
Temperatures, °F	
Heater Outlet	410
Catalyst #1	620
#2	620
#3	646
#4	649
#5	618
Average	620
Product Separator	48

DISTILLATIONS	A S T M	Hempel Dist.		
		°F	%	A.P.I.
Prod.	Naph			
A.P.I.	56.7	to 400	71.6	56.7
I.B.P.	90	400-550	16.6	37.8
5%		550+	11.8	
10%	124			
20	158			
30	182			
40	206			
50	226			
60	252			
70	286			
80	318			
90	354			
95	386			
E.P.	400			
Rec.	97.0			
Res.	1.5			
Loss.	1.5			

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	627.50
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	32.50
In Reactor at End of Period	595
Reactor d-P, H_2O	
Pounds in Reactor	
Density, lbs./cu. ft.	154
Bed Height, Feet	
Space Vel. SCFH/lb. cat.	
Inventory Figures	15.01
From d-P Meters	

CATALYST ANALYSIS — Particle Size				
Screen			Sedimentation	
Frac.	M	%	M	%
On 40	420+	24.5	80+	
100	419-150	43.3	80-40	
150	149-105	12.1	40-20	
200	104-74	11.7	20-10	
250	73-62	3.5	10-0	
325	61-44	3.3		
<325	43-0	1.6		

Density, lbs./cu. ft		Chem. Anal.	
Aerated	212	% Fe	
Settled	213	% C	
Compacted	215	% Oil	
Sp. Grav.	4.98	Specific Surface	
			m^2/gm
		1.5	ml.NH_3/gm

NATURAL GAS	%
CO_2	1.290
CH_4	84.138
C_2H_6	9.036
C_3H_8	2.322
C_4H_{10}	0.066
N_2	2.606
O_2	0.542

PRODUCT INSPECTION						
	Oil	Water	Product	Pour °F	SUS @ °F	
Neut. No.	45	40				
Sap. No.	51	45				
Hydrox. No.						
Bromine No.	76					
% Fe						
% Alc		10				
Aniline Point °F	60.8					
°API	51.2	10.6				

GENERATOR ELEMENTAL BALANCE

	IN Mol %	SCFH m/hr	C	H	O	OUT	Mol %	SCFH m/hr	C	H	O
O_2		5.578			11.156	CO_2	1.690	0.394	0.38		0.8
CO_2		0.114	0.114		0.228	CO	35.456	8.051	8.05		8.1
CH_4		7.420	7.420	29.680		CH_4	2.116	0.490	0.48	1.920	
C_2H_6		0.798	1.596	4.788		H_2	59.890	13.600		27.200	
C_3H_8		0.205	0.615	1.640		N_2	0.848	0.193			
C_4H_{10}		0.006	0.024	0.060		H_2O				6.089	3.0
N_2						Total		22.708	8.92	35.209	11.9
Total		8.819	9.769	36.168	11.384				91.26	97.34	104.2

FRESH FEED	%	m/hr	#/hr
CO 28.010	35.46	8.05	225.51
H_2 2.016	59.89	13.60	27.42
CO_2 44.010	1.69	0.39	16.90
N_2 28.016	0.85	0.19	5.38
CH_4 16.042	2.12	0.48	7.72
C_2H_4 26.052			
C_2H_6 30.068			
C_1+C_2			
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_3-C_6			
TOTAL		22.708	282.93
H_2+CO	95.35	21.651	8206 S.C.F.H.
H_2/CO		1.69	121862

WET GAS	%	At. Wt. Balance m/hr	At. Wt. Balance #/hr
	14.7	1.406	39.40
	46.5	4.445	8.96
	18.9	1.803	79.34
	2.1	0.196	5.47
	10.6	1.015	16.27
	1.9	0.179	5.02
	0.9	0.087	2.63
	2.2	0.210	8.81
	0.2	0.017	0.75
	1.1	0.108	6.04
	0.3	0.025	1.45
	0.5	0.046	3.26
	0.04	0.003	0.25
	0.11	0.011	0.95
		9.552	178.62
		5.851	
		3.16	

	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr
	6.229	14.280	7.635
	19.678	33.278	24.123
	7.981	8.365	9.784
	0.866	1.058	1.062
	4.493	4.974	5.508
	0.790	0.790	0.969
	0.387	0.387	0.474
	0.928	0.928	1.138
	0.074	0.074	0.091
	0.478	0.478	0.586
	0.110	0.110	0.135
	0.204	0.204	0.250
	0.017	0.017	0.020
	0.048	0.048	0.059
	42.283	64.991	55.876
	25.907	47.558	31.758
		2.33	3.16

NET CHANGE m/hr	#/hr
-6.645	-186.11
-9.155	-18.46
1.419	62.44
0.534	8.55
0.179	5.02
0.087	2.63
	16.20
0.210	8.81
0.017	0.75
0.108	6.04
0.025	1.45
0.046	3.26
0.003	0.25
0.011	0.95
	21.51
-15.800	
1.38	

YIELD BASIS H_2+CO FED

	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	POLYMER #/hr	#/MCF	#/gal	gal/hr	gal/MCF	% Unsats.
	1.074	4.32	2.039	0.248	7.93	0.966	6.25	1.269	0.155	92.6
	0.091	4.24	0.177	0.022						
	0.736	5.00	1.208	0.147	5.74	0.699	6.10	0.941	0.115	81.3
	0.177	4.86	0.298	0.036	1.45	0.177	4.86	0.298	0.036	
	0.397	5.45	0.598	0.073	3.26	0.397	5.45	0.598	0.073	92.6
	0.030	5.25	0.048	0.006	0.25	0.030	5.25	0.048	0.006	
	0.116	5.54	0.171	0.021	0.95	0.116	5.54	0.171	0.021	
	2.621		4.539	0.553	19.58	2.385		3.325	0.406	

Distribution of Recovered Oil

	400 EP	0.412
	400-550	0.096
	550+	0.068
		0.576

CUMULATIVE TOTALS	H_2+CO,MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO			
$\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 8.4	RECOVERED OIL	0.217*	30.50
	TOTAL OIL		52.01
	WATER SOLUBLE CHEMICALS	0.141*	7.46
	TOTAL LIQUID PRODUCTS C_3+		59.47

	3.717		4.730
	6.338		9.269
	0.909		0.885
	7.247		10.154

0.576	30.50	3.717	
1.129	50.08	6.102	
0.108	7.46	0.909	
1.237	57.54	7.011	

	4.730	0.576	
	8.055	0.982	
	0.885	0.108	
	8.940	1.090	

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
57.94	82.54	67.31	72.98	46.53	27.51	33.22	78.59

NET WATER	3.683*	66.35	8.086
GROSS WATER		73.81	8.995
HYDROCARBON TOTAL—C_1+		75.67	9.221

	7.965	0.971	
	8.850	1.079	

*Included in Reactor Effluent Total

Weight Balance 92.6%

g/M3 = 16.91 × ± MCF.

cc/M3 = 141.3 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 E From Hr. 0700 to Hr. 0700 Hrs. 72-96

FLOWS	SCFH	%
Oxygen	2086	
Nat. Gas	3442	
Total	5528	
Fresh Feed	9140	
F. F. by C	9714	
Avg. F. F.	9427	
Wet Gas	3484	
Contraction		
Recycle	15778	
Bleed	829	
Total	16607	
Total Feed	25747	
Recycle/F.F.	1.82	
Inlet Vel.	1.06	
Steam Flow		

RUN CONDITIONS	
Generator Press.	322
O_2 Preheat, °F	425
Gas Preheat, °F	690
Reactor Press.	300
Steam Back Press.	750
Temperatures, °F	
Heater Outlet	459
Catalyst #1	635
#2	635
#3	654
#4	664
#5	626
Average	635
Product Separator	48

DISTILLATIONS — A S T M	
Prod.	Naph
A.P.I.	57.9
I.B.P.	90
5%	
10%	132
20	156
30	180
40	206
50	226
60	246
70	276
80	305
90	352
95	380
E.P.	392
Rec.	97.0
Res.	1.0
Loss.	2.0

Hempel Dist.		
°F	%	A.P.I.
to 400	71.6	57.9
400-550	15.6	37.7
550+	12.8	

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	595
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	50.50
In Reactor at End of Period	544.50
Reactor d-P, H_2O	
Pounds in Reactor	
Density, lbs./cu. ft.	158
Bed Height, Feet	
Space Vel. SCFH/lb. cat.	
Inventory Figures	17.3
From d-P Meters	

CATALYST ANALYSIS — Particle Size				
	Screen		Sedimentation	
Frac.	M	%	M	%
On 40	420+	23.6	80+	
100	419-150	48.5	80-40	
150	149-105	12.8	40-20	
200	104-74	10.2	20-10	
250	73-62	2.7	10-0	
325	61-44	1.2		
<325	43-0	0.8		

Density, lbs./cu. ft		Chem. Anal.	
Aerated	162	% Fe	
Settled	165	% C	
Compacted	172	% Oil	
Sp. Grav.	4.61	Specific Surface	
			m^2 gm
		1.6	ml.NH_3/gm

NATURAL GAS	%
CO_2	1.27
CH_4	85.41
C_2H_6	8.37
C_3H_8	1.68
C_4H_{10}	0.06
N_2	2.69
O_2	0.52

PRODUCT INSPECTION						
	Oil	Water	Product	Pour °F	SUS @ °F	
Neut. No.	45	41				
Sap. No.	49	41				
Hydrox. No.						
Bromine No.	77					
% Fe						
% Alc		11				
°API	51.3	10.7				

GENERATOR ELEMENTAL BALANCE

IN	Mol %	SCFH m/hr	C	H	O
O_2		5.550			11.100
CO_2		0.115	0.115		0.230
CH_4		7.756	7.756	31.024	
C_2H_6		0.760	1.520	4.560	
C_3H_8		0.153	0.459	1.224	
C_4H_{10}		0.005	0.020	0.050	
N_2		0.244			
Total			9.870	36.858	11.330

OUT	Mol %	SCFH m/hr	C	H	O
CO_2		0.434	0.43		0.9
CO		8.424	8.42		8.4
CH_4		0.824	0.82	3.296	
H_2		14.201		28.402	
N_2		0.234			
H_2O				4.518	2.3
Total			9.68	36.216	11.6
			98.1%	98.25	102.0

	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	34.932	8.424	235.96	14.88	1.605	44.95	6.519	14.943	8.124	-6.819	-191.01
H_2 2.016	58.884	14.201	28.63	44.19	4.764	9.61	19.361	33.562	24.125	-9.437	-19.02
CO_2 44.010	1.798	0.434	19.10	18.60	2.005	88.23	8.148	8.582	10.153	1.571	69.13
N_2 28.016	0.970	0.234	6.56	2.75	0.297	8.32	1.206	1.440	1.503	0.063	
CH_4 16.042	3.416	0.824	13.22	13.19	1.422	22.80	5.779	6.603	7.201	0.598	9.58
C_2H_4 28.052				1.74	0.187	5.23	0.760	0.760	0.947	0.187	5.23
C_2H_6 30.068				0.77	0.085	2.50	0.337	0.337	0.420	0.083	2.50
C_1+C_2											17.31
C_3H_6 42.078				1.94	0.209	8.79	0.851	0.851	1.060	0.209	8.79
C_3H_8 44.094				0.10	0.011	0.47	0.042	0.042	0.053	0.011	0.47
C_4H_8 56.104				1.00	0.108	6.05	0.437	0.437	0.545	0.108	6.05
C_4H_{10} 58.120				0.29	0.032	1.84	0.128	0.128	0.160	0.032	1.84
C_5H_{10} 70.130				0.42	0.046	3.21	0.184	0.184	0.234	0.046	3.21
C_5H_{12} 72.146				0.02	0.002	0.16	0.008	0.008	0.010	0.002	0.16
C_6H_{12} 84.156				0.13	0.014	1.18	0.058	0.058	0.072	0.014	1.18
C_3-C_6											21.70
TOTAL		24.117	303.47		10.783	203.35	43.819	67.936	58.034		
H_2+CO	93.816	22.625	8575 S.C.F.H.		6.369		25.880	48.505	32.249	-16.256	
H_2/CO		1.69	11662		2.97			2.25	2.97	1.38	

YIELD BASIS H_2+CO FED

	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	POLYMER #/hr	POLYMER #/MCF	POLYMER #/gal	POLYMER gal/hr	POLYMER gal/MCF	Unsats.
	1.025	4.32	2.035	0.237	7.91	0.922	6.25	1.266	0.147	95.0
	0.055	4.24	0.111	0.013						
	0.706	5.00	1.210	0.141	5.75	0.671	6.10	0.943	0.110	77.1
	0.215	4.86	0.379	0.044	1.84	0.215	4.86	0.379	0.044	
	0.374	5.45	0.589	0.069	3.21	0.374	5.45	0.589	0.069	95.8
	0.019	5.25	0.030	0.003	0.16	0.019	5.25	0.030	0.003	
	0.138	5.54	0.213	0.025	1.18	0.138	5.54	0.213	0.025	
	2.532		4.567	0.532	20.05	2.339		3.420	0.398	

Distribution of Recovered Oil

400 EP 0.383

400-550 0.083

550+ 0.069

CUMULATIVE TOTALS	H_2+CO,MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO								
	RECOVERED OIL	0.211#	29.58	3.450		4.590	0.535	29.58	3.450		4.590	0.535
	TOTAL OIL		51.28	5.982		9.157	1.067	49.63	5.789		8.010	0.933
	WATER SOLUBLE CHEMICALS	0.130#	7.84	0.914		0.927	0.108	7.84	0.914		0.927	0.108
$\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 9.75	TOTAL LIQUID PRODUCTS C_3+		58.12	6.896		10.084	1.175	57.47	6.703		8.937	1.041
	NET WATER	3.091#	62.50	7.289		7.503	0.876					
	GROSS WATER		70.34	8.203		8.430	0.984					
	HYDROCARBON TOTAL—C_1+		75.43	8.915								

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+ /C_1+
55.29	80.90	66.40	71.80	45.63	28.12	33.51	77.08

*Included in Reactor Effluent Total

Weight Balance = 90.04%

g/M3 = 16.91 × ± MCF.

cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 F From Hr. 0700 to Hr. 0700 Hrs. 96-120

FLOWS	SCFH	%
Oxygen	2073	
Nat. Gas	3423	
Total		
Fresh Feed	9239	
F. F. by C	9102	
Avg. F. F.	9170	
Wet Gas	3728	
Contraction		
Recycle	15619	
Bleed	763	
Total	16381	
Total Feed	25619	
Recycle/F.F.	1.77	
Inlet Vel.	1.05	
Steam Flow		

RUN CONDITIONS	
Generator Press.	318
O_2 Preheat, °F	441
Gas Preheat, °F	696
Reactor Press.	293
Steam Back Press.	800
Temperatures, °F	
Heater Outlet	449
Catalyst #1	628
#2	628
#3	641
#4	651
#5	631
Average	630
Product Separator	44

DISTILLATIONS	ASTM	Hempel Dist.	°F	%	A.P.I.
Prod.	Naph				
A.P.I.	56.5		to 400	72.0	56.5
I.B.P.	98		400-550	16.0	37.9
5%			550+	12.0	
10%	136				
20	162				
30	188				
40	208				
50	236				
60	258				
70	284				
80	318				
90	352				
95	384				
E.P.	407				
Rec.	98				
Res.	1.5				
Loss	0.5				

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	544.50
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	18
In Reactor at End of Period	526.50
Reactor d-P, H_2O	
Pounds in Reactor	
Density, lbs./cu. ft.	155
Bed Height, Feet	
Space Vel. SCFH/lb. cat.	
Inventory Figures	17.4
From d-P Meters	

CATALYST ANALYSIS — Particle Size	Screen			Sedimentation	
	Frac.	M	%	M	%
	On 40	420+	24.5	80+	
	100	419-150	46.9	80-40	
	150	149-105	13.4	40-20	
	200	104-74	10.4	20-10	
	250	73-62	3.2	10-0	
	325	61-44	1.2		
	<325	43-0	0.4		

Density, lbs./cu. ft.	Chem. Anal.
Aerated 159	% Fe
Settled 161	% C
Compacted 169	% Oil
Sp. Grav. 4.6	Specific Surface
	m^2/gm
3.7	$ml.NH_3/gm$

NATURAL GAS	%
CO_2	1.15
CH_4	80.98
C_2H_6	10.29
C_3H_8	4.42
C_4H_{10}	0.11
N_2	2.53
O_2	0.52

PRODUCT INSPECTION	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	45	41			
Sap. No.	50	47			
Hydrox. No.					
Bromine No.	72				
% Fe					
% Alc		11			
°API	50.6	10.7			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	SCFH m/hr	C	H	O
O_2		5.516			11.03
CO_2		0.104	0.10		0.21
CH_4		7.312	7.31	29.248	
C_2H_6		0.929	1.86	5.574	
C_3H_8		0.399	1.20	3.192	
C_4H_{10}		0.010	0.04	0.100	
N_2		0.228			
Total			10.51	38.114	11.24

OUT	Mol %	SCFH m/hr	C	H	O
CO_2	1.867	0.455	0.46		0.9
CO	33.975	8.281	8.28		8.3
CH_4	4.490	1.094	1.09	4.376	
H_2	58.812	14.335		28.670	
N_2	0.856	0.209			
H_2O				4.583	2.3
Total			9.83	37.629	11.5
Balance			93.5%	98.72	102.2

	FRESH FEED %	m/hr	#/hr	WET GAS %	At. Wt. Balance m/hr	#/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	#/hr
CO 28.010	33.975	8.281	231.95	15.55	1.772	49.63	6.721	15.002	8.493	-6.509	-182.32
H_2 2.016	58.812	14.335	28.90	44.93	5.117	10.32	19.419	33.754	24.536	-9.218	-18.58
CO_2 44.010	1.867	0.455	20.02	18.33	2.088	91.89	7.924	8.379	10.012	1.633	71.87
N_2 28.016	0.856	0.209	5.86	1.80	0.205	5.74	0.777	0.986	0.982		
CH_4 16.042	4.490	1.094	17.55	13.18	1.501	24.07	5.696	6.790	7.197	0.407	6.52
C_2H_4 28.052				1.67	0.190	5.33	0.720	0.720	0.910	0.190	5.33
C_2H_6 30.068				0.71	0.081	2.43	0.306	0.306	0.387	0.081	2.43
C_1+C_2											14.28
C_3H_6 42.078				1.78	0.203	8.52	0.767	0.767	0.970	0.203	8.52
C_3H_8 44.094				0.17	0.020	0.87	0.073	0.073	0.093	0.020	0.87
C_4H_8 56.104				1.05	0.119	6.69	0.452	0.452	0.571	0.119	6.69
C_4H_{10} 58.120				0.24	0.027	1.55	0.102	0.102	0.129	0.027	1.55
C_5H_{10} 70.130				0.46	0.052	3.66	0.197	0.197	0.249	0.052	3.66
C_5H_{12} 72.146				0.04	0.005	0.36	0.016	0.016	0.021	0.005	0.36
C_6H_{12} 84.156				0.12	0.014	1.17	0.053	0.053	0.067	0.014	1.17
C_3-C_6											22.82
TOTAL		24.374	304.28		11.391	212.21	43.223	67.597	58.149		
H_2+CO	92.787	22.616	8572 S.C.F.H.		6.889		26.140	48.756	33.029	-15.727	
H_2/CO		1.73	116658		2.89			2.25	2.89	1.42	

YIELD BASIS H_2+CO FED

	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	POLYMER #/hr	#/MCF	#/gal	gal/hr	gal/MCF	% Unsats.
	0.761									
	0.622								0.488	70.2
	0.283									
	1.666									
	0.994	4.32	1.972	0.230	7.67	0.895	6.25	1.227	0.143	91.4
	0.101	4.24	0.205	0.024						
	0.780	5.00	1.338	0.156	6.36	0.742	6.10	1.042	0.122	81.5
	0.181	4.86	0.319	0.037	1.55	0.181	4.86	0.319	0.037	
	0.427	5.45	0.672	0.078	3.66	0.427	5.45	0.672	0.078	92.0
	0.042	5.25	0.069	0.008	0.36	0.042	5.25	0.069	0.008	
	0.136	5.54	0.211	0.025	1.17	0.136	5.54	0.211	0.025	
	2.661		4.786	0.558	20.77	2.423		3.540	0.413	

Bands	Distribution of Recovered Oil
400 EP	0.351
400-550	0.078
550+	0.059

CUMULATIVE TOTALS	H_2+CO,MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT									
	RECOVERED OIL	0.193*	27.07	3.158		4.180	0.488	27.07	3.158		4.180	0.488	
SHIFT RATIO	TOTAL OIL		49.89	5.819		8.966	1.046	47.84	5.581		7.720	0.901	
	WATER SOLUBLE CHEMICALS	0.137*	7.25	0.846		0.857	0.100	7.25	0.846		0.857	0.100	
$\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 9.0	TOTAL LIQUID PRODUCTS C_3+		57.14	6.665		9.823	1.146	55.09	6.427		8.577	1.001	
	NET WATER	3.205*	57.75	6.737		6.933	0.809						
	GROSS WATER		65.00	7.583		7.790	0.909						
	HYDROCARBON TOTAL—C_1+		71.42	8.331									

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+ /C_1+
53.27	78.60	64.30	69.54	43.39	27.31	32.26	80.01

*Included in Reactor Effluent Total

Weight Balance = 90.5%

g/M3 = 16.91 × #/MCF.
cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 G From Hr. 0700 to Hr. 0700 Hrs. 120-144

FLOWS	SCFH	%
Oxygen	2093	
Nat. Gas	3416	
Total	5509	
Fresh Feed	9206	
F. F. by C	9364	
Avg. F. F.	9285	
Wet Gas	3476	
Contraction		
Recycle	15548	
Bleed	797	
Total	16345	
Total Feed	25551	
Recycle/F.F.	1.78	
Inlet Vel.	1.06	
Steam Flow		

RUN CONDITIONS	
Generator Press.	327
O_2 Preheat, °F	456
Gas Preheat, °F	713
Reactor Press.	300
Steam Back Press.	800
Temperatures, °F	
Heater Outlet	421
Catalyst #1	624
#2	624
#3	642
#4	649
#5	
Average	635
Product Separator	48

DISTILLATIONS

A S T M	
Prod.	Naph
A.P.I.	56.5
I.B.P.	98
5%	
10%	140
20	166
30	192
40	216
50	232
60	260
70	286
80	316
90	356
95	394
E.P.	409
Rec.	97
Res.	2
Loss.	1

Hempel Dist.		
°F	%	A.P.I.
to 400	72.6	56.5
400-550	17.6	37.9
550+	9.8	

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	526.50
Fresh Catalyst Charged	182
Catalyst Recharged	
Total	708.50
Catalyst Taken Out	43.50
In Reactor at End of Period	665
Reactor d-P, H_2O	
Pounds in Reactor	
Density, lbs./cu. ft.	151
Bed Height, Feet	
Space Vel. SCFH/lb. cat.	
Inventory Figures	14
From d-P Meters	

CATALYST ANALYSIS

Particle Size				
Screen			Sedimentation	
Frac.	M	%	M	%
On 40	420+	16.7	80+	
100	419-150	47.7	80-40	
150	149-105	12.2	40-20	
200	104-74	14.3	20-10	
250	73-62	4.1	10-0	
325	61-44	4.0		
<325	43-0	1.0		

Density, lbs./cu. ft.		Chem. Anal.	
Aerated	170	% Fe	
Settled	172	% C	
Compacted	175	% Oil	
Sp. Gravity	4.6	Specific Surface	
			m^2/gm

NATURAL GAS	%
CO_2	1.41
CH_4	83.93
C_2H_6	8.53
C_3H_8	2.54
C_4H_{10}	0.07
N_2	2.90
O_2	0.62

PRODUCT INSPECTION					
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	44	43			
Sap. No.	51	44			
Hydrox. No.					
Bromine No.	73				
% Fe					
% Alc		11			
API	48.2	10.8			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	~~SCFH~~ m/hr	C	H	O
O_2		5.578			11.156
CO_2		0.127	0.127		0.254
CH_4		7.564	7.564	30.256	
C_2H_6		0.769	1.538	4.614	
C_3H_8		0.229	0.687	1.832	
C_4H_{10}		0.006	0.024	0.060	
N_2		0.261			
Total		9.012	9.940	36.762	11.410

OUT	Mol %	~~SCFH~~ m/hr	C	H	O
CO_2		0.470	0.47		0.9
CO		8.440	8.44		8.4
CH_4		0.719	0.72	2.876	
H_2		14.422		28.844	
N_2		0.241			
H_2O				4.551	2.3
Total		24.291	9.63	36.271	11.7
Balance			96.9	98.7	102.1

FRESH FEED	%	m/hr	#/hr
CO 28.010	34.750	8.440	236.40
H_2 2.016	59.370	14.421	29.07
CO_2 44.010	1.933	0.470	20.68
N_2 28.016	0.992	0.241	6.75
CH_4 16.042	2.958	0.719	11.53
C_2H_4 28.052			
C_2H_6 30.068			
C_1+C_2			
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_3-C_6			
TOTAL		24.291	304.43
H_2+CO	94.120	22.882	8665 S.C.F.H.
H_2/CO		1.71	115406

WET GAS	%	At. Wt. Balance m/hr	At. Wt. Balance #/hr
CO 28.010	15.49	1.713	47.97
H_2 2.016	45.50	5.029	10.14
CO_2 44.010	18.72	2.070	91.09
N_2 28.016	2.14	0.236	6.62
CH_4 16.042	11.48	1.269	20.36
C_2H_4 28.052	1.75	0.193	5.41
C_2H_6 30.068	0.79	0.087	2.62
C_1+C_2			
C_3H_6 42.078	1.87	0.207	8.73
C_3H_8 44.094	0.31	0.034	1.48
C_4H_8 56.104	1.09	0.121	6.76
C_4H_{10} 58.120	0.26	0.029	1.68
C_5H_{10} 70.130	0.46	0.051	3.56
C_5H_{12} 72.146	0.03	0.004	0.26
C_6H_{12} 84.156	0.13	0.014	1.22
C_3-C_6			
TOTAL		11.056	207.89
H_2+CO		6.742	
H_2/CO		2.94	

RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr
6.682	15.122	8.395
19.622	34.043	24.651
8.072	8.542	10.142
0.922	1.163	1.158
4.950	5.669	6.219
0.754	0.754	0.947
0.339	0.339	0.426
0.908	0.808	1.015
0.132	0.132	0.166
0.469	0.469	0.590
0.111	0.111	0.140
0.200	0.200	0.251
0.014	0.014	0.018
0.054	0.054	0.068
43.126	67.417	57.945
26.304	49.165	33.046
	2.25	2.94

NET CHANGE m/hr	NET CHANGE #/hr
-6.727	-188.43
-9.392	-18.93
1.600	70.41
0.550	8.83
0.193	5.41
0.087	2.62
	16.96
0.207	8.73
0.034	1.48
0.121	6.76
0.029	1.68
0.051	3.56
0.004	0.26
0.014	1.22
	23.69
-16.119	
1.40	

YIELD BASIS H_2+CO FED

CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
8.126			
1.019			
0.624			
0.302			
1.945			
1.007	4.32	2.021	0.233
0.171	4.24	0.349	0.040
0.780	5.00	1.352	0.156
0.194	4.86	0.346	0.040
0.411	5.45	0.653	0.075
0.030	5.25	0.050	0.006
0.141	5.54	0.220	0.025
2.734		4.991	0.576

POLYMER #/hr	POLYMER #/MCF	POLYMER #/gal	POLYMER gal/hr	POLYMER gal/MCF	% Unsats.
Distribution of					
Recovered Oil					
400 EP				0.347	
400-550				0.084	
550+				0.047	
				0.478	69.0
7.86	0.907	6.25	1.257	0.145	86.0
6.42	0.741	6.10	1.053	0.122	80.9
1.68	0.194	4.86	0.346	0.040	
3.56	0.411	5.45	0.653	0.075	92.7
0.26	0.030	5.25	0.050	0.006	
1.22	0.141	5.54	0.220	0.025	
21.00	2.424		3.579	0.413	

CUMULATIVE TOTALS	H_2+CO MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 8.7

	RECOVERED OIL	TOTAL OIL	WATER SOLUBLE CHEMICALS	TOTAL LIQUID PRODUCTS C_3+	NET WATER	GROSS WATER	HYDROCARBON TOTAL—C_1+
	0.194*	27.16	3.134		4.140	0.478	
		50.85	5.368		9.131	1.054	
	0.145*	7.70	0.889		0.915	0.106	
		58.55	6.757		10.046	1.160	
	3.424*	61.68	7.118		7.405	0.955	
		69.38	8.007		8.320	0.960	
		75.41	8.703				

	27.16	3.134		4.140	0.478
	48.16	5.558		7.719	0.891
	7.70	0.889		0.915	0.106
	55.86	6.447		8.634	0.997

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
54.49	79.70	65.13	70.54	44.48	27.59	32.79	77.63

*Included in Reactor Effluent Total

Weight Balance = 88.4%

g/M3 ÷ 16.91 × = MCF

cc/M3 ÷ 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 H From Hr. 0700 to Hr. 1300 Hrs. 144-150

FLOWS	SCFH	%
Oxygen	2115	
Nat. Gas	3430	
Total		
Fresh Feed	9423	
F. F. by C	9496	
Avg. F. F.	9460	
Wet Gas	3582	
Contraction		
Recycle	15470	
Bleed	787	
Total	16257	
Total Feed	25680	
Recycle/F.F.	1.72	
Inlet Vel.	1.08	
Steam Flow		

RUN CONDITIONS	
Generator Press.	326
O_2 Preheat, °F	685
Gas Preheat, °F	410
Reactor Press.	300
Steam Back Press.	785
Temperatures, °F	
Heater Outlet	430
Catalyst #1	617
#2	617
#3	623
#4	649
#5	
Average	627
Product Separator	46

DISTILLATIONS — ASTM	
Prod.	Naph
A.P.I.	55.5
I.B.P.	104
5%	
10%	136
20	170
30	198
40	216
50	238
60	260
70	290
80	322
90	356
95	386
E.P.	398
Rec.	97.5
Res.	1.5
Loss.	1.0

Hempel Dist.		
°F	%	A.P.I.
to 400	71.3	55.5
400-550	13.3	36.8
550+	15.4	

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	665
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	6
In Reactor at End of Period	659
	20
	639
Reactor d-P, H_2O	
Pounds in Reactor	
Density, lbs./cu. ft.	167
Bed Height, Feet	
Space Vel. SCFH/lb. cat.	
Inventory Figures	14.36
From d-P Meters	

CATALYST ANALYSIS — Particle Size				
Screen			Sedimentation	
Frac.	M	%	M	%
On 40	420+	24.9	80+	
100	419-150	52.0	80-40	
150	149-105	11.3	40-20	
200	104-74	8.0	20-10	
250	73-62	2.0	10-0	
325	61-44	0.4		
<325	43-0	1.4		

Density, lbs./cu. ft.		Chem. Anal.	
Aerated	154	% Fe	
Settled	156	% C	
Compacted	165	% Oil	
Sp. Grav.	4.6	Specific Surface	
			m^2/gm
		2.3	$ml.NH_3/gm$

NATURAL GAS	%
CO_2	1.41
CH_4	83.93
C_2H_6	8.53
C_3H_8	2.54
C_4H_{10}	0.07
N_2	2.90
O_2	0.62

PRODUCT INSPECTION					
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	45	43			
Sap. No.	51	47			
Hydrox. No.					
Bromine No.	81				
% Fe					
% Alc		10			
°API	50.7	10.5			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	m/hr	C	H	O
O_2		5.637			11.274
CO_2		0.128	0.128		0.256
CH_4		7.595	7.595	30.380	
C_2H_6		0.772	1.544	4.632	
C_3H_8		0.330	0.660	1.840	
C_4H_{10}		0.006	0.024	0.060	
N_2		0.262			
Total			9.991	36.912	11.530

OUT	Mol %	m/hr	C	H	O
CO_2		0.449	0.45		0.9
CO		8.816	8.92		8.8
CH_4		0.574	0.57	2.296	
H_2		14.752		29.504	
N_2		0.271			
H_2O				4.372	2.2
Total			9.84	36.172	11.9
Balance			98.6%	98.0	103.2

FRESH FEED	%	m/hr	#/hr
CO 28.010	35.460	8.816	246.94
H_2 2.016	59.335	14.752	29.74
CO_2 44.010	1.805	0.449	19.76
N_2 28.016	1.090	0.271	7.59
CH_4 16.042	2.310	0.574	9.21
C_2H_4 28.052			
C_2H_6 30.068			
C_1+C_2			
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_3-C_6			
TOTAL		24.863	313.24
H_2+CO	94.795	23.568	8933 S.C.F.H.
H_2/CO	1.67		111944

WET GAS	%	At. Wt. Balance m/hr	At. Wt. Balance #/hr
CO 28.010	15.88	1.727	48.37
H_2 2.016	45.85	4.987	10.06
CO_2 44.010	18.75	2.039	89.74
N_2 28.016	2.57	0.280	7.84
CH_4 16.042	10.32	1.122	18.00
C_2H_4 28.052	1.78	0.193	5.42
C_2H_6 30.068	0.89	0.097	2.91
C_1+C_2			
C_3H_6 42.078	1.89	0.205	8.62
C_3H_8 44.094	0.22	0.024	1.07
C_4H_8 56.104	1.01	0.109	6.13
C_4H_{10} 58.120	0.26	0.028	1.60
C_5H_{10} 70.130	0.44	0.047	3.31
C_5H_{12} 72.146	0.06	0.006	0.41
C_6H_{12} 84.156	0.11	0.012	0.97
C_3-C_6			
TOTAL		10.876	204.44
H_2+CO		6.714	
H_2/CO		2.88	

RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
6.812	15.628	8.539	-7.089	-198.57
19.668	34.420	24.655	-9.765	-19.68
8.043	8.492	10.082	1.590	69.98
1.102	1.373	1.382		
4.425	4.999	5.547	0.548	8.79
0.764	0.764	0.957	0.193	5.42
0.382	0.382	0.479	0.097	2.91
				17.12
0.808	0.808	1.013	0.205	8.62
0.094	0.094	0.118	0.024	1.07
0.433	0.433	0.542	0.109	6.13
0.109	0.109	0.137	0.028	1.60
0.187	0.187	0.234	0.047	3.31
0.024	0.024	0.030	0.006	0.41
0.045	0.045	0.057	0.012	0.97
				22.11
42.896	67.759	57.957		
26.480	50.048	33.194	-16.854	
	2.20		1.38	

YIELD BASIS H_2+CO FED

	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	POLYMER #/hr	POLYMER #/MCF	POLYMER #/gal	POLYMER gal/hr	POLYMER gal/MCF	% Unsats.
CO					Distribution of					
H_2					Recovered Oil					
CO_2	7.834					400 EP			0.428	
N_2						400-550			0.080	
CH_4	0.984					550+			0.092	
C_2H_4	0.607								0.600	66.7
C_2H_6	0.326									
C_1+C_2	1.917									
C_3H_6	0.965	4.32	1.995	0.223	7.76	0.869	6.25	1.241	0.139	89.5
C_3H_8	0.120	4.24	0.252	0.028						
C_4H_8	0.686	5.00	1.226	0.137	5.82	0.652	6.10	0.955	0.107	79.8
C_4H_{10}	0.179	4.86	0.329	0.037	1.60	0.179	4.86	0.329	0.037	
C_5H_{10}	0.371	5.45	0.607	0.068	3.31	0.371	5.45	0.607	0.068	88.0
C_5H_{12}	0.046	5.25	0.078	0.009	0.41	0.046	5.25	0.078	0.009	
C_6H_{12}	0.109	5.54	0.175	0.020	0.97	0.109	5.54	0.175	0.020	
C_3-C_6	2.475		4.662	0.522	19.87	2.224		3.385	0.379	
TOTAL										
H_2+CO										
H_2/CO										

CUMULATIVE TOTALS	H_2+CO MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 7.88

EFFLUENT	#/MCF	#/gal	gal/hr	gal/MCF
RECOVERED OIL	0.248*	34.72	3.887	5.360	0.600
TOTAL OIL		56.83	6.362	10.022	1.122
WATER SOLUBLE CHEMICALS	0.142*	7.51	0.841	0.888	0.099
TOTAL LIQUID PRODUCTS C_3+		64.34	7.203	10.910	1.221
NET WATER	3.695*	66.57	7.452	7.992	0.895
GROSS WATER		74.08	8.293	8.880	0.995
HYDROCARBON TOTAL—C_1+		81.46	9.119		

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
56.3	80.41	66.19	71.51	45.36	28.37	33.68	78.98

*Included in Reactor Effluent Total

Weight Balance = 91.45%

g/M3 = 16.91 × ± MCF.

cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 I From Hr. 2300 to Hr. 0700 Hrs. 150-159

FLOWS	SCFH	%
Oxygen	2170	
Nat. Gas	3372	
Total		
Fresh Feed	9162	
F. F. by C	8729	
Avg. F. F.	8945	
Wet Gas	3220	
Contraction		
Recycle	14787	
Bleed	763	
Total	15550	
Total Feed	24712	
Recycle/F.F.	1.70	
Inlet Vel.	1.02	
Steam Flow		

RUN CONDITIONS	
Generator Press.	323
O_2 Preheat, °F	470
Gas Preheat, °F	687
Reactor Press:	298.
Steam Back Press.	702
Temperatures, °F	
Heater Outlet	414
Catalyst #1	637
#2	637
#3	648
#4	610
#5	610
Average	628
Product Separator	

DISTILLATIONS	ASTM	Hempel Dist. °F	%	A.P.I.
Prod.	Naph			
A.P.I.	55.3	to 400	71.3	55.3
I.B.P.	104	400-550	20.6	35.9
5%		550+	8.1	
10%	146			
20	174			
30	198	WATER		
40	224	Temp.	%	
50	248	200		
60	272	203		
70	296	208		
80	326			
90	364			
95	389			
E.P.	412			
Rec.	98			
Res.	1.5			
Loss.	0.5			

CATALYST DATA	
In Reactor at Start of Period	639
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	24
In Reactor at End of Period	615
Reactor d-P, H_2O	
Pounds in Reactor	900
Density, lbs./cu. ft.	166
Bed Height, Feet	8.2
Space Vel. SCFH/lb. cat.	
Inventory Figures	14.54
From d-P Meters	10

CATALYST ANALYSIS	Particle Size				
	Screen			Sedimentation	
	Frac.	M	%	M	%
	On 40	420+	19.9	80+	
	100	419-150	40.9	80-40	
	150	149-105	12.3	40-20	
	200	104-74	13.3	20-10	
	250	73-62	4.6	10-0	
	325	61-44	6.4		
	<325	43-0	2.6		
	Density, lbs./cu. ft			Chem. Anal.	
	Aerated	155		% Fe	
	Settled	158		% C	
	Compacted	166		% Oil	
	Sp. Grav.	4.7		Specific Surface	
					m^2 gm
					ml. NH_3/gm

NATURAL GAS	%
CO_2	1.25
CH_4	85.96
C_2H_6	8.60
C_3H_8	3.12
C_4H_{10}	0.12
N_2	0.97
O_2	0.08

PRODUCT INSPECTION	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	42	37			
Sap. No.	49	41			
Hydrox. No.					
Bromine No.	80				
% Fe					
% Alc		5			
Aniline Point °F	55.0				
°API	49.7	10.5			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	SCFH m/hr	C	H	O
O_2		5.733			11.466
CO_2		0.111	0.11		0.222
CH_4		7.649	7.65	30.596	
C_2H_6		0.765	1.53	4.590	
C_3H_8		0.278	0.83	2.224	
C_4H_{10}		0.011	0.04	0.110	
N_2		0.077			
Total			10.17	37.520	11.688

OUT	Mol %	SCFH m/hr	C	H	O
CO_2		0.438	0.44		0.9
CO		8.559	8.56		8.5
CH_4		1.069	1.07	4.276	
H_2		14.041		28.082	
N_2		0.069			
H_2O				4.834	2.4
Total			10.07	37.192	11.9
Balance			99.0	99.1	101.4

FRESH FEED	%	m/hr	#/hr
CO 28.010	35.405	8.559	239.74
H_2 2.016	58.080	14.041	28.31
CO_2 44.010	1.810	0.438	19.28
N_2 28.016	0.285	0.069	1.93
CH_4 16.042	4.420	1.069	17.15
C_2H_4 28.052			
C_2H_6 30.068			
C_1+C_2			
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_6H_{12} 72.146			
C_7H_{12} 84.156			
C_3-C_6			
TOTAL		24.175	306.41
H_2+CO	93.485	22.600	8565 S.C.F.H.
H_2/CO		1.64	116754

WET GAS	%	At. Wt. Balance m/hr	#/hr
	14.14	1.396	39.10
	41.31	4.079	8.22
	19.57	1.932	85.01
	0.78	0.077	2.15
	16.27	1.606	25.77
	1.83	0.180	5.06
	0.82	0.080	2.41
	1.99	0.196	8.26
	0.36	0.035	1.53
	1.95	0.192	10.76
	0.31	0.030	1.76
	0.49	0.049	3.42
	0.08	0.007	0.50
	0.15	0.014	1.17
		9.874	195.12
		5.475	
		2.92	

RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr
5.800	14.359	7.196
16.949	30.990	21.028
8.028	8.466	9.960
0.320	0.389	0.397
6.674	7.743	8.280
0.749	0.749	0.929
0.334	0.334	0.414
0.817	0.817	1.013
0.146	0.146	0.181
0.798	0.798	0.990
0.125	0.125	0.155
0.201	0.201	0.250
0.031	0.031	0.038
0.059	0.059	0.073
41.030	65.205	55.304
22.749	45.349	28.224
	2.16	2.92

NET CHANGE m/hr	#/hr
-7.163	-200.64
-9.962	-20.09
1.494	65.73
0.557	8.62
0.180	5.06
0.080	2.41
	16.09
0.196	8.26
0.035	1.53
0.192	10.76
0.030	1.76
0.049	3.42
0.007	0.50
0.014	1.17
	27.40
-17.125	
1.39	

YIELD BASIS H_2 + CO FED

CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
7.674			
1.006			
0.591			
0.281			
1.878			
0.964	4.32	1.912	0.223
0.179	4.24	0.361	0.042
1.256	5.00	2.152	0.251
0.205	4.86	0.362	0.042
0.399	5.45	0.628	0.073
0.058	5.25	0.095	0.011
0.137	5.54	0.211	0.025
3.199		5.721	0.668
7.138		10.921	1.275
0.461		0.465	0.054
7.599		11.386	1.329
8.593		8.835	1.032
9.054		9.300	1.086
9.477			

POLYMER #/hr	#/MCF	#/gal	gal/hr	gal/MCF	% Unsats.
Distribution of					
Recovered Oil					
400 EP				0.433	
400-550				0.125	
550+				0.049	
				0.607	69.1
7.43	0.867	6.25	1.189	0.139	84.9
10.22	1.193	6.10	1.676	0.196	86.4
1.76	0.205	4.86	0.362	0.042	
3.42	0.399	5.45	0.628	0.073	86.0
0.50	0.058	5.25	0.095	0.011	
1.17	0.137	5.54	0.211	0.025	
24.50	2.860		4.161	0.486	
33.74	3.939		5.200	0.607	
58.24	6.799		9.361	1.093	
3.95	0.461		0.465	0.054	
62.19	7.260		9.826	1.147	

CUMULATIVE TOTALS	H_2+CO,MCF	Catalyst #	C_3^+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT			
SHIFT RATIO	$\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 7.12	RECOVERED OIL	0.241*
		TOTAL OIL	
		WATER SOLUBLE CHEMICALS	0.074*
		TOTAL LIQUID PRODUCTS C_3+	
		NET WATER	4.085*
		GROSS WATER	
		HYDROCARBON TOTAL—C_1+	

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3^+/C_1^+
59.16	83.69	70.95	75.77	49.88	32.15	37.76	80.18

*Included in Reactor Effluent Total

Weight Balance = 91.11%

g/M3 = 16.91 × ± MCF

cc/M3 = 141.3 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 J From Hr. 0700 to 0700 Hrs. 159-179

FLOWS	SCFH	%
Oxygen	2182	
Nat. Gas	3384	
Total		
Fresh Feed	9307	
F. F. by C	9675	
Avg. F. F.	9491	
Wet Gas	3213	
Contraction		
Recycle	14914	
Bleed	765	
Total	15679	
Total Feed	24986	
Recycle/F.F.	1.68	
Inlet Vel.	1.06	
Steam Flow		

RUN CONDITIONS	
Generator Press.	326
O_2 Preheat, °F	450
Gas Preheat, °F	660
Reactor Press.	295
Steam Back Press.	700
Temperatures, °F	
Heater Outlet	505
Catalyst #1	650
#2	650
#3	670
#4	660
#5	
Average	650
Product Separator	

DISTILLATIONS — A S T M	
Prod.	Naph
A.P.I.	56.1
I.B.P.	100
5%	
10%	130
20	162
30	188
40	202
50	234
60	254
70	284
80	320
90	356
95	388
E.P.	408
Rec.	97
Res.	2
Loss.	1

Hempel Dist.		
°F	%	A.P.I.
to 400	72.5	56.1
400-550	20.3	36.1
550+	7.1	

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	615
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	37
In Reactor at End of Period	578
Reactor d-P, H_2O	
Pounds in Reactor	810
Density, lbs./cu. ft.	157
Bed Height, Feet	7.8
Space Vel. SCFH/lb. cat.	
Inventory Figures	16.42
From d-P Meters	11.72

CATALYST ANALYSIS — Particle Size				
	Screen		Sedimentation	
Frac.	M	%	M	%
On 40	420+	24.4	80+	
100	419-150	51.2	80-40	
150	149-105	11.2	40-20	
200	104-74	10.0	20-10	
250	73-62	1.6	10-0	
325	61-44	1.2		
<325	43-0	0.4		
Density, lbs./cu. ft.			Chem. Anal.	
Aerated	159		% Fe	
Settled	161		% C	
Compacted	177		% Oil	
Sp. Grav.	4.7		Specific Surface	
				m^2 gm
			3.9	ml.NH_3/gm

NATURAL GAS	%
CO_2	1.37
CH_4	85.34
C_2H_6	8.91
C_3H_8	3.18
C_4H_{10}	0.09
N_2	0.95
O_2	0.14

PRODUCT INSPECTION					
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	45	37			
Sap. No.	47	52			
Hydrox. No.					
Bromine No.	86				
% Fe					
% Alc		8			
°API	49.8	10.6			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	SCFH m/hr	C	H	O
O_2		5.768			11.536
CO_2		0.122	0.12		0.244
CH_4		7.621	7.62	30.48	
C_2H_6		0.796	1.59	4.78	
C_3H_8		0.284	0.95	2.27	
C_4H_{10}		0.008	0.08	0.08	
N_2		0.085			
Total			10.22	37.61	11.780

OUT	Mol %	SCFH m/hr	C	H	O
CO_2		0.448	0.45		0.9
CO		8.566	8.57		8.6
CH_4		0.870	0.87	3.480	
H_2		14.550		29.100	
N_2		0.122			
H_2O				4.834	2.4
Total			9.88	37.414	11.9
Balance			96.7	99.5	100.8

	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	34.88	8.566	239.93	13.89	1.356	38.00	5.747	14.313	7.103	-7.210	-201.93
H_2 2.016	59.25	14.550	29.33	42.09	4.110	8.29	17.413	31.963	21.523	-10.440	-21.04
CO_2 44.010	1.83	0.448	19.72	20.42	1.993	87.72	8.445	8.893	11.438	1.545	68.00
N_2 28.016	0.50	0.122	3.42	0.85	0.083	2.33	0.353	0.475	0.436		
CH_4 16.042	3.54	0.870	13.96	14.83	1.447	23.21	6.134	7.004	7.581	0.577	9.25
C_2H_4 28.052				1.98	0.192	5.39	0.817	0.817	1.009	0.192	5.39
C_2H_6 30.068				0.88	0.085	2.56	0.363	0.363	0.448	0.085	2.56
C_1+C_2											17.20
C_3H_6 42.078				2.25	0.220	9.26	0.930	0.930	1.149	0.220	9.26
C_3H_8 44.094				0.43	0.041	1.83	0.177	0.177	0.219	0.041	1.83
C_4H_8 56.104				1.22	0.119	6.66	0.503	0.503	0.621	0.119	6.66
C_4H_{10} 58.120				0.33	0.032	1.88	0.134	0.134	0.161	0.032	1.88
C_5H_{10} 70.130				0.47	0.046	3.24	0.194	0.194	0.240	0.046	3.24
C_5H_{12} 72.146				0.27	0.027	1.91	0.113	0.113	0.139	0.027	1.91
C_6H_{12} 84.156				0.11	0.010	0.88	0.046	0.046	0.056	0.010	0.88
C_3-C_6											25.66
TOTAL		24.556	306.36		9.762	193.10	41.369	65.925	55.565		
H_2+CO	94.13	23.116	8761 S.C.F.H.		5.466		23.160	46.276	28.626	-17.650	
H_2/CO		1.70	11414		3.03			2.23		1.45	

YIELD BASIS H_2+CO FED

	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	POLYMER #/hr	POLYMER #/MCF	POLYMER #/gal	POLYMER gal/hr	POLYMER gal/MCF	Unsats.
	2.962		2.144	0.245	8.33	0.951	6.25	1.333	0.152	84.3
	0.209	4.24	0.432	0.049						
	0.760	5.00	1.332	0.152	6.33	0.723	6.10	1.038	0.118	78.8
	0.215	4.86	0.387	0.044	1.88	0.215	4.86	0.387	0.044	
	0.370	5.45	0.594	0.068	3.24	0.370	5.45	0.594	0.068	63.0
	0.218	5.25	0.364	0.042	1.91	0.218	5.25	0.364	0.042	
	0.100	5.54	0.159	0.018	0.88	0.100	5.54	0.159	0.018	
	2.929		5.412	0.618	22.57	2.577		3.875	0.442	

Distribution of Recovered Oil

	400 EP			0.428	
	400-550			0.119	
	550+			0.042	
				0.589	69.3

CUMULATIVE TOTALS

	H_2+CO,MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 8.51

EFFLUENT										
RECOVERED OIL	0.238#	33.40	3.812		5.160	0.589	33.40	3.812		5.160	0.589
TOTAL OIL		59.06	6.741		10.572	1.207	55.97	6.389		9.035	1.031
WATER SOLUBLE CHEMICALS	0.121#	6.44	0.735		0.766	0.087	6.44	0.735		0.766	0.087
TOTAL LIQUID PRODUCTS C_3+		65.50	7.476		11.338	1.294	62.41	7.124		9.801	1.118
NET WATER	4.075#	73.42	8.380		8.814	1.006					
GROSS WATER		79.86	9.115		9.580	1.093					
HYDROCARBON TOTAL—C_1+		82.70	9.439								

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+ / C_1+
60.25	84.17	71.75	76.35	50.37	32.66	38.14	79.20

#Included in Reactor Effluent Total

Weight Balance = 91.72%

g/M3 = 16.91 × ± MCF

cc/M3 = 141.3 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 K From Hr. 0700 to Hr. 0700 Hrs. 179-203

FLOWS	SCFH	%
Oxygen	2244	
Nat. Gas	3449	
Total		
Fresh Feed	9342	
F. F. by C	9377	
Avg. F. F.	9360	
Wet Gas	3532	
Contraction		
Recycle	15614	
Bleed	801	
Total	16415	
Total Feed	25757	
Recycle/F.F.	1.76	
Inlet Vel.	1.10	
Steam Flow		

RUN CONDITIONS	
Generator Press.	324
O_2 Preheat, °F	454
Gas Preheat, °F	681
Reactor Press.	295
Steam Back Press.	740
Temperatures, °F	
Heater Outlet	516
Catalyst #1	651
#2	651
#3	667
#4	669
#5	
Average	651
Product Separator	38

DISTILLATIONS — A S T M	
Prod.	Naph
A.P.I.	56.3
I.B.P.	108
5%	
10%	142
20	172
30	192
40	218
50	234
60	260
70	288
80	320
90	344
95	384
E.P.	400
Rec.	97.5
Res.	1.5
Loss.	0.5

Hempel Dist.		
°F	%	A.P.I.
to 400	71.6	56.3
400-550	18.3	37.8
550+	10.1	

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	578
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	64
In Reactor at End of Period	514
Reactor d-P, H_2O	
Pounds in Reactor	747
Density, lbs./cu. ft.	147
Bed Height, Feet	7.7
Space Vel. SCFH/lb. cat.	
Inventory Figures	18.21
From d-P Meters	12.53

CATALYST ANALYSIS — Particle Size				
	Screen		Sedimentation	
Frac.	M	%	M	%
On 40	420+	26.9	80+	
100	419-150	50.5	80-40	
150	149-105	10.7	40-20	
200	104-74	9.5	20-10	
250	73-62	1.4	10-0	
325	61-44	0.4		
<325	43-0	0.6		

Density, lbs./cu. ft.		Chem. Anal.	
Aerated	144	% Fe	
Settled	146	% C	
Compacted	164	% Oil	
Sp. Grav.	4.3	Specific Surface	
			m^2/gm
		3.9	$ml.NH_3/gm$

NATURAL GAS	%
CO_2	1.50
CH_4	85.63
C_2H_6	8.63
C_3H_8	3.13
C_4H_{10}	0.12
N_2	0.83
O_2	0.16

PRODUCT INSPECTION						
	Oil	Water	Product	Pour °F	SUS @ °F	
Neut. No.	43	39				
Sap. No.	53	52				
Hydrox. No.						
Bromine No.	83					
% Fe						
% Alc		8				
°API	49.3	10.6				

GENERATOR ELEMENTAL BALANCE

IN	Mol %	SCFH m/hr	C	H	O
O_2		5.935			11.87
CO_2		0.136	0.14		0.27
CH_4		7.792	7.79	31.168	
C_2H_6		0.785	1.57	4.710	
C_3H_8		0.285	0.86	2.280	
C_4H_{10}		0.011	0.04	0.110	
N_2		0.076			
Total			10.403	38.268	12.14

OUT	Mol %	SCFH m/hr	C	H	O
CO_2		0.425	0.50		1.0
CO		8.951	8.95		9.0
CH_4		0.883	0.88	3.532	
H_2		14.203		28.406	
N_2		0.118			
H_2O				5.366	2.7
Total			10.33	37.304	12.6
Balance			99.3	97.5	104.0

	FRESH FEED %	m/hr	#/hr	WET GAS %	At. Wt. Balance m/hr	#/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	#/hr
CO 28.010	36.32	8.951	250.76	14.93	1.635	45.80	6.468	15.419	8.103	-7.316	-204.96
H_2 2.016	57.62	14.203	28.64	43.09	4.716	9.51	18.661	32.864	23.377	-9.487	-19.13
CO_2 44.010	2.01	0.495	21.78	20.01	2.190	96.40	8.667	9.162	10.857	1.705	74.62
N_2 28.016	0.48	0.118	3.29	0.75	0.082	2.30	0.326	0.444	0.408		
CH_4 16.042	3.58	0.883	14.16	13.60	1.489	23.89	5.892	6.775	7.381	0.606	9.73
C_2H_4 28.052				1.98	0.217	6.10	0.859	0.859	1.076	0.217	6.10
C_2H_6 30.068				0.92	0.100	3.01	0.397	0.397	0.497	0.100	3.01
C_1+C_2											18.84
C_3H_6 42.078				2.21	0.242	10.18	0.956	0.956	1.198	0.242	10.18
C_3H_8 44.094				0.36	0.040	1.76	0.158	0.158	0.198	0.040	1.76
C_4H_8 56.104				1.17	0.128	7.19	0.508	0.508	0.636	0.128	7.19
C_4H_{10} 58.120				0.32	0.035	2.04	0.138	0.138	0.173	0.035	2.04
C_5H_{10} 70.130				0.49	0.054	3.79	0.212	0.212	0.266	0.054	3.79
C_5H_{12} 72.146				0.04	0.005	0.34	0.017	0.017	0.022	0.005	0.34
C_6H_{12} 84.156				0.12	0.013	1.09	0.053	0.053	0.066	0.013	1.09
C_3-C_6											26.39
TOTAL		24.649	318.62		10.946	231.41	43.312	67.961	58.341		
H_2+CO	93.94	23.154	8776 S.C.F.H.		6.351		25.129	48.283	31.480	-16.803	
H_2/CO		1.59	11394		2.89			2.13		1.30	

YIELD BASIS H_2+CO FED — CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	POLYMER #/hr	#/MCF	#/gal	gal/hr	gal/MCF	% Unsats.
				Distribution of					
				Recovered Oil					
8.502					400 EP			0.398	
					400-550			0.102	
1.109					550+			0.056	
								0.556	68.5
0.695									
0.343									
2.147									
1.160	4.32	2.356	0.268	9.16	1.044	6.25	1.466	0.167	85.8
0.201	4.24	0.415	0.047						
0.819	5.00	1.438	0.164	6.83	0.778	6.10	1.120	0.128	78.5
0.232	4.86	0.420	0.048	2.04	0.232	4.86	0.420	0.048	
0.432	5.45	0.695	0.079	3.79	0.432	5.45	0.695	0.079	91.5
0.039	5.25	0.065	0.007	0.34	0.039	5.25	0.065	0.007	
0.124	5.54	0.197	0.022	1.09	0.124	5.54	0.197	0.022	
3.007		5.586	0.635	23.25	2.649		3.963	0.451	

CUMULATIVE TOTALS	H_2+CO MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT									
SHIFT RATIO	RECOVERED OIL	0.227*	31.78	3.621		4.880	0.556	31.78	3.621		4.880	0.556	
	TOTAL OIL		58.17	6.628		10.466	1.191	55.03	6.270		8.843	1.007	
$\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 8.37	WATER SOLUBLE CHEMICALS	0.113*	5.99	0.683		0.704	0.080	5.99	0.683		0.704	0.080	
	TOTAL LIQUID PRODUCTS C_3+		64.16	7.311		11.170	1.271	61.02	6.953		9.547	1.097	
	NET WATER	3.743*	67.44	7.684		8.096	0.922						
	GROSS WATER		73.43	8.367		8.800	1.002						
	HYDROCARBON TOTAL—C_1+		83.00	9.457									

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+
55.60	81.73	66.80	72.57	47.45	28.87	34.80	77.30

*Included in Reactor Effluent Total

Weight Balance = 90.05%

g/M3 = 16.91 × ± MCF.

cc/M3 = 141.3 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 L From Hr. 0700 to Hr. 0700 Hrs. 203-227

FLOWS	SCFH	%
Oxygen	2183	
Nat. Gas	3455	
Total		
Fresh Feed	9292	
F. F. by C	9900	
Avg. F. F.	9596	
Wet Gas	3940	
Contraction		
Recycle	15693	
Bleed	779	
Total	16472	
Total Feed	25764	
Recycle/F.F.	1.77	
Inlet Vel.	1.10	
Steam Flow		

RUN CONDITIONS	
Generator Press.	327
O_2 Preheat, °F	415
Gas Preheat, °F	680
Reactor Press.	295
Steam Back Press.	725
Temperatures, °F	
Heater Outlet	534
Catalyst #1	651
#2	652
#3	657
#4	652
#5	
Average	651
Product Separator	48

DISTILLATIONS — ASTM	
Prod.	Naph
A.P.I.	54.1
I.B.P.	98
5%	
10%	140
20	174
30	199
40	222
50	244
60	270
70	298
80	320
90	366
95	398
E.P.	415
Rec.	97
Res.	1.5
Loss.	1.5

Hempel Dist.		
°F	%	A.P.I.
to 400	73.3	54.1
400-550	14.0	37.2
550+	12.7	

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	514
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	85
In Reactor at End of Period	429
Reactor d-P, H_2O	
Pounds in Reactor	592
Density, lbs./cu. ft.	135
Bed Height, Feet	6.7
Space Vel. SCFH/lb. cat.	
Inventory Figures	22.37
From d-P Meters	16.21

CATALYST ANALYSIS — Particle Size				
	Screen			Sedimentation
Frac.	M	%	M	%
On 40	420+	25.7	80+	
100	419-150	50.0	80-40	
150	149-105	11.4	40-20	
200	104-74	8.2	20-10	
250	73-62	1.8	10-0	
325	61-44	1.0		
<325	43-0	1.8		

Density, lbs./cu. ft.		Chem. Anal.	
Aerated	148	% Fe	
Settled	150	% C	
Compacted	159	% Oil	
Sp. Grav.	3.96	Specific Surface	
			m^2/gm
		4.8	$ml.NH_3/gm$

NATURAL GAS	%
CO_2	1.32
CH_4	85.58
C_2H_6	8.79
C_3H_8	3.01
C_4H_{10}	0.11
N_2	1.04
O_2	0.16

PRODUCT INSPECTION					
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	47	38			
Sap. No.	62	48			
Hydrox. No.					
Bromine No.	83				
% Fe					
% Alc		8			
Aniline Point °F	49.6				
°API	49.1	10.6			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	SCFH m/hr	C	H	O
O_2		5.775			11.550
CO_2		0.120	0.12		0.240
CH_4		7.801	7.80	31.204	
C_2H_6		0.801	1.60	4.806	
C_3H_8		0.274	0.82	2.192	
C_4H_{10}		0.010	0.04	0.100	
N_2		0.095			
Total			10.39	38.302	11.790

OUT	Mol %	SCFH m/hr	C	H	O
CO_2		0.481	0.48		1.0
CO		8.901	8.90		8.9
CH_4		0.762	0.76	3.048	
H_2		14.328		28.656	
N_2		0.045			
H_2O				5.226	2.6
Total			10.14	36.930	12.5
Balance			97.7	96.4	105.9

FRESH FEED	%	m/hr	#/hr
CO 28.010	36.31	8.901	249.32
H_2 2.016	58.44	14.328	28.88
CO_2 44.010	1.96	0.481	21.17
N_2 28.016	0.18	0.045	1.26
CH_4 16.042	3.11	0.762	12.22
C_2H_4 28.052			
C_2H_6 30.068			
C_1+C_2			
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_3-C_6			
TOTAL		24.517	312.85
H_2+CO	94.75	23.229	8804 S.C.F.H.
H_2/CO		1.61	11358

WET GAS	%	At. Wt. Balance m/hr	At. Wt. Balance #/hr
	15.88	1.910	53.51
	46.09	5.546	11.18
	18.87	2.270	99.91
	0.38	0.045	1.26
	12.26	1.475	23.66
	1.75	0.201	5.88
	0.78	0.094	2.82
	1.92	0.230	9.69
	0.21	0.025	1.12
	1.02	0.123	6.89
	0.29	0.035	2.01
	0.43	0.052	3.66
	0.02	0.002	0.16
	0.12	0.014	1.17
		12.034	222.93
		7.456	
		2.90	

	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
	6.900	15.801	8.810	-6.991	-195.81
	20.033	34.361	25.579	-8.782	-17.70
	8.199	8.680	10.469	1.789	78.74
	0.164	0.209	0.209		
	5.326	6.088	6.801	0.713	11.44
	0.758	0.758	0.959	0.201	5.88
	0.338	0.338	0.432	0.094	2.82
					20.14
	0.834	0.834	1.064	0.230	9.69
	0.090	0.090	0.115	0.025	1.12
	0.445	0.445	0.567	0.123	6.89
	0.125	0.125	0.160	0.035	2.01
	0.188	0.188	0.740	0.052	3.66
	0.099	0.099	0.011	0.002	0.16
	0.052	0.052	0.066	0.014	1.17
					24.70
	43.462	67.979	59.052		
	26.933	50.162	34.389	-15.773	
		2.17		1.26	

YIELD BASIS H_2+CO FED

CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	POLYMER #/hr	POLYMER #/MCF	POLYMER #/gal	POLYMER gal/hr	POLYMER gal/MCF	% Unsats.
					Distribution of				
					Recovered Oil				
8.943					400 EP			0.328	
					400-550			0.063	
1.299					550+			0.057	
								0.448	68.1
0.668									
0.320									
2.287									
1.101	4.32	2.243	0.255	8.72	0.990	6.25	1.395	0.158	90.2
0.127	4.24	0.264	0.030						
0.783	5.00	1.378	0.157	6.55	0.744	6.10	1.074	0.122	77.8
0.228	4.86	0.414	0.047	2.01	0.228	4.86	0.414	0.047	
0.416	5.45	0.672	0.076	3.66	0.416	5.45	0.672	0.076	96.3
0.018	5.25	0.030	0.003	0.16	0.018	5.25	0.030	0.003	
0.133	5.54	0.211	0.024	1.17	0.133	5.54	0.211	0.024	
2.806		5.212	0.592	22.27	2.529		3.796	0.430	

CUMULATIVE TOTALS	H_2+CO MCF	Catalyst #	C_3^+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO									
	RECOVERED OIL	0.183#	25.70	2.919		3.940	0.448	25.70	2.919		3.940	0.448	
	TOTAL OIL		50.40	5.725		9.152	1.040	47.97	5.448		7.736	0.878	
	WATER SOLUBLE CHEMICALS	0.098	5.21	0.592		0.616	0.070	5.21	0.592		0.616	0.070	
$\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 9.28	TOTAL LIQUID PRODUCTS C_3^+		55.61	6.317		9.768	1.109	53.18	6.040		8.352	0.948	
	NET WATER	3.275	59.01	6.702		7.084	0.805						
	GROSS WATER		64.22	7.294		7.700	0.875						
	HYDROCARBON TOTAL—C_1^+		75.75	8.604									

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3^+/C_1^+
50.91	78.54	61.29	67.90	44.24	25.56	31.44	73.41

*Included in Reactor Effluent Total

Weight Balance = 90.30%

g/M3 ÷ 16.91 × = MCF.
cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 M From Hr. 0700 to Hr. 0700 Hrs. 227-251

FLOWS	SCFH	%
Oxygen	2167	
Nat. Gas	3378	
Total		
Fresh Feed	9100	
F. F. by C	8865	
Avg. F. F.	8983	
Wet Gas	3728	
Contraction		
Recycle	15827	
Bleed	811	
Total	16638	
Total Feed	25738	
Recycle/F.F.	1.83	
Inlet Vel.	1.10	
Steam Flow		

RUN CONDITIONS	
Generator Press.	332
O_2 Preheat, °F	445
Gas Preheat, °F	698
Reactor Press.	295
Steam Back Press.	775
Temperatures, °F	
Heater Outlet	512
Catalyst #1	652
#2	653
#3	666
#4	651
#5	
Average	653
Product Separator	45

DISTILLATIONS — A S T M	
Prod.	Naph
A.P.I.	54.6
I.B.P.	96
5%	
10%	136
20	168
30	196
40	220
50	240
60	262
70	294
80	326
90	360
95	388
E.P.	402
Rec.	97
Res.	2
Loss.	1

Hempel Dist.	°F	%	A.P.I.
	to 400	72.0	54.6
	400-550	13.3	38.0
	550+	14.7	

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	429
Fresh Catalyst Charged	161
Catalyst Recharged	
Total	590
Catalyst Taken Out	73
In Reactor at End of Period	517
Reactor d-P, H_2O	
Pounds in Reactor	720
Density, lbs./cu. ft.	145
Bed Height, Feet	7.5
Space Vel. SCFH/lb. cat.	
Inventory Figures	17.38
From d-P Meters	12.48

CATALYST ANALYSIS — Particle Size	Screen			Sedimentation	
	Frac.	M	%	M	%
	On 40	420+	30.6	80+	
	100	419-150	50.5	80-40	
	150	149-105	8.8	40-20	
	200	104-74	7.5	20-10	
	250	73-62	1.4	10-0	
	325	61-44	0.8		
	<325	43-0	0.4		

Density, lbs./cu. ft.		Chem. Anal.	
Aerated	149	% Fe	
Settled	150	% C	
Compacted	165	% Oil	
Sp. Grav.	4.1	Specific Surface	
			m^2/gm
		2.3	ml. NH_3/gm

NATURAL GAS	%
CO_2	1.37
CH_4	84.63
C_2H_6	9.26
C_3H_8	3.36
C_4H_{10}	0.14
N_2	1.06
O_2	0.18

PRODUCT INSPECTION					
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	46	41			
Sap. No.	56	46			
Hydrox. No.					
Bromine No.	85				
% Fe					
% Alc		10			
°API	49.1	10.7			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	SCFH m/hr	C	H	O
O_2		5.735			11.470
CO_2		0.122	0.12		0.244
CH_4		7.544	7.54	30.176	
C_2H_6		0.825	1.65	4.950	
C_3H_8		0.300	0.90	2.400	
C_4H_{10}		0.12	0.05	0.120	
N_2		0.94			
Total			10.26	37.646	11.714

OUT	Mol %	SCFH m/hr	C	H	O
CO_2		0.469	0.47		0.9
CO		8.927	8.93		8.9
CH_4		0.923	0.92	3.692	
H_2		13.598		27.196	
N_2		0.095			
H_2O				5.228	2.6
Total			10.32	36.116	12.5
Balance			100.5	95.9	106.5

FRESH FEED	%	m/hr	#/hr
CO 28.010	37.18	8.927	250.04
H_2 2.016	56.63	13.598	27.41
CO_2 44.010	1.95	0.469	20.64
N_2 28.016	0.40	0.095	2.66
CH_4 16.042	3.84	0.923	14.81
C_2H_2 28.052			
C_2H_4 30.068			
C_1+C_2			
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_6H_{12} 72.146			
C_6H_{12} 84.156			
C_3-C_6			
TOTAL		24.010	315.56
H_2+CO	93.31	22.525	8537 S.C.F.H.
H_2/CO		1.52	11714

WET GAS	%	At. Wt. Balance m/hr	At. Wt. Balance #/hr
CO 28.010	15.62	1.810	50.69
H_2 2.016	44.45	5.152	10.38
CO_2 44.010	19.34	2.241	98.64
N_2 28.016	0.56	0.065	1.81
CH_4 16.042	13.34	1.546	24.80
C_2H_2 28.052	1.84	0.213	5.99
C_2H_4 30.068	0.83	0.095	2.88
C_1+C_2			
C_3H_6 42.078	2.07	0.239	10.06
C_3H_8 44.094	0.10	0.012	0.50
C_4H_8 56.104	1.04	0.120	6.74
C_4H_{10} 58.120	0.29	0.033	1.92
C_5H_{10} 70.130	0.40	0.047	3.31
C_6H_{12} 72.146	0.04	0.005	0.34
C_6H_{12} 84.156	0.10	0.012	0.99
C_3-C_6			
TOTAL		11.592	19.08
H_2+CO		6.962	
H_2/CO		2.85	

RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
6.855	15.782	8.665	-7.117	-199.35
19.512	33.110	24.664	-8.446	-17.03
8.488	8.957	10.729	1.772	78.00
0.247	0.342	0.312		
5.854	6.777	7.400	0.623	9.99
0.808	0.808	1.021	0.213	5.99
0.363	0.363	0.458	0.095	2.88
				18.86
0.907	0.907	1.146	0.239	10.06
0.045	0.045	0.057	0.012	0.50
0.455	0.455	0.575	0.120	6.74
0.126	0.126	0.159	0.033	1.92
0.177	0.177	0.224	0.047	3.31
0.016	0.016	0.021	0.005	0.34
0.046	0.046	0.058	0.012	0.99
				23.86
43.898	67.908	59.151		
26.367	48.892	33.329	-15.563	
	2.10		1.19	

YIELD BASIS H_2+CO FED

CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	POLYMER #/hr	POLYMER #/MCF	POLYMER #/gal	POLYMER gal/hr	POLYMER gal/MCF	% Unsats.
				Distribution of					
				Recovered Oil					
9.137					400 EP			0.387	
					400-550			0.072	
					550+			0.079	
0.702								0.538	69.2
0.337									
2.209									
1.178	4.32	2.329	0.273	9.05	1.060	6.25	1.448	0.170	95.2
0.059	4.24	0.118	0.014						
0.790	5.00	1.348	0.158	6.40	0.750	6.10	1.049	0.123	78.4
0.225	4.86	0.395	0.046	1.92	0.225	4.86	0.395	0.046	
0.388	5.45	0.607	0.071	3.31	0.388	5.45	0.607	0.071	90.4
0.040	5.25	0.065	0.008	0.34	0.040	5.25	0.065	0.008	
0.116	5.54	0.179	0.021	0.99	0.116	5.54	0.179	0.021	
2.796		5.041	0.591	22.01	2.579		3.743	0.439	
1.178	4.32	2.329	0.273	9.05	1.060	6.25	1.448	0.170	95.2
0.059	4.24	0.118	0.014						
0.790	5.00	1.348	0.158	6.40	0.750	6.10	1.049	0.123	78.4
0.225	4.86	0.395	0.046	1.92	0.225	4.86	0.395	0.046	
0.388	5.45	0.607	0.071	3.31	0.388	5.45	0.607	0.071	90.4
0.040	5.25	0.065	0.008	0.34	0.040	5.25	0.065	0.008	
0.116	5.54	0.179	0.021	0.99	0.116	5.54	0.179	0.021	
2.796		5.041	0.591	22.01	2.579		3.743	0.439	

CUMULATIVE TOTALS	H_2+CO,MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO		RECOVERED OIL	TOTAL OIL	WATER SOLUBLE CHEMICALS	TOTAL LIQUID PRODUCTS C_3+	NET WATER	GROSS WATER	HYDROCARBON TOTAL—C_1+
$\frac{(H_2)(CO_2)}{(H_2O)(CO)}$	9.20	0.213*	29.93	3.506	4.590	0.538	29.93	3.506	4.590	0.538
			53.79	6.302	9.631	1.129	51.94	6.085	8.333	0.977
		0.127*	6.72	0.787	0.798	0.093	6.72	0.787	0.798	0.093
			60.51	7.089	10.429	1.222	58.66	6.872	9.131	1.070
		3.321*	59.83	7.008	7.182	0.841				
			66.55	7.796	7.980	0.934				
			79.37	9.298						

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
51.72	79.72	62.11	69.09	45.10	25.51	31.83	76.24

*Included in Reactor Effluent Total

Weight Balance = 89.50%

g/M3 = 16.91 × ± MCF.

cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 N From Hr. 0700 to 0700 Hrs. 251-275

FLOWS	SCFH	%
Oxygen	2160	
Nat. Gas	3382	
Total		
Fresh Feed	9059	
F. F. by C	9052	
Avg. F. F.	9056	
Wet Gas	3394	
Contraction		
Recycle	15214	
Bleed	768	
Total	15982	
Total Feed	25041	
Recycle/F.F.	1.77	
Inlet Vel.	1.06	
Steam Flow		

RUN CONDITIONS	
Generator Press.	331
O_2 Preheat, °F	436
Gas Preheat, °F	705
Reactor Press.	295
Steam Back Press.	790
Temperatures, °F	
Heater Outlet	519
Catalyst #1	651
#2	650
#3	660
#4	642
#5	
Average	650
Product Separator	

DISTILLATIONS — A S T M	
Prod.	Naph
A.P.I.	55.1
I.B.P.	94
5%	
10%	134
20	160
30	190
40	216
50	236
60	262
70	290
80	318
90	354
95	380
E.P.	400
Rec.	97
Res.	2
Loss.	1

Hempel Dist.		
°F	%	A.P.I.
to 400	68.6	35.1
400-550	16.6	37.9
550+	14.8	

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	517
Fresh Catalyst Charged	170
Catalyst Recharged	
Total	687
Catalyst Taken Out	94
In Reactor at End of Period	593
Reactor d-P, H_2O	
Pounds in Reactor	821.11
Density, lbs./cu. ft.	143
Bed Height, Feet	8.7
Space Vel. SCFH/lb. cat.	
Inventory Figures	15.27
From d-P Meters	11.03

CATALYST ANALYSIS — Particle Size				
	Screen			Sedimentation
Frac.	M	%	M	%
On 40	420+	35.8	80+	
100	419-150	53.2	80-40	
150	149-105	5.7	40-20	
200	104-74	4.1	20-10	
250	73-62	0.4	10-0	
325	61-44	0.4		
<325	43-0	0.4		
Density, lbs./cu. ft.			Chem. Anal.	
Aerated	151		% Fe	
Settled	152		% C	
Compacted	164		% Oil	
Sp. Grav.	4.4		Specific Surface	
				m^2/gm
			3.0	ml.NH_3/gm

NATURAL GAS	%
CO_2	1.36
CH_4	95.99
C_2H_6	8.25
C_3H_8	2.75
C_4H_{10}	0.10
N_2	1.31
O_2	0.24

PRODUCT INSPECTION						
	Oil	Water	Product	Pour °F	SUS @ °F	
Neut. No.	54	40				
Sap. No.	58	48				
Hydrox No.						
Bromine No.	84					
% Fe						
% Alc		7				
°API	49.2	10.4				

GENERATOR ELEMENTAL BALANCE

IN	Mol %	~~SCFH~~ m/hr	C	H	O
O_2		5.721			11.442
CO_2		0.121	0.12		0.242
CH_4		7.672	7.672	30.688	
C_2H_6		0.736	1.47	4.416	
C_3H_8		0.245	0.74	1.960	
C_4H_{10}		0.009	0.04	0.090	
N_2		0.117			
Total			10.04	37.154	11.684

OUT	Mol %	~~SCFH~~ m/hr	C	H	O
CO_2		0.46	0.5		0.9
CO		8.91	8.9		8.9
CH_4		0.84	0.8	3.368	
H_2		13.60		27.204	
N_2		0.10			
H_2O				5.156	2.6
Total			10.2	35.728	12.4
Balance			101.7	96.2	106.1

	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	37.262	8.907	249.48	14.672	1.596	44.72	6.187	15.094	7.783	-7.311	-204.76
H_2 2.016	56.905	13.602	27.42	42.830	4.659	9.39	18.059	31.661	22.718	-8.943	-18.03
CO_2 44.010	1.907	0.456	20.07	19.830	2.157	94.94	8.361	8.817	10.518	1.701	74.87
N_2 28.016	0.403	0.096	2.69	0.832	0.091	2.55	0.351	0.447	0.442		
CH_4 16.042	3.523	0.842	13.51	14.390	1.565	25.10	6.066	6.908	7.631	0.723	11.59
C_2H_4 28.052				1.920	0.209	5.86	0.809	0.809	1.018	0.209	5.86
C_2H_6 30.068				0.910	0.098	2.96	0.383	0.383	0.481	0.098	2.96
C_1+C_2											20.41
C_3H_6 42.078				2.232	0.243	10.23	0.941	0.941	1.184	0.243	10.23
C_3H_8 44.094				0.220	0.024	1.07	0.093	0.093	0.117	0.024	1.07
C_4H_8 56.104				1.230	0.134	7.50	0.519	0.519	0.653	0.134	7.50
C_4H_{10} 58.120				0.312	0.034	1.98	0.132	0.132	0.166	0.034	1.98
C_5H_{10} 70.130				0.488	0.053	3.75	0.206	0.206	0.259	0.053	3.75
C_5H_{12} 72.146				0.050	0.005	0.35	0.021	0.021	0.026	0.005	0.35
C_6H_{12} 84.156				0.096	0.010	0.8	0.040	0.040	0.050	0.010	0.91
C_3-C_6											25.69
TOTAL		23.903	313.17		10.378	211.21	42.169	66.072	57.011		
H_2+CO	94.167	22.509	8531 S.C.F.H.		6.255		24.246	46.755	30.501	-16.254	
H_2/CO		1.53	11721		2.92			2.10		1.22	

YIELD BASIS H_2+CO FED

	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	POLYMER # hr	POLYMER #/MCF	POLYMER #/gal	POLYMER gal/hr	POLYMER gal MCF	Unsats.
	1.199	4.32	2.368	0.278	9.21	1.080	6.25	1.474	0.173	91.0
	0.125	4.24	0.252	0.030						
	0.979	5.00	1.500	0.176	7.13	0.836	6.10	1.169	0.137	79.8
	0.232	4.86	0.407	0.048	1.98	0.232	4.86	0.407	0.048	
	0.440	5.45	0.688	0.081	3.75	0.440	5.45	0.688	0.081	91.4
	0.041	5.25	0.067	0.008	0.35	0.041	5.25	0.067	0.008	
	0.095	5.54	0.146	0.017	0.91	0.095	5.54	0.146	0.017	
	3.011		5.428	0.638	23.23	2.724		3.951	0.464	
	0.223*	31.21	3.658		4.790	0.561		31.21	3.658	
		56.90	6.669		10.218	1.199		54.44	6.382	
	0.095*	5.06	0.593		0.594	0.070		5.06	0.593	
		61.96	7.262		10.812	1.267		59.50	6.975	
	3.646*	65.69	7.700		7.886	0.924				
		70.75	8.293		8.480	0.994				
		82.37	9.654							

Distribution of Recovered Oil

	400 EP	400-550	550+
			0.085
			0.093
			0.083
			0.561

CUMULATIVE TOTALS	H_2+CO,MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 8.42

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+ / C_1+
54.49	82.08	65.75	72.21	48.44	28.25	34.76	75.22

*Included in Reactor Effluent Total

Weight Balance = 88.08%

g/M3 ÷ 16.91 = MCF

cc/M3 ÷ 141.3 = gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 0 From Hr. 0700 to Hr. 0700 Hrs. 275-299

FLOWS	SCFH	%
Oxygen	2173	
Nat. Gas	3390	
Total	5563	
Fresh Feed	9216	
F. F. by C	9060	
Avg. F. F.	9138	
Wet Gas	3726	
Contraction		
Recycle	15799	
Bleed	804	
Total	16603	
Total Feed	25819	
Recycle/F.F.	1.80	
Inlet Vel.	1.08	
Steam Flow		

RUN CONDITIONS	
Generator Press.	338
O_2 Preheat, °F	447
Gas Preheat, °F	700
Reactor Press.	300
Steam Back Press.	730
Temperatures, °F	
Heater Outlet	563
Catalyst #1	646
#2	652
#3	660
#4	645
#5	
Average	650
Product Separator	

DISTILLATIONS — A S T M	
Prod.	Naph
A.P.I.	50.5
I.B.P.	96
5%	
10%	130
20	166
30	196
40	220
50	240
60	260
70	292
80	320
90	358
95	384
E.P.	403
Rec.	97
Res.	2
Loss.	1

Hempel Dist.		
°F	%	A.P.I.
to 400	71.0	50.5
400-550	15.6	38.0
550+	13.4	

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	593
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	99
In Reactor at End of Period	494
Reactor d-P, H_2O	
Pounds in Reactor	678.88
Density, lbs./cu. ft.	139
Bed Height, Feet	7.4
Space Vel. SCFH/lb. cat.	
Inventory Figures	18.50
From d-P Meters	13.46

CATALYST ANALYSIS — Particle Size				
Screen			Sedimentation	
Frac.	M	%	M	%
On 40	420+	25.9	80+	
100	419-150	50.7	80-40	
150	149-105	11.3	40-20	
200	104-74	8.1	20-10	
250	73-62	1.6	10-0	
325	61-44	0.2		
<325	43-0	2.2		
Density, lbs./cu. ft.			Chem. Anal.	
Aerated	169		% Fe	
Settled	171		% C	
Compacted	182		% Oil	
Sp. Grav.	4.8		Specific Surface	
				m^2/gm
			2.4	ml.NH_3/gm

NATURAL GAS	%
CO_2	1.32
CH_4	86.01
C_2H_6	8.71
C_3H_8	2.84
C_4H_{10}	0.09
N_2	0.81
O_2	0.22

PRODUCT INSPECTION					
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	47	42			
Sap. No.	58	48			
Hydrox. No.					
Bromine No.	80				
% Fe					
% Alc		10			
°API	47.9	10.6			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	scfh / m³/hr	C	H	O
O_2		5.753			11.506
CO_2		0.118	0.12		0.236
CH_4		7.694	7.69	30.776	
C_2H_6		0.779	1.66	4.674	
C_3H_8		0.254	0.76	2.032	
C_4H_{10}		0.008	0.03	0.080	
N_2		0.072			
Total			10.26	37.562	11.742

OUT	Mol %	scfh / m³/hr	C	H	O
CO_2		0.449	0.45		0.9
CO		8.820	8.82		8.8
CH_4		0.945	0.95	3.780	
H_2		14.022		28.044	
N_2		0.080			
H_2O				4.892	2.4
Total			10.21	36.816	12.2
Balance			99.51	98.01	103.6

	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	36.27	8.320	247.05	16.47	1.933	54.14	7.213	16.033	9.146	-6.887	-192.91
H_2 2.016	57.66	14.022	28.27	45.57	5.349	10.78	19.961	33.983	25.310	-8.673	-17.49
CO_2 44.010	1.85	0.449	19.76	18.03	2.117	93.16	7.398	8.347	10.015	1.668	73.40
N_2 28.016	0.33	0.080	2.24	0.91	0.107	3.01	0.400	0.480	0.507	0.027	
CH_4 16.042	3.89	0.945	15.16	12.78	1.500	24.06	5.597	6.542	7.097	0.555	8.90
C_2H_4 28.052				1.59	0.186	5.23	0.697	0.697	0.883	0.186	5.23
C_2H_6 30.068				0.73	0.085	2.54	0.318	0.318	0.403	0.085	2.54
C_1+C_2											16.67
C_3H_6 42.078				2.13	0.250	10.49	0.931	0.931	1.181	0.250	10.49
C_3H_8 44.094				0.10	0.012	0.53	0.042	0.042	0.054	0.012	0.53
C_4H_8 56.104				0.97	0.113	6.36	0.424	0.424	0.537	0.113	6.36
C_4H_{10} 58.120				0.25	0.031	1.80	0.110	0.110	0.141	0.031	1.80
C_5H_{10} 70.130				0.39	0.045	3.18	0.170	0.170	0.215	0.045	3.18
C_5H_{12} 72.146				0.02	0.002	0.17	0.007	0.007	0.009	0.002	0.17
C_6H_{12} 84.156				0.09	0.011	0.91	0.039	0.039	0.050	0.011	0.91
C_3-C_6											23.44
TOTAL		24.317	312.48		11.737	216.36	43.806	68.123	59.167		
H_2+CO	93.93	22.842	8657 S.C.F.H.		7.282		27.174	50.016	34.456	-15.560	
H_2/CO		1.59	115513		2.77			2.12		1.26	

YIELD BASIS H_2+CO FED

	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF	POLYMER #/hr	POLYMER #/MCF	POLYMER #/gal	POLYMER gal/hr	POLYMER gal/MCF	% Unsats.
CO					Distribution of					
H_2					Recovered Oil					
CO_2					400 EP				0.381	
N_2					400-550				0.084	
CH_4					550+				0.072	
C_2H_4									0.537	68.7
C_2H_6										
C_1+C_2										
C_3H_6	1.212	4.32	2.428	0.280	9.44	1.090	6.25	1.511	0.175	95.6
C_3H_8	0.061	4.24	0.125	0.014						
C_4H_8	0.735	5.00	1.272	0.147	6.04	0.698	6.10	0.990	0.114	79.5
C_4H_{10}	0.208	4.86	0.370	0.043	1.90	0.208	4.86	0.370	0.043	
C_5H_{10}	0.367	5.45	0.583	0.067	3.18	0.367	5.45	0.583	0.067	95.1
C_5H_{12}	0.020	5.25	0.032	0.004	0.17	0.020	5.25	0.032	0.004	
C_6H_{12}	0.105	5.54	0.164	0.019	0.91	0.105	5.54	0.164	0.019	
C_3-C_6	2.707		4.974	0.575	21.54	2.488		3.650	0.422	
TOTAL										
H_2+CO										
H_2/CO										

CUMULATIVE TOTALS	H_2+CO MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO		
$\frac{(H_2)(CO_2)}{(H_2O)(CO)}$	8.44	

EFFLUENT	CONDENSATE #/hr	CONDENSATE gal/hr	CONDENSATE gal/MCF	POLYMER #/hr	POLYMER #/MCF	POLYMER #/gal	POLYMER gal/hr	POLYMER gal/MCF
RECOVERED OIL	0.216*	30.33	3.504	4.650	0.537	30.33	3.504	4.650	0.537
TOTAL OIL		53.77	6.211	9.624	1.112	51.87	5.992	8.300	0.959
WATER SOLUBLE CHEMICALS	0.125*	6.64	0.767	0.789	0.091	6.64	0.767	0.789	0.091
TOTAL LIQUID PRODUCTS C_3+		60.41	6.978	10.413	1.203	58.51	6.759	9.089	1.050
NET WATER	3.283*	59.15	6.833	7.101	0.820				
GROSS WATER		65.79	7.600	7.890	0.911				
HYDROCARBON TOTAL—C_1+		77.08	8.903						

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+
51.73	78.08	61.88	68.12	42.95	25.52	31.11	78.37

*Included in Reactor Effluent Total

Weight Balance = 88.75%

g/M3 = 16.91 × ±/MCF.
cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 P From Hr. 0700 to Hr. 0700 Hrs. 299-319

FLOWS	SCFH	%
Oxygen	2152	
Nat. Gas	3401	
Total		
Fresh Feed	9237	
F. F. by C	9349	
Avg. F. F.	9293	
Wet Gas	4014	
Contraction		
Recycle	16220	
Bleed	828	
Total	17048	
Total Feed	26285	
Recycle/F.F.	1.84	
Inlet Vel.	1.10	
Steam Flow		

RUN CONDITIONS	
Generator Press.	341
O_2 Preheat, °F	435
Gas Preheat, °F	685
Reactor Press.	300
Steam Back Press.	853
Temperatures, °F	
Heater Outlet	560
Catalyst #1	643
#2	641
#3	657
#4	651
#5	
Average	648
Product Separator	

DISTILLATIONS	ASTM
Prod.	Naph
A.P.I.	68.3
I.B.P.	98
5%	
10%	140
20	156
30	206
40	224
50	252
60	272
70	298
80	330
90	364
95	390
E.P.	407
Rec.	97.5
Res.	2.0
Loss.	0.5

Hempel Dist.	°F	%	A.P.I.
to 400	68.3	53.7	
400-550	19.3	38.2	
550+	12.4		

WATER	Temp.	%
	200	
	203	
	208	

CATALYST DATA	
In Reactor at Start of Period	494
Fresh Catalyst Charged	207
Catalyst Recharged	
Total	701
Catalyst Taken Out	125
In Reactor at End of Period	576
Reactor d-P, H_2O	
Pounds in Reactor	797
Density, lbs./cu. ft.	142
Bed Height, Feet	8.5
Space Vel. SCFH/lb. cat.	
Inventory Figures	16.13
From d-P Meters	11.66

CATALYST ANALYSIS — Particle Size				
	Screen		Sedimentation	
Frac.	M	%	M	%
On 40	420+	23.9	80+	
100	419-150	49.3	80-40	
150	149-105	11.1	40-20	
200	104-74	10.3	20-10	
250	73-62	2.2	10-0	
325	61-44	0.2		
<325	43-0	3.0		

Density, lbs./cu. ft.		Chem. Anal.	
Aerated	170	% Fe	
Settled	172	% C	
Compacted	185	% Oil	
Sp. Grav.	4.7	Specific Surface	
			m^2/gm
		2.6	ml.NH_3/gm

NATURAL GAS	%
CO_2	1.52
CH_4	84.96
C_2H_6	9.29
C_3H_8	2.77
C_4H_{10}	0.11
N_2	1.12
O_2	0.24
MW	18.767

PRODUCT INSPECTION					
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	49	44			
Sap. No.	58	47			
Hydrox. No.					
Bromine No.	71.1				
% Fe					
% Alc		9			
Aniline Point °F	57.0				
°API	47.6	10.5			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	~~SCF/~~ m/hr	C	H	O
O_2		5.700			11.400
CO_2		0.136	0.14		0.272
CH_4		7.624	7.62	30.496	
C_2H_6		0.834	1.67	5.004	
C_3H_8		0.249	0.75	1.992	
C_4H_{10}		0.010	0.04	0.100	
N_2		0.100			
Total			10.22	37.592	11.672

OUT	Mol %	~~SCF/~~ m/hr	C	H	O
CO_2		0.424	0.42		0.8
CO		8.786	8.79		8.8
CH_4		0.962	0.96	3.848	
H_2		14.100		28.200	
N_2		0.100			
H_2O				4.832	2.4
Total			10.17	36.878	12.0
Balance			99.58	98.10	103.1

	FRESH FEED %	m/hr	#/hr	WET GAS %	At. Wt. Balance m/hr	#/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	#/hr
CO 28.010	36.048	8.786	246.10	17.89	2.200	61.62	8.048	16.834	10.248	-6.586	-184.48
H_2 2.016	57.852	14.100	28.42	46.97	5.763	11.62	21.080	35.180	26.843	-8.337	-16.80
CO_2 44.010	1.742	0.424	18.66	16.52	2.032	89.41	7.431	7.955	9.463	1.608	70.75
N_2 28.016	0.412	0.100	2.80	0.77	0.095	2.67	0.347	0.447	0.442		
CH_4 16.042	3.946	0.962	15.43	12.48	1.535	24.62	5.613	6.575	7.148	0.573	9.19
C_2H_4 28.052				1.47	0.180	5.05	0.659	0.659	0.839	0.180	5.05
C_2H_6 30.068				0.63	0.078	2.33	0.285	0.285	0.363	0.078	2.33
C_1+C_2											16.57
C_3H_6 42.078				1.57	0.193	8.10	0.705	0.705	0.898	0.193	8.10
C_3H_8 44.094				0.12	0.014	0.62	0.052	0.052	0.066	0.014	0.62
C_4H_8 56.104				0.88	0.108	6.06	0.397	0.397	0.505	0.108	6.06
C_4H_{10} 58.120				0.28	0.034	1.95	0.124	0.124	0.158	0.034	1.95
C_5H_{10} 70.130				0.40	0.049	3.42	0.178	0.178	0.227	0.049	3.42
C_5H_{12} 72.146				0.03	0.003	0.26	0.012	0.012	0.015	0.003	0.26
C_6H_{12} 84.156				0.11	0.014	1.17	0.051	0.051	0.065	0.014	1.17
C_5-C_6											21.58
TOTAL		24.372	311.41		12.296	218.91	44.981	69.353	60.788		
H_2+CO	93.900	22.886	8674 S.C.F.H.		7.963		29.128	52.014	37.091	-14.923	
H_2/CO		1.60	11528		2.62			2.09		1.27	

YIELD BASIS H_2+CO FED

	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	POLYMER #/hr	#/MCF	#/gal	gal/hr	gal/MCF	% Unsats.
	2.488		4.523	0.521	19.85	2.288		3.400	0.391	
TOTAL										
H_2+CO	0.934	4.32	1.875	0.216	7.29	0.840	6.25	1.166	0.134	93.2
C_3H_8 44.094	0.071	4.24	0.146	0.017						
C_4H_8 56.104	0.699	5.00	1.212	0.140	5.76	0.664	6.10	0.944	0.109	76.1
C_4H_{10} 58.120	0.225	4.86	0.401	0.046	1.95	0.225	4.86	0.401	0.046	
C_5H_{10} 70.130	0.394	5.45	0.628	0.072	3.42	0.394	5.45	0.628	0.072	94.2
C_5H_{12} 72.146	0.030	5.25	0.050	0.006	0.26	0.030	5.25	0.050	0.006	
C_6H_{12} 84.156	0.135	5.54	0.211	0.024	1.17	0.135	5.54	0.211	0.024	
C_5-C_6	2.488		4.523	0.521	19.85	2.288		3.400	0.391	
TOTAL										
H_2+CO	0.934	4.32	1.875	0.216	7.29	0.840	6.25	1.166	0.134	93.2
H_2/CO										

CUMULATIVE TOTALS	H_2+CO,MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO	$\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 7.76				
RECOVERED OIL	0.208*	29.20	3.366	4.440	0.512
TOTAL OIL		50.78	5.854	8.963	1.033
WATER SOLUBLE CHEMICALS	0.109*	5.76	0.664	0.683	0.079
TOTAL LIQUID PRODUCTS C_3+		56.54	6.518	9.646	1.112
NET WATER	3.194*	57.54	6.633	6.907	0.796
GROSS WATER		63.30	7.297	7.590	0.875
HYDROCARBON TOTAL—C_1+		73.11	8.428		

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+ /C_1+
49.55	74.96	59.13	65.21	39.12	23.70	28.69	77.34

*Included in Reactor Effluent Total

Weight Balance = 90.26%

g/M3 = 16.91 × ± MCF

cc/M3 = 141.3 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 Q From Hr. 0700 to Hr. 0700 Hrs. 319-343

FLOWS	SCFH	%
Oxygen	2158	
Nat. Gas	3402	
Total		
Fresh Feed	9200	
F. F. by C	9369	
Avg. F. F.	9285	
Wet Gas	4255	
Contraction		
Recycle	16344	
Bleed	860	
Total	17204	
Total Feed	26404	
Recycle/F.F.	1.87	
Inlet Vel.	1.11	
Steam Flow		

RUN CONDITIONS	
Generator Press.	345
O_2 Preheat, °F	442
Gas Preheat, °F	720
Reactor Press.	300
Steam Back Press.	770
Temperatures, °F	
Heater Outlet	575
Catalyst #1	652
#2	652
#3	651
#4	651
#5	651
Average	651
Product Separator	40

DISTILLATIONS — ASTM	
Prod.	Naph
A.P.I.	53.7
I.B.P.	104
5%	
10%	140
20	174
30	204
40	226
50	248
60	268
70	294
80	326
90	356
95	386
E.P.	402
Rec.	98.0
Res.	1.5
Loss.	0.5

Hempel Dist.		
°F	%	A.P.I.
to 400	66.6	53.7
400-550	19.0	38.0
550+	14.4	

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	576
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	64
In Reactor at End of Period	512
Reactor d-P, H_2O	
Pounds in Reactor	658.35
Density, lbs./cu. ft.	133
Bed Height, Feet	7.5
Space Vel. SCFH/lb. cat.	
Inventory Figures	18.13
From d-P Meters	14.10

CATALYST ANALYSIS — Particle Size					
	Screen			Sedimentation	
Frac.	M	%		M	%
On 40	420+	25.9		80+	
100	419-150	51.9		80-40	
150	149-105	9.5		40-20	
200	104-74	8.9		20-10	
250	73-62	1.6		10-0	
325	61-44	0.8			
<325	43-0	1.4			
Density, lbs./cu. ft.				Chem. Anal.	
Aerated	164			% Fe	
Settled	166			% C	
Compacted	182			% Oil	
Sp. Grav.	4.7			Specific Surface	
					m^2/gm
				1.8	ml.NH_3/gm

NATURAL GAS	%
CO_2	1.31
CH_4	84.95
C_2H_6	9.56
C_3H_8	2.85
C_4H_{10}	0.12
N_2	0.96
O_2	0.25
MW	18.754

PRODUCT INSPECTION					
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	51	45			
Sap. No.	64	52			
Hydrox. No.					
Bromine No.	74				
% Fe					
% Alc		11.5			
°API	47.4	10.4			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	SCFH-m/hr	C	H	O
O_2		5.716			11.432
CO_2		0.118	0.12		0.236
CH_4		7.624	7.62	30.496	
C_2H_6		0.858	1.72	5.148	
C_3H_8		0.256	0.77	2.048	
C_4H_{10}		0.011	0.04	0.110	
N_2		0.086			
Total			10.27	37.802	11.668

OUT	Mol %	SCFH-m/hr	C	H	O
CO_2		0.399	0.40		0.8
CO		8.618	8.62		8.6
CH_4		1.116	1.12	4.454	
H_2		14.071		28.142	
N_2		0.070			
H_2O				4.856	2.4
Total			10.13	37.452	11.8
Balance			98.67	99.07	101.5

FRESH FEED	%	m/hr	#/hr
CO 28.010	35.503	8.618	241.39
H_2 2.016	57.966	14.071	28.37
CO_2 44.010	1.645	0.399	17.56
N_2 28.016	0.288	0.070	1.96
CH_4 16.042	4.598	1.116	17.90
C_2H_4 28.052			
C_2H_6 30.068			
C_1+C_2			
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_3-C_6			
TOTAL		24.274	307.18
H_2+CO	93.469	22.689	8599 S.C.F.H.
H_2/CO		1.63	11629

WET GAS	%	At. Wt. Balance m/hr	At. Wt. Balance #/hr
	18.30	2.425	67.93
	47.14	6.249	12.60
	15.69	2.079	91.51
	0.99	0.131	3.67
	12.47	1.653	26.52
	1.42	0.188	5.27
	0.60	0.080	2.41
			16.30
	1.55	0.205	8.64
	0.11	0.014	0.63
	0.79	0.104	5.83
	0.52	0.068	3.98
	0.34	0.045	3.14
	0.11	0.014	1.19
			23.41
		13.258	235.33
		8.674	
		2.58	

RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr
8.305	16.923	10.730
21.396	35.467	27.822
7.121	7.520	9.200
0.448	0.518	0.579
5.660	6.776	7.313
0.644	0.644	0.832
0.273	0.273	0.353
0.704	0.704	0.909
0.050	0.050	0.064
0.357	0.357	0.461
0.234	0.234	0.302
0.152	0.152	0.197
0.048	0.048	0.062
45.392	69.666	61.506
29.701	52.390	38.375
	2.10	

NET CHANGE m/hr	#/hr
-6.193	-173.46
-7.822	-15.77
1.680	73.95
0.537	8.62
0.188	5.27
0.080	2.41
	16.30
0.205	8.64
0.014	0.63
0.104	5.83
0.068	3.98
0.045	3.14
0.014	1.19
	23.41
-14.015	
1.26	

YIELD BASIS H_2+CO FED

CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
8.600			
1.002			
0.613			
0.280			
1.895			
1.005	4.32	2.000	0.233
0.073	4.24	0.149	0.017
0.678	5.00	1.166	0.136
0.463	4.86	0.819	0.095
0.365	5.45	0.576	0.067
	5.25		
0.138	5.54	0.215	0.025
2.722		4.905	0.573

POLYMER #/hr	#/MCF	#/gal	gal/hr	gal/MCF	Unsats.
Distribution of					
Recovered Oil					
400 EP				0.248	
400-550				0.070	
550+				0.054	
				0.372	70.1
7.78	0.905	6.25	1.245	0.145	93.6
5.54	0.644	6.10	0.908	0.106	60.5
3.98	0.463	4.86	0.819	0.095	
3.14	0.365	5.45	0.576	0.067	100.0
		5.25			
1.19	0.138	5.54	0.215	0.025	
21.63	2.515		3.763	0.438	

CUMULATIVE TOTALS	H_2+CO MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO				
	RECOVERED OIL	0.150*	21.02	2.444
	TOTAL OIL		44.43	5.166
	WATER SOLUBLE CHEMICALS	0.116*	6.17	0.718
$\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 9.15	TOTAL LIQUID PRODUCTS C_3+		50.60	5.884
	NET WATER	2.590*	46.66	5.426
	GROSS WATER		52.83	6.144
	HYDROCARBON TOTAL—C_1+		66.90	7.779

3.200	0.372	
6.963	0.810	
0.728	0.085	
7.691	0.895	
6.330	0.736	

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
45.38	71.86	55.59	61.77	36.60	22.05	26.75	75.64

*Included in Reactor Effluent Total

Weight Balance = 88.37%

g/M3 = 16.91 ÷ = MCF

cc/M3 = 141.3 ÷ gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 R-1 From Hr. 0700 to Hr. 1200 Hrs. 343-348

FLOWS	SCFH	%
Oxygen	2176	
Nat. Gas	3430	
Total		
Fresh Feed	9464	
F. F. by C	10001	
Avg. F. F.	9732	
Wet Gas	3975	
Contraction		
Recycle	17314	
Bleed	914	
Total	18228	
Total Feed	27692	
Recycle/F.F.	1.93	
Inlet Vel.	1.17	
Steam Flow		

RUN CONDITIONS	
Generator Press.	338
O_2 Preheat, °F	431
Gas Preheat, °F	707
Reactor Press.	295
Steam Back Press.	650
Temperatures, °F	
Heater Outlet	545
Catalyst #1	695
#2	634
#3	642
#4	642
#5	
Average	639
Product Separator	45

DISTILLATIONS — A S T M	
Prod.	Naph
A.P.I.	53.8
I.B.P.	10.4
5%	
10%	150
20	186
30	206
40	236
50	256
60	276
70	298
80	324
90	344
95	382
E.P.	400
Rec.	98
Res.	1.5
Loss.	0.5

Hempel Dist.	°F	%	A.P.I.
to 400		63.3	53.8
400-550		18.0	39.1
550+		18.7	

WATER	Temp.	%
	200	
	203	
	208	

CATALYST DATA	
In Reactor at Start of Period	512
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	41
In Reactor at End of Period	471
Reactor d-P, H_2O	
Pounds in Reactor	605
Density, lbs./cu. ft.	132
Bed Height, Feet	6.9
Space Vel. SCFH/lb. cat.	
Inventory Figures	20.7
From d-P Meters	16.1

CATALYST ANALYSIS — Particle Size	Screen		Sedimentation	
Frac.	M	%	M	%
On 40	420+		80+	
100	419-150		80-40	
150	149-105		40-20	
200	104-74		20-10	
250	73-62		10-0	
325	61-44			
<325	43-0			

Density, lbs./cu. ft.	Chem. Anal.
Aerated	% Fe
Settled	% C
Compacted	% Oil
Sp. Grav.	Specific Surface
	m^2/gm

NATURAL GAS	%
CO_2	1.33
CH_4	85.33
C_2H_6	9.67
C_3H_8	2.31
C_4H_{10}	0.05
N_2	1.07
O_2	0.24
MW	18.606

PRODUCT INSPECTION					
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	49	46			
Sap. No.	66	53			
Hydrox. No.					
Bromine No.	71				
% Fe					
% Alc		10.5			
°API	47.1	10.5			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	SCFH m/hr	C	H	O
O_2					
CO_2					
CH_4					
C_2H_6					
C_3H_8					
C_4H_{10}					
N_2					
Total					

OUT	Mol %	SCFH m/hr	C	H	O
CO_2					
CO					
CH_4					
H_2					
N_2					
H_2O					
Total					

FRESH FEED	%	m/hr	#/hr
CO 28.010	35.37	8.831	247.36
H_2 2.016	58.27	14.551	29.33
CO_2 44.010	1.83	0.457	20.11
N_2 28.016	0.55	0.136	3.81
CH_4 16.042	3.99	0.996	15.98
C_2H_4 28.052			
C_2H_6 30.068			
C_1+C_2			
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_6H_{12} 72.146			
C_6H_{12} 84.156			
C_3-C_6			
TOTAL		24.971	316.59
H_2+CO	93.64	23.382	8862 S.C.F.H.
H_2/CO		1.65	112841

WET GAS	%	At. Wt. Balance m/hr	At. Wt. Balance #/hr
	23.09	3.820	106.99
	54.79	9.063	18.27
	12.05	1.993	87.70
	0.67	0.111	3.10
	6.37	1.053	16.90
	0.83	0.137	3.85
	0.40	0.066	1.99
	0.71	0.118	4.95
	0.44	0.073	4.11
	0.21	0.035	2.01
	0.25	0.042	2.91
	0.06	0.010	0.71
	0.13	0.022	1.87
		16.542	255.34
		12.883	
		2.37	

RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr
11.105	19.936	14.925
26.351	40.902	35.414
5.795	6.252	7.788
0.322	0.458	0.433
3.064	4.060	4.117
0.399	0.399	0.536
0.192	0.192	0.258
0.341	0.341	0.459
0.212	0.212	0.285
0.101	0.101	0.136
0.120	0.120	0.162
0.029	0.029	0.039
0.063	0.063	0.085
48.095	73.066	67.046
37.456	60.838	50.339
	2.05	2.37

NET CHANGE m/hr	#/hr
-5.011	-140.37
-5.448	-11.06
1.536	67.59
0.057	0.92
0.137	3.85
0.066	1.99
	6.76
0.118	4.95
0.073	4.11
0.035	2.01
0.042	2.91
0.010	0.71
0.022	1.87
	16.56
-10.499	
1.10	

YIELD BASIS H_2+CO FED

CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
0.104			
0.434			
0.225			
0.763			
0.559	4.32	1.146	0.129
	4.24		
0.464	5.00	0.822	0.093
0.227	4.86	0.414	0.047
0.328	5.45	0.534	0.060
0.080	5.25	0.135	0.015
0.211	5.54	0.338	0.038
1.869		3.389	0.382

POLYMER #/hr	#/MCF	#/gal	gal/hr	gal/MCF
Distribution of				
Recovered Oil				
	400 EP			0.183
	400-550			0.052
	550+			0.054
4.46	0.503	6.25	0.712	0.080
3.90	0.440	6.10	0.640	0.072
2.01	0.227	4.86	0.414	0.047
2.91	0.328	5.45	0.534	0.060
0.71	0.080	5.25	0.135	0.015
1.87	0.211	5.54	0.338	0.038
15.86	1.789		2.773	0.312

% Unsats.
0.289
67.5
100.0
67.7
80.6

CUMULATIVE TOTALS	H_2+CO MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 8.4

EFFLUENT	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	#/hr	#/MCF	#/gal	gal/hr	gal/MCF
RECOVERED OIL	0.120*	16.90	1.907		2.560	0.289	16.90	1.907		2.560	0.289
TOTAL OIL		33.46	3.776		5.949	0.671	32.76	3.696		5.333	0.601
WATER SOLUBLE CHEMICALS	0.088*	4.69	0.529		0.559	0.063	4.69	0.529		0.559	0.063
TOTAL LIQUID PRODUCTS C_3+		38.15	4.305		6.508	0.734	37.45	4.225		5.892	0.664
NET WATER	2.201*	39.66	4.475		4.761	0.537					
GROSS WATER		44.35	5.004		5.320	0.600					
HYDROCARBON TOTAL—C_1+		44.91	5.068								

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
33.76	56.74	37.72	44.90	25.14	13.32	17.26	84.95

*Included in Reactor Effluent Total

Weight Balance = 77.63%

g/M3 = 16.91 × #/MCF.
cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 R-2 From ______ Hr. 1200 to ______ Hr. 2300 Hrs. 348-359

FLOWS	SCFH	%
Oxygen	2176	
Nat. Gas	3430	
Total		
Fresh Feed	9195	
F. F. by C		
Avg. F. F.		
Wet Gas	4013	
Contraction		
Recycle	17314	
Bleed	914	
Total	18228	
Total Feed	27423	
Recycle/F.F.	1.98	
Inlet Vel.	1.11	
Steam Flow		

RUN CONDITIONS	
Generator Press.	338
O_2 Preheat, °F	431
Gas Preheat, °F	707
Reactor Press.	295
Steam Back Press.	650
Temperatures, °F	
Heater Outlet	545
Catalyst #1	695
#2	634
#3	642
#4	642
#5	
Average	639
Product Separator	45

DISTILLATIONS — ASTM	
Prod.	Naph.
A.P.I.	53.8
I.B.P.	10.4
5%	
10%	150
20	186
30	206
40	236
50	256
60	276
70	298
80	324
90	344
95	382
E.P.	400
Rec.	98
Res.	1.5
Loss.	0.5

Hempel Dist. °F	%	A.P.I.
to 400	63.3	53.8
400-550	18.0	39.1
550+	18.7	

WATER Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	471
Fresh Catalyst Charged	188
Catalyst Recharged	
Total	659
Catalyst Taken Out	50
In Reactor at End of Period	609
Reactor d-P, H_2O	
Pounds in Reactor	902
Density, lbs./cu. ft.	140
Bed Height, Feet	9.8
Space Vel. SCFH/lb. cat.	
Inventory Figures	15.1
From d-P Meters	10.2

CATALYST ANALYSIS — Particle Size	Screen M	%	Sedimentation M	%
On 40	420+		80+	
100	419-150		80-40	
150	149-105		40-20	
200	104-74		20-10	
250	73-62		10-0	
325	61-44			
<325	43-0			

Density, lbs./cu. ft.		Chem. Anal.	
Aerated		% Fe	
Settled		% C	
Compacted		% Oil	
Sp. Grav.		Specific Surface	m²/gm

NATURAL GAS	%
CO_2	1.33
CH_4	85.33
C_2H_6	9.67
C_3H_8	2.31
C_4H_{10}	0.05
N_2	1.07
O_2	0.24
MW	18.606

PRODUCT INSPECTION	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	49	46			
Sap. No.	66	53			
Hydrox. No.					
Bromine No.	71				
% Fe					
% Alc		10.5			
°API	47.1	10.5			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	SCFH m/hr	C	H	O
O_2					
CO_2					
CH_4					
C_2H_6					
C_3H_8					
C_4H_{10}					
N_2					
Total					

OUT	Mol %	SCFH m/hr	C	H	O
CO_2					
CO					
CH_4					
H_2					
N_2					
H_2O					
Total					

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED — CONDENSATE				POLYMER					
	%	m/hr	#/hr	%	At. Wt. Balance m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	Unsats.
CO 28.010	35.13	8.520	238.65	16.69	1.821	51.01	7.376	15.896	9.197	-6.699	-187.64					Distribution of					
H_2 2.016	59.05	14.322	28.88	48.60	5.302	10.69	21.477	35.799	26.779	-9.020	-18.19					Recovered Oil					
CO_2 44.010	1.79	0.434	19.10	16.18	1.766	77.75	7.150	7.584	8.916	1.332	58.65	6.772					400 EP			0.357	
N_2 28.016	0.51	0.124	3.47	1.10	0.120	3.36	0.486	0.610	0.606								400-550			0.101	
CH_4 16.042	3.52	0.854	13.70	11.76	1.283	20.58	5.197	6.051	6.480	0.429	6.88	0.794					550+			0.105	
C_2H_4 28.052				1.42	0.155	4.35	0.628	0.628	0.783	0.155	4.35	0.502								0.563	68.3
C_2H_6 30.068				0.66	0.072	2.16	0.292	0.292	0.364	0.072	2.16	0.249									
C_1+C_2											13.39	1.545									
C_3H_6 42.078				1.68	0.183	7.70	0.742	0.742	0.925	0.183	7.70	0.889	4.32	1.782	0.206	6.93	0.800	6.25	1.109	0.128	87.6
C_3H_8 44.094				0.24	0.026	1.15	0.106	0.106	0.132	0.026	1.15	0.133	4.24	0.271	0.031						
C_4H_8 56.104				0.90	0.098	5.50	0.398	0.398	0.496	0.098	5.50	0.635	5.00	1.100	0.127	5.23	0.604	6.10	0.857	0.099	78.4
C_4H_{10} 58.120				0.25	0.027	1.57	0.110	0.110	0.137	0.027	1.57	0.181	4.86	0.323	0.037	1.57	0.181	4.86	0.323	0.037	
C_5H_{10} 70.130				0.37	0.040	2.81	0.164	0.164	0.204	0.040	2.81	0.324	5.45	0.516	0.060	2.81	0.324	5.45	0.516	0.060	93.0
C_5H_{12} 72.146				0.03	0.003	0.22	0.013	0.013	0.016	0.003	0.22	0.025	5.25	0.042	0.005	0.22	0.025	5.25	0.042	0.005	
C_6H_{12} 84.156				0.12	0.013	1.09	0.053	0.053	0.066	0.013	1.09	0.126	5.54	0.197	0.023	1.09	0.126	5.54	0.197	0.023	
C_3-C_6											20.04	2.313		4.231	0.489	17.85	2.060		3.044	0.352	
TOTAL		24.254	303.81		10.909	189.94	44.192	68.446	59.562												
H_2+CO	94.18	22.842	8660 S.C.F.H.		7.123		28.853	51.695		-15.719											
H_2/CO	1.68		11547		2.91			2.25		1.35											

CUMULATIVE TOTALS	H_2+CO, MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 6.37

	m/hr	#/hr	Condensate #/MCF	#/gal	gal/hr	gal/MCF	Polymer #/hr	#/MCF	#/gal	gal/hr	gal/MCF
RECOVERED OIL	0.229*	32.14	3.711		4.873	0.563	32.14	3.711		4.873	0.563
TOTAL OIL		52.18	6.024		9.104	1.052	49.99	5.771		7.917	0.915
WATER SOLUBLE CHEMICALS	0.157*	8.31	0.960		1.034	0.119	8.31	0.960		1.034	0.119
TOTAL LIQUID PRODUCTS C_3+		60.49	6.984		10.138	1.171	58.30	6.731		8.951	1.034
NET WATER	4.075*	73.42	8.478		8.814	1.018					
GROSS WATER		81.73	0.438		9.848	1.137					
HYDROCARBON TOTAL—C_1+		73.88	8.529								

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+
55.02	78.63	62.98	68.82	42.14	25.20	30.41	81.88

*Included in Reactor Effluent Total

Weight Balance = 98.13%

g/M3 = 16.91 × #/MCF.
cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 S From Hr. 1600 to Hr. 2000 Hrs. 359-364

FLOWS	SCFH	%
Oxygen	2112	
Nat. Gas	3353	
Total		
Fresh Feed	9551	
F. F. by C	9475	
Avg. F. F.	9513	
Wet Gas	3941	
Contraction		
Recycle	15724	
Bleed	1063	
Total	16787	
Total Feed	26338	
Recycle/F.F.	1.75	
Inlet Vel.	1.11	
Steam Flow		

RUN CONDITIONS	
Generator Press.	334
O_2 Preheat, °F	490
Gas Preheat, °F	710
Reactor Press.	300
Steam Back Press.	690
Temperatures, °F	
Heater Outlet	680
Catalyst #1	632
#2	658
#3	685
#4	631
#5	
Average	651
Product Separator	42

DISTILLATIONS — ASTM	
Prod.	Naph
A.P.I.	53.6
I.B.P.	10.8
5%	
10%	146
20	176
30	204
40	228
50	248
60	268
70	292
80	316
90	350
95	376
E.P.	400
Rec.	98
Res.	1.5
Loss.	0.5

Hempel Dist.	°F	%	A.P.I.
to 400		63.3	53.6
400-550		18.3	39.0
550+		18.4	

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	609
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	12
In Reactor at End of Period	597
Reactor d-P, H_2O	
Pounds in Reactor	1039
Density, lbs./cu. ft.	164
Bed Height, Feet	9.6
Space Vel. SCFH/lb. cat.	
Inventory Figures	15.93
From d-P Meters	9.16

CATALYST ANALYSIS — Particle Size	Screen			Sedimentation	
	Frac.	M	%	M	%
	On 40	420+		80+	
	100	419-150		80-40	
	150	149-105		40-20	
	200	104-74		20-10	
	250	73-62		10-0	
	325	61-44			
	<325	43-0			

Density, lbs./cu. ft.	Chem. Anal.	
Aerated	% Fe	
Settled	% C	
Compacted	% Oil	
Sp. Grav.	Specific Surface	m^2/gm

NATURAL GAS	%
CO_2	1.35
CH_4	84.30
C_2H_6	9.16
C_3H_8	2.67
C_4H_{10}	0.09
N_2	1.97
O_2	0.46
MW	18.801

PRODUCT INSPECTION	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	53	43			
Sap. No.	66	51			
Hydrox. No.					
Bromine No.	66				
% Fe					
% Alc		10			
°API	47.1	10.4			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	SCFH m/hr	C	H	O
O_2		5.614			11.228
CO_2		0.119	0.119		0.238
CH_4		7.459	7.459	29.84	
C_2H_6		0.810	1.620	4.86	
C_3H_8		0.236	0.708	1.89	
C_4H_{10}		0.008	0.032	0.08	
N_2		0.174			
Total			9.938	36.66	11.466

OUT	Mol %	SCFH m/hr	C	H	O
CO_2		0.612	0.6		1.2
CO		9.083	9.1		9.1
CH_4		0.549	0.5	2.196	
H_2		14.781		29.562	
N_2		0.176			
H_2O				3.612	1.8
Total			10.2	35.370	12.1
Balance			103.1	96.5	105.6

	FRESH FEED %	m/hr	#/hr	WET GAS %	At. Wt. Balance m/hr	#/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	#/hr
CO 28.010	36.04	9.083	254.41	17.44	2.073	58.05	7.725	16.808	9.798	-7.010	-196.36
H_2 2.016	58.65	14.781	29.80	48.15	5.724	11.53	21.327	36.108	27.051	-9.057	-18.27
CO_2 44.010	2.43	0.612	26.93	17.75	2.110	92.87	7.862	8.474	9.972	1.498	65.94
N_2 28.016	0.70	0.176	4.93	1.22	0.145	4.07	0.540	0.716	0.685		
CH_4 16.042	2.18	0.549	8.81	9.67	1.149	18.43	4.283	4.832	5.432	0.600	9.62
C_2H_4 28.052				1.57	0.186	5.22	0.695	0.695	0.881	0.186	5.22
C_2H_6 30.068				0.74	0.088	2.65	0.328	0.328	0.416	0.088	2.65
C_1+C_2											17.49
C_3H_6 42.078				1.59	0.189	7.93	0.704	0.704	0.893	0.189	7.93
C_3H_8 44.094											
C_4H_8 56.104				0.79	0.094	5.26	0.350	0.350	0.444	0.094	5.26
C_4H_{10} 58.120				0.37	0.045	2.59	0.164	0.164	0.209	0.045	2.59
C_5H_{10} 70.130				0.39	0.047	3.29	0.173	0.173	0.220	0.047	3.29
C_5H_{12} 72.146				0.15	0.018	1.31	0.066	0.066	0.084	0.018	1.31
C_6H_{12} 84.156				0.17	0.021	1.73	0.075	0.075	0.096	0.021	1.73
C_3-C_6											22.11
TOTAL		25.201	324.88		11.887	214.95	44.293	69.494	60.323		
H_2+CO	94.69	23.864	9044 S.C.F.H.		7.797		29.052	52.916	36.849	-16.067	
H_2/CO		1.63	11057		2.76			2.15		1.29	

YIELD BASIS H_2+CO FED

	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF	POLYMER #/hr	#/MCF	#/gal	gal/hr	gal/MCF	% Unsats.
CO 28.010					Distribution of					
H_2 2.016					Recovered Oil					
CO_2 44.010	7.291					400 EP			0.368	
N_2 28.016						400-550			0.107	
CH_4 16.042	1.064					550+			0.107	
C_2H_4 28.052	0.577								0.582	67.9
C_2H_6 30.068	0.293									
C_1+C_2	1.934									
C_3H_6 42.078	0.877	4.32	1.836	0.203	7.14	0.789	6.25	1.142	0.126	100.0
C_3H_8 44.094		4.24								
C_4H_8 56.104	0.582	5.00	1.052	0.116	5.00	0.553	6.10	0.820	0.091	67.6
C_4H_{10} 58.120	0.286	4.86	0.533	0.059	2.59	0.286	4.86	0.533	0.059	
C_5H_{10} 70.130	0.364	5.45	0.604	0.067	3.29	0.364	5.45	0.604	0.067	72.3
C_5H_{12} 72.146	0.145	5.25	0.250	0.028	1.31	0.145	5.25	0.250	0.028	
C_6H_{12} 84.156	0.191	5.54	0.312	0.034	1.73	0.191	5.54	0.312	0.034	
C_3-C_6	2.445		4.587	0.507	21.06	2.328		3.661	0.405	

CUMULATIVE TOTALS	H_2+CO MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 7.34

	RECOVERED OIL	TOTAL OIL	WATER SOLUBLE CHEMICALS	TOTAL LIQUID PRODUCTS C_3+	NET WATER	GROSS WATER	HYDROCARBON TOTAL—C_1+
	0.247*	34.70	3.837		5.260	0.582	
		56.81	6.282		9.847	1.089	
	0.143*	7.61	0.841		0.902	0.100	
		64.42	7.123		10.749	1.189	
	3.753*	67.62	7.478		8.118	0.898	
		75.23	8.319		9.020	0.998	
		81.91	9.057				

	34.70	3.837		5.260	0.582	
	55.76	6.165		8.921	0.987	
	7.61	0.841		0.902	0.100	
	63.37	7.006		9.823	1.087	

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+ /C_1+
52.83	77.18	61.27	67.33	41.71	25.08	30.36	78.65

*Included in Reactor Effluent Total

Weight Balance = 91.52%

g/M3 ÷ 16.91 × = MCF.
cc/M3 ÷ 141.3 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 45 T From Hr. 2000 to Hr. 1100 Hrs. 364-379

FLOWS	SCFH	%
Oxygen	2317	
Nat. Gas	3344	
Total		
Fresh Feed	9511	
F. F. by C	9544	
Avg. F. F.	9528	
Wet Gas	4155	
Contraction		
Recycle	15855	
Bleed	1050	
Total	16905	
Total Feed	26416	
Recycle/F.F.	1.78	
Inlet Vel.	1.11	
Steam Flow		

RUN CONDITIONS	
Generator Press.	335
O_2 Preheat, °F	415
Gas Preheat, °F	701
Reactor Press.	300
Steam Back Press.	690
Temperatures, °F	
Heater Outlet	612
Catalyst #1	638
#2	651
#3	655
#4	646
#5	
Average	647
Product Separator	43

DISTILLATIONS — A S T M	
Prod.	Naph
A.P.I.	52.0
I.B.P.	110
5%	
10%	130
20	184
30	208
40	238
50	262
60	288
70	312
80	338
90	366
95	392
E.P.	418
Rec.	98
Res.	1.5
Loss	0.5

Hempel Dist.		
°F	%	A.P.I.
to 400	66.0	52.0
400-550	23.0	37.8
550+	21	

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	597
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	65
In Reactor at End of Period	532
Reactor d-P, H_2O	
Pounds in Reactor	865.9
Density, lbs./cu. ft.	164
Bed Height, Feet	8
Space Vel. SCFH/lb. cat.	
Inventory Figures	17.9
From d-P Meters	11

CATALYST ANALYSIS — Particle Size				
	Screen		Sedimentation	
Frac.	M	%	M	%
On 40	420+	24.2	80+	
100	419-150	52.2	80-40	
150	149-105	11.8	40-20	
200	104-74	9.6	20-10	
250	73-62	1.4	10-0	
325	61-44	0.0		
<325	43-0	0.8		

Density, lbs./cu. ft.		Chem. Anal.	
Aerated	173	% Fe	
Settled	175	% C	
Compacted	185	% Oil	
Sp. Gravity	4.07	Specific Surface	
			m^2/gm
		2.3	ml.NH_3/gm

NATURAL GAS	
	%
CO_2	1.79
CH_4	83.98
C_2H_6	8.26
C_3H_8	3.80
C_4H_{10}	0.13
N_2	1.63
O_2	0.41
MW	19.082

PRODUCT INSPECTION						
	Oil	Water	Product	Pour °F	SUS @ °F	
Neut. No.	50	47				
Sap. No.	68	60				
Hydrox. No.						
Bromine No.	63					
% Fe						
% Alc		10				
Aniline Point						
°API	46.4	10.5				

GENERATOR ELEMENTAL BALANCE

IN						OUT					
	Mol %	~~SCFH~~ m/hr	C	H	O		Mol %	~~SCFH~~ m/hr	C	H	O
O_2		6.149			12.298	CO_2		0.515	0.5		1.03
CO_2		0.158	0.16		0.316	CO		9.058	9.1		9.06
CH_4		7.410	7.41	29.640		CH_4		0.767	0.8	3.07	
C_2H_6		0.729	1.46	2.187		H_2		14.571		29.14	
C_3H_8		0.335	1.01	2.680		N_2		0.182			
C_4H_{10}		0.011	0.04	0.110		H_2O				3.73	1.87
N_2		0.144				Total			10.3	35.94	11.95
Total			10.08	34.617	12.614	Balance			102.6	103.82	94.75

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
					At. Wt. Balance							CONDENSATE				POLYMER				%
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	Unsats.
CO 28.010	36.10	9.058	253.71	18.29	2.318	64.92	7.976	17.034	10.294	-6.740	-188.79					Distribution of					
H_2 2.016	58.07	14.571	29.38	47.87	6.067	12.23	20.871	33.442	26.938	-8.504	-17.15					Recovered Oil					
CO_2 44.010	2.05	0.515	22.66	17.01	2.155	94.83	7.415	7.930	9.570	1.640	72.17	8.058				400 EP				0.300	
N_2 28.016	0.73	0.182	5.10	1.34	0.170	4.76	0.584	0.766	0.754							400-550				0.104	
CH_4 16.042	3.06	0.767	12.30	10.23	1.296	20.78	4.459	5.226	5.755	0.529	8.48	0.947				550+				0.050	
C_2H_4 28.052				1.46	0.185	5.19	0.635	0.635	0.820	0.185	5.19	0.579								0.454	69.5
C_2H_6 30.068				0.64	0.081	2.43	0.278	0.278	0.359	0.081	2.43	0.271									
C_1+C_2											16.10	1.797									
C_3H_6 42.078				1.44	0.183	7.69	0.629	0.629	0.812	0.183	7.69	0.859	4.32	1.780	0.199	6.92	0.773	6.25	1.107	0.124	100.0
C_3H_8 44.094													4.24								
C_4H_8 56.104				0.80	0.102	5.71	0.349	0.349	0.451	0.102	5.71	0.638	5.00	1.142	0.128	5.42	0.605	6.10	0.889	0.099	80.3
C_4H_{10} 58.120				0.20	0.025	1.48	0.086	0.086	0.111	0.025	1.48	0.165	4.86	0.305	0.034	1.48	0.165	4.86	0.305	0.034	
C_5H_{10} 70.130				0.42	0.053	3.73	0.182	0.182	0.235	0.053	3.73	0.416	5.45	0.684	0.076	3.73	0.416	5.45	0.684	0.076	80.3
C_5H_{12} 72.146				0.10	0.013	0.91	0.044	0.044	0.057	0.013	0.91	0.102	5.25	0.173	0.019	0.91	0.102	5.25	0.173	0.019	
C_6H_{12} 84.156				0.17	0.021	1.75	0.073	0.073	0.094	0.021	1.75	0.195	5.54	0.316	0.035	1.75	0.195	5.54	0.316	0.035	
C_3-C_6											21.27	2.375		4.400	0.491	20.21	2.256		3.474	0.387	
TOTAL		25.094	323.15		12.674	226.42	43.603	66.674	60.085												
H_2+CO	94.17	23.629	8957 S.C.F.H.		8.385		28.847	50.476	37.232	-15.244											
H_2/CO		1.61	11165		2.62			1.96		1.26											

CUMULATIVE TOTALS	H_2+CO, MCF	Catalyst #	C_3+, gal	gal/MCF	gal/#
Previous Total					
Current Period					
New Total					

EFFLUENT SHIFT RATIO $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ 7.19

EFFLUENT												
RECOVERED OIL	0.192#	26.93	3.007		4.070	0.454	26.93	3.007		4.070	0.454	
TOTAL OIL		48.20	5.382		8.470	0.945	47.14	5.263		7.544	0.841	
WATER SOLUBLE CHEMICALS	0.133#	7.05	0.787		0.837	0.093	7.05	0.787		0.837	0.093	
TOTAL LIQUID PRODUCTS C_3+		55.25	6.169		9.307	1.038	54.19	6.050		8.381	0.934	
NET WATER	3.483#	62.75	7.006		7.533	0.841						
GROSS WATER		69.80	7.793		8.370	0.934						
HYDROCARBON TOTAL—C_1+		71.35	7.966									

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	$CO+H_2$	C_3+/C_1+
49.49	74.41	58.36	64.51	39.57	25.43	30.20	77.44

*Included in Reactor Effluent Total

Weight Balance = 90.54%

g/M3 = 16.91 × #/MCF.
cc/M3 = 141.3 × gal/MCF