THE TEXAS COMPANY — MONTEBELLO LABORATORY
RATE CALCULATIONS

RUN NO. 64-J
HOURS 170-194

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	1800	0200	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.17	10.780 0.022			21.604	WET GAS	303.14	347.26
CO 28.010	38.26	37.32	37.46	37.680	15.701	15.701		15.701	CO_2 44.010	1.27	0.167	0.167		0.334	OIL	52.94	52.94
H_2 2.016	59.22	60.22	59.91	59.784	24.910		49.820		N_2 28.016	0.96	0.126				WATER	134.61	134.61
CO_2 44.010	2.30	2.35	2.41	2.353	0.980	0.980		1.960	CH_4 16.042	82.98	10.934	10.934	43.736		TOTAL	490.69	534.81
N_2 28.016	0.09	0.03	0.15	0.090	0.038				C_2H_6 30.068	7.00	0.922	1.844	5.532		FRESH FEED	534.81	
CH_4 16.042	0.13	0.08	0.07	0.093	0.039	0.039	0.156		C_3H_8 44.094	5.48	0.722	2.166	5.776		WEIGHT BALANCE	91.75	
			M. W	12.83510					C_4H_{10} 58.120	1.57	0.207	0.828	2.070				
			H_2O 18.016				8.296	4.148	C_5H_{12} 72.146	0.57	0.075	0.375	0.900		WET GAS FACTOR	1145543	
						16.720	58.272	21.809	MW	20.03876					INDICATED LOSS—S C F H	717	
			BALANCE			102.49	100.44	99.41	TOTAL			16.314	58.014	21.938		5646	

WET GAS	1400	2200		
CO 28.010	9.51	9.37	9.46	9.447
H_2 2.016	38.91	40.60	39.59	39.700
CO_2 44.010	30.71	29.41	30.33	30.150
N_2 28.016	1.18	1.06	1.81	1.350
CH_4 16.042	8.60	8.39	7.98	8.324
C_2H_4 28.052	2.26	2.45	1.78	2.163
C_2H_6 30.068	1.62	1.68	1.62	1.640
C_3H_6 42.078	3.04	2.94	3.48	3.153
C_3H_8 44.094	0.27	0.28	0.16	0.237
C_4H_8 56.104	2.03	1.90	1.81	1.913
C_4H_{10} 58.120	0.63	0.58	0.78	0.663
C_5H_{10} 70.130	0.86	0.87	0.76	0.830
C_5H_{12} 72.146	0.17	0.17	0.22	0.187
C_6H_{12} 84.156	0.21	0.30	0.22	0.243
			M. W.	23.34022

GAS FLOW RATES

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

HOUR	GAGE	GAL.
OIL	6'6"	344.95
	6'4½"	338.40
	5'0½"	268.57
	1'6½"	80.37
WATER	7'1"	375.50
	4'5"	227.10
	6'2"	327.49
	1'7-3/4	85.91

LIQUID PRODUCT RATES

°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
48	1.0059	346.99	51.7		
49	1.0054	340.23	6.430		
50	1.0049	269.89	"		
46	1.0069	80.92	"		
		+1.87		+12.00	52.94
		197.60		1270.57	8.233
67	0.99932	375.24	10.6		
62	0.99982	227.06	8.293		
66	0.99942	327.30	"		
60	1.0000	85.91	"		134.61
		389.57		3230.70	16.232

THE TEXAS COMPANY — MONTEBELLO LABORATORY
RATE CALCULATIONS

RUN NO. 64-K
HOURS 194-218

	GAS ANALYSES				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	0.23	10.777 0.030			21.614	WET GAS	304.88	330.29
CO 28.010	37.65	37.08	37.18	37.303	14.929	14.929		14.929	CO_2 44.010	1.39	0.182	0.182		0.364	OIL	53.43	53.43
H_2 2.016	59.69	59.93	59.79	59.804	23.935		47.870		N_2 28.016	2.10	0.276				WATER	129.79	129.79
CO_2 44.010	2.32	2.30	2.39	2.337	0.935	0.935		1.870	CH_4 16.042	82.20	10.787	10.787	43.148		TOTAL	488.10	513.51
N_2 28.016	0.30	0.59	0.59	0.493	0.197				C_2H_6 30.068	7.04	0.924	1.848	5.544		FRESH FEED	513.51	
CH_4 16.042	0.04	0.10	0.05	0.063	0.025	0.025	0.100		C_3H_8 44.094	5.18	0.680	2.040	5.440		WEIGHT BALANCE	95.05	
			M. W	12.83096			8.714	5.179	C_4H_{10} 58.120	1.43	0.188	0.752	1.880				
			H_2O 18.016				9.536	4.768	C_5H_{12} 72.146	0.43	0.056	0.280	0.672		WET GAS FACTOR	1083344	
						15.889	57.506	21.567	MW	20.0024					INDICATED LOSS—S C F H	421	
			BALANCE			100.00	101.45	98.13	TOTAL			15.889	56.684	21.978		5468	

WET GAS				
CO 28.010	9.45	10.08	9.49	9.673
H_2 2.016	40.39	40.66	40.20	40.417
CO_2 44.010	30.10	28.83	30.13	29.687
N_2 28.016	0.78	1.57	1.78	1.377
CH_4 16.042	8.90	8.05	7.97	8.307
C_2H_4 28.052	2.31	2.21	2.25	2.257
C_2H_6 30.068	1.63	1.62	1.65	1.633
C_3H_6 42.078	2.86	3.01	2.81	2.893
C_3H_8 44.094	0.29	0.26	0.21	0.253
C_4H_8 56.104	1.69	1.88	1.71	1.760
C_4H_{10} 58.120	0.53	0.69	0.71	0.643
C_5H_{10} 70.130	0.71	0.78	0.72	0.737
C_5H_{12} 72.146	0.16	0.16	0.16	0.160
C_6H_{12} 84.156	0.20	0.20	0.21	0.203
			M. W.	22.92514

GAS FLOW RATES

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

HOUR	GAGE	GAL.
OIL	7'0-3/4	374.41
	5'0½"	268.57
	3'6¼"	188.91
	1'10"	96.02
WATER	6'5"	340.58
	6'2"	327.49
	7'4"	388.59
	1'8"	87.01
	2'1-3/4	113.46
	1'0"	52.00

LIQUID PRODUCT RATES

°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
57	1.0015	374.97	52.8		
50	1.0049	269.89	6.392		
44	1.0079	190.40			
58	1.0010	96.12			
		+1.25		+8.00	53.43
		200.61		1282.30	8.359
65	0.99953	340.42	10.8		
66	0.99942	327.30	8.282		
61	0.99992	388.56			
60	1.0000	87.01			
57	1.00025	113.49			
43	1.00114	52.06			129.79
		376.10		3114.86	15.671

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-L
HOURS 218-242

	GAS ANALYSES				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	0.12	10.835 0.016			21.702	WET GAS	305.75	338.99
CO 28.010	37.22	37.08	36.81	37.037	15.250	15.250		15.250	CO_2 44.010	1.16	0.154	0.154		0.308	OIL	53.25	53.25
H_2 2.016	60.12	60.12	60.43	60.223	24.796		49.592		N_2 28.016	1.43	0.190				WATER	131.59	131.59
CO_2 44.010	2.27	2.46	2.41	2.380	0.980	0.980		1.960	CH_4 16.042	82.83	10.994	10.994	43.976		TOTAL	490.59	523.83
N_2 28.016	0.26	0.23	0.24	0.243	0.100				C_2H_4 30.068	7.20	0.956	1.912	5.736		FRESH FEED	523.83	
CH_4 16.042	0.13	0.11	0.11	0.117	0.048	0.048	0.192		C_2H_6 44.094	5.25	0.697	2.091	5.576		WEIGHT BALANCE	93.65	
			M. W	12.722445			8.288	4.800	C_4H_{10} 58.120	1.54	0.204	0.816	2.040				
			H_2O 18.016				8.944	4.472	C_5H_{12} 72.146	0.47	0.062	0.310	0.744		WET GAS FACTOR	1108716	
						16.278	58.728	21.682	MW	19.9510986					INDICATED LOSS—S C F H	553	
			BALANCE			100.00	101.13	98.51	TOTAL			16.277	58.072	22.010		5642	

WET GAS					GAS FLOW RATES											LIQUID PRODUCT RATES				
CO 28.010		9.92	10.09	10.005		$\sqrt{h}$	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		40.55	41.24	40.895	FRESH FEED		413.9	59	2275506	(15626)	(41.174)	OIL	7'3½"	386.41	44	1.0079	389.46	52.0		
CO_2 44.010		30.23	29.63	29.930	79.31	6.388	20.703	1.0010	1.5085	15838	41.734		3'6¼"	188.91	44	1.0079	190.40	6.420		53.25
N_2 28.016		1.20	1.15	1.175	WET GAS		1.54	56	1269721								199.06		1277.97	8.294
CH_4 16.042		7.73	7.77	7.750	158.44	7.046	4.030	1.0039	1.1268	5089	13.410									
C_2H_4 28.052		2.46	2.55	2.505	RECYCLE		413.8	67												
C_2H_6 33.068		1.39	1.43	1.410	79.31	8.558	20.700	0.9933	1.1268	15725	41.436									
C_3H_6 42.078		2.83	2.88	2.855	BLEED															
C_3H_8 44.094		0.22	0.26	0.240	5.02	8.225	20.700	1.0000	1.1268	963	2.538	WATER	7'2½"	382.05	66	0.99942	381.83	10.8		
C_4H_8 56.104		1.75	1.63	1.690	NATURAL GAS		437.9	185	1451047				2'1-3/4	113.46	57	1.00025	113.49	8.282		
C_4H_{10} 58.120		0.65	0.43	0.540	28.43	7.700	21.274	0.8979	1.2046	5037	13.273		3'2½"	172.54	57	1.00025	172.58			
C_5H_{10} 70.130		0.71	0.65	0.680	OXYGEN		444.0	60					1'1-3/4	59.56	56	1.00033	59.58			131.59
C_5H_{12} 72.146		0.16	0.13	0.145	27.07	7.092	21.417	1.0000	--	4112	10.835						381.34		3158.26	15.889
C_6H_{12} 84.156		0.20	0.16	0.180	STEAM		27.6													
			M. W.	22.800276	215.7	5.958														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-M
HOURS 242-266

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR		2200		AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		# hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.17	10.785 0.023			21.616	WET GAS	311.94	342.92
CO 28.010		37.23		37.23	15.171	15.171		15.171	CO_2 44.010	0.94	0.125	0.125		0.250	OIL	51.32	51.32
H_2 2.016		59.90		59.90	24.409		48.818		N_2 28.016	1.28	0.170				WATER	128.42	128.42
CO_2 44.010		2.50		2.50	1.019	1.019		2.038	CH_4 16.042	83.41	11.104	11.104	44.416		TOTAL	491.68	522.66
N_2 28.016		0.26		0.26	0.106				C_2H_4 30.068	7.24	0.964	1.928	5.784		FRESH FEED	522.66	
CH_4 16.042		0.11		0.11	0.045	0.045	0.180		C_2H_6 44.094	5.14	0.684	2.052	5.472		WEIGHT BALANCE	94.07	
			M. W	12.82644					C_4H_{10} 58.120	1.39	0.185	0.740	1.850				
			H_2O 18.016				9.261	4.631	C_5H_{12} 72.146	0.43	0.057	0.285	0.684		WET GAS FACTOR	1099313	
						16.235	58.259	21.840	MW	19.768782					INDICATED LOSS—S C F H	511	
			BALANCE			100.00	100.09	99.88	TOTAL			16.234	58.206	21.866		5657	

WET GAS					GAS FLOW RATES											LIQUID PRODUCT RATES				
CO 28.010		10.51	9.60	10.055		$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
H_2 2.016		42.06	39.18	40.620	FRESH FEED		414.8	61	2257056	(15464)	(40.749)	OIL	5'4½"	286.02	45	1.0074	288.14	53.8		
CO_2 44.010		28.74	30.87	29.805	79.31	6.396	20.724	0.9990	1.5024	15778	41.576		1'9½"	93.76	43	1.0084	94.55	6.357		
N_2 28.016		1.14	1.04	1.090	WET GAS		1.54	58	1258447								80.16		41.00	51.32
CH_4 16.042		7.83	7.58	7.705	158.44	7.171	4.030	1.0019	1.1218	5146	13.560						193.75		1231.67	8.073
C_2H_4 28.052		2.42	2.57	2.495	RECYCLE		413.6	68												
C_2H_6 33.068		1.40	1.51	1.455	79.31	8.533	20.695	0.9924	1.1218	15592	41.086									
C_3H_6 42.078		2.38	3.39	2.885	BLEED															
C_3H_8 44.094		0.20	0.39	0.295	5.02	8.138	20.695	1.0000	1.1218	948	2.498	WATER	7'1-5/8	378.23	70	0.99896	377.84	10.8		
C_4H_8 56.104		1.51	2.13	1.820	NATURAL GAS		437.2	186	1464430				3'2½"	172.54	57	1.00025	172.58	8.282		
C_4H_{10} 58.120		0.63	0.56	0.595	28.43	7.700	21.258	0.8972	1.2101	5052	13.312		3'5"	183.46	59	1.00009	183.48			
C_5H_{10} 70.130		0.71	0.82	0.765	OXYGEN		442.8	62					0'3-3/4	16.60	54	1.00047	16.61			128.42
C_5H_{12} 72.146		0.23	0.16	0.195	27.07	7.083	21.389	0.9981	--	4093	10.785						372.13		3081.98	15.505
C_6H_{12} 84.156		0.24	0.20	0.220	STEAM		27.3													
			M. W.	23.004539	215.7	6.075														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-N
HOURS 265-290

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.18	10.498 0.024			21.044	WET GAS	301.41	345.94
CO 28.010	37.20	36.51	36.91	36.874	15.231	15.231		15.231	CO_2 44.010	1.12	0.147	0.147		0.294	OIL	45.24	46.24
H_2 2.016	59.93	60.92	60.53	60.460	24.974		49.948		N_2 28.016	1.31	0.172				WATER	127.99	127.99
CO_2 44.010	2.05	2.17	2.15	2.123	0.877	0.877		1.754	CH_4 16.042	82.41	10.843	10.843	43.372		TOTAL	475.64	520.17
N_2 28.016	0.22	0.20	0.19	0.203	0.084				C_2H_4 30.068	7.58	0.997	1.994	5.982		FRESH FEED	520.17	
CH_4 16.042	0.60	0.20	0.22	0.340	0.140	0.140	0.560		C_2H_6 44.094	5.33	0.701	2.103	5.608		WEIGHT BALANCE	91.44	
			M. W	12.593029					C_4H_{10} 58.120	1.54	0.203	0.812	2.030				
			H_2O 18.016				8.015	4.008	C_5H_{12} 72.146	0.53	0.070	0.350	0.840		WET GAS FACTOR	1147738	
						16.248	58.523	20.993	MW	20.04452					INDICATED LOSS—S C F H	784	
			BALANCE			100.00	101.19	98.38	TOTAL			16.249	57.832	21.338		6090	

WET GAS					GAS FLOW RATES												LIQUID PRODUCT RATES					
						$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
CO 28.010	9.77	9.32	10.51	9.867			413.9	66	2298890	(15676)	(41.306)	OIL	7'2-3/4	383.14	63	0.9985	382.57	52.2		
H_2 2.016	42.63	42.49	44.92	43.346	FRESH FEED 79.31	6.458	20.703	0.9943	1.5162	15986	42.124		5'4½"	286.02	45	1.0074	288.14	6.413		
CO_2 44.010	27.66	28.51	24.35	26.840			1.53	64	1342950				2'9½"	149.62	51	1.0044	150.28			
N_2 28.016	1.02	1.23	1.26	1.170	WET GAS 158.44	7.200	4.029	0.9962	1.1589	5306	13.982		1'4-3/4	72.68	64	0.9980	72.53			
CH_4 16.042	9.02	8.39	8.38	8.597			413.1	74									+0.86		45.50	46.24
C_2H_4 28.052	2.20	2.49	2.56	2.417	RECYCLE 79.31	8.550	20.683	0.9868	1.1589	16039	42.264						173.04		1109.71	7.210
C_2H_6 33.068	1.52	1.56	1.65	1.577																
C_3H_6 42.078	2.63	2.58	2.92	2.710	BLEED 5.02	8.125	20.683	1.0000	1.1589	978	2.577	WATER	7'3½"	386.41	72	0.99872	385.92	10.8		
C_3H_8 44.094	0.21	0.25	0.29	0.250																
C_4H_8 56.104	1.71	1.59	1.69	1.663	NATURAL GAS 28.43	7.700	434.8	189	1444285				3'5"	183.46	59	1.00009	183.48	8.282		
C_4H_{10} 58.120	0.49	0.54	0.48	0.503			21.201	0.8951	1.2018	4993	13.157		4'1½"	220.55	65	0.99953	220.45			
C_5H_{10} 70.130	0.77	0.66	0.69	0.707	OXYGEN 27.07	6.946	441.2	68					1'0"	52.00	60	1.00000	52.00			127.99
C_5H_{12} 72.146	0.16	0.23	0.13	0.173			21.352	0.9924	—	3984	10.498						370.89		3071.71	15.454
C_6H_{12} 84.156	0.21	0.16	0.17	0.180	STEAM 215.7	6.096	26.2													
			M. W.	21.557008																

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-O
HOURS 290-314

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR				AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.23	10.487 0.030			21.034	WET GAS	313.03	346.12
CO 28.010	37.06	36.98	36.45	36.830	15.078	15.078		15.078	CO_2 44.010	1.38	0.181	0.181		0.362	OIL	45.07	45.07
H_2 2.016	59.97	60.70	60.93	60.533	24.782		49.564		N_2 28.016	1.78	0.234				WATER	123.00	123.00
CO_2 44.010	2.00	1.95	2.15	2.033	0.832	0.832		1.664	CH_4 16.042	82.21	10.812	10.812	43.248		TOTAL	481.10	514.19
N_2 28.016	0.28	0.21	0.31	0.267	0.109				C_2H_4 30.068	7.35	0.967	1.934	5.802		FRESH FEED	514.19	
CH_4 16.042	0.69	0.16	0.16	0.337	0.138	0.138	0.552		C_2H_6 44.094	5.01	0.659	1.977	5.272		WEIGHT BALANCE	93.56	
			M. W	12.5600	41.931				C_4H_{10} 58.120	1.50	0.197	0.788	1.970				
			H_2O 18.016				8.168	4.084	C_5H_{12} 72.146	0.54	0.071	0.355	0.652		WET GAS FACTOR		1105708
						16.048	58.284	20.826		20.0482					INDICATED LOSS—S C F H		556
			BALANCE			100.00	101.99	97.34	TOTAL			16.047	57.144	21.396			5817

WET GAS					GAS FLOW RATES												LIQUID PRODUCT RATES					
						$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
CO 28.010	11.04	10.81		10.925			413.1	67	2.304936	(15536)	(40.939)	OIL	5'11½"	316.58	51	1.0044	317.97	51.1		
H_2 2.016	39.02	41.91		40.465	FRESH FEED 79.31	6.433	20.683	0.9933	1.5182	15913	41.931		2'9½"	149.62	51	1.0044	150.28	6.451		45.07
CO_2 44.010	28.70	28.13		28.415			1.58	64	1.28217								167.69		1081.77	6.987
N_2 28.016	0.62	1.40		1.010	WET GAS 158.44	7.296	4.035	0.9962	1.1323	5261	13.864									
CH_4 16.042	9.83	7.89		8.860			413.3	75												
C_2H_4 28.052	2.55	2.45		2.500	RECYCLE 79.31	8.513	20.688	0.9859	1.1323	15593	41.088									
C_2H_6 33.068	1.64	1.53		1.585																
C_3H_6 42.078	2.60	2.63		2.615	BLEED 5.02	8.133	20.688	1.0000	1.1323	957	2.522	WATER	7'0"	371.14	70	0.99896	370.75	10.8		
C_3H_8 44.094	0.23	0.27		0.250																
C_4H_8 56.104	1.75	1.50		1.625	NATURAL GAS 28.43	7.708	435.6	192	1.44402		43.610		4'1½"	220.55	65	0.99953	220.45	8.282		
C_4H_{10} 58.120	0.73	0.46		0.595			21.220	0.8931	1.2017	4991	13.152		4'2"	222.74	62	0.99982	222.70			
C_5H_{10} 70.130	0.84	0.68		0.760	OXYGEN 27.07	6.925	441.3	66					0'3-3/4	16.60	75	0.99832	16.57			123.00
C_5H_{12} 72.146	0.20	0.10		0.150			21.354	0.9943	—	3980	10.487						356.43		2951.95	14.851
C_6H_{12} 84.156	0.25	0.24		0.245	STEAM 215.7	6.050	25.5													
			M. W.	22.5789																

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-P
HOURS 314-338

	GAS ANALYSES			
HOUR	1400	2200	0545	AVERAGE
FRESH FEED				
CO 28.010	36.57	37.02	36.75	36.780
H_2 2.016	60.53	60.35	59.38	60.087
CO_2 44.010	1.99	2.34	3.57	2.633
N_2 28.016	0.20	0.16	0.20	0.187
CH_4 16.042	0.71	0.13	0.10	0.313
			M. W	12.7748
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	10.39	10.63	10.45	10.490
H_2 2.016	42.85	42.93	41.20	42.327
CO_2 44.010	26.99	27.73	28.91	27.877
N_2 28.016	1.81	1.21	1.24	1.420
CH_4 16.042	8.18	7.71	7.67	7.853
C_2H_4 28.052	2.30	2.32	1.69	2.103
C_2H_6 33.068	1.48	1.57	1.38	1.477
C_3H_6 42.078	2.72	2.44	2.61	2.590
C_3H_8 44.094	0.26	0.26	0.19	0.237
C_4H_8 56.104	1.64	1.52	2.70	1.953
C_4H_{10} 58.120	0.44	0.62	0.72	0.593
C_5H_{10} 70.130	0.68	0.71	0.69	0.693
C_5H_{12} 72.146	0.10	0.13	0.33	0.187
C_6H_{12} 84.156	0.16	0.22	0.22	0.200
			M. W.	22.175784

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

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

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

LIQUID PRODUCT RATES							
HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
OIL	7'3-3/8	385.87	66	0.9970	384.71	53.0		
	5'11½"	316.58	51	1.0044	317.97	6.385		
	3'3"	174.73	47	1.0064	175.85			
	1'5-7/8	77.62	65	0.9975	77.43			
					+0.78		+5.00	44.15
					165.94		1059.53	6.914
WATER	7'0-3/4	374.41	73	0.99858	373.88	10.9		
	4'2"	222.74	62	0.99982	222.70	8.276		
	4'11"	262.02	65	0.99953	261.90			
	1'0-5/8	54.68	72	0.99872	54.61			123.61
					358.47		2966.70	14.936

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-Q
HOURS 338-362

	GAS ANALYSES			
HOUR	1400	1800	0600	AVERAGE
FRESH FEED				
CO 28.010	37.13	37.74	36.73	37.200
H_2 2.016	60.40	59.71	60.47	60.194
CO_2 44.010	2.15	2.37	2.48	2.333
N_2 28.016	0.10	0.06	0.17	0.110
CH_4 16.042	0.22	0.12	0.15	0.163
			M. W	12.71695
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	10.27	10.78	10.09	10.380
H_2 2.016	41.73	42.65	42.41	42.264
CO_2 44.010	27.93	28.23	28.88	28.347
N_2 28.016	0.97	0.92	0.96	0.950
CH_4 16.042	8.18	7.68	7.93	7.930
C_2H_4 28.052	2.19	2.16	2.22	2.190
C_2H_6 33.068	1.74	1.71	1.74	1.730
C_3H_6 42.078	3.04	2.48	2.56	2.693
C_3H_8 44.094	0.41	0.30	0.29	0.333
C_4H_8 56.104	1.86	1.51	1.47	1.613
C_4H_{10} 58.120	0.57	0.55	0.53	0.550
C_5H_{10} 70.130	0.76	0.69	0.64	0.697
C_5H_{12} 72.146	0.13	0.13	0.11	0.123
C_6H_{12} 84.156	0.22	0.21	0.17	0.200
			M. W.	22.15826

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

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

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

LIQUID PRODUCT RATES							
HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
OIL	6'5"	340.58	54	1.0030	341.60	51.7		
	3'3"	174.73	47	1.0064	175.85	6.430		
					+1.59		+10.25	44.83
					167.34		1076.00	6.973
WATER	7'3"	384.23	70	0.99896	383.83	10.9		
	4'11"	262.02	65	0.99953	261.90	8.276		
	5'10½"	312.21	67	0.99932	312.00			
	1'5½"	75.97	64	0.99963	75.94			123.45
					357.99		2962.73	14.916

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 64-R
HOURS 362-386

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

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

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

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

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	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	37.004	15.435	432.33	7.633	1.023	28.65	3.262	18.697	4.285	-14.412	-403.68				
H_2 2.016	60.439	25.211	50.83	37.541	5.032	10.14	16.040	41.251	21.072	-20.179	- 40.69				
CO_2 44.010	2.003	0.835	36.75	30.639	4.106	180.71	13.092	13.927	17.198	3.271	143.96	9.333			
N_2 28.016	0.159	0.066	1.85	1.567	0.210	5.88	0.670	0.736	0.880						
CH_4 16.042	0.395	0.165	2.65	11.090	1.486	23.84	4.739	4.904	6.225	1.321	21.19	1.374			
C_2H_4 28.052				2.377	0.319	8.95	1.016	1.016	1.335	0.319	8.95	0.580			
C_2H_6 30.068				1.779	0.238	7.16	0.760	0.760	0.998	0.238	7.16	0.464			
C_1+C_2											37.30	2.418			
C_3H_6 42.078				2.873	0.385	16.20	1.228	1.228	1.613	0.385	16.20	1.050	4.32	3.750	0.243
C_3H_8 44.094				0.269	0.036	1.59	0.115	0.115	0.151	0.036	1.59	0.103	4.24	0.375	0.024
C_4H_8 56.104				2.002	0.268	15.04	0.855	0.855	1.123	0.268	15.04	0.975	5.00	3.008	0.195
C_4H_{10} 58.120				0.777	0.104	6.04	0.332	0.332	0.436	0.104	6.04	0.392	4.86	1.243	0.081
C_5H_{10} 70.130				0.917	0.123	8.63	0.392	0.392	0.515	0.123	8.63	0.559	5.45	1.583	0.103
C_5H_{12} 72.146				0.244	0.033	2.38	0.104	0.104	0.137	0.033	2.38	0.154	5.25	0.453	0.029
C_6H_{12} 84.156				0.292	0.039	3.28	0.125	0.125	0.164	0.039	3.28	0.213	5.54	0.592	0.038
C_3-C_6											53.16	3.446		11.004	0.713
TOTAL		41.712	524.41		13.402	318.49	42.730	84.442	63.841						
H_2+CO	97.443	40.646	15425	SCFH	6.055		19.302	59.948	25.357	-34.591					
H_2/CO		1.63	Factor 648298		4.92		4.92	2.21	4.92	1.40					
RECOVERED OIL										0.445**	62.44	4.048		9.710	0.629
TOTAL OIL											115.60	7.494		20.714	1.342
WATER SOLUBLE CHEMICALS										0.378**	20.08	1.302	7.926	2.533	0.164
TOTAL LIQUID PRODUCTS C_3+											135.68	8.796		23.247	1.506
NET WATER										6.886**	124.05	8.042		14.892	0.965
GROSS WATER											144.13	9.344		17.425	1.130
HYDROCARBON TOTAL—C_1+											172.98	11.214			

Weight Recovery, %	88.09
Pressure, psig	416
Temperature, °F	663
Recycle Ratio	1.02
Catalyst Age, hrs.	56
Inlet Velocity, Ft/sec	0.99
Bed Depth, Ft	18.26
Bed Density, #/CF	164
Space Velocity, vhv	1281
Catalyst	
Weight, #	1981
Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$	= 12.3

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+
67.87	93.37	80.04	85.10	77.08	48.92	57.70	78.44

YIELD BASIS H_2+CO FED

YIELDS	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	82.52	8.013	98.0	7.853
400-550	12.72	1.235	91.4	1.129
550 +	4.76	0.462	114.6	0.529

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	44.3	7.18		
C_3 POLY GASO.	87.5	6.28	1.050	
C_3 POLY TAR	12.5	0.90	0.120	

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	--	--	68.0
C_4 POLY GASO.	5.98	13.16 (6.04)	2.201 (1.243)	1.5
C_4H_{10}	4.86	5.63	1.158	68.0
C_4-FREE GASO.			11.531	5.8
C_4 POLY TAR	7.53	1.88	0.250	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	14.890	0.9653	5233
GAS OIL	1.129	0.0732	397
FUEL OIL	0.529	0.0343	186
POLY TAR	0.370	0.0240	130
TOTAL	16.918	1.0968	5946
W. S. CHEM.	2.533	0.1642	890
TOTAL	19.451	1.2610	6836

Form ML—11

** Included in Reactor Effluent Total

g/NCM = 16.91×#/MCF

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	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	37.359	15.248	427.10	9.124	1.296	36.30	3.917	19.165	5.213	-13.952	-390.80				
H_2 2.016	60.124	24.540	49.47	39.130	5.560	11.21	16.798	41.338	22.358	-18.980	- 38.26				
CO_2 44.010	2.084	0.851	37.45	29.208	4.150	182.64	12.538	13.389	16.688	3.299	145.19				
N_2 28.016	0.193	0.079	2.21	1.509	0.214	6.00	0.648	0.727	0.862						
CH_4 16.042	0.240	0.098	1.57	9.768	1.388	22.27	4.194	4.292	5.582	1.290	20.70	1.371			
C_2H_4 28.052				2.292	0.326	9.14	0.984	0.984	1.310	0.326	9.14	0.605			
C_2H_6 30.068				1.725	0.245	7.37	0.741	0.741	0.986	0.245	7.37	0.488			
C_1+C_2											37.21	2.464			
C_3H_6 42.078				2.913	0.414	17.42	1.251	1.251	1.665	0.414	17.42	1.154	4.32	4.032	0.267
C_3H_8 44.094				0.277	0.039	1.72	0.119	0.119	0.158	0.039	1.72	0.114	4.24	0.406	0.027
C_4H_8 56.104				1.893	0.269	15.09	0.813	0.813	1.082	0.269	15.09	0.999	5.00	3.018	0.200
C_4H_{10} 58.120				0.727	0.103	5.99	0.312	0.312	0.415	0.103	5.99	0.397	4.86	1.233	0.082
C_5H_{10} 70.130				0.931	0.132	9.26	0.400	0.400	0.532	0.132	9.26	0.613	5.45	1.699	0.113
C_5H_{12} 72.146				0.244	0.035	2.53	0.105	0.105	0.140	0.035	2.53	0.168	5.25	0.482	0.032
C_6H_{12} 84.156				0.259	0.037	3.11	0.111	0.111	0.148	0.037	3.11	0.206	5.54	0.561	0.037
C_3-C_6											55.12	3.651		11.431	0.758
TOTAL		40.816	517.80		14.208	330.05	42.931	83.747	64.316						
H_2+CO	97.483	39.788	15100	SCFH	6.856		20.715	60.503	27.571	-32.932					
H_2/CO		1.61	Factor 662251		4.29		4.29	2.16	4.29	1.36					
RECOVERED OIL										0.373**	52.25	3.460		8.149	0.540
TOTAL OIL											107.37	7.111		19.580	1.298
WATER SOLUBLE CHEMICALS										0.375**	19.89	1.317	7.935	2.507	0.166
TOTAL LIQUID PRODUCTS C_3+											127.26	8.428		22.087	1.464
NET WATER										6.429**	115.82	7.670		13.904	0.921
GROSS WATER											135.71	8.987		16.411	1.087
HYDROCARBON TOTAL—C_1+											164.47	10.898			

Weight Recovery, %	89.09
Pressure, psig	414
Temperature, °F	665
Recycle Ratio	1.05
Catalyst Age, hrs.	
Inlet Velocity, Ft/sec	0.99
Bed Depth, Ft	18.84
Bed Density, #/CF	157
Space Velocity, vhv	1214
Catalyst	
Weight, #	1954
Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$	= 11.1

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+
65.19	91.50	77.34	82.77	72.80	45.91	54.43	77.38

YIELD BASIS H_2+CO FED

YIELDS	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	80.76	6.581	98.0	6.449
400-550	11.36	0.926	91.4	0.846
550 +	7.88	0.642	114.6	0.736

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	4.06	7.07		
C_3 POLY GASO.	87.5	6.19	1.035	
C_3 POLY TAR	12.5	0.88	0.117	

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	--	--	68.0
C_4 POLY GASO.	5.98	13.20 (5.99)	2.208 (1.235)	1.5
C_4H_{10}	4.86	5.17	1.064	68.0
C_4-FREE GASO.			10.226	5.8
C_4 POLY TAR	7.53	1.89	0.251	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	13.498	0.8939	4846
GAS OIL	0.846	0.0560	304
FUEL OIL	0.736	0.0487	264
POLY TAR	0.368	0.0244	132
TOTAL	15.448	1.0230	5546
W. S. CHEM.	2.507	0.1660	900
TOTAL	17.955	1.1890	6446

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91×#/MCF

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	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	37.164	15.125	423.65	10.849	1.718	48.12	4.580	19.705	6.298	- 13.407	-375.53				
H_2 2.016	60.285	24.534	49.46	41.618	6.591	13.29	17.569	42.103	24.160	- 17.943	- 36.17				
CO_2 44.010	2.142	0.872	38.37	27.228	4.312	189.77	11.494	12.366	15.806	3.440	151.40	10.059			
N_2 28.016	0.215	0.088	2.47	1.363	0.216	6.05	0.575	0.663	0.791						
CH_4 16.042	0.194	0.079	1.27	8.745	1.385	22.22	3.692	3.771	5.077	1.306	20.95	1.392			
C_2H_4 28.052				2.009	0.318	8.92	0.848	0.848	1.166	0.318	8.92	0.593			
C_2H_6 30.068				1.646	0.261	7.85	0.695	0.695	0.956	0.261	7.85	0.522			
C_1+C_2											37.72	2.507			
C_3H_6 42.078				2.429	0.385	16.20	1.025	1.025	1.410	0.385	16.20	1.076	4.32	3.750	0.249
C_3H_8 44.094				0.231	0.037	1.63	0.098	0.098	0.135	0.037	1.63	0.108	4.24	0.384	0.026
C_4H_8 56.104				1.709	0.271	15.20	0.721	0.721	0.992	0.271	15.20	1.010	5.00	3.040	0.202
C_4H_{10} 58.120				0.699	0.111	6.45	0.295	0.295	0.406	0.111	6.45	0.429	4.86	1.327	0.088
C_5H_{10} 70.130				0.925	0.146	10.24	0.390	0.390	0.536	0.146	10.24	0.680	5.45	1.879	0.125
C_5H_{12} 72.146				0.263	0.042	3.03	0.111	0.111	0.153	0.042	3.03	0.201	5.25	0.577	0.038
C_6H_{12} 84.156				0.286	0.045	3.79	0.121	0.121	0.166	0.045	3.79	0.252	5.54	0.684	0.045
C_3-C_6											56.54	3.756		11.641	0.773
TOTAL		40.698	515.22		15.838	352.76	42.214	82.912	58.052						
H_2+CO	97.449	39.659	15.051 SCFH				22.149	61.808	30.458	-31.350					
H_2/CO		1.62	Factor 664407				3.84	2.14	3.84	1.34					

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	80.75	5.168	98.0	5.065
400-550	10.65	0.682	91.4	0.623
550 +	8.60	0.550	114.6	0.630

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	36.1	5.85		
C_3 POLY GASO.	87.5	5.12	0.856	
C_3 POLY TAR	12.5	0.73	0.097	

	#/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	(6.45 4.77)	(1.327 0.982)	68.0
C_4-FREE GASO.			9.061	5.8
C_4 POLY TAR	7.53	1.90	0.252	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	12.267	0.8150	4419
GAS OIL	0.623	0.0414	224
FUEL OIL	0.630	0.0419	227
POLY TAR	0.349	0.0232	126
TOTAL	13.869	0.9215	4996
W. S. CHEM.	2.428	0.1613	875
TOTAL	16.297	1.0828	5871

Weight Recovery, %	79.66	Catalyst Age, hrs.	279	Space Velocity, vhv	1222	RECOVERED OIL	**0.296
Pressure, psig	410	Inlet Velocity, Ft/sec	1.00	Catalyst Vol.CF	12.32	TOTAL OIL	
Temperature, °F	667	Bed Depth, Ft	18.67	Weight, #	1725	WATER SOLUBLE CHEMICALS	**0.365
Recycle Ratio	1.04	Bed Density, #/CF	140	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$	= 10.7	TOTAL LIQUID PRODUCTS C_3+	
						NET WATER	**5.642
						GROSS WATER	
						HYDROCARBON TOTAL—C_1+	

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+
61.08	88.64	73.14	79.05	68.04	42.62	50.72	75.68

Form ML—11

**Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			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	37.280	15.667	438.83	5.210	0.644	18.04	2.218	17.885	2.862	-15.023	-420.79				
H_2 2.016	60.307	25.345	51.10	37.416	4.623	9.32	15.927	41.272	20.550	-20.722	-41.78				
CO_2 44.010	2.093	0.880	38.73	32.177	3.974	174.91	13.697	14.577	17.671	3.094	136.18	8.750			
N_2 28.016	0.107	0.045	1.26	1.697	0.210	5.88	0.722	0.767	0.932						
CH_4 16.042	0.213	0.090	1.44	11.293	1.395	22.38	4.807	4.897	6.202	1.305	20.94	1.345			
C_2H_4 28.052				2.570	0.318	8.92	1.094	1.094	1.412	0.318	8.92	0.573			
C_2H_6 30.068				1.803	0.223	6.71	0.768	0.768	0.991	0.223	6.71	0.431			
C_1+C_2											36.57	2.349			
C_3H_6 42.078				2.817	0.348	14.64	1.199	1.199	1.547	0.348	14.64	0.941	4.32	3.389	0.218
C_3H_8 44.094				0.283	0.035	1.54	0.120	0.120	0.155	0.035	1.54	0.099	4.24	0.363	0.023
C_4H_8 56.104				2.147	0.265	14.87	0.914	0.914	1.179	0.265	14.87	0.955	5.00	2.974	0.191
C_4H_{10} 58.120				0.900	0.111	6.45	0.383	0.383	0.494	0.111	6.45	0.414	4.86	1.327	0.085
C_5H_{10} 70.130				1.027	0.127	8.91	0.437	0.437	0.564	0.127	8.91	0.572	5.45	1.635	0.105
C_5H_{12} 72.146				0.297	0.037	2.67	0.126	0.126	0.163	0.037	2.67	0.172	5.25	0.509	0.033
C_6H_{12} 84.156				0.363	0.045	3.79	0.155	0.155	0.200	0.045	3.79	0.244	5.54	0.684	0.044
C_3-C_6											52.87	3.397		10.881	0.699
TOTAL		42.026			12.355	299.03	42.568	84.494	63.619						
H_2+CO	97.587	41.012	15564 SCFH		5.267		18.145	59.157	23.412	-35.745					
H_2/CO		1.62	Factor 642508		7.18		7.18	2.31	7.18	1.38					
RECOVERED OIL **										0.519	72.84	4.680		11.333	0.728
TOTAL OIL											125.71	8.077		22.214	1.427
WATER SOLUBLE CHEMICALS **										0.347	18.41	1.183		2.309	0.148
TOTAL LIQUID PRODUCTS C_3+											144.12	9.260		24.523	1.575
NET WATER **										7.830	141.06	9.063		16.934	1.088
GROSS WATER											159.47	10.246		19.243	1.236
HYDROCARBON TOTAL—C_1+											180.69	11.609			

Weight Recovery, %	92.97	Catalyst Age, hrs.		Space Velocity, vhv	1335
Pressure, psig	416	Inlet Velocity, Ft/sec	1.00	Catalyst Vol CF	11.66
Temperature, °F	664	Bed Depth, Ft	17.67	Weight, #	1877
Recycle Ratio	1.01	Bed Density, #/CF	161	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$	= 17.65

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

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY.%	gal/hr
400 EP	81.9	9.281	98.0	9.095
400-550	12.8	1.451	91.4	1.326
550 +	5.3	0.601	114.6	0.689
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	48.6	7.12		
C_3 POLY GASO.	87.5	6.23	1.042	
C_3 POLY TAR	12.5	0.89	0.118	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00			68.0
C_4 POLY GASO.	5.98	13.01	2.176	1.5
C_4H_{10}	4.86	(6.45) 6.11	1.327 1.258	68.0
C_4-FREE GASO.			12.965	5.8
C_4 POLY TAR	7.53	1.86	0.247	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	16.399	1.0536	5712	
GAS OIL	1.326	0.0852	462	
FUEL OIL	0.689	0.0443	240	
POLY TAR	0.365	0.0235	127	
TOTAL	18.779	1.2066	6541	
W. S. CHEM.	2.309	0.1484	805	
TOTAL	21.088	1.3550	7346	

Form ML—11

** Included in Reactor Effluent Total

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-A
HOURS 0-16

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

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

CATALYST DATA						
INVENTORY DATA		PARTICLE SIZE				
In Reactor at Start of Period		Screen Analysis			Sedimentation	
Fresh Catalyst Added		Mesh	Microns	%	Microns	%
Total		On 40	419+		80+	
Catalyst Recovered	70½	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 0-21-3/8	add one ft.	<325				
1 21-3/8-52-3/4	79	CATALYST				
2 52-3/4-84	75	Bulk Density, Lbs./Cu.Ft.				
3 84-115 3/8	87	Aerated				
4 115 3/8-353 1/8	275	Settled				
		Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	161	N_2 Surface, m^2/gm.				
Inventory, Lbs.	1877					
Bed Depth, Ft.	17.67	CHEMICAL ANALYSIS				
Vol., Cu. Ft.	11.66	Fe				
		C				
		O				
		H				
		K_2O, W+, % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	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	36.954	15.470	533.30	6.433	0.794	22.24	2.726	18.196	3.520	-14.676	-411.06
H_2 2.016	60.510	25.331	51.07	36.301	4.483	9.04	15.381	40.712	19.864	-20.848	42.03
CO_2 44.010	2.090	0.875	38.51	31.453	3.884	170.93	13.327	14.202	17.211	3.009	132.42
N_2 28.016	0.133	0.056	1.57	1.660	0.205	5.74	0.703	0.759	0.908		
CH_4 16.042	0.313	0.131	2.10	12.040	1.487	23.85	5.102	5.233	6.589	1.356	21.75
C_2H_4 28.052				2.463	0.304	8.53	1.044	1.044	1.348	0.304	8.53
C_2H_6 30.068				1.930	0.238	7.16	0.818	0.818	1.056	0.238	7.16
C_1+C_2											37.44
C_3H_6 42.078				3.083	0.381	16.03	1.306	1.306	1.687	0.381	16.03
C_3H_8 44.094				0.283	0.035	1.54	0.120	0.120	0.155	0.035	1.54
C_4H_8 56.104				2.090	0.258	14.47	0.886	0.886	1.144	0.258	14.47
C_4H_{10} 58.120				0.800	0.099	5.75	0.339	0.339	0.438	0.099	5.75
C_5H_{10} 70.130				0.937	0.116	8.14	0.397	0.397	0.513	0.116	8.14
C_5H_{12} 72.146				0.237	0.029	2.09	0.100	0.100	0.129	0.029	2.09
C_6H_{12} 84.156				0.290	0.036	3.03	0.123	0.123	0.159	0.036	3.03
C_3-C_6											51.05
TOTAL		41.863	526.55		12.349	298.53	42.372	84.235	53.472		
H_2+CO	97.464	40.801	15484 SCFH		5.277		18.107	58.908	23.384	-35.524	
H_2/CO		1.64	Factor 645827		5.64		5.64	2.24	5.64	1.42	

Weight Recovery, % 90.39	Catalyst Age, hrs.	Space Velocity, vhv 1292	RECOVERED OIL**	0.493	69.16
Pressure, psig 416	Inlet Velocity, Ft/sec 0.96	Catalyst Vol CF 11.98	TOTAL OIL		120.21
Temperature, °F 661	Bed Depth, Ft 18.15	Weight, # 1964	WATER SOLUBLE CHEMICALS **	0.287	15.25
Recycle Ratio 1.01	Bed Density, #/CF 164	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ = 12.18	TOTAL LIQUID PRODUCTS C_3+		135.46
			NET WATER **	7.971	143.61
			GROSS WATER		158.86
			HYDROCARBON TOTAL—C_1+		172.90

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+
70.50	94.87	82.30	87.07	80.66	51.21	60.30	78.35

YIELD BASIS H_2+CO FED

CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
8.552			
1.405			
0.551			
0.462			
2.418			
1.035	4.32	3.711	0.240
0.099	4.24	0.363	0.023
0.935	5.00	2.894	0.187
0.371	4.86	1.183	0.076
0.526	5.45	1.494	0.096
0.135	5.25	0.398	0.026
0.196	5.54	0.547	0.035
3.297		10.590	0.683
4.467		10.749	0.694
7.764		21.339	1.377
0.985		1.916	0.124
8.749		23.255	1.501
9.275		17.240	1.113
10.260		19.156	1.237
11.166			

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	80.6	8.664	98.0	8.491
400-550	12.8	1.376	91.4	1.258
550 +	6.6	0.709	114.6	0.813

	RECOVERY %	#/hr	gal/hr
PROPYLENE	48.5	7.77	
C_3 POLY GASO.	87.5	6.80	1.137
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	12.66	2.117	1.5
C_4H_{10}	4.86	5.75	1.183	68.0
C_4-FREE GASO.			12.067	5.8
C_4 POLY TAR	7.53	1.81	0.240	

	gal/hr	gal/MCF	Bbl/Day
10 # RVF 400 EP GASOLINE	15.367	0.9924	5380
GAS OIL	1.258	0.0812	440
FUEL OIL	0,813	0.0525	285
POLY TAR	0.369	0.0238	129
TOTAL	17.807	1.1499	6234
W. S. CHEM.	1.916	0.1237	671
TOTAL	19.723	1.2736	6905

Form ML—11

** Included in Reactor Effluent Total

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-B
HOURS 16-40

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	442	Fresh Feed	15887
Natural Gas	436	Recycle	15159
Generator Outlet	421	Combined Feed	31046
Reactor Inlet	416	Wet Gas—Measured	3813
Condenser Inlet		Adjusted	4686
Product Accumulator	386	Loss	873
TEMPERATURES—°F.		Recycle/Fresh Feed	1.01
Oxygen	491	Inlet Velocity—ft./sec.	0.96
Natural Gas	800	Fresh Feed Rate—S.C.F.H. CO+H_2	15484
Generator		per Cu. Ft. Dense Bed	1292
Quench Accumulator	115	per Lb. Catalyst	7.88
Reactor Inlet	268	per Sq. Ft.	23460
Condenser Inlet	604		
Product Accumulator	94		
Catalyst No. Height			
1 See Per. A			
2	655		
3	653		
4	668		
5	666		
6	667		
7	659		
8	645		
9	642		
10	656		
11	674		

PRODUCT TESTS	OIL	WATER
°API	51.6	10.6
Neut. No.	45.4	32.0
Sap. No.	61.0	33.8
Hydrox. No.		
Bromine No.	98	
Pour °F.		
Chemicals, % by K_2CO_3		10.0
HEMPEL. DIST. %		°API
205 °F.		
400	79.6	55.2
400-550	12.8	32.0
550+	7.6	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	96	
10%	130	
50%	222	
90%	350	
EP	396	
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	63½	100	150		40—80	
In Reactor at End of Period		150	105		20—40	
		200	74		10—20	
REACTOR d-p, Inches H_2O		250	62		0—20	
No. Height		325	44			
0 See Period A	add 1 ft	325				
1	80	CATALYST				
2	76	Bulk Density, Lbs./Cu.Ft.				
3	90	Aerated				
4	295	Settled				
Total	541	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	164	N_2 Surface, m^2/gm.				
Inventory, Lbs.	1964					
Bed Depth, Ft.	18.15	CHEMICAL ANALYSIS				
Vol., Cu. Ft.	11.98	Fe				
		C				
		O				
		H				
		K_2O, W+, % basis Fe				
		X-Ray Analysis—				
		Fe_2OC_2				
		Fe_3O_4				
		Fe				

RUN NO. 65-C
HOURS 40-64
CATALYST Bethlehem M111
Scale Reduced @ 800°F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED			
					At Wt. Balance							CONDENSATE			
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	36.456	15.297	428.47	8.320	1.053	29.49	3.581	18.878	4.634	-14.244	-398.98				
H_2 2.016	60.903	25.555	51.52	37.816	4.786	9.65	16.274	41.829	21.060	-20.769	41.87				
CO_2 44.010	1.957	0.821	36.13	30.057	3.804	167.44	12.935	13.756	16.739	2.983	131.31	8.470			
N_2 28.016	0.197	0.083	2.33	1.620	0.205	5.74	0.697	0.780	0.902						
CH_4 16.042	0.487	0.204	3.27	11.090	1.404	22.52	4.773	4.977	6.177	1.200	19.25	1.242			
C_2H_4 28.052				2.293	0.290	8.14	0.987	0.987	1.277	0.290	8.14	0.525			
C_2H_6 30.068				1.730	0.219	6.58	0.745	0.745	0.964	0.219	6.58	0.424			
C_1+C_2											33.97	2.191			
C_3H_6 42.078				2.807	0.355	14.94	1.208	1.208	1.563	0.355	14.94	0.964	4.32	3.458	0.223
C_3H_8 44.094				0.267	0.034	1.50	0.115	0.115	0.149	0.034	1.50	0.097	4.24	0.354	0.023
C_4H_8 56.104				1.897	0.240	13.46	0.816	0.816	1.056	0.240	13.46	0.868	5.00	2.692	0.174
C_4H_{10} 58.120				0.750	0.095	5.52	0.323	0.323	0.418	0.095	5.52	0.356	4.86	1.136	0.073
C_5H_{10} 70.130				0.843	0.107	7.50	0.363	0.363	0.470	0.107	7.50	0.484	5.45	1.376	0.089
C_5H_{12} 72.146				0.247	0.031	2.24	0.106	0.106	0.137	0.031	2.24	0.144	5.25	0.427	0.028
C_6H_{12} 84.156				0.263	0.033	2.78	0.113	0.113	0.146	0.033	2.78	0.179	5.54	0.502	0.032
C_3-C_6											47.94	3.092		9.945	0.642
TOTAL		41.960	521.72		12.656	297.51	43.035	84.995	64.217						
H_2+CO	97.359	40.852	15503	SCFH	5.839		19.855	60.707	25.694	-35.013					
H_2/CO		1.67	Factor	645036	4.54		4.54	2.22	4.54	1.46					

Weight Recovery, %	93.59	Catalyst Age, hrs.		Space Velocity, vhv	1275	RECOVERED OIL**	0.498	69.85	4.506	10.868	0.701
Pressure, psig	416	Inlet Velocity, Ft/sec	1.00	Catalyst Vol CF	12.16	TOTAL OIL		117.79	7.598	20.813	1.343
Temperature, °F	659	Bed Depth, Ft	18.43	Weight, #	2006	WATER SOLUBLE CHEMICALS**	0.277	14.72	0.949	1.863	0.120
Recycle Ratio	1.03	Bed Density, #/CF	165	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$	= 9.81	TOTAL LIQUID PRODUCTS C_3+		132.51	8.547	22.676	1.463
						NET WATER **	7.751	139.64	9.007	16.764	1.081
						GROSS WATER		154.36	9.957	18.627	1.202
						HYDROCARBON TOTAL—C_1+		166.48	10.739		

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+
69.84	93.12	81.27	85.71	75.45	49.65	57.68	79.60

YIELD BASIS BROWNSVILLE DESIGN FEED RATE*

YIELDS	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	83.3	9.053	98.0	8.872
400-550	12.4	1.348	91.4	1.232
550 +	4.3	0.467	114.6	0.535

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	47.4	7.08		
C_3 POLY GASO.	87.5	6.19	1.035	
C_3 POLY TAR	12.5	0.89	0.118	

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.17	0.034	68.0
C_4 POLY GASO.	5.98	11.63	1.945	1.5
C_4H_{10}	4.86	5.52	1.136	68.0
C_4-FREE GASO.			12.212	5.8
C_4 POLY TAR	7.53	1.66	0.220	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	15.327	0.9886	5360
GAS OIL	1.232	0.0795	431
FUEL OIL	0.535	0.0345	187
POLY TAR	0.338	0.0218	118
TOTAL	17.432	1.1244	6096
W. S. CHEM.	1.863	0.1202	651
TOTAL	19.295	1.2446	6747

Form ML—11

** Included in Reactor Effluent Total

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-C
HOURS 40-64

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	444	Fresh Feed	15924
Natural Gas	436	Recycle	16332
Generator Outlet	421	Combined Feed	32256
Reactor Inlet	416	Wet Gas—Measured	4072
Condenser Inlet		Adjusted	4803
Product Accumulator	386	Loss	731
TEMPERATURES—°F.		Recycle/Fresh Feed	1.03
Oxygen	466	Inlet Velocity—ft./sec.	1.00
Natural Gas	796	Fresh Feed Rate—S.C.F.H. CO+H_2	15503
Generator		per Cu. Ft. Dense Bed	1275
Quench Accumulator	141	per Lb. Catalyst	7.73
Reactor Inlet	271	per Sq. Ft.	23489
Condenser Inlet	594		
Product Accumulator	89		
Catalyst No. Height			
1 See Per. A			
2	654		
3	651		
4	664		
5	663		
6	664		
7	656		
8	646		
9	639		
10	641		
11	663		

PRODUCT TESTS		
	OIL •	WATER
°API	51.8	10.7
Neut. No.	46.8	35.5
Sap. No.	58.7	38.3
Hydrox. No.		
Bromine No.	101	
Pour °F.		
Chemicals, % by K_2CO_3		10.0
HEMPEL, DIST. %		°API
205 °F.		
400	82.3	54.6
400-550	12.4	35.1
550+	5.3	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	100	
10%	132	
50%	212	
90%	354	
EP	398	
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	62½	100	150		40—80	
In Reactor at End of Period		150	105		20—40	
		200	74		10—20	
REACTOR d-p, Inches H_2O		250	62		0—20	
No. Height		325	44			
0 See Period A		<325				
1	80	CATALYST				
2	76	Bulk Density, Lbs./Cu.Ft.				
3	92	Aerated				
4	305	Settled				
Total	553	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	165	N_2 Surface, m^2/gm.				
Inventory, Lbs.	2006					
Bed Depth, Ft.	18.43	CHEMICAL ANALYSIS				
Vol., Cu. Ft.	12.16	Fe				
		C				
		O				
		H				
		K_2O, W+, % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	YIELD BASIS H_2+CO FED CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	37.330	15.454	432.86	8.717	1.134	31.76	3.722	19.176	4.856	-14.320	-401.10				
H_2 2.016	60.063	24.864	50.13	37.554	4.887	9.85	16.036	40.900	20.923	-19.977	-40.28				
CO_2 44.010	1.957	0.810	35.65	30.263	3.939	173.38	12.923	13.733	16.862	3.129	137.73	9.002			
N_2 28.016	0.163	0.067	1.88	1.410	0.183	5.13	0.602	0.669	0.785						
CH_4 16.042	0.487	0.202	3.24	10.893	1.418	22.75	4.652	4.854	6.070	1.216	19.15	1.275			
C_2H_4 28.052				2.363	0.307	8.61	1.009	1.009	1.316	0.307	8.61	0.563			
C_2H_6 30.068				1.740	0.226	6.80	0.743	0.743	0.969	0.226	6.80	0.444			
C_1+C_2											34.92	2.282			
C_3H_6 42.078				2.740	0.357	15.02	1.170	1.170	1.527	0.357	15.02	0.982	4.32	3.477	0.227
C_3H_8 44.094				0.213	0.028	1.23	0.091	0.091	0.119	0.028	1.23	0.080	4.24	0.290	0.019
C_4H_8 56.104				1.917	0.249	13.97	0.819	0.819	1.068	0.249	13.97	0.913	5.00	2.794	0.183
C_4H_{10} 58.120				0.760	0.099	5.75	0.325	0.325	0.424	0.099	5.75	0.376	4.86	1.183	0.077
C_5H_{10} 70.130				0.883	0.115	8.06	0.377	0.377	0.492	0.115	8.06	0.527	5.45	1.479	0.097
C_5H_{12} 72.146				0.260	0.034	2.45	0.111	0.111	0.145	0.034	2.45	0.160	5.25	0.467	0.031
C_6H_{12} 84.156				0.287	0.037	3.11	0.123	0.123	0.160	0.037	3.11	0.203	5.54	0.561	0.037
C_3-C_6											49.59	3.241		10.251	0.671
TOTAL		41.397	523.76		13.013	307.87	42.703	84.100	64.064						
H_2+CO	97.393	40.318	15300 SCFH		6.021		19.758	60.076	25.779	-34.297					
H_2/CO		1.61	Factor 653594		4.31		4.31	2.13	4.31	1.40					

Weight Recovery, % 93.46	Catalyst Age, hrs.	Space Velocity, vhv 1248	RECOVERED OIL**	0.458	64.21	4.197	10.002	0.654
Pressure, psig 417	Inlet Velocity, Ft/sec 0.99	Catalyst Vol CF 12.26	TOTAL OIL		113.90	7.438	20.253	1.325
Temperature, °F 661	Bed Depth, Ft 18.58	Weight, # 2023	WATER SOLUBLE CHEMICALS **	0.273	14.46	0.945	1.830	0.120
Recycle Ratio 1.03	Bed Density, #/CF 165	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ = 9.54	TOTAL LIQUID PRODUCTS C_3+		128.26	8.383	22.083	1.445
			NET WATER **	7.617	137.22	8.969	16.473	1.077
			GROSS WATER		151.68	9.914	18.303	1.196
			HYDROCARBON TOTAL—C_1+		163.18	10.665		

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

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL. %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	83.4	8.342	98.0	8.175
400-550	12.8	1.280	91.4	1.170
550 +	3.8	0.380	114.6	0.435

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	45.3	6.80		
C_3 POLY GASO.	87.5	5.95	0.995	
C_3 POLY TAR	12.5	0.85	0.113	

	#/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	(5.75) 5.56	(1.183) 1.145	68.0
C_4-FREE GASO.			11.677	5.8
C_4 POLY TAR	7.53	1.75	0.232	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	14.866	0.9716	5268
GAS OIL	1.170	0.0765	415
FUEL OIL	0.435	0.0284	154
POLY TAR	0.345	0.0225	122
TOTAL	16.816	1.0990	5959
W. S. CHEM.	1.830	0.1196	648
TOTAL	18.646	1.2186	6607

Form ML—11

** Included in Reactor Effluent Total

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-D
HOURS 64-88

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	445	Fresh Feed	15710
Natural Gas	436	Recycle	16206
Generator Outlet	421	Combined Feed	31916
Reactor Inlet	417	Wet Gas—Measured	4192
Condenser Inlet		Adjusted	4939
Product Accumulator	386	Loss	747
TEMPERATURES—°F.		Recycle/Fresh Feed	1.03
Oxygen	437	Inlet Velocity—ft./sec.	0.99
Natural Gas	813	Fresh Feed Rate—S.C.F.H.	15300
Generator		per Cu. Ft. Dense Bed	1248
Quench Accumulator	126	per Lb. Catalyst	7.56
Reactor Inlet	286	per Sq. Ft.	23182
Condenser Inlet	586		
Product Accumulator	92	Heat Transfer Calculations	
Catalyst No. Height		Steam Rate = 379#/hr	
1 See Per. A		@ 707 psia & 505°F=	
2	658	1201 BTU/#	
3	656	Water in @ 57°F=25 BTU/#	
4	668	Net Heat Transferred/# Steam	
5	665	= 1176 BTU	
6	665	(1176)(379)=445704	
7	655	Ave. Bed Temp=661°F	
8	646	dT=661-505=156°F	
9	638	Tube Area= 33.8 sq ft	
10	635	$K = \frac{445704}{(33.8)(156)} =$	
11	633	84.5 BTU/°F/sq ft	

PRODUCT TESTS	OIL	WATER
°API	52.0	10.7
Neut. No.	48.5	35.9
Sap. No.	61.0	38.6
Hydrox. No.		
Bromine No.		
Pour °F.		
Chemicals, % by K_2CO_3		10.0
HEMPEL. DIST. %		°API
205 °F.		
400	82.4	55.1
400-550	12.8	34.2
550+	4.8	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	100	
10%	130	
50%	210	
90%	348	
EP	396	
Rec.	96.5	

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	47	100	150		40—80	
In Reactor at End of Period		150	105		20—40	
		200	74		10—20	
REACTOR d-p, Inches H_2O		250	62		0—20	
No. Height		325	44			
0 See Period A	add 1 ft	<325				
1	81	CATALYST				
2	76	Bulk Density, Lbs./Cu.Ft.				
3	91	Aerated				
4	310	Settled				
Total	559	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	165	N_2 Surface, m^2/gm.				
Inventory, Lbs.	2023					
Bed Depth, Ft.	18.58	CHEMICAL ANALYSIS				
Vol., Cu. Ft.	12.26	Fe				
		C				
		O				
		H				
		K_2O, W+, % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr
CO 28.010	37.000	15.287	428.19	9.487	1.267	35.49	4.077	19.364	5.344	-14.020	-392.70
H_2 2.016	60.413	24.960	50.32	38.616	5.158	10.40	16.593	41.553	21.751	-19.802	-39.92
CO_2 44.010	1.917	0.792	34.86	29.243	3.908	171.97	12.566	13.358	16.474	3.116	137.11
N_2 28.016	0.197	0.081	2.27	1.447	0.193	5.41	0.622	0.703	0.815		
CH_4 16.042	0.473	0.195	3.13	10.136	1.354	21.72	4.355	4.550	5.709	1.159	18.59
C_2H_4 28.052				2.197	0.293	8.22	0.944	0.944	1.237	0.293	8.22
C_2H_6 30.068				1.693	0.226	6.80	0.727	0.727	0.953	0.226	6.80
C_1+C_2											33.61
C_3H_6 42.078				2.920	0.390	16.41	1.255	1.255	1.645	0.390	16.41
C_3H_8 44.094				0.297	0.040	1.76	0.128	0.128	0.168	0.040	1.76
C_4H_8 56.104				1.960	0.262	14.70	0.842	0.842	1.104	0.262	14.70
C_4H_{10} 58.120				0.677	0.090	5.23	0.291	0.291	0.381	0.090	5.23
C_5H_{10} 70.130				0.893	0.119	8.35	0.384	0.384	0.503	0.119	8.35
C_5H_{12} 72.146				0.177	0.024	1.73	0.076	0.076	0.100	0.024	1.73
C_6H_{12} 84.156				0.257	0.034	2.86	0.110	0.110	0.144	0.034	2.86
C_3-C_6											51.04
TOTAL		41.315	518.77		13.358	311.05	42.970	84.285	64.482		
H_2+CO	97.413	40.247	15273 SCFH		6.425		20.670	60.917	27.095	-33.822	
H_2/CO		1.65	Factor 654750		4.07		4.07	2.15	4.07	1.41	

YIELD BASIS H_2+CO FED	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
RECOVERED OIL**	0.421	59.04	3.866	9.156	0.599
TOTAL OIL		110.08	7.206	19.764	1.293
WATER SOLUBLE CHEMICALS **	0.267	14.18	0.928	1.794	0.117
TOTAL LIQUID PRODUCTS C_3+		124.26	8.134	21.558	1.410
NET WATER **	7.466	134.50	8.806	16.147	1.057
GROSS WATER		148.68	9.735	17.941	1.175
HYDROCARBON TOTAL—C_1+		157.87	10.337		

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	83.4	7.636	98.0	7.483
400-550	12.8	1.172	91.4	1.071
550 +	3.8	0.348	114.6	0.399

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	44.0	7.22		
C_3 POLY GASO.	87.5	6.32	1.057	
C_3 POLY TAR	12.5	0.90	0.120	

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.13	0.026	68.0
C_4 POLY GASO.	5.98	12.75	2.132	1.5
C_4H_{10}	4.86	5.23	1.076	68.0
C_4-FREE GASO.			10.918	5.8
C_4 POLY TAR	7.53	1.82	0.242	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	14.152	0.9266	5024
GAS OIL	1.071	0.0701	380
FUEL OIL	0.399	0.0261	142
POLY TAR	0.362	0.0237	128
TOTAL	15.984	1.0465	5674
W. S. CHEM.	1.794	0.1175	637
TOTAL	17.778	1.1640	6311

Weight Recovery, %	95.88	Catalyst Age, hrs.	
Pressure, psig	416	Inlet Velocity, Ft/sec	1.00
Temperature, °F	668	Bed Depth, Ft	18.47
Recycle Ratio	1.04	Bed Density, #/CF	167

Space Velocity, vhv	1253	Catalyst Vol CF	12.19
Weight, #	2035	Effluent Shift Ratio $(H_2)(CO_2)/(H_2O)(CO)$	= 8.98

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+
67.67	91.71	79.33	84.04	72.40	47.65	55.52	78.71

Form ML—11

** Included in Reactor Effluent Total

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-E
HOURS 88-112

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	445	Fresh Feed	15679
Natural Gas	436	Recycle	16307
Generator Outlet	420	Combined Feed	31986
Reactor Inlet	416	Wet Gas—Measured	4438
Condenser Inlet		Adjusted	5070
Product Accumulator		Loss	632
TEMPERATURES—°F.		Recycle/Fresh Feed	1.04
Oxygen	484	Inlet Velocity—ft./sec.	1.00
Natural Gas	804	Fresh Feed Rate—S.C.F.H. CO+H_2	15273
Generator		per Cu. Ft. Dense Bed	1253
Quench Accumulator	127	per Lb. Catalyst	7.51
Reactor Inlet	288	per Sq. Ft.	23140
Condenser Inlet	586		
Product Accumulator	94		
Catalyst No. Height			
1 See Per. A			
2	368		
3	662		
4	674		
5	672		
6	672		
7	662		
8	652		
9	644		
10	640		
11	628		

PRODUCT TESTS	OIL	WATER
°API	51.2	10.7
Neut. No.	46.6	33.3
Sap. No.	61.6	37.1
Hydrox. No.		
Bromine No.	91	
Pour °F.		
Chemicals, % by K_2CO_3		10.0
HEMPEL, DIST. %		°API
205 °F.		
400	82.4	54.2
400-550	12.8	34.4
550+	4.8	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	98	
10%	130	
50%	210	
90%	350	
EP	398	
Rec.	96.5	

CATALYST DATA	
INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 See Period A	
1	81
2	77
3	93
4	310
Total	561
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	167
Inventory, Lbs.	2035
Bed Depth, Ft.	18.47
Vol., Cu. Ft.	12.19

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

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

Forced on Wet Gas, Oil and Water

	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	37.163	15.325	429.25	8.793	1.177	32.96	3.801	19.126	4.978	-14.148	-396.29				
H_2 2.016	60.534	24.962	50.32	39.343	5.266	10.62	17.005	41.967	22.271	-19.696	-39.70				
CO_2 44.010	1.743	0.719	31.64	28.860	3.863	170.00	12.474	13.193	16.337	3.144	138.36	9.064			
N_2 28.016	0.183	0.075	2.10	1.857	0.248	6.95	0.803	0.879	1.051						
CH_4 16.042	0.377	0.155	2.49	10.230	1.369	21.95	4.422	4.577	5.791	1.214	19.46	1.277			
C_2H_4 28.052				2.310	0.309	8.67	0.998	0.998	1.307	0.309	8.67	0.569			
C_2H_6 30.068				1.693	0.227	6.83	0.732	0.732	0.959	0.227	6.83	0.448			
C_1+C_2											34.96	2.294			
C_3H_6 42.078				2.457	0.329	13.84	1.062	1.062	1.391	0.329	13.84	0.908	4.32	3.204	0.210
C_3H_8 44.094				0.213	0.029	1.28	0.092	0.092	0.121	0.029	1.28	0.084	4.24	0.302	0.020
C_4H_8 56.104				1.863	0.249	13.97	0.805	0.805	1.054	0.249	13.97	0.917	5.00	2.794	0.183
C_4H_{10} 58.120				0.840	0.113	6.57	0.363	0.363	0.476	0.113	6.57	0.431	4.86	1.352	0.089
C_5H_{10} 70.130				0.927	0.124	8.70	0.401	0.401	0.525	0.124	8.70	0.571	5.45	1.596	0.105
C_5H_{12} 72.146				0.277	0.037	2.67	0.120	0.120	0.157	0.037	2.67	0.175	5.25	0.509	0.033
C_6H_{12} 84.156				0.337	0.045	3.79	0.146	0.146	0.191	0.045	3.79	0.249	5.54	0.684	0.045
C_3-C_6											50.82	3.334		10.441	0.685
TOTAL		41.236	515.80		13.385	308.80	43.223	84.459	64.728						
H_2+CO	97.697	40.287	15242 SCFH		6.443		20.806	61.093	27.249	-33.844					
H_2/CO		1.65	Factor 65608		4.47		4.47	2.19	4.47	1.39					

YIELD BASIS H_2+CO FED

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	84.2	7.680	98.0	7.526
400-550	11.6	1.058	91.4	0.967
550 +	4.2	0.383	114.6	0.439

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	43.8	6.06		
C_3 POLY GASO.	87.5	5.30	0.886	
C_3 POLY TAR	12.5	0.76	0.101	

	#/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	(6.57) 5.40	(1.352) 1.112	68.0
C_4-FREE GASO.			11.201	5.8
C_4 POLY TAR	7.53	1.75	0.232	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	14.357	0.9419	5107
GAS OIL	0.967	0.0634	344
FUEL OIL	0.439	0.0288	156
POLY TAR	0.333	0.0218	118
TOTAL	16.096	1.0559	5725
W. S. CHEM.	1.884	0.1236	670
TOTAL	17.980	1.1795	6395

Weight Recovery, %	94.14	Catalyst Age, hrs.		Space Velocity, vhv	1244	RECOVERED OIL**	0.416	58.34	3.828		9.121	0.598	GAS OIL	0.967	0.0634	344
Pressure, psig	415	Inlet Velocity, Ft/sec	1.00	Catalyst Vol CF	12.25	TOTAL OIL		109.16	7.162		19.562	1.283	FUEL OIL	0.439	0.0288	156
Temperature, °F	668	Bed Depth, Ft	1856	Weight, #	2021	WATER SOLUBLE CHEMICALS**	0.281	14.92	0.979		1.884	0.124	POLY TAR	0.333	0.0218	118
Recycle Ratio	1.05	Bed Density, #/CF	165	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ = 9.85		TOTAL LIQUID PRODUCTS C_3+		124.08	8.141		21.446	1.407	TOTAL	16.096	1.0559	5725
						NET WATER **	7.423	133.74	8.774		16.055	1.053	W. S. CHEM.	1.884	0.1236	670
						GROSS WATER		148.66	9.753		17.939	1.177	TOTAL	17.980	1.1795	6395
						HYDROCARBON TOTAL—C_1+		159.04	10.434							

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+
67.54	92.32	78.90	82.07	73.97	46.93	55.40	78.02

Form ML—11

** Included in Reactor Effluent Total

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-F
HOURS 112-136

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	445	Fresh Feed	15649
Natural Gas	435	Recycle	16403
Generator Outlet	420	Combined Feed	32052
Reactor Inlet	415	Wet Gas—Measured	4359
Condenser Inlet		Adjusted	5080
Product Accumulator	385	Loss	721
TEMPERATURES—°F		Recycle/Fresh Feed	1.05
Oxygen	470	Inlet Velocity—ft./sec.	1.00
Natural Gas	786	Fresh Feed Rate—S.C.F.H.	15242
Generator		per Cu. Ft. Dense Bed	1244
Quench Accumulator	110	per Lb. Catalyst	7.54
Reactor Inlet	285	per Sq. Ft.	23094
Condenser Inlet	589		
Product Accumulator	93		
Catalyst No. Height			
1 See Per. A			
2	669		
3	663		
4	674		
5	675		
6	675		
7	665		
8	655		
9	646		
10	643		
11	627		

PRODUCT TESTS	OIL	WATER
°API	52.7	10.7
Neut. No.	48.3	35.6
Sap. No.	60.8	37.4
Hydrox. No.		
Bromine No.		
Pour °F.	Below -30	
Chemicals, % by K_2CO_3		10.5
HEMPEL, DIST. %		°API
205 °F.		
400	83.2	53.8
400-550	11.6	34.3
550+	5.2	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	96	
10%	128	
50%	208	
90%	346	
EP	390	
Rec.	96.5	

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	12	150	105		20—40	
In Reactor at End of Period		200	74		10—20	
		250	62		0—20	
REACTOR d-p, Inches H_2O		325	44			
No. Height		<325				
0 See Period A						
1	79	CATALYST				
2	76	Bulk Density, Lbs./Cu.Ft.				
3	92	Aerated				
4	310	Settled				
Total	557	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	165	N_2 Surface, m^2/gm.				
Inventory, Lbs.	2021					
Bed Depth, Ft.	18.56	CHEMICAL ANALYSIS				
Vol., Cu. Ft.	12.25	Fe				
		C				
		O				
		H				
		K_2O, W+, % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

Forced

	FRESH FEED %	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	37.470	15.289	428.24	8.483	1.132	31.70	3.622	18.911	4.754	-14.157	-396.54				
H_2 2.016	60.126	24.535	49.46	38.272	5.108	10.30	16.342	40.877	21.450	-19.427	-39.16				
CO_2 44.010	2.150	0.877	38.60	30.663	4.092	180.07	13.094	13.971	17.186	3.215	141.47	9.361			
N_2 28.016	0.177	0.072	2.02	1.507	0.201	5.63	0.644	0.716	0.845						
CH_4 16.042	0.077	0.031	0.50	9.793	1.307	20.96	4.182	4.213	5.489	1.276	20.46	1.354			
C_2H_4 28.052				2.350	0.314	8.80	1.004	1.004	1.318	0.314	8.80	0.582			
C_2H_6 30.068				1.747	0.233	7.01	0.746	0.746	0.979	0.233	7.01	0.464			
C_1+C_2											36.27	2.400			
C_3H_6 42.078				3.187	0.425	17.90	1.361	1.361	1.786	0.425	17.90	1.184	4.32	4.144	0.274
C_3H_8 44.094				0.287	0.038	1.67	0.123	0.123	0.161	0.038	1.67	0.111	4.24	0.394	0.026
C_4H_8 56.104				1.860	0.249	13.95	0.794	0.794	1.043	0.249	13.95	0.923	5.00	2.790	0.185
C_4H_{10} 58.120				0.640	0.085	4.96	0.273	0.273	0.358	0.085	4.96	0.328	4.86	1.021	0.068
C_5H_{10} 70.130				0.867	0.116	8.11	0.370	0.370	0.486	0.116	8.11	0.537	5.45	1.488	0.098
C_5H_{12} 72.146				0.157	0.021	1.54	0.067	0.067	0.088	0.021	1.54	0.102	5.25	0.293	0.019
C_6H_{12} 84.156				0.187	0.025	2.13	0.080	0.080	0.105	0.025	2.13	0.141	5.54	0.384	0.025
C_3-C_6														10.514	0.695
TOTAL		40.804			13.346	314.71	42.703	83.507	63.972		50.26	3.326			
H_2+CO	97.596	39.824	15113 SCFH		6.240		19.964	59.788	26.204	-33.584					
H_2/CO		1.60	Factor 661681		4.51		4.51	2.16	4.51						

Weight Recovery, %	90.40	Catalyst Age, hrs.		Space Velocity, vhv	1208	RECOVERED OIL**	0.420	58.84	3.893
Pressure, psig	415	Inlet Velocity, Ft/sec	0.99	Catalyst Vol CF	12.52	TOTAL OIL		109.10	7.219
Temperature, °F	665	Bed Depth, Ft	18.97	Weight, #	2003	WATER SOLUBLE CHEMICALS**	0.289	15.32	1.014
Recycle Ratio	1.05	Bed Density, #/CF	160	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$	= 10.75	TOTAL LIQUID PRODUCTS C_3+		124.42	8.233

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY				
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+	NET WATER **	7.215	129.98	8.601
67.29	92.60	79.18	84.33	74.86	47.53	56.17	77.44	GROSS WATER		145.30	9.614
								HYDROCARBON TOTAL—C_1+		160.67	10.631

YIELD BASIS H_2+CO FED

400 EP	80.9	7.431	98.0	7.282
400-550	12.0	1.102	91.4	1.007
550 +	7.1	0.652	114.6	0.747

	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	43.3	7.75		
C_3 POLY GASO.	87.5	6.78	1.134	
C_3 POLY TAR	12.5	0.97	0.129	

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00	0.20	0.040	68.0
C_4 POLY GASO.	5.98	12.03	2.012	1.5
C_4H_{10}	4.86	4.96	1.021	68.0
C_4-FREE GASO.			10.581	5.8
C_4 POLY TAR	7.53	1.72	0.228	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	13.654	0.9035	4898
GAS OIL	1.007	0.0666	361
FUEL OIL	0.747	0.0494	268
POLY TAR	0.357	0.0236	128
TOTAL	15.765	1.0431	5655
W. S. CHEM.	1.929	0.1276	692
TOTAL	17.694	1.1707	6347

Form ML—11

** Included in Reactor Effluent Total

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-G
HOURS 136-160

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	446	Fresh Feed	15485
Natural Gas	437	Recycle	16206
Generator Outlet	419	Combined Feed	31691
Reactor Inlet	415	Wet Gas—Measured	4412
Condenser Inlet		Adjusted	5065
Product Accumulator	385	Loss	653
TEMPERATURES—°F.		Recycle/Fresh Feed	1.05
Oxygen	485	Inlet Velocity—ft./sec.	0.99
Natural Gas	792	Fresh Feed Rate—S.C.F.H.	15113
Generator		per Cu. Ft. Dense Bed	1207
Quench Accumulator	127	per Lb. Catalyst	7.55
Reactor Inlet	261	per Sq. Ft.	22898
Condenser Inlet	587		
Product Accumulator	90	Heat Transfer Calculations	
Catalyst No. Height		Steam Rate = 363 #/hr	
1 See Per. A		@ 705 psia & 506°F=	
2	663	1201 BTU/#	
3	657	Water in @ 61°F=29 BTU/#	
4	669	Net Heat Transferred/# Steam	
5	670	= 1172 BTU	
6	671	(1172)(363)=425436 BTU/hr	
7	661	Ave. Bed Temp.= 663°F	
8	653	dT=663-506=157°F	
9	645	Tube Area=34.4 sq ft	
10	641	K= $\frac{425436}{(34.4)(157)}$ =78.8 BTU/°F/sq ft	
11	623		

PRODUCT TESTS	OIL	WATER
°API	52.4	10.7
Neut. No.	51.1	36.2
Sap. No.	62.0	38.7
Hydrox. No.		
Bromine No.	96	
Pour °F.		
Chemicals, % by K_2CO_3		11.0
HEMPEL, DIST. %		°API
205 °F.		
400	79.9	54.5
400-550	12.0	32.5
550+	8.1	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	99	
10%	126	
50%	210	
90%	340	
EP		
Rec.	96	

CATALYST DATA	
INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	27
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 See Period A	
1	78
2	75
3	90
4	310
Total	553
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	160
Inventory, Lbs.	2003
Bed Depth, Ft.	18.97
Vol., Cu. Ft.	12.52

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

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

RUN NO. 65-H
HOURS 160-184
CATALYST Bethlehem M111
Scale Reduced @ 800°F

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

Forced

	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	37.737	15.461	433.01	8.007	1.111	31.12	3.460	18.921	4.571	-14.350	-401.89				
H_2 2.016	59.823	24.508	49.41	40.100	5.567	11.23	17.329	41.837	22.896	-18.951	-38.18				
CO_2 44.010	1.993	0.817	35.96	29.800	4.137	182.08	12.877	13.694	17.014	3.320	146.12	9.633			
N_2 28.016	0.177	0.073	2.05	1.333	0.185	5.18	0.576	0.649	0.761						
CH_4 16.042	0.270	0.111	1.78	9.654	1.340	21.49	4.172	4.283	5.512	1.229	19.71	1.299			
C_2H_4 28.052				2.213	0.307	8.62	0.956	0.956	1.263	0.307	8.62	0.568			
C_2H_6 30.068				1.670	0.232	6.97	0.722	0.722	0.964	0.232	6.97	0.459			
C_1+C_2											35.30	2.326			
C_3H_6 42.078				3.053	0.423	17.82	1.319	1.319	1.742	0.423	17.82	1.174	4.32	4.125	0.272
C_3H_8 44.094				0.323	0.045	1.98	0.140	0.140	0.185	0.045	1.98	0.131	4.24	0.467	0.031
C_4H_8 56.104				1.790	0.248	13.92	0.773	0.773	1.021	0.248	13.92	0.918	5.00	2.784	0.184
C_4H_{10} 58.120				0.697	0.097	5.62	0.301	0.301	0.398	0.097	5.62	0.370	4.86	1.156	0.076
C_5H_{10} 70.130				0.827	0.115	8.07	0.357	0.357	0.472	0.115	8.07	0.532	5.45	1.481	0.098
C_5H_{12} 72.146				0.320	0.044	3.18	0.138	0.138	0.182	0.044	3.18	0.210	5.25	0.606	0.040
C_6H_{12} 84.156				0.213	0.030	2.50	0.092	0.092	0.122	0.030	2.50	0.165	5.54	0.451	0.030
C_3-C_6											53.09	3.500		11.070	0.731
TOTAL		40.970	522.21		13.881	319.79	43.212	84.182	65.117						
H_2+CO	97.560	39.969	15169 SCFH		6.678		20.789	60.758	27.119	-33.301					
H_2/CO		1.59	Factor 65924		5.01		5.01	2.21	5.01	1.32					

Weight Recovery, %	88.14	Catalyst Age, hrs.		Space Velocity, vhv	1243	RECOVERED OIL**	0.395	55.41	3.653		8.659	0.571
Pressure, psig	414	Inlet Velocity, Ft/sec	1.00	Catalyst Vol CF	12.20	TOTAL OIL		108.50	7.153		19.729	1.302
Temperature, °F	663	Bed Depth, Ft	18.49	Weight, #	1928	WATER SOLUBLE CHEMICALS**	0.278	14.75	0.972		1.863	0.123
Recycle Ratio	1.05	Bed Density, #/CF	158	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$	=11.61	TOTAL LIQUID PRODUCTS C_3+		123.25	8.125		21.592	1.425
						NET WATER**	7.341	132.26	8.719		15.877	1.047
						GROSS WATER		147.01	9.691		17.740	1.169
						HYDROCARBON TOTAL—C_1+		158.55	10.452			

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+
66.12	92.81	77.33	83.32	75.84	45.30	54.81	77.74

YIELD BASIS H_2+CO FED

YIELDS	BASIS BROWNSVILLE DESIGN FEED RATE*			
	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	79.0	6.841	98.0	6.704
400-550	10.8	0.935	91.4	0.855
550 +	10.2	0.883	114.6	1.012
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	41.8	7.45		
C_3 POLY GASO.	87.5	6.52	1.090	
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	12.18	2.037	1.5
C_4H_{10}	4.86	(5.62) 5.09	(1.156) 1.047	68.0
C_4-FREE GASO.			10.332	5.8
C_4 POLY TAR	7.53	1.74	0.231	
	gal/hr	gal/MCF	Bbl/Day	
10# RVP 400 EP GASOLINE	13.416	0.8844	4795	
GAS OIL	0.855	0.0564	306	
FUEL OIL	1.012	0.0667	362	
POLY TAR	0.355	0.0234	127	
TOTAL	15.638	1.0309	5590	
W. S. CHEM.	1.863	0.1228	666	
TOTAL	17.501	1.1537	6256	

Form ML—11

** Included in Reactor Effluent Total

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-H
HOURS 160-184

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	446	Fresh Feed	15548
Natural Gas	435	Recycle	16399
Generator Outlet	419	Combined Feed	31947
Reactor Inlet	414	Wet Gas—Measured	4479
Condenser Inlet		Adjusted	5268
Product Accumulator	384	Loss	789
TEMPERATURES—°F.		Recycle/Fresh Feed	1.05
Oxygen	505	Inlet Velocity—ft./sec.	1.00
Natural Gas	784	Fresh Feed Rate—S.C.F.H.	15169
Generator		per Cu. Ft. Dense Bed	1243
Quench Accumulator	128	per Lb. Catalyst	7.87
Reactor Inlet	253	per Sq. Ft.	22983
Condenser Inlet	588		
Product Accumulator	90		
Catalyst No. Height			
1 See Per. A			
2	664		
3	654		
4	666		
5	669		
6	671		
7	663		
8	654		
9	646		
10	643		
11	622		

PRODUCT TESTS	OIL	WATER
°API	52.6	10.7
Neut. No.	50.9	35.7
Sap. No.	64.4	38.4
Hydrox. No.		
Bromine No.	96	
Pour °F.		
Chemicals, % by K_2CO_3		10.5
HEMPEL, DIST. %		°API
205 °F.		
400	78.0	54.4
400-550	10.8	34.2
550+	11.2	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	102	
10%	138	
50%	220	
90%	340	
EP	390	
Rec.	97.0	

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 Period A	
1	77
2	74
3	89
4	315
Total	555
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	158
Inventory, Lbs.	1928
Bed Depth, Ft.	18.49
Vol., Cu. Ft.	12.20

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

CATALYST	
Bulk Density, Lbs./Cu.Ft.	
Aerated	
Settled	
Compacted	
Particle Density, gm./cc.	
NH_3 Value, ml./gm.	
N_2 Surface, m^2/gm.	
CHEMICAL ANALYSIS	
Fe	
C	
O	
H	
K_2O, W+, % basis Fe	
X-Ray Analysis—	
$Fe_{22}C_9$	
Fe_3O_4	
Fe	

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO 28.010	37.014	15.113	423.30	7.957	1.063	29.76	3.367	18.480	4.430	-14.050	-393.54				
H_2 2.016	60.150	24.559	49.51	37.503	5.008	10.10	15.871	40.430	20.879	-19.551	-39.41				
CO_2 44.010	2.280	0.931	40.97	30.513	4.075	179.29	12.913	13.844	16.988	3.144	138.32	9.187			
N_2 28.016	0.313	0.128	3.59	1.480	0.198	5.54	0.626	0.754	0.824						
CH_4 16.042	0.243	0.099	1.59	10.327	1.379	22.12	4.370	4.469	5.749	1.280	20.53	6.364			
C_2H_4 28.052				2.480	0.331	9.29	1.049	1.049	1.380	0.331	9.29	0.617			
C_2H_6 30.068				1.843	0.246	7.40	0.780	0.780	1.026	0.246	7.40	0.491			
C_1+C_2											37.22	2.472			
C_3H_6 42.078				3.210	0.429	18.05	1.358	1.358	1.787	0.429	18.05	1.199	4.32	4.178	0.277
C_3H_8 44.094				0.280	0.038	1.67	0.118	0.118	0.156	0.038	1.67	0.111	4.24	0.394	0.026
C_4H_8 56.104				2.057	0.275	15.43	0.870	0.870	1.145	0.275	15.43	1.025	5.00	3.086	0.205
C_4H_{10} 58.120				0.837	0.111	6.47	0.354	0.354	0.465	0.111	6.47	0.430	4.86	1.331	0.088
C_5H_{10} 70.130				1.027	0.138	9.65	0.435	0.435	0.573	0.138	9.65	0.641	5.45	1.771	0.118
C_5H_{12} 72.146				0.213	0.028	2.02	0.090	0.090	0.118	0.028	2.02	0.134	5.25	0.385	0.026
C_6H_{12} 84.156				0.273	0.037	3.10	0.116	0.116	0.153	0.037	3.10	0.206	5.54	0.560	0.037
C_3-C_6											56.39	3.746		11.705	0.777
TOTAL		40.830	518.96		13.355	319.90	42.317	83.147	63.453						
H_2+CO	97.164	39.672	15056 SCFH		6.071		19.238	58.910	25.309	-33.601					
H_2/CO		1.63	Factor 664187		4.71		4.71	2.19	4.71	1.39					

Weight Recovery, %	94.79	Catalyst Age, hrs.		Space Velocity, vhv	1182	RECOVERED OIL **	0.405	56.86
Pressure, psig	414	Inlet Velocity, Ft/sec	0.99	Catalyst Vol CF	12.74	TOTAL OIL		113.25
Temperature, °F	667	Bed Depth, Ft	19.30	Weight, #	1936	WATER SOLUBLE CHEMICALS **	0.281	14.91
Recycle Ratio	1.04	Bed Density, #/CF	152	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ =	11.33	TOTAL LIQUID PRODUCTS C_3+		128.16
						NET WATER **	7.065	127.28
						GROSS WATER		142.19
						HYDROCARBON TOTAL—C_1+		165.38

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

YIELD BASIS H_2+CO FED

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	79.0	7.012	98.0	6.872
400-550	11.2	0.994	91.4	0.909
550 +	9.8	0.870	114.6	0.997

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

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

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

Form ML—11

** Included in Reactor Effluent Total

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-I
HOURS 184-208

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

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

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

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

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	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	37.413	15.055	421.69	12.380	1.800	50.41	5.348	20.403	7.148	-13.255	-371.28
H_2 2.016	59.984	24.137	48.66	40.427	5.876	11.85	17.464	41.611	23.340	-18.261	-36.81
CO_2 44.010	2.253	0.907	39.92	26.203	3.809	167.63	11.319	12.226	15.128	2.902	127.71
N_2 28.016	0.117	0.047	1.32	1.370	0.199	5.58	0.592	0.639	0.791		
CH_4 16.042	0.233	0.094	1.51	8.837	1.284	20.60	3.817	3.911	5.101	1.190	19.09
C_2H_4 28.052				2.107	0.306	8.58	0.910	0.910	1.216	0.306	8.58
C_2H_6 30.068				1.673	0.243	7.32	0.723	0.723	0.966	0.243	7.32
C_1+C_2											34.99
C_3H_6 42.078				2.657	0.386	16.23	1.148	1.148	1.534	0.386	16.23
C_3H_8 44.094				0.283	0.041	1.83	0.122	0.122	0.163	0.041	1.83
C_4H_8 56.104				1.897	0.276	15.49	0.819	0.819	1.095	0.276	15.49
C_4H_{10} 58.120				0.623	0.090	5.25	0.269	0.269	0.359	0.090	5.25
C_5H_{10} 70.130				1.007	0.146	10.25	0.435	0.435	0.581	0.146	10.25
C_5H_{12} 72.146				0.253	0.037	2.64	0.109	0.109	0.146	0.037	2.64
C_6H_{12} 84.156				0.283	0.041	3.48	0.122	0.122	0.163	0.041	3.48
C_3-C_6						340.09					55.17
TOTAL		40.240	513.07		14.535	327.12	43.199	83.439	65.167		
H_2+CO	97.397	39.192	14873 SCFH		7.676		22.812	62.014	30.488	-31.516	
H_2/CO		1.60	Factor 672359		3.27		3.27	2.04	3.27	1.38	

YIELD BASIS H_2+CO FED	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO				
H_2				
CO_2	8.587			
N_2				
CH_4	1.284			
C_2H_4	0.577			
C_2H_6	0.492			
C_1+C_2	2.353			
C_3H_6	1.091	4.32	3.757	0.253
C_3H_8	0.123	4.24	0.432	0.029
C_4H_8	1.041	5.00	3.098	0.208
C_4H_{10}	0.353	4.86	1.080	0.073
C_5H_{10}	0.689	5.45	1.881	0.126
C_5H_{12}	0.178	5.25	0.503	0.034
C_6H_{12}	0.234	5.54	0.628	0.042
C_3-C_6	3.709		11.379	0.765
TOTAL				
H_2+CO				
H_2/CO				

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	80.7	6.003	98.0	5.883
400-550	11.2	0.833	91.4	0.761
550 +	8.1	0.603	114.6	0.691
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	39.0	6.33		
C_3 POLY GASO.	87.5	5.54	0.926	
C_3 POLY TAR	12.5	0.79	0.105	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00			68.0
C_4 POLY GASO.	5.98	13.55	2.267	1.5
C_4H_{10}	4.86	(5.25) 5.07	(1.080) 1.043	68.0
C_4-FREE GASO.			9.821	5.8
C_4 POLY TAR	7.53	1.94	0.258	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	13.131	0.8829	4787	
GAS OIL	0.761	0.0512	278	
FUEL OIL	0.691	0.0465	252	
POLY TAR	0.363	0.0244	132	
TOTAL	14.946	1.0050	5449	
W. S. CHEM.	1.912	0.1286	697	
TOTAL	16.858	1.1336	6146	

Weight Recovery, %	93.02	Catalyst Age, hrs.		Space Velocity, vhv	1195
Pressure, psig	413	Inlet Velocity, Ft/sec	0.99	Catalyst Vol CF	12.45
Temperature, °F	663	Bed Depth, Ft	18.87	Weight, #	1880
Recycle Ratio	1.07	Bed Density, #/CF	151	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	7.26

RECOVERED OIL **	0.343	48.05	3.231		7.439	0.500	GAS OIL	0.761	0.0512	278
TOTAL OIL		103.22	6.940		18.818	1.265	FUEL OIL	0.691	0.0465	252
WATER SOLUBLE CHEMICALS **	0.289	15.32	1.030		1.912	0.129	POLY TAR	0.363	0.0244	132
TOTAL LIQUID PRODUCTS C_3+		118.54	7.970		20.730	1.394	TOTAL	14.946	1.0050	5449
NET WATER **	6.804	122.58	8.242		14.716	0.989	W. S. CHEM.	1.912	0.1286	697
GROSS WATER		137.90	9.272		16.628	1.118	TOTAL	16.858	1.1336	6146
HYDROCARBON TOTAL—C_1+		153.53	10.323							

FRESH FEED CONVERSION — %				TOTAL FEED CONVERSION — %			SELECTIVITY
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	C_3+/C_1+
63.88	88.04	75.66	80.41	64.97	43.89	50.82	77.21

Form ML—11

** Included in Reactor Effluent Total

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-J
HOURS 208-232

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	442	Fresh Feed	15271
Natural Gas	433	Recycle	16394
Generator Outlet	416	Combined Feed	31665
Reactor Inlet	413	Wet Gas—Measured	4708
Condenser Inlet		Adjusted	5516
Product Accumulator	383	Loss	808
TEMPERATURES—°F.		Recycle/Fresh Feed	1.07
Oxygen	498	Inlet Velocity—ft./sec.	0.99
Natural Gas	791	Fresh Feed Rate—S.C.F.H.	14873
Generator		per Cu. Ft. Dense Bed	1195
Quench Accumulator	125	per Lb. Catalyst	7.91
Reactor Inlet	285	per Sq. Ft.	22535
Condenser Inlet	591		
Product Accumulator	93		
Catalyst No. Height			
1 See Per. A			
2	661		
3	653		
4	666		
5	666		
6	669		
7	663		
8	654		
9	647		
10	643		
11	625		

PRODUCT TESTS	OIL	WATER
°API	50.9	10.6
Neut. No.	54.0	37.4
Sap. No.	69.1	40.4
Hydrox. No.		
Bromine No.	91	
Pour °F.	Below -30	
Chemicals, % by K_2CO_3		11.5
HEMPEL, DIST. %		°API
205 °F.		
400	79.7	54.4
400-550	11.2	33.1
550+	9.1	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	100	
10%	130	
50%	222	
90%	340	
EP	386	
Rec.	96.0	

CATALYST DATA	
INVENTORY DATA	
In Reactor at Start of Period	
K_2CO_3 Catalyst Added	20
Total	
Catalyst Recovered	123
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 See Period A	
1	72
2	72
3	85
4	290
Total	519
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	151
Inventory, Lbs.	1880
Bed Depth, Ft.	18.87
Vol., Cu. Ft.	12.45

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

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	CONDENSATE #/MCF	CONDENSATE #/gal	CONDENSATE gal/hr	CONDENSATE gal/MCF
CO 28.010	37.517	15.240	426.88	11.453	1.691	47.35	4.904	20.144	6.595	-13.549	+379.53				
H_2 2.016	59.813	24.297	48.98	40.560	5.990	12.08	17.369	41.666	23.359	-18.307	-36.90				
CO_2 44.010	2.213	0.899	39.56	27.090	3.999	176.03	11.601	12.500	15.600	3.100	136.47	9.096			
N_2 28.016	0.187	0.076	2.13	1.320	0.195	5.46	0.565	0.641	0.760						
CH_4 16.042	0.270	0.110	1.76	8.950	1.321	21.20	3.833	3.943	5.154	1.211	19.44	1.296			
C_2H_4 28.052				1.990	0.294	8.24	0.852	0.852	1.146	0.294	8.24	0.549			
C_2H_6 30.068				1.653	0.244	7.35	0.708	0.708	0.952	0.244	7.35	0.490			
C_1+C_2											35.03	2.335			
C_3H_6 42.078				2.517	0.372	15.66	1.078	1.078	1.450	0.372	15.66	1.044	4.32	3.625	0.242
C_3H_8 44.094				0.247	0.036	1.60	0.106	0.106	0.142	0.036	1.60	0.107	4.24	0.377	0.025
C_4H_8 56.104				1.827	0.270	15.15	0.782	0.782	1.052	0.270	15.15	1.010	5.00	3.030	0.202
C_4H_{10} 58.120				0.783	0.115	6.71	0.335	0.335	0.450	0.115	6.71	0.447	4.86	1.381	0.092
C_5H_{10} 70.130				0.983	0.145	10.17	0.421	0.421	0.566	0.145	10.17	0.678	5.45	1.866	0.124
C_5H_{12} 72.146				0.330	0.049	3.51	0.141	0.141	0.190	0.049	3.51	0.234	5.25	0.669	0.045
C_6H_{12} 84.156				0.297	0.044	3.69	0.127	0.127	0.171	0.044	3.69	0.246	5.54	0.666	0.044
C_3-C_6											56.49	3.766		11.614	0.774
TOTAL		40.622	51.931		14.765	334.20	42.822	83.444	64.963						
H_2+CO	97.330	39.537	15004 SCFH		7.681		22.273	61.810	29.954	-31.856					
H_2/CO		1.59	Factor 666488		3.54		3.54	2.07	3.54	1.35					

Weight Recovery, %	91.31	Catalyst Age, hrs.		Space Velocity, vhv	1198	RECOVERED OIL **	0.341	47.85	3.189
Pressure, psig	412	Inlet Velocity, Ft/sec	0.99	Catalyst VolCF	12.52	TOTAL OIL		104.34	6.955
Temperature, °F	664	Bed Depth, Ft	18.97	Weight, #	1840	WATER SOLUBLE CHEMICALS **	0.300	15.93	1.062
Recycle Ratio	1.05	Bed Density, #/CF	147	Effluent $(H_2)(CO_2)$ / Shift Ratio $(H_2O)(CO)$ =	8.20	TOTAL LIQUID PRODUCTS C_3+		120.27	8.017
						NET WATER **	6.735	121.33	8.086
						GROSS WATER		137.26	9.148
						HYDROCARBON TOTAL—C_1+		155.30	10.351

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

YIELD BASIS H_2+CO FED

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	80.3	5.929	98.0	5.810
400-550	11.2	0.827	91.4	0.756
550 +	8.5	0.628	114.6	0.720

	RECOVERY %	#/hr	gal/hr	
PROPYLENE	38.8	6.08		
C_3 POLY GASO.	87.5	5.32	0.890	
C_3 POLY TAR	12.5	0.76	0.101	

	#/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	(6.71) 5.06	(1.381) 1.041	68.0
C_4-FREE GASO.			9.901	5.8
C_4 POLY TAR	7.53	1.89	0.251	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	13.159	0.8770	4755
GAS OIL	0.756	0.0504	273
FUEL OIL	0.720	0.0480	260
POLY TAR	0.352	0.0235	127
TOTAL	14.987	0.9989	5415
W. S. CHEM.	1.986	0.1324	718
TOTAL	16.973	1.1313	6133

Form ML—11

** Included in Reactor Effluent Total

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-K
HOURS 232-256

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	441	Fresh Feed	15416
Natural Gas	434	Recycle	16251
Generator Outlet	415	Combined Feed	31667
Reactor Inlet	412	Wet Gas—Measured	4693
Condenser Inlet		Adjusted	5603
Product Accumulator	382	Loss	910
TEMPERATURES—°F.		Recycle/Fresh Feed	1.05
Oxygen	503	Inlet Velocity—ft./sec.	0.99
Natural Gas	805	Fresh Feed Rate—S.C.F.H.	15004
Generator		per Cu. Ft. Dense Bed	1198
Quench Accumulator	134	per Lb. Catalyst	8.15
Reactor Inlet	278	per Sq. Ft.	22733
Condenser Inlet	589		
Product Accumulator	93		
Catalyst No. Height			
1 See Per. A			
2	663		
3	658		
4	669		
5	667		
6	670		
7	664		
8	654		
9	646		
10	642		
11	625		

PRODUCT TESTS	OIL	WATER
°API	50.3	10.6
Neut. No.	54.3	38.4
Sap. No.	70.1	40.4
Hydrox. No.		
Bromine No.	91	
Pour °F.		
Chemicals, % by K_2CO_3		12.0
HEMPEL, DIST. %		°API
205 °F.		
400	79.3	51.6
400-550	11.2	34.0
550+	9.5	
A. S. T. M. DIST. ON	Naphtha	
Naphtha °F.	°F	
IBP	112	
10%	142	
50%	228	
90%	346	
EP	396	
Rec.	97.0	

CATALYST DATA	
INVENTORY DATA	
In Reactor at Start of Period	
Fresh Catalyst Added	
Total	
Catalyst Recovered	22
In Reactor at End of Period	
REACTOR d-p, Inches H_2O	
No. Height	
0 See Period A	
1	70
2	71
3	82
4	285
Total	508
CALCULATED FROM dp	
Density, Lbs./Cu.Ft.	147
Inventory, Lbs.	1840
Bed Depth, Ft.	18.97
Vol., Cu. Ft.	12.52

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

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

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMBINED FEED m/hr	EFFLUENT m/hr	NET CHANGE m/hr	NET CHANGE #/hr	YIELD BASIS H_2+CO FED — CONDENSATE #/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	37.033	15.112	423.27	11.187	1.646	46.10	4.606	19.718	6.252	-13.466	-377.17				
H_2 2.016	60.557	24.710	49.81	42.044	6.185	12.47	17.313	42.023	23.498	-18.525	-37.34				
CO_2 44.010	2.010	0.820	36.09	26.613	3.914	172.26	10.958	11.778	14.872	3.094	136.17	9.010			
N_2 28.016	0.183	0.075	2.10	1.260	0.185	5.18	0.519	0.594	0.704						
CH_4 16.042	0.217	0.089	1.43	8.613	1.267	20.33	3.546	3.635	4.813	1.178	18.90	1.251			
C_2H_4 28.052				2.023	0.298	8.36	0.833	0.833	1.131	0.298	8.36	0.553			
C_2H_6 30.068				1.630	0.240	7.22	0.671	0.671	0.911	0.240	7.22	0.478			
C_1+C_2											34.48	2.282			
C_3H_6 42.078				2.293	0.337	14.18	0.944	0.944	1.281	0.337	14.18	0.938	4.32	3.282	0.217
C_3H_8 44.094				0.193	0.028	1.23	0.079	0.079	0.107	0.028	1.23	0.081	4.24	0.290	0.019
C_4H_8 56.104				1.787	0.263	14.76	0.736	0.736	0.999	0.263	14.76	0.977	5.00	2.952	0.195
C_4H_{10} 58.120				0.720	0.106	6.16	0.296	0.296	0.402	0.106	6.16	0.408	4.86	1.267	0.084
C_5H_{10} 70.130				1.057	0.153	10.73	0.427	0.427	0.580	0.153	10.73	0.710	5.48	1.969	0.130
C_5H_{12} 72.146				0.273	0.040	2.89	0.112	0.112	0.152	0.040	2.89	0.191	5.25	0.550	0.036
C_6H_{12} 84.156				0.327	0.048	4.04	0.135	0.135	0.183	0.048	4.04	0.267	5.54	0.729	0.048
C_3-C_6											53.99	3.572		11.039	0.729
TOTAL		40.806	512.70		14.710	325.91	41.175	81.981	63.424						
H_2+CO	97.590	39.822	15113	SCFH	7.831		21.919	61.741	29.750	-31.991					
H_2/CO		1.64	Factor	661681	3.76		3.76	2.13	3.76	1.38					

Weight Recovery, %	84.03	Catalyst Age, hrs.		Space Velocity, vhv 1231		RECOVERED OIL **	0.329	46.18	3.056	7.111	0.471
Pressure, psig	410	Inlet Velocity, Ft/sec	0.98	Catalyst Vol CF	12.28	TOTAL OIL		100.17	6.628	18.150	1.200
Temperature, °F	667	Bed Depth, Ft	12.60	Weight, #	1756	WATER SOLUBLE CHEMICALS **	0.306	16.23	1.074	2.036	0.135
Recycle Ratio	1.01	Bed Density, #/CF	143	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ =	8.10	TOTAL LIQUID PRODUCTS C_3+		116.40	7.702	20.186	1.335
FRESH FEED CONVERSION = %				TOTAL FEED CONVERSION = %		NET WATER **	6.904	124.38	8.230	14.932	0.988
Contraction	CO	H_2	H_2+CO	CO	H_2	CO+H_2	SELECTIVITY C_3+/C_1+	GROSS WATER		140.61	9.304	16.968	1.123
63.95	89.11	74.97	80.33	68.29	44.08	51.81	77.15	HYDROCARBON TOTAL—C_1+		150.88	9.983		

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*

	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	80.7	5.739	98.0	5.624
400-550	10.8	0.768	91.4	0.702
550 +	8.5	0.604	114.6	0.692

	RECOVERY %	#/hr	gal/hr
PROPYLENE	39.1	5.54	
C_3 POLY GASO.	87.5	4.85	0.811
C_3 POLY TAR	12.5	0.69	0.092

	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00			68.0
C_4 POLY GASO.	5.98	12.92	2.160	1.5
C_4H_{10}	4.86	(6.16) 4.94	(1.267) 1.017	68.0
C_4-FREE GASO.			9.683	5.8
C_4 POLY TAR	7.53	1.84	0.244	

	gal/hr	gal/MCF	Bbl/Day
10 # RVP 400 EP GASOLINE	12.860	0.8509	4613
GAS OIL	0.702	0.0465	252
FUEL OIL	0.692	0.0458	248
POLY TAR	0.336	0.0222	120
TOTAL	14.590	0.9654	5233
W. S. CHEM.	2.036	0.1347	730
TOTAL	16.626	1.1001	5963

Form ML-11

** Included in Reactor Effluent Total

g/NCM = 16.91 × #/MCF

*9488 MCFH H_2 + CO, Bbl/Day = 5431.6 × gal/MCF

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-L
HOURS 256-280

OPERATING CONDITIONS				PRODUCT TESTS		
PRESSURES PSIG		RATES S.C.F.H.			OIL	WATER
Oxygen	439	Fresh Feed	15486	°API	49.9	10.7
Natural Gas	432	Recycle	15626	Neut. No.	54.6	38.4
Generator Outlet	414	Combined Feed	31112	Sap. No.	70.0	40.7
Reactor Inlet	410	Wet Gas—Measured		Hydrox. No.		
Condenser Inlet		Adjusted		Bromine No.	91	
Product Accumulator	382	Loss	1314	Pour °F.		
				Chemicals, % by K_2CO_3		12.0
TEMPERATURES—°F.		Recycle/Fresh Feed	1.01			
Oxygen	479	Inlet Velocity—ft./sec.	0.98			
Natural Gas	804	Fresh Feed Rate—S.C.F.H.	15113	HEMPEL DIST. %		°API
Generator		per Cu. Ft. Dense Bed	1231	205 °F.		
Quench Accumulator	124	per Lb. Catalyst	8.61	400	79.7	50.4
Reactor Inlet	281	per Sq. Ft.	22898	400-550	10.8	35.1
Condenser Inlet	589			550+	9.5	
Product Accumulator	96					
Catalyst No. Height				A. S. T. M. DIST. ON		
1 See Per. A				Naphtha °F.		
2	666			IBP	116	
3	661			10%	146	
4	672			50%	226	
5	671			90%	346	
6	674			EP	398	
7	668			Rec.	97.5	
8	655					
9	647					
10	644					
11	625					

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	18	100	150		40-80	
In Reactor at End of Period		150	105		20-40	
		200	74		10-20	
REACTOR d-p, Inches H_2O		250	62		0-20	
No. Height		325	44			
0 See Period A		<325				
1	68	CATALYST				
2	69	Bulk Density, Lbs./Cu.Ft.				
3	79	Aerated				
4	268	Settled				
Total	484	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.	1756					
Bed Depth, Ft.	12.60	CHEMICAL ANALYSIS				
Vol., Cu. Ft.	12.28	Fe				
		C				
		O				
		H				
		K_2O, Wt. % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		YIELD BASIS H_2+CO FED			
					At Wt. Balance							CONDENSATE			
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	m/hr	m/hr	m/hr	#/hr	#/MCF	#/gal	gal/hr	gal/MCF
CO 28.010	37.100	15.042	421.32	10.757	1.568	43.92	4.709	19.751	6.277	-13.474	-377.40				
H_2 2.016	60.257	24.431	49.25	41.897	6.106	12.31	18.342	42.773	24.448	-18.325	36.94				
CO_2 44.010	2.200	0.892	39.26	27.333	3.984	175.34	11.966	12.858	15.950	3.092	136.08	9.084			
N_2 28.016	0.290	0.118	3.31	1.400	0.204	5.72	0.613	0.731	0.817						
CH_4 16.042	0.153	0.062	0.99	8.757	1.276	20.47	3.833	3.895	5.109	1.214	19.48	1.300			
C_2H_4 28.052				2.013	0.293	8.22	0.881	0.881	1.174	0.293	8.22	0.549			
C_2H_6 30.068				1.643	0.239	7.19	0.719	0.719	0.958	0.239	7.19	0.480			
C_1+C_2											34.89	2.329			
C_3H_6 42.078				2.447	0.357	15.02	1.071	1.071	1.428	0.357	15.02	1.003	4.32	3.477	0.232
C_3H_8 44.094				0.253	0.037	1.63	0.111	0.111	0.148	0.037	1.63	0.109	4.24	0.384	0.026
C_4H_8 56.104				1.600	0.233	13.07	0.700	0.700	0.933	0.233	13.07	0.872	5.00	2.614	0.174
C_4H_{10} 58.120				0.620	0.090	5.23	0.271	0.271	0.361	0.090	5.23	0.349	4.86	1.076	0.072
C_5H_{10} 70.130				0.843	0.123	8.63	0.369	0.369	0.492	0.123	8.63	0.576	5.45	1.583	0.106
C_5H_{12} 72.146				0.190	0.028	2.02	0.083	0.083	0.111	0.028	2.02	0.135	5.25	0.385	0.026
C_6H_{12} 84.156				0.247	0.036	3.03	0.108	0.108	0.144	0.036	3.03	0.202	5.54	0.547	0.037
C_3-C_6											48.63	3.246		10.066	0.673
TOTAL		40.545	514.13		14.574	321.75	43.776	84.321	65.988						
H_2+CO	97.357	39.473	14980 SCFH		7.674		23.051	62.524	30.725	-31.799					
H_2/CO		1.62	Factor 667556		3.89		3.90	2.17	3.89	1.36					

YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	81.0	6.293	98.0	6.167
400-550	9.0	0.699	91.4	0.639
550 +	10.0	0.777	114.6	0.890

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

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

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

Weight Recovery, %	81.20	Catalyst Age, hrs.		Space Velocity, vhv	1220	RECOVERED OIL **	0.359	50.42	3.366		7.769	0.519
Pressure, psig	408	Inlet Velocity, Ft/sec	1.02	Catalyst Vol CF	12.28	TOTAL OIL		99.05	6.612		17.835	1.192
Temperature, °F	667	Bed Depth, Ft	18.61	Weight, #	1682	WATER SOLUBLE CHEMICALS **	0.309	16.39	1.094		2.056	0.137
Recycle Ratio	1.08	Bed Density, #/CF	137	Effluent Shift Ratio $\frac{(H_2)(CO_2)}{(H_2O)(CO)}$ =	8.91	TOTAL LIQUID PRODUCTS C_3+		115.44	7.706		19.891	1.329
						NET WATER **	6.970	125.57	8.383		15.074	1.006
						GROSS WATER		141.96	9.477		17.130	1.144
						HYDROCARBON TOTAL—C_1+		150.33	10.035			

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

Form ML—11

** Included in Reactor Effluent Total

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-M
HOURS 280-304

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	440	Fresh Feed	15387
Natural Gas	431	Recycle	16613
Generator Outlet	413	Combined Feed	32000
Reactor Inlet	408	Wet Gas—Measured	4068
Condenser Inlet		Adjusted	5531
Product Accumulator	381	Loss	1463
TEMPERATURES—°F.		Recycle/Fresh Feed	1.08
Oxygen	484	Inlet Velocity—ft./sec.	1.02
Natural Gas	806	Fresh Feed Rate—S.C.F.H.	14980
Generator		per Cu. Ft. Dense Bed	1220
Quench Accumulator	128	per Lb. Catalyst	8.91
Reactor Inlet	278	per Sq. Ft.	22697
Condenser Inlet	589		
Product Accumulator	92		
Catalyst No. Height			
1 See Per. A			
2	666		
3	661		
4	673		
5	670		
6	674		
7	668		
8	656		
9	648		
10	646		
11	626		

PRODUCT TESTS	OIL	WATER
° API	50.0	10.7
Neut. No.	53.7	36.9
Sap. No.	69.5	40.7
Hydrox. No.		
Bromine No.	93	
Pour °F.		
Chemicals, % by K_2CO_3		12.0
HEMPEL DIST. %		°API
205 °F.		
400	80.0	50.8
400-550	9.0	33.9
550+	11.0	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	112	
10%	142	
50%	226	
90%	346	
EP	388	
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	33	100	150		40—80	
In Reactor at End of Period		150	105		20—40	
		200	74		10—20	
REACTOR d-p, Inches H_2O		250	62		0—20	
No. Height		325	44			
0 See Period A		<325				
1	66	CATALYST				
2	66	Bulk Density, Lbs./Cu.Ft.				
3	75	Aerated				
4	257	Settled				
Total	464	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.	1682					
Bed Depth, Ft.	18.61	CHEMICAL ANALYSIS				
Vol., Cu. Ft.	12.28	Fe				
		C				
		O				
		H				
		K_2O, W+, % basis Fe				
		X-Ray Analysis—				
		$Fe_{20}C_9$				
		Fe_3O_4				
		Fe				

RUN NO. 65-N
HOURS 304-326

THE TEXAS COMPANY — MONTEBELLO LABORATORY
YIELD CALCULATIONS

Overall Effluent Forced

CATALYST Bethlehem Mill Scale Reduced @ 800°F

	FRESH FEED			WET GAS			RECYCLE	COMBINED FEED	EFFLUENT	NET CHANGE		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	37.007	15.106	423.08	10.000	1.388	38.88	4.108	19.214	5.496	-13.718	384.20				
H_2 2.016	60.513	24.700	49.80	41.973	5.826	11.75	17.242	41.942	23.068	-18.874	38.05				
CO_2 44.010	2.143	0.875	38.51	27.877	3.869	170.27	11.452	12.327	15.321	2.994	131.76	8.722			
N_2 28.016	0.200	0.082	2.30	1.470	0.204	5.72	0.604	0.686	0.808						
CH_4 16.042	0.137	0.056	0.90	8.660	1.202	19.28	3.558	3.614	4.760	1.146	18.38	1.217			
C_2H_4 28.052				2.010	0.279	7.83	0.826	0.826	1.105	0.279	7.83	0.518			
C_2H_6 30.068				1.657	0.230	6.92	0.681	0.681	0.911	0.230	6.92	0.458			
C_1+C_2											33.13	2.193			
C_3H_6 42.078				2.460	0.341	14.35	1.011	1.011	1.352	0.341	14.35	0.950	4.32	3.322	0.220
C_3H_8 44.094				0.230	0.032	1.41	0.094	0.094	0.126	0.032	1.41	0.093	4.24	0.333	0.022
C_4H_8 56.104				1.623	0.225	12.62	0.667	0.667	0.892	0.225	12.62	0.835	5.00	2.524	0.167
C_4H_{10} 58.120				0.673	0.093	5.41	0.276	0.276	0.369	0.093	5.41	0.358	4.86	1.113	0.074
C_5H_{10} 70.130				0.837	0.116	8.14	0.344	0.344	0.460	0.116	8.14	0.539	5.45	1.494	0.099
C_5H_{12} 72.146				0.257	0.036	2.60	0.106	0.106	0.142	0.036	2.60	0.172	5.25	0.495	0.033
C_6H_{12} 84.156				0.273	0.038	3.19	0.112	0.112	0.150	0.038	3.19	0.211	5.54	0.576	0.038
C_3-C_6											47.72	3.159		9.857	0.652
TOTAL		40.819	514.59		13.879	308.40	41.081	81.900	63.214						
H_2+CO	97.520	39.806	15107 SCFH		7.214		21.350	61.156	28.564	-32.592					
H_2/CO		1.64	Factor 661944		4.20		4.20	2.18	4.20	1.38					

Weight Recovery, %	81.36	Catalyst Age, hrs.		Space Velocity, vhv	1238	RECOVERED OIL**	0.372	52.14	3.451	8.077	0.535
Pressure, psig	408	Inlet Velocity, Ft/sec	0.99	Catalyst Vol CF	12.20	TOTAL OIL		99.86	6.610	17.934	1.187
Temperature, °F	668	Bed Depth, Ft	18.48	Weight, #	1623	WATER SOLUBLE CHEMICALS**	0.344	18.24	1.207	2.286	0.151
Recycle Ratio	1.01	Bed Density, #/CF	133	Effluent $\frac{(H_2)(CO_2)}{\text{Shift Ratio } (H_2O)(CO)}$	=8.53	TOTAL LIQUID PRODUCTS C_3+		118.10	7.817	20.220	1.338
						NET WATER **	7.538	135.81	8.990	16.303	1.079
						GROSS WATER		154.05	10.197	18.589	1.230
						HYDROCARBON TOTAL—C_1+		151.23	10.010		

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

YIELD BASIS H_2+CO FED				
YIELDS BASIS BROWNSVILLE DESIGN FEED RATE*	CORRECTED HEMPEL, %	gal/hr	TREATING RECOVERY, %	gal/hr
400 EP	81.0	6.542	98.0	6.411
400-550	11.6	0.937	91.4	0.856
550 +	7.4	0.598	114.6	0.685
	RECOVERY %	#/hr	gal/hr	
PROPYLENE	40.1	5.75		
C_3 POLY GASO.	87.5	5.03	0.841	
C_3 POLY TAR	12.5	0.72	0.096	
	#/gal	#/hr	gal/hr	RVP
C_4H_8	5.00			68.0
C_4 POLY GASO.	5.98	11.04	1.846	1.5
C_4H_{10}	4.86	4.77	0.982	68.0
C_4-FREE GASO.		12.644	9.817	5.8
C_4 POLY TAR	7.53	1.58	0.210	
	gal/hr	gal/MCF	Bbl/Day	
10 # RVP 400 EP GASOLINE	12.645	0.8370	4538	
GAS OIL	0.856	0.0567	307	
FUEL OIL	0.685	0.0453	246	
POLY TAR	0.306	0.0203	110	
TOTAL	14.492	0.9593	5201	
W. S. CHEM.	2.286	0.1513	820	
TOTAL	16.778	1.1106	6021	

Form ML—11

** Included in Reactor Effluent Total

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

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA SUMMARY

RUN NO. 65-N
HOURS 304-326

OPERATING CONDITIONS			
PRESSURES PSIG		RATES S.C.F.H.	
Oxygen	440	Fresh Feed	15491
Natural Gas	432	Recycle	15590
Generator Outlet	412	Combined Feed	31081
Reactor Inlet	408	Wet Gas—Measured	3862
Condenser Inlet		Adjusted	5267
Product Accumulator	381	Loss	1405
TEMPERATURES—°F.		Recycle/Fresh Feed	1.01
Oxygen	468	Inlet Velocity—ft./sec.	0.99
Natural Gas	787	Fresh Feed Rate—S.C.F.H.	15107
Generator		per Cu. Ft. Dense Bed	1238
Quench Accumulator	130	per Lb. Catalyst	9.31
Reactor Inlet	275	per Sq. Ft.	22889
Condenser Inlet	592		
Product Accumulator	86		
Catalyst No. Height			
1 See Per. A			
2	666		
3	662		
4	674		
5	671		
6	676		
7	671		
8	659		
9	651		
10	648		
11	629		

PRODUCT TESTS		
	OIL	WATER
° API	51.0	10.7
Neut. No.	54.5	36.0
Sap. No.	70.1	40.4
Hydrox. No.		
Bromine No.	93	
Pour °F.		
Chemicals, % by K_2CO_3		12.3
HEMPEL, DIST. %		°API
205 °F.		
400	80.0	52.0
400-550	11.6	32.8
550+	8.4	
A. S. T. M. DIST. ON		
Naphtha °F.		
IBP	102	
10%	136	
50%	226	
90%	340	
EP	386	
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	64	100	150		40—80	
In Reactor at End of Period		150	105		20—40	
		200	74		10—20	
REACTOR d-p, Inches H_2O		250	62		0—20	
No. Height		325	44			
0 See Period A		<325				
1	65	CATALYST				
2	65	Bulk Density, Lbs./Cu.Ft.				
3	72	Aerated				
4	245	Settled				
Total	447	Compacted				
		Particle Density, gm./cc.				
CALCULATED FROM dp		NH_3 Value, ml./gm.				
Density, Lbs./Cu.Ft.	133	N_2 Surface, m^2/gm.				
Inventory, Lbs.	1623					
Bed Depth, Ft.	18.48	CHEMICAL ANALYSIS				
Vol., Cu. Ft.	12.20	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. 65-A
HOURS 0-16

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1800	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.23	10.569 0.031			21.200	WET GAS	26.99 251.03	299.03
CO 28.010	37.04	37.54	37.26	37.280	15.667	15.667		15.667	CO_2 44.010	1.28	0.171	0.171		0.342	OIL	67.72	72.84
H_2 2.016	60.52	59.90	60.50	60.307	25.345		50.690		N_2 28.016	1.76	0.235				WATER	148.26	159.47
CO_2 44.010	1.98	2.26	2.04	2.093	0.880	0.880		1.760	CH_4 16.042	82.60	11.033	11.033	44.132		TOTAL	494.00	531.34
N_2 28.016	0.08	0.14	0.10	0.107	0.045				C_2H_6 30.068	6.71	0.896	1.792	5.376		FRESH FEED	531.34	
CH_4 16.042	0.38	0.16	0.10	0.213	0.090	0.090	0.360		C_3H_8 44.094	5.22	0.697	2.091	5.576		WEIGHT BALANCE	92.97	
			M. W	12.6432			51.050	17.427	C_4H_{10} 58.120	1.61	0.215	0.860	2.150		Forced Factor	1075587	
			H_2O 18.016				7.682	3.841	C_5H_{12} 72.146	0.59	0.079	0.395	0.948		WET GAS FACTOR	1191212	
					42.026	16.637	58.732	21.268	MW	20.0614					INDICATED LOSS—S C F H	1009	
			BALANCE		101.805	100.945	98.728		TOTAL			16.342	58.182	21.542			

WET GAS					GAS FLOW RATES										LIQUID PRODUCT RATES						
						$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
CO 28.010	6.23	5.69	3.71	5.210																
H_2 2.016	38.83	37.14	36.28	37.416	FRESH FEED		415.5	48	2.28976			OIL	4'8½"	251.11	36	1.0119	254.10	51.8		
CO_2 44.010	30.34	32.83	33.36	32.177	79.31	6.333	20.7412	1.0117	1.51319	15949	42.026		1'9½"	93.76	55	1.0025	93.99	6.427		
N_2 28.016	1.74	1.32	2.03	1.697	WET GAS		1.38	52	1.19615								+8.48		+54.5	
CH_4 16.042	11.19	10.82	11.87	11.293	158.44	5.621	4.010	1.0078	1.09368	3936	10.372						168.59		1083.53	67.72
C_2H_6 28.052	2.49	2.68	2.54	2.570	RECYCLE		415.2	64				16 hrs								10.537
C_2H_4 33.068	1.63	1.78	2.00	1.803	79.31	8.513	20.734	0.9962	1.09368	15252	40.189									
C_3H_6 42.078	2.70	3.23	2.52	2.817	BLEED		415.2	64												
C_3H_8 44.094	0.28	0.33	0.24	0.283	5.02	7.960	20.734	0.9962	1.09368	903	2.379	WATER								
C_4H_8 56.104	2.10	2.10	2.24	2.147	NATURAL GAS		436.1	173	1.44306		42.568		6'11¼"	367.86	58	1.0010	368.23	10.7		
C_4H_{10} 58.120	0.85	0.64	1.21	0.900	28.43	7.713	21.232	0.9064	1.2013	5069	13.357		2'2½"	117.17	62	0.9990	117.05	8.287		
C_5H_{10} 70.130	0.99	0.95	1.14	1.027	OXYGEN		440.2	46					2'4"	124.28	52	1.0049	124.89			
C_5H_{12} 72.146	0.29	0.18	0.42	0.297	27.07	6.853	21.3283	1.0137		4011	10.569		1'8½"	89.24	47	1.0064	89.81			
C_6H_{12} 84.156	0.34	0.31	0.44	0.363	STEAM		30.1										286.26		2372.24	148.26
			M. W.	24.2026	215.7	6.129	0.2920	386#/hr				15 hrs								17.891

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-B
HOURS 16-40

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.21	10.445 0.028			20.946	WET GAS	26.96 242.89	298.53
CO 28.010	36.87	37.22	36.77	36.954	15.470	15.470		15.470	CO_2 44.010	1.40	0.186	0.186		0.372	OIL	62.51	69.16
H_2 2.016	60.32	60.50	60.71	60.510	25.331		50.662		N_2 28.016	1.04	0.138				WATER	143.59	158.86
CO_2 44.010	1.96	2.01	2.30	2.090	0.875	0.875		1.750	CH_4 16.042	83.15	11.021	11.021	44.084		TOTAL	475.95	526.55
N_2 28.016	0.13	0.13	0.14	0.133	0.056				C_2H_6 30.068	6.74	0.893	1.786	5.358		FRESH FEED	526.55	
CH_4 16.042	0.72	0.14	0.08	0.313	0.131	0.131	0.524		C_3H_8 44.094	5.33	0.706	2.118	5.648		WEIGHT BALANCE	90.39	
			M. W	12.5780					C_4H_{10} 58.120	1.60	0.212	0.848	2.120		Forced Factor	1106313	
			H_2O 18.016				8.030	4.015	C_5H_{12} 72.146	0.53	0.070	0.350	0.840		WET GAS FACTOR	1229074	
					41.863	16.476	59.216	21.235	MW	20.0027					INDICATED LOSS—S C F H	1218	
			BALANCE		101.023	102.008	99.610		TOTAL			16.309	58.050	21.318			

WET GAS					GAS FLOW RATES										LIQUID PRODUCT RATES						
						$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL HR
CO 28.010	5.91	6.49	6.90	6.433																
H_2 2.016	36.06	36.55	36.29	36.301	FRESH FEED		416.0	52	2.30163			OIL	7'5½"	395.14	46	1.0069	397.87	51.6		
CO_2 44.010	31.34	30.72	32.30	31.453	79.31	6.313	20.7533	1.0078	1.51711	15887	41.863		4'8½"	251.11	35	1.0124	254.22	6.434		
N_2 28.016	1.36	1.84	1.78	1.660	WET GAS		1.43	55	1.19748											
CH_4 16.042	13.65	11.62	10.85	12.040	158.44	5.450	4.0162	1.0048	1.09429	3813	10.047		2'1"	109.84	35	1.0124	111.20			
C_2H_6 28.052	2.46	2.48	2.45	2.463	RECYCLE		415.4	67					0'5½"	24.34	35	1.0124	24.64			62.51
C_2H_4 33.068	1.88	2.01	1.90	1.930	79.31	8.479	20.7388	0.9933	1.09429	15159	39.945						230.21			9.715
C_3H_6 42.078	2.89	3.48	2.88	3.083	BLEED		415.4	67									+2.95 233.16		+19.00 1500.15	
C_3H_8 44.094	0.23	0.30	0.32	0.283	5.02	8.138	20.7388	0.9933	1.09429	921	2.427	WATER	7'3"	384.23	67	0.9993	383.96	10.6		
C_4H_8 56.104	2.04	2.22	2.01	2.090	NATURAL GAS		435.8	182	1.44730				2'4"	124.28	52	1.0006	124.35	8.293		
C_4H_{10} 58.120	0.70	0.92	0.78	0.800	28.43	7.700	21.2249	0.9000	1.20303	5030	13.254									
C_5H_{10} 70.130	0.93	0.94	0.94	0.937	OXYGEN		442.6	51				7 AM	3'1-3/4	169.21	58	1.0002	169.24			
C_5H_{12} 72.146	0.27	0.18	0.26	0.237	27.07	6.788	21.3845	1.0088		3964	10.445		0'3"	13.28	37	1.0010	13.29			143.59
C_6H_{12} 84.156	0.28	0.25	0.34	0.290	STEAM												415.56			17.315
			M. W.	24.1757	215.7	6.017														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-C
HOURS 40-64

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.21	10.422 0.028			20.900	WET GAS	26.21 252.23	297.51
CO 28.010	36.14	36.84	36.39	36.456	15.297	15.297		15.297	CO_2 44.010	1.39	0.186	0.186		0.372	OIL	65.37	69.85
H_2 2.016	60.70	60.94	61.07	60.903	25.555		51.110		N_2 28.016	1.54	0.206				WATER	144.46	154.36
CO_2 44.010	1.81	1.87	2.19	1.957	0.821	0.821		1.642	CH_4 16.042	83.73	11.205	11.205	44.820		TOTAL	488.27	521.72
N_2 28.016	0.19	0.12	0.28	0.197	0.083				C_2H_4 30.068	6.80	0.910	1.820	5.460		FRESH FEED	521.72	
CH_4 16.042	1.16	0.23	0.07	0.487	0.204	0.204	0.816		C_3H_8 44.094	4.72	0.632	1.896	5.056		WEIGHT BALANCE	93.59	
			M. W	12.43372			5.662	4.333	C_4H_{10} 58.120	1.27	0.170	0.680	1.700		Forced Factor	1068507	
			H_2O 18.016				7.164	3.582	C_5H_{12} 72.146	0.34	0.046	0.230	0.552		WET GAS FACTOR	1179518	
						16.322	59.090	20.521	MW	19.65163					INDICATED LOSS—S C F H	963	
			BALANCE			101.90	102.61	96.47	TOTAL			16.017	57.588	21.272			

WET GAS					GAS FLOW RATES										LIQUID PRODUCT RATES					
						$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL. HR
CO 28.010	7.36	8.30	9.30	8.320																
H_2 2.016	37.04	38.25	38.16	37.816	FRESH FEED		416.2	53	2328346			OIL	6'4½"	338.40	38	1.0109	342.09	51.8		
CO_2 44.010	29.98	29.57	30.62	30.057	79.31	6.296	20.758	1.0068	1.5259	15924	41.960		2'1"	109.84	35	1.0124	111.20	6.427		
N_2 28.016	1.42	1.83	1.61	1.620			1.39	52	1231548								+13.23		+85.00	65.37
CH_4 16.042	13.18	10.63	9.46	11.090	WET GAS 158.44	5.729	4.011	1.0078	1.1098	4072	10.730						244.12		1568.96	10.172
C_2H_4 28.052	2.31	2.24	2.33	2.293			415.9	68												
C_2H_6 33.068	1.68	1.78	1.73	1.730	RECYCLE 79.31	8.488	20.751	0.9924	1.1098	15385	40.540									
C_3H_6 42.078	2.89	2.63	2.90	2.807																
C_3H_8 44.094	0.27	0.25	0.28	0.267	BLEED 5.02	8.192	20.751	1.0000	1.1098	947	2.495	WATER	7'5½"	394.05	65	0.99953	393.86	10.7		
C_4H_8 56.104	1.90	1.97	1.82	1.897			435.8	179	1473160		43.035		3'1-¾	169.21	58	1.00018	169.24	8.287		
C_4H_{10} 58.120	0.67	0.97	0.61	0.750	NATURAL GAS 28.43	7.688	21.225	0.9021	1.2137	5079	13.383		4'9¼"	254.38	58	1.00018	254.43			
C_5H_{10} 70.130	0.83	0.94	0.76	0.843			444.0	53					1'2"	60.66	54	1.00047	60.69			144.46
C_5H_{12} 72.146	0.21	0.32	0.21	0.247	OXYGEN 27.07	6.775	21.417	1.0068		3955	10.422						418.36		3466.95	17.432
C_6H_{12} 84.156	0.26	0.32	0.21	0.263			30.2													
			M. W.	23.506994	STEAM 215.7	5.913														

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-D
HOURS 64-88

	GAS ANALYSES				GENERATOR BALANCE										WEIGHT BALANCE		
HOUR	1400	2200	0600	AVERAGE	M/HR	C	H	O		Mol %	M/Hr	C	H	O		#/hr Measured	At Wt. Balance
FRESH FEED									O_2 32.000	0.22	10.427 0.029			20.912	WET GAS	26.38 261.33	307.87
CO 28.010	37.38	37.25	37.36	37.330	15.454	15.454		15.454	CO_2 44.010	1.17	0.155	0.155		0.310	OIL	60.01	64.21
H_2 2.016	59.62	60.28	60.29	60.063	24.864		49.728		N_2 28.016	0.43	0.057				WATER	141.76	151.68
CO_2 44.010	1.84	2.14	1.89	1.957	0.810	0.810		1.620	CH_4 16.042	83.51	11.033	11.033	44.132		TOTAL	489.48	523.76
N_2 28.016	0.13	0.16	0.20	0.163	0.067				C_2H_4 30.068	6.80	0.898	1.796	5.388		FRESH FEED	523.76	
CH_4 16.042	1.03	0.17	0.26	0.487	0.202	0.202	0.808		C_3H_8 44.094	5.51	0.728	2.184	5.824		WEIGHT BALANCE	93.46	
			M. W	12.652069					C_4H_{10} 58.120	1.67	0.221	0.884	2.210		Forced Factor	1070033	
			H_2O 18.016				8.203	4.102	C_5H_{12} 72.146	0.69	0.091	0.455	1.092		WET GAS FACTOR	1178089	
						16.466	58.739	21.176	MW	20.045075					INDICATED LOSS—S C F H	973	
			BALANCE			99.75	100.16	99.78	TOTAL			16.507	58.646	21.222		5165	

WET GAS					GAS FLOW RATES										LIQUID PRODUCT RATES					
						$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	#/HR GAL. HR
CO 28.010	8.99	8.71	8.45	8.717																
H_2 2.016	38.23	37.48	36.95	37.554	FRESH FEED		416.5	59	2288163			OIL	7'2¼"	380.96	46	1.0069	383.59	52.0		
CO_2 44.010	28.93	30.99	30.87	30.263	79.31	6.300	20.765	1.0010	1.5127	15710	41.397		6'4½"	338.40	38	1.0109	342.09	6.420		
N_2 28.016	1.24	1.55	1.44	1.410			1.40	58	1223664				4'11¼"	263.11	43	1.0084	265.32			
CH_4 16.042	11.91	10.16	10.61	10.893	WET GAS 158.44	5.950	4.012	1.0019	1.1062	4192	11.046		1'8"	87.01	42	1.0089	87.78			
C_2H_4 28.052	2.29	2.36	2.44	2.363			415.8	72									+5.30		+34.00	60.01
C_2H_6 33.068	1.62	1.79	1.81	1.740	RECYCLE 79.31	8.471	20.748	0.9887	1.1062	15245	40.171						224.34		1440.26	9.348
C_3H_6 42.078	2.57	2.71	2.94	2.740																
C_3H_8 44.094	0.20	0.21	0.23	0.213	BLEED 5.02	8.342	20.748	1.0000	1.1062	961	2.532	WATER	7'1¼"	376.59	67	0.99932	376.33	10.7		
C_4H_8 56.104	1.83	1.86	2.06	1.917			435.9	185	1444245				4'9¼"	254.38	58	1.00018	254.43	8.287		
C_4H_{10} 58.120	0.75	0.75	0.78	0.760	NATURAL GAS 28.43	7.700	21.227	0.8979	1.2018	5014	13.212		6'7"	349.31	61	0.99992	349.28			
C_5H_{10} 70.130	0.90	0.85	0.90	0.883			444.6	60					1'2"	60.66	67	0.99932	60.62			141.76
C_5H_{12} 72.146	0.23	0.29	0.26	0.260	OXYGEN 27.07	6.821	21.431	1.0000		3957	10.427						410.56		3402.31	17.107
C_6H_{12} 84.156	0.31	0.29	0.26	0.287			29.4													
			M. W.	23.658438	STEAM 215.7	6.071	0.2893	379#/hr												

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-E
HOURS 88-112

	GAS ANALYSES			
HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	37.08	36.77	37.15	37.000
H_2 2.016	60.35	60.49	60.40	60.413
CO_2 44.010	1.91	1.92	1.92	1.917
N_2 28.016	0.12	0.33	0.14	0.197
CH_4 16.042	0.54	0.49	0.39	0.473
			M. W	12.5564
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	9.08	9.76	9.62	9.487
H_2 2.016	38.73	38.72	38.40	38.616
CO_2 44.010	29.38	29.15	29.20	29.243
N_2 28.016	1.50	1.47	1.37	1.447
CH_4 16.042	10.52	9.86	10.03	10.136
C_2H_6 28.052	2.23	2.13	2.23	2.197
C_2H_4 33.068	1.69	1.65	1.74	1.693
C_3H_8 42.078	2.83	2.96	2.97	2.920
C_3H_6 44.094	0.30	0.30	0.29	0.297
C_4H_8 56.104	1.87	1.98	2.03	1.960
C_4H_{10} 58.120	0.59	0.69	0.75	0.677
C_5H_{10} 70.130	0.92	0.86	0.90	0.893
C_5H_{12} 72.146	0.13	0.20	0.20	0.177
C_6H_{12} 84.156	0.23	0.27	0.27	0.257
			M. W.	23.2854

GENERATOR BALANCE									
M/HR	C	H	O		Mol %	M/Hr	C	H	O
				O_2 32.000	0.20	10.411 0.027			20.849
15.287	15.287		15.287	CO_2 44.010	1.40	0.186	0.186		0.372
24.960		49.920		N_2 28.016	0.73	0.097			
0.792	0.792		1.584	CH_4 16.042	82.74	10.989	10.989	43.956	
0.081				C_2H_6 30.068	7.01	0.931	1.862	5.586	
0.195	0.195	0.780		C_3H_8 44.094	5.61	0.745	2.235	5.960	
				C_4H_{10} 58.120	1.67	0.222	0.888	2.220	
		8.372	4.186	C_5H_{12} 72.146	0.64	0.085	0.425	1.020	
	16.274	59.072	21.057	MW	20.1716				
	98.12	100.56	99.23	TOTAL			16.585	58.742	21.221

GAS FLOW RATES												
	$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60
FRESH FEED 79.31	6.275	415.8	60	2.30559			OIL	7'3¼"	385.32	51	1.0044	387.02
		20.7484	1.0000	1.5184	15679	41.315		4'11¼"	263.11	43	1.0084	265.32
WET GAS 158.44	6.242	1.5	60	1.24326				2'9¾"	149.62	51	1.0044	150.28
		4.0249	1.0000	1.1150	4438	11.694		1'4½"	71.58	51	1.0044	71.89
RECYCLE 79.31	8.488	415.0	76									200.09
		20.7292	0.9850	1.1150	15326	40.385						+10.62 210.71
BLEED 5.02	8.454	415.0	60									
		20.7292	1.0000	1.1150	981	2.585	WATER	7'3½"	386.41	62	0.9998	386.33
NATURAL GAS 28.43	7.700	435.5	175	1.43518		42.970		6'7"	349.31	61	0.9999	349.28
		21.2530	0.9049	1.19798	5044	13.281		7'3½"	386.41	63	0.9997	386.29
OXYGEN 27.07	6.817	444.7	61					1'6¼"	79.27	53	1.0005	79.31
		21.4336	0.9990		2951	10.411		2'8"	142.71	63	0.9997	142.67
STEAM 215.7	6.142							1'5"	73.78	55	1.0004	73.81
												412.89

WEIGHT BALANCE		
	#/hr Measured	At Wt. Balance
WET GAS	25.96 272.30	311.05
OIL	56.61	59.04
WATER	142.57	148.68
TOTAL	497.44	518.77
FRESH FEED	518.77	
WEIGHT BALANCE	95.88	
Forced Factor	1042879	
WET GAS FACTOR	1142306	
INDICATED LOSS—S C F H 632		

LIQUID PRODUCT RATES				
API° #/GAL.	#	#/HR GAL HR
51.2		
6.448		
	1290.18	56.61
	1358.68	8.780
10.7		
8.287		
		142.57
	3421.62	17.204

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-F
HOURS 112-136

Forced

	GAS ANALYSES			
HOUR	1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	37.11	37.26	37.12	37.163
H_2 2.016	60.29	60.58	60.73	60.534
CO_2 44.010	1.59	1.79	1.85	1.743
N_2 28.016	0.25	0.17	0.13	0.183
CH_4 16.042	0.76	0.20	0.17	0.377
			M. W	12.5086
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	8.64	8.86	8.88	8.793
H_2 2.016	39.25	39.89	38.89	39.343
CO_2 44.010	28.61	28.49	29.48	28.860
N_2 28.016	1.64	1.86	2.07	1.857
CH_4 16.042	11.11	10.02	9.56	10.230
C_2H_6 28.052	2.37	2.34	2.22	2.310
C_2H_4 33.068	1.60	1.69	1.79	1.693
C_3H_8 42.078	2.68	2.60	2.09	2.457
C_3H_6 44.094	0.24	0.23	0.17	0.213
C_4H_8 56.104	1.88	1.82	1.89	1.863
C_4H_{10} 58.120	0.59	0.77	1.16	0.840
C_5H_{10} 70.130	0.88	0.89	1.01	0.927
C_5H_{12} 72.146	0.22	0.23	0.38	0.277
C_6H_{12} 84.156	0.29	0.31	0.41	0.337
			M. W.	23.0705

GENERATOR BALANCE									
M/HR	C	H	O		Mol %	M/Hr	C	H	O
				O_2 32.000	0.20	10.377 0.026			20.806
15.325	15.235		15.235	CO_2 44.010	1.30	0.171	0.171		0.342
24.962		49.924		N_2 28.016	1.02	0.134			
0.719	0.719		1.438	CH_4 16.042	83.34	10.985	10.985	43.940	
0.075				C_2H_6 30.068	6.86	0.904	1.808	5.424	
0.155	0.155	0.620		C_3H_8 44.094	5.21	0.687	2.061	5.496	
				C_4H_{10} 58.120	1.54	0.203	0.812	2.030	
		7.384	3.692	C_5H_{12} 72.146	0.53	0.070	0.350	0.840	
	16.109	57.928	20.365	MW	19.9287		16.187	57.730	20.464
	99.52	100.34	99.52	TOTAL					

GAS FLOW RATES												
	$\sqrt{h}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR	HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60
FRESH FEED 79.31	6.254	415.4	60	2.31440			OIL	6'7"	349.31	48	1.0059	351.37
		20.739	1.0000	1.5213	15649	41.236		2'9½"	149.62	51	1.0044	150.28
WET GAS 158.44	6.108	1.5	61	1.25484								201.09
		4.0249	0.9990	1.12019	4359	11.486						+5.00 206.09
RECYCLE 79.31	8.500	414.0	75									
		20.705	0.9859	1.12019	15414	40.617						
BLEED 5.02	8.496	414.0										
		20.705	1.0000	1.1209	989	2.606	WATER	7'5½"	395.14	70	0.99896	394.73
NATURAL GAS 28.43	7.700	435.1	191	1.45267		43.223		2'8"	142.71	63	0.9997	142.67
		21.208	0.8938	1.2053	5002	13.181		3'11"	209.64	64	0.99963	209.56
OXYGEN 27.07	6.800	444.7	62					1'1"	56.30	56	1.00033	56.32
		21.434	0.9981		3938	10.377						405.30
STEAM 215.7	6.096											

WEIGHT BALANCE		
	#/hr Measured	At Wt. Balance
WET GAS	264.99 25.72	308.80
OIL	54.92	58.34
WATER	139.95	148.66
TOTAL	485.58	515.80
FRESH FEED	515.80	
WEIGHT BALANCE	94.14	
Force Factor	1062234	
WET GAS FACTOR	116533	
INDICATED LOSS—S C F H 721		

LIQUID PRODUCT RATES				
API° #/GAL.	#	#/HR GAL HR
52.7		
6.396		
	1286.17 +32.00	54.92
	1318.17	8.587
10.7		
8.287		
		139.95
		16.888

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-G
HOURS 136-160

Forced

HOUR	GAS ANALYSES 1800	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	37.42	37.57	37.42	37.470
H_2 2.016	60.30	60.02	60.06	60.126
CO_2 44.010	1.97	2.24	2.24	2.150
N_2 28.016	0.21	0.10	0.22	0.177
CH_4 16.042	0.10	0.07	0.06	0.077
			M. W	12.7156
			H_2O 18.016	
			BALANCE	
WET GAS 1400				
CO 28.010	8.29	8.61	8.55	8.483
H_2 2.016	37.99	39.20	37.63	38.272
CO_2 44.010	30.11	30.54	31.34	30.663
N_2 28.016	1.54	1.38	1.60	1.507
CH_4 16.042	10.81	9.26	9.31	9.793
C_2H_4 28.052	2.43	2.33	2.29	2.350
C_2H_6 30.068	1.75	1.77	1.72	1.747
C_3H_6 42.078	3.31	3.10	3.15	3.187
C_3H_8 44.094	0.30	0.29	0.27	0.287
C_4H_8 56.104	1.84	1.75	1.99	1.860
C_4H_{10} 58.120	0.53	0.60	0.79	0.640
C_5H_{10} 70.130	0.83	0.79	0.98	0.867
C_5H_{12} 72.146	0.09	0.19	0.19	0.157
C_6H_{12} 84.156	0.18	0.19	0.19	0.187
			M. W.	23.5819

GENERATOR BALANCE HOUR	M/HR	C	H	O		Mol %	M/Hr	C	H	O
FRESH FEED					O_2 32.000	0.23	10.540 0.031			21.142
CO 28.010	15.289	15.289		15.289	CO_2 44.010	1.30	0.173	0.173		0.346
H_2 2.016	24.535		49.070		N_2 28.016	1.83	0.243			
CO_2 44.010	0.877	0.877		1.754	CH_4 16.042	83.20	11.062	11.062	44.248	
N_2 28.016	0.072				C_2H_6 30.068	6.65	0.884	1.768	5.304	
CH_4 16.042	0.031	0.031	0.124		C_3H_8 44.094	5.01	0.666	1.998	5.328	
					C_4H_{10} 58.120	1.34	0.178	0.712	1.780	
			8.192	4096	C_5H_{12} 72.146	0.44	0.059	0.295	0.708	
		16.197	57.386	21.139	MW	19.8102	13.296	16.0082	57.368	21.448
		98.94	100.03	98.56	TOTAL					

WEIGHT BALANCE	#/hr Measured	At Wt. Balance
WET GAS	26.29 274.16	314.71
OIL	56.17	58.84
WATER	138.72	145.30
TOTAL	495.34	
FRESH FEED	518.85	
WEIGHT BALANCE	95.47	
Forced Factor	1047462	
WET GAS FACTOR	1147906	
INDICATED LOSS—S C F H	801	

GAS FLOW RATES		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED	79.31	6.246	414.5 20.7171	60 1.0000	2.27673 1.50888	15485	40.804
WET GAS	158.44	6.238	1.5 4.0249	59 1.0010	1.10798	4412	11.626
RECYCLE	79.31	8.496	412.6 20.6712	74 0.9868	1.10798	15229	40.129
BLEED	5.02	8.500	412.6 20.6712	60 1.0000	1.10798	977	2.574
NATURAL GAS	28.43	7.700	437.0 21.2532	186 0.8972	1.46136 1.20886	5046	13.296
OXYGEN	27.07	6.892	446.0 20.14639	61 0.9990		4000	10.540
STEAM	215.7	5.988	27.4 0.2811		363#/hr		

LIQUID PRODUCT RATES HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
OIL	7'5"	392.96	53	1.0035	394.34	52.4		
	6'7"	349.31	48	1.0059	351.37	6.406		
	3'9½"	203.10	42	1.0089	204.91			
	0'9½"	41.26	63	0.9985	41.20			
					3.75		+24.00	56.17
					210.43			8.768
WATER	7'6"	397.32	71	0.99883	396.86	10.7		
	3'11"	209.64	64	0.99963	209.56	8.287		
	5'6"	292.57	60	1.00000	292.57			
	1'6"	78.16	64	0.99963	78.13			138.72
					401.74			16.739

THE TEXAS COMPANY — MONTEBELLO LABORATORY

RATE CALCULATIONS

RUN NO. 65-H
HOURS 160-184

Forced

HOUR	GAS ANALYSES 1400	2200	0600	AVERAGE
FRESH FEED				
CO 28.010	37.76	37.85	37.60	37.737
H_2 2.016	59.75	59.91	59.81	59.823
CO_2 44.010	1.78	1.99	2.21	1.993
N_2 28.016	0.11	0.11	0.31	0.177
CH_4 16.042	0.60	0.14	0.07	0.270
			M. W	12.746196
			H_2O 18.016	
			BALANCE	
WET GAS				
CO 28.010	8.20	8.95	6.87	8.007
H_2 2.016	40.31	40.36	39.63	40.100
CO_2 44.010	28.25	29.96	31.19	29.800
N_2 28.016	0.97	1.35	1.68	1.333
CH_4 16.042	11.03	8.79	9.14	9.654
C_2H_4 28.052	2.04	2.27	2.33	2.213
C_2H_6 30.068	1.56	1.69	1.76	1.670
C_3H_6 42.078	3.24	2.93	2.99	3.053
C_3H_8 44.094	0.38	0.33	0.26	0.323
C_4H_8 56.104	1.76	1.69	1.92	1.790
C_4H_{10} 58.120	0.85	0.46	0.78	0.697
C_5H_{10} 70.130	0.69	0.84	0.95	0.827
C_5H_{12} 72.146	0.56	0.14	0.26	0.320
C_6H_{12} 84.156	0.16	0.24	0.24	0.213
			M. W.	23.037749

GENERATOR BALANCE HOUR	M/HR	C	H	O		Mol %	M/Hr	C	H	O
FRESH FEED					O_2 32.000	0.29	10.551 0.038			21.178
CO 28.010	15.461	15.461		15.461	CO_2 44.010	1.32	0.175	0.175		0.350
H_2 2.016	24.508		49.016		N_2 28.016	1.17	0.155			
CO_2 44.010	0.817	0.817		1.634	CH_4 16.042	83.76	11.116	11.116	44.464	
N_2 28.016	0.073				C_2H_6 30.068	6.65	0.883	1.766	5.298	
CH_4 16.042	0.111	0.111	0.444		C_3H_8 44.094	4.96	0.658	1.974	5.264	
					C_4H_{10} 58.120	1.41	0.187	0.748	1.870	
			8.499	4.250	C_5H_{12} 72.146	0.44	0.058	0.290	0.696	
		16.389	57.959	21.345	MW	19.761817				
		101.99	100.64	99.15	TOTAL			16.069	57.592	21.528

WEIGHT BALANCE	#/hr Measured	At Wt. Balance
WET GAS	25.69 271.89	319.79
OIL	51.56	55.41
WATER	136.80	147.01
TOTAL	485.94	522.21
FRESH FEED	522.21	
WEIGHT BALANCE	93.05	
Forced Factor	1074638	
WET GAS FACTOR	1176174	
INDICATED LOSS—S C F H	1021	
	5500	

GAS FLOW RATES		$\sqrt{H}$	PRESSURE	TEMP.	M. W.	S. C. F. H.	M/HR
FRESH FEED	79.31	6.288	414.1 20.707	61 0.9990	2271267 1.5071	15548	40.970
WET GAS	158.44	6.271	1.50 4.025	61 0.9990	1256633 1.1210	4479	11.802
RECYCLE	79.31	8.504	412.4 20.666	75 0.9859	1.1210	15404	40.590
BLEED	5.02	8.558	20.666	1.0000	1.1210	995	2.622
NATURAL GAS	28.43	7.700	434.8 21.201	187 0.8965	1464946 1.2103	5036	13.270
OXYGEN	27.07	6.917	446.0 21.464	64 0.9962		4004	10.551
STEAM	215.7	5.942	26.8				

LIQUID PRODUCT RATES HOUR	GAGE	GAL.	°F	FACTOR	GAL. AT 60	API° #/GAL.	#	# HR GAL HR
OIL	7'3"	384.23	46	1.0069	386.88	52.6		
	3'9½"	203.10	42	1.0089	204.91	6.399		
	1'2"	60.66	44	1.0079	61.14			
	0'11½"	49.82	41	1.0094	50.29			
					+0.55		3.50	51.56
					193.37		1237.37	8.057
WATER	7'5½"	395.14	68	0.99920	394.82	10.7		
	5'6"	292.57	60	1.00000	292.57	8.287		
	7'2"	379.86	60	1.00000	379.86			
	1'7-3/4	85.91	60	1.00000	85.91			136.80
					396.20		3283.31	16.508