TABLE A1. LABORATORY ANALYSES FOR DIESEL FROM FISCHER-TROPSCH ARGE WAX (FT1)

Test	ASTM Method	Feed FL-1840	Frac. 1 FL-1898	Frac. 2 FL-1899	Frac. 3 FL-1900	Frac. 4 FL-1901	Frac. 5 FL-1902	Frac. 6 FL-1903	Frac. 7 FL-1904
TBP Cut Pts. °F	-		≤400	400-440	440-480	480-520	520-560	560-600	600 +
°C			≤204	204-227	227-249	249-271	271-293	293-315	315+
Yield, Vol%			0-20	20-31.5	31.5-42.5	42.5-54	54-67	67-82.5	82.5-100
Vol% of Fraction	-		20	11.5	11.0	11.5	13.0	15.5	17.5
Density	D 1298								
Specific Gravity		0.7770	0.7539	0.7632	0.7711	0.7783	0.7852	0.7914	0.7990
°API		50.6	56.2	53.9	52.0	50.3	48.7	47.3	45.6
g/mL		0.7767	0.7536	0.7630	0.7708	0.7780	0.7849	0.7910	0.7986
Distillation, °C/°F,	D 86								
IBP		187/368	169/336	197/386	218/424	242/467	266/511	286/547	313/595
5%		202/396	178/352	202/395	224/436	247/477	271/519	290/555	318/605
10%		208/407	179/355	203/397	226/438	248/478	272/522	292/558	319/607
30%		232/449	183/362	207/404	229/444	252/485	274/526	294/562	322/611
50%		261/502	189/373	213/416	234/453	254/490	277/531	297/566	324/615
70%		287/550	198/388	221/429	238/461	258/496	279/535	299/571	326/619
90		311/592	216/420	233/452	246/475	264/507	285/545	304/579	331/628
95%		319/606	226/438	239/463	250/482	266/511	287/549	306/583	334/633
EP		327/620	236/456	246/474	253/488	272/521	292/557	309/589	337/638
Carbon, wt%	D 3178	84.92	84.53	84.68	84.78	85.0	84.95	85.18	84.93
Hydrogen, wt%		15.12	15.39	15.44	15.29	15.0	15.20	14.91	15.22
Sulfur, wt%	D 2622	0.003	0.001	0.003	0.002	0.003	0.001	0.002	0.003
Aromatics	Hydro-	1.1	1.3	-	-	0.9	-	-	1.4
Olefins	carbon type	1.1	0.6	-	-	0.9	-	-	0.8
Saturates	Vol%	97.8	98.1	-	-	98.2	-	-	97.8
Vis. @ 40°C	D 445	2.42	1.16	1.48	1.85	2.37	3.11	4.01	5.71
@ 100°C		1.05	0.62	0.74	0.86	1.02	1.24	1.46	1.88
RI @ 20°C	D 1218	1.4342	1.4214	1.4266	1.4303	1.4344	1.4382	1.4411	1.4450
Cetane No.	CVCA	64.8	51.2	60.1	66.0	72.1	71.1	82.3	87.3
Cetane Index	D 976	75.4	62.7	67.9	71.0	73.2	74.9	75.1	74.6
	D 4737	81.4	67.2	73.3	78.9	84.2	90.4	95.4	102.2
UV	TOTAL	0.2	0.4	0.3	0.2	0.2	0.1	0.1	0.1
Aromatics	MONO	0.2	0.4	0.3	0.2	0.2	0.1	0.1	0.1
Analyses	DI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wt% Total Carbon	TRI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cloud Pt., °C/°F	D 2500	-20/-4	<-60/-76	-55/-67	-50/-58	-37/-35	-22/-8	-12/10	+1/34
Pour Pt., °C/°F	D 97	-20/-4	<-60/-76	-55/-67	-45/-49	-35/-31	-25/-13	-17/1	-4/25
Aniline Pt., °C/°F	D 611	92.8/199	80.6/178	84.0/183	88.6/192	92.0/198	96.3/205	99.7/212	104.7/221
Smoke Pt., mm	D 1322	+35	+50	+50	+50	+45	+35	+35	N/A

N/A = Not applicable

TABLE A2. LABORATORY ANALYSES FOR F-T STRAIGHT-RUN PRODUCT (FT2)

Test	ASTM Method	FL-2095	Frac. 1 FL-2115	Frac. 2 FL-2116	Frac. 3 FL-2117	Frac. 4 FL-2118	Frac. 5 FL-2119	Frac. 6 FL-2120	Frac. 7 FL-2121
TBP Cut Points, °F		-	300-400	400-440	440-480	480-520	520-580	580-600	600+
°C			149-204	204-227	227-249	249-271	271-304	304-315	315+
Vol% of Fraction		-	16.3	10.1	12.0	10.5	18.2	17.3	15.7
Density	D 1298								
Specific Gravity		0.8081	0.7783	0.7936	0.8058	0.8086	0.8104	0.8132	0.8146
°API		43.6	50.3	46.8	44.1	43.5	43.1	42.5	42.2
g/mL		0.8077	0.7780	0.7932	0.8054	0.8082	0.8100	0.8128	0.8142
Distillation, °C/°F	D 86								
IBP		184/363	102/216	158/316	181/358	200/392	228/442	250/482	276/529
5%		199/391	130/266	163/326	192/377	214/418	239/462	263/506	287/549
10		208/406	134/274	168/334	193/380	218/424	252/468	268/514	292/557
30		238/461	144/292	173/344	199/391	223/434	250/482	276/529	297/566
50		265/509	152/306	179/354	206/403	228/442	254/489	281/537	299/571
70		286/547	162/324	188/370	214/418	233/452	259/498	283/542	303/577
90		309/588	179/354	202/395	228/442	243/470	264/508	289/553	307/585
95		319/606	189/372	208/408	138/459	250/482	269/516	292/558	311/591
EP		331/627	200/392	220/428	281/537	272/522	274/526	296/565	317/603
Carbon, Mass%	D 5291	82.62	79.18	77.78	80.71	82.17	82.03	82.72	84.21
Hydrogen, Mass%		13.76	13.11	13.27	13.54	13.88	13.39	13.49	13.96
Sulfur, Mass%	D 2628	0.031	0.001	<0.001	0.002	0.001	0.003	0.003	<0.001
Hydrocarbon Type	D 1319	Unreliable readings							
Aromatics									
Olefins									
Saturates									
Vis. @ 40°C		2.52 cSt	0.89	1.16	1.58	2.02	2.48	3.14	3.75
@ 100°C		1.08 cSt	0.49	0.61	0.76	0.90	1.07	1.27	1.49
RI @ 20°C		1.4414	1.4196	1.4274	1.4339	1.4381	1.4421	1.4451	1.4476
Cetane No.	CVCA	82.4	34.6	47.0	52.8	66.5	69.2	79.3	94.9
Cetane Index	D 976	62.2	28.9	37.3	44.7	51.6	58.6	63.2	65.5
	D 4737	64.6	35.3	40.5	46.2	53.8	63.2	72.3	80.1
Ring Carbon	UV								
Mono		1.6	2.0	2.1	2.0	1.5	1.7	2.1	0.8
Di		0.1	0.0	0.0	0.1	1.8	0.1	0.1	0.0
Tri		0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.0
Cloud Point, °C	D 2500	-5	less than -60	-54	-36	-25	-12	1	9
Pour Point, °C	D 97	-7	less than -60	-57	-37	-26	-13	-1	7
Aniline Point, °C	D 611	43.2	16.2	20.1	21.7	27.2	37.4	50.1	66.1

TABLE A3. LABORATORY ANALYSES FOR STRAIGHT-RUN DIESEL										
Test	ASTM Method	Feed FL-1627	Frac. 1 FL-1793	Frac. 2 FL-1794	Frac. 3 FL-1795	Frac. 4 FL-1796	Frac. 5 FL-1797	Frac. 6 FL-1798	Frac. 7 FL-1799	Frac. 8 FL-1800
TBP Cut Pts. °F			<400	400-440	440-480	480-520	520-560	560-600	600-640	640+
°C			≤204	204-227	227-249	249-271	271-293	293-315	315-338	338+
Cut Range, Vol%			0-11.5	11.5-20.5	20.5-28.5	28.5-45	45-61.5	61.5-75.5	75.5-86.5	86.5-100
Yield, Vol%			11.5	9.0	8.0	16.5	16.5	14.0	11.0	13.5
Sp. Gr. @ 60°F(°C)	D 1298	0.8458	0.8146	0.8445	0.8483	0.848	0.845	0.847	0.859	0.863
Gravity, °API		35.8	42.2	36.1	35.3	35.3	36.0	35.5	33.3	32.4
Density, g/mL		0.8453	0.8142	0.8440	0.8479	0.8476	0.8446	0.8466	0.8586	0.8625
Distillation, °C/°F, IBP	D 86	178/353	81/282	139/452	247/476	261/502	280/536	299/570	321/610	347/657
5%		220/428	104/324	162/464	251/484	265/509	283/542	302/576	324/616	351/663
10%		241/466	116/338	170/465	252/486	268/514	284/544	303/578	325/617	352/666
30%		273/523	134/377	192/473	256/492	270/518	286/546	305/581	327/620	354/669
50%		288/551	142/404	207/480	259/498	273/523	288/550	307/584	328/622	356/673
70%		305/581	152/425	218/488	263/506	275/527	291/555	309/589	330/626	358/677
90%		335/635	168/452	233/501	269/516	283/542	296/564	314/597	334/634	364/687
95%		347/657	175/462	239/506	272/521	288/550	298/568	317/602	337/638	366/691
EP		356/672	180/475	246/515	276/529	292/556	302/576	321/610	339/643	370/698
Carbon, wt%	D 3178	86.82	86.64	87.08	87.14	87.10	87.06	86.27	86.47	86.38
Hydrogen, wt%		13.31	12.82	12.49	12.44	12.56	12.69	13.59	13.41	13.89
Sulfur, wt%	D 2622	0.052	0.007	0.013	0.018	0.026	0.043	0.073	0.121	0.111
Aromatics	D 1319 Hydro-	23.6	23.4	24.5	25.0	25.4	23.3	22.9	23.7	too heavy
Olefins	carbon Type	1.0	1.1	1.0	1.5	1.6	1.6	1.1	1.2	too heavy
Saturates	Vol%	74.7	75.5	74.5	73.5	73.0	75.1	76.0	75.1	too heavy
Vis. cSt @ 40°C	D 445	3.52	1.26	2.28	2.60	3.18	3.85	5.00	6.86	10.41
cSt @ 100°C		1.34	0.58	0.99	1.10	1.25	1.42	1.70	2.08	2.79
RI @ 20°C	D 1218	1.4718	1.4550	1.4717	1.4742	1.4737	1.4713	1.4726	1.4787	1.4873
Cetane No.	CVCA	56.2	33.9	41.1	40.5	42.5	45.1	64.2	-	-
Cetane Index	D 976	52.6	41.4	44.8	46.0	49.0	52.8	54.5	52.7	52.0
	D 4737	54.6	41.5	45.1	47.0	52.2	59.3	64.8	66.2	80.7
Aromatic, wt%	UV									
Total		11.4	12.3	13.5	13.3	12.5	10.9	8.7	9.3	17.2
Mono-aromatic		4.3	7.9	4.6	4.4	4.3	4.0	3.2	3.1	5.7
Di-aromatic		5.8	4.4	8.6	8.5	7.4	5.7	3.7	3.5	6.2
Tri-aromatic		1.3	0.1	0.4	0.4	0.8	1.2	1.8	2.7	5.2
Cloud Pt., °C/°F	D 2500	1/34	-44/-47	-28/-18	-21/-6	-14/7	-6/21	6/43	12/54	36/97
Pour Pt., °C/°F	D 97	-1/30	-45/-49	-25/-13	-18/0	-12/10	-3/27	6/43	15/59	39/102
Aniline Pt., °C/°F	D 611	73.0/163	54.4/130	62.4/144	64.4/148	68.6/155	75.0/167	80.1/176	82.1/180	88.4/191
Smoke Point, mm	D 1322	17.2	19.5	15.7	15.0	15.3	15.8	16.2	NA	NA

TABLE A4. LABORATORY ANALYSES FOR LOW-AROMATICS STRAIGHT-RUN DIESEL

Test	ASTM Method	Feed FL-1873	Frac. 1 FL-1876	Frac. 2 FL-1877	Frac. 3 FL-1878	Frac. 4 FL-1879	Frac. 5 FL-1880	Frac. 6 FL-1881	Frac. 7 FL-1882	Frac. 8 FL-1883
TBP Cut Pts.°F			IBP-400	400-440	440-480	480-520	520-560	560-600	600-640	640 +
°C			IBP-204	204-227	227-249	249-271	271-293	293-315	315-338	338+
Cut Range, Vol%			0-5	5-15	15-24.5	24.5-39.5	39.5-56	56-73.5	73.5-87	87-100
Yield, Vol%			5	10	9.5	15	16.5	17.5	13.5	13
Sp. Gr. @ 60°F	D 1298	0.8280	0.7892	0.8251	0.8373	0.8368	0.8304	0.8246	0.8314	0.8373
Gravity, °API		39.4	47.8	40.0	37.5	37.6	38.9	40.1	38.7	37.5
Density, g/mL		0.8276	0.7888	0.8247	0.8368	0.8364	0.8300	0.8242	0.8310	0.8368
Distillation, °C/°F, IBP	D 86	128/262	94/201	183/361	219/427	246/474	271/520	293/559	318/605	348/659
5%		193/380	100/212	194/381	226/438	249/480	276/528	297/567	323/613	354/670
10%		228/442	116/241	197/386	227/440	250/482	277/530	297/567	324/615	356/673
30%		264/507	126/258	202/396	229/445	254/489	279/534	301/573	326/618	358/677
50%		282/539	137/278	207/404	233/452	257/494	281/538	303/577	327/620	362/683
70%		300/572	147/297	214/418	238/461	260/500	284/544	304/580	329/624	364/688
90%		328/622	162/323	226/438	246/474	266/510	289/552	308/587	333/631	371/699
95%		340/644	168/334	231/447	249/480	268/515	292/557	311/591	335/635	373/705
EP		351/664	177/351	235/455	253/488	274/526	294/562	314/597	338/641	379/715
Carbon, wt%	D 3178	85.99	86.61	86.26	86.07	86.00	85.87	85.80	85.62	85.68
Hydrogen, wt%		14.86	13.62	14.03	13.91	14.01	14.37	14.50	14.67	14.53
Sulfur, wt%	D 2622	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Aromatics	D 1319 Hydro-	9.8	22.7	14.6	14.9	12.5	9.1	7.6	7.6	NA
Olefins	carbon Type	0.6	0.7	0.9	0.9	2.7	1.8	1.0	2.8	NA
Saturates	Vol%	89.6	76.9	84.5	84.2	84.8	89.1	91.4	89.6	NA
Vis. cSt @ 40°C	D 445	3.17	0.75	1.53	2.12	2.81	3.46	4.35	5.89	8.70
cSt @ 100°C		1.29	0.45	0.75	0.96	1.16	1.32	1.58	1.94	2.54
RI @ 20°C	D 1218	1.4580	1.4403	1.4557	1.4610	1.4608	1.4576	1.4565	1.4595	NA
Cetane No.	CVCA	61.3	23.1	31.7	38.6	44.3	48.8	64.2	79.1	-
Cetane Index	D 976	57.7	13.0	37.4	42.6	49.3	56.7	62.1	61.7	60.5
	D 4737	60.1	23.8	38.1	42.7	51.3	64.1	78.4	81.5	82.2
Aromatic, wt%	UV									
Total		3.3	7.7	5.8	5.0	3.6	2.6	1.5	1.1	0.8
Mono-aromatic		3.0	7.7	5.6	4.6	3.2	2.2	1.3	0.9	0.6
Di-aromatic		0.3	0.1	0.3	0.4	0.4	0.3	0.2	0.2	0.2
Tri-aromatic		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cloud Pt., °C/°F	D 2500	1/34	<-78/-108	-53/-63	-34/-29	-20/-4	-9/16	0/32	15/59	26/79
Pour Pt., °C/°F	D 97	-3/27	<-78-108	-51/-60	-33/-27	-18/0	-7/19	3/37	16/61	28/82
Aniline Pt.,°C/°F	D 611	80.8/177	35.4/96	47.0/117	64.0/147	72.7/163	81.0/178	88.6/191	93.2/200	101.7/215
Smoke Point, mm	D 1322	25.5	20.5	21.5	21.2	21.9	25.9	29.6	NA	NA

TABLE A5. LABORATORY ANALYSES FOR LIGHT-COKER GAS OIL								
	ASTM Method	Feed FL-1440	Frac. 1 FL-1546	Frac. 2 FL-1547	Frac. 3 FL-1548	Frac. 4 FL-1549	Frac. 5 FL-1550	Frac. 6 FL-1551
TBP Cut Pts. °F	–	–	330-440	440-480	480-520	520-560	560-600	600-651
°C			166-227	227-249	249-271	271-293	293-315	315-344
Cut Range, Vol%	–	–	0-25	25-42.7	42.7-59.7	59.7-75.8	75.8-88.8	88.8-100
Yield, Vol%	–	–	25.0	17.7	17.0	16.1	13.0	11.2
Sp. Gravity @ 60°F	D 1298	0.8676	0.8403	0.8565	0.8740	0.8871	0.8927	0.9094
Gravity, °API		31.6	36.9	33.7	30.4	28.0	27.0	24.1
Density, g/mL		0.8671	0.8398	0.8561	0.8735	0.8867	0.8922	0.9089
Distillation, °F, IBP	D 86	196/385	193/379	227/440	249/480	272/521	293/559	315/599
5%		216/420	199/391	229/445	252/485	276/529	296/564	316/601
10%		224/435	202/395	230/446	252/486	277/530	296/565	317/603
30%		239/462	206/403	233/451	255/491	278/533	298/569	319/606
50%		256/492	210/410	236/456	257/495	281/537	299/571	321/609
70%		276/528	214/417	239/462	260/500	283/541	301/574	323/614
90%		301/574	221/429	245/473	264/508	286/547	304/580	329/624
95%		310/590	224/436	248/478	267/512	288/551	306/583	335/635
EP		320/608	238/461	255/491	274/526	296/565	313/595	341/645
Carbon, wt%	D 3178	85.18	85.36	85.70	85.68	85.77	85.96	85.82
Hydrogen, wt%		12.58	13.16	12.46	12.35	12.09	12.27	11.97
Sulfur, wt%	D 2622	1.41	1.16	1.08	1.36	1.48	1.32	1.33
Aromatics	D 1319 Hydro–	52.4	29.1	31.8	38.7	46.4	49.0	too heavy
Olefins	carbon Type	5.9	18.0	17.0	15.8	12.7	14.9	too heavy
Saturates	Vol%	41.7	52.9	51.2	45.5	40.9	36.1	too heavy
Vis. cSt @ 40°C	D 445	2.56	1.46	2.01	2.77	3.97	5.64	10.08
cSt @ 100°C		1.10	0.73	0.90	1.11	1.40	1.69	2.40
RI @ 20°C	D 1218	1.4797	1.4629	1.4729	1.4831	1.4907	1.4942	Too dark
Cetane No.	CVCA	29.0	25.6	27.9	30.1	29.1	32.8	31.7
Cetane Index	D 976	39.3	33.3	37.0	37.9	39.2	40.6	38.8
	D 4737	38.7	32.0	31.9	35.6	37.5	41.2	41.2
Aromatic, wt%	UV							
Total		15.7	11.4	13.8	14.4	15.1	14.7	15.2
Mono-aromatic		8.4	9.1	8.6	7.1	6.7	6.2	5.6
Di-aromatic		5.9	1.6	4.4	6.3	7.2	6.8	6.1
Tri-aromatic		1.4	0.6	0.8	1.0	1.3	1.7	3.5
Cloud Point, °C/°F	D 2500	Too dark	–65/–85	–54/–65	–38/–36	–27/–17	–21/–36	Too dark
Pour Point, °C/°F	D 97	–30/–22	–65/–85	–55/–67	–38/–6	–27/–17	–21/–6	–5/23
Aniline Point, °C/°F	D 611	47.6/118	43.4/110	46.7/116	46.2/115	49.0/120	53.4/128	Too dark
Smoke Point, mm	D 1322	13.3	16.6	16.7	12.4	11.9	11.0	NA

TABLE A6. LABORATORY ANALYSES FOR LOW-SULFUR LIGHT-COKER GAS OIL								
Test	ASTM Method	Feed FL-1442	Frac. 1 FL-1862	Frac. 2 FL-1863	Frac. 3 FL-1864	Frac. 4 FL-1865	Frac. 5 FL-1866	Frac. 6 FL-1867
TBP Cut Pts. °F			<400	400-440	440-480	480-520	520-560	560+
°C			<204	204-227	227-249	249-271	271-293	293+
Cut Range, Vol%			0-13.5	13.5-29.0	29.0-48.5	48.5-66.5	66.5-82.0	82-100
Yield, Vol%			13.5	15.5	19.5	18.0	15.5	18.0
Sp. Gr. @ 60°F	D 1298	0.8463	0.8184	0.8299	0.8403	0.8524	0.8628	0.8697
Gravity, °API		35.7	41.4	39.0	36.9	34.5	32.5	31.2
Density, g/mL			0.8180	0.8295	0.8398	0.8520	0.8623	0.8692
Distillation, °C/°F, IBP	D 86	193/380	169/337	193/379	216/421	239/462	260/500	292/558
5%		213/416	179/354	202/395	221/430	244/472	266/510	296/565
10%		219/427	182/360	204/399	222/432	245/473	267/512	297/567
30%		234/454	190/374	208/407	226/439	248/478	270/518	300/572
50%		247/476	198/389	213/415	231/447	251/484	273/523	303/577
70%		266/511	207/405	218/425	236/456	256/492	276/529	307/584
90%		289/552	219/427	228/442	245/473	262/504	282/539	314/598
95%		300/572	227/441	234/453	249/481	267/512	284/543	319/607
EP		315/599	236/457	242/467	256/492	274/526	288/550	329/624
Carbon, wt%	D 3178	86.85	86.48	86.43	86.59	86.99	86.74	86.72
Hydrogen, wt%		13.31	13.66	13.59	13.54	13.18	13.17	12.96
Sulfur, wt%	D 2622	0.04	0.007	0.009	0.014	0.024	0.041	0.052
Aromatics	D 1319 Hydro-	27.5	22.1	22.9	24.7	28.2	32.5	31.2
Olefins	carbon Type	2.1	1.9	1.8	1.9	1.9	1.6	1.3
Saturates	Vol%	70.4	76.0	75.3	73.4	69.9	65.9	67.5
Vis. cSt @ 40°C	D 445	2.31	1.26	1.52	1.90	2.52	3.45	5.81
cSt @ 100°C			0.58	0.76	0.87	1.06	1.30	1.58
RI @ 20°C	D 1218	1.4676	1.4537	1.4596	1.4646	1.4716	1.4771	1.4810
Cetane No.	CVCA	33.3	28.2	29.5	29.2	30.4	33.7	37.8
Cetane Index	D 976	43.5	36.4	38.0	40.7	42.7	44.5	47.2
	D 4737	43.5	37.4	38.2	40.5	42.7	45.5	52.6
Aromatic, wt%	UV							
Total		10.5	10.0	10.9	10.2	11.0	11.2	11.4
Mono-aromatic		8.2	9.4	9.8	8.4	8.2	7.7	7.2
Di-aromatic		2.3	0.6	1.1	1.8	2.8	3.4	3.5
Tri-aromatic		0.0	0	0	0	0	0.1	0.7
Cloud Pt., °C/°F	D 2500	-35	<-65/-85	-62/-80	-48/-54	-38/-36	-27/-17	-5/23
Pour Pt., °C/°F	D 97	-38/-36	<-65/-85	-6/-80	-45/-49	-35/-31	-27/-17	-2/28
Aniline Pt., °C/°F	D 611	58.6/137	51.7/125	53.5/128	56.2/133	58.2/137	61.2/142	69.6/157
Smoke Point, mm	D 1322	16.2	19.1	18.3	16.7	15.5	14.7	14.1

TABLE A7. LABORATORY ANALYSES FOR LOW-AROMATICS LIGHT-COKER GAS OIL									
Test	ASTM Method	Feed FL-1443	Frac. 1 FL-1597	Frac. 2 FL-1598	Frac. 3 FL-1599	Frac. 4 FL-1600	Frac. 5 FL-1601	Frac. 6 FL-1602	Frac. 7 FL-1603
TBP Cut Pts. °F	-	-	326-400	400-440	440-480	480-520	520-560	560-600	600-746
°C			163-204	204-227	227-249	249-271	271-293	293-315	315-397
Cut Range, Vol%			0-8.5	8.5-24	24-42.3	42.3-58.4	58.4-73.4	73.4-85.9	85.9-100
Yield, Vol%	-	-	8.5	15.5	18.3	16.1	15.0	12.5	14.0
Sp. Gr. @ 60°F	D 1298	0.8393	0.8203	0.8265	0.8324	0.8418	0.8490	0.8498	0.8522
Gravity, °API		37.1	41.1	39.7	38.5	36.6	35.1	35.0	34.5
Density, g/mL		0.8388	0.8198	0.8261	0.8319	0.8413	0.8486	0.8494	0.8518
Distillation, °C/°F, IBP	D 86	211/412	181/358	201/394	221/429	241/466	259/498	281/537	307/585
5%		221/429	188/371	205/401	224/436	244/472	263/506	286/547	312/594
10%		224/436	190/374	207/404	225/437	246/474	264/508	287/548	313/595
30%		240/464	194/382	210/410	228/442	248/479	267/512	289/552	315/599
50%		255/491	199/390	214/417	231/448	251/483	269/516	291/556	317/602
70%		274/526	204/400	218/425	234/453	255/491	272/522	293/560	321/610
90%		302/576	212/414	227/440	242/468	262/503	277/530	297/566	328/622
95%		314/597	216/421	232/449	247/477	265/509	280/536	299/570	333/632
EP		322/612	221/430	241/466	252/485	271/520	286/546	301/574	340/644
Carbon, wt%	D 3178	86.29	86.22	86.40	86.53	86.53	86.66	86.42	86.73
Hydrogen, wt%		13.69	13.50	13.52	13.51	13.41	13.35	13.41	13.58
Sulfur, wt%	D 2622	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	0.002	0.002
Aromatics	D 1319 Hydro-	10.4	10.5	9.1	8.7	10.2	11.9	13.0	14.3
Olefins	carbon Type	0.4	0.7	0.5	0.6	0.5	0.7	0.9	1.0
Saturates	Vol%	89.2	88.8	90.4	90.7	89.3	87.4	86.1	84.7
Vis. cSt @ 40°C	D 445	2.67	1.35	1.58	1.98	2.61	3.37	4.63	7.10
cSt @ 100°C		1.10	0.69	0.78	0.90	1.08	1.28	1.55	2.07
RI @ 20°C	D 1218	1.4608	1.4509	1.4539	1.4569	1.4616	1.4652	1.4662	1.4676
Cetane No.	CVCA	37.7	28.2	30.5	31.7	33.7	39.0	44.1	54.9
Cetane Index	D 976	48.0	36.1	39.7	43.6	46.2	47.9	51.7	53.8
	D 4737	49.2	36.6	39.9	44.0	47.2	50.6	57.7	65.9
Aromatic, wt%	UV								
Total		3.3	4.5	3.9	3.5	3.4	3.3	2.7	2.2
Mono-aromatic		3.0	4.3	3.7	3.3	3.1	2.9	2.3	1.8
Di-aromatic		0.3	0.2	0.2	0.3	0.4	0.4	0.4	0.4
Tri-aromatic		0	0	0	0	0	0	0	0
Cloud Pt., °C/°F	D 2500	-28/-18	<-48/-54	<-48/-54	<-48-54	-41/-42	-31/-24	-21/-6	-4/25
Pour Pt., °C/°F	D 97	-33/-27	<-48/-54	<-48/-54	<-48/-54	-37/-35	-28/-18	-17/1	-4/25
Aniline Pt., °C/°F	D 611	71.2/160	57.4/135	62.9/145	66.0/151	69.5/157	73.0/163	79.7/175	88.6/191
Smoke Point, mm	D 1322	23.1	25.9	23.8	23.5	22.4	21.0	22.1	NA

TABLE A8. LABORATORY ANALYSES FOR LIGHT-CYCLE OIL									
Test	ASTM Method	Feed FL-1538	Frac. 1 FL-1555	Frac. 2 FL-1556	Frac. 3 FL-1557	Frac. 4 FL-1558	Frac. 5 FL-1559	Frac. 6 FL-1560	Frac. 7 FL-1561
TBP Cut Pts. °F	–	–	367-440	440-480	480-520	520-560	560-600	600-640	640-689
°C			186-227	227-249	249-271	271-293	293-315	315-338	338-365
Cut Range, Vol%	–	–	0-8.9	8.9-18.1	18.1-38	38-53	53-67.3	67.3-79	79-100
Yield, Vol%	–	–	8.9	9.2	19.9	15.0	14.3	11.7	21.0
Sp. Gr. @ 60°F	D 1298	0.9490	0.8849	0.9147	0.9321	0.9440	0.9541	0.9685	0.9979
Gravity, °API		17.6	28.4	23.2	20.3	18.4	16.8	14.6	10.3
Density, g/mL		0.9485	0.8844	0.9142	0.9316	0.9434	0.9536	0.9679	0.9973
Distillation, °F, IBP	D 86	186/367	194/382	228/442	247/477	264/508	283/542	303/578	324/616
5%		236/457	196/384	229/444	249/481	268/514	286/546	306/582	336/636
10%		247/476	196/384	231/447	251/483	268/515	287/548	306/583	339/643
30%		265/509	203/397	235/455	252/486	270/518	288/550	308/586	341/645
50%		280/536	210/410	237/459	254/490	272/522	289/552	5309/88	343/651
70%		301/573	218/424	240/464	256/492	274/525	291/556	311/591	348/658
90%		334/634	228/443	245/473	259/499	277/531	294/562	313/596	358/677
95%		347/656	232/449	248/479	262/503	279/534	297/566	316/601	376/709
EP		365/689	238/460	256/492	270/518	284/544	302/575	323/614	390/734
Carbon, wt%	D 3178	88.84	89.00	89.36	88.63	89.80	89.97	89.41	88.67
Hydrogen, wt%		9.84	10.74	10.08	9.69	9.65	9.70	9.41	9.18
Sulfur, wt%	D 2622	0.69	0.16	0.35	0.45	0.41	0.32	0.57	1.85
Aromatics	D 1319 Hydro-	75.5	76.6	74.1	77.2	81.7	80.8	81.0	75.0
Olefins	carbon Type	3.6	2.7	5.4	5.1	4.5	3.0	3.0	1.8
Saturates	Vol%	20.9	20.7	20.5	17.7	13.8	16.2	16.0	23.2
Vis. cSt @ 40°C	D 445	3.16	1.25	1.73	2.14	2.78	3.74	5.47	11.38
cSt @ 100°C		1.20	0.65	0.81	0.94	1.09	1.31	1.64	2.40
RI @ 20°C	D 1218	1.5537	1.5047	1.5279	1.5431	1.5532	1.5572	1.5641	1.5866
Cetane No.	CVCA	15.5	15.2	17.0	4,33	13.9	15.6	16.3	19.1
Cetane Index	D 976	26.1	20.2	22.6	23.8	25.5	26.7	26.9	24.9
	D 4737	23.8	19.3	17.5	17.0	18.1	19.5	19.7	17.6
Aromatic, wt%	UV								
Total		43.7	42.5	55.3	57.2	60.6	46.1	41.2	46.7
Mono-aromatic		6.3	26.7	14.5	6.8	5.1	3.3	4.9	6.4
Di-aromatic		28.3	15.0	39.8	49.6	53.9	37.2	25.2	11.8
Tri-aromatic		9.1	0.8	1.0	0.8	1.6	2.2	6.3	19.6
Cloud Pt., °C/°F	D 2500	–10/14	<–65/–85	–45/–49	–40/–40	–35/3–1	–22/–8	–8/18	9/48
Pour Pt., °C/°F	D 97	–12/10	<–65/–85	–45/–49	–40/–40	–35/–31	–22/–38	–9/16	9/48
Aniline Pt., °C/°F	D 611	9.8/50	35/23	0.5/33	1.3/34	2.0/36	6.5/44	17.3/63	34.0/93
Smoke Point, mm	D1322	6.2	7.2	6.0	6.2	6.0	5.1	5.4	4.1

TABLE A9. LABORATORY ANALYSES FOR LOW-SULFUR LIGHT-CYCLE OIL

Test	ASTM Method	Base FL-1615	Frac. 1 FL-1850	Frac. 2 FL-1851	Frac. 3 FL-1852	Frac. 4 FL-1853	Frac. 5 FL-1854	Frac. 6 FL-1855	Frac. 7 FL-1856
TBP Cut Pts. °F			400-440	440-480	480-520	520-560	560-600	600-640	640+
°C			204-227	227-249	249-271	271-293	293-315	315-338	338+
Cut Range, Vol%			0-12.3	12.3-28	28-48.5	48.5-65	65-79.1	79.1-89.1	89.1-100
Yield, Vol%			12.3	15.7	20.5	16.5	14.1	10.0	10.9
Sp. Gr. 60°F(°C)		0.9200	0.8849	0.9082	0.9153	0.9230	0.9352	0.9484	0.9497
Gravity, °API		22.3	28.4	24.3	23.1	21.8	19.8	17.7	17.5
Density, g/mL		0.9195	0.8844	0.9077	0.9147	0.9225	0.9347	0.9478	0.9491
Distillation, °C/°F, IBP	D 86	200/392	158/317	217/422	237/458	257/495	278/533	312/593	338/641
5%		224/436	180/356	227/440	243/469	261/502	283/541	312/593	341/645
10%		239/462	188/370	229/444	244/472	262/503	284/543	313/595	343/650
30%		255/491	206/403	236/456	248/478	266/510	287/549	315/599	346/655
50%		270/518	218/424	242/467	253/488	271/519	292/557	317/603	351/663
70%		290/554	229/444	248/479	259/498	276/529	296/565	321/609	356/673
90%		323/614	243/469	261/502	272/521	287/549	304/579	325/617	372/702
95%		339/642	249/481	269/516	278/533	293/559	307/585	328/622	386/727
EP		361/682	266/510	284/544	287/548	300/572	313/595	332/630	392/738
Carbon, wt%	D 3178	89.08	88.79	89.36	89.16	89.40	89.69	89.80	89.41
Hydrogen, wt%		10.65	11.03	11.10	11.07	11.04	10.78	10.50	10.86
Sulfur, wt%	D 2622	0.026	0.005	0.002	0.003	0.004	0.006	0.040	0.114
Aromatics	D 1319 Hydro	73.1	69.1	73.6	76.0	76.0	76.7	76.3	Too dark
Olefins	carbon Type	-	0.6	1.0	1.2	2.0	1.0	1.0	
Saturates	Vol%	26.9	30.3	25.4	22.8	22.0	22.3	22.7	
Vis. cSt @ 40°C	D 445	2.96	1.39	1.99	2.34	2.95	4.11	6.41	13.87
cSt @ 100°C		1.16	0.70	0.88	0.99	1.02	1.39	1.85	2.89
RI @ 20°C	D 1218	1.5249	1.4980	1.5125	1.5185	1.5264	1.5358	1.5466	1.5505
Cetane No.	CVCA	17.9	14.0	15.4	15.7	17.3	18.6	19.9	-
Cetane Index	D 976	29.8	23.1	25.3	26.9	29.2	30.4	30.9	32.1
	D 4737	28.6	21.6	22.1	23.4	25.1	26.0	27.7	35.5
Aromatic, wt%	UV								
Total		35.8	29.1	35.4	35.8	36.8	34.1	32.8	31.9
Mono-aromatic		16.6	23.3	22.9	20.4	16.7	11.8	6.8	2.4
Di-aromatic		15.0	5.8	12.5	15.1	19.0	19.6	17.5	9.5
Tri-aromatic		4.2	0	0	0.3	1.2	2.7	8.6	20.1
Cloud Pt., °C/°F	D 2500	+12/-11	<-65/-85	-60/-76	-43/-45	-31/-24	-18/0	-3/27	too dark
Pour Pt., °C/°F	D 97	-25/-13	<-65/-85	-58/-72	-43/-45	-30/-22	-18/0	0/32	16/61
Aniline Pt., °C/°F	D 611	16.6/62	<8/46	8/46	8/46	14.0/57	17.0/63	29.2/85	552.2/126
Smoke Point	D 1322	7.1	8.7	7.1	7.1	7.3	7.1	5.4	NA

TABLE A10. LABORATORY ANALYSES FOR LOW-AROMATICS LIGHT-CYCLE OIL

Test	ASTM Method	Feed FL-1562	Frac. 1 FL-1566	Frac. 2 FL-1567	Frac. 3 FL-1568	Frac. 4 FL-1569	Frac. 5 FL-1570	Frac. 6 FL-1571	Frac. 7 FL-1572
TBP Cut Pts. °F	-		326-400	400-440	440-480	480-520	520-560	560-600	600-746
°C			163-204	204-227	227-249	249-271	271-293	293-315	315-397
Cut Range, Vol%			0-11.3	11.3-25.2	25.2-43	43-61.3	61.3-76.4	76.4-86.4	86.4-100
Yield, Vol%	-		11.3	13.9	17.8	18.3	15.1	10.0	13.6
Sp. Gr. @ 60°F	D 1298	0.8628	0.8483	0.8628	0.8681	0.8713	0.8740	0.8708	0.8453
Gravity, °API		32.5	35.3	32.5	31.5	30.9	30.4	31.0	35.9
Density, g/mL		0.8623	0.8479	0.8623	0.8676	0.8708	0.8735	0.8703	0.8448
Distillation. °C/°F, IBP	D 86	199/390	171/340	206/402	226/439	244/472	266/511	284/543	315/599
5%		215/419	179/354	211/411	229/444	247/476	267/513	286/546	317/603
10%		223/433	183/362	211/412	230/446	247/477	268/514	286/547	319/606
30%		239/463	189/372	213/416	232/450	250/482	269/517	288/550	323/613
50%		253/488	196/384	217/422	234/454	252/486	271/520	289/552	327/620
70%		270/518	202/396	219/426	237/459	254/490	273/523	291/556	336/636
90%		305/581	208/406	223/434	243/470	259/499	277/530	294/561	354/669
95%		325/617	211/411	226/439	246/474	261/501	279/534	296/565	368/694
EP		347/657	215/419	234/453	253/488	268/514	284/544	301/574	379/715
Carbon, wt%	D 3178	86.49	86.67	86.78	86.73	86.73	86.68	86.55	86.07
Hydrogen, wt%		13.55	13.19	13.26	13.04	13.08	13.04	13.07	13.80
Sulfur, wt%	D 2622	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Aromatics	D 1319 Hydro-	10.10	12.6	9.1	11.7	11.6	9.9	10.3	8.1
Olefins	carbon Type	0.6	0.8	0.9	0.8	0.7	0.9	1.1	0.9
Saturates	Vol%	89.3	86.6	90.0	87.5	87.7	89.2	88.6	91.0
Vis. cSt @ 40°C	D 445	2.66	1.33	1.75	2.17	2.71	3.50	4.47	7.02
cSt @ 100°C		1.11	0.70	0.84	1.12	1.12	1.32	1.54	2.15
RI @ 20°C	D 1218	1.4708	1.4621	1.4681	1.4716	1.4736	1.4750	1.4741	1.4645
Cetane No.	CVCA	38.4	22.4	24.5	30.1	31.4	39.6	42.1	77.2
Cetane Index	D 976	40.1	24.6	28.8	33.3	37.4	40.9	45.0	56.9
	D 4737	39.8	24.6	26.7	31.2	35.5	40.5	47.3	72.6
Aromatic, wt%	UV								
Total		3.5	5.6	3.6	4.1	3.9	2.9	2.5	1.4
Mono-aromatic		3.1	5.4	3.4	3.7	3.4	2.5	2.0	1.0
Di-aromatic		0.4	0.2	0.2	0.4	0.5	0.4	0.5	0.4
Tri-aromatic		0	0	0	0	0	0	0	0
Cloud Pt., °C/°F	D 2500	-13/9	>-50/-58	>-50/-58	>-50/-58	>-50/-58	-40.5/-41	-25.5/-8	+12/54
Pour Pt., °C/°F	D 97	-19/-2	>-50/-58	>-50/-58	>-50/-58	>-50/-58	-41/-42	-27.5/-18	+9/48
Aniline Pt., °C/°F	D 611	63.6/146	43.0/109	49.3/121	53.7/129	58.5/137	66.3/151	73.6/164	93.3/200
Smoke Point, mm	D 1322	20.4	19.5	19.8	19.3	18.1	18.5	19.3	NA

TABLE A11. COMPONENT HYDROCARBON COMPOSITION BY GC/MS

Hydrocarbon Type, Wt%/Vol%	SRD Feed 1627	SRD #1 1793	SRD #2/3/4 1794-96	SRD #5/6 1797/98	SRD #7 1799	SRD #8 1800	LCO Feed 1538	LCO #1/2 1555/56	LCO #3/4/5 1557-59	LCO #6 1560	LCO #7 1561
Paraffins	50.1/54.6	46.7/50.0	44.7/47.1	56.2/57.2	50.8/54.0	45.8/49.6	17.6/21.2	25.0/27.9	27.8/31.9	23.1/25.3	18.6/22.5
Monocycloparaffins	15.1/15.7	20.5/20.7	18.6/18.6	14.2/14.0	14.5/14.8	20.1/20.8	7.3/8.5	12.8/13.6	5.4/5.9	3.6/3.9	6.9/7.9
Dicycloparaffins	5.8/5.7	5.4/5.0	7.4/6.7	4.4/4.0	5.4/5.1	5.8/5.6	1.4/1.5	1.1/1.0	5.7/5.7	5.3/5.0	2.2/2.4
Tricycloparaffins	1.7/1.6	2.5/2.1	2.0/1.7	2.0/1.7	2.7/2.4	2.5/2.2	0/0	0/0	0.3/0.3	1.0/0.9	0.7/0.7
Alkylbenzenes	6.0/5.5	12.5/12.0	7.0/7.0	4.4/4.8	4.8/4.7	5.0/4.6	10.6/11.3	27.1/26.5	13.1/13.2	6.2/6.0	2.5/2.7
Indans/Tetralins	3.1/2.6	4.0/3.5	3.8/3.7	2.0/2.1	2.3/2.1	2.6/2.2	1.6/1.5	4.2/4.0	0/0	0/0	0.9/0.9
Indenes	3.7/3.0	0.6/0.5	4.5/4.2	3.5/3.4	3.1/2.6	2.9/2.3	1.8/1.6	2.5/2.3	1.9/1.7	0.3/0.3	0/0
Naphthalene	0.3/0.2	1.5/1.1	0.7/0.5	0.1/0.1	0/0	0/0	0.5/0.4	3.0/2.4	0.4/0.3	0.2/0.1	0/0
Naphthalenes, alkyl	7.1/5.6	5.5/4.5	8.0/7.4	5.7/5.5	4.4/3.8	4.0/3.2	31.2/28.0	22.1/20.1	28.0/24.9	11.2/10.5	14.0/12.7
Acenaphthenes	3.5/2.8	0.6/0.5	2.2/2.0	3.9/3.7	5.0/4.2	3.8/3.0	12.8/11.5	1.6/1.5	11.7/10.4	24.8/23.1	12.6/11.4
Acenaphthylenes	2.4/2.1	0.1/0.1	1.1/1.1	2.7/2.9	4.2/4.0	4.0/3.5	9.4/9.4	0.7/0.7	5.6/5.5	20.7/21.4	16.6/16.7
Tricyclic Aromatics	1.0/0.7	0/0	0/0	0.6/0.6	2.8/2.3	3.6/2.9	5.7/5.0	0/0	0/0	3.8/3.5	25.1/22.3
Total Saturates	72.8/77.5	75.1/77.8	72.7/74.2	76.8/77.0	73.4/76.4	74.2/78.2	26.4/31.2	38.9/42.5	39.3/43.9	33.0/35.2	28.3/33.4
Total Aromatics	27.2/22.5	24.9/22.2	27.3/25.8	23.2/23.0	26.6/23.6	25.8/21.8	73.6/68.8	61.1/57.5	60.7/56.1	67.0/64.8	71.7/66.6

TABLE A12. COMPONENT HYDROCARBON COMPOSITION BY GC/MS

Hydrocarbon Type, Wt%/Vol%	LoA SRD Feed 1873	LoA SRD #1 1876	LoA SRD #2 1877	LoA SRD #3 1878	LoA SRD #4 1879	LoA SRD #5 1880	LoA SRD #6 1881	LoA SRD #7 1882	LoA SRD #8 1883
Paraffins	57.2/60.2	23.3/25.0	37.7/40.2	40.7/44.0	49.3/53.2	59.4/62.6	64.6/67.6	62.6/65.5	60.9/63.9
Monocycloparaffins	16.9/16.8	38.8/39.1	32.1/32.2	20.4/20.9	18.6/18.8	16.4/16.4	21.0/20.5	21.2/20.8	23.7/23.2
Dicycloparaffins	11.3/10.3	0.8/0.8	14.8/13.6	16.8/15.7	12.4/11.7	8.8/8.1	4.7/4.5	6.6/6.0	7.2/6.5
Tricycloparaffins	6.2/5.2	0/0	2.2/1.8	5.5/4.8	4.9/4.3	5.1/4.3	3.1/2.7	3.7/3.1	3.3/2.8
Alkylbenzenes	4.5/4.1	37.1/35.1	7.6/7.3	7.3/6.7	6.6/5.7	4.8/4.4	3.2/2.5	2.9/2.4	2.3/1.9
Indans/Tetralins	2.3/2.0	0/0	5.3/4.7	7.7/6.5	5.5/4.2	2.2/1.8	1.1/0.7	0.8/0.5	0.7/0.5
Indenes	1.4/1.1	0/0	0.1/0.1	0.8/0.7	2.7/2.0	2.2/1.7	1.5/0.9	0.9/0.6	0.7/0.5
Naphthalene	0/0	0/0	0.1/0.1	0.2/0.2	0.0	0.2/0.1	0.1/0	0/0	0/0
Naphthalenes, alkyl	0.2/0.2	0/0	0.1/0.1	0.5/0.4	0.1/0	0.6/0.4	0.5/0.3	0.7/0.5	0.5/0.3
Acenaphthenes	0.1/0.1	0/0	0/0	0.1/0.1	0.1/0.1	0.2/0.2	0.2/0.1	0.4/0.3	0.4/0.3
Acenaphthylenes	0/0	0.0	0/0	0/0	0/0	0.1/0.1	0/0	0.1/0.1	0.1/0.1
Tricyclic Aromatics	0/0	0.0	0/0	0/0	0.0	0/0	0/0	0.0	0.1/0.1
Total Saturates	91.4/92.5	62.9/64.9	86.8/87.7	83.4/85.5	85.1/88.0	89.8/91.4	93.4/95.4	94.1/95.5	95.1/96.4
Total Aromatics	8.6/7.5	37.1/35.1	13.2/12.3	16.6/14.5	14.9/12.0	10.2/8.6	6.6/4.6	5.9/4.5	4.9/3.6

TABLE A13. COMPONENT HYDROCARBON COMPOSITION BY GC/MS

Hydrocarbon Type, Wt%/Vol%	LoS LCO Feed 1615	LoS LCO #1 1850	LoS LCO #2/3 1851/52	LoS LCO #4/5 1853/54	LoS LCO #6 1855	LoS LCO #7 1856	LoA LCO Feed 1562	LoA LCO #1/2 1566/67	LoA LCO #3/4 1568/69	LoA LCO #5/6 1570/71	LoA LCO #7 1572
Paraffins	27.8/31.5	22.5/24.9	28.0/31.0	28.7/30.5	29.1/33.5	29.3/32.6	23.0/25.2	4.1/4.2	13.5/14.9	30.9/34.1	55.1/57.8
Monocycloparaffins	11.1/11.9	17.7/18.2	10.9/11.5	9.3/9.4	8.5/9.3	7.5/8.0	30.3/31.6	54.6/57.3	42.3/43.8	16.2/16.8	20.2/20.0
Dicycloparaffins	3.0/2.9	5.2/4.9	4.1/3.9	2.2/2.0	2.5/2.5	3.5/3.5	22.6/21.6	31.9/31.0	24.4/23.3	16.0/15.3	8.6/7.8
Tricycloparaffins	0.0	0.1/0.1	0.4/0.3	0.1/0.1	0.1/0.1	1.5/1.4	14.1/12.3	0/0	8.9/7.9	26.6/23.6	8.0/6.8
Alkylbenzenes	18.5/18.4	31.5/30.4	22.7/21.9	13.7/13.0	6.6/6.6	2.4/2.4	4.7/4.6	7.0/5.6	5.2/5.1	3.8/3.9	2.4/2.3
Indans/Tetralins	7.5/6.9	15.4/14.7	13.4/12.7	4.5/4.6	0.2/0.2	2.6/2.6	3.7/3.3	2.3/1.7	4.7/4.2	3.2/3.1	1.1/1.1
Indenes	3.7/3.3	2.2/2.0	3.9/3.6	5.5/5.4	2.9/2.6	1.3/1.2	1.3/1.1	0/0	0.8/0.7	2.6/2.4	1.6/1.5
Naphthalene	0.8/0.6	0.1/0.1	0.1/0.1	0.6/0.5	0.1/0.1	0/0	0/0	0/0	0/0	0/0	0/0
Naphthalenes, alkyl	9.2/8.0	4.3/3.8	10.3/9.1	12.9/12.3	5.4/4.7	5.3/4.8	0.1/0.1	0/0	0/0	0.3/0.2	1.2/1.1
Acenaphthenes	9.4/8.1	0.9/0.8	4.8/4.3	14.5/13.9	21.3/18.6	12.5/11.3	0.1/0.1	0/0	0.1/0	0.4/0.3	0.9/0.8
Acenaphthylenes	6.4/6.2	0.1/0.1	1.2/1.2	7.7/8.1	17.5/16.9	14.9/15.0	0.1/0.1	0/0	0/0	0.2/0.2	0.7/0.7
Tricyclic Aromatics	2.5/2.1	0/0	0.2/0.2	0.1/0.1	5.7/4.9	19.3/17.2	0/0	0/0	0/0	0/0	0.2/0.2
Total Saturates	41.9/46.4	45.5/48.1	43.4/46.9	40.4/42.1	40.3/45.4	41.8/45.5	90.0/90.7	90.6/92.5	89.1/89.8	89.6/89.7	91.9/92.4
Total Aromatics	58.1/53.6	54.5/51.9	56.6/53.1	59.6/57.9	59.7/54.6	58.2/54.5	10.0/9.3	9.4/7.5	10.9/10.2	10.4/10.3	8.1/7.6

TABLE A14. COMPONENT HYDROCARBON COMPOSITION BY GC/MS

Hydrocarbon Type, Wt%/Vol%	LCGO Feed 1440	LCGO #1 1546	LCGO #2/3 1547/48	LCGO #4/5 1549/50	LCGO #6 1551	LoS LCGO Feed 1442	LoS LCGO #1/2 1862/63	LoS LCGO #3/4 1864/65	LoS LCGO #5 1866	LoS LCGO #6 1867
Paraffins	24.9/28.3	27.6/29.6	27.7/29.8	23.4/24.5	22.6/24.4	26.8/29.7	32.6/35.0	33.8/35.9	32.5/33.6	34.9/36.3
Monocycloparaffins	25.7/27.7	38.3/38.6	28.2/28.8	24.0/24.3	19.0/19.9	26.8/28.2	35.4/35.8	25.5/25.6	24.0/23.5	21.6/21.3
Dicycloparaffins	10.5/10.5	10.9/10.0	11.1/10.2	9.1/8.5	11.0/10.6	13.0/12.5	9.6/8.9	12.1/11.0	9.8/8.7	10.1/9.0
Tricycloparaffins	3.2/2.9	1.8/1.5	4.2/3.6	4.2/3.7	4.2/3.8	4.0/3.5	0.4/0.4	3.1/2.6	3.6/3.0	4.0/3.3
Alkylbenzenes	8.5/8.0	9.8/9.9	9.0/9.1	10.0/10.3	8.7/8.9	9.9/9.4	11.8/11.2	7.5/7.9	7.2/7.6	7.3/7.7
Indans/Tetralins	8.5/7.3	8.1/7.5	8.8/8.5	5.1/5.3	4.6/4.6	10.7/9.3	9.0/7.8	12.4/12.0	9.3/9.9	5.6/5.9
Indenes	6.4/5.2	1.2/1.1	6.1/5.6	8.8/8.6	4.8/4.5	6.0/5.0	0.3/0.2	4.0/3.7	8.4/8.5	7.0/7.0
Naphthalene	0.7/0.5	0.5/0.4	0.2/0.1	0.2/0.2	0/0	0/0	0.3/0.2	0/0	0.7/0.6	0.2/0.2
Naphthalenes, alkyl	5.1/4.1	0.8/0.7	3.4/3.1	6.9/6.6	7.4/6.8	1.6/1.3	0.5/0.4	1.2/1.1	2.6/2.6	3.3/3.2
Acenaphthenes	3.8/3.1	0.7/0.6	0.6/0.6	4.7/4.5	9.0/8.2	0.8/0.6	0/0	0.2/0.2	1.2/1.2	3.2/3.2
Acenaphthylenes	2.2/1.9	0.1/0.1	0.4/0.4	2.8/3.0	6.2/6.3	0.4/0.4	0/0	0/0	0.7/0.8	2.3/2.5
Tricyclic Aromatics	0.5/0.4	0/0	0.2/0.2	0.6/0.6	2.3/2.1	0.1/0.1	0/0	0.1/0	0/0	0.4/0.4
Total Saturates	64.3/69.5	78.7/79.7	71.2/72.4	60.7/61.0	56.9/58.6	70.5/74.0	78.1/80.1	74.5/75.0	69.9/68.8	70.6/69.9
Total Aromatics	35.7/30.5	21.3/20.3	28.8/27.6	39.3/39.0	43.1/41.4	29.5/26.0	21.9/19.9	25.5/25.0	30.1/31.2	29.4/30.1

TABLE A15. COMPONENT HYDROCARBON COMPOSITION BY GC/MS

Hydrocarbon Type, Wt%/Vol%	LoA LCGO Feed 1443	LoA LCGO #1/2 1597/98	LoA LCGO #3/4 1599/1600	LoA LCGO #5/6 1601/02	LoA LCGO #7 1603	FT Feed 1840	FT #1/2/3 1898-1900	FT #4/5/6 1901-03	FT #6 1903	FT #7 1904
Paraffins	32.5/35.0	26.6/28.6	31.9/34.3	36.9/39.6	43.7/46.4	89.5/90.7	94.8/95.2	83.3/84.2	89.3/90.4	88.1/89.5
Monocycloparaffins	35.3/36.5	49.6/50.4	40.0/40.7	29.2/29.6	29.0/28.3	7.3/6.9	4.3/4.1	14.0/13.4	8.5/8.0	9.7/9.0
Dicycloparaffins	13.9/13.4	13.3/12.4	14.0/13.2	15.0/13.9	14.6/13.6	0/0	0/0	1.9/1.7	1.0/0.8	0.3/0.2
Tricycloparaffins	3.1/2.8	0.7/0.6	3.1/2.7	8.4/7.2	6.3/5.4	0/0	0/0	0/0	0/0	0/0
Alkylbenzenes	8.8/7.7	6.5/5.5	5.1/4.5	3.9/3.8	2.6/2.3	2.7/2.1	0.7/0.6	0.5/0.5	0.7/0.5	1.6/1.1
Indans/Tetralins	4.1/2.9	3.0/2.2	4.4/3.5	3.2/2.9	0.9/0.7	0.1/0.0	0.2/0.1	0.1/0.1	0.1/0.1	0/0
Indenes	1.3/0.9	0.2/0.1	1.4/1.1	3.0/2.6	2.5/1.9	0.4/0.3	0/0	0/0	0.1/0	0.4/0.2
Naphthalene	0.1/0.1	0.1/0.1	0.1/0.1	0/0	0.5/0.3	0/0	0/0	0/0	0/0	0/0
Naphthalenes, alkyl	0.6/0.4	0/0	0/0	0.3/0.2	0/0	0/0	0/0	0/0	0/0	0/0
Acenaphthenes	0.1/0.1	0/0	0/0	0.2/0.2	0/0	0/0	0/0	0/0	0/0	0/0
Acenaphthylenes	0/0	0/0	0/0	0.1/0.1	0/0	0/0	0/0	0/0	0.3/0.2	0/0
Tricyclic Aromatics	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
Total Saturates	84.8/86.9	90.2/92.0	89.0/90.8	89.4/90.3	93.5/94.7	96.8/97.6	99.1/99.3	99.2/99.3	98.8/99.2	98.0/98.6
Total Aromatics	15.2/12.2	9.8/8.0	11.0/9.2	10.6/9.7	6.5/5.3	3.2/2.4	0.9/0.7	0.6/0.6	1.2/0.8	2.0/1.4

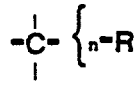
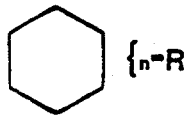
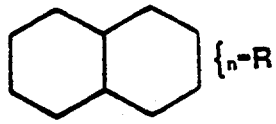
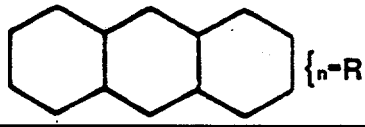
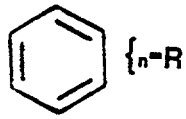
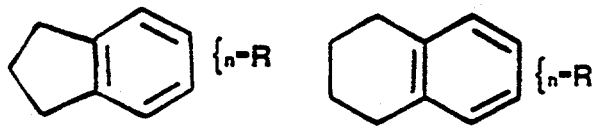
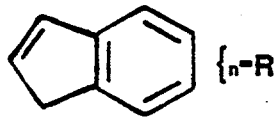
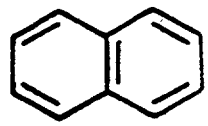
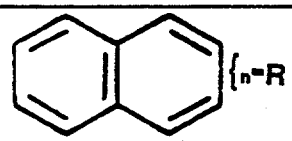
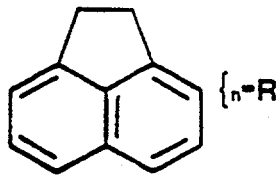
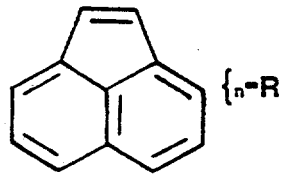
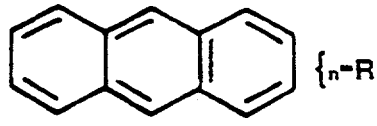
ASTM D2425 HYDROCARBON TYPE CLASSIFICATIONS	
HYDROCARBON TYPE	GENERAL STRUCTURES
Normal/Iso Paraffins	
Monocycloparaffins	
Dicycloparaffins	
Tricycloparaffins	
Alkyl Benzenes	
Indans/Tetralins	
Indenes	
Naphthalene	
Alkyl Naphthalenes	
Acenaphthenes	
Acenaphthylenes	
Tricyclic Aromatics	

TABLE A16. PROTON NMR CHEMICAL-SHIFT ASSIGNMENTS			
Proton Type	Abbreviated Symbol	Description	Chemical Shift Region (ppm, Δ)
1. Alkane methyl	CH_3	Terminal paraffin chain protons	0.5 - 1.05
2. Gamma methyl	CH_3	Terminal alkyl chain protons at least three carbons from an aromatic ring	0.5 - 1.05
3. Alkane methylene	CH_2	Mid-paraffin chain proton with no branching	1.05 - 1.4
4. Beta methyl	CH_2	Terminal alkyl proton exactly two carbons from an aromatic ring	1.05 - 1.4
5. Gamma methylene	CH_2	Mid-alkyl chain proton at least three carbons from an aromatic ring	1.05 - 1.4
6. Alkane methine	CH	Mid-chain proton with branching	1.4 - 2.0
7. Cycloalkane methylene	CH	Cycloalkane (naphthene) proton	1.4 - 2.0
8. Beta methylene	CH	Mid-alkyl chain proton exactly two carbons from an aromatic ring	1.4 - 2.0
9. Alpha methyl	ALP	Terminal alkyl chain on carbon adjacent to an aromatic ring	2.0 - 4.4
10. Alpha methylene	ALP	Alkyl chain proton on carbon adjacent to an aromatic ring	2.0 - 4.4
11. Alpha methine	ALP	Alkyl proton on carbon adjacent to an aromatic ring with branching	2.0 - 4.4
12. Aromatic	ARO (DI & MONO)	All aromatic ring protons on di- or mono-ring compounds	6.2 - 9.2

TABLE A17. PER CENT OF TOTAL PROTON RESONANCE INTENSITY FOR VARIOUS CHEMICAL-SHIFT RANGES					
	Chemical-Shift Ranges in ppm referred to TMS				
SAMPLE NO.	0.5-1.05	1.05-1.4	1.4-2.0	2.0-4.4	6.2-9.2*
1440-F	30.5	33.3	17.1	14.9	4.2
1442-F	33.0	38.2	15.4	9.5	3.9
1546-F	33.6	30.8	17.3	14.9	3.4
1538-F	11.9	27.4	5.8	29.8	25.1
1538	13.0	27.3	5.5	29.3	24.9
1546-F	33.3	31.4	17.7	14.1	3.5
1547-F	33.5	31.5	16.4	14.7	3.9
1548-F	31.6	33.2	16.2	14.5	4.5
1549-F	30.1	35.2	15.8	14.6	4.3
1550-F	29.8	35.6	15.7	14.3	4.6
1551-F	27.5	36.9	15.6	14.6	5.4
1569-F	36.9	32.4	25.0	4.0	1.7
1570-F	36.8	35.5	23.4	3.1	1.2
1571-F	35.0	39.9	20.8	3.3	1.0
1572-F	27.1	56.5	13.2	2.5	0.6
1603-F	39.9	46.2	12.7	0.4	0.8
1615-F	16.6	29.1	11.4	27.0	15.9
1627-F	27.9	53.9	8.8	4.9	4.5
1793-F	32.1	44.9	10.9	6.5	5.5
1794-F	31.7	45.6	10.3	6.6	5.8
1795-F	30.2	46.6	10.5	7.3	5.4
1796-F	29.2	49.1	9.7	7.0	5.0
1797-F	28.6	53.3	9.0	6.1	4.0
1798-F	27.6	55.5	8.4	5.1	3.4
1799-F	24.7	57.1	9.1	5.5	3.6
1800-F	23.4	55.9	10.6	6.2	3.8

* This range contains the resonance from the residual protons in the solvent $CDCl_3$ corresponding to approximately 0.3%.

TABLE A17. PER CENT OF TOTAL PROTON RESONANCE INTENSITY FOR VARIOUS CHEMICAL-SHIFT RANGES (Continued)

	Chemical-Shift Ranges in ppm referred to TMS				
1840-F	37.2	59.3	2.8	0.3	0.4
1850-F	18.8	24.3	13.9	27.7	15.3
1851-F	16.4	25.2	13.4	29.2	15.8
1852-F	15.4	26.7	12.8	28.9	16.1
1853-F	17.1	28.2	11.1	27.6	16.0
1854-F	14.3	30.0	10.3	28.1	17.3
1855-F	14.7	33.6	8.6	25.8	17.3
1856-F	14.8	41.7	8.3	20.2	15.0
1862-F	37.2	36.3	14.3	8.2	4.0
1863-F	36.7	36.9	14.6	8.0	3.8
1864-F	36.0	37.2	14.6	8.5	3.7
1865-F	35.3	37.6	14.2	8.9	4.0
1866-F	32.5	39.3	14.8	9.8	3.6
1867-F	32.3	41.5	13.9	8.7	3.6
1898-F	41.4	53.3	3.2	0.1	2.0
1899-F	38.6	56.8	3.4	0.4	0.8
1900-F	37.4	58.4	3.2	0.5	0.5
1901-F	36.2	60.3	2.4	0.0	1.1
1902-F	32.2	62.8	4.2	0.6	0.2
1903-F	33.4	63.1	2.5	0.3	0.7
1904-F	31.7	64.7	2.9	0.4	0.3
1443-F	33.3	38.8	20.5	6.0	1.3
1555-F	16.5	24.4	7.5	31.9	19.6
1556-F	15.7	26.1	6.1	28.6	23.5
1557-F	13.1	25.7	5.6	30.1	25.4
1558-F	12.6	25.4	5.0	31.6	25.5
1559-F	11.6	27.1	5.5	31.9	24.0

* This range contains the resonance from the residual protons in the solvent $CDCl_3$ corresponding to approximately 0.3%.

TABLE A17. PER CENT OF TOTAL PROTON RESONANCE INTENSITY FOR VARIOUS CHEMICAL-SHIFT RANGES (Continued)

	Chemical-Shift Ranges in ppm referred to TMS				
1560-F	13.2	29.4	5.5	29.1	22.8
1561-F	12.5	33.7	4.7	24.2	25.0
1562-F	35.9	35.0	23.9	3.7	1.5
1566-F	39.6	24.9	27.9	4.8	2.8
1567-F	41.9	25.4	27.9	3.1	1.7
1568-F	39.5	28.7	26.3	3.7	1.9
1597-F	43.8	33.3	17.5	3.3	2.2
1598-F	40.9	35.0	18.5	4.0	1.6
1599-F	40.3	36.7	17.8	3.9	1.3
1600-F	38.7	38.3	17.8	4.0	1.2
1601-F	41.5	39.7	15.2	2.2	1.3
1602-F	37.1	42.7	16.1	3.3	0.9
1873-F	31.0	52.1	12.5	2.9	1.5
1876-F	34.3	37.9	13.9	9.1	4.7
1877-F	34.9	39.8	17.1	5.3	2.9
1878-F	34.4	46.7	13.7	3.5	1.7
1879-F	34.5	41.4	16.9	4.9	2.4
1880-F	31.4	52.3	12.4	2.9	1.1
1881-F	30.5	57.6	9.6	1.6	0.7
1882-F	27.4	61.3	9.4	1.4	0.6
1883-F	27.9	59.9	10.3	1.2	0.7

* This range contains the resonance from the residual protons in the solvent $CDCl_3$ corresponding to approximately 0.3%.

TABLE A18. COMBUSTION ANALYSES FOR FISCHER-TROPSCH DIESEL (FT1)								
Properties	**FT 1 FEED 1840**	**FT1 #1 1898**	**FT1 #2 1899**	**FT1 #3 1900**	**FT1 #4 1901**	**FT1 #5 1902**	**FT1 #6 1903**	**FT1 #7 1904**
VCR Cetane No.	87.8	48.1	52.9	53.5	82.4	86.0	89.6	87.3
CVCA Cetane No.	64.8	51.2	60.1	66.0	72.1	71.1	82.3	87.3
M1 CO	6.29	6.15	5.67	4.68	4.97	5.87	4.32	5.83
M1 HC	2.45	3.40	2.12	1.92	1.83	2.06	1.98	2.44
M1 NOx	3.54	3.34	3.37	3.59	3.43	3.30	3.58	3.20
M1 Smoke	2.00	1.83	2.05	1.80	1.85	2.00	2.10	2.60
M2 CO	5.43	6.24	5.91	4.65	4.56	6.35	4.94	5.66
M2 HC	2.03	2.94	1.91	1.36	1.06	1.41	1.78	1.24
M2 NOx	3.53	3.49	3.35	3.51	3.57	3.18	3.32	3.27
M2 Smoke	2.00	2.30	2.00	1.85	1.90	2.00	2.30	2.00
M3 CO	5.50	7.25	6.42	6.60	5.26	6.55	4.82	6.17
M3 HC	1.55	2.27	1.74	1.71	1.35	1.33	1.43	1.87
M3 NOx	3.33	2.91	3.50	3.57	3.34	3.21	3.43	3.34
M3 Smoke	1.90	1.75	1.75	2.00	4.25	1.70	2.00	2.05
M4 CO	3.95	4.44	4.04	3.94	4.08	3.93	3.48	-
M4 HC	3.71	5.49	3.63	2.79	2.06	1.55	2.07	-
M4 NOx	2.97	4.35	3.77	3.75	3.61	3.97	3.36	-
M4 Smoke	0.90	0.80	1.00	1.00	0.90	1.20	1.25	-
M5 CO	4.95	4.60	4.15	4.54	4.35	4.89	4.56	-
M5 HC	7.21	6.92	5.72	3.28	1.45	1.52	2.30	-
M5 NOx	3.62	5.00	4.25	4.30	4.20	4.48	3.64	-
M5 Smoke	0.60	0.60	0.60	0.80	0.70	0.95	1.00	-

TABLE A19. COMBUSTION ANALYSES FOR STRAIGHT-RUN DIESEL									
Properties	**SRD Feed 1627**	**SRD #1 1793**	**SRD #2 1794**	**SRD #3 1975**	**SRD #4 1796**	**SRD #5 1797**	**SRD #6 1798**	**SRD #7 1799**	**SRD #8 1800**
VCR Cetane No.	58.5	40.3	40.5	43.5	60.7	63.3	63.3	69.4	-
CVCA Cetane No.	56.2	33.9	41.1	40.5	42.5	45.1	64.2	-	-
M1 CO	5.21	5.39	5.59	6.65	4.70	0.93	1.00	0.87	-
M1 HC	2.42	3.41	2.99	1.72	2.38	0.37	0.43	0.38	-
M1 NOx	3.48	3.49	3.78	3.87	3.90	5.29	5.62	5.67	-
M1 Smoke	2.30	2.50	2.80	2.50	2.03	3.70	2.65	2.40	-
M2 CO	5.01	6.27	-	5.50	5.20	0.89	1.01	0.82	-
M2 HC	2.01	3.11	-	1.31	1.65	0.47	0.59	0.34	-
M2 NOx	3.64	3.63	-	3.99	3.98	6.34	6.49	6.39	-
M2 Smoke	2.40	2.60	-	2.40	2.50	3.00	2.10	2.30	-
M3 CO	6.18	6.14	4.89	5.41	5.08	0.76	0.78	0.92	-
M3 HC	1.15	2.21	1.96	1.56	1.37	0.38	0.47	0.32	-
MC NOx	3.55	3.65	3.39	3.83	4.02	6.23	6.33	6.16	-
M3 Smoke	2.60	2.40	2.50	2.15	2.75	1.60	1.05	1.25	-
M4 CO	3.78	3.57	3.96	4.06	2.18	1.68	1.95	-	-
M4 HC	6.46	2.74	2.04	3.42	0.57	0.46	0.53	-	-
M4 NOx	4.45	3.62	4.91	4.23	6.14	5.30	5.26	-	-
M4 Smoke	1.30	1.60	1.00	1.50	1.60	1.25	1.25	-	-
M5 CO	5.19	5.73	5.35	5.34	5.36	3.77	4.15	-	-
M5 HC	7.01	6.27	3.45	3.80	2.71	0.85	0.95	-	-
M5 NOx	4.95	3.94	5.76	4.62	6.98	5.27	5.36	-	-
M5 Smoke	0.90	1.20	0.80	1.40	1.70	1.15	1.35	-	-

TABLE A20. COMBUSTION ANALYSES FOR LOW-AROMATICS STRAIGHT-RUN DIESEL									
Properties	**LoA SRD Feed 1873**	**LoA SRD #1 1876**	**LoA SRD #2 1877**	**LoA SRD #3 1878**	**LoA SRD #4 1879**	**LoA SRD #5 1880**	**LoA SRD #6 1881**	**LoA SRD #7 1882**	**LoA SRD #8 1883**
VCR Cetane No.	58.9	40.3	40.3	41.3	49.8	67.1	75.3	93.0	-
CVCA Cetane No.	61.3	23.1	31.7	38.6	44.3	48.8	64.2	79.1	-
M1 CO	7.37	3.18	5.69	5.26	5.57	5.43	4.70	2.17	-
M1 HC	2.14	8.75	3.45	3.39	1.08	1.99	1.03	0.80	-
M1 NOx	3.31	4.51	3.86	3.47	3.31	3.60	3.39	2.48	-
M1 Smoke	2.55	1.70	2.65	2.15	2.35	1.90	2.40	1.10	-
M2 CO	5.48	3.24	5.68	5.65	5.01	5.69	6.25	6.96	-
M2 HC	1.86	7.20	2.87	2.38	1.28	1.31	1.24	1.37	-
M2 NOx	3.50	5.40	3.38	3.76	3.55	3.49	3.26	3.39	-
M2 Smoke	2.60	1.80	2.50	2.35	2.35	1.95	2.20	2.35	-
M3 CO	5.01	-	4.78	4.91	5.23	5.67	4.40	5.68	-
M3 HC	1.70	-	1.95	1.96	1.33	1.02	1.36	1.27	-
MC NOx	3.57	-	3.75	3.79	3.52	3.62	3.70	3.59	-
M3 Smoke	2.30	-	2.15	2.10	2.15	2.00	1.80	2.00	-
M4 CO	-	-	4.02	3.73	3.99	3.54	3.56	-	-
M4 HC	-	-	4.52	2.44	1.15	1.78	1.66	-	-
M4 NOx	-	-	4.42	4.45	4.17	4.20	4.05	-	-
M4 Smoke	-	0.95	1.20	1.00	0.90	1.10	1.00	-	-
M5 CO	-	-	4.77	4.86	4.74	4.59	4.47	-	-
M5 HC	-	-	5.31	1.33	1.50	1.70	1.79	-	-
M5 NOx	-	-	5.14	4.74	4.48	4.64	4.40	-	-
M5 Smoke	-	0.80	1.80	0.85	0.80	0.90	0.80	-	-

TABLE A21. COMBUSTION ANALYSES FOR LIGHT-COKER GAS OIL							
Properties	**LCGO Feed 1440**	**LCGO #1 1546**	**LCGO #2 1547**	**LCGO #3 1548**	**LCGO #4 1549**	**LCGO #5 1550**	**LCGO #6 1551**
VCR Cetane No.	44.3	31.8	34.8	33.1	35.5	34.2	37.6
CVCA Cetane No.	29.0	25.6	27.9	30.1	29.1	32.8	31.7
M1 CO	7.97	5.43	4.55	6.11	4.89	5.60	5.80
M1 HC	3.63	2.60	3.18	1.88	0.98	1.52	1.23
M1 NOx	3.82	3.71	3.97	4.04	3.89	3.89	4.05
M1 Smoke	2.10	2.10	2.35	2.50	2.10	2.30	1.80
M2 CO	6.41	5.17	4.26	5.84	4.38	5.98	4.94
M2 HC	2.18	3.01	2.67	2.31	0.91	1.55	1.18
M2 NOx	4.78	4.12	4.35	4.40	4.18	4.10	4.36
M2 Smoke	2.20	2.50	2.20	2.50	2.35	2.40	1.90
M3 CO	5.80	7.32	5.65	4.63	4.87	4.50	5.17
M3 HC	1.07	2.36	2.09	1.71	1.02	1.50	1.17
MC NOx	3.91	3.76	4.11	3.95	3.83	3.82	3.98
M3 Smoke	1.80	2.40	2.45	2.20	2.20	2.20	2.80
M4 CO	3.30	4.73	4.00	3.83	3.51	3.74	-
M4 HC	2.86	7.30	5.95	3.27	1.85	1.22	-
M4 NOx	4.95	4.26	5.20	4.36	4.37	4.25	-
M4 Smoke	0.50	1.10	1.15	1.10	1.45	1.35	-
M5 CO	7.59	6.15	6.73	6.62	6.04	8.96	-
M5 HC	13.73	7.22	6.31	2.58	3.55	2.10	-
M5 NOx	6.22	6.09	5.30	5.59	5.29	5.46	-
M5 Smoke	0.80	0.40	0.90	1.00	1.40	1.60	-

TABLE A22. COMBUSTION ANALYSES FOR LOW-SULFUR LIGHT-COKER GAS OIL							
Properties	**LoS LCGO Feed 1442**	**LoS LCGO #1 1862**	**LoS LCGO #2 1863**	**LoS LCGO #3 1864**	**LoS LCGO #4 1865**	**LoS LCGO #5 1866**	**LoS LCGO #6 1867**
VCR Cetane No.	38.1	31.9	34.6	34.8	47.0	39.5	41.1
CVCA Cetane No.	33.3	28.2	29.5	29.2	30.4	33.7	37.8
M1 CO	5.72	5.48	5.13	4.55	7.05	4.13	5.36
M1 HC	1.79	3.74	2.29	1.76	2.14	1.08	1.69
M1 NOx	3.74	3.86	3.76	3.73	3.38	4.00	3.90
M1 Smoke	2.15	2.40	2.10	2.05	2.70	2.20	2.40
M2 CO	4.95	6.28	5.12	4.47	6.70	4.60	6.02
M2 HC	1.31	4.71	2.13	1.72	1.50	0.72	1.58
M2 NOx	4.15	4.45	4.08	4.16	3.93	4.07	3.71
M2 Smoke	2.30	2.10	2.20	2.00	2.85	2.10	2.10
M3 CO	4.32	5.73	4.55	4.57	6.14	4.16	5.14
M3 HC	1.51	2.30	1.73	1.58	1.25	0.97	1.63
MC NOx	3.71	3.36	3.84	3.74	3.70	3.80	3.69
M3 Smoke	1.95	2.15	2.15	2.00	2.65	2.15	2.50
M4 CO	3.92	3.54	3.34	3.90	3.16	3.42	-
M4 HC	6.09	3.97	3.85	2.34	1.09	1.51	-
M4 NOx	3.79	4.66	4.44	4.39	4.54	3.72	-
M4 Smoke	1.40	1.20	1.25	1.30	1.10	1.60	-
M5 CO	5.66	5.47	4.95	5.27	4.68	5.68	-
M5 HC	7.37	6.94	4.98	4.73	1.18	3.07	-
M5 NOx	4.55	5.51	5.09	4.69	5.22	3.85	-
M5 Smoke	1.30	0.80	0.75	1.00	0.80	1.30	-

TABLE A23. COMBUSTION ANALYSES FOR LOW-AROMATICS LIGHT-COKER GAS OIL								
Properties	**LoA LCGO Feed 1443**	**LoA LCGo #1 1597**	**LoA LCGO #2 1598**	**LoA LCGO #3 1599**	**LoA LCGO #4 1600**	**LoA LCGO #5 1601**	**LoA LCGO #6 1602**	**LoA LCGO #7 1603**
VCR Cetane No.	46.7	34.8	37.4	39.5	42.4	47.7	53.9	65.1
CVCA Cetane No.	37.7	28.2	30.5	31.7	33.7	39.0	44.1	54.9
M1 CO	4.59	4.49	4.52	4.79	5.95	5.67	5.75	5.27
M1 HC	2.78	4.38	2.33	2.44	1.94	1.49	1.40	1.32
M1 NOx	3.77	4.00	3.48	3.89	3.39	3.66	3.47	3.68
M1 Smoke	2.30	1.90	2.40	2.10	2.25	2.30	2.70	2.50
M2 CO	4.59	5.27	5.96	4.42	5.78	5.72	6.99	5.62
M2 HC	2.78	4.51	3.81	2.27	1.17	0.95	1.47	1.51
M2 NOx	3.77	4.43	3.89	3.78	3.58	3.83	3.54	3.63
M2 Smoke	2.30	2.10	2.40	2.10	2.25	2.25	2.10	2.20
M3 CO	5.54	6.10	6.29	5.77	4.59	4.49	5.08	5.04
M3 HC	1.81	2.36	1.68	2.50	1.46	0.92	1.31	1.09
MC NOx	3.78	3.76	3.36	4.79	3.51	3.57	3.31	3.53
M3 Smoke	2.30	2.25	2.90	2.00	2.10	2.10	3.10	2.40
M4 CO	3.80	3.84	3.86	3.21	3.44	3.58	3.70	-
M4 HC	6.89	4.88	5.17	1.76	1.86	1.91	1.33	-
M4 NOx	4.73	3.77	4.43	4.38	4.06	3.28	4.26	-
M4 Smoke	1.85	1.30	0.95	1.00	1.20	1.60	1.10	-
M5 CO	4.90	4.82	4.50	4.69	4.28	5.23	4.97	-
M5 HC	7.07	6.23	6.02	2.48	1.50	3.17	1.67	-
M5 NOx	5.14	4.36	4.79	4.95	4.46	3.48	4.52	-
M5 Smoke	2.55	1.00	0.75	0.70	0.80	1.05	1.10	-

TABLE A24. COMBUSTION ANALYSES FOR LIGHT-CYCLE OIL								
Properties	**LCO Feed 1538**	**LCO #1 1555**	**LCO #2 1556**	**LCO #3 1557**	**LCO #4 1558**	**LCO #5 1559**	**LCO #6 1560**	**LCO #7 1561**
VCR Cetane No.	23.4	19.7	20.8	-	19.9	20.4	22.9	22.5
CVCA Cetane No.	15.5	15.2	17.0	-	13.9	15.6	16.3	19.1
M1 CO	-	-	-	-	-	-	6.38	9.56
M1 HC	-	-	-	-	-	-	0.87	1.92
M1 NOx	-	-	-	-	-	-	9.49	8.18
M1 Smoke	-	-	-	-	-	-	1.70	9.00
M2 CO	4.69	3.96	3.70	-	-	4.72	4.23	4.09
M2 HC	1.75	3.62	3.04	-	-	0.47	0.63	0.67
M2 NOx	13.43	13.72	14.08	-	-	14.16	11.23	11.08
M2 Smoke	2.95	1.80	2.10	-	-	1.80	1.70	4.00
M3 CO	-	-	-	-	-	-	1.89	-
M3 HC	-	-	-	-	-	-	0.55	-
MC NOx	-	-	-	-	-	-	8.89	-
M3 Smoke	-	-	-	-	-	-	0.85	-
M4 CO	-	-	-	-	-	-	-	-
M4 HC	-	-	-	-	-	-	-	-
M4 NOx	-	-	-	-	-	-	-	-
M4 Smoke	-	-	-	-	-	-	-	-
M5 CO	-	-	-	-	-	-	-	-
M5 HC	-	-	-	-	-	-	-	-
M5 NOx	-	-	-	-	-	-	-	-
M5 Smoke	-	-	-	-	-	-	-	-

TABLE A25. COMBUSTION ANALYSES LOW-SULFUR LIGHT-CYCLE OIL								
Properties	**LoS LCO Feed 1615**	**LoS LCO #1 1850**	**LoS LCO #2 1851**	**LoS LCO #3 1852**	**LoS LCO #4 1853**	**LoS LCO #5 1854**	**LoS LCO #6 1855**	**LoS LCO #7 1856**
VCR Cetane No.	23.4	29.8	21.6	22.5	22.7	23.9	27.4	35.0
CVCA Cetane No.	17.9	14.0	15.4	15.7	17.3	18.6	19.9	-
M1 CO	7.73	-	-	4.47	5.74	2.84	1.81	1.79
M1 HC	2.30	-	-	1.31	1.71	0.47	0.32	0.71
M1 NOx	5.53	-	-	6.64	6.40	8.60	7.93	6.66
M1 Smoke	2.70	-	-	1.60	2.23	1.90	1.45	2.50
M2 CO	4.66	5.07	4.06	6.24	5.25	1.93	1.67	1.90
M2 HC	1.51	3.22	2.57	2.76	1.31	0.63	0.28	0.47
M2 NOx	6.83	12.52	12.60	7.90	8.05	10.83	9.62	8.15
M2 Smoke	1.85	2.20	1.70	2.20	2.20	1.80	2.00	1.90
M3 CO	5.81	-	-	4.92	4.85	1.39	1.39	1.13
M3 HC	1.57	-	-	1.12	2.13	0.29	0.29	0.33
MC NOx	4.45	-	-	4.67	4.92	7.68	7.72	7.49
M3 Smoke	2.64	-	-	2.60	2.40	1.15	1.25	0.85
M4 CO	12.29	-	-	21.47	14.00	8.78	5.09	3.82
M4 HC	5.50	-	-	6.31	4.27	1.05	0.77	0.92
M4 NOx	6.82	-	-	7.34	8.60	8.39	8.22	6.82
M4 Smoke	0.30	-	-	0.35	0.33	0.75	0.95	1.05
M5 CO	-	-	-	-	-	-	8.77	-
M5 HC	-	-	-	-	-	-	1.50	-
M5 NOx	-	-	-	-	-	-	6.91	-
M5 Smoke	-	-	-	-	-	0.95	0.85	-

TABLE A 26. COMBUSTION ANALYSIS FOR LOW-AROMATICS LIGHT-CYCLE OIL								
Properties	**LoA LCO Feed 1562**	**LoA LCO #1 1566**	**LoA LCO #2 1567**	**LoA LCO #3 1568**	**LoA LCO #4 1569**	**LoA LCO #5 1570**	**LoA LCO #6 1571**	**LoA LCO #7 1572**
VCR Cetane No.	41.9	30.4	34.8	35.6	39.3	42.7	49.1	75.3
CVCA Cetane No.	38.4	22.4	24.5	30.1	31.4	39.6	42.1	77.2
M1 CO	1.16	4.40	1.42	1.14	1.21	0.95	5.30	2.48
M1 HC	0.87	3.65	2.97	2.65	0.53	0.44	1.66	2.93
M1 NOx	5.54	3.62	5.83	6.05	5.94	5.79	3.66	2.01
M1 Smoke	2.10	2.20	1.90	2.10	2.50	1.70	2.40	1.20
M2 CO	1.07	4.25	1.46	1.20	1.14	0.91	5.13	5.35
M2 HC	2.17	4.47	3.23	2.99	2.58	0.53	1.45	1.48
M2 NOx	6.86	4.28	7.41	7.15	7.05	6.64	3.97	3.45
M2 Smoke	1.90	2.20	2.10	2.10	2.10	2.10	2.40	2.50
M3 CO	0.97	6.21	1.05	0.88	0.90	0.83	5.05	6.27
M3 HC	0.81	2.28	1.85	1.62	0.39	0.62	1.34	1.16
MC NOx	5.76	3.56	6.36	6.41	6.13	6.27	3.30	3.29
M3 Smoke	1.45	6.00	1.05	0.85	0.95	1.25	2.20	4.50
M4 CO	2.10	4.03	2.28	2.22	2.17	2.51	4.06	3.16
M4 HC	2.33	6.59	4.58	4.20	2.52	0.96	2.82	1.10
M4 NOx	5.57	4.08	6.00	5.56	5.70	5.50	3.79	4.03
M4 Smoke	0.85	1.60	1.05	1.05	0.85	1.45	1.25	1.60
M5 CO	5.16	7.95	5.33	4.80	5.30	4.42	4.79	-
M5 HC	6.08	9.10	6.57	3.12	0.94	3.66	1.61	-
M5 NOx	4.20	8.17	6.23	5.76	5.96	3.40	4.51	-
M5 Smoke	1.20	0.85	0.85	0.85	0.85	1.10	1.40	-