

Appendix C

Miscellaneous Laboratory Analysis

Blend Study: Lab Analysis of Blend Components

1. Straight-run Condensate Material Properties
2. Fischer-Tropsch C₅/C₈ Oligomerized Products
3. Hydrocracked Wax Analysis
4. LCOs

Blend Study/Economic Evaluation: NHT/CCR Platforming Estimate

5. IBP-350°F Fraction Analyses
 - From Hot + Cold Condensate
 - From Hydrocracked Distillate

Table C.1

Fischer-Tropsch Condensate Analysis

<u>Fraction</u>	<u>Total</u>	<u>IBP-350</u>	<u>350-400</u>	<u>400-450</u>	<u>450-500</u>	<u>500-650</u>	<u>650-700</u>
API	48.3	62.8	56.7	54.0	51.7	48.5	27.4
Flash Pt., °F	102	< 37	132	168	208	265	345
Pour Pt., °F	+80	< -70	-35	-10	+20	+ 60	+125
Freeze Pt., °F		----	-30	- 3	+25	+ 65	----
Smoke Pt., mm	> 50	> 50	> 50	> 50	> 50	> 50	> 50
Viscosity, cSt, @ 100°F		0.572	1.19	1.56	2.13	3.54	8.52
Wt. Fraction		0.16	0.06	0.07	0.12	0.25	0.34

Table C.2

Fischer-Tropsch C₅/C₆ Oligomerized Products

<u>Fraction</u>	<u>IBP-356°F</u>	<u>356°-EP</u>
API	79.5	44.6
Distillation, °F		
IBP		392
5%		405
10%		414
30%		441
50%		491
70%		565
90%		676
95%		712
EP		723
Flash Pt., °F		160
Pour Pt., °F		-60
Viscosity, cSt,		
@ 100°F		3.50
@ 122°F		2.70
Weight Fraction	0.65	0.35

Table C.3
Hydrocracked Wax Analysis

<u>Fraction</u>	<u>Total</u>	<u>IBP-350°F</u>	<u>350-400</u>	<u>400-450</u>	<u>450-500</u>	<u>500-650</u>	<u>650-700</u>
API	48.4	71.5	56.6	53.7	51.4	48.2	44.3
Flash Pt., °F	135	< 37	136	174	210	260	360
Pour Pt., °F	+10	<-70	<-70	<-70	-35	-10	+15
Freeze Pt., °F		<-65	<-65				>+68
Smoke Pt., mm	> 50	> 50	> 50	>50	>50	>50	> 50
Viscosity, cSt, @ 100°F	3.58	0.572	1.13	1.55	2.09	3.59	8.52
Cetane No.	74						
Wt. Fraction		0.26	0.06	0.07	0.06	0.20	0.35

Table C.4
Refinery Light Cycle Oil Analysis

	<u>LCO 1</u>	<u>LCO 2</u>	<u>LCO 3</u>
API	21.1	16.1	14.1
Distillation, °F			
IBP	437	435	477
5%	489	482	498
10%	504	496	513
30%	550	534	554
50%	572	559	592
70%	601	595	637
90%	640	644	687
95%	662	660	702
EP	689	693	723
Cetane Number	27	21	17
Aromatics, wt-%	63.8	72.6	79.1
Paraffins/Naphthenes, wt-%	36.2	20.6	18.2
Olefins, wt-%	----	6.8	2.7
Freeze Pt., °F	+24	+29	+17
Pour Pt., °F	+10	0	-25
Flash Pt., °F	163	204	191
Smoke Pt., mm	6	5	4
Viscosity, cSt, @ 100°F	3.343	3.932	3.226

Table C.5
IBP-350°F Fraction Analyses

<u>Sample</u>	<u>Hot & Cold F-T Condensate</u>	<u>Hydrocracked Distillate</u>
Flow Rate, MTD	283.2	864.3
Specific Gravity	0.7283	0.7026
<u>Distillation, °F</u>		
IBP	158	117
10%	223	154
30%	253	199
50%	271	237
70%	293	284
90%	316	329
95%	338	349
EP	358	387
P vol-%	61	93.0
O vol-%	39	1.0
N vol-%	--	5.0
A vol-%	--	1.0
Nitrogen wt-ppm	1.6	0.14
Sulfur wt-ppm	1.6	3.4
Diene value	20.6	
Bromine Number	45.4	
O, wt-% *	2 (max)	

* Estimate

Table C.6
Chromatographic Analysis, LV-%
(UOP Test Method)

<u>Sample</u>	<u>Hot & Cold F-T Condensate IBP-350°F</u>	<u>Hydrocracked Distillate IBP-350°F</u>
<u>Aromatics</u>		
Benzene		0.1
Toluene		0.1
Ethylbenzene		
p-Xylene		
m-Xylene		0.4
o-Xylene		
C ₉ + Aromatics		0.7
Total A	tr	1.3
<u>Olefins (Total)</u>	39.1	0.2
<u>Paraffins + Naphthenes</u>		
1. Propane		
2. Isobutane		
3. n-Butane		0.1
4. Isopentane		6.1
5. n-Pentane	0.5	5.1
6. Cyclopentane		
7. 2,2-Dimethylbutane		0.1
8. 2,3-Dimethylbutane		0.6
9. 2-Methylpentane	0.1	4.7
10. 3-Methylpentane	0.1	3.2
11. n-Hexane	2.8	5.6
12. 2,2-Dimethylpentane		0.2
13. Methylcyclopentane		0.4
14. 2,4-Dimethylpentane		0.4
15. 2,2,3-Trimethylbutane		
16. 3,3-Dimethylpentane		0.1
17. Cyclohexane		0.1
18. 2-Methylhexane	0.2	4.1
19. 2,3-Dimethylpentane		0.7
20. 1,1-Dimethylcyclopentane		
21. 3-Methylhexane	0.2	4.2
22. 1-cis-3-Dimethylcyclopentane		0.2
23. 1-trans-3-Dimethylcyclopentane		0.1
24. 3-Ethylpentane		0.3

Table C.6
Chromatographic Analysis, LV-%
(UOP Test Method)
(Continued)

Sample	Hot & Cold F-T Condensate IBP-350°F	Hydrocracked Distillate IBP-350°F
<u>Aromatics</u>		
25. 1-trans-2-Dimethylcyclopentane		0.1
26. 2,2,4-Trimethylpentane		
27. n-Heptane	B.2	5.1
28. Methylcyclohexane		0.4
1-cis-2-Dimethylcyclopentane }		0.3
29. 1,1,3-Trimethylcyclopentane, }		
2,2-Dimethylhexane }		
30. Ethylcyclopentane		0.1
31. 2,5-Dimethylhexane		0.6
32. 2,2,3-Trimethylpentane }		0.7
2,4-Dimethylhexane }		
33. 1-trans-2-cis-4-Trimethylcyclopentane		0.1
34. 3,3-Dimethylhexane		0.1
35. 1-trans-2-cis-3-Trimethylcyclopentane		0.1
36. 2,3,4-Trimethylpentane		
37. 2,3,3-Trimethylpentane		
38. 2,3-Dimethylhexane		0.5
1,1,2-Trimethylcyclopentane }		
39. 2-Methyl-3-Ethylpentane		0.1
40. 2-Methylheptane	0.2	3.5
41. 4-Methylheptane	0.1	1.4
42. 3,4-Dimethylhexane }		0.2
3-Methyl-3-Ethylpentane }		
43. 1-cis-2-trans-4-Trimethylcyclopentane, }		0.1
1-cis-2-cis-4-Trimethylcyclopentane }		
44. 3-Methylheptane	0.4	3.6
45. 3-Ethylhexane		0.8
1-cis-3-Dimethylcyclohexane }		
46. 1-cis-2-trans-3-Trimethylcyclopentane, }		
1-trans-4-Dimethylcyclohexane }		
47. 1,1-Dimethylcyclohexane		
48. 1-Methyl-trans-3-Ethylcyclopentane		0.1
49. 1-Methyl-cis-3-Ethylcyclopentane		0.1
50. 1-Methyl-trans-2-Ethylcyclopentane		0.1
51. 1-Methyl-1-Ethylcyclopentane		
52. 1-trans-2-Dimethylcyclohexane		0.1
53. 1-cis-2-cis-3-Trimethylcyclopentane		

Table C.6
Chromatographic Analysis, LV-%
(UOP Test Method)
(Continued)

<u>Sample</u>	<u>Hot & Cold F-T Condensate IBP-350°F</u>	<u>Hydrocracked Distillate IBP-350°F</u>
54. <u>n</u> -Octane		
1-cis-4-Dimethylcyclohexane }		
1-trans-3-Dimethylcyclohexane }	14.5	4.6
55. Isopropylcyclopentane		0.1
56. 1-Methyl-cis-2-Ethylcyclopentane		
57. 1-cis-2-Dimethylcyclohexane		0.5
58. Ethylcyclohexane		0.2
<u>n</u> -Propylcyclopentane }		60.0
C ₇ Naphthenes	0.1	
C ₈ Naphthenes	0.1	
C ₉ Naphthenes	0.1	1.2
C ₉ Paraffins	19.9	16.0
C ₁₀ Naphthenes	0.1	0.2
C ₁₀ Paraffins	12.5	14.4
C ₁₁ Naphthenes		0.3
C ₁₁ Paraffins	0.7	4.4
C ₁₂ Naphthenes }	0.1	
C ₁₂ Paraffins }		2.0
Total P + N	60.9	98.5

Table C.6
Gas Chromatography Analysis
1BP-350°F Hot & Cold F-T Condensate

Analysis of Olefin Cut After Hydrogenation, LV-%

C ₂	
C ₃	
C ₄	tr
C ₅ Naphthene	
C ₅ Paraffins	0.6
C ₆ Naphthenes	tr
C ₆ Paraffins	2.4
C ₇ Naphthenes	0.1
C ₇ Paraffins	5.9
C ₈ Naphthenes	0.1
C ₈ Paraffins	9.7
C ₉ Naphthenes	0.1
C ₉ Paraffins	11.9
C ₁₀ Naphthenes	0.1
C ₁₀ Paraffins	7.7
C ₁₁ Naphthenes	---
C ₁₁ Paraffins	0.5
C ₁₂ Naphthenes	tr
C ₁₂ Paraffins	---
Total	39.1