

Table 26

## RESULT OF PROPYLENE OPERATION

RUN NO. 9972-19  
 CATALYST LZ-Y82 #10042-25 55CC 35.00GM (35.53G AFTER THE RUN, +0.53G)  
 FEED H<sub>2</sub>:C<sub>3</sub>H<sub>6</sub>:H<sub>2</sub>O @ 1:1:2 MOLE RATIO, 0.5 C<sub>3</sub>H<sub>6</sub> WHSV, CONTINUOUS FEED  
 C<sub>3</sub>H<sub>6</sub> MW= 42.0813 DENSITY= 0.5087 GM/CC (@ 73 F)  
 TARGET FLOW: C<sub>3</sub>H<sub>6</sub> 34.3 CC/HR H<sub>2</sub> 168 CCM, 10.1 L/HR H<sub>2</sub>O 15.0 CC/HR  
 ACTUAL FLOW: 35.4 CC/HR EFFLUENT 19.1 L/HR AQ LAYR 14.6 CC/HR

RUN & SAMPLE NO.	9972-19-01	972-19-02	972-19-03	972-19-0A	972-19-05
C <sub>3</sub> H <sub>6</sub> WHSV	0.52	0.50	0.52	0.49	0.53
HRS ON STREAM	16.67	24.67	41.84	48.67	65.92
PRESSURE, PSIG	152	146	147	145	153
TEMP. C	279	280	279	277	338
FEED C <sub>3</sub> H <sub>6</sub> CC	598.42	276.87	609.75	232.20	623.59
HOURS FEEDING	16.67	8.00	17.17	6.83	17.25
EFFLNT GAS LITER	313.11	149.98	329.20	130.66	330.87
GM AQUEOUS LAYER	238.4	117.71	251.5	98.62	252.05
GM LIQ HYDROCARBON	2.20	0.00	1.10	0.00	2.20
WT FR. LIQ HC/FEED	0.0072	0.0000	0.0035	0.0000	0.0069
MATERIAL BALANCE WT %	94.86	101.08	97.09	110.27	100.84
C <sub>3</sub> H <sub>6</sub> CONVERSION %	6.12	4.73	5.01	3.23	9.38
PRDT SELECTIVITY, WT %					
C <sub>4</sub>	0.18	0.00	0.12	0.00	0.15
C <sub>2</sub> HC'S	0.19	0.21	0.16	0.15	0.23
C <sub>3</sub> H <sub>8</sub>	23.96	28.62	23.58	33.48	20.59
C <sub>4</sub> H <sub>10</sub>	1.41	1.49	2.45	1.12	1.41
C <sub>4</sub> H <sub>8</sub> =	3.56	4.11	5.59	3.00	7.62
C <sub>5</sub> H <sub>12</sub>	1.31	1.48	1.84	0.88	1.03
C <sub>5</sub> H <sub>10</sub> =	0.10	0.00	0.18	0.00	0.21
C <sub>6</sub> H <sub>14</sub>	7.93	8.86	7.18	6.83	8.41
C <sub>6</sub> H <sub>12</sub> = & CYCLO'S	20.99	26.69	25.67	27.43	26.68
C <sub>7</sub> - IN GAS	27.94	28.54	25.97	27.11	26.35
LIQ HC'S	12.44	0.00	7.28	0.00	7.33
TOTAL	100.00	100.00	100.00	100.00	100.00
SUB-GROUPING					
C <sub>1</sub> -C <sub>4</sub>	29.30	34.43	31.89	37.75	29.99
C <sub>5</sub> -420 F	65.04	65.57	63.24	62.25	66.76
420-700 F	5.18	0.00	4.36	0.00	3.04
700-END PT	0.49	0.00	0.52	0.00	0.21
C <sub>5</sub> + -END PT	70.70	65.57	68.11	62.25	70.01
ISO/NORMAL MOLE RATIO					
C <sub>4</sub>	6.1395	5.0714	0.5688	7.0588	1.1116
C <sub>5</sub>	4.8718	4.2308	4.1569	1000.0000	1.7453
C <sub>6</sub>	5.1263	4.2245	3.5829	3.1241	3.6116
C <sub>4</sub> :	0.6085	0.6274	0.5146	0.6745	0.6079

Table 26 (cont.)

PARAFFIN/OLEFIN RATIO					
C3	0.0151	0.0138	0.0120	0.0109	0.0206
C4	0.3828	0.3493	0.4220	0.3596	0.1781
C5	12.7222	0.0000	9.7407	0.0000	4.7705
LIQ HC COLLECTION					
PHYS. APPEARANCE	GREEN OIL	GREEN OIL	GREEN OIL	GREEN OIL	GREEN OIL
DENSITY	-				
N, REFRACTIVE INDEX	1.4608				
SIMULT'D DISTILATN					
10 WT % @ DEG F	289	---	352	---	286
16	324	--	378	---	303
50	409	---	467	---	407
84	540	---	616	--	534
90	606	---	665	---	592
RANGE(16-84 %)	216	---	238	---	231
WT % @ 420 F	54.5	---	33.0	---	55.7
WT % @ 700 F	96.1	---	92.9	---	97.1

Table 26 (cont.) RESULT OF PROPYLENE OPERATION

RUN NO. 9972-19  
 CATALYST LZ-YB2 #10042-25 55CC 35.00GM (35.53GM AFTER THE RUN,+0.53G)  
 FEED H2:C3H6:H2O @ 1:1:2 MOLE RATIO,0.5 C3H6 WHSV,CONTINUOUS FEED  
 C3H6 MW= 42.0813 DENSITY= 0.5087 GM/CC (@ 73 F)  
 TARGET FLOW: C3H6 34.3 CC/HR H2 168 CCMN,10.1 L/HR H2O 15.0 CC/HR  
 ACTUAL FLOW: 35.4 CC/HR EFFLUENT 19.1 L/HR AQ LAYR 14.6 CC/HR

RUN & SAMPLE NO.	9972-19-06	972-19-07	972-19-08
C3H6 WHSV	0.53	0.52	0.49
HRS ON STREAM	71.67	88.79	94.29
PRESSURE,PSIG	144	145	145
TEMP. C	338	338	338
FEED C3H6 CC	207.88	612.90	185.63
HOURS FEEDING	5.75	17.12	5.50
EFFLNT GAS LITER	109.36	334.28	106.22
GM AQUEOUS LAYER	83.08	250.11	80.30
GM LIQ HYDROCARBON	0.71	0.70	0.00
WT FR. LIQ HC/FEED	0.0067	0.0022	0.0000
MATERIAL BALANCE WT %	100.98	105.49	112.99
C3H6 CONVERSION %	8.42	5.62	5.52
PRDT SELECTIVITY,WT %			
CH4	0.21	0.16	0.26
C2 HC'S	0.28	0.28	0.30
C3HB	20.10	23.74	24.90
C4H10	0.68	0.60	0.68
C4HB=	7.20	6.02	6.21
C5H12	0.48	0.67	0.75
C5H10=	0.00	0.20	0.25
C6H14	8.73	7.67	7.89
C6H12= & CYCLO'S	30.03	32.33	34.51
C7+ IN GAS	24.24	24.55	24.26
LIQ HC'S	8.07	3.78	0.00
TOTAL	100.00	100.00	100.00
SUB-GROUPING			
C1 -C4	28.46	30.81	32.34
C5 -420 F	67.91	67.49	67.66
420-700 F	3.23	1.51	0.00
700-END FT	0.40	0.19	0.00
C5+-END FT	71.54	69.19	67.66
ISO/NORMAL MOLE RATIO			
C4	0.0000	5.4500	5.1739
C5	1000.0000	1.1296	1.2909
C6	3.3732	2.6382	2.3524
C4=	0.6430	0.6432	0.6407

Table 26 (cont.)

PARAFFIN/OLEFIN RATIO			
C3	0.0178	0.0137	0.0141
C4	0.0908	0.0967	0.1054
C5	0.0000	3.2857	2.8636
LIQ HC COLLECTION			
PHYS. APPEARANCE	YL-GR OIL	YL-GR OIL	YL-GR OIL
DENSITY			
N. REFRACTIVE INDEX			
SIMULT'D DISTILATH			
10 WT % @ DEG F			---
16			---
50			---
84			---
90			---
RANGE(16-84 %)			---
WT % @ 420 F			---
WT % @ 700 F			---

Table 27

## RESULT OF PROPYLENE OPERATION

RUN NO. 9972-22  
 CATALYST UCC-108 #10042-70 SOCC 35.0GM (33.11 GM AFTER THE RUN, -1.89G)  
 FEED H2:C3H6:H2O @ 1:1:2 MOLE RATIO, 0.5 C3H6 WHSV, CONTINUOUS FEED  
 C3H6 MW= 42.0813 DENSITY= 0.5087 GM/CC (@ 73 F)  
 TARGET FLOW: C3H6 34.3 CC/HR H2 168 CCMN, 10.1 L/HR H2O 15.0 CC/HR  
 ACTUAL FLOW: 35.2 CC/HR EFFLUENT 14.6 L/HR AQ LAYR 14.4 CC/HR

RUN & SAMPLE NO.	9972-22-01	972-22-02	972-22-03	972-22-04	972-22-05
C3H6 WHSV	0.52	0.50	0.51	0.51	0.50
HRS ON STREAM	3.67	20.59	27.92	44.08	52.33
PRESSURE, PSIG	152	149	149	150	152
TEMP. C	281	281	280	281	280
FEED C3H6 CC	130.26	587.73	256.11	266.96	285.68
HOURS FEEDING	3.67	16.92	7.33	16.17	8.25
EFFLNT GAS LITER	51.07	239.50	105.62	241.27	123.58
GM AQUEOUS LAYER	49.40	248.69	107.32	234.07	117.51
GM LIQ HYDROCARBON	21.33	96.18	35.73	70.47	32.10
WT FR. LIQ HC/FEED	0.3219	0.3217	0.2742	0.2443	0.2209
MATERIAL BALANCE WT %	100.08	102.34	101.43	103.22	101.03
C3H6 CONVERSION %	73.60	69.46	66.41	63.68	60.22
PRDT SELECTIVITY, WT %					
CH4	0.00	0.02	0.00	0.02	0.03
C2 HC'S	0.02	0.02	0.07	0.01	0.02
C3H8	2.53	2.15	2.20	2.11	2.29
C4H10	0.40	0.21	0.21	0.19	0.20
C4H8=	1.51	1.07	1.05	0.93	0.99
C5H12	0.58	0.30	0.29	0.25	0.26
C5H10=	1.00	0.79	0.68	0.59	0.65
C6H14	6.80	4.83	4.90	4.75	5.02
C6H12= & CYCLO'S	36.57	41.03	45.16	49.62	48.96
C7+ IN GAS	4.27	3.80	3.59	3.92	4.35
LIQ HC'S	46.30	45.78	41.86	37.62	37.23
TOTAL	100.00	100.00	100.00	100.00	100.00
SUB-GROUPING					
C1 -C4	4.47	3.48	3.52	3.26	3.53
C5 -420 F	90.71	92.86	93.34	93.54	93.20
420-700 F	4.82	3.66	3.14	3.20	3.28
700-END PT	0.00	0.00	0.00	0.00	0.00
C5+-END PT	95.53	96.52	96.48	96.74	96.47
ISO/NORMAL MOLE RATIO					
C4	9.7520	7.9481	6.9744	3.9533	4.0000
C5	6.0090	4.2365	4.1630	3.5984	3.6068
C6	4.0698	2.4837	2.1467	1.8975	1.7727
C4+	0.6719	0.6849	0.6951	0.7009	0.7067

Table 27 (cont.)

PARAFFIN/OLEFIN RATIO					
C3	0.0676	0.0468	0.0417	0.0354	0.0332
C4	0.2592	0.1933	0.1906	0.1957	0.1940
C5	0.5659	0.3675	0.4098	0.4051	0.3892
LIQ HC COLLECTION					
PHYS. APPEARANCE	YLW OIL	YLW OIL	GRN OIL	GRN OIL	GRN OIL
DENSITY	0.728	0.722	0.724	0.724	0.725
N, REFRACTIVE INDEX	1.4205	1.4165	1.4160	1.4175	1.4192
SIMULT'D DISTILATN					
10 WT % @ DEG F	154	155	155	157	157
16	161	160	161	162	161
50	257	217	215	230	249
84	388	372	368	377	380
90	424	402	398	405	407
RANGE(16-84 %)	227	212	207	215	219
WT % @ 420 F	89.6	92.0	92.5	91.5	91.2
WT % @ 700 F	100	100	100	100	100

Table 27 (cont.) RESULT OF PROPYLENE OPERATION

RUN NO.	9972-22				
CATALYST	UCC-108 #10042-70 50CC 35.0GM (33.1GM AFTER THE RUN, -1.89G)				
FEED	H <sub>2</sub> :C <sub>3</sub> H <sub>6</sub> :H <sub>2</sub> O @ 1:1:2 MOLE RATIO, 0.5 C <sub>3</sub> H <sub>6</sub> WHSV, CONTINUOUS FEED				
	C <sub>3</sub> H <sub>6</sub> MW= 42.0813 DENSITY= 0.5087 GM/CC (@ 73 F)				
TARGET FLOW:	C <sub>3</sub> H <sub>6</sub> 34.3 CC/HR	H <sub>2</sub> 168 CCMN,	10.1 L/HR	H <sub>2</sub> O	15.0 CC/HR
ACTUAL FLOW:	35.2 CC/HR	EFFLUENT	14.6 L/HR	AQ LAYR	14.4 CC/HR
RUN & SAMPLE NO.	9972-22-06	972-22-07	972-22-08	972-22-09	972-22-10
C <sub>3</sub> H <sub>6</sub> WHSV	0.52	0.50	0.52	0.49	0.53
HRS ON STREAM	68.58	76.17	93.08	99.58	116.60
PRESSURE, PSIG	149	147	149	149	146
TEMP. C	340	340	340	340	340
FEED C <sub>3</sub> H <sub>6</sub> CC	580.81	263.15	604.09	220.24	614.79
HOURS FEEDING	16.25	7.59	16.92	6.50	17.00
EFFLUENT GAS LITER	226.84	107.58	244.97	94.65	252.10
GM AQUEOUS LAYER	232.0	109.99	242.92	92.07	241.87
GM LIQ HYDROCARBON	96.23	37.86	82.05	28.73	73.28
WT FR. LIQ HC/FEED	0.3257	0.2828	0.2670	0.2564	0.2343
MATERIAL BALANCE WT %	103.33	102.01	99.35	110.19	103.46
C <sub>3</sub> H <sub>6</sub> CONVERSION %	72.86	70.62	68.27	67.82	67.40
PRDT SELECTIVITY, WT %					
CH <sub>4</sub>	0.04	0.05	0.02	0.03	0.03
C <sub>2</sub> HC'S	0.11	0.11	0.09	0.08	0.07
C <sub>3</sub> H <sub>8</sub>	2.82	2.68	2.46	2.57	2.44
C <sub>4</sub> H <sub>10</sub>	0.69	0.57	0.31	0.34	0.20
C <sub>4</sub> H <sub>8</sub> =	2.91	2.85	2.19	2.38	1.97
C <sub>5</sub> H <sub>12</sub>	0.82	0.66	0.36	0.34	0.24
C <sub>5</sub> H <sub>10</sub> =	1.55	1.43	1.20	1.17	0.99
C <sub>6</sub> H <sub>14</sub>	7.04	6.14	4.95	4.94	4.52
C <sub>6</sub> H <sub>12</sub> = & CYCLO'S	35.63	40.86	44.76	49.02	51.93
C <sub>7</sub> + IN GAS	4.68	4.45	3.89	3.81	3.68
LIQ HC'S	43.72	40.20	39.77	35.32	33.94
TOTAL	100.00	100.00	100.00	100.00	100.00
SUB-GROUPING					
C <sub>1</sub> -C <sub>4</sub>	6.57	6.26	5.08	5.41	4.70
C <sub>5</sub> -420 F	89.05	91.73	94.09	93.92	94.72
420-700 F	3.50	2.01	0.84	0.67	0.58
700-END PT	0.87	0.00	0.00	0.00	0.00
C <sub>5</sub> + -END PT	93.43	93.74	94.92	94.59	95.30
ISO/NORMAL MOLE RATIO					
C <sub>4</sub>	4.7396	3.0085	3.6132	1.8819	3.3581
C <sub>5</sub>	4.1857	3.1803	2.3820	2.0100	1.6966
C <sub>6</sub>	3.4520	2.4091	1.6323	1.3962	1.1172
C <sub>4</sub> =	0.5350	0.5227	0.5370	0.5231	0.5329

Table 27 (cont.)

PARAFFIN/OLEFIN RATIO					
C3	0.0725	0.0617	0.0507	0.0518	0.0482
C4	0.2274	0.1931	0.1369	0.1392	0.0959
C5	0.5157	0.4465	0.2885	0.2796	0.2329
LIQ HC COLLECTION					
PHYS. APPEARANCE	YLW OIL	YLW OIL	YLW OIL	YLW OIL	YLW OIL
DENSITY	0.726	0.719	0.717	0.707	0.712
N. REFRACTIVE INDEX	1.4240	1.4170	1.4175	1.4144	1.4119
SIMULT'D DISTILLATN					
10 WT % @ DEG F	146	148	149	149	149
16	157	157	158	158	158
50	208	178	173	173	172
84	366	321	292	274	273
90	420	377	324	288	285
RANGE(16-84 %)	209	164	134	116	115
WT % @ 420 F	90.0	95.0	97.9	98.1	98.3
WT % @ 700 F	98.0	100	100	100	100



Table 27 (cont.) RESULT OF PROPYLENE OPERATION

RUN NO. 9972-22  
 CATALYST UCC-108 #10042-70 SOCC 35.0GM (33.11GM AFTER THE RUN, -1.89G)  
 FEED H2:C3H6:H2O @ 1:1:2 MOLE RATIO, 0.5 C3H6 WHSV, CONTINUOUS FEED  
 C3H6 MW= 42.0813 DENSITY= 0.5087 GM/CC (@ 73 F)  
 TARGET FLOW: C3H6 34.3 CC/HR H2 168 CCM, 10.1 L/HR H2O 15.0 CC/HR  
 ACTUAL FLOW: 35.2 CC/HR EFFLUENT 14.6 L/HR AQ LAYER 14.4 CC/HR

RUN & SAMPLE NO.	9972-22-11	972-22-12	972-22-13
C3H6 WHSV	0.51	0.51	0.50
HRS ON STREAM	124.00	140.5	146.5
PRESSURE, PSIG	145	149	149
TEMP. C	340	340	340
FEED C3H6 CC	258.63	574.65	207.66
HOURS FEEDING	7.42	16.50	6.00
EFFLNT GAS LITER	109.21	246.55	89.70
GM AQUEOUS LAYER	105.5	236.60	86.79
GM LIQ HYDROCARBON	30.10	58.73	21.49
WT FR. LIQ HC/FEED	0.2288	0.2009	0.2034
MATERIAL BALANCE WT %	108.21	105.47	102.01
C3H6 CONVERSION %	65.67	64.43	61.56
PRDT SELECTIVITY, WT %			
CH4	0.03	0.03	0.03
C2 HC'S	0.07	0.06	0.07
C3H8	2.43	2.43	2.43
C4H10	0.20	0.21	0.15
C4H8=	1.91	1.86	1.69
C5H12	0.21	0.16	0.12
C5H10=	0.98	0.89	0.91
C6H14	4.39	4.19	4.04
C6H12= & CYCLO'S	53.38	56.70	53.79
C7+ IN GAS	3.43	3.58	3.36
LIQ HC'S	32.98	29.88	33.41
TOTAL	100.00	100.00	100.00
SUB-GROUPING			
C1 -C4	4.63	4.50	4.36
C5 -420 F	94.84	94.74	95.03
420-700 F	0.53	0.66	0.60
700-END PT	0.00	0.00	0.00
C5+-END PT	95.37	95.40	95.64
ISO/NORMAL MOLE RATIO			
C4	2.1550	1.0220	2.4348
C5	1.3559	1.1587	0.9014
C6	0.9939	0.8506	0.8757
C4=	0.5276	0.5095	0.5489

Table 27 (cont.)

PARAFFIN/OLEFIN RATIO			
C3	0.0444	0.0422	0.0373
C4	0.0993	0.1082	0.0841
C5	0.2132	0.1802	0.1328
LIQ HC COLLECTION			
PHYS. APPEARANCE	YLW OIL	YLW OIL	YLW OIL
DENSITY	0.712	0.711	0.701
N. REFRACTIVE INDEX	1.4131	1.4135	1.4121
SIMULT'D DISTILATN			
10 WT % @ DEG F	150	152	150
16	158	158	157
50	172	171	170
84	276	286	279
90	288	310	294
RANGE(16-84 %)	118	128	122
WT % @ 420 F	98.4	97.8	98.2
WT % @ 700 F	100	100	100

Table 28

References to Synthesis Details

<u>Report</u>	<u>Comments</u>
Second Quarterly	Appendix C, Task 1 Catalyst Syn.
Fourth Quarterly	Appendix A, Task 1 Catalyst Syn.
Fifth Quarterly	Appendix A, Task 1 Catalyst Syn. " ", Task 2 Catalyst Syn.
Sixth Quarterly	Appendix A, Task 1 Catalyst Syn. " ", Task 2 Catalyst Syn.
Seventh Quarterly	Appendix A, Task 1 Catalyst Syn. " ", Task 2 Catalyst Syn.
Second Annual	Appendix A, Task 1 Catalyst Syn. " ", Task 2 Catalyst Syn.
Ninth Quarterly	Appendix A, Task 2 Catalyst Syn.

Tenth through Fifteenth Quarterly Reports: A separate "Synthesis" section was not written, rather the synthesis details were presented with the run results. This was done since the test results always lagged the synthesis work by one report and reporting on the synthesis without any information regarding activity was meaningless.

TABLE 29

A chronological listing of Task 1 Runs and reference to sources of details in the Quarterly and Annual Reports.

<u>Run</u>	<u>Catalyst</u>	<u>Feed</u>	<u>Report</u>	<u>Page</u>
09502-01	LZ-105-6	methanol	1Q	3
09710-01	LZ-105-6	"	4Q	28
" -02	LZ-105-6	"	4Q	28
" -03	ZSM-5	"	4Q	28
" -04	UCC-101	"	4Q	28
" -05	UCC-101	"	4Q	28
" -06	Y-82	"	4Q	28
" -07	Y-82	"	4Q	28
" -08	UCC-101	"	4Q	28
" -09	UCC-101	"	4Q	28
" -10	ZSM-5	"	5Q	9
" -11	LZ-105-6	propylene	5Q	9
" -12	LZ-105-6	"	5Q	9
" -13	LZ-105-6	"	5Q	9
" -14	UCC-101	"	5Q	9
" -15	UCC-101	"	5Q	9
" -16	UCC-101	"	5Q	9
" -17	UCC-101	"	5Q	9
09972-01	LZ-105-6	"	5Q	9 & 6Q/17
" -02	LZ-105-6	"	6Q	42
" -03	UCC-101	"	6Q	56
" -04	UCC-101	"	6Q	56
" -05	AlPO4-11	"	6Q	71
" -06	UCC-104	"	6Q	74
" -07	UCC-104	"	6Q	74
" -08	UCC-103	"	7Q	17
" -09	UCC-106	"	7Q	25
" -10	CaY-62	"	7Q	34
" -13	LZ-105-6	"	7Q	42
" -14	UCC-107	"	7Q	58
" -15	RE-Y-62	"	7Q	68
" -16	Silicalite	"	*	*
" -17	Silicalite	"	*	*
" -18	ZSM-5	"	8Q	15
" -20	ZSM-5	"	8Q	15
" -22	UCC-108	"	8Q	35
10112-01	UCC-109	"	8Q	47
09972-21	AlPO4-11	"	8Q	55
" -19	LZ-Y-82	"	8Q	60
10112-03	97% HY-82	"	8Q	67

\* Reports upon the results of Silicalite testing provided to DOE in a private report.

TABLE 30  
Syngas Runs

A chronological listing of Task 2 runs and reference to sources of details in Quarterly and Annual Reports.

<u>Run</u>	<u>Catalyst</u>	<u>Report</u>	<u>Page</u>
09502-02	Fe/SiO <sub>2</sub> /Al <sub>2</sub> O <sub>3</sub>	1A	22
09710-18	UCC-201	6Q	90
" -19	UCC-201	6Q	93
09972-11	UCC-201	7Q	184
" -12	Fe on Y-52	7Q	188
10011-01	UCC-201	6Q	105
" -02	UCC-201	6Q	108
" -03	UCC-202	6Q	126
" -04	UCC-201	6Q	117
" -05	UCC-201	6Q	123
" -06	Reference Fe	7Q	83 (2)
" -07	Fe/UCC-101	7Q	118 (2)
" -08	Fe/K UCC-101	7Q	142 (2)
" -09	Fe+UCC-101	7Q	172
" -10	Fe/K/UCC-104	2A/8Q	100 (2) (3)
" -11	Fe/K/UCC-101	2A/8Q	138 (2)
" -12	Fe/K/UCC-103	2A/8Q	156
" -14	Co/UCC-101	2A/8Q	194
" -15	Fe/K/Al <sub>2</sub> O <sub>3</sub>	2A/8Q	75 (2)
" -16	Fe/K/UCC-108	2A/8Q	163 (2)
" -17	Fe/K/UCC-109	2A/8Q	19
10112-02	Co/SiO <sub>2</sub> /Al <sub>2</sub> O <sub>3</sub>	2A/8Q	170
" -04	Co/UCC-101	9Q	172
" -06	Co/LZ-105-6	9Q	118
" -07	Co/Th/UCC-101	9Q	207
" -09	Co/Th/K/LZY-82	9Q	167
" -10	Co/Th/K/LZY-82	9Q	144
" -11	Fe/K/UCC-107	9Q	115
" -13	Co/Th/UCC-108	10Q	92
" -14	Co/Th/UCC-101	10Q	41
" -15	Co/Th/UCC-101	10Q	70
" -16	Co/Th/X1/UCC-101	10Q	149
" -17	Co/Th/X2/UCC-101	10Q	175
" -18	Co/X3/UCC-101	10Q	190
" -21	Co/X7/UCC-101	11Q	105
" -22	Co/Th/X4/UCC-108	11Q	115
10225-01	Fe/K/LZ-105-6	9Q	80
" -02	Co/Th/UCC-107	9Q	250 (2)
" -03	Fe/K/UCC-111	9Q	51 (2)
" -04	Fe/K/UCC-104	9Q	110
" -05	Fe/K/UCC-108	10Q	300
" -06	Co/Th/UCC-101	10Q	12
" -07	Co/Th/UCC-108	10Q	118
" -08	Co/Th/X4/UCC-101	10Q	216 (2) (3)
" -09	Co/X4/UCC-101	10Q	270

Table 30 (cont.)

"	-10	Fe/Rh/UCC-108	10Q	348
"	-11	Fe/Rh/UCC-108	11Q	286
"	-12	Co/X5/UCC-101	11Q	47
"	-14	Co/Th/UCC-101	11Q	13
"	-15	Co/Th/Zn/UCC-107	11Q	209
"	-16	Co/Th/UCC-103	11Q	149 (2) (3)
"	-17	Co/Th/UCC-103	11Q	187
11677	-01	Co/Th/X6/UCC-101	11Q	67
"	-03	Co/Th/X6/UCC-101	11Q	81 (2) (3)
"	-07	Co/Th/Al2O3	11Q	245 (2) (4)
"	-09	Co/Th/UCC-101/103	3A/12Q	69
"	-10	Co/Th/UCC-101	3A/12Q	14
"	-11	Co/Th/X4/UCC-101/UCC-103	3A/12Q	224 (2) (3)
"	-12	Cu/Zn/Al2O3	3A/12Q	288 (2)
"	-13	Cu/Zn/Al2O3/UCC-101	13Q	125 (2)
"	-14	Co/Th/UCC-103/UCC-101	13Q	47
"	-17	Co/Th/X4/UCC-103/UCC-101	13Q	108
"	-18	Co/Th/UCC-103+Cu/Zn/LZ-105-6	13Q	189 (2)
"	-19	Co/Th/UCC-103+UCC-101+Cu/Zn/A	13Q	259
"	-20	Cu/Zn/LZ-105-6	13Q	185 (2)
"	-21	Cu/Zn/LZ-105-6	13Q	187
11723	-01	Co/Th/Al2O3	11Q	233
"	-03	Co/Th/UCC-103/UCC-108	3A/12Q	93 (3)
"	-04	Co/Th/X6/UCC-103	3A/12Q	176 (2)
"	-05	Co/Th/UCC-103+UCC-101/Cu/Zn	3A/12Q	290 (2)
"	-06	Co/Th/UCC-103+UCC-108	3A/12Q	143
"	-07	Co/Th/UCC-103+UCC-101+Zn/Cu	3A/12Q	306 (2)
"	-08	Co/Th/UCC-103+UCC-101+Cu/Zn/Al2O3	3A/12Q	319 (2)
"	-10	Co/Th/UCC-103+UCC-101	13Q	15
"	-11	Co/Th/Cu+UCC-101+Cu/Zn/alumina	13Q	127
"	-12	Co/Th/UCC-103/UCC-101+Cu/Zn/alumina	13Q	142 (2)
"	-13	Co/Th/UCC-103+UCC-101+Cu/Zn/alumina	13Q	212
"	-14	Co/Th/UCC-101+UCC-101	13Q	64
"	-15	Co/Th/X8/UCC-103+UCC-101	14Q	61
"	-16	Co/Th/X8/UCC-103+UCC-101	14Q	94
"	-17	Co/Th/X4/UCC-103	14Q	A5
"	-18	Co/Th/X4/UCC-103+UCC-101	14Q	178
11885	-01	Co/Th/X4/X8/UCC-103+UCC-101	14Q	118
"	-02	Co/Th/X4/X8/UCC-103+UCC-101	14Q	205
"	-04	Co/X4/X8/UCC-103+UCC-101	14Q	259
"	-05	Co/Th/X4/X8/UCC-103+UCC-101	14Q	149
"	-06	Co/X4/UCC-103+UCC-101	15Q	59
"	-07	Co/X4/UCC-103+UCC-101	15Q	106
"	-08	Co/Th/X6/UCC-103+UCC-101	15Q	158
12064	-01	Co/Th/UCC-103+Cu/13X	15Q	4
"	-02	Co/UCC-103+UCC-101	15Q	11

- (1) The usual conditions were: 300 GHSV, 1:1 H<sub>2</sub>:CO ratio, 300 psig, and 250-270 C.  
(2) Reviewed in this Final Report.  
(3) Better than usual performance.  
(4) Reference Cobalt catalyst.

Table 31  
Catalysts Prepared for Testing For Enhancing  
Water Gas Shift Activity

Run No.	Catalyst Composition	Report	Page
11677-12	Cu/Zn/Al <sub>2</sub> O <sub>3</sub>	3rd Annual	288
11723-05	Co/Th/UCC-103+UCC-103+Cu/Zn	"	290
11723-07	Co/Th/UCC-103+UCC-101+Cu/Zn	"	306
11723-08	Co/Th/UCC-103+UCC-101+Cu/Zn/Al <sub>2</sub> O <sub>3</sub>	"	319
11677-13	Cu/Zn/Al/UCC-101	13th Qrtrly.	125
11723-11	Co/Th/Cu+UCC-101+Cu/Zn/Al	"	127
11723-12	Co/Th/UCC-103+UCC-101+Cu/Zn/Al	"	142
11677-20	Cu/Zn/LZ-105-6	"	185
11677-21	Cu/Zn Ion Exchg./LZ-105-6	"	187
11677-18	Co/Th/UCC-103+Cu/Zn/LZ-105-6	"	189
11723-13	Co/Th/UCC-103+UCC-101+Cu/Zn/A.	"	212
11677-19	Co/Th/UCC-103+UCC-101+Cu/ZN/A	"	259
12064-01	Co/Th/UCC-103+Cu-13X	15th Qrtrly.	A4

Table 32

Stream Compositions For the Two Cases  
Provided for Independant Contractor Studies

<u>Ratios/Components</u>	<u>Case 1</u>	<u>Case 2</u>
<u>Wt. % CH4 Selectivity</u>	12.29	7.82
<u>Conditions:</u>		
U H2:CO usage ratio	1.60	2.00
RF H2:CO feed ratio	1.20	1.39
<u>Feed in</u>		
H2 feed moles	54.46	58.10
CO feed moles	45.54	41.90
H2 + CO moles	100.00	100.00
Wt. feed, pounds	1385.5	1290.67
<u>Effluent out</u>		
<u>Off-gas</u>		
H2 moles	2.15	1.44
CO "	12.85	13.56
CO2 "	5.84	1.48
CH4 "	2.95	1.88
C2 "	0.37	0.32
C3 "	0.32	0.28
C4 "	0.28	0.25
Total moles	24.76	19.21
Total weight, lbs.	704.12	510.30
<u>Liquid</u>		
C5 - C6 weight, lbs.	35.46	32.18
C7 - C8 "	36.61	33.95
C9 - C10 "	34.78	33.46
C11- C12 "	31.70	31.41
C13- C14 "	28.02	28.59
C15- C16 "	24.21	25.45
C17- C18 "	20.58	22.27
C19- C20 "	17.25	19.24
C21- C22 "	14.32	16.44
C23+ "	59.90	80.07
Total liquid H/C, lbs.	302.85	323.04
H2, lbs.	378.69	457.22
<u>Grand total</u>	1385.66	1290.56



Table 33

Characterization of Hydrocarbon Products  
 for two cases for Independent Contractor Studies  
Regardless of Methane Make

Carbon Number	Percent		Iso:normal Ratio	
	Olefins	Paraffins	Olefins	Paraffins
C3	51	49		
C4	68	32	0.054	0.053
C5	70	30	0.07	0.069
C6	58	42	0.23	0.23
C6+	50	50	0.23	0.23

  

185 F - 350 F	42 (R+M)/2
350 F - 600 F	0 F pour point
	76 cetane index