RUN NO. 63-M
HOURS 264-288
CATALYST

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

FRESH FEED	%	m/hr	#/hr	WET GAS	%	At Wt. Balance m/hr	At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	37.023	15.813	442.90		9.103	1.453	40.70	3.878	19.691	5.331	-14.360	-402.20				
H_2 2.016	60.677	25.915	52.24		42.147	6.729	13.57	17.956	43.871	24.685	-19.186	-38.67				
CO_2 44.010	1.673	0.715	31.47		27.133	4.333	190.70	11.559	12.274	16.607	3.618	159.23	10.055			
N_2 28.016	0.227	0.097	2.72		1.507	0.241	6.75	0.642	0.739	0.980						
CH_4 16.042	0.400	0.171	2.74		8.957	1.430	22.94	3.816	3.987	5.417	1.259	20.20	1.276			
C_2H_4 28.052					2.423	0.387	10.86	1.032	1.032	1.419	0.387	10.86	0.686			
C_2H_6 30.068					1.737	0.277	8.33	0.740	0.740	1.017	0.277	8.33	0.526			
C_1+C_2												39.39	2.488			
C_3H_6 42.078					2.807	0.448	18.85	1.196	1.196	1.644	0.448	18.85	1.190	4.32	4.363	0.276
C_3H_8 44.094					0.310	0.049	2.16	0.132	0.132	0.181	0.049	2.16	0.136	4.24	0.509	0.032
C_4H_8 56.104					1.893	0.302	16.94	0.806	0.806	1.108	0.302	16.94	1.070	5.00	3.388	0.214
C_4H_{10} 58.120					0.627	0.100	5.81	0.267	0.267	0.367	0.100	5.81	0.367	4.86	1.195	0.075
C_5H_{10} 70.130					0.873	0.139	9.75	0.372	0.372	0.511	0.139	9.75	0.616	5.45	1.789	0.113
C_5H_{12} 72.146					0.203	0.032	2.31	0.086	0.086	0.118	0.032	2.31	0.146	5.25	0.440	0.028
C_6H_{12} 84.156					0.280	0.045	3.79	0.119	0.119	0.164	0.045	3.79	0.239	5.54	0.684	0.043
C_5+C_6												59.61	3.764		12.368	0.781
TOTAL		42.711	532.07			15.965	353.46	42.601	85.312	65.635						
H_2+CO	97.700	41.728	15836	SCFH		8.182		21.834	63.562	55.931	-33.546					
H_2/CO		1.64	Factor 631472			4.63		4.63	2.23	4.63	1.34					

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	83.5	6.173	98.0	6.050
400-550	11.2	0.828	91.4	0.757
550 +	5.3	0.392	114.6	0.449

	RECOVERY %	#/hr	gal/hr
PROPYLENE	37.6	7.09	
C_3 POLY GASO.	87.5	6.20	1.037
C_3 POLY TAR	12.5	0.89	0.118

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	-	-	68.0
C_4 POLY GASO.	5.98	14.82	2.479	1.5
C_4H_{10}	4.86	(5.81) 5.28	(1.195) 1.087	68.0
C_4 FREE GASO.			10.000	5.8
C_4 POLY TAR	7.33	2.12	0.282	

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

	Weight Recovery, % 90.70	Catalyst Age, hrs. 288	Space Velocity, vhv 1187	RECOVERED OIL 0.338**	47.46	2.997	7.393	0.467
	Pressure, psig 406	Inlet Velocity, Ft/sec 1.02	Catalyst Vol., CF 13.34	TOTAL OIL	107.07	6.761	19.761	1.248
	Temperature, °F 658	Bed Depth, Ft 20.21	Weight, # 1961	WATER SOLUBLE CHEMICALS 0.283**	14.99	0.947	1.902	0.120
	Recycle Ratio 1.00	Bed Density, #/CF 147	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ = 11.93	TOTAL LIQUID PRODUCTS C_3+	122.06	7.708	21.663	1.368
				WET WATER 6.448**	116.16	7.335	13.945	0.881
				GROSS WATER	131.15	8.282	15.247	1.001
				HYDROCARBON TOTAL—C_1+	161.45	10.196		

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

Form ML—11

**Included in Reactor Effluent Total

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

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

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

CATALYST DATA					
INVENTORY DATA		PARTICLE SIZE			
		Screen Analysis		Sedimentation	
In Reactor at Start of Period		Mesh	Microns	Microns	%
Fresh Catalyst Added		On 40	419+	80+	
Total		100	150	40—80	
Catalyst Recovered	33	150	105	20—40	
In Reactor at End of Period		200	74	10—20	
REACTOR d-p, Inches H_2O		250	62	0—20	
No. Height		325	44		
0 See Period A		<325			
1	70	CATALYST			
2	88	Bulk Density, Lbs./Cu.Ft.			
3	65	Aerated			
4	320	Settled			
Total	543	Compacted			
		Particle Density, gm. cc.			
CALCULATED FROM dp		NH_3 Value, ml./gm.			
Density, Lbs./Cu.Ft.	147	N_2 Surface, m^2 gm.			
Inventory, Lbs.	1961				
Bed Depth, Ft.	20.21	CHEMICAL ANALYSIS			
Vol., Cu. Ft.	13.34	Fe			
		C			
		O			
		H			
		K_2O. W+. % basis Fe			
		X-Ray Analysis—			
		$Fe_{20}C_9$			
		Fe_3O_4			
		Fe			

GAS ANALYSES					GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		# hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.26	10.495 0.035			21.060	WET GAS	303.96	353.46
CO 28.010	37.13	37.02	36.92	37.023	15.813	15.813		15.813	CO_2 44.010	1.44	0.192	0.192		0.384	OIL	47.46	47.46
H_2 2.016	60.29	60.94	60.80	60.677	25.915		51.830		N_2 28.016	2.53	0.350				WATER	131.15	131.15
CO_2 44.010	1.79	1.43	1.80	1.673	0.715	0.715		1.430	CH_4 16.042	81.30	10.815	10.815	43.260		TOTAL	482.57	532.07
N_2 28.016	0.19	0.20	0.29	0.227	0.097				C_2H_6 30.068	6.87	0.914	1.828	5.484		FRESH FEED	532.07	
CH_4 16.042	0.60	0.41	0.19	0.400	0.171	0.171	0.684		C_3H_8 44.094	5.15	0.685	2.055	5.480		WEIGHT BALANCE	90.70	
			M. W	12.45744					C_4H_{10} 58.120	1.63	0.217	0.868	2.170				
			H_2O 18.016				6.717	3.359	C_5H_{12} 72.146	0.72	0.096	0.480	1.152		WET GAS FACTOR	1162850	
						16.699	59.231	20.602	MW =	20.29923					INDICATED LOSS—S C F H	848	
			BALANCE			102.84	102.93	96.07	TOTAL			16.238	57.546	21.444			

WET GAS				
CO 28.010	8.99	9.29	9.03	9.103
H_2 2.016	42.62	42.56	41.26	42.147
CO_2 44.010	26.87	26.72	27.81	27.133
N_2 28.016	1.37	1.56	1.59	1.507
CH_4 16.042	9.23	9.07	8.57	8.957
C_2H_4 28.052	2.37	2.37	2.53	2.423
C_2H_6 30.068	1.69	1.74	1.78	1.737
C_3H_6 42.078	2.81	2.65	2.96	2.807
C_3H_8 44.094	0.33	0.28	0.32	0.310
C_4H_8 56.104	1.83	1.80	2.05	1.893
C_4H_{10} 58.120	0.58	0.65	0.65	0.627
C_5H_{10} 70.130	0.87	0.81	0.94	0.873
C_5H_{12} 72.146	0.17	0.22	0.22	0.203
C_6H_{12} 84.156	0.27	0.28	0.29	0.280
			M. W.	22.1403

GAS FLOW RATES									
	$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C F H.	M/HR
FRESH FEED		406.1	69	2323912		
	6.592	20.513	0.9915	1.5244	16.209	42.711
WET GAS		1.68	67	1307567		
	7.154	4.047	0.9933	1.1435	5,210	13.729
RECYCLE		406.0	122			
	8.600	20.511	0.9452	1.1435	15,121	39.845
BLEED						
	8.883	20.511	1.0000	1.1435	1,046	2.756
NATURAL GAS		470.9	201	1426162		
	7.608	22.036	0.8870	1.1942	5,049	13.304
OXYGEN		435.4	73			
	7.021	21.216	0.9877		3,983	10.495
STEAM						
	6.142					

LIQUID PRODUCT RATES								
HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR. GAL HR
OIL	6'10"	362.41	57	1.0015	362.95	52.0		
	3'7½"	193.28	54	1.0030	193.86	6.420		
					49.33		*53.50	47.46
					177.42		1139.04	7.393
WATER	7'11¼"	377.68	80	0.99759	376.77	10.9		
	4'7¾"	247.83	66	0.99942	247.69	8.276		
	6'5½"	342.76	67	0.99932	342.53			
	1'9"	91.50	80	0.99759	91.28			131.15
					380.33		3147.61	15.847

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

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

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO 28.010	37.337	15.892	445.13	10.000	1.656	46.38	4.217	20.109	5.873	-14.236	-398.75				
H_2 2.016	60.276	25.656	51.72	42.387	7.022	14.16	17.875	43.531	24.897	-18.634	-37.56				
CO_2 44.010	1.970	0.839	36.92	26.920	4.459	196.27	11.352	12.191	15.811	3.620	159.35	10.107			
N_2 28.016	0.207	0.088	2.47	1.353	0.224	6.28	0.571	0.659	0.795						
CH_4 16.042	0.210	0.089	1.43	8.390	1.390	22.30	3.538	3.627	4.928	1.301	20.87	1.324			
C_2H_4 28.052				2.380	0.394	11.05	1.004	1.004	1.398	0.394	11.05	0.701			
C_2H_6 30.068				1.680	0.278	8.36	0.708	0.708	0.986	0.278	8.36	0.530			
C_1+C_2											40.28	2.555			
C_3H_6 42.078				2.683	0.444	18.68	1.131	1.131	1.575	0.444	18.68	1.185	4.32	4.324	0.274
C_3H_8 44.094				0.277	0.046	2.03	0.117	0.117	0.163	0.046	2.03	0.129	4.24	0.479	0.030
C_4H_8 56.104				1.873	0.310	17.39	0.790	0.790	1.100	0.310	17.39	1.103	5.00	3.478	0.221
C_4H_{10} 58.120				0.647	0.107	6.22	0.273	0.273	0.380	0.107	6.22	0.394	4.86	1.280	0.081
C_5H_{10} 70.130				0.903	0.150	10.52	0.381	0.381	0.531	0.150	10.52	0.667	5.45	1.930	0.122
C_5H_{12} 72.146				0.210	0.035	2.53	0.089	0.089	0.124	0.035	2.53	0.160	5.25	0.482	0.031
C_6H_{12} 84.156				0.297	0.049	4.12	0.125	0.125	0.174	0.049	4.12	0.261	5.54	0.744	0.047
C_3-C_6											61.49	3.899		12.717	0.806
TOTAL		42.564	537.67		16.564	366.29	42.171	84.735	65.554						
H_2+CO	97.613	41.548	15767	SCFH	8.678		22.092	63.640	30.770	-32.870					
H_2/CO		1.61	Factor 634236		4.24		4.24	2.16	4.24	1.31					

									NET CHANGE m/hr	NET CHANGE #/hr	#/MCF	#/gal	gal/hr	gal/MCF
Weight Recovery, %	90.99	Catalyst Age, hrs.	312	Space Velocity, vhv	1218			RECOVERED OIL	0.319**	44.76	2.839		6.938	0.440
Pressure, psig	404	Inlet Velocity, Ft/sec	1.02	Catalyst Vol., CF	12.94			TOTAL OIL		106.25	6.738		19.655	1.246
Temperature, °F	658	Bed Depth, Ft	19.61	Weight, #	1876			WATER SOLUBLE CHEMICALS	0.271**	14.39	0.913		1.837	0.117
Recycle Ratio	0.99	Bed Density, #/CF	145	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ =	10.76			TOTAL LIQUID PRODUCTS C_3+		120.64	7.651		21.492	1.363
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY	NET WATER	6.229**	112.23	7.118		13.473	0.855
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+	GROSS WATER		126.62	8.031		15.310	0.972
61.08	89.58	72.63	79.11	70.79	42.81	51.65	74.97	HYDROCARBON TOTAL—C_1+		160.92	10.206			

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

	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY %	gal/hr
400 EP	83.5	5.793	98.0	5.677
400-550	11.0	0.763	91.4	0.697
550 +	5.5	0.382	114.6	0.438
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	36.1	6.74		
C_3 POLY GASO.	87.5	5.90	0.987	
C_3 POLY TAR	12.5	0.84	0.116	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	-	-	68.0
C_4 POLY GASO.	5.98	15.22	2.545	1.5
C_4H_{10}	4.86	(6.22) 5.27	(1.280) 1.084	68.0
C_4-FREE GASO.			9.820	5.8
C_4 POLY TAR	7.53	2.17	0.288	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	13.449	0.8530	4625	
GAS OIL	0.697	0.0442	240	
FUEL OIL	0.438	0.0278	151	
POLY TAR	0.404	0.0256	139	
TOTAL	14.988	0.9506	5155	
W. S. CHEM.	1.837	0.1165	632	
TOTAL	16.825	1.0671	5787	

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91×#/MCF

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

OPERATING CONDITIONS

PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	433	Fresh Feed	16,153
Natural Gas	472	Recycle	16,004
Generator Outlet	408	Combined Feed	32,157
Reactor Inlet	404	Wet Gas—Measured	5,455
Condenser Inlet		Adjusted	6,286
Product Accumulator	354	Loss	831
TEMPERATURES—°F.		Recycle/Fresh Feed	0.99
Oxygen	463	Inlet Velocity—ft./sec.	1.02
Natural Gas	780	Fresh Feed Rate—S.C.F.H.	15767
Generator	2283	per Cu. Ft. Dense Bed	1218
Quench Accumulator	126	per Lb. Catalyst	8.40
Reactor Inlet	362	per Sq. Ft.	23889
Condenser Inlet	598		
Product Accumulator	87		
Catalyst No. Height			
1 See Period A	-		
2	656		
3	650		
4	660		
5 Ave. 658	663		
6	664		
7	660		
8	654		
9	646		
10	645		
11	530		

PRODUCT TESTS

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

CATALYST DATA

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

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

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

GAS ANALYSES / GENERATOR BALANCE

HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O
FRESH FEED								
CO 28.010	37.42	37.27	37.32	37.337	15.892	15.892		15.892
H_2 2.016	60.30	60.30	60.23	60.276	25.656		51.312	
CO_2 44.010	1.71	2.07	2.13	1.970	0.839	0.839		1.678
N_2 28.016	0.19	0.22	0.21	0.207	0.088			
CH_4 16.042	0.38	0.14	0.11	0.210	0.089	0.089	0.356	
			M. W	12.631936				
			H_2O 18.016				7.472	3.736
						16.820	59.140	21.306
			BALANCE			101.99	100.94	98.72

	Mol %	M/Hr	C	H	O
O_2 32.000	0.24	10.564 0.032			21.192
CO_2 44.010	1.45	0.195	0.195		0.390
N_2 28.016	1.60	0.215			
CH_4 16.042	82.28	11.058	11.058	44.232	
C_2H_6 30.068	6.98	0.938	1.876	5.628	
C_3H_8 44.094	5.33	0.716	2.148	5.728	
C_4H_{10} 58.120	1.56	0.210	0.840	2.100	
C_5H_{12} 72.146	0.56	0.075	0.375	0.900	
MW = 20.122205					
TOTAL			16.492	58.588	21.582

WEIGHT BALANCE

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

WET GAS

	1400	2200	0600	AVERAGE
CO 28.010	9.48	9.74	10.78	10.000
H_2 2.016	43.06	41.46	42.64	42.387
CO_2 44.010	26.05	27.66	27.05	26.920
N_2 28.016	1.43	1.34	1.29	1.353
CH_4 16.042	9.34	7.77	8.06	8.390
C_2H_4 28.052	2.31	2.43	2.40	2.380
C_2H_6 30.068	1.68	1.69	1.67	1.680
C_3H_6 42.078	2.57	2.94	2.54	2.683
C_3H_8 44.094	0.27	0.26	0.30	0.277
C_4H_8 56.104	1.73	2.25	1.64	1.873
C_4H_{10} 58.120	0.72	0.77	0.45	0.647
C_5H_{10} 70.130	0.86	1.07	0.78	0.903
C_5H_{12} 72.146	0.22	0.25	0.16	0.210
C_6H_{12} 84.156	0.28	0.37	0.24	0.297
			M. W.	22.113455

GAS FLOW RATES

	$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED 79.31	6.623	404.3 / 20.469	68 / 0.9924	2291810 / 1.5139	16,153	42.564
WET GAS 158.44	7.463	1.74 / 4.055	66 / 0.9943	1309157 / 1.1442	5,455	14.374
RECYCLE 79.31	8.558	403.3 / 20.445	124 / 0.9436	1.1442	14,982	39.478
BLEED 5.02	8.700	20.445	1.0000	1.1442	1,022	2.693
NATURAL GAS 28.43	7.667	471.9 / 22.059	205 / 0.8843	1438709 / 1.1995	5,100	13.439
OXYGEN 27.07	7.075	432.8 / 21.154	71 / 0.9896		4,009	10.564
STEAM 215.7	6.263	28.8				

LIQUID PRODUCT RATES

HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
OIL	7'0"	371.14	55	1.0025	372.07	51.1		
	6'10"	362.41	57	1.0015	362.95	6.451		
	3'10½"	206.37	51	1.0044	207.28			
	1'0"	52.00	49	1.0054	52.28			
					+2.40		+15.50	44.76
					166.52		1074.22	6.938
WATER	6'9"	358.04	66	0.99942	357.83	11.0		
	6'5½"	342.76	67	0.99932	342.53	8.270		
	7'6½"	399.50	69	0.99907	399.13			
	1'3½"	67.20	62	0.99982	67.19			
	1'11"	100.59	63	0.99973	100.56			
	1'6½"	80.37	63	0.99973	80.35			126.62
					367.45		3038.81	15.310

THE TEXAS COMPANY — MONTEBELLO LABORATORY

YIELD CALCULATIONS

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

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

Weight Recovery, %	92.67	Catalyst Age, hrs.	336	Space Velocity, vhv	1265
Pressure, psig	402	Inlet Velocity, Ft/sec	1.04	Catalyst Vol., CF	12.56
Temperature, °F	660	Bed Depth, Ft	19.03	Weight, #	1796
Recycle Ratio	0.99	Bed Density, #/CF	143	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$	= 11.41

	NET CHANGE m/hr	NET CHANGE #/hr	#/MCF	#/gal	gal/hr	gal/MCF
RECOVERED OIL	0.321**	45.04	2.834		6.985	0.440
TOTAL OIL		108.17	6.807		20.034	1.262
WATER SOLUBLE CHEMICALS	0.264**	14.03	0.883		1.793	0.113
TOTAL LIQUID PRODUCTS C_3+		122.20	7.690		21.827	1.375
NET WATER	6.080**	109.54	6.893		13.150	0.828
GROSS WATER		123.57	7.776		14.943	0.941
HYDROCARBON TOTAL—C_1+		161.85	10.185			

FRESH FEED CONVERSION — % Contraction	CO	H_2	H_2+CO	TOTAL FEED CONVERSION — % CO	H_2	CO+H_2	SELECTIVITY C_3+/C_1+
60.23	89.46	71.22	78.13	70.90	41.54	50.63	75.50

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

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

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF

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

OPERATING CONDITIONS

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

PRODUCT TESTS

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

CATALYST DATA

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

PARTICLE SIZE

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

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

GAS ANALYSES

HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O
FRESH FEED								
CO 28.010	36.98	36.95	36.90	36.943	15,856	15.856		15.856
H_2 2.016	60.58	60.66	60.62	60.620	26.018		52.036	
CO_2 44.010	1.78	1.88	2.01	1.890	0.811	0.811		1.622
N_2 28.016	0.20	0.19	0.26	0.217	0.093			
CH_4 16.042	0.46	0.32	0.21	0.330	0.142	0.142	0.568	
			M. W	12.515356				
			H_2O 18.016				7.462	3.731
						16.809	60.066	21.209
			BALANCE			99.96	100.71	99.01
WET GAS								
CO 28.010	9.22	9.81	10.35	9.794				
H_2 2.016	42.70	43.83	45.05	43.860				
CO_2 44.010	26.41	26.37	25.41	26.064				
N_2 28.016	1.13	1.23	1.31	1.223				
CH_4 16.042	8.61	8.24	8.11	8.320				
C_2H_4 28.052	2.43	2.26	2.18	2.290				
C_2H_6 30.068	1.65	1.57	1.56	1.593				
C_3H_6 42.078	2.97	2.57	2.54	2.693				
C_3H_8 44.094	0.28	0.31	0.28	0.290				
C_4H_8 56.104	2.29	1.88	1.64	1.937				
C_4H_{10} 58.120	0.54	0.50	0.45	0.497				
C_5H_{10} 70.130	1.15	0.86	0.76	0.923				
C_5H_{12} 72.146	0.24	0.28	0.12	0.213				
C_6H_{12} 84.156	0.38	0.29	0.24	0.303				
			M. W.	21.58958				

GENERATOR BALANCE

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

WEIGHT BALANCE

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

GAS FLOW RATES

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

LIQUID PRODUCT RATES

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	YIELD BASIS H_2+CO FED CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	36.987	14.801	414.58	7.826	1.030	28.85	3.273	18.074	4.303	-13.771	-385.73				
H_2 2.016	60.031	24.022	48.43	39.385	5.182	10.45	16.473	40.495	21.655	-18.840	-37.98				
CO_2 44.010	2.317	0.927	40.80	30.573	4.023	177.05	12.787	13.714	16.810	3.096	136.25	9.248			
N_2 28.016	0.236	0.094	2.63	1.762	0.232	6.50	0.737	0.831	0.969						
CH_4 16.042	0.429	0.172	2.76	9.413	1.239	19.88	3.937	4.109	5.176	1.067	17.12	1.162			
C_2H_4 28.052				2.323	0.306	8.58	0.972	0.972	1.278	0.306	8.58	0.582			
C_2H_6 30.068				1.692	0.223	6.71	0.708	0.708	0.931	0.223	6.71	0.455			
C_1+C_2											32.41	2.199			
C_3H_6 42.078				2.712	0.357	15.02	1.134	1.134	1.491	0.357	15.02	1.019	4.32	3.477	0.236
C_3H_8 44.094				0.290	0.038	1.68	0.121	0.121	0.159	0.038	1.68	0.114	4.24	0.396	0.027
C_4H_8 56.104				1.961	0.258	14.47	0.820	0.820	1.078	0.258	14.47	0.982	5.00	2.894	0.196
C_4H_{10} 58.120				0.662	0.087	5.06	0.277	0.277	0.364	0.087	5.06	0.343	4.86	1.041	0.071
C_5H_{10} 70.130				0.909	0.120	8.42	0.380	0.380	0.500	0.120	8.42	0.572	5.45	1.545	0.105
C_5H_{12} 72.146				0.218	0.029	2.09	0.091	0.091	0.120	0.029	2.09	0.142	5.25	0.398	0.027
C_6H_{12} 84.156				0.274	0.036	3.03	0.115	0.115	0.151	0.036	3.03	0.206	5.54	0.547	0.037
C_3-C_6											49.77	3.378		10.298	0.699
TOTAL		40.016	509.20		13.160	307.79	41.825	81.841	62.508						
H_2+CO	97.018	38.823	14733 SCFH		6.212		19.746	58.569	25.958	-32.611					
H_2/CO		1.62	Factor 678748		5.03		5.03	2.24	5.03	1.37					

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

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

	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
RECOVERED OIL	0.433**	60.78	4.125		9.460	0.642
TOTAL OIL		110.55	7.503		19.758	1.341
WATER SOLUBLE CHEMICALS	0.387**	20.55	1.395	7.941	2.588	0.176
TOTAL LIQUID PRODUCTS C_3+		131.10	8.898		22.346	1.517
NET WATER	6.703**	120.76	8.197		14.497	0.984
GROSS WATER		141.31	9.591		17.085	1.160
HYDROCARBON TOTAL—C_1+		163.51	11.098			

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

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

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

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

Form ML—11

**Included in Reactor Effluent Total

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	YIELD BASIS H_2+CO FED CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	37.372	15.454	432.87	9.575	1.388	38.88	4.030	19.484	5.418	-14.066	-393.99				
H_2 2.016	59.956	24.794	49.98	39.290	5.697	11.49	16.539	41.333	22.236	-19.097	- 38.49				
CO_2 44.010	2.411	0.997	43.88	30.107	4.366	192.15	12.672	13.669	17.038	3.369	148.27	9.707			
N_2 28.016	0.146	0.060	1.68	1.429	0.207	5.80	0.601	0.661	0.808						
CH_4 16.042	0.115	0.048	0.77	8.436	1.223	19.62	3.551	3.599	4.774	1.175	18.85	1.234			
C_2H_4 28.052				2.305	0.334	9.37	0.970	0.970	1.304	0.334	9.37	0.613			
C_2H_6 30.068				1.671	0.242	7.28	0.703	0.703	0.945	0.242	7.28	0.477			
C_1+C_2											35.50	2.324			
C_3H_6 42.078				2.963	0.430	18.09	1.247	1.247	1.677	0.430	18.09	1.184	4.32	4.188	0.274
C_3H_8 44.094				0.272	0.039	1.72	0.114	0.114	0.153	0.039	1.72	0.113	4.24	0.406	0.027
C_4H_8 56.104				1.971	0.286	16.05	0.830	0.830	1.116	0.286	16.05	1.051	5.00	3.210	0.210
C_4H_{10} 58.120				0.650	0.094	5.46	0.274	0.274	0.368	0.094	5.46	0.357	4.86	1.123	0.074
C_5H_{10} 70.130				0.879	0.127	8.91	0.370	0.370	0.497	0.127	8.91	0.583	5.45	1.635	0.107
C_5H_{12} 72.146				0.199	0.029	2.09	0.084	0.084	0.113	0.029	2.09	0.137	5.25	0.398	0.026
C_6H_{12} 84.156				0.253	0.037	3.11	0.106	0.106	0.143	0.037	3.11	0.204	5.54	0.561	0.037
C_3-C_6											55.43	3.629		11.521	0.755
TOTAL		41.353	529.18		14.499	340.02	42.091	83.444	63.720						
H_2+CO	97.328	40.248	15274 SCFH		7.085		20.569	60.817	27.654	- 33.163					
H_2/CO		1.60	Factor 654707		4.10		4.10	2.12	4.10	1.36					

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

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

	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
RECOVERED OIL	**0.385	54.03	3.537		8.418	0.551
TOTAL OIL		109.46	7.166		19.939	1.306
WATER SOLUBLE CHEMICALS	**0.388	20.59	1.348	7.971	2.583	0.169
TOTAL LIQUID PRODUCTS C_3+		130.05	8.514		22.522	1.475
NET WATER	**6.357	114.52	7.498		13.748	0.900
GROSS WATER		135.11	8.846		16.331	1.069
HYDROCARBON TOTAL—C_1+		165.55	10.839			

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

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

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

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

Form ML—11

**Included in Reactor Effluent Total

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED — CONDENSATE			
	%	m/hr	#/hr	%	At Wt. Balance m/hr	At Wt. Balance #/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	37.111	15.146	424.24	9.900	1.491	41.76	4.359	19.505	5.850	-13.655	-382.48				
H_2 2.016	60.097	24.528	49.45	41.319	6.221	12.54	18.190	42.718	24.411	-18.307	-36.91				
CO_2 44.010	2.335	0.953	41.94	29.065	4.377	192.63	12.796	13.749	17.173	3.424	150.69	10.008			
N_2 28.016	0.300	0.122	3.42	1.203	0.181	5.07	0.530	0.652	0.711						
CH_4 16.042	0.157	0.064	1.03	8.090	1.218	19.54	3.562	3.626	4.780	1.154	18.51	1.229			
C_2H_4 28.052				2.419	0.364	10.21	1.065	1.065	1.429	0.364	10.21	0.678			
C_2H_6 30.068				1.519	0.229	6.89	0.669	0.669	0.898	0.229	6.89	0.458			
C_1+C_2											35.61	2.365			
C_3H_6 42.078				2.836	0.427	17.97	1.249	1.249	1.676	0.427	17.97	1.193	4.32	4.160	0.276
C_3H_8 44.094				0.260	0.039	1.72	0.114	0.114	0.153	0.039	1.72	0.114	4.24	0.406	0.027
C_4H_8 56.104				1.733	0.261	14.64	0.763	0.763	1.024	0.261	14.64	0.972	5.00	2.928	0.194
C_4H_{10} 58.120				0.570	0.086	5.00	0.251	0.251	0.337	0.086	5.00	0.332	4.86	1.029	0.068
C_5H_{10} 70.130				0.722	0.109	7.64	0.318	0.318	0.427	0.109	7.64	0.507	5.45	1.402	0.093
C_5H_{12} 72.146				0.168	0.025	1.80	0.074	0.074	0.099	0.025	1.80	0.120	5.25	0.343	0.023
C_6H_{12} 84.156				0.196	0.030	2.52	0.086	0.086	0.116	0.030	2.52	0.167	5.54	0.455	0.030
C_3-C_6											51.29	3.405		10.723	0.712
TOTAL		40.813	520.08		15.058	339.93	44.026	84.839	65.906						
H_2+CO	97.208	39.674	15057	SCFH	7.712		22.549	62.223	30.261	-31.962					
H_2/CO		1.62	Factor 664142		4.17		4.17	2.19	4.17	1.34					

Weight Recovery, %	93.55	Catalyst Age, hrs. 242	Space Velocity, vhv	1112
Pressure, psig	414	Inlet Velocity, Ft/sec	Catalyst	
Temperature, °F	656	Bed Depth, Ft 20.52	Weight, #	1974
Recycle Ratio	1.08	Bed Density, #/CF 146	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ =	11.8

	NET CHANGE m/hr	NET CHANGE #/hr	#/MCF	#/gal	gal/hr	gal/MCF
RECOVERED OIL	0.364**	51.06	3.391		7.984	0.530
TOTAL OIL		102.35	6.796		18.707	1.242
WATER SOLUBLE CHEMICALS	0.374**	19.84	1.318	7.938	2.499	0.166
TOTAL LIQUID PRODUCTS C_3+		122.19	8.114		21.206	1.408
NET WATER	6.084**	109.61	7.280		13.158	0.874
GROSS WATER		129.45	8.597		15.657	1.040
HYDROCARBON TOTAL—C_1+		157.80	10.480			

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+ / C_1+
63.10	90.16	74.64	80.56	70.01	42.86	51.37	77.43

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*

	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	83.40	6.658	98.0	6.525
400-550	9.98	0.797	91.4	0.728
550 +	6.62	0.529	114.6	0.606

	RECOVERY %	#/hr	gal/hr
PROPYLENE	38.1	6.85	
C_3 POLY GASO.	87.5	5.99	1.002
C_3 POLY TAR	12.5	0.86	0.114

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	--	--	68.0
C_4 POLY GASO.	5.98	12.81	2.142	1.5
C_4H_{10}	4.86	(5.00) 4.95	(1.029) 1.018	68.0
C_4-FREE GASO.			9.727	5.8
C_4 POLY TAR	7.53	1.83	0.243	

	gal/hr	gal / MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	12.887	0.8559	4640
GAS OIL	0.728	0.0483	262
FUEL OIL	0.606	0.0402	218
POLY TAR	0.357	0.0237	128
TOTAL	14.578	0.9681	5248
W. S. CHEM.	2.499	0.1660	900
TOTAL	17.077	1.1341	6148

Form ML—11

**Included in Reactor Effluent total

g/NCM = 16.91×#/MCF

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

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

Weight Recovery, %	92.84	Catalyst Age, hrs. 338	Space Velocity, vhv	1112
Pressure, psig	413	Inlet Velocity, Ft/sec	Catalyst	
Temperature, °F	658	Bed Depth, Ft 20.61	Weight, #	1833
Recycle Ratio	1.07	Bed Density, #/CF 135	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ =	11.8

	NET CHANGE m/hr	NET CHANGE #/hr	#/MCF	#/gal	gal/hr	gal/MCF
RECOVERED OIL	0.320**	44.86	2.966		6.974	0.461
TOTAL OIL		97.66	6.457		17.982	1.189
WATER SOLUBLE CHEMICALS	0.393**	20.86	1.379	7.930	2.631	0.174
TOTAL LIQUID PRODUCTS C_3+		118.52	7.836		20.613	1.363
NET WATER	5.670**	102.15	6.754		12.263	0.811
GROSS WATER		123.01	8.133		14.894	0.985
HYDROCARBON TOTAL—C_1+		155.35	10.272			

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+ / C_1+
61.34	88.98	73.12	79.15	68.16	41.91	50.16	76.29

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*

	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	82.68	5.766	98.0	5.651
400-550	9.30	0.649	91.4	0.593
550 +	8.02	0.559	114.6	0.641

	RECOVERY %	#/hr	gal/hr
PROPYLENE	36.3	6.40	
C_3 POLY GASO.	87.5	5.60	0.936
C_3 POLY TAR	12.5	0.80	0.106

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	--	--	68.0
C_4 POLY GASO.	5.98	13.30	2.224	1.5
C_4H_{10}	4.86	(5.17) 4.73	(1.064) 0.974	68.0
C_4-FREE GASO.			8.943	5.8
C_4 POLY TAR	7.53	1.90	0.252	

	gal/hr	gal / MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	12.141	0.8028	4352
GAS OIL	0.593	0.0392	213
FUEL OIL	0.641	0.0424	230
POLY TAR	0.358	0.0237	128
TOTAL	13.733	0.9081	4923
W. S. CHEM.	2.631	0.1740	943
TOTAL	16.364	1.0821	5866

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91×#/MCF

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

Basis Generator Carbon Balance

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

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO 28.010	36.760	14.724	412.42	8.615	1.224	34.28	3.774	18.498	4.998	-13.500	-378.14				
H_2 2.016	59.685	23.907	48.20	43.495	6.182	12.46	19.056	42.963	25.238	-17.725	-35.74				
CO_2 44.010	2.240	0.897	39.48	27.345	3.887	171.06	11.980	12.877	15.867	2.990	131.58	8.975			
N_2 28.016	0.180	0.072	2.02	1.635	0.232	6.50	0.716	0.788	0.948						
CH_4 16.042	1.135	0.455	7.30	9.710	1.380	22.14	4.254	4.709	5.634	0.925	14.84	1.012			
C_2H_4 28.052				2.170	0.308	8.64	0.951	0.951	1.259	0.308	8.64	0.589			
C_2H_6 30.068				1.360	0.193	5.80	0.596	0.596	0.789	0.193	5.80	0.396			
C_1+C_2											29.28	1.997			
C_3H_6 42.078				2.210	0.314	13.21	0.968	0.968	1.282	0.314	13.21	0.901	4.32	3.058	0.209
C_3H_8 44.094				0.245	0.035	1.54	0.107	0.107	0.142	0.035	1.54	0.105	4.24	0.363	0.025
C_4H_8 56.104				1.525	0.217	12.17	0.668	0.668	0.885	0.217	12.17	0.830	5.00	2.434	0.166
C_4H_{10} 58.120				0.560	0.080	4.65	0.245	0.245	0.325	0.080	4.65	0.317	4.86	0.957	0.065
C_5H_{10} 70.130				0.730	0.104	7.29	0.320	0.320	0.424	0.104	7.29	0.497	5.45	1.338	0.091
C_5H_{12} 72.146				0.175	0.025	1.80	0.077	0.077	0.102	0.025	1.80	0.123	5.25	0.343	0.023
C_6H_{12} 84.156				0.225	0.032	2.69	0.099	0.099	0.131	0.032	2.69	0.183	5.54	0.486	0.033
C_3-C_6											43.35	2.957		8.979	0.612
TOTAL		40.055	509.42		14.213	304.23	43.811	83.866	65.743						
H_2+CO	96.445	38.631	14660 SCFH		7.406		22.830	61.461	30.236	31.225					
H_2/CO		1.62	Factor 682128		5.05		5.05	2.32	5.05	1.31					

Weight Recovery, % 100.73	Catalyst Age, hrs.	Space Velocity, vhv 1250	RECOVERED OIL	0.440	61.73	4.211
Pressure, psig 416	Inlet Velocity, Ft/sec 0.99	Catalyst Vol CF 11.73	TOTAL OIL		105.08	7.168
Temperature, °F 643	Bed Depth, Ft 17.77	Weight, # 1771	WATER SOLUBLE CHEMICALS	0.351	18.65	1.272
Recycle Ratio 1.04	Bed Density, #/CF 151	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	TOTAL LIQUID PRODUCTS C_3+		123.73	8.440
			NET WATER	6.928	124.81	8.514
			GROSS WATER		143.46	9.786
			HYDROCARBON TOTAL—C_1+		153.01	10.437

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

YIELD BASIS H_2+CO FED

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*

	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY,%	gal/hr
400 EP	80.9	7.752	98.0	7.597
400-550	13.3	1.275	91.4	1.165
550 +	5.8	0.556	114.6	0.637

	RECOVERY %	#/hr	gal/hr
PROPYLENE	39.8	5.26	
C_3 POLY GASO.	87.5	4.60	0.769
C_3 POLY TAR	12.5	0.66	0.088

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.30	0.060	68.0
C_4 POLY GASO.	5.98	10.39	17.37	1.5
C_4H_{10}	4.86	4.65	0.957	68.0
C_4-FREE GASO.			10.533	5.8
C_4 POLY TAR	7.53	1.48	0.197	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	13.287	0.9063	4914
GAS OIL	1.165	0.0795	431
FUEL OIL	0.637	0.0435	236
POLY TAR	0.285	0.0194	105
TOTAL	15.374	1.0487	5686
W. S. CHEM.	2.338	0.1595	865
TOTAL	17.712	1.2082	6551

Form ML—11

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

Basis Generator Carbon Balance

RUN NO. 64-A
HOURS 0-10

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	440	Fresh Feed	15935
Natural Gas	436	Recycle	16626
Generator Outlet	419	Combined Feed	32561
Reactor Inlet	416	Wet Gas—Measured	5460
Condenser Inlet		Adjusted	5830
Product Accumulator	370	Loss	370
TEMPERATURES—°F.		Recycle/Fresh Feed	1.04
Oxygen	470	Inlet Velocity—ft./sec.	0.99
Natural Gas	731	Fresh Feed Rate—S.C.F.H.	14660
Generator	2034	per Cu.Ft. Dense Bed	1250
Quench Accumulator	169	per Lb. Catalyst	8.28
Reactor Inlet	315		22212
Condenser Inlet	590		
Product Accumulator	86		
Catalyst No. Height			
1 0'0"	--		
2 0'9"	636		
3 1'9"	629		
4 4'5"	645		
5 7'0"	651		
6 12'3"	652		
7 17'5"	647		
8 20'0"	631		
9 22'7"	636		
10 25'2"	638		
11 26'11"	644		

PRODUCT TESTS	OIL	WATER
°API	51.4	10.8
Neut. No.	49.0	37.8
Sap. No.	65.2	43.3
Hydrox. No.		
Bromine No.	92	
Pour °F.		
Chemicals, % by K_2CO_3		13.5
HEMPEL, DIST. %		°API
205 °F.		
400	79.9	55.7
400-550	13.3	30.6
550+	6.8	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	98	
10%	134	
50%	222	
90%	340	
EP	396	
	97.3	

CATALYST DATA	
INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	41.5
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 0-21 3/8	
1 21 3/8-52 3/4	72
2 52 3/4-84	79
3 84-115 3/8	76
4 115 3/8-353 1/8	260
Total	487
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	151
Inventory, Lbs.	1771
Bed Depth, Ft.	17.77
	11.73

PARTICLE SIZE

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

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

Basis Generator Carbon Balance

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO 28.010	37.267	14.790	414.28	6.910	0.887	24.80	2.874	17.664	3.761	-13.903	-389.48				
H_2 2.016	59.953	23.792	47.96	38.507	4.947	9.97	16.016	39.808	20.963	-18.845	-37.99				
CO_2 44.010	2.163	0.858	37.76	30.867	3.965	174.50	12.838	13.696	16.803	3.107	136.74	9.339			
N_2 28.016	0.160	0.063	1.77	1.897	0.244	6.84	0.789	0.852	1.033						
CH_4 16.042	0.457	0.181	2.90	10.293	1.322	21.21	4.281	4.462	5.603	1.141	18.31	1.251			
C_2H_4 28.052				2.387	0.307	8.61	0.993	0.993	1.300	0.307	8.61	0.588			
C_2H_6 30.068				1.733	0.223	6.71	0.721	0.721	0.944	0.223	6.71	0.458			
C_1+C_2											33.63	2.297			
C_3H_6 42.078				2.803	0.360	15.15	1.166	1.166	1.526	0.360	15.15	1.035	4.32	3.507	0.240
C_3H_8 44.094				0.297	0.038	1.68	0.124	0.124	0.162	0.038	1.68	0.115	4.24	0.396	0.027
C_4H_8 56.104				2.093	0.269	15.09	0.871	0.871	1.140	0.269	15.09	1.031	5.00	3.018	0.206
C_4H_{10} 58.120				0.690	0.089	5.17	0.287	0.287	0.376	0.089	5.17	0.353	4.86	1.064	0.073
C_5H_{10} 70.130				0.990	0.127	8.91	0.412	0.412	0.539	0.127	8.91	0.609	5.45	1.635	0.112
C_5H_{12} 72.146				0.233	0.030	2.16	0.097	0.097	0.127	0.030	2.16	0.148	5.25	0.411	0.028
C_6H_{12} 84.156				0.300	0.039	3.28	0.125	0.125	0.164	0.039	3.28	0.224	5.54	0.592	0.040
C_3-C_6											51.44	3.513		10.623	0.726
TOTAL		39.684	504.67		12.847	304.08	41.594	81.278	62.122						
H_2+CO		38.582	14642 SCFH		5.834		18.890	57.472	24.724	32.747					
H_2/CO		1.61	Factor 682967		5.58		5.57	2.25	5.57	1.36					
RECOVERED OIL										0.425	59.64	4.073		9.214	0.629
TOTAL OIL											111.08	7.586		19.837	1.355
WATER SOLUBLE CHEMICALS										0.292	15.49	1.058		1.957	0.134
TOTAL LIQUID PRODUCTS C_3+											126.57	8.644		21.794	1.489
NET WATER										6.964	125.46	8.569		15.061	
GROSS WATER											140.95	9.626		17.018	
HYDROCARBON TOTAL—C_1+											160.20	10.941			

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

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

YIELD BASIS H_2+CO FED

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY,%	gal/hr
400 EP	82.2	7.574	98.0	7.423
400-550	12.7	1.170	91.4	1.069
550 +	5.1	0.470	114.6	0.539

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	44.0	6.67		
C_3 POLY GASO.	87.5	5.84	0.977	
C_3 POLY TAR	12.5	0.83	0.110	

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.27	0.054	68.0
C_4 POLY GASO.	5.98	12.97	2.168	1.5
C_4H_{10}	4.86	5.17	1.064	68.0
C_4-FREE GASO.			11.038	5.8
C_4 POLY TAR	7.53	1.85	0.246	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	14.324	0.9783	5304
GAS OIL	1.069	0.0730	396
FUEL OIL	0.539	0.0368	200
POLY TAR	0.356	0.0243	132
TOTAL	16.288	1.1124	6032
W. S. CHEM.	1.957	0.1337	725
TOTAL	18.245	1.2461	6757

Form ML—11

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-B
HOURS 10-34

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	442	Fresh Feed	15060
Natural Gas	436	Recycle	15785
Generator Outlet	420	Combined Feed	30845
Reactor Inlet	415	Wet Gas—Measured	4861
Condenser Inlet		Adjusted	4875
Product Accumulator	370	Loss	14
TEMPERATURES—°F.		Recycle/Fresh Feed	1.05
Oxygen	468	Inlet Velocity—ft./sec.	0.99
Natural Gas	768	Fresh Feed Rate—S.C.F.H.	14642
Generator	2195	per Cu. Ft. Dense Bed	1179
Quench Accumulator	172	per Lb. Catalyst	7.70
Reactor Inlet	339		22185
Condenser Inlet	618		
Product Accumulator	95	Heat Transfer Calculations	
Catalyst No. Height		Steam Rate=390#/hr	
1 See Per. A	--	@ 706 psia & 505°F	
2	653	=1201 BTU/#	
3	648	Water in @ 58°F=26 BTU/#	
4	664	Net Heat Trans/# steam=1175 BTU	
5	670	(1175)(390)=458250	
6	669	Ave. Bed Temp=661°F	
7	660	dP=661-505=156°F	
8	642	Tube Area=33.8 sq ft	
9	648	$K = \frac{458250}{(33.8)(156)} = 86.9$ BTU/°F/sq ft	
10	656		
11	692		

PRODUCT TESTS	OIL	WATER
°API	50.5	10.8
Neut. No.	47.4	35.2
Sap. No.	61.5	37.5
Hydrox. No.		
Bromine No.		
Pour °F.		
Chemicals, % by K_2CO_3		11.5
HEMPEL. DIST. %		°API
205 °F.		
400	81.2	53.9
400-550	12.7	34.4
550+	6.1	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	101	
10%	134	
50%	227	
90%	354	
EP	408	
	96.2	

CATALYST DATA	
INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	61
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 See Per. A	52
1	73
2	81
3	78
4	270
Total	554
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	153
Inventory, Lbs.	1901
Bed Depth, Ft.	18.82
	12.42

PARTICLE SIZE

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

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO 28.010	37.360	14.808	414.78	7.220	0.898	25.15	2.943	17.751	3.841	-13.910	-389;63				
H_2 2.016	59.953	23.762	47.90	37.160	4.621	9.32	15.145	38.907	19.766	-19.141	-38.58				
CO_2 44.010	2.307	0.914	40.23	39.370	4.027	177.22	13.194	14.108	17.221	3.113	136.99	9.359			
N_2 28.016	0.230	0.091	2.55	1.993	0.248	6.95	0.812	0.903	1.060						
CH_4 16.042	0.150	0.060	0.96	9.337	1.161	18.62	3.806	3.866	4.967	1.101	17.66	1.207			
C_2H_4 28.052				2.383	0.296	8.30	0.971	0.971	1.267	0.296	8.30	0.567			
C_2H_6 30.068				1.810	0.225	6.77	0.738	0.738	0.963	0.225	6.77	0.463			
C_1+C_2											32.73	2.237			
C_3H_6 42.078				2.817	0.350	14.73	1.148	1.148	1.498	0.350	14.73	1.006	4.32	3.410	0.233
C_3H_8 44.094				0.310	0.039	1.72	0.126	0.126	0.165	0.039	1.72	0.118	4.24	0.406	0.028
C_4H_8 56.104				2.207	0.274	15.37	0.900	0.900	1.174	0.274	15.37	1.050	5.00	3.074	0.210
C_4H_{10} 58.120				0.733	0.091	5.29	0.299	0.299	0.390	0.091	5.29	0.361	4.86	1.088	0.074
C_5H_{10} 70.130				1.070	0.133	9.33	0.436	0.436	0.569	0.133	9.33	0.637	5.45	1.712	0.117
C_5H_{12} 72.146				0.250	0.031	2.24	0.102	0.102	0.133	0.031	2.24	0.153	5.25	0.427	0.029
C_6H_{12} 84.156				0.340	0.042	3.53	0.139	0.139	0.181	0.042	3.53	0.241	5.54	0.637	0.044
C_3-C_6											52.21	3.566		10.754	0.735
TOTAL		39.635	506.42		12.436	304.54	40.759	80.394	60.846						
H_2+CO		38.570	14637 SCFH		5.519		18.088	56.658	23.607	-33.051					
H_2/CO		1.60	Factor 683200		5.15		5.15	2.19	5.15	1.38					
RECOVERED OIL										0.449	62.92	4.299		9.768	0.667
TOTAL OIL											115.13	7.865		20.522	1.402
WATER SOLUBLE CHEMICALS										0.263	13.95	0.953		1.761	0.120
TOTAL LIQUID PRODUCTS C_3+											129.08	8.818		22.283	1.522
NET WATER										6.939	125.01	8.511		15.007	1.025
GROSS WATER											138.96	9.494		16.768	1.146
HYDROCARBON TOTAL—C_1+											161.81	11.055			

Weight Recovery, % 100.38 | Catalyst Age, hrs. | Space Velocity, vhv 1164
Pressure, psig 415 | Inlet Velocity, Ft/sec 0.94 | Catalyst Vol CF 12.58
Temperature, °F 656 | Bed Depth, Ft 19.06 | Weight, # 1963
Recycle Ratio 1.03 | Bed Density, #/CF 156 | Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+
68.62	93.94	80.55	85.69	78.36	49.20	58.33	79.76

YIELD BASIS H_2+CO FED

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	81.0	7.912	98.0	7.754
400-550	13.6	1.328	91.4	1.214
550 +	5.4	0.528	114.6	0.605

	RECOVERY %	#/hr	gal/hr
PROPYLENE	45.4	6.69	
C_3 POLY GASO.	87.5	5.85	0.978
C_3 POLY TAR	12.5	0.84	0.112

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.34	0.068	68.0
C_4 POLY GASO.	5.98	13.15	2.199	1.5
C_4H_{10}	4.86	5.29	1.088	68.0
C_4-FREE GASO.			11.508	5.8
C_4 POLY TAR	7.53	1.88	0.250	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	14.863	1.0154	5505
GAS OIL	1.214	0.0829	449
FUEL OIL	0.605	0.0413	224
POLY TAR	0.362	0.0247	134
TOTAL	17.044	1.1643	6312
W. S. CHEM.	1.761	0.1203	652
TOTAL	18.805	1.2846	6964

Form ML—11

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-C
HOURS 34-58

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	443	Fresh Feed	15041
Natural Gas	436	Recycle	15468
Generator Outlet	419	Combined Feed	30509
Reactor Inlet	415	Wet Gas—Measured	4749
Condenser Inlet		Adjusted	4719
Product Accumulator	370	Loss	-30
TEMPERATURES—°F.		Recycle/Fresh Feed	1.03
Oxygen	488	Inlet Velocity—ft./sec.	0.94
Natural Gas	780	Fresh Feed Rate—S.C.F.H.	14637
Generator	2300	per Cu. Ft. Dense Bed	1164
Quench Accumulator	173	per Lb. Catalyst	7.46
Reactor Inlet	333	per Sq. Ft.	22177
Condenser Inlet	620		
Product Accumulator	96		
Catalyst No. Height			
1 See Per. A	--		
2	650		
3	647		
4	659		
5	664		
6	663		
7	655		
8	639		
9	642		
10	654		
11	682		

PRODUCT TESTS	OIL	WATER
°API	51.4	10.7
Neut. No.	47.4	35.2
Sap. No.	59.5	37.5
Hydrox. No.		
Bromine No.	96	
Pour °F.		
Chemicals, % by K_2CO_3		10.5
HEMPEL, DIST. %		°API
205 °F.		
400	80.0	54.8
400-550	13.6	34.4
550+	6.4	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	104	
10%	134	
50%	222	
90%	342	
EP	394	
Rec.	96.8	

CATALYST DATA	
INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	40
In Reactor at End of Period	
REACTOR d-p. Inches H_2O	
No. Height	
0 See Per. A	53
1	74
2	83
3	80
4	282
Total	572
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	156
Inventory, Lbs.	1963
Bed Depth, Ft.	19.06
Vol., Cu. Ft.	12.58

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

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO 28.010	36.633	14.700	411.74	7.653	0.980	27.45	3.142	17.842	4.122	-13.720	-384.29				
H_2 2.016	60.330	24.209	48.81	38.003	4.867	9.81	15.603	39.812	20.470	-19.342	-39.00				
CO_2 44.010	2.497	1.002	44.10	32.060	4.106	180.67	13.163	14.165	17.269	3.104	136.57	9.249			
N_2 28.016	0.370	0.148	4.15	1.717	0.220	6.16	0.705	0.853	0.925						
CH_4 16.042	0.170	0.068	1.09	8.930	1.144	18.35	3.666	3.734	4.810	1.076	17.26	1.169			
C_2H_4 28.052				2.367	0.303	8.50	0.972	0.972	1.275	0.303	8.50	0.576			
C_2H_6 30.068				1.813	0.232	6.98	0.744	0.744	0.976	0.232	6.98	0.473			
C_1+C_2											32.74	2.218			
C_3H_6 42.078				2.950	0.378	15.91	1.211	1.211	1.589	0.378	15.91	1.077	4.32	3.683	0.249
C_3H_8 44.094				0.317	0.041	1.81	0.130	0.130	0.171	0.041	1.81	0.123	4.24	0.427	0.029
C_4H_8 56.104				2.087	0.267	14.98	0.857	0.857	1.124	0.267	14.98	1.014	5.00	2.996	0.203
C_4H_{10} 58.120				0.707	0.091	5.29	0.290	0.290	0.381	0.091	5.29	0.358	4.86	1.088	0.074
C_5H_{10} 70.130				0.913	0.117	8.21	0.375	0.375	0.492	0.117	8.21	0.556	5.45	1.506	0.102
C_5H_{12} 72.146				0.220	0.028	2.02	0.090	0.090	0.118	0.028	2.02	0.137	5.25	0.385	0.026
C_6H_{12} 84.156				0.263	0.034	2.86	0.108	0.108	0.142	0.034	2.86	0.194	5.54	0.516	0.035
C_3-C_6											51.08	3.459		10.601	0.718
TOTAL		40.127	509.89		12.808	309.00	41.056	81.183	61.583						
H_2+CO	96.963	38.909	14766 SCFH		5.847		18.745	57.654	24.592	-33.062					
H_2/CO		1.65	Factor 677231		4.97		4.97	2.23	4.97	1.41					

Weight Recovery, % 99.78	Catalyst Age, hrs.	Space Velocity, vhv 1144	RECOVERED OIL	0.429	60.23	4.079
Pressure, psig 416	Inlet Velocity, Ft/sec 0.95	Catalyst Vol CF 12.91	TOTAL OIL		111.31	7.538
Temperature, °F 655	Bed Depth, Ft 19.56	Weight, # 2001	WATER SOLUBLE CHEMICALS	0.266	14.12	0.956
Recycle Ratio 1.02	Bed Density, #/CF 155	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	TOTAL LIQUID PRODUCTS C_3+		125.43	8.494
			NET WATER	7.024	126.54	8.570
			GROSS WATER		140.66	9.526
			HYDROCARBON TOTAL—C_1+		158.17	10.712

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

YIELD BASIS H_2+CO FED

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	82.6	7.792	98.0	7.636
400-550	11.3	1.066	91.4	0.974
550 +	6.1	0.575	114.6	0.659

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	44.6	7.10		
C_3 POLY GASO.	87.5	6.21	1.038	
C_3 POLY TAR	12.5	0.89	0.118	

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.16	0.032	68.0
C_4 POLY GASO.	5.98	12.97	2.168	1.5
C_4H_{10}	4.86	5.29	1.088	68.0
C_4-FREE GASO.			11.081	5.8
C_4 POLY TAR	7.53	1.85	0.246	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	14.369	0.9731	5276
GAS OIL	0.974	0.0660	358
FUEL OIL	0.659	0.0446	242
POLY TAR	0.364	0.0247	134
TOTAL	16.366	1.1084	6010
W. S. CHEM.	1.782	0.1207	654
TOTAL	18.148	1.2291	6664

Form ML—11

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-D
HOURS 58-82

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	444	Fresh Feed	15228
Natural Gas	437	Recycle	15581
Generator Outlet	420	Combined Feed	30809
Reactor Inlet	416	Wet Gas—Measured	4843
Condenser Inlet		Adjusted	4860
Product Accumulator	369	Loss	17
TEMPERATURES—°F.		Recycle/Fresh Feed	1.02
Oxygen	512	Inlet Velocity—ft./sec.	0.95
Natural Gas	792	Fresh Feed Rate—S.C.F.H.	14766
Generator	2324	per Cu. Ft. Dense Bed	1144
Quench Accumulator	172	per Lb. Catalyst	7.38
Reactor Inlet	344	per Sq. Ft.	22373
Condenser Inlet	616		
Product Accumulator	88		
Catalyst No. Height			
1 See Per. A			
2	650		
3	646		
4	658		
5	662		
6	661		
7	654		
8	638		
9	638		
10	652		
11	685		

PRODUCT TESTS	OIL	WATER
°API	53.0	10.7
Neut. No.	44.2	34.0
Sap. No.	60.0	37.9
Hydrox. No.		
Bromine No.	92	
Pour °F.		
Chemicals, % by K_2CO_3		10.5
HEMPEL. DIST. %		°API
205 °F.		
400	81.6	56.1
400-550	11.3	35.3
550+	7.1	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	100	
10%	130	
50%	218	
90%	348	
EP	400	
Rec.	97.0	

CATALYST DATA					
INVENTORY DATA		PARTICLE SIZE			
In Reactor at Start of Period		Screen Analysis		Sedimentation	
Fresh Catalyst Added		Mesh	Microns	%	Microns	%
Total		On 40	419+		80+	
Catalyst Recovered	20	100	150		40—80	
In Reactor at End of Period		150	105		20—40	
		200	74		10—20	
REACTOR d-p, Inches H_2O		250	62		0—20	
No. Height		325	44			
0 See Per. A	53	<325				
1	73	CATALYST				
2	84	Bulk Density, Lbs./Cu.Ft.				
3	78	Aerated				
4	295	Settled				
Total	583	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	155	N_2 Surface, m^2/gm.				
Inventory, Lbs.	2001					
Bed Depth, Ft.	19.56	CHEMICAL ANALYSIS				
Vol., Cu. Ft.	12.91	Fe				
		C				
		O				
		H				
		K_2O, W+, % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	YIELD BASIS H_2+CO FED CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	36.913	14.978	419.52	8.730	1.178	33.00	3.658	18.636	4.836	-13.800	-386.52				
H_2 2.016	60.237	24.442	49.28	39.760	5.366	10.82	16.662	41.104	22.028	-19.076	-38.46				
CO_2 44.010	2.377	0.965	42.47	30.224	4.081	179.61	12.665	13.630	16.746	3.116	137.14	9.167			
N_2 28.016	0.240	0.097	2.72	1.567	0.211	5.91	0.657	0.754	0.868						
CH_4 16.042	0.233	0.095	1.52	8.794	1.187	19.04	3.685	3.780	4.872	1.092	17.52	1.171			
C_2H_4 28.052				2.310	0.312	8.75	0.968	0.968	1.280	0.312	8.75	0.585			
C_2H_6 30.068				1.743	0.235	7.07	0.730	0.730	0.965	0.235	7.07	0.473			
C_1+C_2											33.34	2.229			
C_3H_6 42.078				2.783	0.376	15.82	1.166	1.166	1.542	0.376	15.82	1.057	4.32	3.662	0.245
C_3H_8 44.094				0.283	0.088	1.68	0.119	0.119	0.157	0.038	1.68	0.112	4.24	0.396	0.026
C_4H_8 56.104				1.893	0.255	14.31	0.793	0.793	1.048	0.255	14.31	0.957	5.00	2.862	0.191
C_4H_{10} 58.120				0.620	0.084	4.88	0.260	0.260	0.344	0.084	4.88	0.326	4.86	1.004	0.067
C_5H_{10} 70.130				0.843	0.114	7.99	0.353	0.353	0.467	0.114	7.99	0.534	5.45	1.466	0.098
C_5H_{12} 72.146				0.210	0.028	2.02	0.088	0.088	0.116	0.028	2.02	0.135	5.25	0.385	0.026
C_6H_{12} 84.156				0.240	0.032	2.69	0.101	0.101	0.133	0.032	2.69	0.180	5.54	0.486	0.032
C_3-C_6											49.39	3.301		10.261	0.685
TOTAL		40.577	515.51		13.497	313.59	41.905	82.482	63.159						
H_2+CO	97.150	39.420	14960 SCFH		6.544		20.320	59.740	26.864	-32.876					
H_2/CO		1.63	Factor 668449		4.56		4.55	2.21	4.56	1.38					
RECOVERED OIL										0.423	59.40	3.971		9.303	0.622
TOTAL OIL											108.79	7.272		19.564	1.307
WATER SOLUBLE CHEMICALS										0.297	15.74	1.052		1.978	0.132
TOTAL LIQUID PRODUCTS C_3+											124.53	8.324		21.542	1.439
NET WATER										7.037	126.78	8.475	8.33	15.220	1.017
GROSS WATER											142.52	9.527		17.198	1.149
HYDROCARBON TOTAL—C_1+											157.87	10.553			

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
400 EP	82.8	7.703	98.0	7.549
400-550	11.1	1.033	91.4	0.944
550 +	6.1	0.567	114.6	0.650

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	42.7	6.76		
C_3 POLY GASO.	87.5	5.91	0.988	
C_3 POLY TAR	12.5	0.85	0.113	

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.41	0.082	68.0
C_4 POLY GASO.	5.98	12.16	2.034	1.5
C_4H_{10}	4.86	4.88	1.004	68.0
C_4-FREE GASO.			10.874	5.8
C_4 POLY TAR	7.53	1.74	0.231	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	13.994	0.9354	5071
GAS OIL	0.944	0.0631	342
FUEL OIL	0.650	0.0434	235
POLY TAR	0.344	0.0230	125
TOTAL	15.932	1.0649	5773
W. S. CHEM.	1.978	0.1322	717
TOTAL	17.910	1.1971	6490

Weight Recovery, %	99.05	Catalyst Age, hrs.		Space Velocity, vhv	1151		
Pressure, psig	416	Inlet Velocity, Ft/sec	0.96	Catalyst Vol CF	13.00		
Temperature, °F	655	Bed Depth, Ft	19.7	Weight, #	2028		
Recycle Ratio	1.03	Bed Density, #/CF	156	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ =			

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+
66.74	92.14	78.05	83.40	74.05	46.41	55.03	78.88

Form ML—11

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-E
HOURS 82-106

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	444	Fresh Feed	15399
Natural Gas	435	Recycle	15903
Generator Outlet	420	Combined Feed	31302
Reactor Inlet	416	Wet Gas—Measured	5042
Condenser Inlet		Adjusted	5122
Product Accumulator	370	Loss	80
TEMPERATURES—°F.		Recycle/Fresh Feed	1.03
Oxygen	518	Inlet Velocity—ft./sec.	0.96
Natural Gas	812	Fresh Feed Rate—S.C.F.H.	14960
Generator	2324	per Cu. Ft. Dense Bed	1151
Quench Accumulator	173	per Lb. Catalyst	7.38
Reactor Inlet	359	per Sq. Ft.	22667
Condenser Inlet	608		
Product Accumulator	90		
Catalyst No. Height			
1 See Per. A	---		
2	651		
3	649		
4	659		
5	660		
6	659		
7	652		
8	637		
9	633		
10	647		
11	665		

PRODUCT TESTS	OIL	WATER
°API	53.0	10.7
Neut. No.	43.5	33.4
Sap. No.	61.0	38.8
Hydrox. No.		
Bromine No.	94	
Pour °F.		
Chemicals, % by K_2CO_3		11.5
HEMPEL. DIST. %		°API
205 °F.		
400	81.8	56.2
400-550	11.1	35.2
550+	7.1	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	100	
10%	130	
50%	220	
90%	350	
EP	400	
Rec.	97.0	

CATALYST DATA						
INVENTORY DATA		PARTICLE SIZE				
In Reactor at Start of Period		Screen Analysis			Sedimentation	
Fresh Catalyst Added		Mesh	Microns	%	Microns	%
Total		On 40	419+		80+	
Catalyst Recovered	27	100	150		40—80	
In Reactor at End of Period		150	105		20—40	
		200	74		10—20	
REACTOR d-p, Inches H_2O		250	62		0—20	
No. Height		325	44			
0 See Per. A	54	<325				
1	73	CATALYST				
2	86	Bulk Density, Lbs./Cu.Ft.				
3	78	Aerated				
4	300	Settled				
Total	591	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	156	N_2 Surface, m^2/gm.				
Inventory, Lbs.	2028					
Bed Depth, Ft.	19.70	CHEMICAL ANALYSIS				
Vol., Cu. Ft.	13.00	Fe				
		C				
		O				
		H				
		K_2O, W+, % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

By Carbon Balance

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED			
					At Wt. Balance							CONDENSATE			
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	37.377	15.144	424.17	9.827	1.407	39.41	4.091	19.235	5.498	-13.737	-384.76				
H_2 2.016	59.813	24.234	48.86	39.666	5.679	11.45	16.511	40.745	22.190	-18.555	37.41				
CO_2 44.010	2.540	1.029	45.29	29.687	4.252	187.13	12.358	13.387	16.610	3.223	141.84	9.491			
N_2 28.016	0.140	0.057	1.60	1.450	0.208	5.83	0.604	0.661	0.812						
CH_4 16.042	0.130	0.053	0.85	8.390	1.201	19.27	3.492	3.545	4.693	1.148	18.42	1.233			
C_2H_4 28.052				2.400	0.344	9.65	0.999	0.999	1.343	0.344	9.65	0.646			
C_2H_6 30.068				1.760	0.252	7.58	0.733	0.733	0.988	0.252	7.58	0.507			
C_1+C_2											35.65	2.386			
C_3H_6 42.078				2.640	0.378	15.91	1.099	1.099	1.477	0.378	15.91	1.065	4.32	3.683	0.246
C_3H_8 44.094				0.303	0.043	1.90	0.126	0.126	0.169	0.043	1.90	0.127	4.24	0.448	0.030
C_4H_8 56.104				1.903	0.272	15.26	0.792	0.792	1.064	0.272	15.26	1.021	5.00	3.052	0.204
C_4H_{10} 58.120				0.553	0.079	4.59	0.230	0.230	0.309	0.079	4.59	0.307	4.86	0.944	0.063
C_5H_{10} 70.130				0.917	0.131	9.19	0.382	0.382	0.513	0.131	9.19	0.615	5.45	1.686	0.113
C_5H_{12} 72.146				0.217	0.031	2.24	0.090	0.090	0.121	0.031	2.24	0.150	5.25	0.427	0.029
C_6H_{12} 84.156				0.287	0.041	3.45	0.119	0.119	0.160	0.041	3.45	0.231	5.54	0.623	0.042
C_3-C_6											52.54	3.516		10.863	0.727
TOTAL		40.517	520.77		14.318	332.86	41.626	82.143	63.194						
H_2+CO	97.190	39.378	14944 SCFH		7.086		20.602	59.980	27.688	-32.292					
H_2/CO		1.60	Factor 669164		4.04		4.04	2.12	4.04	1.35					

Weight Recovery, % 94.17	Catalyst Age, hrs.	Space Velocity, vhv 1158	RECOVERED OIL	0.389	54.62	3.655	8.526	0.571	GAS OIL	0.904	0.0605	328
Pressure, psig 416	Inlet Velocity, Ft/sec 0.96	Catalyst Vol CF 12.90	TOTAL OIL		107.16	7.171	19.389	1.298	FUEL OIL	0.479	0.0321	174
Temperature, °F 653	Bed Depth, Ft 19.54	Weight, # 2025	WATER SOLUBLE CHEMICALS	0.276	14.65	0.980	1.851	0.124	POLY TAR	0.348	0.0233	126
Recycle Ratio 1.03	Bed Density, #/CF 157	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	TOTAL LIQUID PRODUCTS C_3+		121.81	8.151	21.240	1.422	TOTAL	15.588	1.0432	5655
			NET WATER	6.585	118.64	7.939	14.243	0.953	W. S. CHEM.	1.851	0.1239	672
			GROSS WATER		133.29	8.919	16.094	1.077	TOTAL	17.439	1.1671	6327
			HYDROCARBON TOTAL—C_1+		157.46	10.537						

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+
64.66	90.71	76.57	82.01	71.42	45.54	53.84	77.36

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	83.5	7.119	98.0	6.977
400-550	11.6	0.989	91.4	0.904
550 +	4.9	0.418	114.6	0.479

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	40.0	6.36		
C_3 POLY GASO.	87.5	5.56	0.930	
C_3 POLY TAR	12.5	0.80	0.106	

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.69	0.138	68.0
C_4 POLY GASO.	5.98	12.75	2.132	1.5
C_4H_{10}	4.86	4.59	0.944	68.0
C_4-FREE GASO.			10.643	5.8
C_4 POLY TAR	7.53	1.82	0.242	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	13.857	0.9273	5027

Form ML—11

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-F
HOURS 106-128

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

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

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED			
					At Wt. Balance							CONDENSATE			
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	36.575	15.213	426.11	9.160	1.300	36.41	3.802	19.015	5.102	-13.913	-389.70				
H_2 2.016	60.860	25.314	51.03	39.455	5.595	11.29	16.378	41.692	21.973	-19.719	-39.74				
CO_2 44.010	2.255	0.938	41.28	29.785	4.229	186.13	12.364	13.302	16.593	3.291	144.85	9.418			
N_2 28.016	0.170	0.071	1.99	1.490	0.211	5.91	0.618	0.689	0.829						
CH_4 16.042	0.140	0.058	0.93	8.815	1.251	20.07	3.659	3.717	4.910	1.193	19.14	1.244			
C_2H_4 28.052				2.395	0.340	9.54	0.994	0.994	1.334	0.340	9.54	0.620			
C_2H_6 30.068				1.670	0.237	7.13	0.693	0.693	0.930	0.237	7.13	0.464			
C_1+C_2											35.81	2.328			
C_3H_6 42.078				3.055	0.433	18.22	1.268	1.268	1.701	0.433	18.22	1.185	4.32	4.218	0.274
C_3H_8 44.094				0.305	0.043	1.90	0.127	0.127	0.170	0.043	1.90	0.124	4.24	0.448	0.029
C_4H_8 56.104				1.965	0.279	15.65	0.816	0.816	1.095	0.279	15.65	1.018	5.00	3.130	0.204
C_4H_{10} 58.120				0.645	0.092	5.16	0.268	0.268	0.360	0.092	5.16	0.336	4.86	1.062	0.069
C_5H_{10} 70.130				0.855	0.121	8.49	0.355	0.355	0.476	0.121	8.49	0.552	5.45	1.558	0.101
C_5H_{12} 72.146				0.180	0.026	1.88	0.075	0.075	0.101	0.026	1.88	0.122	5.25	0.358	0.023
C_6H_{12} 84.156				0.225	0.032	2.69	0.093	0.093	0.125	0.032	2.69	0.175	5.54	0.486	0.032
C_3-C_6											53.99	3.512		11.260	0.732
TOTAL		41.594	521.34		14.189	330.47	41.510	83.104	63.121						
H_2+CO	97.435	40.527	15380 SCFH		6.895		20.180	60.707	27.075	-33.632					
H_2/CO		1.66	Factor 650195		4.30		4.31	2.19	4.31	1.42					
									RECOVERED OIL	0.390	54.64	3.553		8.498	0.553
									TOTAL OIL		108.63	7.065		19.758	1.285
									WATER SOLUBLE CHEMICALS	0.272	14.44	0.939		1.807	0.117
									TOTAL LIQUID PRODUCTS C_3+		123.07	8.004		21.565	1.402
									NET WATER	6.760	121.79	7.919		14.621	0.951
									GROSS WATER		136.23	8.858		16.428	1.068
									HYDROCARBON TOTAL—C_1+		158.88	10.332			

Weight Recovery, % 94.77	Catalyst Age, hrs.	Space Velocity, vhv 1184	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*												
Pressure, psig 415	Inlet Velocity, Ft/sec 0.98	Catalyst Vol CF 12.99	400 EP	78.7	6.688	98.0	6.554								
Temperature, °F 657	Bed Depth, Ft 19.68	Weight, # 2039	400-550	11.6	0.986	91.4	0.901								
Recycle Ratio 1.00	Bed Density, #/CF 157	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	550 +	9.7	0.824	114.6	0.944								
FRESH FEED CONVERSION — %			TOTAL FEED CONVERSION — %			SELECTIVITY									
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+								
65.89	91.45	77.90	82.99	73.17	47.30	55.40	77.46								

	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	41.5	7.56		
C_3 POLY GASO.	87.5	6.61	1.105	
C_3 POLY TAR	12.5	0.95	0.126	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.01	0.002	68.0
C_4 POLY GASO.	5.98	13.69	2.288	1.5
C_4H_{10}	4.86	5.16	1.062	68.0
C_4-FREE GASO.			10.061	5.8
C_4 POLY TAR	7.53	1.95	0.259	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	13.413	0.8721	4728	
GAS OIL	0.901	0.0586	318	
FUEL OIL	0.944	0.0614	333	
POLY TAR	0.385	0.0250	136	
TOTAL	15.643	1.0171	5515	
W. S. CHEM.	1.807	0.1175	637	
TOTAL	17.450	1.1346	6152	

Form ML—11

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-G
HOURS 128-141

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	YIELD BASIS H_2+CO FED CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	37.855	15.759	441.39	9.867	1.442	40.38	4.187	19.946	5.629	-14.317	-401.01				
H_2 2.016	59.365	24.714	49.82	38.337	5.602	11.28	16.269	40.983	21.871	-19.112	-38.54				
CO_2 44.010	2.495	1.039	45.73	30.807	4.500	198.03	13.074	14.113	17.574	3.461	152.30	9.915			
N_2 28.016	0.187	0.078	2.19	1.425	0.208	5.83	0.605	0.683	0.813						
CH_4 16.042	0.098	0.041	0.66	8.213	1.200	19.25	3.485	3.526	4.685	1.159	18.59	1.210			
C_2H_4 28.052				2.263	0.331	9.29	0.960	0.960	1.291	0.331	9.29	0.605			
C_2H_6 30.068				1.615	0.236	7.10	0.685	0.685	0.921	0.236	7.10	0.462			
C_1+C_2											34.98	2.277			
C_3H_6 42.078				3.005	0.439	18.47	1.275	1.275	1.714	0.439	18.47	1.202	4.32	4.275	0.278
C_3H_8 44.094				0.243	0.036	1.59	0.103	0.103	0.139	0.036	1.59	0.104	4.24	0.375	0.024
C_4H_8 56.104				2.102	0.307	17.22	0.892	0.892	1.199	01307	17.22	1.121	5.00	3.444	0.224
C_4H_{10} 58.120				0.740	0.108	6.28	0.314	0.314	0.422	0.108	6.28	0.409	4.86	1.292	0.084
C_5H_{10} 70.130				0.915	0.134	9.40	0.388	0.388	0.522	0.134	9.40	0.612	5.45	1.725	0.112
C_5H_{12} 72.146				0.210	0.031	2.24	0.089	0.089	0.120	0.031	2.24	0.146	5.25	0.427	0.028
C_6H_{12} 84.156				0.258	0.038	3.20	0.109	0.109	0.147	0.038	3.20	0.208	5.54	0.578	0.038
C_3-C_4											58.40	3.802		12.116	0.788
TOTAL		41.631	539.79		14.612	349.56	42.435	83.066	64.421						
H_2+CO	97.220	40.473	15360 SCFH		7.044		20.456	60.929	27.500	-33.429					
H_2/CO		1.57	Factor 651041		3.89		3.89	2.05	3.89	1.33					

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	83.0	6.985	98.0	6.845
400-550	11.2	0.943	91.4	0.862
550 +	5.8	0.488	114.6	0.559

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	40.3	7.44		
C_3 POLY GASO.	87.5	6.51	1.089	
C_3 POLY TAR	12.5	0.93	0.124	

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	--	--	68.0
C_4 POLY GASO.	5.98	1.507	2.520	1.5
C_4H_{10}	4.86	(6.28) 5.55	(1.292) 1.142	68.0
C_4-FREE GASO.			10.664	5.8
C_4 POLY TAR	7.53	12.153	0.286	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	14.326	0.9327	5057
GAS OIL	0.862	0.0561	304
FUEL OIL	0.559	0.0364	197
POLY TAR	0.410	0.0267	145
TOTAL	16.157	1.0519	5703
W. S. CHEM.	1.974	0.1285	697
TOTAL	18.131	1.1804	6400

Weight Recovery, % 91.96	Catalyst Age, hrs.	Space Velocity, vhv 1193	RECOVERED OIL
Pressure, psig 416	Inlet Velocity, Ft/sec 0.99	Catalyst Vol CF 12.88	TOTAL OIL
Temperature, °F 660	Bed Depth, Ft 19.52	Weight, # 1984	WATER SOLUBLE CHEMICALS
Recycle Ratio 1.02	Bed Density, #/CF 154	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	TOTAL LIQUID PRODUCTS C_3+

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

	0.385	53.93	3.511		8.416	0.548	
		112.33	7.313		20.532	1.336	
	0.296	15.71	1.023	12.0	1.974	0.129	
		128.04	8.336		22.506	1.465	
NET WATER	6.693	120.59	7.851	8.33	14.476	0.942	
GROSS WATER		136.30	8.874		16.450	1.071	
HYDROCARBON TOTAL—C_1+		163.02	10.613				

Form ML—11

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

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

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	443	Fresh Feed	15799
Natural Gas	438	Recycle	16104
Generator Outlet	420	Combined Feed	31903
Reactor Inlet	416	Wet Gas—Measured	4857
Condenser Inlet		Adjusted	5545
Product Accumulator	368	Loss	688
TEMPERATURES—°F.		Recycle/Fresh Feed	1.02
Oxygen	483	Inlet Velocity—ft./sec.	0.99
Natural Gas	741	Fresh Feed Rate—S.C.F.H.	15360
Generator	2317	per Cu.Ft. Dense Bed	1193
Quench Accumulator	187	per Lb. Catalyst	7.74
Reactor Inlet	355		23273
Condenser Inlet	594		
Product Accumulator	88		
Catalyst No. Height			
1 See Per. A	--		
2	661		
3	651		
4	660		
5	664		
6	665		
7	658		
8	643		
9	638		
10	639		
11	628		

PRODUCT TESTS	OIL	WATER
°API	52.3	10.7
Neut. No.	52.2	37.4
Sap. No.	64.7	40.9
Hydrox. No.		
Bromine No.	94	
Pour °F.		
Chemicals, % by K_2CO_3		12.0
HEMPEL, DIST. %		°API
205 °F.		
400	82.0	54.0
400-550	11.2	34.1
550+	6.8	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	100	
10%	132	
50%	218	
90%	350	
EP	392	
	96.5	

CATALYST DATA	
INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	19
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 See Per. A	54
1	70
2	88
3	76
4	290
Total	578
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	154
Inventory, Lbs.	1984
Bed Depth, Ft.	19.52
	12.88

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

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	YIELD BASIS H_2+CO FED CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	37.680	15.701	439.77	9.447	1.406	39.38	4.042	19.743	5.448	-14.295	-400.39				
H_2 2.016	59.784	24.910	50.22	39.700	5.906	11.91	16.988	41.898	22.894	-19.004	-38.31				
CO_2 44.010	2.353	0.980	43.13	30.150	4.486	197.42	12.901	13.881	17.387	3.506	154.29	10.011			
N_2 28.016	0.090	0.038	1.06	1.350	0.201	5.63	0.578	0.616	0.779						
CH_4 16.042	0.093	0.039	0.63	8.324	1.238	19.86	3.562	3.601	4.800	1.199	19.23	1.248			
C_2H_2 26.052				2.163	0.322	9.03	0.926	0.926	1.248	0.322	9.03	0.586			
C_2H_6 30.068				1.640	0.244	7.34	0.702	0.702	0.946	0.244	7.34	0.476			
C_1+C_2											35.60	2.310			
C_3H_6 42.078				3.153	0.469	19.73	1.349	1.349	1.818	0.469	19.73	1.280	4.32	4.567	0.296
C_3H_8 44.094				0.237	0.035	1.54	0.101	0.101	0.136	0.035	1.54	0.100	4.24	0.363	0.024
C_4H_8 56.104				1.913	0.285	15.99	0.819	0.819	1.104	0.285	15.99	1.038	5.00	3.198	0.208
C_4H_{10} 58.120				0.663	0.099	5.75	0.284	0.284	0.383	0.099	5.75	0.373	4.86	1.183	0.077
C_5H_{10} 70.130				0.830	0.123	8.63	0.355	0.355	0.478	0.123	8.63	0.560	5.45	1.583	0.103
C_5H_{12} 72.146				0.187	0.028	2.02	0.080	0.080	0.108	0.028	2.02	0.131	5.25	0.385	0.025
C_6H_{12} 84.156				0.243	0.036	3.03	0.104	0.104	0.140	0.036	3.03	0.197	5.54	0.547	0.035
C_3-C_6											56.69	3.679		11.826	0.768
TOTAL		41.668	534.81		14.878	347.26	42.791	84.459	64.960						
H_2+CO	97.464	40.611	15412 SCFH		7.312		21.030	61.641	28.342	-33.299					
H_2/CO		1.59	Factor 648845		4.20		4.20	2.12	4.20	1.33					

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	84.2	6.932	98.0	6.793
400-550	9.6	0.790	91.4	0.722
550 +	6.2	0.511	114.6	0.586

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

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

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	13.887	0.9011	885
GAS OIL	0.722	0.0468	254
FUEL OIL	0.586	0.0380	206
POLY TAR	0.395	0.0256	139
TOTAL	15.590	1.0115	5484
W. S. CHEM.	1.899	0.1232	668
TOTAL	17.489	1.1347	6152

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

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

Form ML—11

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-J
HOURS 170-194

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

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

CATALYST DATA	
INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	18
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 See Per. A	53
1	69
2	86
3	76
4	299
Total	583
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	152
Inventory, Lbs.	2001
Bed Depth, Ft.	19.94
Vol. Cu. Ft.	13.16

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

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED								
					At Wt. Balance							CONDENSATE								
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF	YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
CO 28.010	37.303	14.929	418.18	9.673	1.394	39.05	4.228	19.157	5.622	-13.535	+379.13						CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
H_2 2.016	59.804	23.935	48.26	40.417	5.823	11.74	17.663	41.598	23.486	-18.112	36.52					400 EP	82.5	6.896	98.0	6.758
CO_2 44.010	2.337	0.935	41.15	29.687	4.277	188.23	12.975	13.910	17.252	3.342	147.08	9.972				400-550	11.0	0.919	91.4	0.840
N_2 28.016	0.493	0.197	5.52	1.377	0.198	5.55	0.602	0.799	0.800							550 +	6.5	0.544	114.6	0.623
CH_4 16.042	0.063	0.025	0.40	8.307	1.197	19.20	3.631	3.656	4.828	1.172	18.80	1.275								
C_2H_4 28.052				2.257	0.325	9.12	0.986	0.986	1.311	0.325	9.12	0.618					RECOVERY %	#/hr	gal/hr	
C_2H_6 30.068				1.633	0.235	7.07	0.714	0.714	0.949	0.235	7.07	0.479				PROPYLENE	39.2	6.88		
C_1+C_2											34.99	2.372				C_3 POLY GASO.	87.5	6.02	1.007	
C_3H_6 42.078				2.893	0.417	17.55	1.264	1.264	1.681	0.417	17.55	1.190	4.32	4.063	0.276	C_3 POLY TAR	12.5	0.86	0.114	
C_3H_8 44.094				0.253	0.036	1.59	0.111	0.111	0.147	0.036	1.59	0.108	4.24	0.375	0.026					
C_4H_8 56.104				1.760	0.254	14.25	0.769	0.769	1.023	0.254	14.25	0.966	8.00	2.850	0.193		#/gal	#/hr	gal/hr	RVP
C_4H_{10} 58.120				0.643	0.093	5.41	0.281	0.281	0.374	0.093	5.41	0.367	4.86	1.113	0.075	C_4H_8	5.00	--	--	68.0
C_5H_{10} 70.130				0.737	0.106	7.43	0.322	0.322	0.428	0.106	7.43	0.504	5.45	1.363	0.092	C_4 POLY GASO.	5.98	12.47	2.085	1.5
C_5H_{12} 72.146				0.160	0.023	1.66	0.070	0.070	0.093	0.023	1.66	0.113	5.25	0.316	0.021	C_4H_{10}	4.86	(5.41) 4.96	(1.113) 1.021	68.0
C_6H_{12} 84.156				0.203	0.029	2.44	0.089	0.089	0.118	0.029	2.44	0.165	5.54	0.440	0.030	C_4-FREE GASO.			9.884	5.8
C_3-C_6											50.33	3.413		10.520	0.713	C_4 POLY TAR	7.53	1.78	0.236	
TOTAL		40.021	513.51		14.407	330.29	43.705	83.726	65.150											
H_2+CO	97.107	38.864	14749 SCFH		7.217		21.891	60.755	29.108	-31.647							gal/hr	gal/MCF	Bbl/Day	
H_2/CO		1.60	Factor 678012		4.18		4.18	2.17	4.18	1.34						10 # RVP 400 EP GASOLINE	12.990	0.8807	4775	
Weight Recovery, % 95.05			Catalyst Age, hrs.			Space Velocity, vhv 1106			RECOVERED OIL	0.381	53.43	3.623		8.359	0.567	GAS OIL	0.840	0.0570	309	
Pressure, psig 413			Inlet Velocity, Ft/sec 0.99			Catalyst Vol CF 13.34			TOTAL OIL		103.76	7.036		18.879	1.280	FUEL OIL	0.623	0.0422	229	
Temperature, °F 658			Bed Depth, Ft 20.21			Weight, # 2001			WATER SOLUBLE CHEMICALS	0.281	14.92	1.012		1.881	0.128	POLY TAR	0.350	0.0237	128	
Recycle Ratio 1.09			Bed Density, #/CF 150			Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =			TOTAL LIQUID PRODUCTS C_3+		118.68	8.048		20.760	1.408	TOTAL	14.803	1.0036	5441	
FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY		NET WATER	6.376	114.87	7.788		13.790	0.935	W. S. CHEM.	1.881	0.1275	691	
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+		GROSS WATER		129.79	8.800		15.671	1.063	TOTAL	16.684	1.1311	6132	
64.00	90.66	75.67	81.43	70.65	43.54	52.09	77.23		HYDROCARBON TOTAL—C_1+		153.67	10.420								

Form ML—11

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-K
HOURS 194-218

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

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

Weight Recovery, % 93.65	Catalyst Age, hrs.	Space Velocity, vhv 1126	RECOVERED OIL	0.380	53.25	3.504	8.294	0.546
Pressure, psig 414	Inlet Velocity, Ft/sec 1.00	Catalyst Vol CF 13.50	TOTAL OIL		102.35	6.735	18.584	1.223
Temperature, °F 656	Bed Depth, Ft 20.45	Weight, # 2011	WATER SOLUBLE CHEMICALS	0.285	15.12	0.995	1.907	0.125
Recycle Ratio 1.07	Bed Density, #/CF 149	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	TOTAL LIQUID PRODUCTS C_3+		117.47	7.730	20.491	1.348
			NET WATER	6.464	116.47	7.664	13.982	0.920
			GROSS WATER		131.59	8.659	15.889	1.047
			HYDROCARBON TOTAL—C_1+		151.93	9.997		

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

YIELD BASIS H_2+CO FED

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

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

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

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

Form ML—11

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-L
HOURS 218-242

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	444	Fresh Feed	15626
Natural Gas	438	Recycle	16688
Generator Outlet	418	Combined Feed	32314
Reactor Inlet	414	Wet Gas—Measured	5089
Condenser Inlet		Adjusted	5642
Product Accumulator	368	Loss	553
TEMPERATURES—°F.		Recycle/Fresh Feed	1.07
Oxygen	510	Inlet Velocity—ft./sec.	1.00
Natural Gas	768	Fresh Feed Rate—S.C.F.H.	15198
Generator	2356	per Cu. Ft. Dense Bed	1126
Quench Accumulator	187	per Lb. Catalyst	7.56
Reactor Inlet	307	per sq ft	23027
Condenser Inlet	582		
Product Accumulator	84		
Catalyst No. Height			
1 See Per. A	--		
2	656		
3	648		
4	658		
5	659		
6	660		
7	656		
8	646		
9	639		
10	634		
11	607		

PRODUCT TESTS	OIL	WATER
°API	52.0	10.8
Neut. No.	50.0	36.6
Sap. No.	64.4	41.9
Hydrox. No.		
Bromine No.	86	
Pour °F.		
Chemicals, % by K_2CO_3		12.0
HEMPEL. DIST. %		°API
205 °F.		
400	82.5	54.3
400-550	11.3	34.0
550+	6.2	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	98	
10%	128	
50%	211	
90%	331	
EP	388	
Rec.	97.0	

CATALYST DATA	
INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	16
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 See Per. A	51
1	68
2	81
3	76
4	310
Total	586
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	149
Inventory, Lbs.	2011
Bed Depth, Ft.	20.45
Vol. cu. ft.	13.50

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

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
CO 28.010	37.23	15.171	424.91	10.055	1.499	41.99	4.382	19.553	5.881	-13.672	-382.92
H_2 2.016	59.90	24.409	49.21	40.620	6.055	12.21	17.705	42.114	23.760	-18.354	-37.00
CO_2 44.010	2.50	1.019	44.85	29.805	4.443	195.53	12.991	14.010	17.434	3.424	150.68
N_2 28.016	0.26	0.106	2.97	1.090	0.162	4.54	0.475	0.581	0.637		
CH_4 16.042	0.11	0.045	0.72	7.705	1.149	18.43	3.358	3.403	4.507	1.104	17.71
C_2H_4 28.052				2.495	0.372	10.44	1.087	1.087	1.459	0.372	10.44
C_2H_6 30.068				1.455	0.217	6.52	0.634	0.634	0.851	0.217	6.52
C_1+C_2											34.67
C_3H_6 42.078				2.885	0.430	18.09	1.257	1.257	1.687	0.430	18.09
C_3H_8 44.094				0.295	0.044	1.94	0.129	0.129	0.173	0.044	1.94
C_4H_8 56.104				1.820	0.271	15.20	0.793	0.793	1.064	0.271	15.20
C_4H_{10} 58.120				0.595	0.089	5.17	0.259	0.259	0.348	0.089	5.17
C_5H_{10} 70.130				0.765	0.114	7.99	0.333	0.333	0.447	0.114	7.99
C_5H_{12} 72.146				0.195	0.029	2.09	0.085	0.085	0.114	0.029	2.09
C_6H_{12} 84.156				0.220	0.033	2.78	0.096	0.096	0.129	0.033	2.78
C_3-C_6											53.26
TOTAL		40.749	522.66		14.907	342.92	43.584	84.333	65.410		
H_2+CO	97.13	39.580	15020 SCFH		7.554		22.087	61.667	29.641	-32.026	
H_2/CO		1.61	Factor 665778		4.04		4.04	2.15	4.04	1.34	
RECOVERED OIL										0.366	51.32
TOTAL OIL											104.58
WATER SOLUBLE CHEMICALS										0.295	15.67
TOTAL LIQUID PRODUCTS C_3+											120.25
NET WATER										6.258	112.75
GROSS WATER											128.42
HYDROCARBON TOTAL—C_1+											154.92

YIELD BASIS H_2+CO FED	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
C_3H_6	1.179			
C_2H_4	0.695			
C_2H_6	0.434			
C_3	2.308			
C_3H_6	1.204	4.32	4.188	0.279
C_3H_8	0.129	4.24	0.458	0.030
C_4H_8	1.012	5.00	3.040	0.202
C_4H_{10}	0.344	4.86	1.064	0.071
C_5H_{10}	0.532	5.45	1.466	0.098
C_5H_{12}	0.139	5.25	0.398	0.026
C_6H_{12}	0.185	5.54	0.502	0.034
C_6	3.545		11.116	0.740
TOTAL	10.313			

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

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

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

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

Weight Recovery, % 94.07	Catalyst Age, hrs.	Space Velocity, vhv 1100	Catalyst Vol CF 13.66	Weight, # 1953	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =
Pressure, psig 415	Inlet Velocity, Ft/sec 0.99				
Temperature, °F 655	Bed Depth, Ft 20.69				
Recycle Ratio 1.07	Bed Density, #/CF 143				

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

Form ML—11

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-M
HOURS 242-266

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	443	Fresh Feed	15464
Natural Gas	437	Recycle	16540
Generator Outlet	418	Combined Feed	32004
Reactor Inlet	415	Wet Gas—Measured	5146
Condenser Inlet		Adjusted	5657
Product Accumulator	369	Loss	511
TEMPERATURES—°F.		Recycle/Fresh Feed	1.07
Oxygen	469	Inlet Velocity—ft./sec.	0.99
Natural Gas	772	Fresh Feed Rate—S.C.F.H. H_2+CO	15020
Generator	2557	per Cu. Ft. Dense Bed	1100
Quench Accumulator	182	per Lb. Catalyst	7.69
Reactor Inlet	318	per sq ft	22758
Condenser Inlet	582		
Product Accumulator	84		
Catalyst No. Height			
1 See Per. A	---		
2	654		
3	650		
4	660		
5	657		
6	658		
7	653		
8	646		
9	637		
10	633		
11	697		

PRODUCT TESTS	OIL	WATER
°API	53.8	10.8
Neut. No.	47.6	38.0
Sap. No.	65.5	38.7
Hydrox. No.		
Bromine No.	96	
Pour °F.		
Chemicals, % by K_2CO_3		12.7
HEMPEL, DIST. %		°API
205 °F.		
400	85.6	56.4
400-550	8.0	33.8
550+	6.4	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	96	
10%	128	
50%	204	
90%	336	
EP	380	
Rec.	96.0	

CATALYST DATA						
INVENTORY DATA		PARTICLE SIZE				
In Reactor at Start of Period		Screen Analysis			Sedimentation	
Fresh Catalyst Added		Mesh	Microns	%	Microns	%
Total		On 40	419+		80+	
Catalyst Recovered	16	100	150		40—80	
In Reactor at End of Period		150	105		20—40	
		200	74		10—20	
REACTOR d-p, Inches H_2O		250	62		0—20	
No. Height		325	44			
0 See Per. A	50	<325				
1	67	CATALYST				
2	80	Bulk Density, Lbs./Cu. Ft.				
3	70	Aerated				
4	302	Settled				
Total	569	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu. Ft.	143	N_2 Surface, m^2/gm.				
Inventory, Lbs.	1953					
Bed Depth, Ft.	20.69	CHEMICAL ANALYSIS				
Vol Cu Ft	13.66	Fe				
		C				
		O				
		H				
		K_2O, W+, % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

RUN NO. 64-N
HOURS 266-290
CATALYST M3 Reduced at Montebello

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	At Wt. Balance m/hr	At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO 28.010	36.874	15.231	426.62	9.867	1.583	44.34	4.424	19.655	6.007	-13.648	-382.28				
H_2 2.016	60.460	24.974	50.35	43.346	6.956	14.02	19.437	44.411	26.393	-18.018	-36.33				
CO_2 44.010	2.123	0.877	38.60	26.840	4.307	189.55	12.035	12.912	16.342	3.430	150.95	9.893			
N_2 28.016	0.203	0.084	2.35	1.170	0.188	5.27	0.525	0.609	0.713						
CH_4 16.042	0.340	0.140	2.25	8.597	1.380	22.14	3.855	3.995	5.235	1.240	19.89	1.304			
C_2H_4 28.052				2.417	0.388	10.88	1.084	1.084	1.472	0.388	10.88	0.713			
C_2H_6 30.068				1.577	0.253	7.61	0.707	0.707	0.960	0.253	7.61	0.499			
C_1+C_2											38.38	2.516			
C_3H_6 42.078				2.710	0.435	18.30	1.215	1.215	1.650	0.435	18.30	1.199	4.32	4.236	0.278
C_3H_8 44.094				0.250	0.040	1.76	0.112	0.112	0.152	0.040	1.76	0.115	4.24	0.415	0.027
C_4H_8 56.104				1.663	0.267	14.98	0.746	0.746	1.013	0.267	14.98	0.982	5.00	2.996	0.196
C_4H_{10} 58.120				0.503	0.081	4.71	0.226	0.226	0.307	0.081	4.71	0.309	4.86	0.969	0.064
C_5H_{10} 70.130				0.707	0.113	7.92	0.317	0.317	0.430	0.113	7.92	0.519	5.45	1.453	0.095
C_5H_{12} 72.146				0.173	0.028	2.02	0.077	0.077	0.105	0.028	2.02	0.132	5.25	0.385	0.025
C_6H_{12} 84.156				0.180	0.029	2.44	0.081	0.081	0.110	0.029	2.44	0.160	5.54	0.440	0.029
C_3-C_4											52.13	3.416		10.894	0.714
TOTAL		41.306	520.17		16.048	345.94	44.841	86.147	67.798						
H_2+CO	97.334	40.205	15258 SCFH		8.539		23.861	64.066	32.400	-31.666					
H_2/CO		1.64	Factor 655393		4.39		4.39	2.26	4.39	1.32					

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

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

YIELD BASIS H_2+CO FED

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
400 EP	81.0	5.840	98.0	5.723
400-550	9.6	0.692	91.4	0.632
550 +	9.4	0.678	114.6	0.777

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

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

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

Form ML—11

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-N
HOURS 266-290

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

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

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	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	36.830	15.078	422.33	10.925	1.675	46.92	4.764	19.842	6.439	-13.403	-375.41
H_2 2.016	60.533	24.782	49.96	40.465	6.203	12.51	17.648	42.430	23.851	-18.579	37.45
CO_2 44.010	2.033	0.832	36.62	28.415	4.356	191171	12.393	13.225	16.749	3.524	155.09
N_2 28.016	0.267	0.109	3.05	1.010	0.155	4.34	0.440	0.549	0.595		
CH_4 16.042	0.337	0.138	2.21	8.860	1.358	21.79	3.864	4.002	5.222	1.220	19.58
C_2H_4 28.052				2.500	0.383	10.74	1.090	1.090	1.473	0.383	10.74
C_2H_6 30.068				1.585	0.243	7.31	0.691	0.691	0.943	0.243	7.31
C_1+C_2											37.63
C_3H_6 42.078				2.615	0.401	16.87	1.140	1.140	1.541	0.401	16.87
C_3H_8 44.094				0.250	0.038	1.68	0.109	0.109	0.147	0.038	1.68
C_4H_8 56.104				1.625	0.249	13.97	0.709	0.709	0.958	0.249	13.97
C_4H_{10} 58.120				0.595	0.091	5.29	0.259	0.259	0.350	0.091	5.29
C_5H_{10} 70.130				0.760	0.117	8.21	0.331	0.331	0.448	0.117	8.21
C_5H_{12} 72.146				0.150	0.023	1.66	0.065	0.065	0.088	0.023	1.66
C_6H_{12} 84.156				0.245	0.038	3.20	0.107	0.107	0.145	0.038	3.20
C_3-C_6											50.88
TOTAL		40.939			15.330	346.12	43.610	84.549	65.525		
H_2+CO	97.363	39.860	15127 SCFH		7.878		22.412	62.272	30.290	31.982	
H_2/CO		1.64	Factor 661069		3.70		3.70	2.14	3.70	1.39	

YIELD BASIS H_2+CO FED

	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO	10.253			
H_2				
CO_2				
N_2				
CH_4	1.294			
C_2H_4	0.710			
C_2H_6	0.483			
C_1+C_2	2.487			
C_3H_6	1.115	4.32	3.905	0.258
C_3H_8	0.111	4.24	0.396	0.026
C_4H_8	0.924	5.00	2.794	0.185
C_4H_{10}	0.350	4.86	1.088	0.072
C_5H_{10}	0.543	5.45	1.506	0.100
C_5H_{12}	0.110	5.25	0.316	0.021
C_6H_{12}	0.212	5.54	0.578	0.038
C_3-C_6	3.364		10.583	0.700
TOTAL				
H_2+CO				
H_2/CO				

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*

	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	80.6	5.632	98.0	5.519
400-550	10.8	0.755	91.4	0.690
550 +	8.6	0.600	114.6	0.688

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	37.5	6.326		
C_3 POLY GASO.	87.5	5.535	0.926	
C_3 POLY TAR	12.5	0.791	0.105	

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	--	--	68.0
C_4 POLY GASO.	5.98	12.22	2.044	1.5
C_4H_{10}	4.86	4.57	0.941	68.0
C_4-FREE GASO.			8.845	5.8
C_4 POLY TAR	7.53	1.75	0.232	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	11.830	0.7820	4240
GAS OIL	0.690	0.0456	247
FUEL OIL	0.688	0.0455	247
POLY TAR	0.337	0.0223	121
TOTAL	13.545	0.8954	4855
W. S. CHEM.	1.931	0.1277	692
TOTAL	15.476	1.0231	5547

RECOVERED OIL	0.321	45.07	2.979		6.987	0.462
TOTAL OIL		95.95	6.343		17.570	1.162
WATER SOLUBLE CHEMICALS	0.290	15.38	1.017		1.931	0.128
TOTAL LIQUID PRODUCTS C_3+		111.33	7.360		19.501	1.290
NET WATER	5.974	107.62	7.114		12.920	
GROSS WATER		123.00	8.131		14.851	
HYDROCARBON TOTAL—C_1+		148.96	9.847			

Weight Recovery, % 93.56	Catalyst Age, hrs.	Space Velocity, vhv 1118	
Pressure, psig 413	Inlet Velocity, Ft/sec 0.99	Catalyst Vol CF 13.53	
Temperature, °F 654	Bed Depth, Ft 20.50	Weight, # 1881	
Recycle Ratio 1.07	Bed Density, #/CF 139	Effluent (H2)(CO2) / Shift Ratio (H2O)(CO) =	

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

Form ML—11

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-0
HOURS 290-314

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	441	Fresh Feed	15536
Natural Gas	436	Recycle	16550
Generator Outlet	418	Combined Feed	32086
Reactor Inlet	413	Wet Gas—Measured	5261
Condenser Inlet		Adjusted	5817
Product Accumulator	369	Loss	556
TEMPERATURES—°F.		Recycle/Fresh Feed	1.07
Oxygen	475	Inlet Velocity—ft./sec.	0.99
Natural Gas	776	Fresh Feed Rate—S.C.F.H.	15127
Generator	2300	per Cu. Ft. Dense Bed	1118
Quench Accumulator	184	per Lb. Catalyst	8.04
Reactor Inlet	317	per sq ft	22920
Condenser Inlet	589		
Product Accumulator	89		
Catalyst No. Height			
1 See Per.A	--		
2	653		
3	648		
4	658		
5	656		
6	658		
7	655		
8	649		
9	641		
10	638		
11	612		

PRODUCT TESTS	OIL	WATER
° API	51.1	10.8
Neut. No.	50.0	38.4
Sap. No.	67.5	42.8
Hydrox. No.		
Bromine No.	80	
Pour °F.		
Chemicals, % by K_2CO_3		13.0
HEMPEL. DIST. %		°API
205 °F.		
400	79.6	52.0
400-550	10.8	35.0
550+	9.6	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	110	
10%	144	
50%	224	
90%	334	
EP	392	
Rec	97.5	

CATALYST DATA	
INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	0
Total	
Catalyst Recovered	14
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 See Per. A	48
1	66
2	74
3	70
4	290
Total	548
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	139
Inventory, Lbs.	1881
Bed Depth, Ft.	20.50
Vol cu ft	13.53

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

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED			
					At Wt. Balance							CONDENSATE			
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	36.780	14.926	418.08	10.490	1.659	46.47	4.611	19.537	6.270	-13.267	-371.61				
H_2 2.016	60.087	24.384	49.16	42.327	6.693	13.49	18.607	42.991	25.300	-17.691	-35.67				
CO_2 44.010	2.633	1.068	47.00	27.877	4.408	194.00	12.255	13.323	16.663	3.340	147.00	9.854			
N_2 28.016	0.187	0.076	2.13	1.420	0.225	6.30	0.624	0.700	0.849						
CH_4 16.042	0.313	0.127	2.04	7.853	1.242	19.92	3.452	3.579	4.694	1.115	17.88	1.199			
C_2H_4 28.052				2.103	0.333	9.34	0.924	0.924	1.257	0.333	9.34	0.626			
C_2H_6 30.068				1.477	0.234	7.04	0.649	0.649	0.883	0.234	7.04	0.472			
C_1+C_2											34.26	2.297			
C_3H_6 42.078				2.590	0.410	17.25	1.139	1.139	1.549	0.410	17.25	1.156	4.32	3.993	0.268
C_3H_8 44.094				0.237	0.037	1.63	0.104	0.104	0.141	0.037	1.63	0.109	4.24	0.384	0.026
C_4H_8 56.104				1.953	0.309	17.34	0.859	0.859	1.168	0.309	17.34	1.162	5.00	3.468	0.232
C_4H_{10} 58.120				0.593	0.094	5.46	0.261	0.261	0.355	0.094	5.46	0.366	4.86	1.123	0.075
C_5H_{10} 70.130				0.693	0.110	7.71	0.305	0.305	0.415	0.110	7.71	0.517	5.45	1.415	0.095
C_5H_{12} 72.146				0.187	0.030	2.16	0.082	0.082	0.112	0.030	2.16	0.145	5.25	0.411	0.028
C_6H_{12} 84.156				0.200	0.032	2.69	0.088	0.088	0.120	0.032	2.69	0.180	5.54	0.486	0.033
C_3-C_6											54.24	3.636		11.280	0.756
TOTAL		40.581	518.41	[illegible]	15.812	350.65	43.960	84.541	66.362						
H_2+CO		39.310	14918 SCFH		8.352		23.218	62.528	31.570	-30.958					
H_2/CO		1.63	Factor 670331		4.04		4.04	2.20	4.04	1.33					
RECOVERED OIL										0.315	44.15	2.960		6.914	0.463
TOTAL OIL											98.39	6.595		18.194	1.219
WATER SOLUBLE CHEMICALS										0.301	15.99	1.072		2.016	0.135
TOTAL LIQUID PRODUCTS C_3+											114.38	7.667		20.210	1.354
NET WATER										5.974	107.62	7.214		12.920	0.866
GROSS WATER											123.61	8.286		14.936	1.001
HYDROCARBON TOTAL—C_1+											148.64	9.964			

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*				
	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
400 EP	83.0	5.739	98.0	5.624
400-550	9.0	0.622	91.4	0.569
550 +	8.0	0.553	114.6	0.634
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	36.0	6.210		
C_3 POLY GASO.	87.5	5.434	0.909	
C_3 POLY TAR	12.5	0.776	0.103	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	--	--	68.0
C_4 POLY GASO.	5.98	15.17	2.537	1.5
C_4H_{10}	4.86	(5.46) 4.92	(1.123) 1.012	68.0
C_4-FREE GASO.			8.845	5.8
C_4 POLY TAR	7.53	2.17	0.288	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	12.394	0.8308	4504	
GAS OIL	0.569	0.0381	207	
FUEL OIL	0.634	0.0425	230	
POLY TAR	0.391	0.0262	142	
TOTAL	13.988	0.9376	5083	
W. S. CHEM.	2.015	0.1351	732	
TOTAL	16.003	1.0727	5815	

Weight Recovery, % 92.76	Catalyst Age, hrs.	Space Velocity, vhv 1113	
Pressure, psig 413	Inlet Velocity, Ft/sec 0.99	Catalyst Vol CF 13.40	
Temperature, °F 656	Bed Depth, Ft 20.30	Weight, # 1836	
Recycle Ratio 1.08	Bed Density, #/CF 137	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ =	

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+
61.04	88.89	72.55	78.75	67.91	41.15	49.51	76.95

Form ML—11

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-P
HOURS 314-338

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	442	Fresh Feed	15400
Natural Gas	437	Recycle	16683
Generator Outlet	418	Combined Feed	32083
Reactor Inlet	413	Wet Gas—Measured	5358
Condenser Inlet		Adjusted	6000
Product Accumulator	369	Loss	642
TEMPERATURES—°F.		Recycle/Fresh Feed	1.08
Oxygen	463	Inlet Velocity—ft./sec.	0.99
Natural Gas	783	Fresh Feed Rate—S.C.F.H.	14918
Generator	2324	per Cu. Ft. Dense Bed	1113
Quench Accumulator	180	per Lb. Catalyst	8.13
Reactor Inlet	319	per sq ft	22603
Condenser Inlet	591		
Product Accumulator	90		
Catalyst No. Height			
1 See Per. A	---		
2	655		
3	648		
4	658		
5	657		
6	658		
7	657		
8	651		
9	642		
10	639		
11	612		

PRODUCT TESTS		
	OIL	WATER
°API	53.0	10.9
Neut. No.	53.5	37.8
Sap. No.	66.9	41.5
Hydrox. No.		
Bromine No.	87	
Pour °F.		
Chemicals, % by K_2CO_3		13.5
HEMPEL, DIST. %		°API
205 °F.		
400	82.0	53.8
400-550	9.0	34.4
550+	9.0	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	110	
10%	134	
50%	214	
90%	334	
EP	394	
Rec.	97.0	

CATALYST DATA					
INVENTORY DATA		PARTICLE SIZE			
In Reactor at Start of Period		Screen Analysis		Sedimentation	
Fresh Catalyst Added	0	Mesh	Microns %	Microns	%
Total		On 40	419+	80+	
Catalyst Recovered	15	100	150	40—80	
In Reactor at End of Period		150	105	20—40	
		200	74	10—20	
REACTOR d-p, Inches H_2O		250	62	0—20	
No. Height		325	44		
0 See Per. A	47	<325			
1	65	CATALYST			
2	74	Bulk Density, Lbs./Cu.Ft.			
3	69	Aerated			
4	280	Settled			
Total	535	Compacted			
		Particle Density, gm./cc.			
CALCULATED FROM dp		NH_3 Value, ml./gm.			
Density, Lbs./Cu.Ft.	137	N_2 Surface, m^2/gm.			
Inventory, Lbs.	1836				
Bed Depth, Ft.	20.30	CHEMICAL ANALYSIS			
Vol Cu. Ft	13.40	Fe			
		C			
		O			
		H			
		K_2O, W+, % basis Fe			
		X-Ray Analysis—			
		$Fe_{20}C_9$			
		Fe_3O_4			
		Fe			

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
CO 28.010	37.200	15.294	428.39	10.380	1.661	46.51	4.560	19.854	6.221	-13.633	381.88
H_2 2.016	60.194	24.748	49.89	42.264	6.762	13.63	18.568	43.316	25.330	-17.986	-36.26
CO_2 44.010	2.333	0.959	42.21	28.347	4.536	199.60	12.453	13.412	16.989	3.577	157.39
N_2 28.016	0.110	0.045	1.26	0.950	0.152	4.26	0.417	0.462	0.569		
CH_4 16.042	0.163	0.067	1.08	7.930	1.269	20.36	3.484	3.553	4.753	1.202	19.28
C_2H_4 28.052				2.190	0.350	9.82	0.962	0.962	1.312	0.350	9.82
C_2H_6 30.068				1.730	0.277	8.33	0.760	0.760	1.037	0.277	8.33
C_1+C_2											37.43
C_3H_6 42.078				2.693	0.431	18.14	1.183	1.183	1.614	0.431	18.14
C_3H_8 44.094				0.333	0.053	2.34	0.146	0.146	0.199	0.053	2.34
C_4H_8 56.104				1.613	0.258	14.47	0.709	0.709	0.967	0.258	14.47
C_4H_{10} 58.120				0.550	0.088	5.11	0.242	0.242	0.330	0.088	5.11
C_5H_{10} 70.130				0.697	0.112	7.85	0.306	0.306	0.418	0.112	7.85
C_5H_{12} 72.146				0.123	0.020	1.44	0.054	0.054	0.074	0.020	1.44
C_6H_{12} 84.156				0.200	0.032	2.69	0.088	0.088	0.120	0.032	2.69
C_3-C_6											52.04
TOTAL		41.113	522.83		16.001	354.55	43.932	85.045	66.542		
H_2+CO	97.394	40.042	15195 SCFH		8.423		23.128	63.170	31.551	-31.619	
H_2/CO		1.62	Factor 658111		4.07		4.07	2.18	4.07	1.32	

YIELD BASIS H_2+CO FED	#/MCF	#/gal	gal/hr	gal/MCF
CONDENSATE	1.269			
	0.646			
	0.548			
	2.462			
	1.194	4.32	4.199	0.276
	0.154	4.24	0.552	0.036
	0.952	5.00	2.894	0.190
	0.336	4.86	1.051	0.069
	0.517	5.45	1.440	0.095
	0.095	5.25	0.274	0.018
	0.177	5.54	0.486	0.032
	3.425		10.896	0.716
RECOVERED OIL	2.950		6.973	0.459
TOTAL OIL	6.375		17.869	1.175
WATER SOLUBLE CHEMICALS	1.010		1.939	0.128
TOTAL LIQUID PRODUCTS C_3+	7.385		19.808	1.303
NET WATER	7.114		12.977	0.854
GROSS WATER	8.124		14.916	0.982
HYDROCARBON TOTAL—C_1+	9.848			

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	82.6	5.760	98.0	5.645
400-550	10.4	0.725	91.4	0.663
550 +	7.0	0.488	114.6	0.559
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	36.2	6.57		
C_3 POLY GASO.	87.5	5.75	0.962	
C_3 POLY TAR	12.5	0.82	0.109	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	--	--	68.0
C_4 POLY GASO.	5.98	12.66	2.117	1.5
C_4H_{10}	4.86	(5.11) 4.61	(1.051) 0.948	68.0
C_4-FREE GASO.			8.807	5.8
C_4 POLY TAR	7.53	1.81	0.240	
	gal/hr	gal/MCF	Bbl/Day	
10# RVP 400 EP GASOLINE	11.872	0.7813	4236	
GAS OIL	0.663	0.0436	236	
FUEL OIL	0.559	0.0368	200	
POLY TAR	0.349	0.0230	125	
TOTAL	13.443	0.8847	4797	
W. S. CHEM.	1.939	0.1276	692	
TOTAL	15.382	1.0123	5489	

Weight Recovery, % 92.73	Catalyst Age, hrs.	Space Velocity, vhv 1109	
Pressure, psig 413	Inlet Velocity, Ft/sec 1.00	Catalyst Vol CF 13.70	
Temperature, °F 659	Bed Depth, Ft 20.75	Weight, # 1822	
Recycle Ratio 1.07	Bed Density, #/CF 133	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	

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

Form ML—11

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-Q
HOURS 338-362

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

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

CATALYST DATA	
INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	26
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 See Per. A	46
1	64
2	72
3	66
4	283
Total	531
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	133
Inventory, Lbs.	1822
Bed Depth, Ft.	20.75
Vol Cu. Ft.	13.70

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

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	YIELD BASIS H_2+CO FED CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	36.887	15.266	427.61	10.316	1.678	47.00	4.561	19.827	6.239	-13.588	-380.61				
H_2 2.016	60.260	24.940	50.28	42.540	6.918	13.95	18.809	43.749	25.727	-18.022	-36.33				
CO_2 44.010	2.380	0.985	43.35	27.703	4.505	198.22	12.249	13.234	16.754	3.520	154.87	10.150			
N_2 28.016	0.230	0.095	2.66	1.117	0.182	5.10	0.494	0.589	0.676						
CH_4 16.042	0.243	0.101	1.62	8.113	1.320	21.18	3.587	3.688	4.907	1.219	19.56	1.282			
C_2H_4 28.052				2.217	0.361	10.13	0.980	0.980	1.341	0.361	10.13	0.664			
C_2H_6 30.068				1.690	0.275	8.27	0.747	0.747	1.022	0.275	8.27	0.542			
C_1+C_2											37.96	2.488			
C_3H_6 42.078				2.680	0.436	18.35	1.185	1.185	1.621	0.436	18.35	1.203	4.32	4.248	0.278
C_3H_8 44.094				0.303	0.049	2.16	0.134	0.134	0.183	0.049	2.16	0.142	4.24	0.509	0.033
C_4H_8 56.104				1.657	0.270	15.15	0.733	0.733	1.003	0.270	15.15	0.993	5.00	3.030	0.199
C_4H_{10} 58.120				0.517	0.084	4.88	0.229	0.229	0.313	0.084	4.88	0.320	4.86	1.004	0.066
C_5H_{10} 70.130				0.723	0.118	8.28	0.320	0.320	0.438	0.118	8.28	0.543	5.45	1.519	0.100
C_5H_{12} 72.146				0.167	0.027	1.95	0.074	0.074	0.101	0.027	1.95	0.128	5.25	0.371	0.024
C_6H_{12} 84.156				0.257	0.042	3.53	0.114	0.114	0.156	0.042	3.53	0.231	5.54	0.637	0.042
C_3-C_6											54.30	3.560		11.318	0.742
TOTAL		41.387	525.52		16.265	358.15	44.216	85.603	67.042						
H_2+CO	97.147	40.206	15258 SCFH		8.596		23.370	63.576	31.966	-31.710					
H_2/CO		1.63	Factor 655393		4.12		4.12	2.21	4.12	1.33					

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	84.5	5.934	98.0	5.815
400-550	7.0	0.492	91.4	0.450
550 +	8.5	0.597	114.6	0.684
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	35.7	6.55		
C_3 POLY GASO.	87.5	5.73	0.958	
C_3 POLY TAR	12.5	0.82	0.109	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	--	--	68.0
C_4 POLY GASO.	5.98	13.26	2.217	1.5
C_4H_{10}	4.86	(4.88) 4.85	(1.004) 0.998	68.0
C_4-FREE GASO.			9.300	5.8
C_4 POLY TAR	7.53	1.89	0.251	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	12.515	0.8202	4447	
GAS OIL	0.450	0.0293	160	
FUEL OIL	0.684	0.0448	243	
POLY TAR	0.360	0.0236	128	
TOTAL	14.009	0.9181	4978	
W. S. CHEM.	1.843	0.1208	655	
TOTAL	15.852	1.0389	5633	

Weight Recovery, %	92.30	Catalyst Age, hrs.		Space Velocity, vhv	1107	RECOVERED OIL	0.324	45.38	2.974	7.023	0.460
Pressure, psig	414	Inlet Velocity, Ft/sec	1.01	Catalyst Vol CF	13.78	TOTAL OIL		99.68	6.534	18.341	1.202
Temperature, °F	661	Bed Depth, Ft	20.88	Weight, #	1792	WATER SOLUBLE CHEMICALS	0.274	14.56	0.954	1.843	0.121
Recycle Ratio	1.07	Bed Density, #/CF	130	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =		TOTAL LIQUID PRODUCTS C_3+		114.24	7.488	20.184	1.323
						NET WATER	5.963	107.43	7.041	12.897	0.845
						GROSS WATER		121.99	7.995	14.740	0.966
						HYDROCARBON TOTAL—C_1+		152.20	9.976		

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

Form ML—11

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 64-R
HOURS 362-386

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	444	Fresh Feed	15706
Natural Gas	437	Recycle	16780
Generator Outlet	418	Combined Feed	32486
Reactor Inlet	414	Wet Gas—Measured	5475
Condenser Inlet		Adjusted	6173
Product Accumulator	370	Loss	698
TEMPERATURES—°F.		Recycle/Fresh Feed	1.07
Oxygen	456	Inlet Velocity—ft./sec.	1.01
Natural Gas	780	Fresh Feed Rate—S.C.F.H.	15258
Generator	2360	per Cu.Ft. Dense Bed	1107
Quench Accumulator	170	per Lb. Catalyst	8.51
Reactor Inlet	316	per sq ft	23118
Condenser Inlet	598		
Product Accumulator	88		
Catalyst No. Height			
1 See Per.A	--		
2	661		
3	652		
4	661		
5	662		
6	665		
7	663		
8	658		
9	651		
10	646		
11	620		

PRODUCT TESTS	OIL	WATER
°API	50.8	10.9
Neut. No.		
Sap. No.		
Hydrox. No.		
Bromine No.		
Pour °F.	below -30	
Chemicals, % by K_2CO_3		12.5
HEMPEL, DIST. %		°API
205 °F.		
400	83.5	53.8
400-550	7.0	33.7
550+	9.5	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	100	
10%	136	
50%	225	
90%	346	
EP	400	
Rec.	97.0	

CATALYST DATA						
INVENTORY DATA		PARTICLE SIZE				
In Reactor at Start of Period		Screen Analysis			Sedimentation	
Fresh Catalyst Added		Mesh	Microns	%	Microns	%
Total		On 40	419+		80+	
Catalyst Recovered	29	100	150		40—80	
In Reactor at End of Period		150	105		20—40	
		200	74		10—20	
REACTOR d-p, Inches H_2O		250	62		0—20	
No. Height		325	44			
0 See Per. A	45	<325				
1	63	CATALYST				
2	70	Bulk Density, Lbs./Cu.Ft.				
3	64	Aerated				
4	280	Settled				
Total	522	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	130	N_2 Surface, m^2/gm.				
Inventory, Lbs.	1792					
Bed Depth, Ft.	20.88	CHEMICAL ANALYSIS				
Vol. Cu. Ft.	13.78	Fe				
		C				
		O				
		H				
		K_2O, W+, % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-A
HOURS 0-10

Basis Generator Carbon Balance

GAS ANALYSES				
HOUR	0200	0600		AVERAGE
FRESH FEED				
CO 28.010	37.15	36.37		36.760
H_2 2.016	59.23	60.14		59.685
CO_2 44.010	2.32	2.16		2.240
N_2 28.016	0.20	0.16		0.180
CH_4 16.042	1.10	1.17		1.135
			M. W	12.718055
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	8.83	8.40		8.615
H_2 2.016	43.95	43.04		43.495
CO_2 44.010	27.16	27.53		27.345
N_2 28.016	1.55	1.72		1.635
CH_4 16.042	9.48	9.94		9.710
C_2H_4 28.052	2.12	2.22		2.170
C_2H_6 33.068	1.36	1.36		1.360
C_3H_6 42.078	2.21	2.21		2.210
C_3H_8 44.094	0.24	0.25		0.245
C_4H_8 56.104	1.50	1.55		1.525
C_4H_{10} 58.120	0.52	0.60		0.560
C_5H_{10} 70.130	0.69	0.77		0.730
C_5H_{12} 72.146	0.17	0.18		0.175
C_6H_{12} 84.156	0.22	0.23		0.225
			M. W.	21.404416

GENERATOR BALANCE									
M/HR	C	H	O		Mol %	M/Hr	C	H	O
				O_2 32.000	0.25	10.332 0.033			20.730
14.724	14.724		14.724	CO_2 44.010	1.19	0.158	0.158		0.316
23.907		47.814		N_2 28.016	2.56	0.339			
0.897	0.897		1.794	CH_4 16.042	81.46	10.786	10.786	43.144	
0.072				C_2H_4 30.068	7.32	0.969	1.938	5.814	
0.455	0.455	1.820		C_2H_6 44.094	5.27	0.698	2.094	5.584	
		7.626	4.528	C_4H_{10} 58.120	1.43	0.189	0.756	1.890	
		8.342	4.171	C_5H_{12} 72.146	0.52	0.069	0.345	0.828	
	16.853	57.976	20.689		20.119748				
	100.00	101.25	98.30	TOTAL			16.077	57.260	21.046

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

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-B
HOURS 10-34

Basis Generator Carbon Balance

GAS ANALYSES				
HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	37.00	36.89	37.91	37.267
H_2 2.016	60.00	60.46	59.40	59.953
CO_2 44.010	1.96	2.21	2.32	2.163
N_2 28.016	0.18	0.15	0.15	0.160
CH_4 16.042	0.86	0.29	0.22	0.457
			M. W	12.7172
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	7.01	6.74	6.98	6.910
H_2 2.016	39.63	37.88	38.01	38.507
CO_2 44.010	30.21	30.71	31.68	30.867
N_2 28.016	1.64	2.00	2.05	1.897
CH_4 16.042	10.82	10.35	9.71	10.293
C_2H_4 28.052	2.46	2.26	2.44	2.387
C_2H_6 33.068	1.63	1.81	1.76	1.733
C_3H_6 42.078	2.55	2.95	2.91	2.803
C_3H_8 44.094	0.28	0.28	0.33	0.297
C_4H_8 56.104	1.89	2.29	2.10	2.093
C_4H_{10} 58.120	0.57	0.83	0.67	0.690
C_5H_{10} 70.130	0.88	1.16	0.93	0.990
C_5H_{12} 72.146	0.17	0.36	0.17	2.333
C_6H_{12} 84.156	0.26	0.38	0.26	0.300
			M. W.	23.67025

GENERATOR BALANCE									
M/HR	C	H	O		Mol %	M/Hr	C	H	O
				O_2 32.000	0.28	10.690 0.037			21.454
14.790	14.790		14.790	CO_2 44.010	1.56	0.205	0.205		0.410
23.792		47.584		N_2 28.016	3.37	0.442			
0.858	0.858		1.716	CH_4 16.042	80.49	10.550	10.550	42.200	
0.063				C_2H_4 30.068	6.96	0.912	1.824	5.472	
0.181	0.181	0.724		C_3H_8 44.094	5.20	0.682	2.046	5.456	
				C_4H_{10} 58.120	1.54	0.202	0.808	2.020	
		9.117	4.559	C_5H_{12} 72.146	0.60	0.079	0.395	0.948	
39.684	15.828	102.85	21.065	MW	20.346046				
	100.00	102.85	96.345	TOTAL			15.828	56.096	21.864

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

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

LIQUID PRODUCT RATES								
HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
OIL	6'4"	336.22	55	1.0025	337.06	50.5		
	2'3-3/4	123.13	54	1.0030	123.50	6.473		
					+ 7.57		449.00	59.64
					221.13		1431.37	9.214
WATER	7'1-3/4	378.77	65	0.99953	378.59	10.8		
	6'2½"	328.58	64	0.99963	328.46	8.282		
	7'1½"	377.68	62	0.99872	377.20			
	1'4½"	71.58	60	1.00000	71.58			
	2'1-3/4	113.46	67	0.99932	113.38			
	1'2"	60.66	54	1.00047	60.69			140.95
					408.44		3382.70	17.018

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-C
HOURS 34-58

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

GENERATOR BALANCE									
M/HR	C	H	O		Mol %	M/Hr	C	H	O
				O_2 32.000	0.21	10.659 0.028			21.374
14.808	14.808		14.808	CO_2 44.010	1.27	0.167	0.167		0.334
23.762		47.524		N_2 28.016	3.21	0.422			
0.914	0.914		1.828	CH_4 16.042	81.43	10.710	10.710	42.840	
0.091				C_2H_4 30.068	6.79	0.893	1.786	5.358	
0.060	0.060	0.240		C_2H_6 44.094	5.14	0.676	2.028	5.408	
		8.536	6.900	C_4H_{10} 58.120	1.44	0.189	0.756	1.890	
5.584		11.168	5.584	C_5H_{12} 72.146	0.51	0.067	0.335	0.804	
45.219	15.782	58.932	22.220	MW	20.101363				
	100.00	104.67	102.36	TOTAL			15.782	56.300	21.708

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

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

LIQUID PRODUCT RATES						
HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
OIL	7'2½"	382.05	58	1.0010	382.43	51.4		
	6'4"	336.22	55	1.0025	337.06	6.441		
	4'8½"	251.11	52	1.0039	252.09	"		
	1'2-3/4	63.92	60	1.0000	63.92	"		
					+0.89		+5.75	62.92
					234.43		1509.96	9.768
WATER	7'1½"	377.68	78	0.99788	376.88	10.7		
	2'1-3/4	113.46	67	0.99932	113.38	8.287		
	3'6-3/4	191.09	68	0.99920	190.94	"		
	1'0"	52.00	58	1.00018	52.01	"		138.96
					402.43		3334.94	16.768

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-D
HOURS 58-82

Calculated by Carbon Balance

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

GENERATOR BALANCE									
M/HR	C	H	O		Mol %	M/Hr	C	H	O
				O_2 32.000	0.21	10.690 0.028			21.436
14.700	14.700		14.700	CO_2 44.010	1.31	0.174	0.174		0.348
24.209		48.418		N_2 28.016	3.40	0.451			
1.002	1.002		2.004	CH_4 16.042	81.63	10.821	10.821	43.284	
0.148				C_2H_4 30.068	6.63	0.879	1.758	5.274	
0.068	0.068	0.272		C_2H_6 44.094	4.98	0.660	1.980	5.280	
				C_4H_{10} 58.120	1.38	0.183	0.732	1.830	
		8.935	4.468	C_5H_{12} 72.146	0.46	0.061	0.305	0.732	
	15.770	57.625	21.172		20.014677				
	100.00	102.17	97.19	TOTAL			15.770	56.400	21.784

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

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

LIQUID PRODUCT RATES								
HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
OIL	7'2"	379.86	64	0.9980	379.10	53.0		
	4'8½"	251.11	52	1.0039	252.09	6.385		
	2'9½"	149.62	49	1.0054	150.43			
	1'0"	52.00	60	1.0000	52.00		1445.44	
					+0.94		+6.00	60.23
					226.38			9.433
WATER	7'1"	375.50	79	0.99775	374.66	10.7		
	3'6-3/4	191.09	68	0.99920	190.94	8.287		
	5'1-1/8	271.29	62	0.99982	271.24			
	0'11"	47.65	70	0.99896	47.60			140.66
					407.36		3375.79	16.973

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-E
HOURS 82-106

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.20	10.593 0.027			21.240	WET GAS	308.68	313.59
CO 28.010	36.88	37.28	36.58	36.913	14.978	14.978		14.978	CO_2 44.010	1.36	0.180	0.180		0.360	OIL	59.40	59.40
H_2 2.016	60.26	59.78	60.67	60.237	24.442		48.884		N_2 28.016	2.15	0.285				WATER	142.52	142.52
CO_2 44.010	2.15	2.51	2.47	2.377	0.965	0.965		1.930	CH_4 16.042	82.59	10.960	10.960	43.840		TOTAL	510.60	515.51
N_2 28.016	0.15	0.37	0.20	0.240	0.097				C_2H_4 30.068	6.66	0.884	1.768	5.304		FRESH FEED	515.51	
CH_4 16.042	0.56	0.06	0.08	0.233	0.095	0.095	0.380		C_2H_6 44.094	5.07	0.673	2.019	5.384		WEIGHT BALANCE	99.05	
			M. W	12.70444			8.006	4.692	C_4H_{10} 58.120	1.47	0.195	0.780	1.950				
			H_2O 18.016				8.695	4.348	C_3H_{12} 72.146	0.50	0.066	0.330	0.792		WET GAS FACTOR	1015906	
						16.038	57.959	21.256	MW	19.9671564					INDICATED LOSS—S C F H	80	
			BALANCE			100.01	101.20	98.41	TOTAL			16.037	57.270	21.600		5122	

WET GAS					GAS FLOW RATES										LIQUID PRODUCT RATES					
CO 28.010	8.18	8.75	9.26	8.730		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
H_2 2.016	40.04	39.80	39.44	39.760	FRESH FEED		415.8	67	2278730	(15399)	(40.577)	OIL	7'0-1/8	371.68	56	1.0020	372.42	53.0		
CO_2 44.010	29.77	30.49	30.41	30.224	79.31	6.571	20.748	0.9933	1.5095	16212	42.719		2'9½"	149.62	49	1.0054	150.43	6.385		
N_2 28.016	1.47	1.77	1.46	1.567	WET GAS		1.50	65	1246065								+1.29		+8.25	59.40
CH_4 16.042	9.35	8.59	8.44	8.794	158.44	7.117	4.025	0.9952	1.1163	5042	13.286						223.28		1425.64	9.303
C_2H_4 28.052	2.35	2.30	2.28	2.310	RECYCLE		416.2	109												
C_2H_6 33.068	1.72	1.75	1.76	1.743	79.31	8.504	20.758	0.9560	1.1163	14941	39.370									
C_3H_6 42.078	2.81	2.72	2.82	2.783	BLEED															
C_3H_8 44.094	0.34	0.24	0.27	0.283	5.02	8.271	20.758	1.0000	1.1163	962	2.535	WATER	7'1½"	377.68	70	0.99896	377.29	10.7		
C_4H_8 56.104	2.00	1.75	1.93	1.893	NATURAL GAS		435.0	182	1449880				5'1-1/8	271.29	62	0.99982	271.24	8.287		
C_4H_{10} 58.120	0.55	0.65	0.66	0.620	28.43	7.708	21.206	0.9000	1.2041	5036	13.270		7'5½"	395.14	69	0.99907	394.77			
C_5H_{10} 70.130	0.93	0.77	0.83	0.843	OXYGEN		444.3	71					2'0"	105.19	66	0.99942	105.13			
C_5H_{12} 72.146	0.21	0.21	0.21	0.210	27.07	7.004	21.424	0.9896	--	4020	10.593		2'0"	105.19	63	0.99973	105.16			
C_6H_{12} 84.156	0.28	0.21	0.23	0.240	STEAM		31.1						1'8¼"	88.12	64	0.99963	88.09			142.52
			M. W.	23.233134	215.7	6.125											412.76		3420.54	17.198

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-F
HOURS 106-128

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.22	10.659 0.029			21.376	WET GAS	302.49	332.86
CO 28.010	37.34	37.51	37.28	37.377	15.144	15.144		15.144	CO_2 44.010	1.46	0.192	0.192		0.384	OIL	54.62	54.62
H_2 2.016	59.88	59.58	59.98	59.813	24.234		48.468		N_2 28.016	1.22	0.161				WATER	133.29	133.29
CO_2 44.010	2.32	2.70	2.60	2.540	1.029	1.029		2.058	CH_4 16.042	82.60	10.886	10.886	43.544		TOTAL	490.40	520.77
N_2 28.016	0.20	0.16	0.06	0.140	0.057				C_2H_4 30.068	7.09	0.934	1.868	5.604		FRESH FEED	520.77	
CH_4 16.042	0.26	0.05	0.08	0.130	0.053	0.053	0.212		C_2H_6 44.094	5.29	0.697	2.091	5.576		WEIGHT BALANCE	94.17	
			M. W	12.85306			8.978	4.558	C_4H_{10} 58.120	1.57	0.207	0.828	2.070				
			H_2O 18.016				9.047	4.524	C_5H_{12} 72.146	0.55	0.072	0.360	0.864		WET GAS FACTOR	1100400	
						16.226	57.727	21.726	MW	20.079114					INDICATED LOSS—S C F H	496	
			BALANCE			100.00	100.12	99.84	TOTAL			16.225	57.658	21.760		5434	

WET GAS					GAS FLOW RATES										LIQUID PRODUCT RATES Basis 17 hours					
CO 28.010	9.77	9.86	9.85	9.827		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
H_2 2.016	40.60	38.94	39.46	39.666	FRESH FEED		415.7	65	2252381	(15376)	(40.517)	OIL	5'2-3/4	278.39	53	1.0035	279.36	52.4		
CO_2 44.010	28.52	30.52	30.02	29.687	79.31	6.424	20.746	0.9952	1.5008	15787	41.599		2'6½"	135.80	69	0.9956	135.20	6.406		
N_2 28.016	1.28	1.56	1.51	1.450	WET GAS		1.53	64	1245334								+0.78		+5.00	54.62
CH_4 16.042	9.02	7.93	8.22	8.390	158.44	6.959	4.029	0.9962	1.1159	4938	13.012						144.94		928.49	8.526
C_2H_4 28.052	2.37	2.38	2.45	2.400	RECYCLE		414.9	108												
C_2H_6 33.068	1.82	1.76	1.70	1.760	79.31	8.438	20.727	0.9568	1.1159	14810	39.025									
C_3H_6 42.078	2.66	2.73	2.53	2.640	BLEED															
C_3H_8 44.094	0.31	0.28	0.32	0.303	5.02	8.500	20.727	1.0000	1.1159	987	2.601	WATER	7'1½"	377.68	73	0.99858	377.14	10.8		
C_4H_8 56.104	1.80	1.99	1.92	1.903	NATURAL GAS		434.7	184	1441796				3'4½"	181.27	73	0.99858	181.01	8.282		
C_4H_{10} 58.120	0.54	0.60	0.52	0.553	28.43	7.691	21.199	0.8986	1.2007	5001	13.178		3'3½"	176.91	66	0.99942	176.81			
C_5H_{10} 70.130	0.89	0.94	0.92	0.917	OXYGEN		441.8	65					1'10¾	99.44	69	0.99907	99.35			133.29
C_5H_{12} 72.146	0.14	0.22	0.29	0.217	27.07	7.027	21.366	0.9952		4045	10.659						273.59		2265.87	16.094
C_6H_{12} 84.156	0.28	0.29	0.29	0.287	STEAM		27.7													
			M. W.	23.246762	215.7	6.359														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-G
HOURS 128-141

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

WET GAS					GAS FLOW RATES										LIQUID PRODUCT RATES Basis 13 hours					
CO 28.010	9.17	9.15		9.160		$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016	40.14	38.77		39.455	FRESH FEED 79.31	6.375	415.4 20.739	70 0.9905	2309697 1.5198	15785	41594	OIL	7'4"	388.59	60	1.0000	388.59	51.7		
CO_2 44.010	29.26	30.31		29.785									5'2-3/4	278.39	53	1.0035	279.36	6.430		
N_2 28.016	1.42	1.56		1.490	WET GAS 158.44	7.008	1.50 4.025	69 0.9915	1242961 1.1149	4940	13.017						41.24		48.00	54.64
CH_4 16.042	8.93	8.70		8.815													110.47		710.32	8.498
C_2H_4 28.052	2.39	2.40		2.395	RECYCLE 79.31	8.500	414.2 20.710	111 0.9543	1.1149	14854	39.141									
C_2H_6 33.068	1.64	1.70		1.670																
C_3H_6 42.078	3.01	3.10		3.055	BLEED 5.02	7.754	20.710	1.0000	1.1149	899	2.369	WATER	7'4½"	390.78	70	0.99896	390.37	10.6		
C_3H_8 44.094	0.34	0.27		0.305																
C_4H_8 56.104	1.90	2.03		1.965	NATURAL GAS 28.43	7.683	435.4 21.216	181 0.9007	1424526 1.1935	4982	13.128		3'3½"	176.91	66	0.99942	176.81	8.293		136.23
C_4H_{10} 58.120	0.63	0.66		0.645													213.56		1771.05	16.428
C_5H_{10} 70.130	0.81	0.90		0.855	OXYGEN 27.07	7.000	442.8 21.389	71 0.9896	--	4011	10.569									
C_5H_{12} 72.146	0.18	0.18		0.180																
C_6H_{12} 84.156	0.18	0.27		0.225	STEAM 415 215.7	6.308	31.9													
			M. W.	23.291114																

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

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

H 0600		GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
	HOUR	I 1400	I 2200	I 0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
	FRESH FEED									O_2 32.000	0.205	10.896 0.027			21.846	WET GAS	306.17	349.56
37.16	CO 28.010	38.35	38.28	37.63	37.855	15.759	15.759		15.759	CO_2 44.010	1.370	0.180	0.180		0.360	OIL	53.93	53.93
60.02	H_2 2.016	58.89	59.02	59.53	59.365	24.714		49.428		N_2 28.016	1.220	0.161				WATER	136.30	136.30
2.62	CO_2 44.010	2.41	2.43	2.52	2.495	1.039	1.039		2.078	CH_4 16.042	82.345	10.842	10.842	43.368		TOTAL	496.40	539.79
0.14	N_2 28.016	0.20	0.17	0.24	0.187	0.078				C_2H_4 30.068	7.320	0.964	1.928	5.784		FRESH FEED	539.79	
0.06	CH_4 16.042	0.15	0.10	0.08	0.098	0.041	0.041	0.164		C_2H_6 44.094	5.205	0.685	2.055	5.480		WEIGHT BALANCE	91.96	
				M. W	12.966145					C_4H_{10} 58.120	1.600	0.211	0.844	2.110				
				H_2O 18.016				8.526	4.263	C_5H_{12} 72.146	0.735	0.097	0.485	1.164		WET GAS FACTOR	1141718	
							16.839	58.118	22.100	MW	20.17638					INDICATED LOSS—S C F H	688	
				BALANCE			103.09	100.37	99.52	TOTAL			16.334	57.906	22.206		5545	

0600	WET GAS					GAS FLOW RATES										LIQUID PRODUCT RATES Basis 29 hours					
9.48	CO 28.010	10.10	10.17	9.72	9.867		$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
35.13	H_2 2.016	39.56	38.56	40.10	38.337	FRESH FEED 79.31	6.440	415.5 20.741	62 0.9981	2232737 1.4942	15799	41.631	OIL	6'4½"	338.40	49	1.0054	340.23	52.3 6.410	2180.87	
32.60	CO_2 44.010	30.41	30.80	29.42	30.807									1'10-3/8	97.73	55	1.0025	97.97	52.2 6.413	628.28	
1.44	N_2 28.016	1.08	1.73	1.45	1.425	WET GAS 158.44	6.914	1.54 4.030	60 1.0000	1210119 1.1001	4857	12.798						41.79		411.50	53.93
7.56	CH_4 16.042	8.74	8.15	8.40	8.213													244.05		1564.09	8.416
2.35	C_2H_4 28.052	2.21	2.24	2.25	2.263	RECYCLE 79.31	8.460	415.0 20.729	71 0.9896	1.1001	15141	39.897									
1.72	C_2H_6 33.068	1.54	1.56	1.64	1.615																
3.71	C_3H_6 42.078	2.71	2.89	2.71	3.005	BLEED 5.02	8.415	20.729	1.0000	1.1001	963	2.538	WATER	7'4½"	390.78	69	0.99907	390.42	10.7 8.287	3235.41	
0.23	C_3H_8 44.094	0.25	0.26	0.23	0.243																
2.86	C_4H_8 56.104	1.75	1.91	1.89	2.102	NATURAL GAS 28.43	7.697	438.2 21.281	188 0.8958	1434846 1.1979	4997	13.167		1'5-5/8	76.52	58	1.00018	76.53	10.6 8.293	634.66	
1.10	C_4H_{10} 58.120	0.51	0.54	0.81	0.740									4'3"	227.10	62	0.99982	227.06	10.7	1881.65	
1.24	C_5H_{10} 70.130	0.75	0.81	0.86	0.915	OXYGEN 27.07	7.137	443.3 21.401	60 1.0000	--	4135	10.896		1'2-3/4	63.92	61	0.99992	63.91	8.287	529.62	136.30
0.25	C_5H_{12} 72.146	0.17	0.17	0.25	0.210													477.04		3952.78	16.450
0.33	C_6H_{12} 84.156	0.22	0.21	0.27	0.258	STEAM 415 215.7	6.521	28.7													
				M. W.	23.923259																