APPENDIX E

DETAILED DATA OBTAINED WITH DEVELOPMENTAL CATALYSTS SG-A-4 AND SGF-A-3

TABLE E1

PROCESSING H_2/CO OVER FRESH SG-A-4 AT 575°F AND 200 PSIG

(Activation: 16 Hrs, H_2/CO, 610°F, 0 psig)

Run Number CT-143-75	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10
Days On Stream	1.9	3.9	5.9	7.9	9.9	11.9	13.9	15.9	17.8	19.8
Temperature, Inlet, °F	562	562	560	560	562	562	561	560	552	551
Average, °F	553	552	550	550	552	553	553	553	546	547
Maximum, °F	575	575	573	573	574	577	575	575	568	569
Outlet, °F	539	537	536	536	538	539	539	538	530	532
GHSV	570	565	586	592	580	580	580	580	565	565
WHSV	1.1	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0
Material Balance, % wt	100	100	100	100	104	101	100	100	99	99
CO Conversion, % wt	64	64	64	64	65	67	67	67	69	66
To HC, % wt	75	75	74	74	74	72	73	73	72	74
H_2 Conversion, % wt	59	60	58	59	58	59	60	63	62	60
To HC, % wt	80	77	79	79	79	79	81	79	81	78
Total Conversion, % wt	63	64	63	64	65	67	66	66	68	66
gm HC/m^3 CO	240	230	236	232	234	234	244	236	264	246
HC Selectivity, % wt										
C_1	21	23	23	24	25	25	25	26	20	21
C_2	8	10	11	12	12	13	12	13	12	12
C_3	6	5	6	5	5	6	5	6	5	6
C_4	11	9	11	9	8	8	9	8	9	10
C_5	10	9	8	8	8	7	8	9	10	9
C_6+	44	44	41	42	42	41	41	38	44	42
Olefin Selectivity, % wt										
C_2	12	4	12	12	20	11	11	10	13	14
C_3	8	18	23	17	9	16	17	16	14	22
C_4	7	21	31	37	35	41	46	46	52	54
C_5	13	25	39	47	52	56	60	62	70	70
C_5 Olefin Selectivity, % wt										
1-Pentene	0	2	1	2	2	2	2	2	2	3
2-Pentene	13	16	17	17	17	17	17	17	17	17
Methylbutenes	87	82	82	81	81	81	81	81	81	80
Aromatics in C_6+, % wt	43	31	21	16	15	13	12	11	1	1
90% OH, °F	375	373	373	374	375	377	367	362	372	367
O.N. (R+0)	91	-	-	92	-	-	-	93	-	-

TABLE E2

PROCESSING A H_2/CO CHARGE OVER REGENERATED SG-A-4 CATALYST AT 575°F AND 200 PSIG

(1st Regeneration: 16 Hrs, Air, 950°F, 0 psig)
(Activation: 16 Hrs, H_2/CO, 610°F, 0 psig)

Run Number CT-143-75	11	12	13	14	15	16	17
Days On Stream	1.9	3.9	5.9	6.9	8.9	10.9	12.9
Temperature, Inlet, °F	561	563	562	563	562	562	562
Average, °F	558	556	555	556	556	556	555
Maximum, °F	574	576	575	576	576	575	576
Outlet, °F	544	542	542	542	542	542	542
GHSV	582	582	580	575	580	580	580
WHSV	1.0	1.0	1.1	1.0	1.0	1.1	1.0
Material Balance, % wt	103	101	102	103	101	98	101
CO Conversion, % wt	65	63	65	67	67	65	67
To HC, % wt	74	74	73	72	72	74	73
H_2 Conversion, % wt	61	61	62	61	61	60	61
To HC, % wt	81	82	79	81	82	81	81
Total Conversion, % wt	65	63	65	67	67	64	64
gm HC/m^3 CO	244	232	236	236	244	242	244
HC Selectivity, % wt							
C_1	23	23	25	26	25	25	26
C_2	10	11	12	12	13	12	13
C_3	6	6	6	7	5	6	6
C_4	12	10	9	9	8	10	9
C_5	10	9	8	7	9	8	8
C_6+	39	41	40	39	42	39	38
Olefin Selectivity, % wt							
C_2	9	9	8	8	7	11	10
C_3	7	16	17	-	9	8	15
C_4	11	27	19	26	31	36	39
C_5	12	20	30	37	42	48	53
C_5 Olefin Selectivity, % wt							
1-Pentene	0	2	3	3	3	2	3
2-Pentene	20	18	17	17	18	18	17
Methylbutenes	80	80	80	80	79	80	80
Aromatics in C_6+, % wt	41	34	26	23	18	17	14
90% OH, °F	362	343	340	342	369	371	375
O.N. (R+0)	-	-	-	-	-	-	92

TABLE E3

PROCESSING A H_2/CO CHARGE OVER REGENERATED SG-A-4 CATALYST
AT 575°F AND 200 PSIG
(Regeneration: 16 Hrs., Air, 950°F, 0 psig)
(Activation: 16 Hrs., H_2/CO, 610°F, 0 psig)

	2nd REGENERATION			3rd REGENERATION		
Run Number CT-143-75	18	19	20	21	22	23
Days on Stream	1.9	3.9	5.9	1.9	3.9	5.9
Temperature, Inlet, °F	559	558	558	557	559	558
Average, °F	556	555	556	556	558	556
Maximum, °F	574	574	575	573	575	572
Outlet, °F	543	542	542	543	545	543
GHSV	575	575	580	580	572	580
WHSV	1.0	1.0	1.0	1.0	1.0	1.0
Material Balance, % Wt	100	105	102	100	106	103
CO Conversion, % Wt	59	59	57	51	51	49
To HC, % Wt	77	81	78	82	81	82
H_2 Conversion, % Wt	60	60	59	53	58	58
To HC, % Wt	82	77	79	76	79	79
Total Conversion, % Wt	59	59	57	51	52	50
gm HC/m^3CO	230	222	220	206	199	197
HC Selectivity, % Wt						
C_1	22	24	23	21	25	25
C_2	10	12	12	10	12	12
C_3	6	6	6	6	7	7
C_4	10	10	10	11	10	11
C_5	9	8	8	9	7	7
C_6+	43	40	41	43	39	38
Olefin Selectivity, % Wt						
C_2	14	13	13	15	18	14
C_3	1	1	1	1	1	8
C_4	5	14	21	9	4	15
C_5	13	23	30	14	20	24
C_5 Olefin Selectivity, % Wt						
1-Pentene	0	3	3	0	3	3
2-Petene	21	20	19	21	22	21
Methylbutenes	79	77	78	79	75	76
Aromatics in C_6+, % Wt	44	34	26	43	40	35
90% OH, °F	362	359	358	362	366	368

TABLE E4

REGENERATION OF CATALYST SG-A-4

4 Cycles - 3 Regenerations

(Regeneration - 16 Hrs-Air-950°F-0 psig)
(Activation - 16 Hrs-H_2/CO-610°F-0 psig)

PROCESSING AT 575°F, 200 PSIG, 575 GHSV, H_2/CO

	Fresh		Reg 1X		Reg 2X		Reg 3X	
Run 143-	75-1	75-3	75-11	75-13	75-18	75-20	75-21	75-23
Stream Days	1.9	5.9	1.9	5.9	1.9	5.9	1.9	5.9
% Conversion								
CO	64	64	65	65	59	57	51	49
H_2	59	58	61	62	60	59	53	58
% HC Selectivity								
$C_1 + C_2$	29	34	33	37	32	35	31	37
C_5	54	49	49	48	52	49	52	45
% $C_5^=$ in C_5 Fract.	13	39	12	30	13	30	14	24
% $MeC_4^=$ in $C_5^=$	87	82	80	80	79	78	79	76
% C_6^+ Aromatics	43	21	41	26	44	26	43	35

TABLE E5

TEMPERATURE AND REGENERATION STUDY ON CATALYST SG-A-4

(Activation: 16 Hrs, H_2/CO, 610°F, 0 psig)
(Process Conditions: H_2/CO, 200 psig, GHSV=600)

Run Number CT-143-80-	1	2	3	4	5		6	7	8
Days On Stream	1.9	3.9	5.9	7.0	8.9		1.9	3.9	5.9
Temperature, Inlet, °F	563	546	535	522	559		559	559	560
Average, °F	564	545	536	523	560		566	563	564
Maximum, °F	575	560	545	530	575		574	575	576
Outlet, °F	548	532	523	512	544		549	549	549
GHSV	593	593	582	580	610		588	588	582
GHSV	1.1	1.1	1.1	1.1	1.1		1.1	1.1	1.1
Material Balance, % wt	98	102	104	103	97	REGENERATION[a]	97	101	98
CO Conversion, % wt	69	56	51	41	71		70	74	72
To HC, % wt	72	79	82	87	70		71	70	70
H_2 Conversion, % wt	59	56	57	51	61		62	62	60
To HC, % wt	80	72	72	66	81		83	82	81
Total Conversion, % wt	69	56	51	42	71		70	73	71
mm HC/m^3 CO	254	205	196	156	243		264	274	254
HC Selectivity, % wt									
C_1	17	17	17	18	21		20	22	23
C_2	7	9	10	12	11		8	8	10
C_3	7	5	5	6	5		6	8	7
C_4	14	10	11	7	9		13	15	8
C_5	10	9	10	8	9		9	8	8
C_6+	45	50	47	49	45		44	39	44
Olefin Selectivity, % wt									
C_2	12	17	21	29	8		9	9	8
C_3	1	11	21	33	26		1	1	12
C_4	9	34	49	53	38		5	16	12
C_5	10	45	63	73	49		13	21	33
C_5 Olefin Selectivity, % wt									
1-Pentene	0	3	2	2	3		2	3	2
2-Pentene	21	16	16	18	17		20	19	18
Methylbutenes	79	81	82	80	80		78	78	80
Atomatics in C_6+, % wt	48	22	13	2	16		46	34	25
90% OH, °F	378	355	375	378	360		370	368	366
ON (R+0)	91	-	-	-	-		-	-	-

(a) H_2, 16 Hr @ 750°F; 10% Air, 1 Hr @ 750°F; 100% Air, 4 Hr @ 850°F all at 0 psig.

TABLE E6

CONTINUATION OF A TEMPERATURE AND REGENERATION STUDY ON CATALYST SG-A-4[a]

(Activation: 16 Hrs, H_2/CO, 610°F, 0 psig)
(Process Conditions: H_2/CO, 200 psig, 600 GHSV)

Run Number CT-143-80-		6	7	8		9	10	11		12	13	14
Days On Stream		1.9	3.9	5.9		1.9	3.9	5.9		1.9	3.9	5.9
Temperature, Inlet, °F		559	559	560		547	547	545		534	533	532
Average, °F		566	563	564		552	551	550		538	537	536
Maximum, °F		574	575	576		559	560	560		544	545	544
Outlet, °F	R[b]	549	549	549	R[b]	539	538	537	R[b]	526	526	524
GHSV	E	588	588	582	E	580	580	580	E	580	580	580
WHSV	G	1.1	1.1	1.1	G	1.1	1.1	1.1	G	1.1	1.1	1.1
Material Balance, % wt	E	97	101	98	E	99	102	99	E	102	102	103
	N				N				N			
CO Conversion, % wt	E	70	74	72	E	63	63	60	E	48	48	51
To HC, % wt	R	71	70	70	R	75	74	77	R	83	83	81
H_2 Conversion, % wt	A	62	62	60	A	61	61	58	A	58	58	59
H_2 To HC, % wt	T	83	82	81	T	79	79	77	T	74	74	75
	I				I				I			
Total Conversion, % wt	O	70	73	71	O	63	63	60	O	49	49	52
gm HC/m^3 CO	N	264	274	254	N	238	222	222	N	191	186	196
HC Selectivity, % wt												
C_1		20	22	23		19	22	21		19	20	20
C_2		8	8	10		9	10	10		9	11	11
C_3		6	8	7		7	6	6		5	5	7
C_4		13	15	8		16	10	10		9	9	11
C_5		9	8	8		10	8	9		8	9	9
C_6+		44	39	44		39	44	45		50	46	42
Olefin Selectivity, % wt												
C_2		9	9	8		11	10	14		17	21	15
C_3		1	1	12		13	8	18		11	22	25
C_4		5	16	12		21	27	39		35	41	44
C_5		13	21	33		25	41	52		43	60	65
C_5 Olefin Selectivity, % wt												
1-Pentene		2	3	2		3	3	2		3	2	3
2-Pentene		20	19	18		18	17	17		16	17	16
Methylbutenes		78	78	80		79	80	81		81	81	81
Aromatics, in C_6+, % wt		46	34	25		34	24	18		24	16	13
90% OH, °F		370	368	366		369	367	362		366	368	362
ON (R+O)		-	-	-		-	91	-		90	-	-

(a) Catalyst had previously 8.9 days on stream
(b) 16 Hrs, H_2 @ 750°F; 1 Hr, 10% Air @ 750°F; 4 Hr, 100% Air @ 850°F, all at 0 psig

TABLE E7

CONTINUATION OF A REGENERATION STUDY ON CATALYST SGA-4[a]
EFFECT OF OPERATING PRESSURE

(τ = 44 sec)

(Activation: 16 Hrs, H_2/CO, 610°F, 0 psig)

		100 psig				200 psig				400 psig	
Run Number CT-143-80-		15	16	17		18	19	20		22	23
Days On Stream		1.9	3.9	5.9		1.9	3.9	5.9		1.9	2.9
Temperature, Inlet, °F		571	565	564		552	558	556		548	549
Average, °F		573	569	567		560	564	563		558	559
Maximum, °F		576	574	574		568	576	574		574	576
Outlet, °F		563	558	556		546	551	548		541	542
GHSV	R[b]	333	308	305	R[b]	580	590	590	R[c]	1107	1140
WHSV	E	0.6	0.6	0.6	E	1.0	1.1	1.1	E	2.0	2.1
Material Balance, % wt	G	102	97	100	G	97	104	103	G	105	102
	E				E				E		
CO Conversion, % wt	N	74	78	85	N	68	70	70	N	49	48
To HC, % wt	E	65	63	59	E	72	70	71	E	85	84
H_2 Conversion, % wt	R	59	64	67	R	64	66	63	R	59	54
To HC, % wt	A	90	91	91	A	82	84	82	A	70	66
	T				T				T		
Total Conversion, % wt	I	74	77	84	I	68	70	70	I	50	49
gm HC/m^3 CO	O	228	243	266	O	256	242	247	O	196	186
	N				N				N		
HC Selectivity, % wt											
C_1		32	31	31		21	25	25		23	23
C_2		12	11	10		10	11	10		15	15
C_2		9	9	8		7	7	7		6	7
C_3		13	10	11		12	11	10		9	8
C_4		7	7	7		8	8	8		6	6
C_5		27	32	33		43	38	40		41	41
C_6+											
Olefin Selectivity, % wt											
C_2		9	4	8		13	12	13		11	15
C_3		1	1	1		1	6	6		18	16
C_4		4	8	2		7	8	12		41	43
C_5		7	6	5		20	22	33		61	65
C_5 Olefin Selectivity, % wt											
1-Pentene		0	0	0		0	0	3		3	3
2-Pentene		15	22	15		19	20	19		17	18
Methylbutenes		85	78	85		81	80	78		80	79
Aromatics in C_6+, % wt		58	60	59		42	35	28		18	15
90% OH, °F		373	734	361		370	361	263		369	370

(a) Catalyst had previously 26.6 days on stream.
(b) 16 Hrs, H_2 @ 750°F; > 1 Hr, 10% Air, 750°F; 4 Hrs, 100% Air @ 850°F, all at 0 psig.
(c) 5 Hrs, H_2 @ 750°F;

TABLE E8

COMPARISON OF SYNTHESIS GAS AND CARBON MONOXIDE FOR ACTIVATION OF CATALYST SG-A-4[a]

(Process H_2/CO at 575°F, 200 psig and 600 GHSV)

		Pretreatment Gas - 610°F, 0 psig for 16 hours					
		H_2/CO			CO		
Run Number CT-143-80		24	25	26	31	32	33
Days On Stream		1.9	3.9	5.9	1.9	3.9	5.9
Temperature, Inlet, °F		557	557	557	557	555	555
Average, °F		564	562	563	566	562	562
Maximum, °F		573	574	576	574	573	574
Outlet, °F	R[b]	551	549	549	R[b] 551	549	549
GHSV	E	590	586	580	E 580	580	580
WHSV	G	1.1	1.1	1.1	G 1.1	1.1	1.1
Material Balance, % wt	E	100	101	103	E 100	96	98
	N				N		
CO Conversion, % wt	E	71	67	73	E 80	71	75
To HC, % wt	R	70	72	69	R 64	70	68
H_2 Conversion, % wt	A	61	59	62	A 63	59	61
To HC, % wt	T	82	79	81	T 84	82	81
	I				I		
Total Conversion, % wt	O	71	67	73	O 80	71	75
gm HC/m^3 CO	N	242	232	258	N 264	248	246
HC Selectivity, % wt							
C_1		24	23	23	24	22	24
C_2		11	11	12	12	11	12
C_3		7	6	8	7	6	6
C_4		9	10	13	10	10	9
C_{5+}		8	8	7	8	9	9
C_6		41	42	37	39	42	40
Olefin Selectivity, % wt							
C_2		8	12	11	7	7	7
C_3		7	8	5	1	7	8
C_4		8	24	28	9	24	29
C_5		22	33	42	22	34	44
C_5 Olefin Selectivity, % wt							
1-Pentene		4	3	3	3	2	3
2-Pentene		19	19	17	18	18	18
Methylbutenes		77	78	80	79	80	79
Aromatics in C_6^+, % wt		38	30	23	36	28	21
90% OH, °F		362	373	366	-	-	366

(a) Catalyst had previously 41 days on stream.
(b) 5 hours, H_2 at 750°F; 1 hour, 10% air, 750°F; 4 hours, 100% air, 850°F.

TABLE E9

CONTINUATION OF REGENERATION STUDY ON CATALYST SG-A-4[a]
EFFECT OF SPACE VELOCITY AND TEMPERATURE ON ACTIVITY AND SELECTIVITY

(Processing: H_2/CO at 200 psig)

Run Number CT-143-80-		27	28	29	30		34	35	36
Days On Stream		1.9	3.9	5.9	7.9		6.9	7.9	8.9
Temperature, Inlet, °F		550	555	567	557		550	549	550
Average, °F		553	558	571	564		560	560	562
Maximum, °F		560	566	580	574		574	574	576
Outlet, °F		543	547	560	551		545	544	545
GHSV		280	280	272	585		1160	1160	1160
WHSV		0.6	0.6	0.6	1.1		2.2	2.2	2.2
Material Balance, % wt		100	102	100	99		103	101	99
CO Conversion, % wt	R[b]	88	87	94	68	R[c]	45	48	50
To HC, % wt	E	60	61	55	71	E	85	83	83
H_2 Conversion, % wt	G	65	69	71	59	G	46	51	51
H_2 To HC, % wt	E	88	86	91	79	E	67	68	70
	N					N			
Total Conversion, % wt	E	88	87	94	68	E	45	48	50
gm HC/m^3 CO	R	289	288	292	230	R	175	173	189
	A					A			
HC Selectivity, % wt	T					T			
C_1	I	23	24	30	25	I	23	25	24
C_2	O	12	12	13	12	O	11	13	12
C_3	N	8	8	9	6	N	7	8	8
C_4		11	15	15	10		8	10	9
C_5		7	8	8	7		7	8	8
C_6^+		39	35	25	40		44	36	39
Olefin Selectivity, % wt									
C_2		3	3	3	8		22	19	18
C_3		1	1	1	8		27	33	30
C_4		2	6	5	30		46	54	53
C_5		9	8	4	38		70	72	72
C_5 Olefin Selectivity, % wt									
1-Pentene		0	0	0	3		3	3	2
2-Pentene		14	14	0	18		18	18	18
Methylbutenes		86	86	100	79		79	79	80
Aromatics in C_6^+, % wt		44	45	57	26		11	13	13
90% OH, °F		374	364	-	-		355	356	-
O.N. (R+0)		-	-	-	91		-	-	-

(a) Catalyst had previously 47 days on stream.
(b) 5 hours, H_2 at 750°F; 1 hour, 10% air, 750°F; 4 hours, 100% air, 850°F; activation with H_2/CO, 16 hours, 610°F, 0 psig.
(c) 5 hours, H_2 at 750°F; 1 hour, 10% air, 750°F; 4 hours, 100% air, 850°F; activation with CO, 16 hours, 610°F, 0 psig.

TABLE E10

MATERIAL BALANCES FROM FLUID BENCH-SCALE UNIT WITH CATALYST SGF-A-3

RUN NUMBER 225-	42- 1	42- 2	42- 3	42- 4	42- 5	42- 6	42- 7	42- 8	42- 9
RUN DAYS-ON-STREAM	1.3	2.3	3.3	4.3	5.3	7.2	8.3	10.3	11.3
CUM. DAYS-ON-STREAM	1.3	2.3	3.3	4.3	5.3	7.2	8.3	10.3	11.3
FRESH FEED H2/CO RATIO	1.0	1.1	1.1	1.1	1.1	1.0	1.0	1.1	1.0
GHSV, HR-1 (CHG BASIS)	1005	1010	995	1003	1010	1001	994	1000	996
RECYCLE RATIO	2.00	1.97	1.98	2.00	1.98	2.03	2.01	2.01	2.01
REACT. PRESS., PSIG	200	200	201	200	200	201	201	202	201
REACT. INLET TEMP., °F	422	434	446	446	435	425	418	435	431
NOM. REACT. TEMP., °F	560	560	560	560	560	540	540	580	580
CONVERSIONS, MOL °/°									
H2	63.4	75.3	78.4	81.5	81.7	79.8	81.3	85.3	85.2
CO	41.3	55.2	62.0	60.8	63.8	54.8	53.4	73.8	73.7
H2+CO	52.4	65.8	70.4	71.5	73.1	67.4	67.3	79.7	79.6
YIELDS, WT °/°									
HYDROGEN	2.5	1.8	1.6	1.3	1.3	1.4	1.3	1.0	1.0
WATER	15.1	16.6	16.1	15.5	16.1	16.9	16.8	12.7	12.6
CO	55.5	41.6	35.5	36.6	33.7	42.2	43.7	24.4	24.5
CO2	12.1	21.2	24.5	25.5	27.1	19.6	18.8	39.0	39.1
TOTAL HYDROCARBON	14.9	18.7	22.4	21.1	21.8	19.8	19.5	22.9	22.7
HC SELECTIVITY, WT °/°									
METHANE	18.5	18.6	18.3	15.8	17.1	13.5	11.8	19.3	19.5
ETHENE	0.6	0.5	0.4	0.5	0.5	0.6	0.6	0.5	0.5
ETHANE	9.1	9.7	9.6	8.1	8.8	7.9	7.1	10.1	10.3
PROPENE	0.7	0.6	0.7	0.6	0.8	1.7	2.0	1.1	1.2
PROPANE	4.8	4.9	4.8	4.2	4.1	3.8	3.6	4.5	4.6
BUTENES	2.4	2.3	2.4	2.7	2.9	4.9	5.2	3.4	3.5
I-BUTANE	5.1	5.0	4.8	4.0	3.6	1.4	1.0	2.9	3.0
N-BUTANE	3.4	3.5	3.5	3.0	3.0	2.6	2.3	2.8	2.9
TOTAL C4-	44.5	45.1	44.5	38.9	40.8	36.3	33.6	44.7	45.3
C5+ PARAFFINS	16.0	17.3	17.5	17.4	16.3	12.1	11.0	14.3	14.2
OLEFINS	9.5	13.0	15.2	18.7	21.4	31.2	33.5	22.2	21.5
NAPHTHENES	2.7	2.6	2.5	2.8	2.2	1.1	1.5	1.8	1.9
AROMATICS	15.9	11.8	10.4	10.9	7.9	0.4	0.6	6.9	6.1
OTHERS	11.5	10.2	9.9	11.3	11.3	18.7	19.8	10.0	11.0
TOTAL C5+	55.5	54.9	55.5	61.1	59.2	63.7	66.4	55.3	54.7
YIELDS, G/SCM CONV CO+H2									
TOTAL HC	188	181	206	191	192	194	193	188	186
C5+	104	99	114	117	114	124	128	104	102
OLEFINS, WT °/° BY C NO.									
C2	6.7	4.7	4.5	5.5	4.9	7.2	8.3	4.9	4.9
C3	12.3	10.9	12.1	12.1	16.4	30.6	35.6	20.2	20.2
C4	21.8	21.2	22.3	27.4	31.0	55.4	61.4	37.4	37.5
C5	26.5	30.1	34.7	38.4	43.3	67.8	72.3	50.2	50.3
90 PCT OH, RAW PROD., °F	386	374	-	375	372	379	378	368	371
OCTANE NO. ON RAW PROD.									
R+0	94.9	-	92.3	91.6	91.5	88.6	87.5	91.6	91.5
R+3	-	98.3	96.6	97.9	97.7	96.5	96.2	97.5	97.3
OXYGENATES, WT °/°	0.1	-	-	-	0.3	-	-	0.1	-

TABLE E11

MATERIAL BALANCES FROM FLUID BENCH-SCALE UNIT WITH CATALYST SGF-A-3

RUN NUMBER 225-	42-10	42-11	42-12	42-13	42-14	42-15	42-16	42-17	42-18
RUN DAYS-ON-STREAM	12.3	14.3	15.3	16.8	18.4	20.2	21.3	22.3	23.3
CUM. DAYS-ON-STREAM	12.3	14.3	15.3	16.8	18.4	20.2	21.3	22.3	23.3
FRESH FEED H2/CO RATIO	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.0	1.0
GHSV, HR⁻¹ (CHG BASIS)	1003	1006	1003	1002	999	1016	1005	996	995
RECYCLE RATIO	2.00	1.99	1.98	1.98	2.00	1.97	2.01	2.03	2.00
REACT. PRESS., PSIG	201	200	200	200	201	300	300	300	300
REACT. INLET TEMP., °F	426	416	413	422	429	414	412	437	449
NOM. REACT. TEMP., °F	560	560	560	560	560	560	560	560	560
CONVERSIONS, MOL °/°									
H2	85.0	84.2	85.2	85.4	84.2	89.2	87.7	87.9	87.3
CO	76.7	72.5	73.1	75.3	78.5	86.6	84.8	82.3	82.5
H2+CO	80.9	78.4	79.2	80.4	81.5	87.9	86.3	85.2	84.9
YIELDS, WT °/°									
HYDROGEN	1.1	1.1	1.0	1.0	1.2	0.8	0.9	0.8	0.9
WATER	12.0	12.5	12.2	11.8	12.1	12.3	11.3	9.8	9.5
CO	21.7	25.6	25.1	23.1	20.0	12.5	14.1	16.5	16.3
CO2	41.5	37.9	38.9	40.9	40.8	48.6	48.3	48.0	48.8
TOTAL HYDROCARBON	23.8	22.9	22.8	23.3	26.0	25.9	25.4	24.9	24.6
HC SELECTIVITY, WT °/°									
METHANE	21.2	19.8	18.8	19.2	21.3	22.3	23.6	24.1	25.1
ETHENE	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.5
ETHANE	11.2	10.8	10.3	10.6	11.8	12.1	12.8	13.0	13.7
PROPENE	1.1	1.3	1.3	1.4	1.3	0.9	1.0	1.3	1.2
PROPANE	4.9	5.2	5.1	5.3	6.3	6.2	6.7	6.7	6.9
BUTENES	3.5	3.9	4.0	4.2	4.2	3.2	3.2	3.3	3.1
I-BUTANE	2.9	2.5	2.4	2.3	2.4	2.4	2.5	2.8	2.9
N-BUTANE	2.9	3.1	3.1	3.1	3.5	3.5	3.7	3.6	3.7
TOTAL C4-	48.3	47.0	45.6	46.7	51.1	51.0	53.8	55.3	57.0
C5+ PARAFFINS	13.4	12.0	11.7	11.5	12.1	14.4	13.0	12.6	11.7
OLEFINS	21.4	24.0	25.9	25.7	22.6	20.9	19.2	17.9	17.0
NAPHTHENES	1.7	1.3	1.3	1.3	1.5	1.8	1.7	1.6	1.4
AROMATICS	5.1	4.5	4.3	4.1	3.1	3.4	3.6	4.2	5.4
OTHERS	10.2	11.2	11.2	10.6	9.7	8.5	8.7	8.3	7.5
TOTAL C5+	51.7	53.0	54.4	53.3	48.9	49.0	46.2	44.7	43.0
YIELDS, G/SCM CONV CO+H2									
TOTAL HC	192	192	192	190	204	191	190	192	192
C5+	100	102	104	101	100	93	88	86	83
OLEFINS, WT °/° BY C NO.									
C2	4.4	4.7	4.8	4.7	4.1	3.1	3.1	3.7	3.4
C3	18.8	20.0	19.8	21.4	17.1	13.1	13.4	16.3	15.0
C4	37.5	41.1	42.5	43.7	41.4	35.4	34.2	34.4	31.8
C5	50.1	55.3	57.1	57.9	55.4	51.9	49.9	48.5	46.0
90 PCT OH, RAW PROD., °F	366	368	365	365	351	361	360	367	369
OCTANE NO. ON RAW PROD.									
R+0	91.3	90.3	90.0	89.8	89.9	88.6	88.6	90.5	90.1
R+3	-	96.9	97.0	96.9	96.9	96.3	96.4	97.2	97.5
OXYGENATES, WT °/°	-	0.1	0.1	0.1	0.1	-	0.1	0.3	0.1

TABLE E12

MATERIAL BALANCES FROM FLUID BENCH-SCALE UNIT WITH CATALYST SGF-A-3

RUN NUMBER 225-	43- 1	47- 1	47- 2	47- 3	47- 4	49- 1	49- 2	49- 3	49- 4
RUN DAYS-ON-STREAM	2.9	1.4	2.4	4.3	5.3	1.4	2.4	3.4	4.4
CUM. DAYS-ON-STREAM	2.9	1.4	2.4	4.3	5.3	1.4	2.4	3.4	4.4
FRESH FEED H2/CO RATIO	1.0	1.1	1.0	1.0	1.1	1.3	1.3	1.2	1.2
GHSV, HR^{-1} (CHG BASIS)	1015	1010	1007	706	704	989	981	988	983
RECYCLE RATIO	1.95	1.49	1.51	1.56	1.54	3.77	3.85	3.83	3.91
REACT. PRESS., PSIG	201	200	200	200	201	200	200	200	200
REACT. INLET TEMP., °F	398	401	403	404	401	426	441	437	431
NOM. REACT. TEMP., °F	560	560	560	560	560	560	560	560	560
CONVERSIONS, MOL °/°									
H2	67.3	62.8	69.5	68.9	64.5	76.8	80.6	84.0	80.8
CO	53.5	52.8	59.0	55.6	49.6	62.9	67.0	68.1	69.2
H2+CO	60.5	57.9	64.3	62.3	57.3	70.7	74.6	76.8	75.6
YIELDS, WT °/°									
HYDROGEN	2.3	2.6	2.1	2.2	2.5	1.9	1.7	1.3	1.6
WATER	11.9	11.0	11.1	9.5	8.4	21.1	22.6	22.1	20.2
CO	43.4	44.1	38.4	41.6	47.1	34.1	30.3	29.3	28.4
CO2	25.4	26.2	29.9	29.5	27.1	20.7	21.4	23.3	26.1
TOTAL HYDROCARBON	17.0	16.1	18.5	17.2	14.7	22.2	24.1	23.8	23.4
HC SELECTIVITY, WT °/°									
METHANE	23.5	25.4	22.1	23.5	23.4	22.8	20.8	20.5	22.4
ETHENE	0.5	0.6	0.6	0.6	0.6	0.3	0.3	0.3	0.3
ETHANE	11.8	11.2	10.7	10.4	11.0	11.5	10.6	10.3	11.4
PROPENE	0.5	0.7	0.8	0.8	1.0	0.6	0.5	0.7	0.8
PROPANE	6.2	6.4	6.2	6.5	6.0	6.1	5.7	5.3	6.5
BUTENES	1.6	1.9	2.3	2.5	2.8	1.6	1.6	1.9	2.1
I-BUTANE	5.5	6.4	6.2	5.9	5.4	5.5	5.1	4.7	4.4
N-BUTANE	3.7	3.8	3.9	3.7	3.9	4.0	3.8	3.6	4.1
TOTAL C4-	53.3	56.4	53.0	54.1	54.0	52.4	48.3	47.2	52.0
C5+ PARAFFINS	13.7	12.7	14.4	13.7	13.7	13.4	13.9	14.5	14.2
OLEFINS	7.0	4.7	8.8	8.9	8.3	6.8	11.0	11.6	10.3
NAPHTHENES	2.3	1.8	2.1	2.2	1.9	1.5	1.6	1.6	1.5
AROMATICS	12.9	15.3	14.0	11.7	9.0	19.1	17.5	16.6	12.8
OTHERS	10.9	9.1	7.7	9.3	13.0	6.8	7.7	8.5	9.3
TOTAL C5+	46.7	43.6	47.0	45.9	46.0	47.6	51.7	52.8	48.0
YIELDS, G/SCM CONV CO+H2									
TOTAL HC	184	181	190	182	167	189	192	191	191
C5+	86	79	89	84	77	90	99	101	93
OLEFINS, WT °/° BY C NO.									
C2	4.2	5.4	5.4	5.9	5.0	2.8	2.7	2.8	2.5
C3	7.2	9.7	11.7	11.4	14.3	9.3	8.8	11.0	10.6
C4	14.6	15.8	18.8	20.7	23.0	14.4	15.1	18.2	20.2
C5	20.6	21.3	26.3	29.9	30.5	20.3	21.4	27.5	30.1
90 PCT OH, RAW PROD., °F	379	-	-	382	-	373	371	368	368
OCTANE NO. ON RAW PROD.									
R+0	95.9	97.4	95.0	91.7	93.4	95.0	-	92.0	-
R+3	-	-	-	-	-	-	98.5	-	97.4
OXYGENATES, WT °/°	-	-	-	-	-	0.1	-	0.1	-

TABLE E13

MATERIAL BALANCES FROM FLUID BENCH-SCALE UNIT WITH CATALYST SGF-A-3

RUN NUMBER 225-	50- 1	50- 2	50- 3	56- 1	56- 2	56- 3	56- 4	56- 5
RUN DAYS-ON-STREAM	2.7	4.0	5.1	1.1	2.1	3.1	4.0	5.0
CUM. DAYS-ON-STREAM	8.4	9.7	10.8	1.1	2.1	3.1	4.0	5.0
FRESH FEED H2/CO RATIO	1.3	1.3	1.3	1.0	1.0	1.0	1.0	1.0
GHSV, HR^{-1} (CHG BASIS)	1003	999	1005	1010	1011	1012	1007	1003
RECYCLE RATIO	3.91	3.86	3.86	1.96	1.98	1.99	2.00	2.03
REACT. PRESS., PSIG	200	201	200	200	200	200	200	200
REACT. INLET TEMP., °F	433	439	423	421	418	418	412	416
NOM. REACT. TEMP., °F	560	560	560	560	560	560	560	560
CONVERSIONS, MOL °/°								
H2	58.7	59.0	58.1	67.3	69.8	72.5	73.1	71.5
CO	52.7	53.3	52.0	45.9	55.5	56.4	60.3	56.0
H2+CO	56.0	56.5	55.5	56.7	62.7	64.5	66.8	63.8
YIELDS, WT °/°								
HYDROGEN	3.5	3.6	3.6	2.2	2.0	1.9	1.8	2.0
WATER	13.8	12.4	12.3	13.8	11.5	11.9	11.6	11.1
CO	43.5	42.8	44.0	50.6	41.5	40.6	37.0	41.0
CO2	23.3	23.6	23.6	16.9	27.1	26.1	29.0	27.3
TOTAL HYDROCARBON	15.9	17.6	16.4	16.5	17.9	19.5	20.4	18.6
HC SELECTIVITY, WT °/°								
METHANE	37.7	37.8	39.4	22.5	27.3	26.8	26.8	26.7
ETHENE	0.2	0.1	0.1	0.5	0.4	0.4	0.4	0.4
ETHANE	18.9	18.5	18.6	11.1	12.2	12.3	12.7	12.7
PROPENE	0.5	0.5	0.5	1.1	0.8	1.0	1.0	1.0
PROPANE	9.2	9.1	9.1	6.0	7.3	7.3	7.3	6.8
BUTENES	1.2	1.2	1.2	2.7	2.5	2.7	2.7	2.7
I-BUTANE	4.5	4.2	3.9	5.8	5.5	5.4	4.9	4.7
N-BUTANE	4.5	4.4	4.3	4.0	4.0	4.1	4.1	4.0
TOTAL C4-	76.7	75.8	77.1	53.6	60.0	60.0	59.8	59.0
C5+ PARAFFINS	8.4	8.2	7.8	15.0	12.1	11.7	11.9	11.8
OLEFINS	1.9	1.7	2.0	8.3	6.9	8.5	8.6	9.5
NAPHTHENES	0.8	0.9	0.9	2.2	1.6	1.6	1.7	1.6
AROMATICS	6.0	6.0	6.4	12.9	10.0	9.3	8.0	7.6
OTHERS	6.2	7.4	5.9	8.0	9.4	8.9	10.0	10.4
TOTAL C5+	23.3	24.2	22.9	46.4	40.0	40.0	40.2	41.0
YIELDS, G/SCM CONV CO+H2								
TOTAL HC	170	183	175	193	190	200	203	193
C5+	40	44	40	90	76	80	82	79
OLEFINS, WT °/° BY C NO.								
C2	0.9	0.8	0.7	4.3	3.0	3.2	2.9	3.4
C3	5.3	5.0	5.3	15.1	10.3	11.6	11.6	12.4
C4	11.5	12.0	12.7	21.6	20.3	22.5	23.1	23.8
C5	15.7	15.9	16.4	29.6	27.8	30.8	31.0	32.4
90 PCT OH, RAW PROD., °F	-	-	-	386	393	373	371	369
OCTANE NO. ON RAW PROD.								
R+0	-	-	-	95.2	-	94.6	-	93.0
R+3	-	99.7	-	-	99.1	-	98.5	-
OXYGENATES, WT °/°	-	-	-	0.1	-	-	0.2	-

TABLE E14

MATERIAL BALANCES FROM FLUID BENCH-SCALE UNIT WITH CATALYST SGF-A-3

RUN NUMBER 225-	58- 1	58- 2	58- 3	58- 4	58- 5	58- 6	59- 1	59- 2	59- 3	59- 4	59- 5
RUN DAYS-ON-STREAM	1.2	2.1	3.0	4.0	5.0	6.0	1.4	2.3	3.3	4.3	5.3
CUM. DAYS-ON-STREAM	1.2	2.1	3.0	4.0	5.0	6.0	7.9	8.8	9.8	10.8	11.8
FRESH FEED H2/CO RATIO	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1
GHSV, HR^{-1} (CHG BASIS)	1018	1020	1020	1018	1013	1016	995	995	988	981	984
RECYCLE RATIO	2.92	2.84	2.85	2.89	2.95	2.98	3.07	3.06	2.98	3.05	2.53
REACT. PRESS., PSIG	200	205	200	200	200	200	200	200	200	201	200
REACT. INLET TEMP., °F	425	417	444	435	422	419	439	456	428	430	432
NOM. REACT. TEMP., °F	560	560	560	560	560	560	560	560	560	560	560
CONVERSIONS, MOL °/°											
H2	68.9	75.2	76.2	73.8	75.5	78.6	71.9	73.4	73.3	73.9	75.4
CO	44.1	52.8	55.4	58.1	61.3	65.7	55.3	59.1	60.1	62.0	64.4
H2+CO	56.7	64.1	65.8	65.9	68.4	72.1	63.6	66.3	66.7	67.9	70.0
YIELDS, WT °/°											
HYDROGEN	2.2	1.7	1.6	1.8	1.7	1.4	1.9	1.8	1.8	1.8	1.7
WATER	15.2	14.4	15.0	12.3	11.4	10.9	12.0	11.5	11.0	10.6	9.9
CO	52.5	44.3	41.9	39.4	36.3	32.3	41.9	38.3	37.4	35.6	33.3
CO2	16.1	22.0	23.5	27.7	31.1	34.5	27.4	30.3	31.7	33.5	36.0
TOTAL HYDROCARBON	14.1	17.5	18.0	18.8	19.5	20.9	16.8	18.1	18.1	18.6	19.1
HC SELECTIVITY, WT °/°											
METHANE	31.2	23.5	22.8	27.8	26.9	26.7	31.2	31.6	31.8	32.9	31.2
ETHENE	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.2
ETHANE	15.6	12.3	12.2	13.2	13.8	14.0	15.6	15.7	15.9	16.5	15.9
PROPENE	1.6	0.5	0.7	0.7	0.7	0.7	1.5	0.7	0.7	0.5	0.5
PROPANE	8.6	7.8	7.8	8.4	8.4	8.7	8.9	9.6	9.6	10.1	10.1
BUTENES	1.7	1.9	2.1	1.9	2.0	2.0	1.4	1.1	1.4	1.4	1.4
I-BUTANE	5.7	5.1	5.1	4.9	5.1	5.2	6.8	6.1	5.8	5.6	5.3
N-BUTANE	5.2	4.6	4.8	4.5	4.9	5.0	4.8	4.7	4.7	4.8	4.8
TOTAL C4-	69.8	55.9	55.7	61.7	62.2	62.4	70.5	69.8	70.2	72.1	69.5
C5+ PARAFFINS	11.1	13.4	14.0	12.5	12.2	12.7	9.9	10.6	10.6	9.4	9.7
OLEFINS	2.8	5.6	8.6	7.1	5.7	5.7	2.6	3.2	2.6	2.9	3.1
NAPHTHENES	1.2	2.4	2.3	1.9	2.0	2.2	1.5	1.9	2.0	1.4	1.7
AROMATICS	8.5	13.0	11.1	8.8	9.7	9.6	10.0	11.6	10.8	8.9	9.6
OTHERS	6.7	9.6	8.3	8.1	8.2	7.5	5.4	3.0	3.9	5.2	6.5
TOTAL C5+	30.2	44.1	44.3	38.3	37.8	37.6	29.5	30.2	29.8	27.9	30.5
YIELDS, C/SCM CONV CO+H2											
TOTAL HC	162	181	182	191	189	193	177	180	182	182	178
C5+	49	80	80	73	71	73	52	55	54	51	54
OLEFINS, WT °/° BY C NO.											
C2	1.2	1.3	1.7	1.9	2.0	1.6	2.0	1.7	1.7	1.6	1.5
C3	15.3	6.3	8.1	7.2	7.8	7.3	14.1	7.1	7.0	5.1	4.7
C4	13.6	16.5	17.6	16.9	16.7	16.3	10.7	9.4	11.9	12.1	12.5
C5	16.1	20.5	25.0	21.9	19.5	19.8	12.1	15.0	13.8	13.3	13.3
90 PCT OH, RAW PROD., °F	-	372	-	370	370	-	373	373	370	371	-
OCTANE NO. ON RAW PROD.											
R+0	95.6	-	93.8	-	94.1	-	97.3	-	96.3	-	95.3
R+3	-	99.3	-	98.9	-	98.5	-	100.7	-	100.3	-
OXYGENATES, WT °/°	0.2	-	-	0.1	-	-	0.2	-	-	0.2	-

TABLE E15

MATERIAL BALANCES FROM FLUID BENCH-SCALE UNIT WITH CATALYST SGF-A-3

RUN NUMBER 225-	61- 1	61- 2	61- 3	61- 4	61- 5	61- 6	62- 1	62- 2	62- 3	62- 4
RUN DAYS-ON-STREAM	1.2	2.5	3.4	4.3	5.2	6.2	2.4	3.4	4.4	5.5
CUM. DAYS-ON-STREAM	14.6	15.9	16.8	17.7	18.6	19.6	22.5	23.5	24.5	25.6
FRESH FEED H2/CO RATIO	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.2
GHSV, HR^{-1} (CHG BASIS)	1009	1017	1013	999	1007	1004	1005	992	998	998
RECYCLE RATIO	2.99	2.95	2.98	3.04	3.00	3.04	2.95	2.95	2.96	3.03
REACT. PRESS., PSIG	200	200	200	200	200	200	200	201	201	200
REACT. INLET TEMP., °F	426	422	414	401	405	433	425	441	439	424
NOM. REACT. TEMP., °F	560	560	560	560	560	560	560	560	560	560
CONVERSIONS, MOL %/%										
H2	66.2	72.4	74.9	76.7	78.4	79.1	55.7	58.6	62.4	60.6
CO	43.5	53.4	54.3	55.0	63.3	60.8	36.0	40.2	44.5	50.1
H2+CO	54.8	62.9	64.5	65.8	70.8	70.0	46.1	49.5	53.4	55.8
YIELDS, WT %/%										
HYDROGEN	2.5	2.0	1.8	1.7	1.4	1.4	3.1	2.9	2.5	3.1
WATER	15.8	14.3	13.6	13.7	13.9	12.7	11.4	9.2	9.5	12.1
CO	57.4	47.4	46.2	45.5	34.5	36.6	59.7	55.9	52.0	46.1
CO2	12.7	20.0	20.5	20.8	29.0	30.1	15.2	20.2	22.9	21.2
TOTAL HYDROCARBON	11.6	16.3	18.0	18.4	21.1	19.1	10.4	11.8	13.0	17.3
HC SELECTIVITY, WT %/%										
METHANE	35.8	28.2	27.8	26.5	27.3	26.6	40.0	34.3	35.8	39.2
ETHENE	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
ETHANE	18.3	14.6	14.3	13.5	13.9	14.0	19.8	17.3	18.5	19.5
PROPENE	1.0	0.7	0.6	0.6	0.6	0.5	0.0	0.0	0.0	0.0
PROPANE	10.5	9.4	9.6	9.0	9.7	9.9	12.8	11.3	12.7	13.4
BUTENES	2.5	1.9	2.4	2.2	1.8	2.2	1.7	1.4	1.3	0.7
I-BUTANE	4.0	3.4	3.5	3.4	3.4	3.7	2.7	2.5	2.8	2.6
N-BUTANE	5.6	5.2	5.3	5.0	5.6	5.8	5.9	5.3	5.9	5.9
TOTAL C4-	77.9	63.4	63.7	60.4	62.4	62.8	82.9	72.2	77.1	81.3
C5+ PARAFFINS	9.0	11.8	11.4	12.6	12.3	12.8	6.2	9.2	8.9	7.6
OLEFINS	2.7	5.2	6.1	8.2	7.4	7.2	3.4	2.9	2.2	1.4
NAPHTHENES	0.4	2.1	1.8	2.1	2.0	1.9	0.2	1.0	0.7	0.6
AROMATICS	2.5	9.4	7.9	8.2	7.6	7.5	1.4	6.8	4.2	3.5
OTHERS	7.4	8.2	9.1	8.6	8.3	7.8	5.9	8.0	6.8	5.6
TOTAL C5+	22.1	36.6	36.3	39.6	37.6	37.2	17.1	27.8	22.9	18.7
YIELDS, G/SCM CONV CO+H2										
TOTAL HC	131	159	173	173	201	181	148	157	164	192
C5+	29	58	63	69	76	67	25	44	37	36
OLEFINS, WT %/% BY C NO.										
C2	0.9	0.8	1.0	1.1	0.6	0.7	0.7	0.6	0.6	0.3
C3	9.0	6.7	6.3	6.5	5.7	4.9	0.0	0.0	0.0	0.0
C4	20.6	17.9	21.3	20.7	17.0	18.6	16.5	15.0	13.3	7.7
C5	24.9	23.8	26.6	32.6	23.9	25.2	19.7	19.7	17.9	10.5
90 PCT OH, RAW PROD., °F	376	376	-	370	369	-	386	383	-	-
OCTANE NO. ON RAW PROD.										
R+0	-	93.4	-	92.4	-	91.7	-	-	91.0	-
R+3	-	-	97.3	-	96.7	-	-	97.2	-	95.9
OXYGENATES, WT %/%	-	0.4	-	-	-	-	0.7	-	-	-

TABLE E16

MATERIAL BALANCES FROM FLUID BENCH-SCALE UNIT WITH CATALYST SGF-A-3

RUN NUMBER 225-	64- 1	64- 2	64- 3	65- 1	65- 2	65- 3	65- 4	65- 5	66- 1	66- 2	66- 3	66- 4
RUN DAYS-ON-STREAM	1.2	2.2	3.2	1.5	2.5	3.5	4.5	5.5	1.4	2.4	3.4	4.4
CUM. DAYS-ON-STREAM	27.6	28.6	29.6	1.5	2.5	3.5	4.5	5.5	7.4	8.4	9.4	10.4
FRESH FEED H2/CO RATIO	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
GHSV, HR^{-1} (CHG BASIS)	1013	1010	1003	1010	1005	1009	1011	1010	1004	1009	1001	1001
RECYCLE RATIO	2.90	2.97	2.93	3.00	2.97	2.98	2.96	2.96	2.97	2.99	2.96	3.01
REACT. PRESS., PSIG	200	200	201	200	200	200	201	200	200	200	200	200
REACT. INLET TEMP., °F	419	414	404	416	425	417	423	432	418	421	421	422
NOM. REACT. TEMP., °F	560	560	560	560	560	560	560	560	560	560	560	560
CONVERSIONS, MOL °/°												
H2	52.1	55.9	56.9	67.3	78.9	81.5	84.5	84.9	75.1	80.6	82.2	83.5
CO	30.3	37.6	39.9	44.5	55.8	55.6	59.1	60.1	63.3	68.3	73.7	75.6
H2+CO	41.1	46.8	48.4	56.1	67.6	68.6	71.8	72.7	69.4	74.5	78.0	79.6
YIELDS, WT °/°												
HYDROGEN	3.2	3.0	2.9	2.3	1.5	1.2	1.1	1.0	1.7	1.3	1.2	1.1
WATER	8.9	10.1	9.8	16.8	17.8	18.7	18.7	18.6	13.7	12.7	13.1	12.5
CO	65.4	58.4	56.2	51.9	41.2	41.5	38.2	37.4	34.2	29.6	24.5	22.8
CO2	13.1	16.4	18.1	13.0	20.7	20.3	21.4	21.6	31.2	35.6	38.3	41.3
TOTAL HYDROCARBON	9.3	12.1	12.9	17.6	21.0	21.2	24.1	25.2	20.3	22.4	24.6	24.2
HC SELECTIVITY, WT °/°												
METHANE	43.5	43.8	42.5	18.4	16.6	15.6	13.6	13.1	27.1	24.8	23.5	23.4
ETHENE	0.1	0.1	0.0	0.4	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.2
ETHANE	21.5	21.6	21.1	9.1	8.0	7.1	6.6	6.4	14.5	13.8	13.4	13.3
PROPENE	0.1	0.1	0.1	0.7	0.6	0.5	0.7	0.7	1.0	0.7	0.6	0.7
PROPANE	13.3	14.3	14.1	5.0	4.6	3.5	3.4	3.2	8.1	8.1	7.8	7.5
BUTENES	0.9	0.7	0.5	1.9	1.9	1.3	2.3	2.4	1.9	1.8	1.8	1.8
I-BUTANE	2.8	2.8	2.6	5.2	5.0	3.7	3.5	3.1	4.3	4.3	4.2	3.9
N-BUTANE	5.3	5.7	5.6	3.4	3.2	2.5	2.5	2.3	4.0	4.2	4.2	4.0
TOTAL C4-	87.6	89.0	86.5	44.1	40.1	34.4	32.9	31.5	61.1	57.9	55.7	54.9
C5+ PARAFFINS	5.4	5.7	5.8	14.1	15.0	15.1	14.0	13.6	10.4	11.7	11.9	11.8
OLEFINS	0.6	0.5	0.6	7.8	10.7	14.7	18.0	20.3	5.2	6.2	7.4	8.2
NAPHTHENES	0.0	0.1	0.3	2.2	2.4	2.5	1.7	1.7	1.8	2.2	2.0	2.1
AROMATICS	0.0	0.0	3.3	14.9	13.1	11.5	9.0	7.9	9.9	9.2	8.7	8.4
OTHERS	6.4	4.8	3.5	16.8	18.8	21.9	24.4	25.0	11.6	12.8	14.2	14.6
TOTAL C5+	12.4	11.0	13.5	55.9	59.9	65.6	67.1	68.5	38.9	42.1	44.3	45.1
YIELDS, G/SCM CONV CO+H2												
TOTAL HC	152	172	176	189	181	178	191	194	180	184	192	185
C5+	19	19	23	98	100	107	117	122	63	69	76	74
OLEFINS, WT °/° BY C NO.												
C2	0.5	0.3	0.2	4.5	3.9	2.6	4.4	4.4	2.2	1.9	1.8	1.8
C3	0.7	0.5	0.4	12.6	11.2	12.1	17.1	18.3	10.5	7.5	7.5	8.2
C4	10.1	7.7	5.3	18.4	19.0	17.4	27.7	30.7	18.4	17.9	17.7	18.4
C5	11.5	9.5	8.2	24.5	26.2	28.6	38.3	41.8	21.6	21.8	22.9	24.1
90 PCT OH, RAW PROD., °F	-	-	393	375	-	372	366	-	390	-	379	377
OCTANE NO. ON RAW PROD.												
R+0	-	-	-	94.1	-	93.1	-	91.7	94.4	-	93.1	-
R+3	-	-	-	-	96.6	-	97.6	-	-	97.7	-	97.3
OXYGENATES, WT °/°	-	-	0.2	-	-	0.1	-	0.2	0.1	0.1	0.1	-

TABLE E17

MATERIAL BALANCES FROM FLUID BENCH-SCALE UNIT WITH CATALYST SGF-A-3

RUN NUMBER 225-	67- 1	67- 2	67- 3	67- 4	67- 5	67- 6	67- 7	67- 8	67- 9
RUN DAYS-ON-STREAM	1.5	2.2	3.9	4.9	6.1	6.9	8.0	9.0	10.0
CUM. DAYS-ON-STREAM	1.5	2.2	3.9	4.9	6.1	6.9	8.0	9.0	10.0
FRESH FEED H2/CO RATIO	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0
GHSV, HR^{-1} (CHG BASIS)	1013	1014	504	504	2004	2021	1030	1031	1035
RECYCLE RATIO	2.96	2.94	6.98	6.95	1.00	0.99	2.95	2.94	2.94
REACT. PRESS., PSIG	200	200	200	200	200	200	200	200	200
REACT. INLET TEMP., °F	401	420	421	423	433	419	432	418	420
NOM. REACT. TEMP., °F	560	560	560	560	560	560	560	560	560
CONVERSIONS, MOL %/%									
H2	67.8	77.4	87.4	88.7	68.0	66.2	81.2	81.4	81.9
CO	48.7	55.9	64.4	65.3	55.7	55.5	67.2	69.2	71.0
H2+CO	58.3	67.1	76.0	77.0	61.9	60.9	74.2	75.3	76.4
YIELDS, WT %/%									
HYDROGEN	2.2	1.6	0.9	0.8	2.2	2.3	1.3	1.2	1.2
WATER	15.2	15.3	18.1	17.3	9.9	9.8	12.9	13.8	12.8
CO	48.0	41.0	33.2	32.4	41.4	41.5	30.6	28.8	27.2
CO2	18.1	23.4	26.6	27.9	29.5	29.3	34.5	34.9	36.8
TOTAL HYDROCARBON	16.6	18.6	21.2	21.6	16.9	17.0	20.7	21.3	22.0
HC SELECTIVITY, WT %/%									
METHANE	22.3	24.2	21.0	20.7	27.9	27.7	24.6	25.6	26.4
ETHENE	0.4	0.3	0.2	0.2	0.4	0.5	0.3	0.3	0.3
ETHANE	11.7	12.7	10.9	10.6	14.6	14.9	13.7	14.0	14.3
PROPENE	0.9	0.7	0.6	0.7	1.5	1.8	1.3	0.8	0.8
PROPANE	6.9	7.5	6.6	6.2	8.0	8.8	7.7	8.1	8.4
BUTENES	2.2	1.9	1.4	1.2	3.9	4.6	2.6	2.5	2.4
I-BUTANE	5.3	5.2	6.0	6.0	3.4	2.7	3.7	3.6	3.7
N-BUTANE	4.0	4.2	4.1	4.0	4.1	4.4	4.4	4.4	4.5
TOTAL C4-	53.6	56.8	50.7	49.6	63.8	65.4	58.2	59.5	60.7
C5+ PARAFFINS	13.4	13.8	15.9	17.1	10.5	9.4	12.9	13.1	12.5
OLEFINS	8.1	7.6	8.9	8.4	8.2	9.4	11.2	10.6	10.1
NAPHTHENES	2.2	2.2	2.6	3.2	1.3	1.0	1.5	1.9	1.6
AROMATICS	14.9	12.3	14.2	13.7	6.6	5.4	7.7	7.6	7.4
OTHERS	7.7	7.2	7.7	7.9	9.6	9.3	8.5	7.3	7.7
TOTAL C5+	46.4	43.2	49.3	50.4	36.2	34.6	41.8	40.5	39.3
YIELDS, G/SCM CONV CO+H2									
TOTAL HC	190	179	185	187	182	185	186	189	192
C5+	88	77	92	94	66	64	78	77	76
OLEFINS, WT %/% BY C NO.									
C2	3.0	2.4	1.6	1.7	3.0	3.3	1.8	1.9	1.9
C3	11.4	9.0	8.3	9.5	15.5	17.1	14.1	9.4	8.4
C4	19.2	16.7	11.9	10.7	34.5	39.4	24.2	23.7	22.8
C5	23.6	21.7	15.1	17.8	38.2	44.1	32.3	31.9	31.1
90 PCT OH, RAW PROD., °F	-	388	390	383	-	321	378	376	372
OCTANE NO. ON RAW PROD.									
R+O	95.2	-	93.1	-	93.1	-	-	-	-
R+3	-	97.5	-	99.2	-	98.6	-	-	-
OXYGENATES, WT %/%	0.2	0.1	0.3	0.1	0.1	-	0.2	0.2	0.2

TABLE E18

GAS COMPOSITION OVER CATALYST SGF-A-3 IN THE FLUID BENCH-SCALE UNIT

RUN NO., 225-	42- 1	42- 2	42- 3	42- 4	42- 5	42- 6	42- 7	42- 8	42- 9
HYDROGEN	36.55	34.37	32.93	33.55	31.70	31.29	30.82	28.68	28.93
CO	49.71	45.70	46.46	43.06	47.14	53.09	51.44	40.24	37.29
CO2	7.45	12.01	12.59	13.75	13.56	9.39	10.72	21.17	22.69
NITROGEN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
METHANE	3.72	4.80	4.69	5.81	4.36	3.22	3.66	6.02	6.80
ETHENE	0.06	0.07	0.08	0.09	0.09	0.10	0.11	0.10	0.10
ETHANE	1.03	1.34	1.28	1.59	1.22	1.03	1.18	1.69	1.90
PROPENE	0.06	0.07	0.09	0.09	0.11	0.20	0.23	0.14	0.14
PROPANE	0.34	0.45	0.43	0.51	0.38	0.35	0.42	0.50	0.57
I-BUTANE	0.25	0.33	0.32	0.32	0.23	0.07	0.07	0.27	0.27
1-BUTENE	0.08	0.10	0.13	0.14	0.16	0.17	0.19	0.17	0.18
N-BUTANE	0.18	0.23	0.23	0.25	0.20	0.16	0.18	0.23	0.25
TRANS-2-BUTENE	0.03	0.04	0.05	0.06	0.07	0.12	0.14	0.07	0.07
CIS-2-BUTENE	0.02	0.03	0.03	0.04	0.04	0.07	0.09	0.04	0.05
UNKNOWN C4-MONOOLEFINS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-DIOLEFINS (DIENES)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3-METHYL-1-BUTENE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I-PENTANE	0.16	0.21	0.20	0.21	0.16	0.06	0.06	0.17	0.18
1-PENTENE	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
2-METHYL-1-BUTENE	0.02	0.02	0.03	0.04	0.04	0.05	0.06	0.04	0.05
N-PENTANE	0.08	0.10	0.10	0.10	0.09	0.07	0.07	0.09	0.09
TRANS-2-PENTENE	0.01	0.01	0.02	0.02	0.03	0.05	0.06	0.03	0.03
CIS-2-PENTENE	0.00	0.01	0.01	0.01	0.01	0.03	0.03	0.01	0.02
2-METHYL-2-BUTENE	0.06	0.08	0.10	0.12	0.14	0.17	0.19	0.13	0.14
UNKNOWN C5-MONOOLEFINS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5-DIOLEFINS (DIENES)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CYCLOPENTANE	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00
C6+ HC	0.20	0.05	0.23	0.25	0.26	0.26	0.25	0.18	0.22
H2/CO	0.74	0.75	0.71	0.78	0.67	0.59	0.60	0.71	0.78
RECYCLE RATIO	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

TABLE E19

GAS COMPOSITION OVER CATALYST SGF-A-3 IN THE FLUID BENCH-SCALE UNIT

RUN NO., 225-	42-10	42-11	42-12	42-13	42-14	42-15	42-16	42-17	42-18
HYDROGEN	29.31	29.64	29.37	30.18	31.08	27.89	27.90	27.74	27.58
CO	36.72	39.22	37.31	34.56	33.02	27.87	28.57	31.05	29.63
CO2	22.70	20.71	21.98	22.93	23.26	29.03	28.44	27.66	27.38
NITROGEN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
METHANE	6.95	6.19	6.79	7.38	7.72	9.66	9.68	8.57	9.87
ETHENE	0.10	0.10	0.10	0.10	0.10	0.09	0.10	0.10	0.11
ETHANE	1.95	1.81	1.98	2.17	2.24	2.76	2.73	2.43	2.79
PROPENE	0.15	0.17	0.17	0.20	0.18	0.17	0.16	0.15	0.17
PROPANE	0.57	0.59	0.67	0.75	0.80	0.91	0.92	0.80	0.95
I-BUTANE	0.26	0.21	0.21	0.21	0.20	0.25	0.24	0.24	0.26
1-BUTENE	0.19	0.19	0.20	0.22	0.20	0.18	0.17	0.16	0.16
N-BUTANE	0.25	0.25	0.27	0.30	0.31	0.34	0.33	0.30	0.34
TRANS-2-BUTENE	0.08	0.10	0.10	0.11	0.10	0.09	0.08	0.08	0.08
CIS-2-BUTENE	0.05	0.06	0.07	0.07	0.06	0.06	0.05	0.05	0.05
UNKNOWN C4-MONOOLEFINS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-DIOLEFINS (DIENES)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3-METHYL-1-BUTENE	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
I-PENTANE	0.17	0.15	0.15	0.16	0.15	0.16	0.16	0.15	0.17
1-PENTENE	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
2-METHYL-1-BUTENE	0.05	0.05	0.06	0.06	0.05	0.05	0.04	0.04	0.04
N-PENTANE	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.09	0.10
TRANS-2-PENTENE	0.03	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03
CIS-2-PENTENE	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.01
2-METHYL-2-BUTENE	0.14	0.17	0.17	0.18	0.16	0.14	0.13	0.13	0.11
UNKNOWN C5-MONOOLEFINS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5-DIOLEFINS (DIENES)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CYCLOPENTANE	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
C6+ HC	0.21	0.23	0.22	0.25	0.20	0.18	0.14	0.18	0.16
H2/CO	0.80	0.76	0.79	0.87	0.94	1.00	0.98	0.89	0.93
RECYCLE RATIO	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

TABLE E20

GAS COMPOSITION OVER CATALYST SGF-A-3 IN THE FLUID BENCH-SCALE UNIT

RUN NO., 225-	49- 1	49- 2	49- 3	49- 4	50- 1	50- 2	50- 3	56- 1	56- 2	56- 3	56- 4	56- 5
HYDROGEN	34.50	34.57	30.28	30.26	43.35	42.33	42.27	36.60	34.98	35.17	34.93	38.79
CO	39.94	39.76	40.79	40.68	39.15	37.39	37.44	48.03	43.81	42.05	42.68	46.68
CO2	12.40	12.45	15.12	15.18	8.29	9.62	9.62	7.89	11.63	12.76	12.59	6.28
NITROGEN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
METHANE	8.14	8.18	8.57	8.60	6.00	7.26	7.26	4.55	6.05	6.31	6.19	5.24
ETHENE	0.07	0.07	0.07	0.07	0.02	0.02	0.02	0.06	0.05	0.05	0.06	0.05
ETHANE	2.20	2.21	2.30	2.31	1.64	1.84	1.84	1.18	1.48	1.60	1.56	1.31
PROPENE	0.09	0.09	0.10	0.10	0.04	0.04	0.04	0.08	0.08	0.08	0.09	0.05
PROPANE	0.78	0.78	0.79	0.80	0.55	0.61	0.61	0.41	0.60	0.61	0.57	0.44
I-BUTANE	0.52	0.52	0.51	0.51	0.25	0.20	0.20	0.26	0.32	0.31	0.29	0.23
1-BUTENE	0.09	0.09	0.11	0.11	0.04	0.04	0.04	0.09	0.10	0.10	0.10	0.08
N-BUTANE	0.37	0.37	0.39	0.39	0.20	0.21	0.21	0.20	0.24	0.26	0.24	0.19
TRANS-2-BUTENE	0.04	0.04	0.05	0.05	0.02	0.01	0.01	0.04	0.04	0.05	0.04	0.03
CIS-2-BUTENE	0.02	0.03	0.03	0.03	0.01	0.01	0.01	0.02	0.02	0.03	0.02	0.02
UNKNOWN C4-MONOOLEFINS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-DIOLEFINS (DIENES)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3-METHYL-1-BUTENE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
I-PENTANE	0.31	0.31	0.31	0.31	0.14	0.13	0.13	0.17	0.19	0.19	0.19	0.16
1-PENTENE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-METHYL-1-BUTENE	0.02	0.02	0.03	0.03	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
N-PENTANE	0.14	0.14	0.15	0.15	0.06	0.06	0.06	0.08	0.08	0.09	0.09	0.09
TRANS-2-PENTENE	0.01	0.01	0.02	0.02	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.02
CIS-2-PENTENE	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01
2-METHYL-2-BUTENE	0.07	0.07	0.09	0.09	0.03	0.02	0.02	0.06	0.07	0.07	0.08	0.08
UNKNOWN C5-MONOOLEFINS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5-DIOLEFINS (DIENES)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CYCLOPENTANE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
C6+ HC	0.28	0.28	0.30	0.30	0.20	0.20	0.20	0.21	0.21	0.22	0.23	0.21
H2/CO	0.86	0.87	0.74	0.74	1.11	1.13	1.13	0.76	0.80	0.84	0.82	0.83
RECYCLE RATIO	3.8	3.8	3.8	3.9	3.9	3.9	3.9	2.0	2.0	2.0	2.0	2.0

TABLE E21

GAS COMPOSITION OVER CATALYST SGF-A-3 IN THE FLUID BENCH-SCALE UNIT

RUN NO., 225-	58- 1	58- 2	58- 3	58- 4	58- 5	58- 6	59- 1	59- 2	59- 3	59- 4	59- 5
HYDROGEN	32.83	31.16	30.89	31.85	30.42	29.45	31.79	31.52	31.36	31.68	32.81
CO	48.81	48.26	47.05	44.17	40.06	39.59	41.68	40.76	39.93	39.20	38.91
CO2	9.33	11.20	12.47	12.90	16.64	18.32	14.81	15.38	16.13	16.43	16.44
NITROGEN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
METHANE	5.51	5.60	5.77	6.87	7.98	7.75	7.51	7.90	8.11	8.09	7.58
ETHENE	0.02	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03
ETHANE	1.53	1.60	1.61	1.86	2.20	2.19	1.99	2.11	2.16	2.19	2.06
PROPENE	0.02	0.14	0.07	0.07	0.07	0.08	0.07	0.07	0.05	0.07	0.06
PROPANE	0.68	0.62	0.70	0.78	0.91	0.92	0.82	0.87	0.89	0.90	0.83
I-BUTANE	0.30	0.31	0.30	0.35	0.41	0.38	0.39	0.39	0.37	0.38	0.33
1-BUTENE	0.07	0.09	0.09	0.09	0.09	0.10	0.05	0.06	0.06	0.07	0.06
N-BUTANE	0.28	0.30	0.30	0.32	0.38	0.38	0.30	0.31	0.32	0.32	0.30
TRANS-2-BUTENE	0.02	0.03	0.04	0.04	0.04	0.04	0.02	0.02	0.02	0.02	0.02
CIS-2-BUTENE	0.01	0.02	0.02	0.02	0.02	0.03	0.01	0.02	0.01	0.02	0.02
UNKNOWN C4-MONOOLEFINS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-DIOLEFINS (DIENES)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3-METHYL-1-BUTENE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I-PENTANE	0.20	0.21	0.20	0.22	0.25	0.24	0.22	0.22	0.21	0.21	0.19
1-PENTENE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-METHYL-1-BUTENE	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01
N-PENTANE	0.10	0.12	0.11	0.11	0.12	0.13	0.09	0.09	0.10	0.10	0.10
TRANS-2-PENTENE	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00
CIS-2-PENTENE	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
2-METHYL-2-BUTENE	0.04	0.06	0.06	0.05	0.05	0.06	0.03	0.03	0.03	0.03	0.03
UNKNOWN C5-MONOOLEFINS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5-DIOLEFINS (DIENES)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CYCLOPENTANE	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
C6+ HC	0.21	0.20	0.25	0.23	0.27	0.27	0.18	0.17	0.18	0.23	0.18
H2/CO	0.67	0.65	0.66	0.72	0.76	0.74	0.76	0.77	0.79	0.81	0.84
RECYCLE RATIO	2.9	2.8	2.8	2.9	2.9	3.0	3.1	3.1	3.0	3.0	2.5

TABLE E22

GAS COMPOSITION OVER CATALYST SGF-A-3 IN THE FLUID BENCH-SCALE UNIT

RUN NO., 225-	61- 1	61- 2	61- 3	61- 4	61- 5	61- 6	62- 1	62- 2	62- 3	62- 4	64- 1	64- 2	64- 3
HYDROGEN	33.46	32.02	30.85	30.61	28.27	29.55	38.49	37.18	36.70	39.93	36.91	38.23	37.48
CO	47.00	49.68	49.88	48.68	44.32	44.36	46.36	45.07	48.15	40.41	43.52	49.57	48.99
CO2	8.43	8.77	9.92	10.49	15.74	14.19	6.22	8.86	7.35	9.76	5.91	5.07	5.67
NITROGEN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
METHANE	6.43	5.99	5.87	6.30	7.22	7.33	5.85	5.76	5.11	6.58	5.15	4.79	5.33
ETHENE	0.01	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00
ETHANE	1.76	1.62	1.58	1.71	1.99	2.00	1.65	1.61	1.35	1.69	1.36	1.24	1.38
PROPENE	0.05	0.05	0.07	0.12	0.13	0.07	0.05	0.07	0.00	0.00	0.00	0.00	0.00
PROPANE	0.76	0.72	0.68	0.71	0.87	0.97	0.68	0.68	0.62	0.78	0.60	0.55	0.61
I-BUTANE	0.20	0.19	0.19	0.22	0.25	0.27	0.12	0.13	0.10	0.13	0.09	0.08	0.09
1-BUTENE	0.07	0.08	0.08	0.10	0.09	0.09	0.03	0.03	0.03	0.03	0.01	0.02	0.01
N-BUTANE	0.30	0.29	0.29	0.33	0.40	0.40	0.23	0.25	0.22	0.23	0.18	0.17	0.19
TRANS-2-BUTENE	0.02	0.03	0.03	0.04	0.04	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01
CIS-2-BUTENE	0.01	0.02	0.02	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00
UNKNOWN C4-MONOOLEFINS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-DIOLEFINS (DIENES)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3-METHYL-1-BUTENE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I-PENTANE	0.16	0.15	0.15	0.17	0.20	0.20	0.10	0.10	0.09	0.11	0.07	0.07	0.07
1-PENTENE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-METHYL-1-BUTENE	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00
N-PENTANE	0.11	0.10	0.11	0.12	0.14	0.14	0.07	0.08	0.07	0.10	0.05	0.05	0.05
TRANS-2-PENTENE	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CIS-2-PENTENE	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-METHYL-2-BUTENE	0.05	0.06	0.06	0.07	0.07	0.06	0.03	0.03	0.03	0.02	0.01	0.01	0.01
UNKNOWN C5-MONOOLEFINS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5-DIOLEFINS (DIENES)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CYCLOPENTANE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
C6+ HC	0.17	0.18	0.21	0.24	0.20	0.26	0.07	0.13	0.14	0.15	0.10	0.12	0.10
H2/CO	0.71	0.64	0.62	0.63	0.64	0.67	0.83	0.82	0.76	0.90	0.75	0.77	0.77
RECYCLE RATIO	3.0	2.9	3.0	3.0	3.0	3.0	2.9	2.9	3.0	3.0	2.9	3.0	2.9

TABLE E23

GAS COMPOSITION OVER CATALYST SGF-A-3 IN THE FLUID BENCH-SCALE UNIT

RUN NO., 225-	65- 1	65- 2	65- 3	65- 4	65- 5	66- 1	66- 2	66- 3	66- 4
HYDROGEN	36.17	31.96	30.03	30.10	27.56	29.70	28.95	27.59	27.12
CO	51.84	50.33	52.46	52.43	50.35	38.08	35.93	34.95	34.38
CO2	5.31	8.90	9.38	9.37	12.75	19.50	21.53	22.57	23.48
NITROGEN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
METHANE	3.95	5.25	4.91	4.90	5.60	7.86	8.60	9.17	9.30
ETHENE	0.05	0.06	0.06	0.06	0.07	0.05	0.04	0.06	0.06
ETHANE	1.03	1.36	1.22	1.21	1.45	2.34	2.56	2.75	2.79
PROPENE	0.05	0.07	0.08	0.08	0.11	0.09	0.08	0.10	0.11
PROPANE	0.40	0.52	0.45	0.44	0.49	0.91	0.98	1.05	1.05
I-BUTANE	0.31	0.41	0.34	0.34	0.34	0.36	0.36	0.41	0.39
1-BUTENE	0.07	0.10	0.10	0.10	0.14	0.09	0.08	0.11	0.12
N-BUTANE	0.19	0.25	0.23	0.23	0.25	0.34	0.36	0.41	0.40
TRANS-2-BUTENE	0.03	0.04	0.04	0.04	0.07	0.04	0.03	0.05	0.05
CIS-2-BUTENE	0.02	0.03	0.03	0.03	0.04	0.02	0.01	0.03	0.03
UNKNOWN C4-MONOOLEFINS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-DIOLEFINS (DIENES)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3-METHYL-1-BUTENE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I-PENTANE	0.20	0.26	0.23	0.23	0.22	0.23	0.23	0.27	0.25
1-PENTENE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-METHYL-1-BUTENE	0.01	0.02	0.03	0.03	0.04	0.02	0.01	0.02	0.02
N-PENTANE	0.08	0.11	0.10	0.10	0.10	0.11	0.10	0.13	0.13
TRANS-2-PENTENE	0.01	0.01	0.02	0.02	0.03	0.01	0.00	0.01	0.02
CIS-2-PENTENE	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01
2-METHYL-2-BUTENE	0.04	0.07	0.08	0.08	0.12	0.05	0.04	0.07	0.07
UNKNOWN C5-MONOOLEFINS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5-DIOLEFINS (DIENES)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CYCLOPENTANE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
C6+ HC	0.23	0.23	0.20	0.20	0.24	0.19	0.09	0.23	0.23
H2/CO	0.70	0.63	0.57	0.57	0.55	0.78	0.81	0.79	0.79
RECYCLE RATIO	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

TABLE E24

GAS COMPOSITION OVER CATALYST SGF-A-3 IN THE FLUID BENCH-SCALE UNIT

RUN NO., 225-	67- 1	67- 2	67- 3	67- 4	67- 5	67- 6	67- 7	67- 8	67- 9
HYDROGEN	34.47	31.13	19.95	19.10	32.22	40.64	27.73	28.16	28.11
CO	49.08	46.30	45.02	45.64	46.93	45.67	39.39	37.54	37.49
CO2	8.43	12.27	19.82	20.35	12.39	7.71	19.59	20.07	20.42
NITROGEN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
METHANE	4.81	6.29	9.23	9.10	5.15	3.66	8.42	8.88	8.69
ETHENE	0.04	0.04	0.05	0.05	0.03	0.04	0.05	0.05	0.05
ETHANE	1.34	1.74	2.58	2.47	1.42	1.04	2.45	2.56	2.50
PROPENE	0.07	0.07	0.08	0.11	0.07	0.08	0.17	0.09	0.11
PROPANE	0.54	0.70	1.01	0.95	0.53	0.40	0.59	1.00	0.96
I-BUTANE	0.31	0.34	0.70	0.69	0.39	0.09	0.31	0.32	0.32
1-BUTENE	0.07	0.09	0.09	0.08	0.06	0.09	0.12	0.13	0.13
N-BUTANE	0.23	0.29	0.47	0.44	0.25	0.14	0.37	0.38	0.37
TRANS-2-BUTENE	0.03	0.04	0.04	0.03	0.02	0.04	0.05	0.05	0.05
CIS-2-BUTENE	0.03	0.03	0.03	0.02	0.01	0.03	0.03	0.04	0.04
UNKNOWN C4-MONOOLEFINS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4-DIOLEFINS (DIENES)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3-METHYL-1-BUTENE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I-PENTANE	0.20	0.23	0.40	0.40	0.22	0.08	0.22	0.22	0.22
1-PENTENE	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
2-METHYL-1-BUTENE	0.02	0.02	0.02	0.03	0.01	0.02	0.03	0.03	0.03
N-PENTANE	0.09	0.11	0.16	0.17	0.09	0.05	0.12	0.12	0.12
TRANS-2-PENTENE	0.01	0.01	0.01	0.00	0.01	0.01	0.02	0.02	0.02
CIS-2-PENTENE	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01
2-METHYL-2-BUTENE	0.05	0.06	0.06	0.07	0.04	0.06	0.09	0.08	0.08
UNKNOWN C5-MONOOLEFINS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5-DIOLEFINS (DIENES)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CYCLOPENTANE	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.01
C6+ HC	0.18	0.22	0.26	0.27	0.15	0.12	0.22	0.24	0.25
H2/CO	0.70	0.67	0.44	0.42	0.69	0.89	0.70	0.75	0.75
RECYCLE RATIO	3.0	2.9	7.0	6.9	1.0	1.0	2.9	2.9	2.9

TABLE E25

EXPERIMENTS IN SUPPORT OF THE KINETIC STUDY OVER CATALYST SG-A-4

Experiment	H_2/CO Mole Ratio	Total Pressure, psig	Partial Pressure, Absolute H_2	Partial Pressure, Absolute CO	Temperature, °F Average	Temperature, °F Maximum	WHSV	GHSV	Contact Time, sec	Conversion Wt % CO	Conversion Wt % H_2	Conversion Mole % (H_2+CO)	% C to HC	% H_2 to HC	Selectivity, Wt % C_1	Selectivity, Wt % C_2	Selectivity, Wt % C_3
159-201	1	200	109	106	546	551	10.7	5703	4.7	13.4	19.0	16.4	87	49	19	5	10
					522	526	10.7	5703	4.9	7.9	12.6	10.5	91	50	20	6	11
					523	528	5.8	3083	9.0	15.0	25.4	20.4	84	56	26	10	9
					494	499	5.8	3093	9.2	11.5	13.8	12.8	93	30	14	6	12
159-202	1	200	109	106	499	502	10.7	5697	5.0	6.8	8.0	7.6	95	26	14	7	14
					521	525	9.1	3053	9.1	13.7	21.2	17.7	89	52	16	5	10
					520	525	10.6	5650	4.9	9.6	12.6	11.3	92	38	17	5	10
					521	525	16.4	8727	3.2	5.4	11.4	8.7	92	62	19	0	8
					546	551	10.5	5600	4.8	13.1	22.8	18.2	84	62	20	3	10
					545	551	16.2	8627	3.1	6.8	11.6	9.4	82	64	32	7	18
					567	575	10.5	5617	4.7	21.4	30.3	26.1	80	59	20	8	9
					567	575	16.4	8727	3.0	16.2	21.6	19.1	85	49	19	7	10
159-208	2	200	147	68	524	528	7.7	5947	4.7	16.8	17.6	17.5	91	64	25	7	11
					522	525	11.7	8983	3.1	10.2	14.0	12.9	92	71	27	8	13
					522	525	15.6	11977	2.3	11.2	10.3	10.7	95	55	24	6	10
		310	222	103	521	527	17.2	13263	3.1	12.7	13.5	13.4	94	62	26	8	15
159-204	2	310	218	107	543	551	11.4	8547	4.8	25.1	21.6	22.7	91	54	28	12	11
					543	547	15.0	11190	3.7	23.2	17.2	19.1	93	44	28	10	11
158-155	2	310	222	103	519	525	11.6	8950	4.7	16.4	16.1	16.4	94	58	27	9	11
					520	526	15.1	11590	3.6	15.6	12.6	13.7	96	48	22	10	11
					520	525	19.3	14880	2.8	11.6	9.0	9.9	96	45	26	6	14
					521	525	25.6	19707	2.1	10.9	5.4	7.3	97	-	23	7	7
158-154	3	200	163	52	521	525	9.5	8990	3.1	19.7	13.9	15.3	95	60	27	9	11
					522	525	12.6	12017	2.3	18.8	9.8	12.0	96	44	26	7	11
					521	523	15.9	15080	1.8	14.6	9.0	10.4	97	52	26	6	8
		440	345	110	522	528	15.9	15127	3.9	19.9	11.5	13.6	97	49	31	10	14
					516	527	25.1	23820	2.5	11.5	7.0	8.1	98	50	32	8	8
159-207	3	440	344	111	496	502	3.3	3070	19.6	43.8	26.2	30.7	95	52	24	10	11
					496	500	6.3	5957	10.1	27.8	17.4	20.1	97	52	25	11	14
					497	500	9.7	9160	6.6	21.5	11.7	14.2	98	43	24	8	12
					535	549	9.6	9067	6.3	38.9	23.9	27.7	94	54	28	12	11
					534	547	12.8	12007	4.8	32.6	18.5	22.0	95	48	26	11	12
159-209	4	200	175	40	523	526	7.8	8990	3.1	22.3	15.9	17.2	94	72	31	9	11
					524	527	10.8	12347	2.2	20.1	15.0	16.0	95	72	27	8	11
					524	527	13.2	15157	1.8	18.7	13.2	14.0	96	70	26	8	10
		530	443	102	521	528	13.1	14993	4.7	28.8	16.3	18.7	96	63	34	13	15
					520	529	17.2	19773	3.5	23.5	14.8	16.5	96	66	34	12	15

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