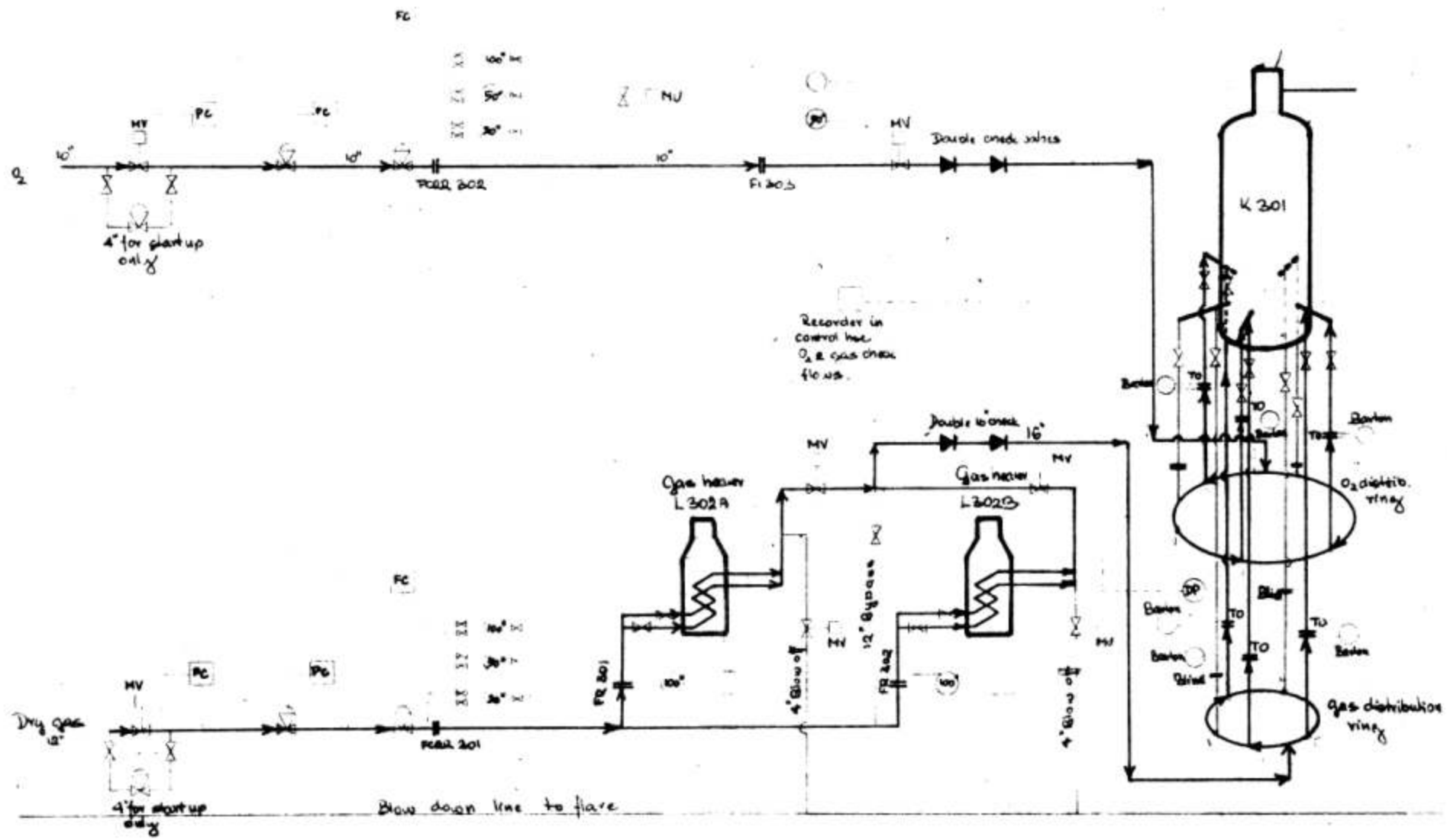


A P P E N D I X

O₂ Blow off
in atmosph
(start up only)

#3 GAS.GEN
INPUT
Gas generator

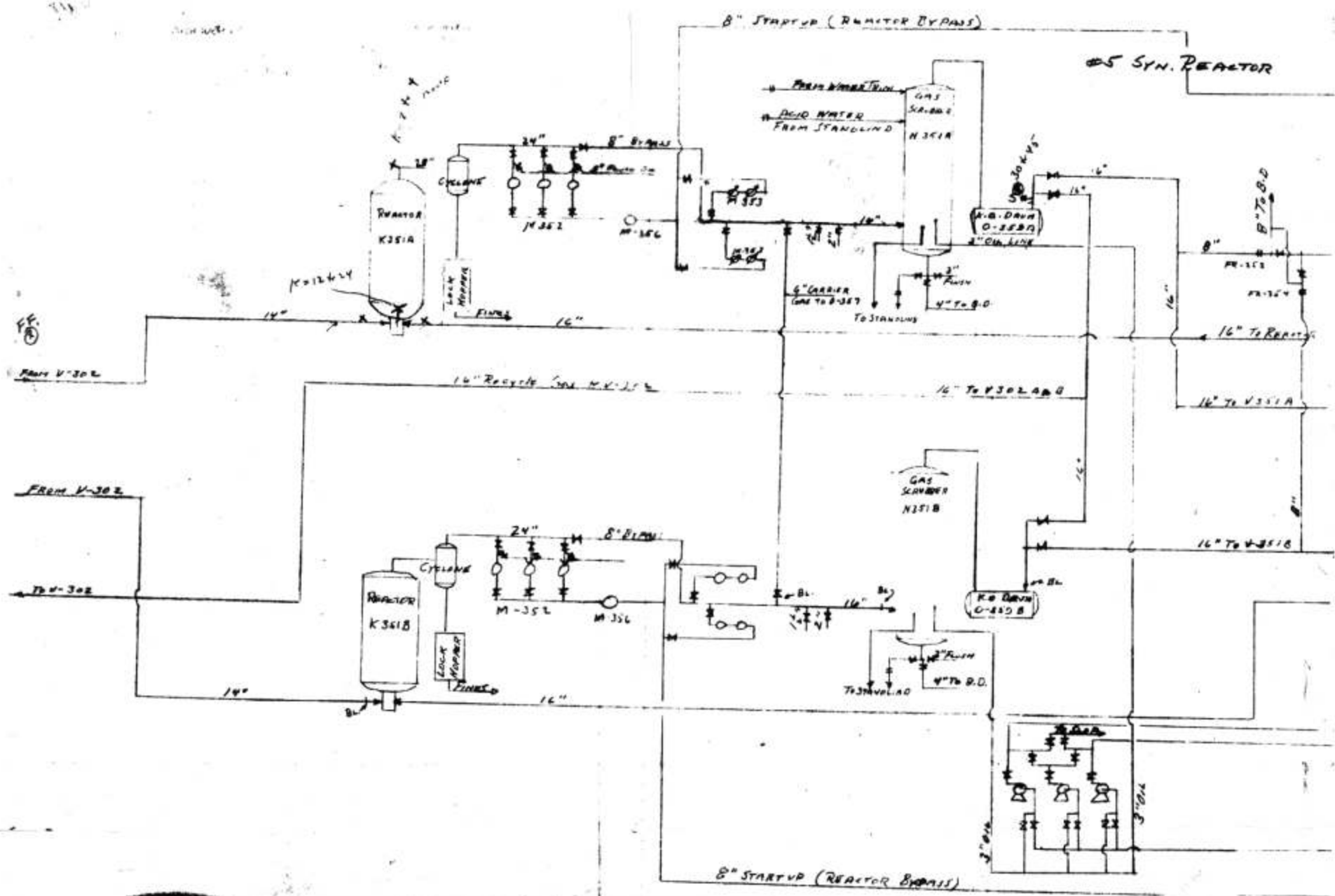


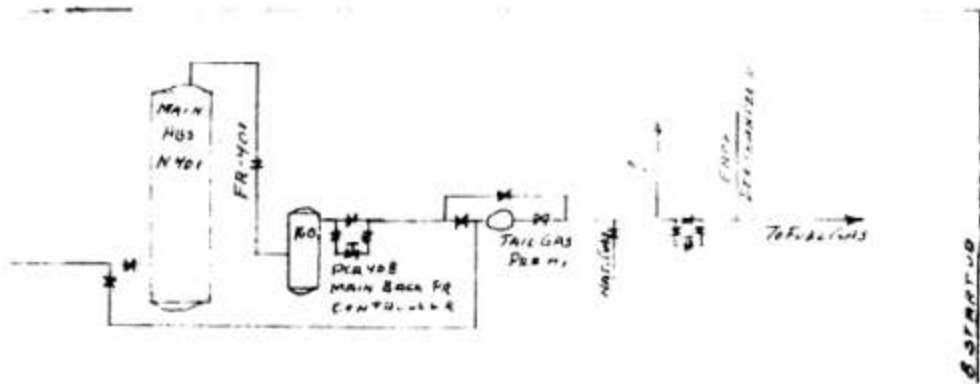
4" for plant up only

Recorder in control room
O₂ & gas check flows

4" for plant up only

Blow down line to flare





→ 6 SYN. REACTOR RECYCLE

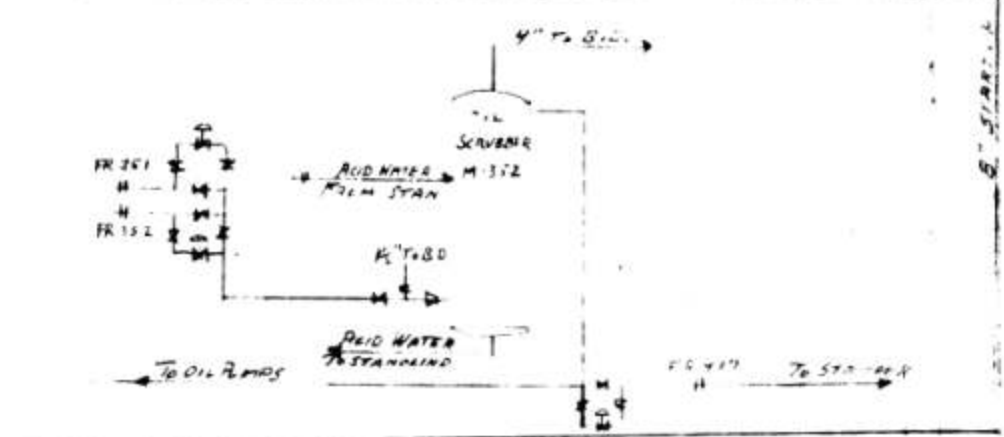
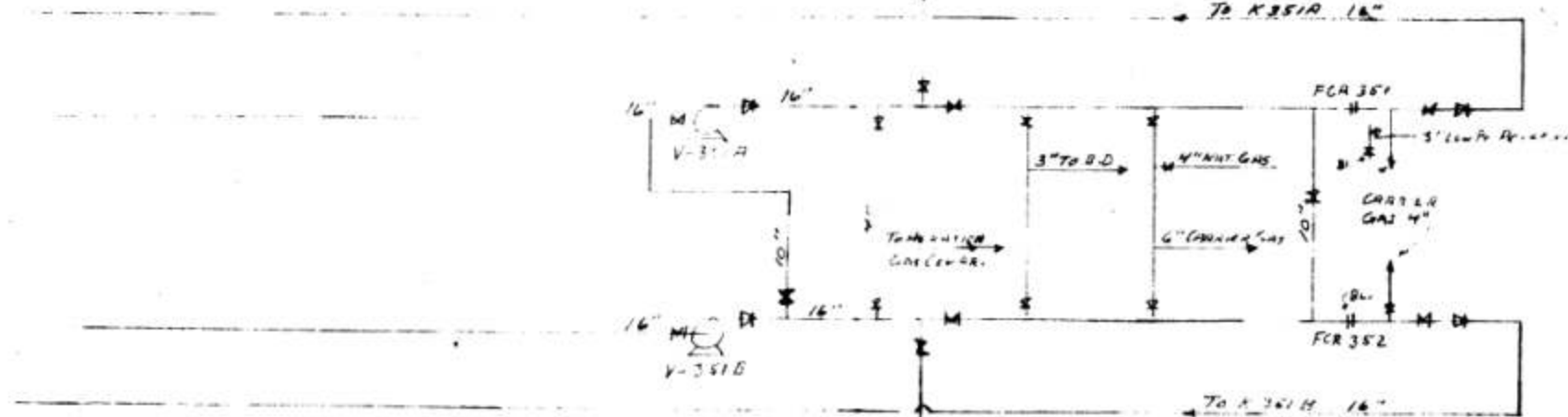


TABLE I
TABULATION OF DATA USED IN H₂ CONVERSION CORRELATIONS

Montebello Run #63 Brownsville Mill Scale Cat.	FF H ₂ /CO	CO Conv. %	H ₂ Conv. %	Mols CO ₂ Made	CO to CO ₂	(H ₂)(CO ₂) (CO)(H ₂ O)	Tot. C ₃ ⁺ lbs./hr.	CH ₂ Mols/Hr.	Mols CO Fed	CO to C ₃ ⁺	R/FF	CO +H ₂ Conv.	Mols CH ₄ Make	CO to CH ₄	Net H ₂ O Make MPH	H ₂ MPH in Feed	H ₂ to H ₂ O	Space Velocity	Reactor inlet °F.
A	1.56	34.36	80.95	3.220	21.2	12.84	130.89	9.35	15.213	61.5	0.99	86.19	1.114	7.32	7.471	23.751	31.45	1039	415
B	1.63	94.15	80.30	3.250	21.2	12.65	131.92	9.42	15.343	61.4	0.98	85.55	1.275	8.30	7.325	25.065	29.22	1079	414
C	1.60	94.56	80.85	3.238	21.1	13.11	136.50	9.75	15.338	63.6	0.96	86.13	0.944	6.15	7.316	24.512	29.84	1085	412
D	1.63	94.47	81.11	3.074	19.8	12.25	137.02	9.79	15.511	63.1	0.97	86.20	1.437	9.25	7.506	25.224	29.75	1096	415
E	1.66	94.13	82.28	3.075	20.1	11.38	135.37	9.67	15.284	63.3	0.96	86.73	1.177	7.70	7.410	25.397	29.17	1084	414
F	1.62	93.71	80.87	3.369	21.5	11.58	131.58	9.40	15.639	60.1	0.96	85.76	1.249	7.98	7.248	25.413	28.52	1095	413
G	1.62	93.33	80.76	3.324	21.1	10.88	134.65	9.62	15.777	61.0	0.95	85.55	1.265	8.01	7.255	25.621	28.31	1114	416
H	1.62	93.53	80.27	3.375	21.5	11.58	129.66	9.26	15.684	59.0	0.96	85.33	1.310	8.35	7.283	25.438	28.63	1102	415
I	1.62	93.27	79.14	3.485	21.9	11.98	133.96	9.57	15.891	60.2	0.95	84.51	1.259	7.92	6.984	25.674	27.20	1126	412
J	1.58	92.42	77.16	3.623	22.8	11.78	122.98	8.78	15.878	55.3	0.98	83.07	1.328	8.36	6.883	25.096	27.42	1112	409
K	1.68	92.16	77.33	3.413	22.1	11.60	123.85	8.84	15.432	57.3	0.99	82.86	1.315	8.52	6.807	25.943	26.23	1133	409
L	1.63	91.07	75.28	3.519	22.3	11.05	124.92	8.92	15.763	56.6	0.99	81.28	1.326	8.41	6.491	25.701	25.25	1149	408
M	1.64	90.81	74.03	3.618	22.9	11.93	122.06	8.72	15.813	55.1	1.00	80.39	1.259	7.96	6.448	25.915	24.88	1187	406
N	1.61	89.58	72.63	3.620	22.8	10.76	120.64	8.62	15.892	54.2	0.99	79.11	1.301	8.18	6.229	25.656	24.27	1218	404
O	1.64	89.46	71.22	3.637	22.9	11.41	122.20	8.73	15.856	55.1	0.99	78.13	1.279	8.06	6.080	26.018	23.36	1265	402
MISC. LAB. & PILOT UNIT DATA FROM EASTMAN'S TULSA REPORT																			
Beacon 11140 Stanolind	2.0	98.60	90.66	0.897	10.22	23.31	87.29	6.23	8.775	71.0	2.0	93.31	0.838	9.54	6.895	17.575	39.23	9120	-
D-201-42 3/5	1.97	97.94	84.97	0.652	14.61	20.33	44.68	3.19	4.462	71.5	1.0	89.34	0.446	10.0	2.850	8.791	32.41	1072	-
D-201-45 3/5	1.85	93.85	79.21	0.753	16.41	9.07	39.37	2.81	4.586	61.3	1.0	84.35	0.496	10.8	2.564	8.471	30.26	1195	-
D-201-46 3/5	1.84	97.23	84.45	0.655	14.49	15.55	43.98	3.14	4.520	69.5	1.0	88.94	0.440	9.73	2.796	8.332	33.55	1137	-
Montebello 57 F/O	1.57	93.75	78.57	2.850	22.47	13.37	102.87	7.35	12.678	58.0	0.98	84.47	1.023	8.06	5.712	19.925	28.66	1119	-
64 F/P	1.62	90.26	75.44	3.403	22.32	10.85	119.32	8.52	15.240	55.9	1.06	81.10	1.166	7.65	6.402	24.645	25.97	1138	-
65 F/N	1.62	90.87	77.00	3.114	20.49	9.18	120.97	8.64	15.194	56.9	1.05	82.31	1.216	8.00	7.108	24.537	28.96	1218	-
66 F/O	1.63	91.15	75.03	3.430	22.88	11.82	117.28	8.38	14.985	55.9	1.00	81.17	1.262	8.42	6.294	24.358	25.83	1210	-
MONTEBELLO RUN #59 (SPENT CM&S)																			
A	1.65	93.71	84.10	3.175	19.51	-	150.6	10.76	16.267	66.14	0.87	87.73	1.444	8.87	7.893	26.810	29.44	1383	140
B	1.65	92.74	82.32	3.271	19.95	7.72	142.21	10.16	16.394	61.97	0.88	86.25	1.137	6.93	8.470	27.128	31.22	1463	146
C	1.66	94.53	81.90	3.587	22.01	12.80	143.97	10.28	16.293	63.09	0.85	86.65	1.258	7.72	7.558	27.070	27.92	1517	153
D	1.65	95.29	83.81	3.264	19.99	12.19	155.63	11.12	16.327	68.11	0.84	88.14	1.168	7.15	8.079	26.975	29.94	1488	155
E	1.72	95.58	82.38	3.504	21.73	15.46	145.05	10.36	16.125	64.25	0.85	87.23	1.229	7.62	7.940	27.748	28.61	1565	155
F	1.77	94.57	80.48	3.343	20.89	13.63	145.10	10.36	15.996	64.76	0.87	85.56	1.210	7.56	7.841	28.385	27.62	1596	152
G	1.77	93.19	78.60	3.562	22.26	12.77	134.67	9.62	15.999	60.12	0.87	83.86	1.201	7.50	7.491	28.384	26.39	1705	152
H	1.82	92.59	77.31	3.423	21.83	13.16	138.35	9.88	15.677	63.02	0.87	82.74	1.238	7.89	7.005	28.459	24.61	1761	156

---Note Trend---

BEACON LABORATORY DATA (Received from Beacon 3/10/52)

<u>Run #</u>	<u>11,138</u>	<u>11,143</u>	<u>11,144</u>	<u>11,146</u>	<u>11,004</u>	<u>11,096</u>
<u>Catalyst</u>	Brownsville Mill Scale reduced at <u>Beacon</u> Best run with <u>Mill Scale</u> Cat. Rec'd. <u>10/10/51</u>	Brownsville 0 Hr. Sample Run #11 Run as <u>Received</u>	Brownsville 96 Hr. Sample Run #11 Run as <u>Received</u>	Brownsville 12 Hr. Sample Run #11 Run as <u>Received</u>	Spent CM&S Run At 200 #	Bethlehem Mill Scale
Lgt. of Run (Hrs.)		84	84	72	84	84
R/FF	2.0	2.0	2.0	2.0	2.0	2.0
Pressure, psig	400	400	400	400	200	200
Temp.	675	675	675	675	650	650
Total C ₃ ⁺ Yields (gms/CM)	155	152.4	141.0	142.0	149.6	157.4
V/Hr/V	80	80.7	81.7	79.1	39.6	39.6
V/Hr/V (x125)	10,000				5,000	
H ₂ /CO FF	2.02	2.0	1.89	2.05	1.99	1.96
% Contr.	87.1	86.7	78.3	82.2	87.0	85.3
H ₂ Conv.	94.4	93.8	86.0	89.3	94.6	92.1
CO Conv.	99.2	99.0	97.5	98.1	99.4	99.3
CO to CO ₂ %	8.0	8.1	12.9	11.4	7.3	8.0
CO to CH ₄	9.8	10.0	10.9	10.0	10.9	9.4
CO to C ₂ s	7.7	8.1	10.1	8.8	7.4	9.1
CO to C ₃ ⁺	61.8	60.9	53.3	56.5	67.8	64.5
CO to Oxygenates	12.7	13.0	14.5	13.4	4.3	10.5
CO to C ₃ ⁺ Total	74.5	73.9	67.8	69.9	72.1	75.0
H ₂ to H ₂ O Chem.Free	-	40.9	34.8	36.4	43.2	41.3
Wet Gas % Unsats.						
C ₂	29.0	50.5	55.7	52.4	36.8	57.7
C ₃	85.2	86.7	85.5	86.2	81.1	88.2
C ₄	86.2	88.0	90.5	86.3	83.8	90.6
(H ₂) (CO ₂)						
<u>(CO) (H₂O)</u>	23.0	18.9	21.1	21.3	23.5	21.9

BROWNSVILLE RUN #5 (Not used except in Fig. 1, A & B)

Date	1-16-51 (24 Hrs.)	1-17-51	1-18-51	1-20-51	1-21-51	1-22-51	1-23-51	1-24-51 (24 Hrs.)
Mols CO	100	100	100	100	100	100	100	100
CO Conv.	50.71	49.21	52.31	71.74	73.69	71.24	65.62	69.38
CO Unconv.	49.29	50.79	47.69	28.26	26.31	28.76	34.38	30.62
Mols H ₂	179	185	182	183	183	183	183	182
H ₂ % Conv.	21.79	26.08	24.00	39.18	43.21	39.24	32.92	36.86
H ₂ Unconv. %	78.21	73.92	76.00	60.82	56.79	60.76	67.08	63.14
Unconv. Mols	140.0	136.75	138.32	111.30	103.9	111.2	122.8	114.9
Unconv. Lbs.	280	273.5	276.6	222.6	207.8	222.4	245.6	229.8
<u>In Product</u>								
wt. % H ₂	4.72	6.33	6.69	4.99	4.77	4.85	5.32	5.17
Total Prod. Lbs.	5932	4321	4135	4461	4356	4586	4617	4445
Unconv. CO Lbs.	1380	1422	1335	791	737	805	963	857
Unconv. CO wt. % Calc.	23.3	32.9	32.28	17.73	16.91	17.6	20.9	19.3
Unconv. CO wt. % Actual	22.18	32.90	30.76	17.50	16.21	17.47	20.75	19.74
CO ₂ wt. %	24.70	31.46	32.76	38.09	38.63	36.43	35.08	37.06
Lbs.	1465	1359	1355	1699	1683	1671	1620	1647
Mols (CO to CO ₂)	33.3	30.9	30.8	38.6	38.3	38.0	36.8	37.4
Water wt. %	32.20	8.96	9.22	12.84	13.21	15.44	14.94	10.63
Lbs.	1910	387	381	573	575	708	690	473
Mols	106	21.5	21.2	31.8	31.9	39.3	38.3	26.3
H ₂ to H ₂ O %	59.2	11.6	11.6	17.4	17.4	21.5	20.9	14.5
C ₃ + (Incl. Oxygenates) wt. %	10.94	13.24	13.22	15.62	15.81	14.75	14.35	15.02
Lbs.	649	572	547	697	689	676	663	668
Mols CH ₂ (CO to C ₃ +) wt. %	46.4	40.9	39.1	49.8	49.1	48.3	47.4	47.7
CH ₄ wt. %	0.91	0.98	0.95	3.87	4.53	4.53	3.73	4.12
Lbs.	54	42	39	173	197	208	172	183
Mols (CO to CH ₄)	3.4	2.6	2.4	6.1	12.3	13.0	10.8	14.4
C ₂ s wt. %	1.14	1.39	1.64	2.68	2.13	1.93	1.57	1.92
Lbs.	67.6	60.0	67.8	120	93	89	72	85
Mols (CO to C ₂ s)	4.7	4.1	4.7	7.3	6.4	6.1	5.0	5.9
Oxy. Comps. wt. %	0.58	1.52	1.57	1.96	2.02	2.10	2.21	2.88
Lbs.	34.4	65.7	64.9	8	88	96	102	128
CO to Oxygenates	2.5	4.7	4.6	6.2	6.3	6.9	7.3	9.1
R/FF	1.23	1.10	1.09	1.33	1.34	1.20	1.30	1.31

BROWNSVILLE RUN #6

	3/13/51	3/14/51	3/15/51	3/16/51	3/17/51	3/18/51	3/19/51
Mols. CO	100	100	100	100	100	100	100
CO Conv.	70.78	74.71	75.28		76.51	73.15	73.76
CO Unconv. Mols.	29.22	25.29	24.72		23.49	26.85	26.24
Mols. H ₂	185	180	176	176	174	183	183
H ₂ % Conv.	43.54	48.14	49.24		48.53	43.36	42.49
H ₂ Unconv. %	56.46	51.86	50.76		51.47	56.64	57.51
H ₂ Unconv. Mols.	104.45	93.35	89.34		89.56	103.65	105.24
H ₂ Unconv. Lbs.	208.9	186.7	178.6		179.1	207.3	210.5
In Product:							
Wt. % H ₂	5.36	4.79	4.59		4.60	5.28	5.21
Total Prod. Lbs.	3897	3898	3891		3896	3926	4040
Unconv. CO Lbs.	818.2	708	692.2		657.7	751.8	734.7
Unconv. CO Calc. Wt.%	21.0	18.2	17.8		16.9	19.1	18.2
Actual Wt.%	20.8	17.82	17.63		16.89	19.01	18.89
CO ₂ Wt.%	25.46	25.29	21.94		23.62	28.55	28.38
Lbs.	992.2	985.8	853.7		920.2	1120.9	1146.6
Mols CO to CO ₂	22.6	22.4	19.4		20.9	25.5	26.1
Water Wt.%	13.11	14.50	16.91		10.74	10.77	12.08
Lbs.	510.9	565.2	658.0		418.4	422.8	488.0
Mols.	28.4	31.4	36.6		23.2	23.5	27.1
H ₂ to H ₂ O Mol.%	15.4	17.5	20.8		13.3	12.8	14.8
C ₃ Incl. Oxy. Wt.%	11.58	13.32	13.01		13.49	12.59	10.88
Lbs.	451.3	519.2	506.2		525.6	494.3	439.6
Mols CH ₂ (Mols. CO to C ₃)	32.2	37.1	36.2		37.5	35.3	31.4
CH ₄ Wt. %	5.0	5.93	6.97		10.72	4.40	4.83
Lbs.	198.7	231.2	271.2		417.7	172.7	195.1
Mols.(CO to CH ₄)	12.4	17.5	17.0		26.1	10.8	12.2
C ₂ Wt. %	2.21	2.20	1.87		2.41	2.41	2.37
Lbs.	86.1	85.8	72.8		93.9	94.6	95.7
Mols. CO to C ₂ ^B	5.9	5.9	5.0		6.5	6.5	6.6
Oxy. Comps. Wt. %	2.20	2.24	2.23		2.55	2.69	2.74
Lbs.	85.7	87.3	86.8		99.3	105.6	110.7
Mols.	6.1	6.2	6.2		7.1	7.5	7.9
R/FF	0.58	.51	.42		.53	.60	.61

BROWNVILLE RUN #2

	APRIL 22	APRIL 23	APRIL 24	APRIL 25	APRIL 26	APRIL 27	APRIL 28	APRIL 29	APRIL 30	MAY 1	MAY 2	MAY 3	MAY 4	MAY 5	MAY 6	MAY 7	MAY 8	MAY 9	MAY 10	MAY 11	MAY 12	MAY 13	MAY 14	
Mole CO	1006	1006	1006	1006	1006	1006	1006	1006	1006	1006	1006	1006	1006	1006	1006	1006	1006	1006	1006	1006	1006	1006	1006	1006
CO Conv.	79.5	77.09	75.57	82.22	81.11	81.27	81.89	79.51	82.35	83.22	81.72	83.04	82.96	84.30	83.8	78.76	79.47	77.24	77.85	79.19	77.94	79.49	79.49	76.82
CO Unconv.	30.5	22.91	24.43	17.78	16.49	18.73	18.91	20.49	17.65	16.78	16.48	16.96	17.04	15.70	16.2	21.24	20.53	22.76	22.05	20.81	20.06	20.51	23.18	23.18
Mole H ₂	179.	176.	171.	168.	170.	169.	167.	168.	170.	164.	166.	166.	172.	172.	168.	161.	166.	172.	175.	166.	175.	175.	175.	179.
H ₂ & Conv.	54.3	56.60	54.62	60.26	61.42	60.40	61.66	56.57	61.49	63.43	63.34	62.12	62.31	64.29	63.37	60.50	54.95	52.71	53.63	53.99	54.47	50.46	52.76	52.76
H ₂ & Unconv.	45.7	43.20	45.38	39.74	36.58	39.60	38.34	43.43	38.53	36.55	36.66	37.88	37.69	35.71	36.03	39.77	45.01	47.29	46.37	46.01	45.53	49.54	47.24	47.24
H ₂ Unconv. Mole	71.7	75.2	78.3	66.76	62.19	66.9	64.0	72.96	65.5	59.9	59.0	62.9	64.8	61.44	61.74	63.9	74.8	81.3	81.1	76.4	79.7	85.7	84.0	84.0
H ₂ Unconv. Lbs.	143.4	150.4	157.	133.5	124.4	133.8	128.0	145.9	131.0	119.8	118.0	123.8	129.5	122.9	123.0	127.8	149.6	164.6	162.2	152.8	159.4	177.4	169.2	169.2
IB PRODUCT																								
Mgt. & H ₂	3.62	4.01	4.18	3.87	3.30	3.57	3.44	3.89	3.47	3.20	3.20	3.36	3.43	3.27	3.27	3.44	4.00	4.33	4.30	4.06	4.15	4.34	4.37	4.37
Total Prod. Lbs.	3784	3751	3726	3739	3720	3731	3721	3751	3775	3744	3688	3744	3778	3758	3781	3715	3741	3755	3772	3764	3841	3819	3643	3643
Unconv. CO Lbs.	854.0	642	684	499	473	524	529	574	494	470	456	475	477	440	454	595	575	617	617	583	617	574	649	649
Unconv. CO Mgt. & Unconv. CO Actual	22.79	17.08	18.21	13.35	12.55	14.04	14.21	15.20	13.09	12.55	12.36	12.69	12.61	11.71	12.07	16.00	15.37	16.96	16.33	15.49	16.06	15.03	17.81	17.81
	13.34	16.95	18.11	13.17	12.44	13.53	13.48	15.18	13.97	12.43	12.65	12.64	13.54	11.99	13.90	15.90	15.27	16.77	16.27	15.37	16.01	14.92	16.56	16.56
CO ₂ Mgt. & Lbs. Mole.	33.16	32.95	31.73	31.79	31.40	32.22	32.19	30.84	31.31	31.61	30.99	31.48	32.33	31.71	32.10	31.52	34.87	34.80	33.12	34.93	35.79	35.60	33.79	33.79
	1841.80	1833.1	1819.7	1848.6	1837.7	1820.2	1827.8	1821.1	1831.3	1851.1	1824.4	1831.7	1821.4	1819.7	1827.3	1818.9	1835.9	1825.5	1825.3	1811.8	1822.2	1831.9	1828.4	1828.4
	28.29	28.12	29.08	27.31	26.90	27.32	27.22	26.41	26.26	26.90	26.83	26.79	27.76	26.81	27.64	28.38	29.64	29.27	28.37	29.88	31.21	30.73	27.00	27.00
Water Mgt. & Lbs. Mole.	15.11	15.44	15.27	16.75	16.39	17.63	17.11	15.84	17.41	17.53	16.92	17.36	18.29	18.10	18.51	16.87	14.52	13.47	16.01	15.33	16.37	14.97	14.93	14.93
	605.90	579.2	571.5	676.3	693.3	657.8	636.7	594.2	693.7	618.4	734.5	787.7	483.2	717.8	599.2	626.7	542.8	494.5	503.9	572.0	582.0	571.7	543.9	543.9
H ₂ to H ₂ O Mole. \$.2	.18	.16	.2	.22	.22	.21	.20	.23	.21	.25	.26	.16	.23	.23	.22	.18	.17	.19	.19	.18	.18	.18	.17
Cy+ (Incl. water sol. chem.) Mgt. & Lbs.	17.60	18.18	16.02	19.87	24.57	17.41	20.13	20.12	16.81	23.28	22.52	22.71	16.50	17.66	17.61	14.71	19.14	14.43	14.58	13.99	12.35	11.26	11.68	11.68
	660.7	886.	601.7	747.9	928.2	724.2	748.3	734.7	710.1	871.8	834.2	850.3	823.4	874.9	662.7	545.5	566.2	541.8	549.9	525.6	474.1	489.0	425.3	425.3
Mole CO ₂	47.19	48.9	42.98	53.04	64.30	51.73	53.43	53.91	50.72	61.26	59.59	60.74	44.33	48.20	47.34	39.04	40.46	38.70	39.28	37.61	33.89	30.71	30.39	30.39
CH ₄ Mgt. & Lbs. Mole.	5.50	5.24	7.38	7.57	5.93	5.14	5.35	5.34	6.73	5.50	4.93	5.55	3.83	3.75	5.71	5.23	3.49	3.87	6.17	6.20	6.22	6.82	5.69	5.69
	213.2	196.8	272.2	283.0	225.6	204.8	206.5	205.3	234.1	203.9	219.	207.8	213.5	214.9	214.8	190.3	220.4	232.7	236.8	258.9	290.3	293.3	207.3	207.3
	13.1	12.78	17.33	17.69	13.98	12.80	12.91	12.52	15.88	12.87	13.69	14.99	13.34	13.43	13.43	12.14	13.77	13.78	14.54	14.80	14.93	16.48	14.96	14.96
C ₂ Mgt. & Lbs. Mole.	2.08	2.39	4.13	2.61	2.20	2.38	2.49	2.34	2.42	1.80	2.17	3.17	3.28	3.08	3.44	3.17	2.77	3.03	3.18	2.19	1.14	3.50	2.27	2.27
	77.3	89.65	80.0	97.5	84.9	88.6	92.7	87.8	91.6	67.4	87.4	128.7	183.9	115.7	129.4	117.9	103.6	111.8	119.9	82.4	119.8	133.7	82.7	82.7
	5.26	6.09	5.44	6.84	5.64	6.01	6.31	5.97	6.22	4.59	5.95	8.62	8.43	7.87	8.80	8.01	7.95	7.74	8.16	5.61	6.15	9.10	5.63	5.63
Org. Comp. Mgt. & Lbs. Mole.	1.14	1.46	1.31	3.59	3.35	3.19	3.88	3.60	3.76	3.14	3.80	3.38	4.24	4.42	4.68	4.31	3.89	4.09	4.18	3.55	4.04	4.20	3.78	3.78
	113.87	129.8	124.3	134.2	133.8	131.9	144.4	135.0	141.9	127.3	160.1	140.8	169.2	173.6	176.1	160.1	145.3	153.1	157.7	133.6	155.7	161.2	137.7	137.7
	8.42	9.27	8.38	24.98	24.56	24.56	10.31	9.94	10.14	9.66	10.21	10.01	13.44	12.10	12.58	13.44	10.39	10.86	11.26	9.34	11.09	11.51	8.84	8.84
H ₂ O	1.50	1.61	1.44	1.35	1.35	1.32	1.20	1.32	1.32	1.19	1.23	1.23	1.28	1.21	1.27	.91	1.0	1.0	1.0	1.08	1.48	1.69	1.63	1.63

BROWNSVILLE RUNS #9 & #10

Date	RUN # 9					RUN # 10					
	6-5-51 (10 Hrs.)	6-6-51	6-7-51	6-8-51	6-9-51 (9 Hrs.)	7-21-51 (24 Hrs.)	7-22-51	7-23 to 7-28-51	7-29-51	7-30-51	7-31-51 (18 Hrs.)
Mols CO	100	100	100	100	100	100	100	No Data	100	100	100
CO Conv.	81.47	80.44	71.15	71.91	78.49	76.77	77.04		68.63	72.55	54.96
CO Unconv.	18.53	19.56	28.85	28.09	21.51	23.23	22.96		31.37	27.45	45.04
Mols H ₂	184.5	182.9	186.7	178.0	174.7	186.5	186.		175.9	178.4	182.2
H ₂ % Conv.	54.71	48.97	41.54	45.50	47.09	51.84	61.87		51.33	52.42	41.08
H ₂ Unconv. %	45.29	51.03	58.46	54.50	52.91	48.16	38.13		48.67	47.58	58.92
H ₂ Unconv. Mols	83.6	93.3	109.1	97.0	92.4	89.8	70.9		85.6	84.9	107.4
H ₂ Unconv. Lbs.	167.2	186.6	218.2	194.0	184.8	179.6	141.8		171.2	169.8	214.8
In Product:											
Wt. % H ₂	4.44	5.00	5.80	5.19	4.86	4.76	4.14		4.71	4.61	5.76
Total Prod. Lbs.	3765.7	3732	3762	3738	3802	3773	3425		3635	3683	3729
Unconv. CO Lbs.	518.8	547.7	307.8	786.5	602.3	650.4	642.9		878.4	768.6	1261.1
Unconv. CO Wt. % Calc.	13.77	14.67	21.47	21.04	15.84	17.23	18.77		24.16	20.86	33.81
Unconv. CO Wt. % Actual	13.67	14.55	21.30	20.35	15.73	19.09	16.9		23.99	20.68	33.55
CO ₂ Wt. %	25.67	32.39	28.84	26.52	29.16	23.69	21.89		20.07	25.56	11.76
Lbs.	966.7	1208.8	1085.0	991.3	1108.7	893.8	749.7		729.5	941.4	438.5
Mols CO to CO ₂	22.0	27.5	24.7	22.5	25.2	20.3	17.0		16.6	21.4	10.0
Water Wt. %	19.41	8.37	9.30	11.28	12.43	-	-		-	-	-
Lbs.	730.9	310.9	349.9	421.6	472.6	-	-		-	-	-
Mols	40.6	17.3	19.4	23.4	26.3	-	-		-	-	-
H ₂ to H ₂ O Mol %	22.0	9.5	10.4	13.1	15.1	-	-		-	-	-
C ₃ + incl. Oxyg. Wt. %	13.52	15.25	14.57	14.67	14.76	14.73	17.51		16.03	14.71	14.31
Lbs.	509.1	569.1	548.1	548.4	561.2	555.8	599.7		582.7	541.8	533.6
Mols CH ₂ (Mols CO to C ₃ +)	36.4	40.6	39.1	39.2	40.1	39.7	42.8		41.6	38.7	38.1
CH ₄ Wt. %	4.30	5.15	2.71	2.80	3.41	3.09	5.00		2.79	2.82	0.62
Lbs.	161.9	192.2	102.0	108.4	129.6	116.6	171.3		101.4	103.9	23.1
Mols (CO to CH ₄)	10.1	12.0	6.4	6.8	8.1	7.3	7.1		6.3	6.5	1.4
C ₂ s Wt. %	2.01	2.54	1.03	2.17	2.17	1.35	2.17		2.21	4.23	1.14
Lbs.	75.7	94.8	38.7	79.2	82.5	50.9	74.3		80.3	155.8	42.5
Mols CO to C ₂ s	5.2	6.5	2.7	5.5	5.7	3.5	5.1		5.5	10.7	2.9
Oxy. Comps. Wt. %	1.80	2.94	2.25	2.84	3.07	2.03	3.16		3.31	3.28	3.73
Lbs.	67.8	109.7	84.6	106.2	116.7	76.6	108.2		120.3	120.8	139.1
CO to Oxygenates	4.8	7.8	6.0	7.6	8.3	5.5	7.7		8.6	8.6	9.9
R/FF	1.33	1.50	1.55	0.81	0.63	1.69	1.46		1.60	1.87	1.75

BROWNSVILLE RUN #11

<u>Date</u>	<u>11-11-51</u> (24 Hrs.)	<u>11-12-51</u>	<u>11-13-51</u>	<u>11-14-51</u>	<u>11-15-51</u>	<u>11-16-51</u>	<u>11-17-51</u>	<u>11-18-51</u>	<u>11-19-51</u> (24 Hrs.)
Mols CO	100	100	100	100	100	100	100	100	100
Mols CO Conv.	85.3	88.1	86.6	84.4	81.4	82.7	80.5	80.8	81.5
Mols CO Unconv.	14.7	11.9	13.4	15.6	18.6	17.3	19.5	19.2	18.5
Mols H ₂	183	185	184	185	186	178	176	176	188
% H ₂ Conv.	63.3	67.7	67.2	65.0	61.3	63.4	58.7	62.0	63.8
Mols H ₂ Unconv.	67.2	59.8	60.4	64.8	72.0	65.1	72.7	66.9	63.7
Lb. H ₂ Unconv.	135.4	119.6	120.8	129.6	144.0	130.2	145.4	133.8	127.4
<u>Product</u>									
Wt. % H ₂	3.57	3.16	3.24	3.43	3.86	3.50	3.92	3.61	3.56
Total Prod. Lb.	3800	3780	3730	3780	3730	3720	3710	3710	3580
Unconv. CO. Lb.	412	333	375	437	521	484	546	538	518
Unconv. CO Wt. % Calc.	10.82	8.81	10.05	11.56	13.97	13.01	14.72	14.50	14.47
Unconv. CO Wt. % Actual	10.82	8.73	9.95	11.50	13.82	12.85	14.58	14.30	13.44
CO ₂ Wt. %	24.98	23.22	23.08	21.71	23.97	22.76	22.14	22.68	20.60
CO ₂ Lb.	949	878	861	821	894	847	821	841	737
CO ₂ Mols	21.56	19.95	19.56	18.65	20.31	19.24	18.65	19.11	16.74
CO to CO ₂ Mol %	21.6	20.0	19.6	18.7	20.3	19.2	18.7	19.1	16.7
Water Wt. %	19.25	23.78	22.74	22.20	16.83	20.36	18.34	19.62	20.11
Lb.	732	899	848	839	628	759	680	728	720
Mols	40.7	49.9	47.1	46.6	34.9	42.2	37.8	40.4	40.0
Mol %	27.2	27.0	25.6	25.2	18.8	23.7	21.5	23.0	21.3
C ₃ + Wt. %	17.69	16.74	18.28	18.88	19.94	17.24	18.39	17.92	18.56
Lb.	672	633	682	714	744	641	682	665	664
Mols CH ₂ Mol % (CO to C ₃ +)	48.0	45.2	48.7	51.0	53.1	45.8	48.7	47.5	47.4
CH ₄ Wt. %	3.31	4.01	3.37	2.94	2.95	3.50	3.40	3.18	3.21
Lb.	126	152	126	111	110	130	126	118	115
Mols Mol %	7.88	9.50	7.88	6.94	6.88	8.13	7.88	7.38	7.19
C ₂ Wt. %	2.65	2.98	2.58	2.41	2.44	2.44	2.57	2.65	2.74
Lb.	101	113	96	91	91	91	95	98	98
Mols Mol %	7.0	7.8	6.6	6.2	6.2	6.2	6.6	6.8	6.8
Oxyg. Wt. %	4.06	3.99	4.24	4.36	4.22	4.45	4.08	4.33	4.14
Lb.	154	151	158	165	157	166	151	161	148
Mols Mol %	11.0	10.8	11.3	11.8	11.2	11.9	10.8	11.5	10.6
R/FF	1.49	1.37	1.31	1.42	1.53	1.43	1.13	1.36	1.16

BROWNSVILLE RUN #12

<u>Date</u>	<u>11-29-51</u> (24 Hrs.)	<u>11-30-51</u>	<u>12-1-51</u>	<u>12-2-51</u>	<u>12-3-51</u>	<u>12-4-51</u>	<u>12-5-51</u>	<u>12-6-51</u>	<u>12-7-51</u> (6 Hrs.)
Mols CO	100	100	100	100	100	100	100	100	100
Mols CO Conv.	82.41	85.28	85.87	85.11	85.22	84.48	84.34	86.13	85.90
Mols CO Unconv.	17.59	14.72	14.13	14.89	14.78	15.52	15.66	13.87	14.10
Mols H ₂	180	178	183	184	185	184	186	192	190
% H ₂ Conv.	59.53	65.36	66.92	66.71	65.21	66.56	61.61	67.45	67.29
Mols H ₂ Unconv.	72.8	61.7	60.5	61.3	64.4	61.5	65.5	62.5	62.1
Lb. H ₂ Unconv.	145.6	123.4	121.0	122.6	128.8	123.0	131.6	125.0	124.2
<u>Product</u>									
Wt. % H ₂	3.88	3.26	3.11	3.10	3.24	3.08	3.31	3.10	3.18
Total Prod. Lb.	3750	3785	3891	3955	3975	3994	3976	4032	3906
Unconv. CO Lb.	493	412	396	417	414	435	438	388	395
Unconv. CO Wt. % Calc.	13.15	10.88	10.17	10.56	10.44	10.89	11.01	9.62	10.12
Unconv. CO Wt. % Actual	12.99	10.79	10.07	10.45	10.31	10.74	10.92	9.55	9.60
CO ₂ Wt. %	23.90	21.47	19.65	17.90	20.09	17.47	19.16	17.76	18.22
CO ₂ Lb.	896	813	765	708	799	698	762	716	912
Mols Mol %	20.4	18.5	17.4	16.1	18.2	15.9	17.3	16.3	16.2
Water Wt. %	19.17	22.04	24.11	24.14	18.48	22.73	20.40	21.56	22.79
Lb.	719	834	938	955	735	908	811	869	890
Mols	39.9	46.3	52.1	53.0	40.8	50.4	45.0	48.3	49.4
Mol %	22.2	26.0	28.5	28.8	22.0	27.4	24.2	25.2	26.0
C ₃ ⁺ Wt. %	17.13	19.00	17.27	18.10	20.18	18.26	18.03	17.48	17.19
Lb.	642	719	672	716	802	729	717	705	671
Mols Mol %	45.9	51.4	48.0	51.1	57.3	52.1	51.2	50.4	47.9
CH ₄ Wt. %	2.85	2.86	2.78	2.67	3.18	2.91	3.39	6.21	4.09
Lb.	107	108	108	106	125	116	135	250	160
Mols Mol %	6.7	6.8	6.8	6.6	7.9	7.3	8.4	15.6	10.0
C ₂ Wt. %	2.49	2.21	2.45	2.46	2.67	2.54	2.64	2.65	2.78
Lb.	93	84	95.3	97.3	106	101	105	107	109
Mols Mol %									
Oxyg. Wt. %	4.06	4.30	4.57	4.58	4.34	4.08	4.21	4.22	3.74
Lb.	152	163	178	181	173	163	167	170	146
Mols Mol %	10.8	11.3	12.8	12.9	12.7	11.3	12.0	12.2	10.7
R/FF	1.60	1.41	1.31	1.41	1.55	1.40	1.52	1.50	1.42

BROWNSVILLE RUN #13

<u>Date</u>	<u>12-21-51</u> (13 Hrs.)	<u>12-22-51</u>	<u>12-23-51</u>	<u>12-24-51</u>	<u>12-25-51</u>	<u>12-26-51</u>	<u>12-27-51</u>	<u>12-28-51</u>	<u>12-29-51</u>	<u>12-30-51</u>	<u>12-31-51</u>	<u>1-1-52</u>	<u>1-2-52</u> (3 Hrs.)
Mols CO	100	100	100	100	100	100	100	100	100	100	100	100	100
Mols CO Conv.	81.25	84.28	82.84	79.98	80.81	79.50	79.99	77.27	74.10	75.66	76.03	76.53	76.85
Mols CO Unconv.	18.75	15.72	17.16	20.02	19.19	20.50	20.01	22.73	25.90	24.34	23.97	23.47	23.15
Mols H ₂	181	187	186	185	183	189	186	189	189	189	190	189	189
% H ₂ Conv.	61.55	64.65	63.24	59.22	59.37	60.21	58.06	53.38	51.27	53.52	53.37	54.45	55.09
Mols H ₂ Unconv.	69.6	66.1	68.4	75.4	74.4	75.2	78.0	88.1	92.1	87.8	88.6	86.1	84.9
Lbs. H ₂ Unconv.	139.2	132.2	136.8	150.8	148.8	150.4	156	176.2	184.2	175.6	177.2	172.2	169.8
<u>In Product</u>													
Wt. % H ₂	3.56	3.36	3.44	3.80	3.79	3.74	3.89	4.44	4.53	4.36	4.32	4.24	4.18
Total Prod. Lb.	3910	3930	3980	3970	3930	4020	4010	3970	4066	4030	4100	4060	4060
Unconv. CO Lb.	525	440	480	561	537	574	560	636	725	682	671	657	648
Unconv. CO Wt. % Calc.	13.43	11.20	12.06	14.13	13.66	14.28	13.97	16.02	17.83	16.97	16.37	16.18	15.96
Unconv. CO Wt. % Actual	13.31	11.11	11.97	13.99	13.51	14.15	13.87	15.86	17.64	16.62	16.32	16.03	15.81
CO ₂ Wt. %	17.71	20.25	17.98	18.07	18.93	17.09	18.42	21.51	19.49	19.64	19.43	19.81	19.34
CO ₂ Lb.	692	796	716	717	744	687	739	854	792	791	797	804	785
CO ₂ Mols - Mol %	15.7	18.1	16.3	16.3	16.9	15.6	16.8	19.4	18.0	18.0	18.1	18.3	17.8
Water Wt. %	20.13	19.50	34.39	21.81	21.55	21.01	19.78	18.04	16.66	16.73	18.51	17.85	19.43
Lb.	787	766	1369	866	847	845	793	716	677	674	759	725	789
Mols	43.7	42.6	76.0	48.1	47.1	47.0	44.1	39.8	37.6	37.4	42.2	40.3	43.8
Mol %	24.1	22.8	40.9	26.0	25.7	24.9	23.7	21.1	19.9	19.8	22.2	21.3	23.2
C ₃ + Wt. %	20.06	19.54	16.65	16.67	17.22	18.20	17.62	14.67	15.08	16.83	14.27	15.29	14.66
Lb.	784	768	662	662	677	732	707	582	613	678	585	621	595
Mols Mol %	56.0	54.9	47.3	47.3	48.4	52.3	50.5	41.6	43.8	48.4	41.8	44.4	42.3
CH ₄ Wt. %	3.00	3.26	2.20	2.31	2.62	1.85	2.07	2.29	1.34	2.18	1.64	1.56	1.49
Lb.	117	128	88	92	103	74	83	91	55	88	67	63	61
Mols Mol %	7.3	8.0	5.5	5.8	6.4	4.6	5.2	5.7	3.4	5.5	4.2	3.9	3.8
C ₂ Wt. %	1.78	2.45	2.35	2.20	2.25	2.26	2.34	2.21	2.28	2.15	2.15	2.54	2.50
Lb.	70	96	94	87	88	91	94	88	93	87	88	103	102
Mols Mol %	4.8	6.6	6.5	6.0	6.1	6.3	6.5	6.1	6.4	6.0	6.1	7.1	7.0
Oxy. Wt. %	3.04	4.33	4.21	4.04	4.05	4.12	3.72	3.97	4.57	4.10	3.71	4.02	4.33
Lb.	119	170	168	160	159	166	149	158	186	165	152	163	176
Mols Mol %	8.5	12.1	12.0	11.4	11.4	11.9	10.6	11.3	13.3	11.8	10.9	11.6	12.6
R/PP	1.55	1.66	1.38	1.38	1.49	1.65	1.32	1.42	1.47	1.41	1.47	1.41	1.28

BROWNSVILLE RUN #14

	1-9-52 (13 Hrs.)	1-10-52	1-11-52	1-12-52	1-13-52	1-14-52	1-15-52	1-16-52	1-17-52	1-18-52	1-19-52	1-20-52	1-21-52	1-22-52 (5 Hrs.)
Mols CO	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
CO Conv.	83.53	83.27	83.00	82.09	81.92	83.25	86.78	86.54	85.92	83.88	84.94	85.53	80.41	74.34
CO Unconv. Mols	16.47	16.73	17.00	17.91	18.08	16.75	13.22	13.46	14.08	16.12	15.06	14.47	19.59	25.66
Mols H ₂	187	184	188	185	185	190	187	185	186	179	186	186	190	193
H ₂ % Conv.	63.51	61.74	60.10	57.05	57.85	61.46	67.25	67.21	62.66	61.78	62.83	63.42	56.91	48.71
H ₂ % Unconv.	36.49	38.26	39.90	42.95	42.15	38.54	32.75	32.79	37.34	38.22	37.17	36.58	43.09	51.29
H ₂ Unconv. Mols	68.24	70.40	75.01	79.46	77.98	73.23	61.24	60.66	69.45	68.41	69.14	68.04	81.87	99.00
H ₂ Unconv. Lbs.	136.48	140.80	150.02	158.92	155.96	146.46	122.48	121.32	138.90	136.82	138.28	136.08	163.74	198.00
IN PRODUCT														
Wt. % H ₂	3.32	3.48	3.71	3.94	3.95	3.61	3.02	3.07	3.51	3.51	3.44	3.40	4.10	4.86
Total Product Lbs.	4111	4046	4044	4034	3948	4057	4056	3952	3957	3898	4020	4002	3994	4074
Unconv. CO Lbs.	461.2	468.4	476.0	501.5	506.2	469	370.2	376.9	394.2	451.4	421.7	405.2	548.2	718.5
Unconv. CO Wt. %	11.22	11.58	11.77	12.43	12.82	11.56	9.13	9.54	9.96	11.58	10.49	10.12	13.73	17.64
Actual	11.14	11.49	11.70	12.36	12.74	11.48	9.06	9.48	9.90	11.03	10.40	10.02	13.60	17.82
CO ₂ Wt. %	16.44	20.51	20.87	23.30	24.16	21.41	17.66	17.30	21.24	17.09	19.19	16.80	20.29	20.40
Lbs.	675.8	829.8	844.0	940	953.8	868.6	716.3	683.7	840.5	666.2	771.4	672.3	810.4	831.1
Mols.	15.4	18.9	19.2	21.4	21.7	19.7	16.3	15.5	19.1	17.1	17.5	15.3	18.4	18.9
Water Wt. %	21.78	18.28	19.08	14.32	15.43	19.11	24.6	26.92	22.93	23.65	22.44	27.81	22.94	21.44
Lbs.	895.4	739.6	771.6	577.7	609.2	775.3	997.8	1063.9	907.3	921.9	902.1	1113.0	916.2	873.5
Mols	49.7	41.1	42.9	32.1	33.8	43.1	55.4	59.1	50.4	51.2	50.1	61.8	50.9	48.5
H ₂ to H ₂ O Mol %	26.5	22.3	22.8	17.4	18.3	22.7	29.6	31.9	27.1	28.6	26.2	33.2	26.8	25.1
C ₃ + Wt. %	19.49	18.30	16.95	19.15	16.97	17.05	18.15	17.32	16.70	17.03	16.42	16.47	14.02	11.29
Lbs.	801.2	740.4	685.5	772.5	670.0	691.7	736.2	684.5	660.8	663.8	660.1	659.1	560.0	460.0
Mols CH ₂ (Mol % CO to C ₃ +))	57.2	52.9	49.0	55.2	47.9	49.4	52.6	48.9	47.2	47.4	47.2	47.1	40.0	32.9
CH ₄ Wt. %	2.40	3.36	2.72	2.55	2.89	2.54	2.79	2.15	2.74	2.58	2.94	1.83	2.25	1.25
Lbs.	98.7	135.9	110.0	102.9	114.1	103	113.2	85.0	108.4	100.6	118.2	73.2	89.9	50.9
Mols - Mol %	6.2	8.5	6.9	6.4	7.1	6.4	7.1	5.3	6.8	6.3	7.4	4.6	5.6	3.2
C ₂ Wt. %	2.19	2.46	2.61	2.55	2.47	2.76	2.47	2.50	2.48	2.45	2.37	2.12	2.17	1.95
Lbs.	90.0	99.5	105.5	102.9	97.5	112	100.2	98.8	98.1	95.5	95.3	84.8	86.7	79.4
Mols - Mol %	6.2	6.9	7.3	7.1	6.7	7.7	6.9	6.8	6.8	6.6	6.6	5.8	6.0	5.5
Oxy. Comps. Wt. %	3.39	4.16	4.46	3.82	3.35	4.21	4.65	4.19	4.26	4.13	4.36	4.53	3.86	3.37
Lbs.	139.4	168.3	180.4	154.1	132.3	170.8	188.6	165.6	168.6	161.0	175.3	181.3	154.2	137.3
Mols	10.0	12.0	12.9	11.0	9.5	12.2	13.5	11.8	12.0	11.5	12.5	13.0	11.0	9.8
R/FP	1.81	1.74	1.66	1.68	1.64	1.88	2.00	1.95	1.45	1.75	1.80	1.60	1.13	0.97

BROWNSVILLE RUN #15

Date	2-2-52 (21-1/2 Hours)	2-3-52	2-4-52	2-5-52	2-6-52	2-7-52	2-8-52	2-9-52	2-10-52	2-11-52 (10-1/2 Hours)
Mols CO	100	100	100	100	100	100	100	100	100	100
CO Conv.	91.19	83.70	82.89	79.81	78.04	81.68	78.41	83.30	82.62	84.40
CO Unconv. Mols	8.81	16.30	17.11	20.19	21.96	18.32	21.59	16.70	17.38	15.60
Mols H ₂	182	185	185	186	188	183	189	187	191	186
H ₂ % Conv.	80.35	62.08	60.15	51.31	50.58	53.87	53.68	60.52	59.92	61.57
H ₂ Unconv. %	19.65	37.92	39.85	48.69	49.42	46.13	46.32	39.48	40.08	38.43
H ₂ Unconv. Mols	35.76	70.15	73.72	73.73	92.91	84.42	87.54	73.83	76.55	71.48
H ₂ Unconv. Lbs.	71.52	140.30	147.44	147.46	185.82	168.84	175.08	147.66	153.10	142.96
<u>In Product</u>										
Wt. % H ₂	1.42	3.54	3.66	4.56	4.60	4.24	4.06	3.64	3.80	3.50
Total Prod. Lbs.	5037	3963	4028	3234	4040	3982	4312	4057	4029	4085
Unconv. CO Lbs.	246.7	456.4	479.1	565.3	614.9	513.0	604.5	467.6	486.6	436.8
Unconv. CO Wt. %	24.90	11.52	11.8	17.4	15.22	12.88	14.01	11.53	12.08	10.69
Calc.	4.82	11.41	11.78	14.07	15.15	12.90	14.99	11.49	11.97	10.59
Actual										
CO ₂ Wt. %	9.94	20.79	20.76	25.77	24.66	24.08	23.31	18.04	19.63	19.42
Lbs.	500.7	823.9	836.2	833.4	996.3	956.9	1005.1	731.9	790.9	793.3
CO to CO ₂ Mol %	11.4	18.7	19.0	18.9	22.6	21.7	22.8	16.6	18.0	18.0
Water Wt. %	21.04	20.22	18.49	14.73	14.95	17.01	15.49	24.98	22.39	20.89
Lbs.	106.0	801.3	744.8	476.4	604.0	677.3	667.9	1013.4	902.1	853.4
Mols	58.8	44.5	41.4	26.5	33.6	37.6	37.1	56.3	50.1	47.4
H ₂ to H ₂ O Mol %	32.3	24.1	22.4	14.2	17.9	20.5	19.6	30.1	26.2	25.5
C ₃ + (incl. water chems.) Wt. %	13.65	17.11	17.95	13.17	13.08	17.01	13.12	14.43	14.62	16.22
Lbs.	687.6	678.1	723.0	425.9	528.4	677.3	565.7	585.4	589.0	662.6
Mols CH ₄ (Mol % CO to C ₃ +)	49.1	48.4	51.6	30.4	37.7	48.4	40.4	41.8	42.1	47.3
CH ₄ Wt. %	8.65	3.57	3.00	3.92	3.08	2.69	4.21	2.39	3.14	2.91
Lbs.	435.7	141.5	120.8	126.7	124.4	107.1	181.5	97.0	126.5	118.9
Mols Mol %	7.2	8.8	7.6	7.9	7.9	6.7	11.3	6.1	7.9	7.4
C ₂ Wt. %	1.63	2.11	2.36	2.25	2.27	2.40	2.56	2.29	2.37	2.60
Lbs.	82.1	83.6	95.1	72.8	91.7	95.6	110.4	92.9	95.5	106.2
Mols Mol %	5.6	5.7	6.5	5.0	6.2	6.5	7.5	6.3	6.5	7.2
Oxy. Comps. Wt. %	2.49	3.23	3.95	2.97	2.62	2.58	2.69	4.03	3.61	4.25
Lbs.	125.4	128.0	159.1	96.0	105.8	102.7	116.0	163.5	145.4	173.6
Mols	9.0	9.1	11.4	6.9	7.6	7.3	8.2	11.7	12.6	12.4
R/FF	1.23	1.34	1.32	0.93	0.76	0.83	0.64	1.53	1.65	1.78

BROWNSVILLE RUN #16

<u>Date</u>	<u>2-19-52</u> (17-1/2 Hours)	<u>2-20-52</u>	<u>2-21-52</u>	<u>2-22-52</u> (3-1/2 Hrs.)
Mols CO	100.00	100.00	100.00	100.00
CO Conv.	82.44	81.38	76.81	75.19
CO Unconv. Mols	17.56	18.62	23.19	24.81
Mols H ₂	178	182	184	193
H ₂ % Conv.	56.98	55.58	45.89	43.54
H ₂ % Unconv.	43.02	44.42	54.11	56.46
H ₂ Unconv. Mols	76.58	79.07	96.32	100.52
H ₂ Unconv. Lbs.	153.16	158.14	192.64	201.04
<u>In Product</u>				
Wt. % H ₂	3.71	4.04	4.94	5.24
Total Prod. Lbs.	4128	3914	3900	3837
Unconv. CO Lbs.	491.7	521.4	649.3	694.7
Unconv. CO Wt. %	11.91	13.32	16.65	18.11
Actual	11.83	12.91	16.03	16.55
CO ₂ Wt. %	22.97	23.45	24.96	23.22
Lbs.	948.2	917.8	973.4	891.0
Mols	21.6	20.9	22.1	20.3
Water Wt. %	25.18	16.42	14.69	11.13
Lbs.	1039.4	642.7	572.9	427.1
Mols	57.7	35.7	31.8	23.7
H ₂ to H ₂ O Mol %	32.4	19.6	17.3	12.3
C ₃ ⁺ Wt. %	15.00	14.24	11.87	13.47
Lbs.	619.2	557.4	462.9	516.8
Mols CH ₂ (Mol % CO to C ₃ ⁺)	44.2	39.8	33.1	36.9
CH ₄ Wt. %	2.75	4.04	2.84	2.97
Lbs.	113.5	158.1	110.8	114.0
Mols Mol %	7.1	9.9	6.9	7.1
C ₂ Wt. %	2.90	2.61	2.29	2.34
Lbs.	119.7	102.2	89.3	89.8
Mols Mol %	8.3	7.0	6.2	6.2
Oxy. Comps. Wt. %	3.76	3.56	2.88	3.57
Lbs.	155.2	139.3	112.3	137.0
Mols	11.1	10.0	8.0	9.8
R/FF	1.74	1.05	0.59	0.73

BROWNSVILLE RUN #17

Shut Down
2 PM 3/13
8 Hours
3-13-52

Date	21 Hours									
	3-4-52	3-5-52	3-6-52	3-7-52	3-8-52	3-9-52	3-10-52	3-11-52	3-12-52	3-13-52
Mols CO	100	100	100	100	100	100	100	100	100	100
Mols CO Conv.	84.13	67.17	66.46	70.94	63.51	66.30	56.55	63.43	67.78	65.57
Mols CO Unconv.	15.87	32.83	33.54	29.06	36.49	33.70	43.45	36.57	32.22	34.43
Mols H ₂ from H ₂ /CO ratio	180.9	189.4	183.1	188.3	183.6	185.1	184.7	183.1	180.2	183.7
% H ₂ Conv.	57.23	41.57	40.26	44.39	35.52	39.19	35.78	38.25	42.5	44.14
H ₂ Unconv. %	42.77	58.43	59.74	55.61	64.48	60.81	64.22	61.75	57.50	55.86
H ₂ Unconv. Mols	77.37	110.67	109.38	104.71	118.39	112.56	118.61	113.06	103.62	102.61
H ₂ Unconv. Lbs.	154.74	221.34	218.76	209.42	236.78	225.12	237.22	226.12	207.24	205.22
<u>In Product</u>										
Wt. % H ₂	3.86	5.52	5.51	5.28	5.95	5.73	5.98	5.77	5.23	5.19
Total Prod. Lbs.	4008.8	4009.7	3970.2	3966.2	3979.4	3928.7	3966.8	3918.8	3962.5	3954.1
Unconv. CO Lbs.	444.4	919.24	939.1	813.7	1021.7	943.6	1216.6	1024.0	902.2	964.0
Unconv. CO Wt. % Calc.	11.08	23.92	23.65	20.51	25.67	24.0	30.66	26.13	22.76	24.37
Wt. % Actual	10.99	22.75	23.49	20.35	25.48	23.84	30.44	25.91	22.58	24.18
CO ₂ Wt. %	22.32	23.38	22.49	24.91	21.7	23.61	17.06	21.70	20.86	17.77
CO ₂ Lbs.	894.8	937.5	892.9	988.0	863.5	927.6	676.7	850.4	826.6	702.6
CO ₂ Mols (CO to CO ₂)	20.3	21.3	20.3	22.5	19.6	21.1	15.4	19.3	18.8	16.0
Water Wt. %	19.87	11.97	12.10	12.53	12.23	12.25	13.73	13.57	16.98	20.88
Lbs.	796.5	480.0	480.4	497.0	486.7	481.3	544.6	531.8	672.4	825.6
Mols.	44.2	26.7	26.7	27.6	27.0	26.7	30.3	29.5	37.4	45.9
H ₂ to H ₂ O Mol %	24.4	14.1	14.6	14.7	14.7	14.4	16.4	16.1	20.8	25.0
C ₃ + Wt. % (incl. wsc)	14.50	10.97	10.73	10.18	8.54	9.66	8.34	7.64	9.49	7.76
Lbs.	581.3	439.9	426.0	403.8	339.8	379.5	330.8	299.4	376.0	306.8
Mols CH ₂ (CO to C ₃ +)	41.5	31.4	30.4	28.8	24.3	27.1	23.6	21.4	26.9	21.9
CH ₄ Wt. %	3.16	2.05	3.33	3.38	2.68	2.76	2.01	3.04	2.40	2.21
Lbs.	126.7	82.2	132.2	134.0	106.6	108.4	79.7	119.1	95.1	87.4
Mols (CO to CH ₄)	7.9	5.1	8.3	8.4	6.7	6.8	5.0	7.4	5.9	5.5
C ₂ Wt. %	2.41	1.94	2.04	2.00	1.76	1.83	1.39	1.73	1.88	1.63
Lbs.	96.6	77.8	81.0	79.3	70.3	71.9	55.1	67.8	74.5	64.5
(CO to C ₂)	6.7	5.4	5.6	5.5	4.8	5.0	3.8	4.7	5.1	4.4
Oxy. Comps. Wt. %	2.87	2.60	2.57	2.95	2.24	2.30	2.30	1.93	2.33	2.42
Lbs.	115.1	104.3	102.0	117.0	89.1	90.4	91.2	75.6	92.3	95.7
Mols	8.2	7.4	7.3	8.4	6.4	6.5	6.5	5.4	6.6	6.8
R/FF	1.00	0.51	0.66	0.59	0.56	0.67	0.69	0.67	0.62	0.63

TABLE II
 SNOWSVILLE REACTOR DATA

Run #	Sp. Vel.	C ₃ Yield* #PH	C ₃ Yield* #P/MSCFP FF	Reactor Bed Temp.	Reactor Effluent T.	Reactor Ste. T. Feed	H/FF	Pressure Reactor Top	Cat. Holdup Tons	Cat. Dens.	Bed** Hgt.	F.F. to Reactor MSCFP	Tot. Feed	% Contr.	% H ₂ + CO. Conv.	% Fe.	C ₃ /C ₂ + Selectivity	(H ₂) (CO)	(CO ₂) (HCO)
1/16/51	801	39.2	21.6	665		574	1.23	260	131	134	10.6	1.81	4.04	24.71	31.9	74.2			
17	1012	42.0	19.5	630		610	1.10	305	137	137	10.6	2.16	4.34	23.66	34.2	71.8			
18	972	40.3	18.9	647		639	1.08	310	183	150	10.9	2.13	4.44	22.93	33.8	74.0			
Proc.	19																		
Engr.	20																		
Calcs.	21	770	48.8	24.6	659	615	1.33	318	177	149	12.8	1.98	4.63	32.21	50.6	75.0			
Water Sol.	22	782	50.1	24.9	659	610	1.34	318	178	150	12.8	2.01	4.70	34.47	53.7	74.3			
Chemg.	23	840	51.2	23.7	646	593	1.20	320	180	152	12.8	2.18	4.75	31.87	50.6	74.0	No data	No data	
305#/Hbl.	24	707	49.5	23.2	612	579	1.30	320	203	145	14.9	2.13	4.90	28.15	44.5	72.7			
		761	49.8	23.2	610	554	1.31	320	210	154	14.0	2.14	4.95	30.22	48.6	76.8			
	2 days																		
Ave.	17 & 18	992	41.2	19.2	639	625	1.09	318	160	144	10.8	2.15	4.49	23.30	34.0	72.9	No data	No data	
	5 days																		
Ave.	20 to 25	772	49.9	23.9	637	588	1.30	319	190	150	13.5	2.08	4.79	31.38	49.6	74.6			
	1st day Sep.																		
Run #6																			
3/13/51	1365	35.6	11.8	660	660	624	0.59	310	131	128	11.0	3.03	4.80	34.85	53.1	--			
14	1347	61.0	19.1	693	675	630	0.51	305	118	104	12.2	3.20	4.90	34.65	57.6	--			
15	1222	59.8	18.5	653	670	630	0.42	305	121	99	13.1	3.24	4.60	37.30	58.7	75.0			
16	--	--	--	645	645	610	--	305	153	105	15.6	--	4.80	--	--	75.2	No data	No data	
17	753	55.7	18.6	664	666	575	0.53	305	189	104	19.5	2.30	4.60	12.18	58.8	75.8			
18	772	54.0	17.9	656	655	515	0.60	305	185	102	19.5	3.06	4.90	32.10	53.9	--			
19	840	49.1	16.1	659	660	505	0.61	290	183	102	19.2	3.05	4.90	29.40	53.9	73.3			
	2 days																		
Ave.	14 & 15	1285	60.4	18.8	673	640	0.47	305	120	102	12.7	3.22	4.75	35.98	58.2	75.0	No data	No data	
	3 days																		
Ave.	17, 18, 19	788	52.9	17.4	660	660	0.58	300	186	103	19.4	2.80	4.80	24.6	55.5	74.6			
Run #7																			
4/8/51		Data																	
9		not																	
10		worked up.																	
11																			
12																			
13																			

* Including water sol. chemicals. Actg. Dept. WSC=318 #/Hbl.

** Effective reactor area= 187 sq. ft.

Run #	Sp. Vel.	% H ₂ Conv.	C ₃ + Yield BPH	C ₃ + Yield BPM/ MMSCF	Reactor Bed Temp.	Reactor Effl. Temp.	Reactor Btm. T.	R/FF	Pressure Reactor Top	Cat. Holdup Tons	Reactor Vel.	Cat. Dens.	Bed Ht.	FF to Reactor MMSCF	Tot. Feed	% Contr.	% H ₂ + CO Conv.	% Fe	C ₃ +/ C ₁ + Select.	(H ₂) (CO)	(CO ₂) (H ₂ O)
4/22/51	1197		74.9	25.1	675	680	270	1.50	365	132	0.50	112	12.6	2.981	7.463	47.5	66.1	75.6			
23	1272		79.15	25.4	675	678	285	1.40	365	122	.54	107	12.2	3.116	7.507	46.8	64.2	74.3			
25	1093		87.39	28.4	680	670	281	1.36	358	146	.50	112	14.0	3.074	7.240	47.1	68.5				
26	1141		93.36	28.9	670	684	360	1.29	355	147	.52	114	13.8	3.231	7.406	43.8	70.7	75.4			
27	1125		77.1	24.4	675	668	375	1.32	358	142	.50	108	14.1	3.157	7.348	50.1	68.4	76.7			
28	1148		96.11	29.8	670	670	380	1.21	359	138	.50	105	14.0	3.222	7.148	50.5	69.2	75.6			
29	1237		95.07	30.0	685	675	380	1.31	360	126	.50	105	12.8	3.168	7.342	47.0	65.2	74.9			
30	1030		83.94	26.0	678	679	380	1.26	360	154	.50	108	15.2	3.224	7.295	48.3	69.2				
5/1/51	1001		87.56	27.3	675	670	382	1.19	358	162	.50	110	15.7	3.205	7.010	48.3	70.9	74.3	78.6	2.402	
2	1085		85.82	25.8	680	696	370	1.21	350	151	.51	106	15.3	3.326	7.353	48.6	71.5		76.3	2.336	
3	1142		86.53	25.6	680	676	380	1.22	355	141	.51	104	14.5	3.382	7.528	45.8	70.0	74.7	76.9	2.265	
4	1029		82.83	25.8	671	682	380	1.29	350	151	.54	106	15.2	3.216	7.374	47.7	69.9	73.9	78.0	2.681	
5	1027		91.98	27.8	668			1.23	350	166	.51	112	15.8	3.307	7.394	48.8	71.6	74.0	79.3	2.666	
6	1087		94.95	28.4	683			1.24	350	158	.51	110	15.4	3.339	7.477	47.4	71.0	70.7	79.17	2.697	
7	1146		82.03	24.1	673		370	0.91	345	149	.51	110	14.5	3.402	6.514	43	67.4	73.2	75.81	3.582	
8	1186		83.89	24.2	672	663	425	0.87	350	146	.51	108	14.5	3.460	6.467	38	63.8	73.9	75.58	3.878	
9	1162		79.22	23.4	677	675	420	1.02	355	141		106	14.2	3.390	6.850	37.3	61.7	74.0	75.56	3.878	
10	1188		82.46	23.8	660	671	395	0.94	365	145		107	14.5	3.465	6.715	36.1	62.5	73.2	74.35	3.110	
11	1183		68.86	21.8	672	676		0.93	350	156		123	13.6	3.159	7.100	31.8	63.5	73.7	71.02	3.462	
12	1081		64.49	21.1	669	669		.51	350	156		120	13.9	3.062	4.628	36.3	63.0	73.2	72.0	3.669	
13	941		57.21	19.6	678	685		.68	350	163		114	15.3	2.924	4.906	34.3	61.0	74.9	67.33	4.092	
14	979		55.19	18.6	680	674		.66	350	160		113	15.2	2.973	4.931	34.9	61.4	73.8	71.86	3.374	
15 days Ave 22 to 7	1115		86.91	27.05	676	677	352	1.29	357	145		109	14.3	3.211	7.342	47.7	69.0	74.6	78.05	2.508	
8 days Ave 7 to 15	1108		71.7	22.1	673	673	489	0.91	352	152		113	14.4	3.229	6.014	36.5	63.0	73.7	72.94	3.631	
5 days 7 to 11	1167		78.49	23.46	671	671	402	.93	353	146		111	12.3	3.373	6.729	37.2	63.7	73.6	74.46	3.582	
3 days 12 to 14	1000		58.96	19.76	676	676	605	.62	350	160		116	14.8	2.986	4.821	35.7	61.8	74.0	70.39	3.711	
Run #9 6/5/51																					
10 Hrs.	1411	57.71	50.3	17.8	675	648	675		290	152	0.58	160	10.2	2.825	3.716	42.2	64.1	81.6	70.16	3.267	
6	1384	48.97	57.1	20.3	660	643	630		350	156	.52	160	10.4	2.814	4.212	35.4	60.1	79.6	67.78		
7	2146	41.54	97.4	19.5	650	630	325		350	147	.88	141	11.2	5.003	7.779	30.6	51.9	78.4	81.23	6.475	
8	2347	45.50	98.3	20.6	650	641	350	0.80	350	139	.98	139	10.7	4.769	8.609	35.5	53.0	77.5	75.65	4.649	
9	2471	47.09	99.8	20.8	650	644	385	0.84	350	139	.92	156	9.6	4.806	8.196	37.1	58.5	77.1	73.43	5.758	
2 days Ave 5 and 6	1398		53.7	19.1	668	646	652		320	154		160	10.3	2.820	3.964	38.8	62.1	80.6	68.97	3.267	
3 days Ave 7,8 and 9	2321		98.5	20.3	650	638	353	0.82	350	142		145	10.5	4.857	8.195	34.4	54.5	77.7	76.57	5.63	

Run #10	CO Conv.	Sp. Vel.	H ₂ Conv.	C ₂ H ₄ RPM	C ₂ H ₄ M/SCT	Reactor Bed Temp.	Reactor Effl. Temp.	Reactor Stm. T. Nozzle O	H/FF	Pressure Reactor Top	Cat. Holdup Tons	Reactor Vel.	Cat. Dens.	Bed Htg.	FF to Reactor M/SCTPM	Tot. Feed	% Contr.	% H ₂ +CO Conv.	% Fe	C ₂ H ₄ Select.	(H ₂) (CO)	(CO ₂) (H ₂ O)	
24 Hrs.																							
7/21/51	76.77	699	51.84	51.3	20.4	600	600		1.69	350	254	.86	150	18.2	2.51	6.76	38.7						
22	77.04	812	61.87	62.2	22.1	620	630		1.66	350	252	.77	158	17.1	2.82	6.48	39.5	60.54	88.6	76.81	2.66		
23		761				600	630		1.39	350	248	.78	158	16.8	2.61	6.25	38.0	66.85	84.7	70.96	2.40		
24		769				600	614		1.47	350	245	.81	160	16.4	2.57	6.37	40.0		84.1				
25		791				610	636		1.38	350	253	.81	156	16.0	2.68	6.40	36.1		83.5				
26		736				600	639		1.78	350	250	.82	150	16.4	2.53	7.04	35.5		83.0				
27		827				590	626	455	1.63	350	223	.84	146	16.4	2.70	7.10	36.9		83.0				
28		919				600	627	460	1.32	350	218	.81	144	16.2	2.96	6.88	32.4		83.7				
29	68.63	849	51.33	58.9	22.0	620	591	470	1.60	350	213	.81	144	15.8	2.67	6.85	33.3	57.60	81.4	76.24	2.26		
30	72.55	794	52.42	52.8	21.0	650	628	475	1.84	350	209	.85	142	15.7	2.51	7.14	37.9	59.65	81.4	74.57	3.39		
31	54.96	807	41.08	47.2	19.1	640	644		1.85	350	208	.67	143	15.6	2.48	7.06	33.6	46.	81.5	89.04	1.222		
Ave 4 days (11 day run) 1st day Sep.		816		55.3	21.1	633	624	465	1.69	350	221		147	16.1	2.62	6.91	36.1	57.5	82.3	77.52	2.39		
Run #11																							
6 AM																							
11/11/51	85.3	826	63.3	75.2	28.1	647	660	495	1.49	350	231	.83	152	16.3	2.68	Original	55.3	6.68	71.0	85.1	74.83	2.42	
12	88.1	739	67.7	69.4	23.1	660	660	560	1.37	350	226	.84	154	15.7	3.00	decrease	56.2	7.12	74.9	83.5	70.55	2.89	
13	86.0	799	67.2	75.2	24.4	655	655	430	1.31	350	220	.88	152	15.5	3.08		55.4	7.13	74.0	82.7	75.47	2.63	
14	84.4	1019	65.0	80.3	26.0	645	655	431	1.42	350	213	.89	150	15.2	3.10		53.9	7.51	78.8	82.6	77.93	2.43	
15	81.4	1011	61.3	82.1	26.7	630	660	475	1.53	350	210	.94	148	15.2	3.07		51.4	7.16	68.3	81.8	78.70	3.10	
16	82.7	1073	63.4	69.9	23.3	650	630	412	1.43	350	203	.91	154	14.1	2.99		53.0	7.25	70.4	81.0	74.35	2.44	
17	80.5	865	58.7	80.3	26.3	620	630	443	1.15	345	262	.84	158	17.8	3.05		48.8	6.50	66.6	80.1	75.51	2.62	
18	80.8	988	62.0	82.4	27.3	640	590	465	1.36	350	255	.87	168	16.3	3.09		49.9	7.11	68.8	80.1	75.56	2.30	
19	81.5	1054	63.8	83.0	25.7	655	650	410	1.16	350	248	.85	168	15.8	3.23		49.0	6.96	69.9	81.4	78.02	2.35	
8 days Ave 12 & 20 1st day Sep.		994		77.9	25.4	644	641	453	1.34	350	230		157	15.7	3.08		52.2	7.09	70.6	81.9	74.55	2.68	

<u>H₂CO/ in FF</u>	<u>Run #16</u>	<u>CO Conv.</u>	<u>Sp. Yel.</u>	<u>H₂ Conv.</u>	<u>C₂⁺ Yield RPH</u>	<u>C₃ Yield RPH/WHSCP</u>	<u>Reactor Bed Temp.</u>	<u>FF Preheat</u>	<u>H/FF</u>	<u>Pressure Reactor Top</u>	<u>Cat. Holdup Tons</u>	<u>Reactor Vel. Ft./Sec.</u>	<u>Cat. Runn.</u>	<u>Bed Hct.</u>	<u>FF to Reactor DMECON</u>	<u>Tot. Feed</u>	<u>% ConSr.</u>	<u>% H₂+ CO Conv.</u>	<u>% Fe</u>	<u>% C</u>	<u>C₂⁺/ C₁⁺ Select.</u>
1.780	17 1/2 Hrs.																				
1.824	2/19/52	82.44	818	56.98	51.9	22.2	650		1.74	350	153	0.78	120	13.6	2.34	6.40	58.1	66.1	80.9		72.7
1.836	20	81.38	1288	55.58	66.9	20.2	680		1.05	350	142	0.81	120	12.7	3.30	6.75	43.1	64.7	79.3		67.8
	21	*76.81	1808	45.89	75.9	16.8	650		0.59	350	134	0.79	114	12.7	4.51	7.16	35.0	56.8	77.6		69.8
1.931	3 1/2 Hrs.	75.19	1606	43.54	76.4	18.8	620	470	0.73	350	137	0.42	134	10.8	4.06	7.04	33.3	54.3	80.5		71.1
<u>H₂CO/ in FF</u>	<u>Run#17</u>																				
1.809	21 Hrs.																				
1.894	3/4/52	84.13	1414	57.23	63.4	20.8	685	640	1.00	350	91		94	10.5	3.043	6.08	47.06	66.80	78.9	9.0	72.25
1.894	5	67.17	2516	41.57	68.8	15.3	500	420	0.51	350	73		92	8.75	4.49	6.76	28.52	50.42			78.23
1.831	6	66.46	2357	40.26	63.5	15.1	650	380	0.56	375	68		86	8.25	4.20	6.98	32.77	49.52			66.64
1.883	7	70.34	2726	44.39	63.3	14.3	660	635	0.59	375	51		64	8.00	4.44	7.06	31.68	53.60			65.42
1.836	8	63.51	2552	35.52	53.7	12.1	675	640	0.56	375	83		104	8.50	4.42	6.92	28.90	45.39		no samples	65.42
1.851	9	66.30	2696	39.19	60.1	13.7	690	635	0.67	375	67		88	8.00	4.38	7.31	28.26	48.70			67.81
1.847	10	56.55	2614	35.78	55.1	12.2	665	635	0.69	375	50		58	8.50	4.52	7.55	24.08	43.08			71.08
1.831	11	63.43	2846	38.25	50.4	10.9	690	635	0.67	370	72		98	8.00	4.62	7.70	24.55	47.14			61.60
1.802	12	67.78	2708	42.5	62.6	13.7	645	635	0.62	375	55		72	8.25	4.56	7.40	30.68	51.52			68.73
1.837	8 Hrs.																				
	13	65.57	3027	44.14	49.0	11.0	645	640	0.63	375	41		60	7.25	4.47	7.30	33.71	51.70			66.91

* Started reducing preheat temp. stepwise at 3 PM.

EFFECT OF SPACE VEL. IN LABS.

PR TDC802 37 P

TABLE V

<u>Run No.</u>	<u>Sp. Vel.</u>	<u>C₃⁺#/ MMSCF Y H₂+CO Fed.</u>	<u>% H₂+CO Present In Gas</u>	<u>C₃⁺#/MMSCF of FF</u>	<u>C₃⁺Bbls./ MMSCF *</u>	<u>H₂+CO Conv.%</u>
46-1	2825	5960	91.51	5454	22.82	58.4
46-2	2314	6460	"	5912	24.84	64.6
46-3	2178	6640	"	6076	25.52	67.5
45-1	1646	7070	"	6469	27.18	71.4
49-2	1215	8210	"	7513	31.56	76.4
49-1	1072	8370	"	7659	32.18	78.0
29-3/6	939	8570	"	7842	32.95	85.1

* Use ave #/Bbl. of C₃⁺ = 238#/Bbl.

SUMMARY OF OPERATIONS

Run No.	Starting Date	Shutdown Date	Days Duration	Charge Rate - % of Design Capacity Reached			Production		Type of Gas Generator Burner	Type of Catalyst Charge		Cause of Shutdown	Corrective Steps Taken Prior to Succeeding Run
				Oxygen Plant (for 1 Unit)	Generator	Reactor (for 1 Reactor)	Barrels Raw Chemicals to Primary Oil	Stanolind Lbs. per Day		% Reduced Catalyst Start	Finish		
1	8-24-50	8-26-50	2	52 (58)	19 (23)	-	Nil		First Slot Type	0	0	Blade failure Steam Turbine Oxygen Plant V-201 B Air Compressor	<ol style="list-style-type: none"> 1. Replacement of zirconia brick lining of generator combustion space with Alundun. 2. Oxygen slots of burners were filled by welding, and replacing by drilling smaller (5/16") holes.
2	9-16-50	9-17-50	1	63 (70)	21 (31)	-	Nil		Modified First Slot Type Field Drilled Oxygen Holes	0	0	Fire, resultant from split in 1 1/2" synthesis gas discharge line to B Reactor.	<ol style="list-style-type: none"> 1. Extensive steps taken in Section 350 to avoid trapping of catalyst and to protect metal walls where it occurs, such as elimination of dead ends, removal of insulation from feed lines, installation of check and control valves, and new purge connections and lining inside bottom of reactors with insulating cement. 2. Repair of fire damage. 3. Changes in pipe work and instrumentation in Section 300 to avoid spontaneous fires in synthesis gas lines. 4. Installed gas oil flushing connections to eliminate plugging in M-352 Exchangers.
3	10-28-50	11-3-50	6	67 (72)	29 (31)	30 (-)	690		Same	0	0	Failure of Gas Generator Burner cooling water supply.	<ol style="list-style-type: none"> 1. Installed emergency boiler feed supply to burner cooling water circuit and continuous use of 2 pumps in this service. 2. Replaced corroded 25-20 soot blower with chrome alloy and patched baffles and initiated engineering of water cooled soot blowers and refractory protected baffles. 3. Installed new slot type burners with 3 rows of oxygen holes and placed castable refractory on burners. 4. Installed small K-303 Gas Generator to permit reduction of catalyst between runs. 5. Resurfaced gasket area of M-352 Exchangers.

Run No.	Starting Date	Shutdown Date	Days Duration	Charge Rate - 1% of Design Capacity Reached			Production		Type of Gas Generator Burner	Type of Catalyst Charge		Cause of Shutdown	Corrective Steps Taken Prior to Succeeding Run
				Oxygen Plant (for 1 Unit)	Generator	Reactor (for 1 Reactor)	Barrels Raw Primary Oil (Total Run)	Chemicals to Stanolind Lbs. per Day		% Reduced Catalyst Start	% Reduced Catalyst Finish		
4	12-28-50	1-1-51	4	71 (73)	30 (33)	30 (-)	1461	-	Second Slot Type 3 Rows Oxygen Holes	25 25 50 Tons A.W. used in Run #3 142 Tons Raw A.W. 30 Tons 76% Fe A.W. 75 Tons 91% Fe A.W.	Failure of Thrust Bear- ing V-202 B Oxygen Compress- or	<ol style="list-style-type: none"> 1. Enlarged Balance Piston and Thrust Bearing on Oxygen Compressor V-202 B and made certain changes to oil system. 2. Installed cross-over piping so that the A & B Oxygen Compressors could be used on opposite units. 3. Retubed V-201 A Surface Condenser. 4. Installed Centrifix in low pressure Tower A Oxygen Unit. 5. Patched generator baffles and connected steam purge to oxygen header. 	
5	1-16-51	1-25-51	9	72 (76)	33 (35)	47 (63)	4167	36,840 (57,000)	Same	24 44 140 Tons used in #4 (40 Tons MS Red. Fe A.W. Added during run. (40 Tons MS Red. to 90.5%	Failure of Baffles and Soot Blowers due to corrosion.	<ol style="list-style-type: none"> 1. Retubed V-201 B Surface Condenser and made miscellaneous changes to attempt increased capacity of oxygen unit. 2. Installed new water cooled soot blowers and refractory protected baffles in Gas Generator. 3. Installed new type slot burners with 2 rows oxygen holes. 4. Removed all steam bundles from both reactors, removed baffles from bundles, welded up holes in bundles and reassembled reactors without baffles. 	
6	3-11-51	3-20-51	9	80 (83)	38 (39)	58 (66)	6287	62,200 (68,800)	Third Slot Type 2 Rows Oxygen Holes	100 80 115 Tons Freshly reduced Mill Scale + 55 Tons red. cat. 100 Tons Mill Scale of red. cat. added during run.	Failure by burn-out of Gas Generator #5 Burner.	<ol style="list-style-type: none"> 1. Plugging end oxygen holes to decrease exposure of slot cooling chamber. 2. Repaired castable refractory on #3 Baffle. 	

* Figures not in parenthesis are average for run.

* Figures in parenthesis are maximum attained during run.

INSERT

OVS

[2 Pgs.]

SUMMARY OF OPERATIONS

Run No.	Starting Date	Shutdown Date	Days duration	Charge Rate - % of Design Capacity Reached			Production		Type of Gas Generator Burner	Type of Catalyst Charge - % Reduced Catalyst.		Cause of Shutdown	Corrective Steps Taken Prior to Succeeding Run.	
				Oxygen Plant (for 1 Unit)	Generator	Reactor (for 1 Reactor)	Barrels Raw Chemicals to Primary Oil (Total Run)	Stanolind Lbs. per day		Start	Finish			
7	4-8-51	4-13-51	6	76 (83)	22 (40)	56 (62)	4,450	79,300 (1) (85,000)	Third Slot Type - plugged end holes	80	88	Sticking of air reversing valve Oxygen Plant - Oxygen Compressor kicked out.	<ol style="list-style-type: none"> 1. Replaced #1 Burner. 2. Installed Perlite packing in Regenerator "A" Oxygen Unit. 3. Installed ferrules in holes of grid of "A" Reactor. 4. Modified seal system of V-202-B Oxygen Compressor. 	
8	4-21-51	5-15-51	24	83 (86)	40 (58)	62 (65)	22,391	103,000 (1) (134,000)	Same	100(2)	100	Failure of Gas Generator Burner.	<ol style="list-style-type: none"> 1. Installed fourth slot-type burners (V-slot). 2. Replaced castable refractory on center and water cooled baffles of generator. 3. Repaired finger baffles. 4. Installed ferrules in holes of grid of "B" Reactor. 	
9	6-5-51	6-9-51	4	A 61 (67)	B 72 (74)	52 (62)	80 (100)	3,059	74,000 (1) (109,500)	Fourth Slot Type - V Slot	100(2)	100	Bad start-up. Excessive soot blowing caused by by-passing of generator baffles.	<ol style="list-style-type: none"> 1. Installed Enco finger baffles. 2. Reverted to use of Third type slot burners. 3. Installed new rotors in Recycle Compressors for higher compression ratio. 4. Modified seal system V-202-A Oxygen Compressor.
10	7-7-51	8-1-51	11	70 (72)	25 (26)	50 (52)	11,692(a)	66,630 (1) (75,200)	Third Slot Type - Same as Runs 7&8	100(3)	100	Hot spot in Boiler section of Generator.	<ol style="list-style-type: none"> 1. Completely dismantled generator internals. Installed new brick piers and inconel shields at water tube wall joints. Installed new inconel baffles in steam bundles. 	
11	11-10-51	11-20-51	10	82 (87)	39 (40)	60 (63)	12,517(b)	96,250 (1) (106,800)	Third Slot Type - Inconel	100	100	Power failure shutting down Oxygen Plant. (Burners found with carbon toadstools and badly burned in Oxygen slots.)	<ol style="list-style-type: none"> 1. Installed emergency power generator for Oxygen Plant. 2. Decided use 5% Steam in gas to generator and up to 500°F gas preheat and to raise temperature burner cooling water - all in effort reduce carbon forming tendency. 3. Replaced burners with new third slot type burners of same design. 	

* Figures in parenthesis are maximum for run, those not in parenthesis are average.

(1) Total Chemicals production: Run 7 - 396,300 Run 10 - 737,300
Run 8 - 2,460,159 Run 11 - 982,500
Run 9 - 355,461

(2) Theoretical only - batch was not started fresh.

(3) Reduced to 95% Fe.

(a) Includes 3,399 Poly Gaso.

(b) Includes 4,256 Poly Gaso.

SUMMARY OF OPERATIONS

Run No.	Starting Date	Shutdown Date	Days Duration	Charge Rate - % of Design Capacity Reached			Production		Type of Gas Generator Burner	Type of Catalyst Charge		Cause of Shutdown	Corrective Steps Taken Prior to Succeeding Run	
				Oxygen Plant (for 1 Unit)	Generator	Reactor (for 1 Reactor)	Barrels Raw Chemicals to Primary Oil Stanolind (Total Run)	Lbs. per Day		% Reduced Catalyst Start	Finish			
12	11-28-51	12-7-51	9	* 79 (83)	* 36 (38)	* 58 (60)	9330 (1)	94,000 (2) (112,400)	Third Slot Type - Inconel	100 (3)	100	Tube failures on M-352 A&B Exchangers caused loss of Boiler Feed Water to K-301 Generator steam drum.	<ol style="list-style-type: none"> 1. Installed automatic valve to tie generator boiler feed water line into 600 area. To provide boiler feed in emergency. 2. Installed gunite liners in channel and floating heads of M-352 Exchangers on K-351 B reactor and are Mosel lining similar parts of M-352 Exchangers on K-351 A Reactor. 3. Planning installation of catalyst scrubbers on Reactor Effluent and attempting locate six field boilers to increase 175% steam availability. 	
13	12-20-51	1-2-52	13	83 (87)	34 (37)	62 (67)	10,246 (1)	89,500 (2) (113,000)	Third Slot Type - Inconel	100 (4)	100	Thrust bearing failure of third stage of V-202 A oxygen compressor.	<ol style="list-style-type: none"> 1. V-202 B compressor with 12.5% oversized thrust bearing placed in service while V-202 A undergoing repairs. 2. V-202 A compressor third stage thrust bearing rebuilt with 50% larger bearing surface. 	
14	1-8-52	1-22-52	14	A 71 (78)	B 52 (58)	36 (48)	54 (76)	11,205 (1)	88,200 (2) (104,600)	Third Slot Type - Stainless Steel	100 (5)	100	Failure of "B" cooling water circuit on #3 burner.	<ol style="list-style-type: none"> 1. Installed improved instrumentation for measuring generator burner pressure drop. 2. Finished installation acetylene absorbers on both oxygen plants. 3. Switched from K-351 B to K-351 A reactor in order stainless steel line channel and floating heads on reactor exchanger system (B Unit). Since gunite lining not giving desired corrosion protection.
15	2-1-52	2-11-52	10	70 (72)	75 (82)	35 (48)	67 (91)	11,445 (1) 1313 BPD	90,800 (96,000) 18.8% of design	Third Slot Type - Stainless Steel without capillary tubes.	79 Tons from Run 14 & 121 Tons Reduced & 96% Cat. added during run was carbided before adding. Before run cat. conditioned and carbided.	Leak at upstream flg. of valve on inlet to M-352 A. Leak in #5 Burners. Biggerheads found on all burners. Installed 3 new burners.		
16	2-18-52	2-22-52	4	50 (58)	75 (78)	38 (49)	71 (91)	3355 (1)	103,000 (106,900) 34.7% of design	Third Slot Type - Inconel. No capillaries.	104 Tons from previous run and 24 Tons new.	Hot Spot around generator nozzle due to running with two O ₂ pits. All three burners badly burned at ends of slots.		
17	3-3-52	3-13-52	Started Generator 9 AM 3-13-52 2 PM		Burner failure Leak in M-352				Entire run with low cat. level. Added 40 Tons 80% Fe poorly reduced cat. & a little more later didn't do any good.					

*Figures in parenthesis are maximum for run, those not in parenthesis are average.

(1) Includes poly gasoline - Run 12 - 3070 Barrels Run 14 - 2817 Barrels
Run 13 - 5093 Barrels

(2) Total chemicals production Run 12 - 800,000 Run 14 - 1,145,000
Run 13 - 1,165,000

(3) Reduced to 96% Fe. - Same catalyst as used in Run 11.

(4) Comprised 130 tons used catalyst from Run 12 and 127 tons fresh reduced catalyst. 60 tons reduced mill scale and 49 tons reduced and carbided mill scale added during run.

(5) Comprised used catalyst from Run 13 plus 55 tons fresh reduced (245°F.) mill scale catalyst. Entire batch conditioned before run for 24 hrs. with fresh feed rate of 500 MSCFH in circulating natural gas stream at 620°F. bed temperature.

1-251-2 REACTOR RUN #6 OPERATING & YIELD SUMMARY

PERIOD		13 MAR	14 MAR	15 MAR	16 MAR	17 MAR	18 MAR	19 MAR				
Operating Conditions	Point No.											
Total Reactor Feed	MMSCFH	4.80	4.90	4.60	4.80	4.60	4.90	4.90				
Synthesis Gas (1)	MMSCFH	3.03	3.20	3.24	-	3.03	3.06	3.05				
Recycle Gas	MMSCFH	1.77	1.62	1.36	-	1.57	1.84	1.85				
Reactor Top Pressure	PSI	310	305	305	305	305	305	290				
Reactor Gas Feed	°F	820	516	535	540	440	540	560				
Reactor Bed	°F	660	693	653	645	664	656	659				
Catalyst Holdup	Tons	131	118	121	153	189	185	183				
Catalyst Density	#/CF	128	104	99	105	104	102	102				
% Fe in Catalyst		no sample	no sample	75.01	75.17	75.78	no sample	73.27				
% Reduced Catalyst Charged to Reactor		100	100	100	88.38	79.85	79.85	79.85				
Space Velocity - V/V/HR.		1365	1347	1222	-	753	772	840				
RESULTS												
Conversion	CO	70.78	74.71	75.28	-	76.51	73.15	73.76				
	H ₂	43.54	48.138	49.24	-	48.53	43.36	42.49				
	H ₂ +CO	53.08	57.62	58.67	-	58.79	53.89	53.86				
Contraction	%	34.85	34.65	33.50	-	32.18	32.10	29.40				
Production - Gals O ₂ +/MBCF CO+H ₂ FF		0.629	0.737	0.736	-	0.787	0.674	0.600				
Yields - Output Basis		WT.% BPH	WT.% BPH	WT.% BPH		WT.% BPH	WT.% BPH	WT.% BPH				
CO		20.80	17.82	17.63		16.89	19.01	18.89				
H ₂		5.36	4.79	4.59		4.60	5.28	5.21				
CO ₂		26.75	26.75	28.43		23.49	29.12	28.21				
H ₂		4.05	3.31	4.33		4.30	4.74	5.87				
CH ₄		6.14	9.51	9.12		12.75	6.03	6.57				
C ₂ H ₄		1.41	1.39	1.21		1.30	1.67	1.57				
C ₂ H ₆		0.80	0.81	0.66		1.11	0.74	0.80				
C ₃ H ₆		2.07	1.72	1.84		1.70	2.06	1.73				
C ₃ H ₈		0.59	0.97	0.59		0.77	0.42	0.75				
C ₄ H ₆		1.64	1.68	1.52		1.40	1.77	1.77				
C ₄ H ₁₀		0.18	0.29	0.59		0.29	0.46	0.34				
C ₅ + PPO		4.90	6.42	6.24		6.78	5.19	3.55				
Water Soluble Chemicals (3)		2.20	2.24	2.23		2.55	2.69	2.74				
Process Water		13.11	14.50	16.91		10.74	10.77	12.08				
Total C ₂ + C ₃		38.63	40.25	42.83		37.73	51.27	42.07				
(1) Calculated by Output Basis		11.76	12.06	12.47		11.59	12.64	12.02				
(2) Methane Bleed Gas Subtracted												
(3) Stanolind Data												

Note: Periods are 6AM To 6AM, except till 4:50AM March 20 for March 19 Period.

K-351-A REACTOR RUN #7 OPERATING & YIELD SUMMARY

TABLE 1

PERIOD		30May51	40May51	50May51	60May51	70May51	8May51	9May51	10May51	11May51	12May51	13May51
Operating Conditions	Point No.											
Total Reactor Feed	MMSCFH	4.038	4.034	3.932	3.929	3.980	3.952	3.985	3.997	4.437	4.628	4.566
Synthesis Gas (1)	MMSCFH	3.382	3.316	3.307	3.337	3.427	3.460	3.390	3.465	3.159	3.063	2.974
Recycle Gas from V-351	MMSCFH	0.656	0.718	0.625	0.592	0.553	0.492	0.595	0.532	0.278	0.565	0.592
Reactor Top Pressure	PSI	355	350	350	350	345	350	355	365	358	355	350
Reactor Gas Feed	OP	620	640	640	640	640	640	640	640	630	650	640
Reactor Bed	OP	680	671	668	683	673	672	677	660	672	667	678
Catalyst Holdup	Tons	141	151	166	158	149	146	141	145	154	154	163
Catalyst Density	#/CF	104	106	112	110	110	108	106	107	123	120	114
% Fe in Catalyst		74.7	73.9	74.0	72.7	72.2	72.9	74.0	72.2	73.7	73.2	74.4
% Reduced Catalyst Charged to Reactor				95.5						96.8		
Space Velocity - V/V/HR.		1142	1029	1027	1087	1146	1186	1162	1188	1183	1081	941
SELECTIVITY												
Conversion	CO	76.9	73.0	74.3	77.2	77.67	75.81	75.56	74.35	71.02	72.0	67.33
	H ₂	83.04	82.96	84.30	83.8	78.74	79.47	77.24	77.95	79.19	77.94	79.49
	H ₂ + CO	62.12	62.31	64.29	63.37	60.30	56.95	52.71	53.63	53.99	56.47	50.46
Conversion	%	45.8	47.7	48.8	47.4	43	38	37.3	36.05	31.31	36.3	34.3
Recycle Ratio (total recycle/fresh)		1.23	1.29	1.23	1.23	0.92	0.87	1.02	0.94	1.25	0.19	0.67
Production-Gals C ₂ + / SCF CO ₂ (feed)		1.039	1.084	1.137	1.176	1.199	1.107	0.958	0.967	0.915	0.854	0.785
Yields - Output Basis												
	Wt% BPH	Wt% BPH	Wt% BPH	Wt% BPH	Wt% BPH	Wt% BPH	Wt% BPH	Wt% BPH	Wt% BPH	Wt% BPH	Wt% BPH	Wt% BPH
A	2.31	2.32	2.36	2.32	2.4	2.4	2.4	2.4	2.29	2.44	2.30	2.25
CO	14.4	12.51	11.57	11.4	10.8	10.77	10.77	11.27	15.37	14.91	14.32	
H ₂	3.76	3.43	3.17	3.7	3.44	4.00	4.33	4.20	4.06	4.15	4.54	
CO ₂	34.48	32.4	31.77	32.10	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5
H ₂	3.39	3.03	3.57	3.19	3.18	3.55	3.52	3.32	3.89	4.28	4.71	
CH ₄	5.55	5.6	5.98	5.92	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71
C ₂ H ₆	1.10	1.51	1.67	1.58	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67
C ₂ H ₄	0.18	0.74	0.38	0.73	0.81	0.44	0.44	0.69	0.77	0.70	1.35	
C ₂ H ₂	1.57	1.74	1.74	1.81	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71
C ₃ H ₈	0.12	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
C ₃ H ₆	1.14	1.87	2.04	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86
C ₄ H ₁₀	0.13	1.72	1.18	1.54	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
C ₄ H ₈	0.13	1.72	1.18	1.54	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
C ₄ H ₆	0.13	1.72	1.18	1.54	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
C ₅ + BPO	0.13	1.72	1.18	1.54	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Water Soluble Chemicals (2)												
Process Water												
Catalyst Bed Age - Days		24.5	19.7	20.7	21.7	22.7	23.7	24.7	18.7	19.7	20.7	21.7
(1) Calculated by Output Basis		26.5	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5
(2) Calculated by Output Basis		25.6	25.4	25.8	25.7	25.1	24.2	23.7	22.8	21.8	21.1	19.6

PERIOD		14 May 51	15 May 51						
Operating Conditions	Point No.								
Total Reactor Feed	PI 303	KSCFH	4.921						
Synthesis Gas (1)		MSCFH	2.973						
Recycle Gas from V-351		KSCFH							
Reactor Top Pressure	PSI		350	355					
Reactor Gas Feed	OP		640	640					
Reactor Bed	OS		680	680					
Catalyst Holdup	tons		160	157					
Catalyst Density	g/cc		113	120					
% Fe in Catalyst			73.8	74.3					
% Reduced Catalyst Charged to Reactor									
Spare Velocity - V/V _{dr}			979						
RESULTS	<i>Silver Activity</i>		7680						
Conversion	CO		76.82						
	H ₂		52.26						
	H ₂ + CO		61.23						
Contractions	%		34.9						
Recycle Ratio (total recycle: fresh)			0.71						
Production-Gas G ₃ /SCFH CO ₂ (2)			0.795						
Yields - Output Basis			wt% 87						
A			2.28						
CO			16.66						
H ₂			4.37						
CO ₂			38.72	38.77					
H ₂			6.43						
CH ₄			5.44	3.84					
C ₂ H ₆			1.50						
C ₂ H ₄			0.27						
C ₃ H ₈			2.16	1.92					
C ₃ H ₆			0.66	0.76					
C ₄ H ₁₀			1.81	1.68					
C ₄ H ₈			0.48	2.36					
C ₅ H ₁₂			4.95	1.27					
C ₅ H ₁₀									
Water Soluble Chemicals (2)			272	806					
Process Water (2)			1493	1013					
Catalyst Bed Age - Days			227	237					
(1) Calculated by Output Basis									
(2) Standard Data			53.12						
			19.6						

37.66 38.13 37.75 37.00 36.00 35.19 33.56 32.56 31.42 30.95 29.43
 67.33 61.56 60.90 60.00 59.00 58.00 56.90 56.00 55.00 54.00 53.00
 K-351-B REACTOR RUN # 90 OPERATING & FIELD SUMMARY

PERIOD	7/21/51	7/22/51	7/23/51	7/24/51	7/25/51	7/26/51	7/27/51	7/28/51	7/29/51	7/30/51	7/31/51	
Operating Conditions	Point No.											
Total Reactor Feed	MMSCFH	6.76	6.48	6.25	6.27	6.40	7.04	7.10	6.88	6.95	7.14	7.06
Synthesis Gas (1)	MMSCFH	2.51	2.82	2.61	2.57	2.68	2.52	2.70	2.96	2.67	2.51	2.48
Recycle Gas from V-351	MMSCFH	2.58	3.25	2.22	2.39	3.14	2.45	2.45	2.22	2.28	2.47	2.61
Reactor Top Pressure	PSI	350	350	350	350	350	350	350	350	350	350	350
Reactor Gas Feed	Op	625	625	640	640	640	660	660	660	660	660	640
Reactor Bed	Op	600	620	600	640	610	600	590	600	620	650	640
Catalyst Holdup	Tons	254	252	248	345	233	230	223	218	212	209	208
Catalyst Density	#/CU	150	158	158	160	156	150	146	144	144	142	143
% Fe in Catalyst		88.6	84.7	84.1	82.5	83.5	83.0	83.0	82.7	81.4	81.4	81.5
% Reduced Catalyst Charged to Reactor		100	N	add. anal. catalyst		added						
Space Velocity - 1/V/HR.		699	812	761	769	791	736	827	919	844	794	807
Recycle Ratio		1.63	1.96	1.33	1.97	1.39	1.78	1.63	1.32	1.60	1.94	1.95
Conversion	OO	76.81	70.96	-	-	-	-	-	76.24	74.57	89.04	89.04
	N ₂	51.84	61.87	-	-	-	-	-	51.23	52.42	41.08	41.08
	N ₂ + CO	60.54	66.25	-	-	-	-	-	57.60	59.65	46.00	46.00
Conversion	%	38.72	39.47	27.96	44.00	36.10	35.45	36.96	32.43	32.27	37.87	33.56
Recycle Ratio (total recycle: fresh)		1.70	1.32	1.40	1.41	1.39	1.78	1.63	1.22	1.60	1.84	1.83
Fr. Reaction-Gas C ₂ H ₄ /MSDF CO + H ₂		0.932	0.920	-	-	-	-	-	0.926	0.952	0.781	0.781
Yields - Output Basis		wt% RPH	wt% RPH						wt% RPH	wt% RPH	wt% RPH	
A		22	214						20	20	158	
CO		1709	169						2397	2069	2255	
N ₂		776	414						471	461	576	
CO ₂		2267	2129						3007	2556	1176	
H ₂		143	275						40	37	261	
CH ₄		204	50						279	282	062	
C ₂ H ₆		058	141						123	141	052	
C ₂ H ₄		277	076						098	092	062	
C ₃ H ₈		219	292.11	100					254	165	182	149
C ₃ H ₆		091	210.75	23					074	27	062	22
C ₄ H ₁₀		193	76.198	91					177	75	236	90
C ₄ H ₈		021	090.59	25					043	19	060	24
C ₄ H ₆												
C ₅ + RPO		756	237.89	284					744	247	606	199
Water Soluble Chemicals (2)	10/hr	202	166	216	221	278	243	3122	2651	3021	2742	231
Process Water	(2) 10/hr	12,124	15,625	14,000	13,792	13,021	19,029	14,604	11,646	12,646	10,780	14,233
		513	62.2							58.0	51.5	47.2
(1) Calculated by Output Basis		20.4	21.1							21.1	21.2	13.1
(2) Standard Data												

Periods are from 6AM to 2PM
 to 6AM next day

University of Illinois at Urbana-Champaign

COPY

GARTHAGE HYDROCOL, INC. Run #11

P.O. BOX 1913

Brownsville, Texas

November 28, 1951

Mr. L. G. Kemp, Jr.
The Texas Company
135 East 42nd Street
New York 17, N. Y.

Dear Mr. Kemp:

The following letter presents history and identity of catalyst samples shipped to Beacon from the recent Run 10 on our K-351A Reactor. As noted below, a copy of this letter and its attachments has been sent to Dr. C. E. Moser at the Beacon Laboratories for his information. 11

Table 1 presents results of tests obtained locally on catalyst samples submitted, and Table 2 is a summary of results obtained on the reactor. The catalyst charge to the subject Run consisted of catalyst which had been reduced to 96% plus iron content prior to charging to the reactor. The catalyst was fluidized in the reactor for several days with a methane hydrogen mixture prior to introduction of synthesis gas at 12:30 P.M. on November 10th. Please advise if you desire any additional information on the catalyst samples covered by this letter.

Following termination of the above synthesis run on November 20th, the catalyst was retained in the reactor and kept in a fluidized state by circulation of methane and hydrogen. It is our intention to submit additional catalyst samples from the next reactor run for evaluation at Beacon

Very truly yours,

R. H. AITKEN
Superintendent

WRS:mr
Encl.
Cc: Mr. F. M. Dawson

Dr. C. E. Moser

TABLE 1DESCRIPTION OF SAMPLES SENT TO BEACON

Sample No.	1	2	3	4	5	6
Lab. No.	B-30725	B-30740	B-30854	B-30940	B-31190	B-31464
Date	11-10-51	11-10-51	11-14-51	11-15-51	11-17-51	11-19-51
Time	12:00 N.	12:00 M.	10:00 AM	12:00 M.	12:00 M.	12:00 N.
Reactor Hrs.	0	12	94	132	180	216
% Fe	95.93	85.86	83.6	82.73	81.6	80.1
% K ₂ O	0.97	0.63	0.62	0.64	0.67	-
% C	-	5.2	6.7	7.0	7.3	6.9
Dry Sieve						
On 40	3.4	5.6	2.8	2.8	3.2	2.0
60	20.6	16.8	16.2	16.2	19.4	15.0
80	16.4	13.6	14.6	13.2	16.4	15.4
100	17.0	12.6	15.8	11.2	14.4	14.8
120	14.0	18.2	18.8	20.0	21.8	24.2
200	21.4	26.0	27.0	29.4	22.6	25.6
Pan	8.0	8.2	5.8	6.8	2.4	3.0

6-21A PLANT RUN OPERATIONAL & YIELD SUMMARY TABLE 2

DATE (D AM - O AM)	11-11-51	11-12-51	11-13-51	11-14-51	11-15-51	11-16-51	11-17-51	11-18-51	11-19-51		
OPERATIONAL CONDITIONS											
WATERGAS GAS - M/SOPI 31	2.98	3.00	3.06	3.10	3.07	2.99	3.05	3.09	3.23		
WATERGAS GAS - M/SOPI	4.00	4.10	4.05	4.41	4.09	4.26	3.45	4.02	3.73		
WATERGAS RATIO	1.34	1.37	1.31	1.42	1.53	1.43	1.13	1.30	1.16		
WATERGAS FOR PRESSURE-PSI	35	350	350	350	350	350	345	350	350		
WATERGAS TEMP. - °F	647	660	655	645	630	650	620	610	655		
WATERGAS DENSITY - TONS	231	226	220	215	210	203	202	255	248		
WATERGAS DENSITY - #/CF	152	154	152	150	148	154	156	168	168		
O ₂ Po & % O	65.1 -	83.5 -	82.7/7.3	82.7/7.2	81.8/6.9	81.0/7.3	80.1/7.5				
WATERGAS VELOCITY - 1/4"/HR	526	939	999	1019	1014	1073	305	988	1054		
H ₂ /CO RATIO OR FRESH FEED	1.33	1.35	1.84	1.35	1.86	1.78	1.76	1.76	1.88		
CONVERSIONS-- CO %	85.3	80.1	86.6	84.4	81.4	82.7	80.5	80.3	81.5		
H ₂ %	63.3	67.1	67.2	65.0	61.3	63.4	58.7	62.0	63.8		
CO/H ₂ %	71.0	74.9	74.0	71.8	68.3	70.4	66.6	68.8	69.9		
CONTRACTION %	55.3	50.2	55.4	53.9	51.4	53.0	48.8	49.7	49.0		
SELECTIVITY C ₂ /C ₁ %	74.8	70.5	75.5	74.9	78.1	74.3	75.5	78.0	78.0		
PRODUCTION - OUTPUT BASIS											
GALS C ₂ /H ₄ OR H ₂ /CO											2)
COMPONENT YIELDS 1)	Wt% BPH	Wt% BPH	Wt% BPH	Wt% BPH	Wt% BPH	Wt% BPH	Wt% BPH	Wt% BPH	Wt% BPH	Wt% BPH	
A	2.23	2.11	2.37	2.34	2.13	2.20	2.16	2.20	2.14		
W	10.62	6.73	9.95	11.50	13.82	12.85	14.58	14.30	13.44		
H ₂	3.57	3.16	3.24	3.43	3.36	3.50	3.92	3.61	3.56		
CO ₂	24.90	23.22	23.00	21.71	23.97	22.76	22.14	22.08	20.60		
H ₂	3.24	3.02	3.54	3.11	3.13	3.85	3.32	3.16	2.90		
CO	3.41	4.01	3.37	2.94	2.95	3.50	3.40	3.18	3.21		
C ₂ H ₄	1.67	1.85	1.50	1.51	1.39	1.44	1.48	1.54	1.72		
C ₂ H ₆	0.98	1.13	1.08	0.90	1.05	1.00	1.09	1.11	1.02		
C ₃ H ₈	2.76 13.5	3.09 16.8	2.35 15.9	3.03 17.4	3.00 16.0	2.14 12.0	3.17 18.0	2.43 14.1	2.39 14.1		
C ₃ H ₆	0.89 4.5	0.92 5.1	0.92 5.2	1.12 5.9	0.90 5.4	0.07 3.7	1.20 6.9	0.77 9.5	.92 5.5		
C ₄ H ₁₀	2.14 11.1	2.06 11.7	2.47 11.9	2.40 11.7	2.20 10.5	2.00 9.5	2.09 11.1	2.48 12.2	2.75 14.0		
C ₄ H ₈	0.22 1.1	0.31 1.5	0.31 1.5	0.44 2.5	0.49 2.4	0.69 3.4	0.48 2.4	0.51 2.0	.74 1.3		
C ₅ HPU	7.60 25.0	6.37 23.9	7.47 21.2	7.52 24.0	9.07 33.4	7.26 27.3	6.77 26.7	7.40 29.9	8.12 34.2		
WATERGAS DENSITY	4.00 11.4	3.99 12.4	4.24 13.5	4.30 14.0	4.22 13.3	4.45 14.0	4.08 13.2	4.33 14.1	4.14 13.9		
PROCESS WASTE	19.25	23.70	22.74	22.20	16.31	20.36	18.34	19.62	20.11		

1) ANALYSIS BASED ON PRODUCTION FROM OUTPUT FIGURES ALSO CO₂ & C₂ DATA ARE EXCLUSIVE OF GAS GENERATOR
 2) CALCULATED ON A. OUTPUT BASIS

January 3, 1951

Mr. L. C. Kemp, Jr.
The Texas Company
135 East 42nd Street
New York 17, N. Y.

blind: The Texas Company
K-351-A Catalyst Samples

Dear Sir,

Please refer to our letter of November 28, 1951 wherein we gave you operating data on Run No. 10 K-351-A Reactor, and tests on the samples of catalyst of different bed-life which were sent to Beacon Laboratory for possible evaluation. This letter gives similar data and tests for Run No. 11, November 28, 1951 through December 7, 1951.

Table I is a tabulation of results of tests on the catalyst samples and is self explanatory. Table II is a summary of results obtained on the reactor. The catalyst charge for this run was essentially the same as at the end of Run No. 10, previously covered, but the catalyst was kept fluidized with a mixture of methane and hydrogen prior to cutting in synthesis gas on November 28, 1951. Additional catalyst was added during the run.

Samples of catalyst are being sent to Beacon during the current Run No. 12 which started December 20, 1951 and similar data will be furnished in the near future.

Yours very truly,

Signed: V. K. BRANDENBURG

V. K. BRANDENBURG
Superintendent

WHR:ms
Encl.
cc: FMD
Dr. C.E. Moser, TICO, Beacon

100 8 0 = 123

TABLE I

DESCRIPTION OF SAMPLES SENT TO PEACON

Date Caught	11-28-51	11-29-51	12-1-51	12-3-51	12-5-51	12-7-51
Time Caught	4:30PM	6:00AM	8:00AM	6:00AM	6:00AM	6:00AM
Bed Life Hrs	Zero	12	62	108	156	204
Lab No. B -	32087	32127	32426	32701	33068	33430
Sample No.	12-1	12-2	12-3	12-4	12-5	12-6
% Fe	90.71	85.52	84.16	81.93	81.36	81.73
% K ₂ O	0.52	0.51	0.40	0.61	0.70	0.71
% C	5.88	-	7.30	7.02	7.34	7.24
Dry Dieve						
on 40	2.4	2.8	2.2	1.8	3.0	2.0
60	15.4	16.6	16.8	15.6	25.2	15.8
80	14.9	15.0	14.8	15.2	16.6	16.0
100	9.6	9.0	8.6	10.4	5.6	9.8
120	23.2	24.2	25.4	25.8	29.2	22.6
200	30.8	28.5	31.2	29.0	19.2	31.4
Pan	3.6	3.6	2.8	3.0	1.0	2.2

K-351-A REACTOR RUN 11 OPERATING & YIELD SUMMARY

TABLE 1

DATE	11-29-51	11-30-51	12-1-51	12-2-51	12-3-51	12-4-51	12-5-51	12-6-51	12-7-51
OPERATING CONDITIONS									
SYNTHESIS GAS - MMSCFH 2)	2.91	3.03	3.02	3.00	2.71	2.90	2.81	2.80	2.73
RECYCLE GAS - MMSCFH	4.66	4.26	3.95	4.22	4.21	4.05	4.26	4.20	3.87
REACTOR TOP PRESSURE - PSI	350	350	350	350	350	350	350	350	350
REACTOR BED TEMP. - °F	650	650	660	650	650	630	630	650	650
CATALYST HOLDUP - TONS	215	210	210	281	266	252	246	243	236
" DENSITY - #/CF	162	160	168	169	168	166	166	168	188
% Fe & %C	85.9	86.1	85.4	82.6	82.4	81.6	81.5	80.9	80.5
SPACE VELOCITY - V/V/HR	1040	1081	832	862	820	891	891	928	956
H ₂ /CO RATIO OR FRESH FEED	1.80	1.78	1.83	1.84	1.85	1.84	1.86	1.92	1.90
CONVERSIONS - CO %	82.42	85.28	85.87	85.11	85.22	84.48	84.34	86.13	85.90
H ₂ %	59.53	65.36	66.92	66.71	65.21	66.56	64.61	67.45	67.29
CO/H ₂ %	67.69	72.51	73.62	73.19	72.23	72.85	71.50	73.84	73.53
CONTRACTION %	50.41	53.75	50.46	51.07	51.66	50.21	49.76	50.92	41.60
SELECTIVITY C ₃ /C ₂ %	76.22	78.92	76.76	77.93	77.53	76.99	74.91	66.37	71.40

PRODUCTION - OUTPUT BASIS

GALS C₃/M CF H₂/CO

COMPONENT YIELDS 1)

	Wt%	BPH	Wt%	BPH	Wt%	BPH	Wt%	BPH	Wt%	BPH	Wt%	BPH	Wt%	BPH				
A	1.99		2.20		2.05		1.93		2.13		1.94		2.34		2.05		2.10	
CO	12.99		10.79		10.07		10.45		10.31		10.74		10.92		9.55		9.60	
H ₂	3.88		3.26		3.11		3.10		3.24		3.08		3.31		3.10		3.18	
CO ₂	23.90		21.47		19.65		17.90		20.09		17.47		19.16		17.76		18.22	
H ₂	3.31		3.04		3.88		3.68		4.10		4.20		4.05		3.58		3.13	
CH ₄	2.85		2.86		2.78		2.67		3.18		2.91		3.39		6.21		4.09	
C ₂ H ₄	1.54		1.23		1.40		1.42		1.58		1.50		1.60		1.52		1.47	
C ₂ H ₆	.95		.98		1.05		1.01		1.09		1.04		1.04		1.13		1.31	
C ₃ H ₆	2.74		2.62		2.75		2.74		2.84		2.66		2.95		2.76		3.09	
C ₃ H ₈	.82		1.69		.86		.83		.96		.97		1.04		.84		.94	
C ₄ H ₈	2.04		2.32		2.11		2.21		2.95		2.65		2.31		2.30		2.36	
C ₄ H ₁₀	.26		.36		.28		.27		.41		.30		.30		.37		.33	
C ₅ RPO	7.21	26.2	7.71	30.2	6.70	26.2	7.48	29.1	8.68	31.2	7.60	29.2	7.22	26.2	6.99	25.2	6.73	23.4
WATER SOLUBLE CHEMICALS	4.06	12.4	4.30	13.8	4.57	14.7	4.53	14.7	4.34	12.6	4.08	12.8	4.21	12.6	4.22	12.5	3.74	10.7
PROCESS WATER	19.17		22.04		24.11		24.11		18.48		22.73		20.40		21.56		22.79	

1) AERATION GAS SUBTRACTED FROM OUTPUT FIGURES ALSO CH₄ & CO₂ DATA ARE NET EXCLUSIVE OF GAS GENERATOR 2) CALCULATED ON AN OUTPUT BASIS

DON GEORGE GARRISON, President
 FRANK M. DAWSON, Treasurer
 ALLEN A. BREWSTER, Secretary
 R. H. AITKEN, Vice President
 ALBERT L. WOLFE, Secretary

CARTHAGE HYDROCOL, INC
 P O BOX 1913
 BROWNSVILLE, TEXAS

January 25, 1952

TEL. & PDS DIV	
FEB 4 1952	
KEY	VP
✓	✓
WAL	✓
GK	✓
TCH	✓
W	✓
WLD	✓
✓	✓
IPG	✓
JHG	✓
WRH	✓
✓	GM
PJK	Hdl

MEV

Mr. L. C. Kemp, Jr.
 The Texas Company
 135 East 42nd Street
 New York 17, N. Y.

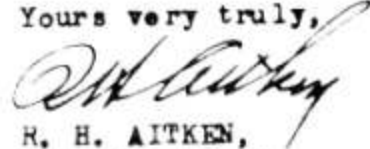
Dear Sir:

Please refer to the file of correspondence which covers operating data on previous Synthesis Reactor runs and tests on special catalyst samples submitted. This letter gives similar data for the Reactor Run No. 12-A, Plant Run No. 13, December 21, 1951 to January 2, 1952 inclusive.

Table I is a tabulation of the results of tests covering six samples obtained as shown during the run. The catalyst in this reactor consisted of catalyst transferred from K-351-A used on the previous run (Reactor Run No. 11, Plant Run No. 12) and about 100 tons fresh catalyst. The catalyst was subjected to a "pretreating cycle" then to a 24-hour carbiding cycle immediately prior to starting the synthesis reaction and approximately 50 tons of fresh catalyst were added near the end of this run.

Samples of catalyst from Reactor Run 12-B, Plant Run 14 have been submitted to Beacon and operating data will be furnished in the near future.

Yours very truly,


 R. H. AITKEN,
 Vice President

WHR:ms
 Encl-2
 cc: Dr. C. E. Moser, Beacon
 Mr. du B. Eastman, Montebello

WMS-MGM
 CFL

LCR (LW) 2/7/52

TABLE I

DESCRIPTION OF CATALYST SAMPLES SUBMITTED

PLANT RUN NO. 13 REACTOR RUN NO. 12-A

Date Caught	12-20-51	12-21-51	12-23	12-26	12-29	12-31
Bed Life Hrs.	Note 1	Note 2	72 Hrs.	120 hrs.	188 hrs.	236 hrs
Lab No. B -	34271	34297	34584	34905	35274	35646
Sample No.	13-1	13-2	13-3	13-4	13-5	13-6
%Fe	90.4	83.5	81.6	80.5	80.2	80.9
%K ₂ O	0.61	0.58	0.69	0.69	-	0.58
%C	3.4	4.2	6.0	7.3	7.50	6.5
Dry Sieve						
On 40	2.0	1.6	1.8	2.4	-	1.2
60	19.6	14.8	17.4	16.0	-	14.6
80	15.6	15.8	17.8	17.4	-	17.0
100	0.2	0.2	1.0	8.6	-	27.0
120	37.8	37.0	29.6	21.4	-	9.4
200	20.8	25.8	26.2	26.4	-	28.4
Pan	4.8	4.4	6.2	8.6	-	2.6

Note 1 - Sample obtained after "pretreating cycle" and before "carbiding cycle".

Note 2 - Sample obtained after "carbiding cycle" and prior to start of Synthesis.

DATE	12-21	12-22	12-23	12-24	12-25	12-26	12-27	12-28	12-29
OPERATING CONDITIONS									
SYNTHESIS GAS - MMSCFH	2.84	2.76	3.00	2.93	2.98	2.79	3.17	3.17	3.03
RECYCLE GAS - MMSCFH	4.40	4.58	4.14	4.05	4.43	4.61	4.19	4.50	4.46
REACTOR TOP PRESSURE - PSI	330	350	350	350	350	350	350	350	350
REACTOR BED TEMPERATURE - °F	640	620	625	635	635	620	620	615	612
CATALYST HOLDUP - TONS	195	188	200	204	211	216	200	192	183
DENSITY - #/CF	150	148	150	150	148	148	148	146	144
% F & % C	84.9 - 7.9	85.4 - 6.3	82.11 - 4.8	80.4 - 6.0	80.9 - 5.9	80.5 - 4.2	80.3 - 5.3	80.2 - 6.6	79.9 - 7.5
SPACE VELOCITY - V/V/Hr	1006	1050	1043	993	944	971	1128	1115	1071
H ₂ /CO RATIO OF FRESH FEED	1.81	1.87	1.86	1.85	1.83	1.89	1.86	1.89	1.89
CONVERSIONS - CO %	81.25	84.28	82.84	79.98	80.81	79.50	79.99	77.27	74.10
H ₂ %	61.55	64.65	63.24	59.22	59.37	60.21	58.06	53.38	51.27
CO/H ₂ %	68.64	71.49	70.08	66.50	66.92	66.91	65.73	61.63	59.16
CONTRACTION %	44.3	54.4	50.6	46.8	47.1	47.0	46.8	43.7	43.1
SELECTIVITY C ₃ /C ₁ %	80.76	77.4	78.52	78.72	77.94	81.59	79.98	76.52	80.92
PRODUCTION -- OUTPUT BASIS									
COMPONENT YIELDS	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH
A	2.03	2.31	2.13	2.08	2.00	1.98	2.08	2.23	2.17
CO	13.31	11.11	11.97	13.99	13.51	14.15	13.87	15.86	17.64
H ₂	3.56	3.36	3.44	3.80	3.79	3.74	3.89	4.44	4.53
CO ₂	17.71	20.25	17.98	16.07	18.93	17.09	18.42	21.51	19.49
N ₂	2.95	3.62	3.44	3.20	3.21	3.19	3.43	2.76	3.49
CH ₄	3.00	3.26	2.20	2.11	2.62	1.85	2.07	2.29	1.34
C ₂ H ₄	1.21	1.51	1.54	1.36	1.45	1.46	1.51	1.46	1.43
C ₂ H ₆	.57	.94	.81	.84	.80	.80	.83	.75	1.05
C ₃ H ₆	2.79	15.0	2.69	13.8	2.08	11.7	2.56	14.1	2.86
C ₃ H ₈	.98	5.3	.93	4.8	.74	4.2	.97	5.4	.86
C ₄ H ₈	2.10	9.7	2.03	9.0	1.84	8.9	2.08	9.9	2.71
C ₄ H ₁₀	.27	1.3	.32	1.5	.50	2.5	.19	.9	.28
C ₅ /RPO	10.88	37.0	9.24	31.8	7.28	27.6	6.83	25.4	6.46
WATER SOLUBLE CHEMICALS	3.04	9.3	4.33	12.6	4.21	13.5	4.06	12.7	4.05
PROCESS WATER	20.13	-	19.50	-	21.81	-	21.55	-	21.01
Tot. C ₃	77.6	73.1	68.9	64.4	71.9	76.5	81.0	63.4	61.3

OPERATING & YIELD SUMMARY OF

K-351-B REACTOR - RUN NO. 12-B

PLANT RUN NO. 14

WRS

EHM

HIJ

TABLE I
DESCRIPTION OF CATALYST SAMPLES SUBMITTED

	<u>PLANT RUN NO 14</u>				<u>REACTOR RUN 12-B</u>			
Date Caught	1-8-52	1-9-52	1-10-52	1-12-52	1-14-52	1-16-52	1-18-52	1-20-52
Bed Life Hrs	Note 1	Note 2	12	60	108	156	204	252
Lab No. B -	35998	36068	36153	36374	36657	37112	37220	37386
Sample No.	14-1	14-2	14-3	14-4	14-5	14-6	14-7	14-8
% Fe	84.8	81.3	79.9	80.1	79.9	79.2	79.5	79.2
% K ₂ O	0.55	0.49	0.31	0.29	0.39	0.15	9.29	0.30
% C	5.2	7.2	6.9	8.1	..	8.5	8.1	8.5
Dry Sieve Ana.								
On 40	1.2	1.6	1.2	2.2	2.8	2.0	1.6	1.4
60	10.2	11.4	11.4	15.6	18.0	16.4	14.8	12.2
80	13.6	13.0	14.0	15.0	18.2	17.2	17.2	16.6
100	23.8	20.6	24.6	29.2	28.8	27.4	29.2	35.6
120	8.2	10.8	9.8	4.2	6.6	8.4	9.0	6.4
200	31.2	31.4	29.0	28.6	24.4	27.6	27.8	26.2
Pan	12.6	12.0	9.4	5.8	1.6	1.4	1.2	1.2

Note 1 - This sample obtained at end of H₂ "Pretreat" and prior to "Carbiding cycle".

Note 2 - This sample obtained at end of "carbiding cycle" and just prior to start of Synthesis reaction.

DATE	1-9-52	1-10-52	1-11-52	1-12-52	1-13-52	1-14-52	1-15-52	1-16-52	1-17-52
OPERATING CONDITIONS									
SYNTHESIS GAS - MNSCFH	2.65	2.55	2.65	2.54	2.50	2.40	2.31	2.38	2.59
RECYCLE GAS - MNSCFH	4.79 ^{1.77}	4.44 ^{1.89}	4.39 ^{1.77}	4.26 ^{1.80}	4.11 ^{1.61}	4.50 ^{1.90}	4.62 ^{1.93}	4.65 ^{1.93}	3.76 ^{1.35}
REACTOR TOP PRESSURE - PSI	325	350	350	350	350	350	350	350	350
REACTOR BED TEMPERATURE - °F	639	671	676	676	682	669	667	671	674
CATALYST HOLDUP - TONS	208 ²⁰⁸ 225 ²²⁵	210 ²¹⁰	200 ²⁰⁰	190 ¹⁹⁰	181 ¹⁸¹	172 ¹⁷²	164 ¹⁶⁴	156 ¹⁵⁶	152 ¹⁵²
DENSITY - #/CF	146	144	144	142	140	136	134	130	132
%O ₂ & %C	82.9 - 6.0	79.7 - 7.8	79.8 - 8.3	79.2 - 7.5	79.4 - 7.9	79.9 - 8.1	80.0 - 8.4	79.7 - 9.7	79.4 - 8.7
SPACE VELOCITY - V/V/Hr	791	801	876	872	894	867	850	924	1044
H ₂ /CO RATIO OF FRESH FEED	1.87	1.84	1.88	1.85	1.85	1.90	1.87	1.85	1.86
CONVERSIONS - CO %	83.53	83.27	83.00	82.09	81.92	83.25	86.78	86.54	85.92
H ₂ %	63.51	61.74	60.20	57.05	57.85	61.46	67.25	67.21	62.66
CO/CH ₄ %	70.49	69.32	68.06	65.85	66.31	68.98	74.06	74.00	70.80
CONTRACTION %	50.25	51.11	46.34	48.68	47.64	48.02	56.76	52.26	48.32
SELECTIVITY C ₃ / C ₁ %	80.95	74.93	76.06	78.41	76.02	76.89	77.51	78.81	76.21
PRODUCTION - OUTPUT BASIS	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH
COMPONENT YIELDS	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH
A	2.05	2.02	2.36	2.29	2.24	2.13	1.97	1.98	2.11
CO	11.14	11.49	11.7	12.36	12.74	11.48	9.06	9.48	9.90
H ₂	3.32 2.32	3.48	3.71	3.94	3.95	3.61	3.02	3.07	3.51
CO ₂	16.44	20.51	20.87	23.30	24.16	21.41	17.66	17.30	21.24
N ₂	3.61	4.38	3.50	4.15	4.57	5.10	4.26	4.12	3.23
CH ₄	2.40	3.36	2.72	2.55	2.89	2.54	2.79	2.15	2.74
C ₂ H ₄	1.40	1.56	2.29	1.69	1.66	1.57	1.66	1.66	1.68
C ₂ H ₆	.79	.90	.32	.86	.81	.79	.81	.84	.80
C ₃ H ₆	2.51 12.6	2.47 12.0	1.59 7.9	2.74 13.1	2.43 11.7	2.39 10.7	2.76 12.0	2.07 9.3	2.46 11.9
C ₃ H ₈	1.01 5.2	.90 4.5	.91 4.6	.93 4.6	.89 4.2	.85 3.9	.98 4.3	.85 3.9	.89 4.4
C ₄ H ₁₀	1.98 8.6	1.36 5.7	1.72 7.4	1.91 7.9	1.88 7.6	1.57 6.1	2.02 7.6	1.83 7.1	1.68 7.0
C ₄ H ₁₂	.25 1.1	.28 1.2	.23 1.0	.25 1.0	.40 1.7	.35 1.4	.25 1.0	.31 1.2	.26 1.1
C ₅ RPO	1.22 4.8	1.43 5.5	.84 3.3	1.60 6.8	1.32 4.9	1.72 6.5	1.22 4.2	1.92 6.8	1.07 4.2
WATER SOLUBLE CHEMICALS	3.39 9.7	4.16 11.5	4.46 12.6	3.82 10.5	3.35 8.9	4.21 10.8	4.65 11.6	4.19 10.7	4.26 11.8
PROCESS WATER	21.78	18.28	19.08	14.32	15.43	19.11	24.60	26.92	22.93
	77.0	61.4	60.3	65.9	59.5	57.3	59.2	57.0	59.9

Feed being cut down

DATE	1-18-52		1-19-52		1-20-52		1-21-52		1-22-52	
OPERATING CONDITIONS										
SYNTHESIS GAS - MNSCPH	2.51		2.60		2.74		3.235		3.77	
RECYCLE GAS -- MNSCPH	4.40 ^{6.51}		4.68 ^{7.25}		4.38 ^{7.02}		3.78 ^{7.12}		3.66 ^{7.43}	
REACTOR TOP PRESSURE - PSI	350		350		350		350		350	
REACTOR BED TEMPERATURE - ° F	667		669		679		669		653	
CATALYST HOLDUP - TONS	143 ¹⁵³		115 ¹⁴⁰		122 ¹³¹		106 ¹³¹		110 ¹⁰²	
" DENSITY - #/CP	124 ¹²⁴		130		120		116		134	
% Fe & % C	79.5 8.9		80.2 4.9		79.0 11.2		79.8 9.1		80.6 9.5	
SPACE VELOCITY - V/V/Hr	1003		978		1220		1734		2115	
H ₂ /CO RATIO ON FRESH FEED	1.79 ^{58.5}		1.86		1.86		1.90		1.92 ^{59.0}	
CONVERSIONS - CO %	83.88		84.94		85.53		80.41		74.34	
H ₂ %	61.78		62.83		63.42		56.91		48.71	
CO/H ₂ %	69.50		70.55		71.14		65.00		57.56	
CONTRACTION %	49.48 ^{49.3}		48.99 ^{47.8}		48.64 ^{47.7}		42.86 ^{44.5}		38.11 ^{44.5}	
SELECTIVITY C ₃ /C ₁ %	77.28		75.92		80.66		76.07		77.97	
PRODUCTION - OUTPUT BASIS	wt%	BPH	wt%	BPH	wt%	BPH	wt%	BPH	wt%	BPH
COMPONENT YIELDS										
A	1.97		2.10		1.89		1.92		1.89	
CO	11.03		10.40		10.32		13.60		17.82	
H ₂	3.51		3.44		3.40		4.10		4.86	
CO ₂	17.09		19.19		16.80		20.29		20.40	
H ₂	3.63		4.25		3.76		3.47		3.06	
CH ₄	2.58		2.94		1.83		2.25		1.25	
C ₂ H ₄	1.63		1.61		1.48		1.55		1.48	
C ₂ H ₆	.72		.76		.64		.62		.47	
C ₃ H ₆	2.46 11.4		2.22 12.3		1.89 4.7		2.10 13.0		1.62 11.4	
C ₃ H ₈	.81 3.9		1.15 5.7		.73 3.8		.65 4.1		.56 4.0	
C ₄ H ₈	1.78 7.3		1.29 5.5		1.44 6.4		1.32 7.1		.91 5.5	
C ₄ H ₁₀	.31 1.3		.24 1.1		.40 1.8		.24 1.3		.11 7.7	
C ₅ / RPO	1.30 3.9		.29 1.1		1.08 4.4		.77 3.0		.77 4.3	
WATER SOLUBLE CHEMICALS	14.13 11.2		14.36 12.2		14.53 11.1		13.06 13.7		13.37 13.5	
PROCESS WATER	23.65 --		22.44 --		27.81 --		22.94 --		21.44 --	

33.0 37.3 39.8 43.0 46.4
58.5 59.3 60.8 61.5 61.7

DATE	2-2-52	2-3-52	2-4-52	2-5-52	2-6-52	2-7-52	2-8-52	
OPERATING CONDITIONS								
SYNTHESIS GAS - MMSCFH	2.92	2.86	2.95	3.73	4.45	4.53	4.11	
RECYLE GAS - MMSCFH	3.60	3.84	3.98	3.98	3.88	3.75	2.65	
REACTOR TOP PRESSURE - PSI	350	350	350	355	380	380	250	
REACTOR BED TEMPERATURE - °F	650	645	640	650	690	670	650	
CATALYST HOLDUP - TONS	141	137	133	131	129	129	140	
" DENSITY - #/CF	126	126	122	120	114	112	124	
% P _o & % C	72.95-9.4	80.31-11.3	79.13-13.0	79.25-11.2	77.47-13.6	79.6-13.2	78.33-10.4	
SPACE VELOCITY - V/V/Hr	1168	1220	1280	1587	1769	1809	1676	
H ₂ /CO RATIO OF FRESH FEED	1.82	1.85	1.85	1.86	1.88	1.83	1.89	
CONVERSIONS - CO %	91.19	83.70	82.89	79.81	78.04	81.68	78.41	
H ₂ %	80.35	62.08	60.15	51.31	50.58	53.87	53.69	
CO/H ₂ %	14.70	69.66	68.12	61.26	60.13	63.70	62.25	
CONTRACTION %	55.07	46.19	44.61	38.03	40.72	46.37	29.42	
SELECTIVITY C ₃ /C ₂ %	56.67	75.15	77.02	67.97	70.96	76.99	65.99	
PRODUCTION - OUTPUT BASIS								
rate of production								
COMPONENT YIELDS	WT% - BPH	WT% BPH	WT% BPH	WT% BPH	WT% BPH	WT% BPH	WT% BPH	WT% BPH
A	1.73	1.89	2.05	2.15	2.02	2.00	2.17	
CO	4.22	11.41	11.78	14.07	15.15	12.90	14.89	
H ₂	1.42	3.54	3.66	4.58	4.80	4.24	4.66	
CO ₂	9.94	28.79	28.76	25.77	24.66	24.63	23.31	
H ₂	3.61	3.59	3.52	3.74	3.93	2.94	3.01	
CH ₄	8.65	3.57	3.00	3.92	3.08	2.69	4.21	
C ₂ H ₄	.54	1.44	1.63	1.57	1.64	1.72	1.78	
C ₂ H ₆	1.09	1.67	.73	.68	.63	1.68	.78	
C ₃ H ₆	1.99 12.5	1.71-9.1	1.92 11.1	2.32 16.0	1.67 13.9	1.91 16.9	2.54 19.4	
C ₃ H ₈	.90 6.4	.78-4.3	.81 4.6	.73 5.1	.53 4.5	.80 7.0	.83 6.4	
C ₄ H ₈	1.57 9.5	2.90 12.4	2.85 12.3	1.44 8.5	1.88 13.5	2.75 20.3	.92 6.1	
C ₄ H ₁₀	.38 2.4	.57 1.7	.28 1.4	.21 1.3	.32 2.4	.45 3.4	.31 2.1	
C ₅ RPO	6.22 30.3	8.12 30.2	8.35 32.5	5.47 25.2	6.06 33.7	8.45 31.5	5.82 29.8	
WATER SOLUBLE CHEMICALS	2.49 4.4	3.23-9.6	3.91-12.6	2.97 11.8	2.62 12.4	2.58 12.6	2.69 11.7	
PROCESS WATER	21.04	20.22	18.89	14.71	14.65	17.81	15.49	
	71.0	69.5	74.5	67.9	91.4	111.7	75.5	
R/FF	1.23	1.34	1.32	0.93	0.76	0.83	0.64	

DATE	2-9-52	2-10-52	2-11-52				
OPERATING CONDITIONS							
SYNTHESIS GAS - MMSCPH	2.36	2.66	2.52				
RECYCLE GAS - MMSCPH	3.62	4.00	4.49				
REACTOR TOP PRESSURE - PSI	242	350	350				
REACTOR BED TEMPERATURE - °F	580	600	630				
CATALYST HOLDUP - TONS	124	130	132				
" DENSITY - #/CF	116	116	128				
% Fe & % C	81.9 - 9.1	78.5 - 10.1	78.2 - 9.1				
SPACE VELOCITY - V/V/Hr	998	1043	1114				
H ₂ /CO RATIO ON FRESH FEED	1.87	1.91	1.86				
CONVERSIONS - CO %	82.30	82.62	84.40				
H ₂ %	60.50	59.92	61.57				
CO/H ₂ %	68.47	67.71	69.55				
CONTRACTION %	49.75	39.80	45.97				
SELECTIVITY C ₂ /C ₂ %	79.54	72.64	74.60				
PRODUCTION - OUTPUT BASIS							
ONS CO ₂ / M CO ₂ / 100							
COMPONENT YIELDS	WT% BPH	WT% BPH	WT% BPH				
A	1.92	2.12	2.71				
CO	11.43	11.97	10.57				
H ₂	3.68	3.10	3.20				
CO ₂	18.24	18.63	19.42				
H ₂	2.84	2.97	3.11				
CH ₄	2.89	3.14	2.91				
C ₂ H ₄	1.82	1.58	1.80				
C ₂ H ₆	.77	.79	.80				
C ₃ H ₆	2.41	10.7	2.30	12.4	2.27	10.9	
C ₃ H ₈	.77	3.5	.81	4.1	.75	3.8	
C ₄ H ₈	1.76	6.7	1.84	7.9	1.8	6.7	
C ₄ H ₁₀	1.30	1.2	.30	1.3	.27	1.2	
C ₅ RPO	5.16	12.4	5.26	18.0	2.04	17.2	
WATER SOLUBLE CHEMICALS	1.03	10.2	3.6	10.2	4.21	11.6	
PROCESS WATER	21.92	—	22.39	—	20.59	—	
		47.7		54.4		57.4	
RIF		1.53		1.65		1.78	

TABLE I
DESCRIPTION OF CATALYST SAMPLES SUBMITTED
PLANT RUN NO. 16

Date Caught	2-17-52	2-18-52	2-19-52	2-20-52	2-22-52
Bed Life Hrs	Note 1	Note 2	Note 3	24	72
Lab No. B-	39415	39477	39545	39642	39799
Sample No.	16-1	16-2	16-3	16-4	16-5
% Fe	86.07	87.57	83.5	79.71	80.48
% K ₂ O	1.45	0.78	0.69	0.48	0.52
% C	3.58	6.57	7.56	10.01	10.26
Dry Sieve Analysis					
On 40	0.8	0.2	1.0	0.8	1.2
60	7.8	11.0	12.0	9.8	10.6
80	11.2	16.0	17.6	14.0	16.4
100	11.2	13.0	14.4	12.2	13.4
120	7.6	9.2	11.0	8.6	9.2
200	31.0	31.6	28.4	35.8	38.8
Pan	30.6	19.0	15.8	17.6	11.4

Note 1 - This sample obtained at end of loading.

Note 2 - This sample obtained at end of H₂ "Pretreat" and prior to "Carbiding Cycle".

Note 3 - This sample obtained at end of "Carbiding Cycle".

TABLE 11

K-351-A PLANT RUN NO. 16 OPERATING & YIELD SUMMARY

DATE	2-19-52		2-20-52		2-21-52		-Note 1- 2-22-52	
OPERATING CONDITIONS								
SYNTHESIS GAS - MMSCFH	2.34		3.30		4.51		4.06	
RECYCLE GAS - MMSCFH	4.06		3.45		2.65		2.98	
REACTOR TOP PRESSURE - PSI	350		350		350		350	
REACTOR BED TEMPERATURE - °F	650		680		650		620	
CATALYST HOLDUP - TONS	153		142		134		137	
" DENSITY - #/CF	120		120		114		114	
% Fe & % C	80.86	11.5	79.33	12.3	77.60	11.3	80.48	10.3
SPACE VELOCITY - V/V/Hr	818		1288		1808		1606	
H ₂ /CO RATIO OF FRESH FEED	1.780		1.824		1.836		1.931	
CONVERSIONS - CO %	82.44		81.38		76.81		75.19	
H ₂ %	56.98		55.58		45.89		43.54	
CO ₂ /H ₂ %	66.14		64.71		56.79		54.34	
CONTRACTION %	58.08		43.09		35.04		33.26	
SELECTIVITY C ₃ /C ₁ %	72.67		67.83		69.80		71.07	
PRODUCTION - OUTPUT BASIS	wt%	BPH	wt%	BPH	wt%	BPH	wt%	BPH
COMPONENT YIELDS								
A	2.32		2.12		2.10		2.16	
CO	11.83		12.91		16.03		16.55	
H ₂	3.71		4.04		4.94		5.24	
CO ₂	22.97		23.45		24.96		23.22	
H ₂	5.52		4.15		3.51		3.80	
CH ₄	2.75		4.04		2.84		2.97	
C ₂ H ₄	1.82		1.70		1.61		1.68	
C ₂ H ₆	1.08		.91		.68		.66	
C ₃ H ₆	2.26	10.3	2.57	16.1	1.93	16.4	1.83	14.0
C ₃ H ₈	.67	3.1	.78	5.0	.57	5.0	.53	4.1
C ₄ H ₈	2.28	9.0	1.94	10.5	1.58	11.6	1.78	11.8
C ₄ H ₁₀	.59	2.4	.28	1.5	.28	2.1	.35	2.4
C ₅ & RPO	5.44	17.30	5.11	21.8	4.63	26.8	5.41	28.5
WATER SOLUBLE CHEMICALS	3.76	9.8	3.56	12.0	2.88	14.0	3.57	15.6
PROCESS WATER	25.18	52.5	16.42	66.2	14.69	72.3	11.13	76.1

Note 1 - Unit Shut-down 9:30AM 2/22/52 after 3 1/2 hours on this operating day.

100% based H₂+CO in

TABLE I
DESCRIPTION OF CATALYST SAMPLES SUBMITTED
PLANT RUN NO. 17

Date Caught	3-3-52	3-4-52	3-5-52	3-14-52
Bed Life Hrs	Note 1	Note 2	24	Note 3
Lab No. B -	40286	40328	40404	41399
Sample No.	17-1	17-2	17-3	17-4
% Fe	84.5	79.3	75.9	75.6
% K ₂ O	0.49	0.30	0.54	0.38
% C	9.25	13.0	11.3	12.3
Dry Sieve Analysis				
On 40	0.6	2.0	12.0	1.4
60	10.2	10.0	15.2	12.6
80	19.4	13.0	25.6	59.4
100	11.4	8.4	7.2	0.2
120	7.4	7.0	2.6	0.4
200	37.0	32.4	29.6	24.2
Pan	14.2	21.0	18.0	1.4

Note 1 - This sample caught at end of "Pretreat" cycle. See attached letter.

Note 2 - This sample caught at end of "Carbiding" cycle. See attached letter.

Note 3 - This sample caught when emptying Reactor at end of Run 17. No intermediate samples obtained due to low bed level in Reactor.

DATE	3-4-52	3-5-52	3-6-52	3-7-52	3-8-52	3-9-52	3-10-52	3-11-52	3-12-52	3-13-52
OPERATING CONDITIONS										
SYNTHESIS GAS - M.SCFH	3.04	4.49	4.20	4.44	4.42	4.38	4.52	4.62	4.56	4.47
RECYCLE GAS - M.SCFH	3.04	2.27	2.78	2.62	2.50	2.93	3.13	3.07	2.84	2.83
REACTOR TOP PRESSURE - PSI	350	350	375	375	375	375	375	370	375	375
REACTOR BED TEMPERATURE - °P	685	500	650	660	675	690	665	650	645	645
CATALYST HOLDUP - TONS	91	73	68	51	83	67	50	72	55	41
" DENSITY - #/CF	94	92	86	64	104	88	58	98	72	60
% Fe & % C	78.9 9.0	-- *	-- *	-- *	-- *	-- *	-- *	-- *	-- *	-- *
SPACE VELOCITY - V/V Hr	1414	2516	2357	2726	2552	2696	2614	2846	2708	3027
H ₂ /CO RATIO OF FRESH FEED	1.809	1.894	1.831	1.883	1.836	1.851	1.847	1.831	1.802	1.837
CONVERSIONS - CO %	84.13	67.17	66.46	70.94	63.51	66.30	56.55	63.43	67.78	65.57
H ₂ %	57.23	41.57	40.26	44.39	35.52	39.19	35.78	38.25	42.50	44.14
CO/H ₂ %	66.80	50.42	49.52	53.60	45.39	48.70	43.08	47.14	51.52	51.70
CONTRACTION %	47.06	28.52	32.77	31.48	28.90	28.26	24.08	24.55	30.68	33.71
SELECTIVITY C ₃ /C ₁ %	72.25	78.23	66.64	65.42	65.82	67.81	71.08	61.60	68.73	66.91
PRODUCTION - OUTPUT BASIS	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH	wt% BPH
COMPONENT YIELDS										
A	2.13	2.13	2.12	2.12	2.18	2.05	1.93	2.10	2.05	1.88
CO	10.99	22.75	23.49	20.35	25.48	23.84	30.44	25.91	22.58	24.18
H ₂	3.86	5.52	5.51	5.28	5.95	5.73	5.98	5.77	5.23	5.19
CO ₂	22.32	23.38	22.49	24.91	21.69	23.61	17.06	21.70	20.86	17.77
N ₂	3.89	2.83	2.93	3.20	3.24	3.36	3.17	3.27	2.84	2.95
CH ₄	3.16	2.05	3.33	3.38	2.68	2.76	2.01	3.04	2.40	2.21
C ₂ H ₄	1.74	1.56	1.55	1.54	1.25	1.26	1.11	1.28	1.34	1.32
C ₂ H ₆	.67	.38	.49	.46	.41	.57	.28	.45	.54	.31
C ₃ H ₆	2.81 16.3	1.37 11.4	2.02 15.9	2.14 17.6	1.33 11.1	2.11 17.2	1.75 14.9	1.58 13.6	1.35 11.7	1.66 13.9
C ₃ H ₈	.88 5.2	.41 3.5	.47 3.8	.48 4.1	.57 4.9	.60 5.0	.82 7.1	.38 3.3	.46 4.0	.47 4.0
C ₄ H ₈	1.60 8.0	1.77 12.7	1.34 9.2	1.34 9.5	1.17 8.4	1.28 9.0	1.11 8.1	1.02 7.6	1.49 11.2	.98 7.1
C ₄ H ₁₀	.25 1.3	.23 1.7	.23 1.6	.34 2.5	.30 2.2	.17 1.2	.49 3.7	.36 2.8	.33 2.6	.10 0.7
C ₅ RPO	6.09 23.1	4.59 27.10	4.10 21.4	2.93 15.8	2.83 16.5	3.20 17.0	1.87 10.3	2.37 13.6	3.53 21.6	2.13 11.7
WATER SOLUBLE CHEMICALS	2.87 9.5	2.60 12.4	2.57 11.6	2.95 13.8	2.24 10.6	2.30 10.7	2.30 11.0	1.93 9.5	2.33 11.5	2.42 11.6
PROCESS WATER	19.87 -	11.97 -	12.10 -	12.53 -	12.23 -	12.25 -	13.73 -	13.57 -	16.98 -	20.88 -

* No Sample obtained due to low bed level in Reactor.