PROCESS STUDY REPORT
TALARA REFINERY MODIFICATIONS PROJECT

FEASIBILITY STUDY
FINAL REPORT

PETROPERU

Volume 2 of 2

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FOSTER WHEELER USA CORPORATION

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APPENDIX A.1 – CRUDE OIL DATA

This appendix contains the crude oil assays used for the study.

A.1.1 CUISIANA

A.1.2 LORETO

A.1.3 MAYNA

A.1.4 MESA

A.1.5 ORIENTE

A.1.6 ONO MIX

A.1.7 PETROTECH

A.1.8 PEREZ COMPANC

A.1.9 CRUDO COMPOSITO VARIOS

SOURCE OF SAMPLE		CRUDE DATA		ASSAY SUMMARY/TBP DATA		
Reference	A05498	Gravity	39.4	Yield on Crude	%wt	%vol
		Light Hydrocarbon Analysis		Gas to C4 (corrected)	2.2	2.75
				Light Distillate to 300 F (API)	22.25	25.4
				Kerosine 300 - 450 F	16.45	16.95
Field	CUSIANA	H2S ppm wt	0.50	Gas oil 450 - 648 F	24.6	23.65
		Methane %wt	-	Residue above 648 F	34.5	31.25
		Ethane %wt	0.03			
		Propane %wt	0.45	Gas to C4 (corrected)	2.2	2.75
Export Terminal	COVENAS	Isobutane %wt	0.54			
		n-Butane %wt	1.18	Total to 203 F (API)	11.85	14.4
				300 F	24.45	28.15
Source	SAMPLE TAKEN DIRECTLY FROM STORAGE TANK			347 F	29.9	33.85
		Total C1 - C4	2.20	450 F	40.9	45.1
				648 F	65.5	68.75
				696 F	70.7	73.6
		Isopentane %wt	1.44	948 F	90.7	92.05
Sample Date	31-Ago-98	n-Pentane %wt	1.39	1022 F	93.45	94.5
Date Rec'd	17-Sep-98			Volume expansion of 0.50 per cent vol on crude subtracted from the gas yield		

		API	75.35	52.72	65.56	44.76	32.96	28.35	26.41	19.69
			DISTILLATES							
TBP cut point F API		Total Crude	C5-203	203-347	C5-300	300-450	450-648	648-696	696-948	948-1022
Yield on crude	%wt	100.0	9.65	18.05	22.25	16.45	24.6	5.2	20.0	2.75
Yield on crude	%vol	100.0	11.65	19.45	25.4	16.95	23.65	4.85	18.45	2.45
Density at 59 F	kg/litre	0.8275	0.6841	0.7681	0.7254	0.8028	0.8604	0.8852	0.8961	0.9362
Sulphur	%wt	0.17	< 0.001	< 0.001	< 0.001	< 0.001	0.098	0.31	0.34	0.52
Mercaptan sulphur	%wt	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	-	-	-	-
Viscosity at 68 F	cSt	-	-	-	-	-	-	-	-	-
86 F		3.23	-	-	-	-	-	-	-	-
104 F		2.58	-	-	-	1.10	-	-	-	-
122 F		2.12	-	-	-	-	2.91	7.94	-	-
140 F		-	-	-	-	0.87	-	-	17.14	141.5
212 F		-	-	-	-	-	1.34	2.69	5.83	25.0
Cloud point	F	-	-	-	-	-	7	63	-	-
Pour point	F	32-44	-	-	-	-	5	59	108	-
Wax	%wt	-	-	-	-	-	3.0	22.5	30.5	20.9
Total nitrogen	ppm wt	-	-	-	-	-	50	270	640	1400
Basic nitrogen	ppm wt	-	-	-	-	-	-	-	160	300
Organic oxygen	%wt	-	-	-	-	-	-	-	0.15	-
Acidity	mgKOH/g	< 0.05	-	-	-	0.006	0.02	0.02	0.01	0.01
Carbon residue	%wt	0.85(C)	-	-	-	-	-	-	0.01	1.6
Asphaltanes	%wt	0.09(C)	-	-	-	-	-	-	-	-
Vanadium	ppm wt	< 2	-	-	-	-	-	-	-	-
Nickel	ppm wt	< 2	-	-	-	-	-	-	-	-
Arsenic	ppb wt	12.00	-	-	-	-	-	-	-	-
Cadmium	ppb wt	<19.00	-	-	-	-	-	-	-	-
Copper	ppb wt	88.00	-	-	-	-	-	-	-	-
Lead	ppb wt	<4	-	-	-	-	-	-	-	-
Mercury	ppb wt	24.00	-	-	-	-	-	-	-	-
Aromatics	%vol	-	-	-	-	19.6	22.0*	-	-	-
Smoke point	mm	-	-	-	-	22	16	-	-	-
Freezing point	F	-	-	-	-	-78	16	-	-	-
Aniline point	F	-	-	-	-	129.2	155.3	178.0	208.8	214.5
Cetane Index ASTM D976/IP380		-	-	-	-	37.5/40.0	46.2/48.7	47.5/-	-	-
Refractive index at 158 F		-	-	-	-	-	-	1.4710	1.4771	1.5024
Hydrogen content	%wt	-	-	-	-	13.8	-			
Paraffins	%wt	-	74.1	44.3	57.1	-	-			
Naphthanes	%wt	-	21.8	32.8	28.9	-	-			
Aromatics	%wt	-	4.1	22.9	14.0	-	24.3*			
n-Paraffins	%wt	-	30.6	17.1	23.2	-	-			
Colour stability		-	-	-	-	Stable	Stable			
Naphthalenes	%vol	-	-	-	-	1.61	10.72			
Salt	lb/1000bbl	6.0	-	-	-	-	-			
Water	%vol	0.15	-	-	-	-	-			
Research Octane Number		-	71.4	-	-	-	-			

*232 - 342 Aromatics

	%wt	/%vol
1 ring	11.6	/11.4
2 ring	11.6	/ 9.8
3 ring	1.1	/ 0.8

696 - 948 DWO

Density at 59F	kg/l	0.9306
Viscosity at 104F	cSt	91.17
140F	cSt	32.10
212F	cSt	8.15
Viscosity index		29
Pour point	F	- 6

Table 1

CUSIANA Crude Oil
Properties of Residues

		RESIDUES			
TBP Cut point (API)	F	648 (C)	696	948	1022
Yield on crude oil	%wt	34.5	29.3	9.3	6.55
Yield on crude oil	%vol	31.25	26.4	7.95	5.5
Density at 59F	kg/litre	0.913	0.918	0.969	0.9835
Sulphur	%wt	0.44	0.46	0.72	0.80
Viscosity at 122F	cSt	47.3	(72.5)	-	-
140F	cSt	-	(45.6)	-	-
176F	cSt	-	21.3	-	-
212F	cSt	-	11.75	116.5	258
248F	cSt	-	7.28	52.6	102.5
302F	cSt	-	-	21.1	35.8
Penetration at 77F	mm/10	-	-	489	175
Softening point	F	-	-	122.0	117.7
Pour point	F	108	113	108	118.4
Wax content	%wt	26.0	26.5	17.5	16.0(C)
Total nitrogen	ppm wt	970	1100	2090	2380
Basic nitrogen	ppm wt	-	310	640	780
Acidity	mgKOH/g	-	< 0.05	-	-
Carbon residue	%wt	2.5	3.0	9.4(C)	12.7(C)
Asphaltenes	%wt	0.25	0.3	1.0(C)	1.4(C)
Vanadium	ppm wt	< 2	2	7	10
Nickel	ppm wt	< 2	< 2	3	4
Xylene equivalent		-	15.0	-	20.0
Saturates	%wt	-	64	-	25
Aromatics	%wt	-	32	-	62
Resins A	%wt	-	3	-	10
Resins B	%wt	-	1	-	3

(C) = calculated value
( ) = extrapolated value

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Table 2

CUSIANA Crude Oil
Individual Hydrocarbons in the 59 - 203F Cut

TBP Cut point F	59 - 203		59 - 203	
Yield on crude oil	9.55		11.55	
Position in Crude	2.3 - 11.85		2.85 - 14.4	
Hydrocarbons	% wt On Cut	% wt On Crude	% vol On Cut	% vol On Crude
ethane	-	-	-	-
propane	-	-	-	-
isobutane	-	-	-	-
n-Butane	0.35	0.03	0.41	0.05
neopentane	0.02	trace	0.02	trace
isopentane	12.36	1.18	13.61	1.57
n-Pentane	12.80	1.21	13.97	1.62
2,2-dimethylbutane	0.66	0.06	0.70	0.08
cyclopentane	1.44	0.14	1.31	0.15
2,3-dimethylbutane	1.95	0.19	2.00	0.23
2-methylpentane	9.93	0.95	10.39	1.20
3-methylpentane	5.72	0.55	5.79	0.67
n-hexane	12.11	1.16	12.55	1.45
2,2-dimethylpentane	0.45	0.04	0.46	0.05
methylcyclopentane	6.33	0.60	5.77	0.67
2,4-dimethylpentane	0.97	0.09	0.99	0.11
2,2,3-trimethylbutane	0.16	0.02	0.16	0.02
benzene	2.72	0.26	2.12	0.24
3,3-dimethylpentane	0.24	0.02	0.24	0.03
cyclohexane	5.96	0.57	5.23	0.60
2-methylhexane	4.13	0.39	4.16	0.48
2,3-dimethylpentane	1.32	0.13	1.30	0.15
1,1-dimethylcyclopentane	0.59	0.06	0.52	0.06
3-methylhexane	3.88	0.37	3.86	0.45
1,cis-3-dimethylcyclopentane	1.01	0.10	0.89	0.10
1,trans-3-dimethylcyclopentane	0.98	0.09	0.86	0.10
3,ethylpentane	0.22	0.02	0.22	0.02
1,trans-2-dimethylcyclopentane	1.45	0.14	1.27	0.15
2,2,4-trimethylpentane	-	-	-	-
n-heptane	4.88	0.47	4.88	0.56
1,cis-2-dimethylcyclopentane methylcyclohexane 2,2,3,3-tetramethylbutane	4.58	0.44	3.98	0.46
1,1,3-trimethylcyclopentane	0.11	0.01	0.10	0.01
2,2-dimethylhexane	0.04	trace	0.04	trace
ethylcyclopentane	0.16	0.02	0.14	0.02
2,5-dimethylhexane	0.06	0.01	0.06	0.01
2,2,3-trimethylpentane	-	-	-	-
2,4-dimethylhexane	0.06	0.01	0.06	0.01
1,trans-2-cis-4-trimethylcyclopentane	0.05	trace	0.04	0.01
3,3-dimethylhexane	-	-	-	-
1,trans-2,cis-3-trimethylcyclopentane	0.03	trace	0.03	trace
2,3,4-trimethylpentane	-	-	-	-
2,3,3-trimethylpentane	-	-	-	-
toluene	1.64	0.16	1.29	0.15
higher boiling non-aromatics	0.64	0.06	0.58	0.07
Total	100.00	9.55	100.00	11.55

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Table 3

CUSIANA Crude Oil
Individual Aromatic Components in the 59 - 347F Range

TBP Cut point F		59 - 203*		203 - 300		300 - 347	
Yield on crude oil	%wt	9.55		12.6		5.45	
Position in Crude	%wt	2.3 - 11.85		11.85 - 24.45		24.45 - 29.9	
Hydrocarbons	%wt	On Cut	On Crude	On Cut	On Crude	On Cut	On Crude
benzene		2.72	0.26	0.24	0.03	-	-
toluene		1.64	0.16	8.05	1.01	-	-
ethylbenzene		-	-	1.12	0.14	0.33	0.02
p-xylene		-	-	1.91	0.24	0.81	0.04
m-xylene		-	-	6.87	0.87	3.06	0.17
isopropylbenzene		-	-	0.13	0.02	0.29	0.02
o-xylene		-	-	2.21	0.28	1.74	0.09
n-propylbenzene		-	-	0.12	0.02	0.72	0.04
1-methyl-3-ethylbenzene		-	-				
1-methyl-4-ethylbenzene		-	-	0.47	0.06	4.31	0.23
tert-butylbenzene		-	-				
isobutylbenzene		-	-				
1,3,5-trimethylbenzene		-	-	0.18	0.02	3.68	0.20
sec-butylbenzene		-	-				
1-methyl-3-isopropylbenzene		-	-				
1-methyl-2-ethylbenzene		-	-	0.05	0.01	1.27	0.07
1-methyl-4-isopropylbenzene		-	-				
1,2,4-trimethylbenzene		-	-	0.15	0.02	6.08	0.33
1,4-diethylbenzene		-	-	-	-	0.56	0.03
1-methyl-3-n-propylbenzene		-	-	-	-		
1-methyl-2-iso-propylbenzene		-	-	-	-	0.36	0.02
1-methyl-4-n-propylbenzene		-	-	-	-		
1,3-diethylbenzene		-	-	-	-	0.11	0.01
n-butylbenzene		-	-	-	-		
1,3-dimethyl-5-ethylbenzene		-	-	-	-	0.51	0.03
1,2-diethylbenzene		-	-	-	-	0.03	trace
1-methyl-2-n-propylbenzene		-	-	-	-	-	-
1,2,3-trimethylbenzene		-	-	0.01	trace	1.49	0.08
1,4-dimethyl-2-ethylbenzene		-	-	-	-	0.14	0.01
1,3-dimethyl-4-ethylbenzene		-	-	-	-	0.12	0.01
1,2-dimethyl-4-ethylbenzene		-	-	-	-	0.28	0.02
indane		-	-	-	-	-	-
c11 aromatics		-	-	-	-	0.18	0.01
Total	%wt	4.36	0.42	21.51	2.71	26.07	1.42

Note:- *Summation of individual components from Table 2.

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Table 3A

CUSIANA Crude Oil
Individual Aromatic Components in the 59 - 347C Range

TBP Cut point	F	59 - 203*		203 - 300		300 - 347	
Yield on crude oil	%vol	11.55		13.75		5.7	
Position in Crude	%vol	2.85 - 14.4		14.4 - 28.15		28.15 - 33.85	
Hydrocarbons	%vol	On Cut	On Crude	On Cut	On Crude	On Cut	On Crude
benzene		2.12	0.24	0.21	0.03	-	-
toluene		1.29	0.15	7.05	0.97	-	-
ethylbenzene		-	-	0.98	0.13	0.30	0.02
p-xylene		-	-	1.68	0.23	0.74	0.04
m-xylene		-	-	6.03	0.83	2.78	0.16
isopropylbenzene		-	-	0.11	0.02	0.26	0.02
o-xylene		-	-	1.91	0.26	1.55	0.09
n-propylbenzene		-	-	0.11	0.01	0.66	0.04
1-methyl-3-ethylbenzene		-	-				
1-methyl-4-ethylbenzene		-	-	0.41	0.06	3.92	0.22
tert-butylbenzene		-	-				
isobutylbenzene		-	-				
1,3,5-trimethylbenzene		-	-	0.16	0.02	3.34	0.19
sec-butylbenzene		-	-				
1-methyl-3-isopropylbenzene		-	-				
1-methyl-2-ethylbenzene		-	-	0.04	0.01	1.13	0.06
1-methyl-4-isopropylbenzene		-	-				
1,2,4-trimethylbenzene		-	-	0.13	0.02	5.44	0.31
1,4-diethylbenzene		-	-	-	-	0.51	0.03
1-methyl-3-n-propylbenzene		-	-	-	-		
1-methyl-2-iso-propylbenzene		-	-	-	-	0.32	0.02
1-methyl-4-n-propylbenzene		-	-	-	-		
1,3-diethylbenzene		-	-	-	-	0.10	0.01
n-butylbenzene		-	-	-	-		
1,3-dimethyl-5-ethylbenzene		-	-	-	-	0.46	0.03
1,2-diethylbenzene		-	-	-	-	0.03	trace
1-methyl-2-n-propylbenzene		-	-	-	-	-	-
1,2,3-trimethylbenzene		-	-	0.01	trace	1.31	0.07
1,4-dimethyl-2-ethylbenzene		-	-	-	-	0.13	0.01
1,3-dimethyl-4-ethylbenzene		-	-	-	-	0.11	0.01
1,2-dimethyl-4-ethylbenzene		-	-	-	-	0.25	0.01
indane		-	-	-	-	-	-
oil aromatics		-	-	-	-	0.16	0.01
Total	%vol	3.41	0.39	18.83	2.59	23.48	1.34

Note:- *Summation of individual components from Table 2.

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Table 4

CUSIANA Crude Oil
Hydrocarbon Type Analysis By Gas Chromatography in the 59 - 347F Range

TBP Cut point	F	59 - 203*		203 - 300		300 - 347	
Yield on crude oil	%wt	9.55		12.6		5.45	
Position in Crude	%wt	2.30 - 11.85		11.85 - 24.45		24.45 - 29.9	
Hydrocarbons	%wt	On Cut	On Crude	On Cut	On Crude	On Cut	On Crude
c2 n-paraffin		-	-	-	-	-	-
c3 n-paraffin		-	-	-	-	-	-
c4 isoparaffin		-	-	-	-	-	-
c4 n-paraffin		0.35	0.03	-	-	-	-
c5 naphthenes		1.44	0.14	-	-	-	-
c5 isoparaffin		12.38	1.18	-	-	-	-
c5 n-paraffin		12.80	1.22	-	-	-	-
c6 naphthenes		12.29	1.17	1.43	0.18	-	-
c6 isoparaffin		18.26	1.74	0.28	0.04	-	-
c6 n-paraffin		12.11	1.16	0.36	0.05	-	-
c7 naphthenes		8.77	0.84	12.30	1.55	0.12	0.01
c7 isoparaffin		11.37	1.09	3.61	0.45	0.03	trace
c7 n-paraffin		4.88	0.47	4.93	0.62	0.25	0.01
c8 naphthenes		0.57	0.05	13.16	1.66	1.45	0.08
c8 isoparaffin		0.42	0.04	11.98	1.51	0.23	0.01
c8 n-paraffin		-	-	6.63	0.84	0.91	0.05
c9 naphthenes		-	-	6.69	0.84	10.73	0.58
c9 isoparaffin		-	-	9.33	1.18	4.57	0.25
c9 n-paraffin		-	-	4.00	0.50	6.56	0.36
c10 naphthenes		-	-	0.83	0.10	14.53	0.79
c10 isoparaffin		-	-	1.34	0.17	18.01	0.98
c10 n-paraffin		-	-	1.62	0.20	7.83	0.43
c11 naphthenes		-	-	-	-	2.13	0.12
c11 isoparaffin		-	-	-	-	6.15	0.34
c11 n-paraffin		-	-	-	-	0.43	0.02
total isoparaffin		42.43	4.05	26.54	3.34	28.99	1.58
total n-paraffin		30.14	2.88	17.54	2.21	15.98	0.87
total naphthenes		23.07	2.20	34.41	4.34	28.96	1.58
total aromatics		4.36	0.42	21.51	2.71	26.07	1.42

Note:- *Summation of individual components from Table 2.

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Table 4A

CUSIANA Crude Oil

Hydrocarbon Type Analysis By Gas Chromatography in the 59 - 347F Range

TBP Cut point	F	59 - 203*		203 - 300		300 - 347	
Yield on crude oil	%vol	11.55		13.75		5.7	
Position in Crude	%vol	2.85 - 14.4		14.4 - 28.15		28.15 - 33.85	
Hydrocarbons	%vol	On Cut	On Crude	On Cut	On Crude	On Cut	On Crude
c2 n-paraffin		-	-	-	-	-	-
c3 n-paraffin		-	-	-	-	-	-
c4 isoparaffin		-	-	-	-	-	-
c4 n-paraffin		0.41	0.05	-	-	-	-
c5 naphthenes		1.31	0.15	-	-	-	-
c5 isoparaffin		13.63	1.57	-	-	-	-
c5 n-paraffin		13.97	1.62	-	-	-	-
c6 naphthenes		11.00	1.27	1.42	0.20	-	-
c6 isoparaffin		18.88	2.18	0.32	0.04	-	-
c6 n-paraffin		12.55	1.45	0.41	0.06	-	-
c7 naphthenes		7.66	0.89	12.32	1.69	0.12	0.01
c7 isoparaffin		11.39	1.31	3.99	0.55	0.03	trace
c7 n-paraffin		4.88	0.56	5.47	0.75	0.29	0.02
c8 naphthenes		0.52	0.06	12.94	1.78	1.47	0.08
c8 isoparaffin		0.39	0.05	12.83	1.76	0.25	0.01
c8 n-paraffin		-	-	7.16	0.98	1.02	0.06
c9 naphthenes		-	-	6.52	0.90	10.80	0.62
c9 isoparaffin		-	-	9.72	1.34	4.92	0.28
c9 n-paraffin		-	-	4.23	0.58	7.17	0.41
c10 naphthenes		-	-	0.78	0.11	14.17	0.81
c10 isoparaffin		-	-	1.37	0.19	18.99	1.08
c10 n-paraffin		-	-	1.68	0.23	8.41	0.48
c11 naphthenes		-	-	-	-	2.07	0.12
c11 isoparaffin		-	-	-	-	6.35	0.36
c11 n-paraffin		-	-	-	-	0.46	0.03
total isoparaffin		44.29	5.11	28.23	3.88	30.55	1.74
total n-paraffin		31.81	3.68	18.96	2.61	17.33	0.99
total naphthenes		20.49	2.37	33.98	4.67	28.64	1.63
total aromatics		3.41	0.39	18.83	2.59	23.48	1.34

Note:- *Summation of individual components from Table 2.

Attachment to Report 51 122

Table 5

CUSIANA Crude Oil
Properties of 696 - 1022F Cut

TBP Cut point (API)	F	696 - 1022 (C)
Yield on crude oil	%wt	22.75
Yield on crude oil	%vol	20.9
Density at 59F	kg/litre	0.9008
Sulphur	%wt	0.36
Viscosity at 140F	cSt	21.0
Viscosity at 212F	cSt	6.74
Wax content	%wt	29.4
Total nitrogen	ppm wt	730
Basic nitrogen	ppm wt	180
Acidity	mgKOH/g	0.01
Carbon Residue	%wt	0.20
Aniline Point	F	209.5
Refractive index at 158F		1.4802

(C) = calculated value

Attachment to Report 51 122

Table 6

CUSIANA Crude Oil
TBP data

TBP Cut point (API)	F	122	131	140	149	158	167	176	185	194	203
Total distillate	%wt	5.49	5.97	6.48	7.03	7.65	8.35	9.12	9.96	10.87	11.85
	%vol	7.06	7.65	8.26	8.92	9.65	10.45	11.33	12.28	13.31	14.40
TBP Cut point (API)	F	212	221	230	239	248	257	266	275	284	293
Total distillate	%wt	12.89	13.97	15.10	16.27	17.46	18.66	19.88	21.10	22.31	23.51
	%vol	15.55	16.76	18.01	19.29	20.60	21.92	23.25	24.57	25.87	27.15
TBP Cut poin PI)	F	302	311	320	329	338	347	356	365	374	383
Total distill	%wt	24.68	25.82	26.92	27.97	28.97	29.90	30.77	31.59	32.40	33.23
	%vol	28.40	29.60	30.75	31.85	32.88	33.85	34.75	35.60	36.44	37.30
TBP Cut point (API)	F	392	401	410	419	428	437	446	455	464	473
Total distillate	%wt	34.10	35.04	36.05	37.11	38.20	39.32	40.45	41.58	42.70	43.82
	%vol	38.20	39.16	40.19	41.27	42.38	43.51	44.65	45.78	46.89	48.00
TBP Cut point (API)	F	482	491	500	509	518	527	536	545	554	563
Total distillate	%wt	44.93	46.04	47.15	48.26	49.37	50.48	51.59	52.72	53.85	54.99
	%vol	49.10	50.19	51.27	52.35	53.42	54.50	55.58	56.66	57.74	58.84
TBP Cut point API)	F	572	581	590	599	608	617	626	635	644	653
Total distill e	%wt	56.15	57.30	58.45	59.60	60.73	61.85	62.95	64.03	65.08	66.12
	%vol	59.94	61.04	62.13	63.22	64.29	65.34	66.37	67.38	68.36	69.33
TBP Cut point (API)	F	662	671	680	689	698	707	716	725	734	743
Total distillate	%wt	67.13	68.11	69.07	69.99	70.87	71.73	72.56	73.38	74.20	75.03
	%vol	70.27	71.19	72.08	72.94	73.76	74.56	75.33	76.10	76.87	77.65
TBP Cut point (API)	F	752	770	788	806	824	842	860	878	896	914
Total distillate	%wt	75.88	77.58	79.27	80.92	82.51	84.05	85.54	86.92	88.12	89.13
	%vol	78.44	80.03	81.60	83.13	84.61	86.03	87.40	88.67	89.75	90.65
TBP Cut point (API)	F	932	950	968	977	986	1004	1022	1112	1202	1292
Total distillate	%wt	89.99	90.78	91.52	91.87	92.22	92.87	93.45	95.55	97.05	98.10
	%vol	91.42	92.12	92.78	93.10	93.41	93.98	94.50	96.32	97.60	98.48

Attachment to Report 51 122

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Core Lab

LABORATORY TESTS RESULTS
05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo ~~[illegible]~~ LOCETC
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: Sample as Received

LABORATORY I.D...: 101341-0001
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Yield Data		*1			04/06/00	DBC
API Gravity	18.9	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.9411	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point (Thin Film)	Too Dark		Deg. F	ASTM D-611	04/06/00	KC
Ash Content,	0.05		WT %	ASTM D-482	04/07/00	AB
Asphaltene	10.7	0.05	Wt. %	IP-143	04/07/00	KC
Carbon Residue, Conradson	12.0		Wt. %	ASTM D-189	04/10/00	VS
Cloud Point	Too Dark		Deg. F	ASTM D-2500	04/04/00	AB
Copper by ICP	0.73	0.3	ppm wt.	ICP	04/28/00	JV
Flash Point, PMCC,	32		Deg. F	ASTM D-93	04/04/00	AB
Hydrogen Sulfide, as Sulfur	<1	1	ppm wt.	UOP-163	04/06/00	NA
Iron by ICP	6.9	0.08	ppm wt.	ICP	04/28/00	JV
Kinematic Viscosity	191.5		cSt @ 100 F	ASTM D-445	04/06/00	BB
Kinematic Viscosity	98.07		cSt @ 122 F	ASTM D-445	04/06/00	BB
K Factor	11.6			UOP 375	04/28/00	DBC
Light Hydrocarbons Analysis		*1			04/06/00	PKT
Methane	0	0	LV %			
Ethane	0	0	LV %			
Propane	0.05	0	LV %			
Isobutane	0.08	0	LV %			
N-Butane	0.19	0	LV %			
Neopentane	0	0	LV %			
Isopentane	0.31	0	LV %			
n-Pentane	0.38	0	LV %			
Hexanes	1.15	0	LV %			
Heptanes Plus	97.84	0	LV %			
Total	100.00	0				
Mercaptan Sulfur, as Sulfur	23	1	ppm wt.	UOP-163	04/06/00	NA

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LABORATORY TESTS RESULTS
05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: Sample as Received

LABORATORY I.D...: 101341-0001
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Acid Number by Poten. Titration	<0.01		mg KOH/g	ASTM D-664	04/06/00	N
Nickel by ICP	90	0.2	ppm wt.	ICP	04/28/00	J
Nitrogen, Basic,	1001		ppm wt.	UOP 269	04/06/00	N
Nitrogen, Total by Chemilum.	3194	10	ppm wt.	ASTM D-4629	05/01/00	A
Pour Point	-10		Deg. F	ASTM D-97	04/06/00	A
Sediment and Water	0.90	0.05	L.V. %	ASTM D-4007	04/07/00	D
Sodium by ICP	7.2	0.3	ppm wt.	ICP	04/28/00	J
Sulfur, Total by x-ray Fluoresc.	1.24	0.010	Wt. %	ASTM D-4294	04/05/00	B
Simulated Distillation of Crude		*1		ASTM D-5307	04/06/00	LS
% OFF	Deg. F.	0				
IBP	99	0				
5	266	0				
10	368	0				
15	445	0				
20	504	0				
25	559	0				
30	611	0				
35	658	0				
40	705	0				
45	756	0				
50	806	0				
55	857	0				
60	915	0				
65	982	0				
70	ND	0				
75	ND	0				
80	ND	0				
85	ND	0				
90	ND	0				
95	ND	0				
% Recovered	66.3	0	@ 1000 deg. F			
% Residue	33.7	0	@ 1000 deg. F			
Reid Vapor Pressure	1.11		psi	D-5191 ASTM Eqn.	04/06/00	MB
Vanadium by ICP	207	0.07	ppm wt.	ICP	04/28/00	JW

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LABORATORY TESTS RESULTS

05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: IBP-200 Deg. F (IBP-93 C)

LABORATORY I.D...: 101341-0002
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Yield Data		*1			04/06/00	D
Yield	4.33	0	L.V. %	ASTM D-2892		
Yield	3.21	0	Wt. %	ASTM D-2892		
API Gravity	71.3	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.6978	0	@ 60/60 Deg. F	ASTM D-1298		
Benzene	1.08	0.1	L.V. %	ASTM D-3606	03/14/00	B
D-86 Distillation	Insuff.		Deg. F	ASTM D-86	04/11/00	DB
K Factor	Insuff.			UOP 375	04/28/00	DB
Mercaptan Sulfur, as Sulfur	Insuff.	1	ppm wt.	UOP-163	04/11/00	DB
Nitrogen, Basic,	<6		ppm wt.	UOP 269	12/11/99	MA
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	04/24/00	JD
PONA by Mass Spectrometer & FIA		*1		ASTM D-2789	04/27/00	LS
Paraffins	67.04	0.00	LV %			
Olefins	0.5	0.00	LV %			
Monocycloparaffins	28.98	0.00	LV %			
Dicycloparaffins	0.00	0.00	LV %			
Alkylbenzenes	3.48	0.00	LV %			
Indanes/Tetralins	0.00	0.00	LV %			
Naphthalenes	0.00	0.00	LV %			
Total	100.00	0.00	LV %			
Refractive Index	1.3666			Calculated	05/05/00	DBC
Octane Analysis -- NIR		*1		NIR	04/11/00	DBC
Research Octane Number	74.8	0		NIR		
Motor Octane Number	72.6	0		NIR		
R+M/2	73.7	0				
Sulfur, Total by Microcoulometry	5	1	ppm wt.	ASTM D-3120	04/25/00	JT
Reid Vapor Pressure	8.61		psi	D-5191 ASTM Eqn.	04/18/00	MB

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LABORATORY TESTS RESULTS

05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 200-300 Deg. F (93-149 C)

LABORATORY I.D...: 101341-0003
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Yield Data		*1			04/06/00	DB
Yield	4.53	0	L.V. %	ASTM D-2892		
Yield	3.62	0	Wt. %	ASTM D-2892		
API Gravity	56.5	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.7525	0	@ 60/60 Deg. F	ASTM D-1298		
Benzene	0.10	0.1	L.V. %	ASTM D-3606	03/14/00	BT
D-86 Distillation	Insuff.		Deg. F	ASTM D-86	04/11/00	DBC
Flash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	04/11/00	DBC
K Factor	Insuff.			UOP 375	04/28/00	DBC
Mercaptan Sulfur, as Sulfur	Insuff.	1	ppm wt.	UOP-163	04/11/00	DBC
Nitrogen, Basic,	<5		ppm wt.	UOP 269	12/11/99	MA
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	04/24/00	JDP
PONA by Mass Spectrometer & FIA		*1		ASTM D-2789	04/27/00	LS
Paraffins	49.37	0.00	LV %			
Olefins	0.8	0.00	LV %			
Monocycloparaffins	40.89	0.00	LV %			
Dicycloparaffins	1.10	0.00	LV %			
Alkylbenzenes	7.84	0.00	LV %			
Indanes/Tetralins	0.00	0.00	LV %			
Naphthalenes	0.00	0.00	LV %			
Total	100.00	0.00	LV %			
Refractive Index	1.3953			Calculated	05/05/00	DBC
Octane Analysis -- NIR		*1		NIR	04/11/00	DBC
Research Octane Number	68.4	0		NIR		
Motor Octane Number	66.2	0		NIR		
R+M/2	67.3	0				
Sulfur, Total by Microcoulometry	17	1	ppm wt.	ASTM D-3120	04/25/00	JT
Reid Vapor Pressure	1.19		psi	D-5191 ASTM Eqn.	04/18/00	MB

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LABORATORY TESTS RESULTS

05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 300-350 Deg. F (149-177 C)

LABORATORY I.D...: 101341-0004
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Yield Data		*1			04/06/00	DE
Yield	3.74	0	L.V. %	ASTM D-2892		
Yield	3.14	0	Wt. %	ASTM D-2892		
API Gravity	47.9	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.7888	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	125.1		Deg. F	ASTM D-611	04/12/00	KC
Benzene	<0.1	0.1	L.V. %	ASTM D-3606	03/14/00	BT
Cetane Index	Insuff.			ASTM D-976	04/11/00	DB
Cloud Point	<-90		Deg. F	ASTM D-2500	04/13/00	VS
D-86 Distillation	Insuff.		Deg. F	ASTM D-86	04/11/00	DB
Flash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	04/11/00	DB
Freeze Point	<-100		Deg. F	ASTM D-2386	04/19/00	VS
Kinematic Viscosity	0.92		cSt @ 100 F	ASTM D-445	04/27/00	BB
Kinematic Viscosity	0.80		cSt @ 122 F	ASTM D-445	04/25/00	BB
K Factor	11.6			UOP 375	04/28/00	DB
Mercaptan Sulfur, as Sulfur	Insuff.	1	ppm wt.	UOP-163	04/11/00	DB
Nitrogen, Basic,	Insuff.		ppm wt.	UOP 269	04/11/00	DB
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	04/24/00	JDP
Pour Point	<-90		Deg. F	ASTM D-97	04/13/00	VS
PONA by Mass Spectrometer & FIA		*1		ASTM D-2789	04/27/00	LS
Paraffins	41.15	0.00	LV %			
Olefins	1.1	0.00	LV %			
Monocycloparaffins	34.29	0.00	LV %			
Dicycloparaffins	9.06	0.00	LV %			
Alkylbenzenes	13.83	0.00	LV %			
Indanes/Tetralins	0.51	0.00	LV %			
Naphthalenes	0.06	0.00	LV %			
Total	100.00	0.00	LV %			

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LABORATORY TESTS RESULTS

05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo CXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 300-350 Deg. F (149-177 C)

LABORATORY I.D...: 101341-0004
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Refractive Index	1.4151			Calculated	05/05/00
Octane Analysis -- NIR		*1		NIR	04/11/00
Research Octane Number	71.4	0		NIR	
Motor Octane Number	68.0	0		NIR	
R+M/2	69.7	0			
Smoke Point	23		mm	ASTM D-1322	04/28/00
Sulfur, Total by x-ray Fluoresc.	0.029	0.010	Wt. %	ASTM D-4294	04/12/00
Reid Vapor Pressure	0.23		psi	D-5191 ASTM Eqn.	04/18/00

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LABORATORY TESTS RESULTS

05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 350-400 Deg. F (177-204 C)

LABORATORY I.D...: 101341-0005
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Yield Data		*1			04/06/00	DE
Yield	2.79	0	L.V. %	ASTM D-2892		
Yield	2.42	0	Wt. %	ASTM D-2892		
API Gravity	41.7	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8171	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	127.0		Deg. F	ASTM D-611	04/12/00	EC
Benzene	<0.1	0.1	L.V. %	ASTM D-3606	03/14/00	ST
Cetane Index	Insuff.			ASTM D-976	04/11/00	DB
Cloud Point	<-90		Deg. F	ASTM D-2500	04/13/00	VS
Color	L of 0.5			ASTM D-1500	04/13/00	VS
Color, Saybolt	+20			ASTM D-156	04/28/00	JD
D-86 Distillation	Insuff.		Deg. F	ASTM D-86	04/11/00	DB
Flash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	04/11/00	DB
Freeze Point	<-100		Deg. F	ASTM D-2386	04/19/00	VS
Kinematic Viscosity	1.26		cSt @ 100 F	ASTM D-445	04/27/00	BB
Kinematic Viscosity	1.05		cSt @ 122 F	ASTM D-445	04/25/00	BB
K Factor	11.5			UOP 375	04/28/00	DB
Mercaptan Sulfur, as Sulfur	Insuff.	1	ppm wt.	UOP-163	04/11/00	DB
Naphthalenes in Jet Fuel	Insuff.		L.V. %	ASTM D-1840	04/11/00	DB
Nitrogen, Basic,	Insuff.		ppm wt.	UOP 269	04/11/00	DB
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	04/24/00	JD
Pour Point	<-90		Deg. F	ASTM D-97	04/13/00	VS
PONA by Mass Spectrometer & FIA		*1		ASTM D-2789	04/27/00	LS
Paraffins	31.70	0.00	LV %			
Olefins	1.5	0.00	LV %			

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LABORATORY TESTS RESULTS

05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 350-400 Deg. F (177-204 C)

LABORATORY I.D...: 101341-0005
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Monocycloparaffins	34.23	0.00	LV %			
Dicycloparaffins	15.60	0.00	LV %			
Alkylbenzenes	11.46	0.00	LV %			
Indanes/Tetralins	4.06	0.00	LV %			
Naphthalenes	1.45	0.00	LV %			
Total	100.00	0.00	LV %			
Refractive Index	1.4318			Calculated	05/05/00	DBC
Octane Analysis -- NIR		*1		NIR	04/11/00	DBC
Research Octane Number	69.0	0		NIR		
Motor Octane Number	65.8	0		NIR		
R+M/2	67.4	0				
Smoke Point	21		mm	ASTM D-1322	04/28/00	JDP
Sulfur, Total by x-ray Fluoresc.	0.066	0.010	Wt. %	ASTM D-4294	04/12/00	BB
Reid Vapor Pressure	<0.01		psi	D-5191 ASTM Eqn.	04/18/00	MB

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LABORATORY TESTS RESULTS

05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo CXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 400-500 Deg. F (204-260 C)

LABORATORY I.D...: 101341-0006
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Yield Data		*1			04/06/00	D
Yield	7.70	0	L.V. %	ASTM D-2892		
Yield	6.97	0	Wt. %	ASTM D-2892		
API Gravity	34.7	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8514	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	133.7		Deg. F	ASTM D-611	04/12/00	K
Bromine Number	0.58		g/100g	ASTM D-1159	04/13/00	M
Cetane Index	Insuff.			ASTM D-976	04/11/00	DS
Cloud Point	-32		Deg. F	ASTM D-2500	04/13/00	VS
Color	L of 0.5			ASTM D-1500	04/13/00	VS
Color, Saybolt	+18			ASTM D-156	04/28/00	JD
D-86 Distillation	Insuff.		Deg. F	ASTM D-86	04/11/00	DS
Flash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	04/11/00	DS
Freeze Point	-55		Deg. F	ASTM D-2386	04/19/00	VS
Hydrocarbon Type		*1		ASTM D-1319	04/13/00	VS
Aromatics	20.1	0.2	L.V. %			
Olefins	2.1	0.2	L.V. %			
Saturates	77.8	0.2	L.V. %			
Kinematic Viscosity	2.07		cSt @ 100 F	ASTM D-445	04/27/00	BS
Kinematic Viscosity	1.6		cSt @ 122 F	ASTM D-445	04/25/00	BS
K Factor	11.5			UOP 375	04/28/00	DS
Mercaptan Sulfur, as Sulfur	5	1	ppm wt.	UOP-163	04/12/00	MA
Naphthalenes in Jet Fuel	4.45		L.V. %	ASTM D-1840	05/02/00	KC
Acid Number by Poten. Titration	<0.01		mg KOH/g	ASTM D-664	04/17/00	MA
Nitrogen, Basic,	<5		ppm wt.	UOP 269	12/11/99	MA

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LABORATORY TESTS RESULTS

05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 400-500 Deg. F (204-260 C)

LABORATORY I.D...: 101341-0006
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Nitrogen, Total by Chemilum.	2	1	ppm wt.	ASTM D-4629	04/24/00
Pour Point	-60		Deg. F	ASTM D-97	04/13/00
PNA of Kerosene		*1		ASTM D2425 mod.	04/28/00
Paraffins	39.6	0.1	LV %		
Monocycloparaffins	18.1	0.1	LV %		
Dicycloparaffins	18.5	0.1	LV %		
Tricycloparaffins	3.0	0.1	LV %		
Alkylbenzenes	4.9	0.1	LV %		
Indans	8.3	0.1	LV %		
Indenes	2.4	0.1	LV %		
Naphthalenes	5.0	0.1	LV %		
Acenaphthenes	0.1	0.1	LV %		
Acenaphthalenes	0.1	0.1	LV %		
Tricyclic Aromatics	<0.1	0.1	LV %		
Total	100.0	0	LV %		
Refractive Index	1.4235			Calculated	05/05/00
Smoke Point	18		mm	ASTM D-1322	04/28/00
Sulfur, Total by x-ray Fluoresc.	0.229	0.010	Wt. %	ASTM D-4294	04/12/00

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LABORATORY TESTS RESULTS

05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo CXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 500-550 Deg. F (260-288 C)

LABORATORY I.D...: 101341-0007
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Yield Data		*1			04/06/00
Yield	3.64	0	L.V. %	ASTM D-2892	
Yield	3.38	0	Wt. %	ASTM D-2892	
API Gravity	30.3	0	@ 60/60 Deg. F	ASTM D-287	
Specific Gravity	0.8745	0	@ 60/60 Deg. F	ASTM D-1298	
Aniline Point	135.7		Deg. F	ASTM D-611	04/12/00
Bromine Number	0.89		g/100g	ASTM D-1159	04/13/00
Cetane Index	Insuff.			ASTM D-976	04/11/00
Cloud Point	-16		Deg. F	ASTM D-2500	04/13/00
Color	L of 0.5			ASTM D-1500	04/13/00
D-86 Distillation	Insuff.		Deg. F	ASTM D-86	04/11/00
Flash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	04/11/00
Freeze Point	-17		Deg. F	ASTM D-2386	04/19/00
Hydrocarbon Type		*1		ASTM D-1319	04/13/00
Aromatics	32.4	0.2	L.V. %		
Olefins	4.1	0.2	L.V. %		
Saturates	63.5	0.2	L.V. %		
Kinematic Viscosity	3.58		cSt @ 100 F	ASTM D-445	04/27/00
Kinematic Viscosity	2.71		cSt @ 122 F	ASTM D-445	04/25/00
K Factor	11.5			UOP 375	04/28/00
Mercaptan Sulfur, as Sulfur	Insuff.	1	ppm wt.	UOP-163	04/11/00
Naphthalenes in Jet Fuel	Insuff.		L.V. %	ASTM D-1840	04/11/00
Acid Number by Poten. Titration	<0.01		mg KOH/g	ASTM D-664	04/17/00
Nitrogen, Basic,	Insuff.		ppm wt.	UOP 269	04/11/00
Nitrogen, Total by Chemilum.	22	1	ppm wt.	ASTM D-4629	04/24/00

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LABORATORY TESTS RESULTS
05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 500-550 Deg. F (260-288 C)

LABORATORY I.D...: 101341-0007
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/POLLUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Pour Point	-25		Deg. F	ASTM D-97	04/13/00	VS
PNA of Kerosene		*1		ASTM D2425 mod.	04/28/00	LS
Paraffins	36.2	0.1	LV %			
Monocycloparaffins	17.5	0.1	LV %			
Dicycloparaffins	14.7	0.1	LV %			
Tricycloparaffins	3.1	0.1	LV %			
Alkylbenzenes	5.0	0.1	LV %			
Indans	7.6	0.1	LV %			
Indenes	6.4	0.1	LV %			
Naphthalenes	7.4	0.1	LV %			
Acenaphthenes	1.1	0.1	LV %			
Acenaphthalenes	0.7	0.1	LV %			
Tricyclic Aromatics	0.3	0.1	LV %			
Total	100.0	0	LV %			
Refractive Index	1.4650		67 Deg. C	ASTM D-1747	04/28/00	JDP
Refractive Index	1.4664			Calculated	05/05/00	DBC
Smoke Point	14		mm	ASTM D-1322	04/28/00	JDP
Sulfur, Total by x-ray Fluoresc.	0.519	0.010	Wt. %	ASTM D-4294	04/14/00	BB

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LABORATORY TESTS RESULTS
05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 550-650 DEg. F (288-343 C)

LABORATORY I.D...: 101341-0008
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	BY
Yield Data		*1			04/06/00	DI
Yield	10.19	0	L.V. %	ASTM D-2892		
Yield	9.65	0	Wt. %	ASTM D-2892		
API Gravity	27.2	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8915	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	146.1		Deg. F	ASTM D-611	04/12/00	KC
Bromine Number	0.82		g/100g	ASTM D-1159	04/13/00	MA
Carbon Residue, Conradson	<0.01		Wt. %	ASTM D-189	05/02/00	VS
Carbon Residue, Ramsbottom	0.11		Wt. %	ASTM D-524	06/15/00	*G
Cetane Index	41.9			ASTM D-976	04/20/00	DB
Cloud Point	+20		Deg. F	ASTM D-2500	04/13/00	VS
Color	L of 1.0			ASTM D-1500	04/13/00	VS
Distillation		*1		ASTM D-86	04/20/00	DB
I.B.P.	564	0	Deg F.	ASTM D-86		
5% Recovered	574	1				
10% Recovered	576	1				
20% Recovered	581	1				
30% Recovered	582	1				
40% Recovered	584	1				
50% Recovered	587	1				
60% Recovered	591	1				
70% Recovered	595	1				
80% Recovered	601	1				
90% Recovered	609	1				
95% Recovered	618	1				
End Point	621	1	Deg F.			
% Recovered	98.0	0.1				
% Residue	1.0	0.1				
% Loss	1.0	0.1				
Flash Point, PMCC,	305		Deg. F	ASTM D-93	05/01/00	JDP
Freeze Point	+10		Deg. F	ASTM D-2386	04/19/00	VS
Cinematic Viscosity	7.12		cSt @ 100 F	ASTM D-445	04/27/00	BB

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LABORATORY TESTS RESULTS
05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 550-650 DEg. F (288-343 C)

LABORATORY I.D...: 101341-0008
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/POLLUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Kinematic Viscosity	5.26		cSt @ 122 F	ASTM D-445	04/27/00	BB
K Factor	11.5			UOP 375	04/28/00	DBC
Mercapten Sulfur, as Sulfur	11	1	ppm wt.	UOP-163	04/12/00	MA
Naonthalenes in Jet Fuel	10.3		L.V. %	ASTM D-1840	05/02/00	KC
Acid Number by Poten. Titration	<0.01		mg KOH/g	ASTM D-664	04/17/00	MA
Nitrogen, Basic,	71		ppm wt.	UOP 269	12/11/99	MA
Nitrogen, Total by Chemilum.	116	1	ppm wt.	ASTM D-4629	04/24/00	JDP
Pour Point	+5		Deg. F	ASTM D-97	04/13/00	VS
PNA Middle Distillates, Mass Spec		*1		ASTM D-2425	04/28/00	LS
Paraffins	38.1	0	LV %			
Monocycloparaffins	16.4	0	LV %			
Dicycloparaffins	13.0	0	LV %			
Tricycloparaffins	2.7	0	LV %			
Alkylbenzenes	5.6	0	LV %			
Indanes/Tetralins	6.0	0	LV %			
Indanes	5.7	0	LV %			
Naphthalenes	5.2	0	LV %			
Acenaphthenes	3.3	0	LV %			
Acenaphthalenes	2.1	0	LV %			
Tricyclic Aromatics	1.9	0	LV %			
Total	100.0	0	LV %			
Refractive Index	1.4737		67 Deg. C	ASTM D-1747	04/28/00	JDP
Refractive Index	1.4772			Calculated	05/05/00	DBC
Smoke Point	12		mm	ASTM D-1322	04/28/00	JDP
Sulfur, Total by x-ray Fluoresc.	0.683	0.010	Wt. %	ASTM D-4294	04/14/00	BB

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LABORATORY TESTS RESULTS
05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 650-700 Deg. F (343-371 C)

LABORATORY I.D...: 101341-0009
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/POLLUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data		*1			04/06/00	DBC
Yield	5.02	0	L.V. %	ASTM D-2892		
Yield	4.88	0	Wt. %	ASTM D-2892		
API Gravity	23.2	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.9148	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	147.2		Deg. F	ASTM D-611	04/12/00	KC
Bromine Number	1.4		g/100g	ASTM D-1159	04/13/00	MA
Carbon Residue, Conradson	<0.01		Wt. %	ASTM D-189	05/02/00	VS
Carbon Residue, Ramsbottom	0.11		Wt. %	ASTM D-524	06/15/00	*01
Cetane Index	Insuff.			ASTM D-976	04/11/00	DBC
Cloud Point	+50		Deg. F	ASTM D-2500	04/13/00	VS
Color	L of 1.5			ASTM D-1500	04/13/00	VS
D-86 Distillation	Insuff.		Deg. F	ASTM D-86	04/11/00	DBC
Flash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	04/11/00	DBC
Kinematic Viscosity	16.17		cSt @ 100 F	ASTM D-445	04/27/00	BB
Kinematic Viscosity	10.75		cSt @ 122 F	ASTM D-445	04/27/00	BB
Kinematic Viscosity	2.95		cSt @ 210 F	ASTM D-445	04/27/00	BB
K Factor	11.5			UOP 375	04/28/00	DBC
Mercaptan Sulfur, as Sulfur	13	1	ppm wt.	UOP-163	04/12/00	MA
Acid Number by Poten. Titration	0.04		mg KOH/g	ASTM D-664	04/17/00	MA
Nitrogen, Basic,	202		ppm wt.	UOP 269	12/11/99	MA
Nitrogen, Total by Chemilum.	512	1	ppm wt.	ASTM D-4629	04/24/00	JDP
Pour Point	+35		Deg. F	ASTM D-97	04/13/00	VS
PNA of Gas Oil		*1		ASTM D2786,3239	04/28/00	LS

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LABORATORY TESTS RESULTS
05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 650-700 Deg. F (343-371 C)

LABORATORY I.D...: 101341-0009
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Paraffins	17.0	0	LV %			
Naphthenes	43.0	0	LV %			
Aromatics	40.0	0	LV %			
NAPHTHENIC DISTRIBUTION	-----	0				
---1 Ring	10.6	0	LV %			
---2 Ring	13.7	0	LV %			
---3 Ring	8.8	0	LV %			
---4 Ring	6.6	0	LV %			
---5 Ring	3.3	0	LV %			
---6 Ring	0.0	0	LV %			
AROMATIC DISTRIBUTION	-----	0				
Monoaromatics	15.5	0	LV %			
---Alkylbenzenes	4.4	0	LV %			
---Naphthenebenzenes	5.2	0	LV %			
---Dinaphthenebenzenes	5.9	0	LV %			
Diaromatics	13.2	0	LV %			
---Naphthalenes	3.2	0	LV %			
---Acenaphthenes/Dibenzofurans	4.8	0	LV %			
---Fluorenes	5.2	0	LV %			
Triaromatics	4.9	0	LV %			
---Phenanthrenes	4.4	0	LV %			
---Naphthenephenanthrenes	0.5	0	LV %			
Tetraaromatics	1.3	0	LV %			
---Pyrenes	0.9	0	LV %			
---Chyrsenes	0.4	0	LV %			
Pentaaromatics	0.0	0	LV %			
---Perylenes	0.0	0	LV %			
---Dibenzanthracenes	0.0	0	LV %			
Thiophene Aromatics	5.1	0	LV %			
---Benzothiophenes	2.1	0	LV %			
---Dibenzothiophenes	3.0	0	LV %			
---Naphthabenzothiophenes	0.0	0	LV %			
Unidentified Aromatics	0.0	0	LV %			
Refractive Index	1.4902		67 Deg. C	ASTM D-1747	04/28/00	JOP
Refractive Index	1.4919			Calculated	05/05/00	DBC
Sulfur, Total by x-ray Fluoresc.	1.07	0.010	Wt. %	ASTM D-4294	04/14/00	BB

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LABORATORY TESTS RESULTS

05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 700+ Deg. F (371+ C)

LABORATORY I.D...: 101341-0010
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data		*1			04/06/00	DBC
Yield	38.02	0	L.V. %	ASTM D-2892		
Yield	62.46	0	Wt. %	ASTM D-2892		
API Gravity	8.2	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	1.0130	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point (Thin Film)	Too Dark		Deg. F	ASTM D-611	04/12/00	KC

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LABORATORY TESTS RESULTS
05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 700-800 Deg. F (371-427 C)

LABORATORY I.D...: 101341-0011
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data Hyvac Potstill		*1		ASTM D-5236	04/06/00	DBC
Yield L.V. %	6.99	0	L.V.%	ASTM D-5236		
Yield Wt. %	6.93	0	Wt. %	ASTM D-5236		
API Grav.	20.2	0	@ 60/60 Deg. F	ASTM D-287		
Spec. Grav.	0.9329	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	164.1		Deg. F	ASTM D-611	04/12/00	KC
Asphaltene	0.19	0.05	Wt. %	IP-143	04/18/00	KC
Bromine Number	2.2		g/100g	ASTM D-1159	04/13/00	MA
Carbon Residue, Conradson	<0.01		Wt. %	ASTM D-189	05/01/00	JDP
Carbon Residue, Ramsbottom	0.13		Wt. %	ASTM D-524	06/15/00	*01
Cetane Index	Insuff.			ASTM D-976	04/11/00	DBC
Color	L of 3.5			ASTM D-1500	04/13/00	VS
Vacuum Distillation	Insuff.		Deg. F	ASTM D-1160	04/11/00	DBC
Flash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	04/11/00	DBC
Kinematic Viscosity	66.89		cSt @ 100 F	ASTM D-445	04/27/00	BB
Kinematic Viscosity	37.35		cSt @ 122 F	ASTM D-445	04/27/00	BB
Kinematic Viscosity	6.28		cSt @ 210 F	ASTM D-445	04/27/00	BB
K Factor	11.5			UOP 375	04/28/00	DBC
Acid Number by Poten. Titration	0.02		mg KOH/g	ASTM D-664	04/17/00	MA
Nitrogen, Basic,	Insuff.		ppm wt.	UOP 269	04/11/00	DBC
Nitrogen, Total by Chemilum.	1090	1	ppm wt.	ASTM D-4629	04/24/00	JDP
Pour Point	+70		Deg. F	ASTM D-97	04/13/00	VS
PNA of Gas Oil		*1		ASTM D2786,3239	04/28/00	LS
Paraffins	14.4	0	LV %			
Naphthenes	40.3	0	LV %			

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LABORATORY TESTS RESULTS
05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 700-800 Deg. F (371-427 C)

LABORATORY I.D...: 101341-0011
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Aromatics	45.3	0	LV %			
NAPHTHENIC DISTRIBUTION	-----	0				
---1 Ring	8.9	0	LV %			
---2 Ring	11.4	0	LV %			
---3 Ring	9.6	0	LV %			
---4 Ring	7.8	0	LV %			
---5 Ring	2.6	0	LV %			
---6 Ring	0.0	0	LV %			
AROMATIC DISTRIBUTION	-----	0				
Monoaromatics	17.6	0	LV %			
---Alkylbenzenes	4.9	0	LV %			
---Naphthenebenzenes	5.9	0	LV %			
---Dinaphthenebenzenes	6.8	0	LV %			
Diaromatics	11.6	0	LV %			
---Naphthalenes	2.7	0	LV %			
---Acenaphthenes/Dibenzofurans	3.9	0	LV %			
---Fluorenes	5.0	0	LV %			
Triaromatics	6.2	0	LV %			
---Phenenanthrenes	3.9	0	LV %			
---Naphthenephenanthrenes	2.3	0	LV %			
Tetraaromatics	3.9	0	LV %			
---Pyrenes	2.9	0	LV %			
---Chyrsenes	1.0	0	LV %			
Pentaaromatics	0.4	0	LV %			
---Perylenes	0.3	0	LV %			
---Dibenzanthracenes	0.1	0	LV %			
Thiophene Aromatics	4.6	0	LV %			
---Benzothiophenes	2.5	0	LV %			
---Dibenzothiophenes	1.8	0	LV %			
---Naphthabenzothiophenes	0.3	0	LV %			
Unidentified Aromatics	1.0	0	LV %			
Refractive Index	1.5000		67 Deg. C	ASTM D-1747	04/28/00	JDI
Refractive Index	1.5038			Calculated	05/05/00	DBI
Sulfur, Total by x-ray Fluoresc.	1.10	0.010	Wt. %	ASTM D-4294	04/14/00	BB

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LABORATORY TESTS RESULTS
05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 800-900 Deg. F (427-482 C)

LABORATORY I.D...: 101341-0012
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/POLLUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data Hyvac Potstill		*1		ASTM D-5236	04/06/00	DBC
Yield L.V. %	11.20	0	L.V.%	ASTM D-5236		
Yield Wt. %	11.22	0	Wt. %	ASTM D-5236		
API Grav.	18.6	0	@ 60/60 Deg. F	ASTM D-287		
Spec. Grav.	0.9430	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	171.3		Deg. F	ASTM D-611	04/12/00	KC
Ash Content,	Insuff.		WT %	ASTM D-482	04/11/00	DBC
Asphaltene	0.07	0.05	Wt. %	IP-143	04/18/00	KC
Bromine Number	2.3		g/100g	ASTM D-1159	04/13/00	MA
Carbon Residue, Conradson	0.10		Wt. %	ASTM D-189	05/01/00	JDP
Carbon Residue, Ramsbottom	0.17		Wt. %	ASTM D-524	06/15/00	*01
Cetane Index	Insuff.			ASTM D-976	04/11/00	DBC
Copper by ICP	0.64	0.3	ppm wt.	ICP	04/28/00	JV
Vacuum Distillation	Insuff.		Deg. F	ASTM D-1160	04/11/00	DBC
Flash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	04/11/00	DBC
Iron by ICP	2.1	0.08	ppm wt.	ICP	04/28/00	JV
Kinematic Viscosity	93.32		cSt @ 122 F	ASTM D-445	04/27/00	BB
Kinematic Viscosity	11.01		cSt @ 210 F	ASTM D-445	04/27/00	BB
K Factor	11.6			UOP 375	04/28/00	DBC
Acid Number by Poten. Titration	0.01		mg KOH/g	ASTM D-664	04/17/00	MA
Nickel by ICP	0.21	0.2	ppm wt.	ICP	04/28/00	JV
Nitrogen, Basic,	Insuff.		ppm wt.	UOP 269	04/11/00	DBC
Nitrogen, Total by Chemilum.	1700	1	ppm wt.	ASTM D-4629	04/24/00	JDP
Pour Point	+80		Deg. F	ASTM D-97	04/20/00	VS

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LABORATORY TESTS RESULTS
05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 800-900 Deg. F (427-482 C)

LABORATORY I.D....: 101341-0012
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
PNA of Gas Oil		*1		ASTM D2786,3239	04/28/00	LS
Paraffins	13.1	0	LV %			
Naphthenes	39.4	0	LV %			
Aromatics	47.5	0	LV %			
NAPHTHENIC DISTRIBUTION	-----	0				
---1 Ring	8.5	0	LV %			
---2 Ring	11.0	0	LV %			
---3 Ring	10.5	0	LV %			
---4 Ring	7.6	0	LV %			
---5 Ring	1.8	0	LV %			
---6 Ring	0.0	0	LV %			
AROMATIC DISTRIBUTION	-----	0				
Monoaromatics	19.4	0	LV %			
---Alkylbenzenes	5.8	0	LV %			
---Naphthenebenzenes	6.3	0	LV %			
---Dinaphthenebenzenes	7.3	0	LV %			
Diaromatics	12.5	0	LV %			
---Naphthalenes	3.3	0	LV %			
---Acenaphthenes/Dibenzofurans	3.9	0	LV %			
---Fluorenes	5.3	0	LV %			
Triaromatics	5.1	0	LV %			
---Phenanthrenes	3.0	0	LV %			
---Naphthenephenanthrenes	2.1	0	LV %			
Tetraaromatics	4.1	0	LV %			
---Pyrenes	2.8	0	LV %			
---Chyrsenes	1.3	0	LV %			
Pentaaromatics	0.7	0	LV %			
---Perylenes	0.6	0	LV %			
---Dibenzanthracenes	0.1	0	LV %			
Thiophene Aromatics	4.0	0	LV %			
---Benzothiophenes	2.3	0	LV %			
---Dibenzothiophenes	1.1	0	LV %			
---Naphthabenzothiophenes	0.6	0	LV %			
Unidentified Aromatics	1.7	0	LV %			
Refractive Index	1.5060		67 Deg. C	ASTM D-1747	04/28/00	JDP
Refractive Index	1.5098			Calculated	05/05/00	DBC
Sulfur, Total by x-ray Fluoresc.	1.13	0.010	Wt. %	ASTM D-4294	04/14/00	SS
Vanadium by ICP	<0.07	0.07	ppm wt.	ICP	04/28/00	JM

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LABORATORY TESTS RESULTS
05/19/00

OB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

LIENT I.D.....: Crudo OXI
ATE SAMPLED.....: 03/01/00
IME SAMPLED.....: :
ORK DESCRIPTION...: 900-1025 Deg. F (482-566 C)

LABORATORY I.D...: 101341-0013
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
ield Data Nyvac Potstill		*1		ASTM D-5236	04/06/00	DBC
ield L.V. %	10.35	0	L.V.%	ASTM D-5236		
ield Wt. %	10.55	0	Wt. %	ASTM D-5236		
PI Grav.	16.1	0	@ 60/60 Deg. F	ASTM D-287		
pec. Grav.	0.9585	0	@ 60/60 Deg. F	ASTM D-1298		
niline Point	183.4		Deg. F	ASTM D-611	04/12/00	KC
sh Content,	Insuff.		WT %	ASTM D-482	04/11/00	DBC
sphaltene	0.18	0.05	Wt. %	IP-143	04/18/00	KC
romine Number	3.6		g/100g	ASTM D-1159	04/13/00	MA
rbon Residue, Conradson	1.49		Wt. %	ASTM D-189	05/01/00	JDP
rb Residue, Ramsbottom	0.94		Wt. %	ASTM D-524	06/15/00	*01
px by ICP	<0.3	0.3	ppm wt.	ICP	04/28/00	JM
ou Distillation	Insuff.		Deg. F	ASTM D-1160	04/11/00	DBC
ash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	04/11/00	DBC
on by ICP	1.6	0.08	ppm wt.	ICP	04/28/00	JM
inematic Viscosity	505.7		cSt @ 122 F	ASTM D-445	04/27/00	BB
ne fic Viscosity	34.37		cSt @ 210 F	ASTM D-445	04/27/00	BB
ne ic Viscosity	7.90		cSt @ 300 F	ASTM D-445	04/27/00	BB
Factor	11.6			UOP 375	04/28/00	DBC
id Number by Poten. Titration	0.06		mg KOH/g	ASTM D-664	04/17/00	MA
ckel by ICP	0.46	0.2	ppm wt.	ICP	04/28/00	JM
trogen, Basic,	Insuff.		ppm wt.	UOP 269	04/11/00	DBC
trogen, Total by Chemilum.	2795	10	ppm wt.	ASTM D-4629	05/01/00	AC
netration	> 300		1/10mm Div.	ASTM D-5	04/25/00	DBC

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LABORATORY TESTS RESULTS
05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 900-1025 Deg. F (482-566 C)

LABORATORY I.D...: 101341-0013
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMIT/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Pour Point	+120		Deg. F	ASTM D-97	04/20/00	VS
PNA of Gas Oil		*1		ASTM D2786,3239	04/28/00	LS
Paraffins	9.8	0	LV %			
Naphthenes	32.3	0	LV %			
Aromatics	57.9	0	LV %			
NAPHTHENIC DISTRIBUTION	-----	0				
---1 Ring	8.0	0	LV %			
---2 Ring	9.7	0	LV %			
---3 Ring	9.4	0	LV %			
---4 Ring	4.3	0	LV %			
---5 Ring	0.9	0	LV %			
---6 Ring	0.0	0	LV %			
AROMATIC DISTRIBUTION	-----	0				
Monoaromatics	23.1	0	LV %			
---Alkylbenzenes	6.7	0	LV %			
---Naphthenebenzenes	7.7	0	LV %			
---Dinaphthenebenzenes	8.7	0	LV %			
Diaromatics	16.0	0	LV %			
---Naphthalenes	3.1	0	LV %			
---Acenaphthenes/Dibenzofurans	4.4	0	LV %			
---Fluorenes	8.5	0	LV %			
Triaromatics	4.3	0	LV %			
---Phenanthrenes	2.2	0	LV %			
---Naphthenephenanthrenes	2.1	0	LV %			
Tetraaromatics	3.7	0	LV %			
---Pyrenes	2.2	0	LV %			
---Chyrsenes	1.5	0	LV %			
Pentaaromatics	1.7	0	LV %			
---Perylenes	1.3	0	LV %			
---Dibenzanthracenes	0.4	0	LV %			
Thiopheno Aromatics	5.5	0	LV %			
---Benzothiophenes	3.2	0	LV %			
---Dibenzothiophenes	1.4	0	LV %			
---Naphthabenzothiophenes	0.9	0	LV %			
Unidentified Aromatics	3.6	0	LV %			
Refractive Index	1.5170		67 Deg. C	ASTM D-1747	04/28/00	JDP
Refractive Index	1.5209			Calculated	05/05/00	DBC
Softening Point	102		Deg. F	ASTM D-36	05/05/00	KC
Sulfur, Total by x-ray Fluoresc.	1.30	0.010	Wt. %	ASTM D-4294	04/14/00	BB

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LABORATORY TESTS RESULTS
05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 900-1025 Deg. F (482-566 C)

LABORATORY I.D...: 101341-0013
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
anadium by ICP	0.70	0.07	ppm wt.	ICP	04/28/00	JM

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LABORATORY TESTS RESULTS
05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OX1
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 650+ Deg. F (343+ C)

LABORATORY I.D...: 101341-0014
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data		*1			04/06/00	DBC
Yield	63.06	0	L.V. %	ASTM D-2892		
Yield	67.34	0	Wt. %	ASTM D-2892		
API Gravity	9.2	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	1.0059	0	@ 60/60 Deg. F	ASTM D-1298		
Ash Content,	0.07		WT %	ASTM D-482	04/28/00	KC
Asphaltene	15.1	0.05	Wt. %	IP-143	04/18/00	KC
Bromine Number	2.3		g/100g	ASTM D-1159	04/13/00	NA
Carbon Residue, Conradson	19.42		Wt. %	ASTM D-189	05/01/00	JDP
Carbon Residue, Ramsbottom	19.43		Wt. %	ASTM D-524	06/15/00	*01
Copper by ICP	<0.3	0.3	ppm wt.	ICP	04/28/00	JM
Flash Point, COC,	475		Deg. F	ASTM D-92	05/02/00	JDP
Iron by ICP	9.6	0.08	ppm wt.	ICP	04/28/00	JM
Kinematic Viscosity	Can't Run		cSt @ 122 F	ASTM D-445	04/27/00	BB
Kinematic Viscosity	705.40		cSt @ 210 F	ASTM D-445	04/27/00	BB
K Factor	11.5			UOP 375	04/28/00	DBC
Acid Number by Poten. Titration	0.03		mg KOH/g	ASTM D-664	04/20/00	NA
Nickel by ICP	136	0.2	ppm wt.	ICP	04/28/00	JM
Nitrogen, Basic,	1347		ppm wt.	UOP 269	12/11/99	NA
Nitrogen, Total by Chemilum.	4453	10	ppm wt.	ASTM D-4629	05/01/00	AC
Pour Point	+125		Deg. F	ASTM D-97	04/26/00	VS
Refractive Index	TOO DARK		67 Deg. C	ASTM D-1747	04/28/00	JDP
Sulfur, Total by x-ray Fluoresc.	1.65	0.010	Wt. %	ASTM D-4294	04/27/00	BB
Vanadium by ICP	306	0.07	ppm wt.	ICP	04/28/00	JM

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LABORATORY TESTS RESULTS
05/19/00

JOB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo OXI
DATE SAMPLED.....: 03/01/00
TIME SAMPLED.....: :
WORK DESCRIPTION...: 1025+ Deg. F (566+ C)

LABORATORY I.D...: 101341-0015
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/POLLUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Yield Data Hyvac Potstill		*1		ASTM D-5236	04/06/00	DBI
Yield L.V. %	29.48	0	L.V.%	ASTM D-5236		
Yield Wt. %	33.76	0	Wt. %	ASTM D-5236		
API Grav.	-0.2	0	@ 60/60 Deg. F	by Calculation		
Spec. Grav.	1.0778	0	@ 60/60 Deg. F	by Calculation		
Ash Content,	0.16		WT %	ASTM D-482	04/28/00	KC
Asphaltene	76.7	0.05	Wt. %	IP-143	04/18/00	KC
Bromine Number	1.6		g/100g	ASTM D-1159	04/13/00	NA
Carbon Residue, Conradson	35.04		Wt. %	ASTM D-189	05/01/00	JDP
Carbon Residue, Ramsbottom	37.69		Wt. %	ASTM D-524	06/15/00	*01
Copper by ICP	0.45	0.3	ppm wt.	ICP	04/28/00	JN
Flash Point, COC,	530		Deg. F	ASTM D-92	05/02/00	JDP
Iron by ICP	20	0.08	ppm wt.	ICP	04/28/00	JN
Kinematic Viscosity	Can't Run		cSt @ 210 F	ASTM D-445	04/28/00	BB
Kinematic Viscosity	Can't Run		St @ 300 F	ASTM D-445	04/28/00	BB
Kinematic Viscosity	Can't Run		cSt @ 350 F	ASTM D-445	04/28/00	BB
Factor	Insuff.			UOP 375	04/28/00	DBC
Acid Number by Poten. Titration	<0.01		mg KOH/g	ASTM D-664	04/18/00	NA
Nickel by ICP	270	0.2	ppm wt.	ICP	04/28/00	JN
Nitrogen, Basic,	2119		ppm wt.	UOP 269	04/13/00	NA
Nitrogen, Total by Chemilum.	6962	10	ppm wt.	ASTM D-4629	05/01/00	AC
Penetration	1		1/10mm Div.	ASTM D-5	04/25/00	DBC
Pour Point	Can't Run		Deg. F	ASTM D-97	05/05/00	DBC
Refractive Index	TOO DARK		67 Deg. C	ASTM D-1747	04/28/00	JDP

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LABORATORY TESTS RESULTS

05/19/00

OB NUMBER: 101341 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

LIENT I.D.....: Crudo CXI
ATE SAMPLED.....: 03/01/00
IME SAMPLED.....: :
ORK DESCRIPTION...: 1025+ Deg. F (566+ C)

LABORATORY I.D...: 101341-0015
DATE RECEIVED....: 03/27/00
TIME RECEIVED....: 10:30
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMIT/PDIQ/LOD	UNITS OF MEASURE	TEST METHOD	DATE	TE
oftening Point	243		Deg. F	ASTM D-36	05/05/00	K
ulfur, Total by x-ray Fluoresc.	2.18	0.010	Wt. %	ASTM D-4294	04/28/00	J
anadium by ICP	613	0.07	ppm wt.	ICP	04/28/00	J

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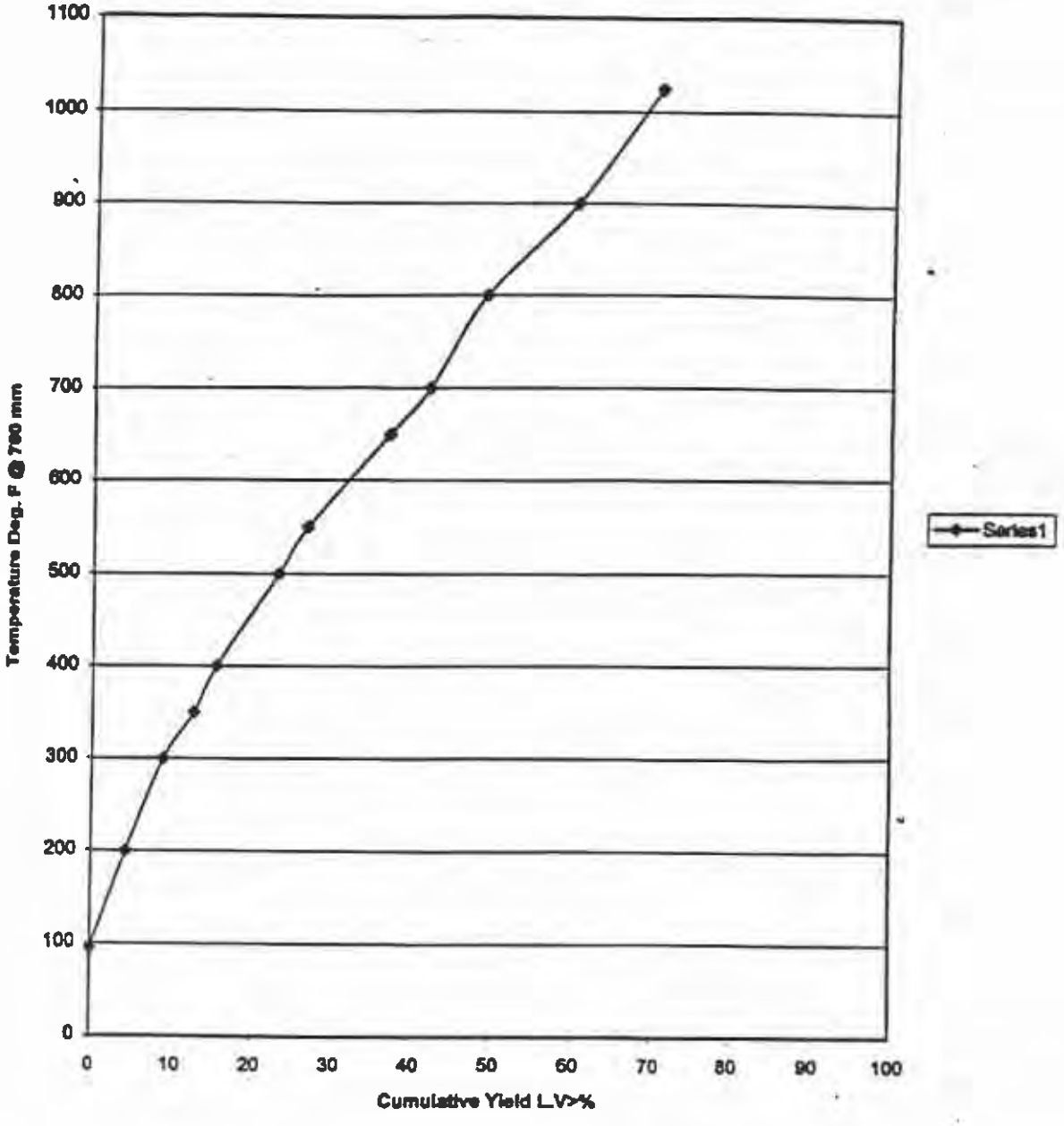
Co. Name: Petroleos Del Peru
Job No: 101341
Sample ID: Crudo OXI
ATTN: Refineria Talara

FRACTIONAL DISTILLATION TABLE

Temp. Range Deg.F.@760mm	Yield, L.V. %	Cumulative Yield, L.V. %	Yield, Wt. %	Cumulative Yield, Wt. %
IBP - 200 Deg.F.	4.33	4.33	3.21	3.21
200 - 300 Deg.F.	4.53	8.86	3.62	6.83
300 - 350 Deg.F.	3.74	12.60	3.14	9.97
350 - 400 Deg.F.	2.79	15.39	2.42	12.39
400 - 500 Deg.F.	7.70	23.09	6.97	19.36
500 - 550 Deg.F.	3.64	26.73	3.38	22.74
550 - 650 Deg.F.	10.19	36.92	9.65	32.39
650 - 700 Deg.F.	5.02	41.94	4.88	37.27
700 - 800 Deg.F.	6.99	48.93	6.93	44.20
800 - 900 Deg.F.	11.20	60.13	11.22	55.42
900 - 1025 Deg.F.	10.35	70.48	10.55	65.97
1025+ Deg.F.	29.48	99.96	33.76	99.73

Petroleos Del Peru Job: 101341 OXI Crude



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LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: Sample as Received

LABORATORY I.D...: 995252-0001
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Yield Data		*1			01/10/00
API Gravity	25.7	0	@ 60/60 Deg. F	ASTM D-287	
Specific Gravity	0.8999	0	@ 60/60 Deg. F	ASTM D-1298	
Aniline Point (Thin Film)	Too Dark		Deg. F	ASTM D-611	01/03/00
Ash Content,	< 0.001		WT %	ASTM D-482	01/10/00
Asphaltene	2.80	0.05	Wt. %	IP-143	12/04/99
Carbon Residue, Conradson	6.18		Wt. %	ASTM D-189	12/05/99
Cloud Point	Too Dark		Deg. F	ASTM D-2500	12/03/99
Copper by ICP	0.09	0.05	ppm wt.	ICP	01/12/00
Flash Point, PMCC,	50		Deg. F	ASTM D-93	12/03/99
Hydrogen Sulfide, as Sulfur	<1	1	ppm wt.	UOP-163	12/04/99
Iron by ICP	8.3	0.08	ppm wt.	ICP	01/12/00
Kinematic Viscosity	43.39		cSt @ 100 F	ASTM D-445	01/14/00
Kinematic Viscosity	25.82		cSt @ 122 F	ASTM D-445	01/12/00
K Factor	11.9			UOP 375	01/13/00
Light Hydrocarbons Analysis		*1			01/07/00
Methane	0	0	LV %		
Ethane	0	0	LV %		
Propane	0.04	0	LV %		
Isobutane	0.05	0	LV %		
N-Butane	0.06	0	LV %		
Neopentane	0	0	LV %		
Isopentane	0.16	0	LV %		
n-Pentane	0.18	0	LV %		
Hexanes	0.88	0	LV %		
Heptanes Plus	98.63	0	LV %		
Total	100.00	0			
Mercaptan Sulfur, as Sulfur	10	1	ppm wt.	UOP-163	12/04/99

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LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: Sample as Received

LABORATORY I.D....: 995252-0001
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Acid Number by Poten. Titration	0.48		mg KOH/g	ASTM D-664	12/29/99
Nickel by ICP	9.2	0.18	ppm wt.	ICP	01/11/00
Nitrogen, Basic,	328		ppm wt.	UOP 269	12/03/99
Nitrogen, Total by Chemilum.	1217	10	ppm wt.	ASTM D-4629	01/11/00
Pour Point	+10		Deg. F	ASTM D-97	12/03/99
Salt Content	760.0		lbs/1000bbls	ASTM D-3230	01/13/00
Sediment and Water	< 0.05	0.05	L.V. %	ASTM D-4007	12/08/99
Sodium by ICP	5.0	1.0	ppm wt.	ICP	01/12/00
Sulfur, Total by x-ray Fluoresc.	0.418	0.010	Wt. %	ASTM D-4294	01/05/00
Reid Vapor Pressure	0.52		psi	D-5191 ASTM Eqn.	12/28/99
Vanadium by ICP	14	0.06	ppm wt.	ICP	01/12/00

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: IBP-200 Deg. F (IBP-93 C)

LABORATORY I.D...: 995252-0003
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Yield Data		*1			01/10/00	DE
Yield	2.60	0	L.V. %	ASTM D-2892		
Yield	1.99	0	Wt. %	ASTM D-2892		
API Gravity	74.2	0	@ 60/60 Deg. F	ASTM D-5002		
Specific Gravity	0.6880	0	@ 60/60 Deg. F	ASTM D-5002		
Benzene	1.16	0.1	L.V. %	ASTM D-3606	01/04/00	BT
D-86 Distillation	Insuff.		Deg. F	ASTM D-86	01/11/00	DE
K Factor	Insuff.			UOP 375	01/11/00	DE
Mercapten Sulfur, as Sulfur	11	1	ppm wt.	UOP-163	12/04/99	MA
Nitrogen, Basic,	<1		ppm wt.	UOP 313	12/03/99	MA
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/11/00	JT
PONA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/25/00	DB
Paraffins	79.30	0.00	LV %			
Olefins	0.4	0.00	LV %			
Monocycloparaffins	17.07	0.00	LV %			
Dicycloparaffins	0.00	0.00	LV %			
Alkylbenzenes	3.23	0.00	LV %			
Indanes/Tetralins	0.00	0.00	LV %			
Naphthalenes	0.00	0.00	LV %			
Total	100.00	0.00	LV %			
Refractive Index	1.3596			Calculated	01/17/00	DB
Octane Analysis -- NIR		*1		NIR	12/29/99	DS
Research Octane Number	75.7	0		NIR		
Motor Octane Number	72.6	0		NIR		
R+M/2	74.1	0				
Sulfur, Total by Microcoulometry	5	1	ppm wt.	ASTM D-3120	12/06/99	JT
Reid Vapor Pressure	11.31		psi	D-5191 ASTM Eqn.	12/31/99	MB

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LABORATORY TESTS RESULTS
01/25/00

OB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

LIENT I.D.....: Crudo Mayna
ATE SAMPLED.....: 11/23/99
IME SAMPLED.....: :
ORK DESCRIPTION...: 200-300 Deg. F (93-149 C)

LABORATORY I.D...: 995252-0004
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
ield Data		*1			01/10/00	DBC
Yield	4.96	0	L.V. %	ASTM D-2892		
Yield	4.07	0	Wt. %	ASTM D-2892		
API Gravity	60.0	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.7390	0	@ 60/60 Deg. F	ASTM D-1298		
enzene	<0.1	0.1	L.V. %	ASTM D-3606	01/04/00	ST
istillation		*1		ASTM D-86	12/30/99	DBC
I.B.P.	233	0	Deg F.	ASTM D-86		
5% Recovered	242	1				
10% Recovered	245	1				
20% Recovered	249	1				
30% Recovered	252	1				
40% Recovered	256	1				
50% Recovered	259	1				
60% Recovered	264	1				
70% Recovered	268	1				
80% Recovered	275	1				
90% Recovered	284	1				
95% Recovered	292	1				
End Point	299	1	Deg F.			
% Recovered	99.0	0.1				
% Residue	0.8	0.1				
% Loss	0.2	0.1				
Flash Point, PMCC,	68		Deg. F	ASTM D-93	12/03/99	VS
K Factor	12.1			UOP 375	01/13/00	DBC
Mercaptan Sulfur, as Sulfur	10	1	ppm wt.	UOP-163	12/04/99	MA
Nitrogen, Basic,	<1		ppm wt.	UOP 313	12/03/99	MA
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/11/00	JT
PONA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/25/00	DB
Paraffins	68.76	0.00	LV %			
Olefins	0.3	0.00	LV %			
Monocycloparaffins	26.35	0.00	LV %			
Dicycloparaffins	1.13	0.00	LV %			
Alkylbenzenes	3.46	0.00	LV %			

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LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 200-300 Deg. F (93-149 C)

LABORATORY I.D...: 995252-0004
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Indanes/Tetralins	0.00	0.00	LV %			
Naphthalenes	0.00	0.00	LV %			
Total	100.00	0.00	LV %			
Refractive Index	1.3864			Calculated	01/17/00	DE
Octane Analysis -- NIR		*1		NIR	12/29/99	DE
Research Octane Number	66.0	0		NIR		
Motor Octane Number	64.4	0		NIR		
R+M/2	65.2	0				
Sulfur, Total by Microcoulometry	6	1	ppm wt.	ASTM D-3120	12/04/99	JT
Reid Vapor Pressure	0.91		psi	D-5191 ASTM Eqn.	12/31/99	MB

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LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 300-350 Deg. F (149-177 C)

LABORATORY I.D...: 995252-0005
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/POLLUTION	UNITS OF MEASURE	TEST METHOD	DATE
Yield Data		*1			01/10/00
Yield	2.72	0	L.V. %	ASTM D-2892	
Yield	2.35	0	Wt. %	ASTM D-2892	
API Gravity	50.5	0	@ 60/60 Deg. F	ASTM D-287	
Specific Gravity	0.7776	0	@ 60/60 Deg. F	ASTM D-1298	
Aniline Point	143.2		Deg. F	ASTM D-611	01/03/00
Benzene	<0.1	0.1	L.V. %	ASTM D-3606	01/06/00
Cetane Index	Insuff.			ASTM D-976	12/28/99
Cloud Point	<-90		Deg. F	ASTM D-2500	12/03/99
D-86 Distillation	Insuff.			ASTM D-86	12/28/99
Flash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	12/28/99
Freeze Point	-82		Deg. F	ASTM D-2386	01/07/00
Kinematic Viscosity	0.98		cSt @ 100 F	ASTM D-445	12/04/99
Kinematic Viscosity	0.86		cSt @ 122 F	ASTM D-445	12/04/99
K Factor	12.0			UOP 375	01/13/00
Mercaptan Sulfur, as Sulfur	6	1	ppm wt.	UOP-163	12/04/99
Nitrogen, Basic,	<1		ppm wt.	UOP 313	12/03/99
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/11/00
Pour Point	<-90		Deg. F	ASTM D-97	12/03/99
PONA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/25/00
Paraffins	55.64	0.00	LV %		
Olefins	0.6	0.00	LV %		
Monocycloparaffins	29.55	0.00	LV %		
Dicycloparaffins	10.17	0.00	LV %		
Alkylbenzenes	3.98	0.00	LV %		
Indanes/Tetralins	0.06	0.00	LV %		
Naphthalenes	0.00	0.00	LV %		
Total	100.00	0.00	LV %		

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LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 300-350 Deg. F (149-177 C)

LABORATORY I.D...: 995252-0005
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Refractive Index	1.4076			Calculated	01/17/00
Octane Analysis -- NIR		*1		NIR	12/29/99
Research Octane Number	66.4	0		NIR	
Motor Octane Number	64.5	0		NIR	
R+M/2	65.5	0			
Smoke Point	25		mm	ASTM D-1322	01/13/00
Sulfur, Total by Microcoulometry	56	1	ppm wt.	ASTM D-3120	12/04/99
Reid Vapor Pressure	0.12		psi	D-5191 ASTM Eqn.	12/31/99

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LABORATORY TESTS RESULTS

01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 350-400 Deg. F (177-204 C)

LABORATORY I.D....: 995252-0006
DATE RECEIVED.....: 12/02/99
TIME RECEIVED.....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Yield Data		*1			01/10/00	D
Yield	2.37	0	L.V. %	ASTM D-2892		
Yield	2.13	0	Wt. %	ASTM D-2892		
API Gravity	43.9	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8066	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	145.2		Deg. F	ASTM D-611	01/03/00	K
Benzene	<0.1	0.1	L.V. %	ASTM D-3606	01/04/00	B
Cetane Index	Insuff.			ASTM D-976	01/11/00	D
Cloud Point	-63		Deg. F	ASTM D-2500	12/03/99	V
Color	L 0.5			ASTM D-1500	12/03/99	V
Color, Saybolt	1SS			ASTM D-156	01/11/00	JI
D-86 Distillation	Insuff.		Deg. F	ASTM D-86	01/11/00	D
Flash Point, PMCC,	150		Deg. F	ASTM D-93	12/03/99	V
Freeze Point	-72		Deg. F	ASTM D-2386	01/07/00	RI
Kinematic Viscosity	1.35		cSt @ 100 F	ASTM D-445	12/04/99	BI
Kinematic Viscosity	1.15		cSt @ 122 F	ASTM D-445	12/04/99	BI
K Factor	11.8			UOP 375	01/13/00	DB
Mercaptan Sulfur, as Sulfur	Insuff.	1	ppm wt.	UOP-163	12/28/99	DB
Naphthalenes in Jet Fuel	0.58		L.V. %	ASTM D-1840	01/17/00	KC
Nitrogen, Basic,	Insuff.		ppm wt.	UOP 269	12/28/99	DE
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/11/00	JI
Pour Point	-70		Deg. F	ASTM D-97	12/03/99	VI
PONA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/25/00	DE
Paraffins	53.7	0.00	LV %			
Olefins	0.7	0.00	LV %			

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LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 350-400 Deg. F (177-204 C)

LABORATORY I.D...: 995252-0006
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Monocycloparaffins	16.2	0.00	LV %		
Dicycloparaffins	21.5	0.00	LV %		
Alkylbenzenes	5.8	0.00	LV %		
Indanes/Tetralins	1.6	0.00	LV %		
Naphthalenes	0.5	0.00	LV %		
Total	100.00	0.00	LV %		
Refractive Index	1.4261			Calculated	01/17/00
Octane Analysis -- NIR		*1		NIR	12/29/99
Research Octane Number	64.1	0		NIR	
Motor Octane Number	62.4	0		NIR	
R+M/2	63.3	0			
Smoke Point	Insuff.		mm	ASTM D-1322	12/28/99
Sulfur, Total by x-ray Fluoresc.	0.016	0.010	wt. %	ASTM D-4294	01/05/00
Reid Vapor Pressure	<0.01		psi	D-5191 ASTM Eqn.	12/31/99

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LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 400-500 Deg. F (204-260 C)

LABORATORY I.D...: 995252-0007
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Yield Data		*1			01/10/00
Yield	6.50	0	L.V. %	ASTM D-2892	
Yield	6.07	0	Wt. %	ASTM D-2892	
API Gravity	37.1	0	@ 60/60 Deg. F	ASTM D-287	
Specific Gravity	0.8395	0	@ 60/60 Deg. F	ASTM D-1298	
Bromine Number	0.27		g/100g	ASTM D-1159	12/30/99
Cetane Index	42.3			ASTM D-976	12/30/99
Cloud Point	+46		Deg. F	ASTM D-2500	12/03/99
Color	L 0.5			ASTM D-1500	12/03/99
Color, Saybolt	+30			ASTM D-156	01/11/00
Distillation		*1		ASTM D-86	01/11/00
I.B.P.	424	0	Deg F.	ASTM D-86	
5% Recovered	437	1			
10% Recovered	438	1			
20% Recovered	444	1			
30% Recovered	448	1			
40% Recovered	451	1			
50% Recovered	454	1			
60% Recovered	458	1			
70% Recovered	462	1			
80% Recovered	467	1			
90% Recovered	474	1			
95% Recovered	480	1			
End Point	486	1	Deg F.		
% Recovered	98.8	0.1			
% Residue	0.8	0.1			
% Loss	0.4	0.1			
Flash Point, PMCC,	190		Deg. F	ASTM D-93	12/03/99
Freeze Point	-44		Deg. F	ASTM D-2386	01/07/00
Hydrocarbon Type		*1		ASTM D-1319	12/30/99
Aromatics	10.7	0.2	L.V. %		
Olefins	1.0	0.2	L.V. %		
Saturates	88.3	0.2	L.V. %		

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LABORATORY TESTS RESULTS

01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 400-500 Deg. F (204-260 C)

LABORATORY I.D...: 995252-0007
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	T
Kinematic Viscosity	2.17		cSt @ 100 F	ASTM D-445	12/04/99	
Kinematic Viscosity	1.77		cSt @ 122 F	ASTM D-445	12/04/99	
K Factor	11.6			UOP 375	01/13/00	
Mercaptan Sulfur, as Sulfur	14	1	ppm wt.	UOP-163	12/04/99	
Naphthalenes in Jet Fuel	1.42		L.V. %	ASTM D-1840	01/17/00	
Acid Number by Poten. Titration	0.03		mg KOH/g	ASTM D-664	12/29/99	
Nitrogen, Basic,	<1		ppm wt.	UOP 313	12/03/99	
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/11/00	
Pour Point	-45		Deg. F	ASTM D-97	12/03/99	
PNA of Kerosene		*1		ASTM D2425 mod.	01/14/00	
Paraffins	48.3	0.1	LV %			
Monocycloparaffins	17.2	0.1	LV %			
Dicycloparaffins	20.4	0.1	LV %			
Tricycloparaffins	4.0	0.1	LV %			
Alkylbenzenes	4.1	0.1	LV %			
Indans	3.3	0.1	LV %			
Indenes	1.2	0.1	LV %			
Naphthalenes	1.5	0.1	LV %			
Acenaphthenes	<0.1	0.1	LV %			
Acenaphthalenes	<0.1	0.1	LV %			
Tricyclic Aromatics	<0.1	0.1	LV %			
Total	100.0	0	LV %			
Refractive Index	1.4454			Calculated	01/17/00	DBC
Smoke Point	18		mm	ASTM D-1322	01/13/00	JJ
Sulfur, Total by x-ray Fluoresc.	0.052	0.010	wt. %	ASTM D-4294	01/05/00	KC

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LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 500-550 Deg. F (260-2[illegible] C)

LABORATORY I.D...: 995252-0008
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TI
Yield Data		*1			01/10/00	D
Yield	2.80	0	L.V. %	ASTM D-2892		
Yield	2.66	0	wt. %	ASTM D-2892		
API Gravity	33.8	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8563	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	155.1		Deg. F	ASTM D-611	01/03/00	[illegible]
Bromine Number	0.32		g/100g	ASTM D-1159	12/30/99	[illegible]
Cetane Index	Insuff.			ASTM D-976	01/11/00	DI
Cloud Point	-24		Deg. F	ASTM D-2500	12/03/99	VS
Color	L 0.5			ASTM D-1500	12/03/99	VS
D-86 Distillation	Insuff.			ASTM D-86	12/28/99	DB
Flash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	12/28/99	DB
Freeze Point	-14		Deg. F	ASTM D-2386	01/07/00	RS
Hydrocarbon Type		*1		ASTM D-1319	12/30/99	VS
Aromatics	16.7	0.2	L.V. %			
Olefins	1.4	0.2	L.V. %			
Saturates	81.9	0.2	L.V. %			
Kinematic Viscosity	3.31		cSt @ 100 F	ASTM D-445	12/04/99	RS
Kinematic Viscosity	2.62		cSt @ 122 F	ASTM D-445	12/04/99	RS
C Factor	11.7			UOP 375	01/13/00	DBC
Mercaptan Sulfur, as Sulfur	Insuff.	1	ppm wt.	UOP-163	12/28/99	DBC
Naphthalenes in Jet Fuel	2.24		L.V. %	ASTM D-1840	01/17/00	KC
Acid Number by Poten. Titration	0.04		mg KOH/g	ASTM D-664	12/30/99	MA
Nitrogen, Basic,	Insuff.		ppm wt.	UOP 269	12/28/99	DBC
Nitrogen, Total by Chemilum.	2	1	ppm wt.	ASTM D-4629	01/11/00	JT

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LABORATORY TESTS RESULTS

01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 500-550 Deg. F (260-288 C)

LABORATORY I.D....: 995252-0008
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Pour Point	-25		Deg. F	ASTM D-97	12/03/99
PNA of Kerosene		*1		ASTM D2425 mod.	01/14/00
Paraffins	47.4	0.1	LV %		
Monocycloparaffins	18.0	0.1	LV %		
Dicycloparaffins	16.8	0.1	LV %		
Tricycloparaffins	4.1	0.1	LV %		
Alkylbenzenes	3.9	0.1	LV %		
Indans	3.7	0.1	LV %		
Indenes	3.3	0.1	LV %		
Napnthalenes	2.3	0.1	LV %		
Acenaphthenes	0.3	0.1	LV %		
Acenaphthalenes	0.2	0.1	LV %		
Tricyclic Aromatics	<0.1	0.1	LV %		
Total	100.0	0	LV %		
Refractive Index	1.4492		67 Deg. C	ASTM D-1747	01/10/00
Refractive Index	1.4531			Calculated	01/17/00
Smoke Point	Insuff.		mm	ASTM D-1322	12/28/99
Sulfur, Total by x-ray Fluoresc.	0.108	0.010	Wt. %	ASTM D-4294	01/05/00

P O BOX 34766
HOUSTON, TX 77234-4282
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CORE LABORATORIES

LABORATORY TESTS RESULTS

01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 550-650 Deg. F (288-343 C)

LABORATORY I.D...: 995252-0009
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Yield Data		*1			01/10/00
Yield	11.99	0	L.V. %	ASTM D-2892	
Yield	11.53	0	Wt. %	ASTM D-2892	
API Gravity	32.0	0	@ 60/60 Deg. F	ASTM D-287	
Specific Gravity	0.8655	0	@ 60/60 Deg. F	ASTM D-1298	
Aniline Point	170.1		Deg. F	ASTM D-611	01/03/00
Bromine Number	0.37		g/100g	ASTM D-1159	12/30/99
Carbon Residue, Conradson	0		Wt. %	ASTM D-189	12/05/99
Carbon Residue, Ramsbottom	0.07		Wt. %	ASTM D-524	01/11/00
Cetane Index	48.4			ASTM D-976	12/30/99
Cloud Point	0		Deg. F	ASTM D-2500	12/03/99
Color	L 0.5			ASTM D-1500	12/03/99
Distillation		*1		ASTM D-86	12/30/99
I.B.P.	548	0	Deg F.	ASTM D-86	
5% Recovered	562	1			
10% Recovered	564	1			
20% Recovered	566	1			
30% Recovered	570	1			
40% Recovered	573	1			
50% Recovered	576	1			
60% Recovered	580	1			
70% Recovered	582	1			
80% Recovered	590	1			
90% Recovered	603	1			
95% Recovered	605	1			
End Point	608	1	Deg F.		
% Recovered	98.0	0.1			
% Residue	1.3	0.1			
% Loss	0.7	0.1			
Flash Point, PMCC,	270		Deg. F	ASTM D-93	12/03/99
Freeze Point	*3		Deg. F	ASTM D-2386	01/07/00
Kinematic Viscosity	5.89		cSt @ 100 F	ASTM D-445	01/12/00

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 550-650 Deg. F (288-343 C)

LABORATORY I.D...: 995252-0009
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Kinematic Viscosity	4.33		cSt @ 122 F	ASTM D-445	12/04/99
K Factor	11.8			UOP 375	01/13/00
Mercaptan Sulfur, as Sulfur	16	1	ppm wt.	UOP-163	12/04/99
Naphthalenes in Jet Fuel	4.17		L.V. %	ASTM D-1840	01/17/00
Acid Number by Poten. Titration	0.11		mg KOH/g	ASTM D-664	12/30/99
Nitrogen, Basic,	12		ppm wt.	UOP 269	12/03/99
Nitrogen, Total by Chemilum.	17	1	ppm wt.	ASTM D-4629	01/11/00
Pour Point	0		Deg. F	ASTM D-97	12/03/99
PNA Middle Distillates, Mass Spec		*1		ASTM D-2425	01/14/00
Paraffins	48.2	0	LV %		
Monocycloparaffins	18.4	0	LV %		
Dicycloparaffins	13.5	0	LV %		
Tricycloparaffins	2.9	0	LV %		
Alkylbenzenes	5.1	0	LV %		
Indanes/Tetralins	3.1	0	LV %		
Indenes	3.9	0	LV %		
Naphthalenes	2.7	0	LV %		
Acenaphthenes	1.0	0	LV %		
Acenaphthalenes	0.8	0	LV %		
Tricyclic Aromatics	0.4	0	LV %		
Total	100.0	0	LV %		
Refractive Index	1.4558		67 Deg. C	ASTM D-1747	01/10/00
Refractive Index	1.4618			Calculated	01/17/00
Smoke Point	13		mm	ASTM D-1322	01/13/00
Sulfur, Total by x-ray Fluoresc.	0.162	0.010	Wt. %	ASTM D-4294	01/05/00

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 650-700 Deg. F (343-371 C)

LABORATORY I.D....: 995252-0010
DATE RECEIVED.....: 12/02/99
TIME RECEIVED.....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	
Yield Data		*1			01/10/00	
Yield	6.37	0	L.V. %	ASTM D-2892		
Yield	6.24	0	Wt. %	ASTM D-2892		
API Gravity	28.9	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8823	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	177.3		Deg. F	ASTM D-611	01/03/00	
Bromine Number	0.56		g/100g	ASTM D-1159	12/30/99	
Carbon Residue, Conradson	0		Wt. %	ASTM D-189	12/05/99	
Carbon Residue, Ramsbottom	0.06		Wt. %	ASTM D-524	01/11/00	
Cetane Index	46.5			ASTM D-976	12/30/99	D
Cloud Point	-48		Deg. F	ASTM D-2500	12/03/99	V
Color	L 1.0			ASTM D-1500	12/03/99	V
Distillation		*1		ASTM D-86	12/30/99	D
I.B.P.	599	0	Deg F.	ASTM D-86		
5% Recovered	628	1				
10% Recovered	635	1				
20% Recovered	637	1				
30% Recovered	640	1				
40% Recovered	642	1				
50% Recovered	643	1				
60% Recovered	645	1				
70% Recovered	646	1				
80% Recovered	649	1				
90% Recovered	653	1				
95% Recovered	656	1				
End Point	661	1	Deg F.			
% Recovered	98.9	0.1				
% Residue	0.6	0.1				
% Loss	0.5	0.1				
Flash Point, PMCC,	315		Deg. F	ASTM D-93	12/03/99	VS
Kinematic Viscosity	11.88		cSt @ 100 F	ASTM D-445	01/12/00	BB
Kinematic Viscosity	7.87		cSt @ 122 F	ASTM D-445	01/12/00	BB

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION....: 650-700 Deg. F (343-371 C)

LABORATORY I.D....: 995252-0010
DATE RECEIVED.....: 12/02/99
TIME RECEIVED.....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TI
Kinematic Viscosity	2.69		cSt @ 210 F	ASTM D-445	01/11/00	E
K Factor	11.8			UOP 375	01/13/00	C
Mercaptan Sulfur, as Sulfur	10	1	ppm wt.	UOP-163	12/04/99	a
Acid Number by Poten. Titration	0.30		mg KOH/g	ASTM D-664	12/30/99	N
Nitrogen, Basic,	39		ppm wt.	UOP 269	12/03/99	N
Nitrogen, Total by Chemilum.	70	1	ppm wt.	ASTM D-4629	01/11/00	J
Pour Point	+30		Deg. F	ASTM D-97	12/03/99	V
PNA of Gas Oil		*1		ASTM D2786,3239	01/18/00	L:
Paraffins	30.7	0	LV %			
Naphthenes	51.3	0	LV %			
Aromatics	18.0	0	LV %			
NAPHTHENIC DISTRIBUTION	--	0				
---1 Ring	17.1	0	LV %			
---2 Ring	17.1	0	LV %			
---3 Ring	10.9	0	LV %			
---4 Ring	6.2	0	LV %			
---5 Ring	0.0	0	LV %			
---6 Ring	0.0	0	LV %			
AROMATIC DISTRIBUTION	--	0				
Monoaromatics	9.6	0	LV %			
---Alkylbenzenes	4.2	0	LV %			
---Naphthenobenzenes	2.3	0	LV %			
---Dinaphthenobenzenes	3.1	0	LV %			
Diaromatics	5.5	0	LV %			
---Naphthalenes	2.3	0	LV %			
---Acenaphthenes/Dibenzofurans	1.5	0	LV %			
---Fluorenes	1.7	0	LV %			
Triaromatics	1.2	0	LV %			
---Phenenanthrenes	1.1	0	LV %			
---Naphthenephenanthrenes	0.1	0	LV %			
Tetraaromatics	0.3	0	LV %			
---Pyrenes	0.2	0	LV %			
---Chyrsenes	0.1	0	LV %			
Pentaaromatics	0.0	0	LV %			
---Perylenes	0.0	0	LV %			
---Dibenzanthracenes	0.0	0	LV %			
Thiophene Aromatics	1.4	0	LV %			

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CORE LABORATORIES

LABORATORY TESTS RESULTS

01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 650-700 Deg. F (343-371 C)

LABORATORY I.D...: 995252-0010
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
---Benzothiophenes	0.8	0	LV %		
---Dibenzothiophenes	0.6	0	LV %		
---Naphthabenzothiophenes	0.0	0	LV %		
Unidentified Aromatics	0.0	0	LV %		
---Class I (see Naph. Phen.)	0.0	0	LV %		
---Class II	0.0	0	LV %		
---Class III	0.0	0	LV %		
---Class IV	0.0	0	LV %		
---Class V	0.0	0	LV %		
---Class VI	0.0	0	LV %		
---Class VII	0.0	0	LV %		
Refractive Index	1.4664		67 Deg. C	ASTM D-1747	01/10/00
Refractive Index	1.4723			Calculated	01/17/00
Sulfur, Total by x-ray Fluoresc.	0.299	0.010	Wt. %	ASTM D-4294	01/05/00

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CORE LABORATORIES

LABORATORY TESTS RESULTS

01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 700+ Deg. F (371+ C)

LABORATORY I.D...: 995252-0011
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Yield Data .		*1			01/10/00
Yield	59.39	0	L.V. %	ASTM D-2892	
Yield	62.71	0	Wt. %	ASTM D-2892	
API Gravity	17.4	0	@ 60/60 Deg. F	ASTM D-287	
Specific Gravity	0.9503	0	@ 60/60 Deg. F	ASTM D-1298	
Aniline Point (Thin Film)	Too Dark		Deg. F	ASTM D-611	01/03/00

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CORE LABORATORIES

LABORATORY TESTS RESULTS

01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....:
WORK DESCRIPTION...: 700-800 Deg. F (371-427 C)

LABORATORY I.D...: 995252-0012
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/PRECISION	UNITS OF MEASURE	TEST METHOD	DATE	T
Yield Data Hyvac Potstill		*1		ASTM D-5236	01/10/00	
Yield L.V. %	10.50	0	L.V.%	ASTM D-5236		
Yield Wt. %	10.50	0	Wt. %	ASTM D-5236		
API Grav.	25.8	0	@ 60/60 Deg. F	ASTM D-287		
Spec. Grav.	0.8996	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	192.4		Deg. F	ASTM D-611	01/03/00	
Asphaltene	0.08	0.05	Wt. %	IP-143	12/04/99	
Bromine Number	0.67		g/100g	ASTM D-1159	12/30/99	
Carbon Residue, Conradson	0		Wt. %	ASTM D-189	12/05/99	
Carbon Residue, Ramsbottom	0.09		Wt. %	ASTM D-524	01/11/00	
Cetane Index	Insuff.			ASTM D-976	12/29/99	
Color	L 3.0			ASTM D-1500	12/03/99	
Vacuum Distillation	Insuff.		Deg. F	ASTM D-1160	12/28/99	
Flash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	12/28/99	
Kinematic Viscosity	37.82		cSt @ 100 F	ASTM D-445	01/12/00	
Kinematic Viscosity	21.8		cSt @ 122 F	ASTM D-445	01/12/00	
Kinematic Viscosity	5.15		cSt @ 210 F	ASTM D-445	01/11/00	
K Factor	11.9			UOP 375	01/13/00	
Acid Number by Poten. Titration	0.55		mg KOH/g	ASTM D-664	12/30/99	
Nitrogen, Basic,	103		ppm wt.	UOP 269	12/03/99	
Nitrogen, Total by Chemilum.	255	1	ppm wt.	ASTM D-4629	01/11/00	
Pour Point	+65		Deg. F	ASTM D-97	01/11/00	
PNA of Gas Oil		*1		ASTM D2786,3239	01/18/00	
Paraffins	25.5	0	LV %			
Naphthenes	51.7	0	LV %			

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 700-800 Deg. F (371-427 C)

LABORATORY I.D....: 995252-0012
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Aromatics	22.8	0	LV %		
NAPHTHENIC DISTRIBUTION	--	0			
---1 Ring	16.2	0	LV %		
---2 Ring	17.4	0	LV %		
---3 Ring	12.1	0	LV %		
---4 Ring	6.0	0	LV %		
---5 Ring	0.0	0	LV %		
---6 Ring	0.0	0	LV %		
AROMATIC DISTRIBUTION	--	0			
Monoaromatics	12.9	0	LV %		
---Alkylbenzenes	5.9	0	LV %		
---Naphthenebenzenes	3.3	0	LV %		
---Dinaphthenebenzenes	3.7	0	LV %		
Diaromatics	5.5	0	LV %		
---Naphthalenes	2.1	0	LV %		
---Acenaphthenes/Dibenzofurans	1.4	0	LV %		
---Fluorenes	2.0	0	LV %		
Triaromatics	1.8	0	LV %		
---Phenanthrenes	1.4	0	LV %		
---Naphthenephenanthrenes	0.4	0	LV %		
Tetraaromatics	0.8	0	LV %		
---Pyrenes	0.7	0	LV %		
---Chyrsenes	0.1	0	LV %		
Pentaaromatics	0.0	0	LV %		
---Perylenes	0.0	0	LV %		
---Dibenzanthracenes	0.0	0	LV %		
Thiophene Aromatics	1.6	0	LV %		
---Benzothiophenes	0.8	0	LV %		
---Dibenzothiophenes	0.7	0	LV %		
---Naphthabenzothiophenes	0.1	0	LV %		
Unidentified Aromatics	0.2	0	LV %		
---Class I (see Naph. Phen.)	0.0	0	LV %		
---Class II	0.0	0	LV %		
---Class III	0.0	0	LV %		
---Class IV	0.2	0	LV %		
---Class V	0.0	0	LV %		
---Class VI	0.0	0	LV %		
---Class VII	0.0	0	LV %		
Refractive Index	1.4770		67 Deg. C	ASTM D-1747	01/10/00
Refractive Index	1.4806			Calculated	01/17/00
Sulfur, Total by x-ray Fluoresc.	0.373	0.010	Wt. %	ASTM D-4294	01/05/00

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 800-900 Deg. F (427-482 C)

LABORATORY I.D...: 995252-0013
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	T
Yield Data Hyvac Potstill		*1		ASTM D-5236	01/10/00	
Yield L.V. %	13.78	0	L.V.%	ASTM D-5236		
Yield Wt. %	13.87	0	Wt. %	ASTM D-5236		
API Grav.	24.7	0	@ 60/60 Deg. F	ASTM D-287		
Spec. Grav.	0.9062	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	201.0		Deg. F	ASTM D-611	01/03/00	I
Ash Content,	<0.001		WT %	ASTM D-482	01/13/00	V
Asphaltene .	0.44	0.05	Wt. %	IP-143	12/04/99	J
Bromine Number	0.78		g/100g	ASTM D-1159	12/30/99	N
Carbon Residue, Conradson	0.02		Wt. %	ASTM D-189	01/10/00	J
Carbon Residue, Ramsbottom	0.11		Wt. %	ASTM D-524	01/11/00	J
Cetane Index	Insuff.			ASTM D-976	12/29/99	D
Copper by ICP	<0.05	0.05	ppm wt.	ICP	01/12/00	J
Vacuum Distillation	Insuff.		Deg. F	ASTM D-1160	12/28/99	D
Flash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	12/28/99	D
Iron by ICP	1.3	0.08	ppm wt.	ICP	01/12/00	J
Kinematic Viscosity	41.27		cSt @ 122 F	ASTM D-445	01/12/00	B
Kinematic Viscosity	7.92		cSt @ 210 F	ASTM D-445	01/11/00	B
K Factor	12.0			UOP 375	01/13/00	D
Acid Number by Poten. Titration	1.00		mg KOH/g	ASTM D-664	12/30/99	M
Nickel by ICP	<0.18	0.18	ppm wt.	ICP	01/11/00	J
Nitrogen, Basic,	138		ppm wt.	UOP 269	12/03/99	M
Nitrogen, Total by Chemilum.	525	10	ppm wt.	ASTM D-4629	01/11/00	J
Pour Point	+80		Deg. F	ASTM D-97	01/11/00	V

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CORE LABORATORIES

LABORATORY TESTS RESULTS

01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 800-900 Deg. F (427-482 C)

LABORATORY I.D...: 995252-0013
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TI
PNA of Gas Oil		*1		ASTM D2786,3239	01/18/00	L
Paraffins	22.9	0	LV %			
Naphthenes	51.6	0	LV %			
Aromatics	25.5	0	LV %			
NAPHTHENIC DISTRIBUTION	--	0				
---1 Ring	15.9	0	LV %			
---2 Ring	17.7	0	LV %			
---3 Ring	12.7	0	LV %			
---4 Ring	4.2	0	LV %			
---5 Ring	1.1	0	LV %			
---6 Ring	0.0	0	LV %			
AROMATIC DISTRIBUTION	--	0				
Monoaromatics	14.6	0	LV %			
---Alkylbenzenes	6.7	0	LV %			
---Naphthenebenzenes	3.8	0	LV %			
---Dinaphthenebenzenes	4.1	0	LV %			
Diaromatics	5.9	0	LV %			
---Naphthalenes	2.3	0	LV %			
---Acenaphthenes/Dibenzofurans	1.4	0	LV %			
---Fluorenes	2.2	0	LV %			
Triaromatics	1.6	0	LV %			
---Phenenanthrenes	1.1	0	LV %			
---Naphthenephenanthrenes	0.5	0	LV %			
Tetraaromatics	1.2	0	LV %			
---Pyrenes	0.9	0	LV %			
---Chyrsenes	0.3	0	LV %			
Pentaaromatics	0.1	0	LV %			
---Perylenes	0.1	0	LV %			
---Dibenzanthracenes	0.0	0	LV %			
Thiophene Aromatics	1.8	0	LV %			
---Benzothiophenes	1.0	0	LV %			
---Dibenzothiophenes	0.7	0	LV %			
---Naphthabenzothiophenes	0.1	0	LV %			
Unidentified Aromatics	0.3	0	LV %			
---Class I (see Naph. Phen.)	0.0	0	LV %			
---Class II	0.0	0	LV %			
---Class III	0.0	0	LV %			
---Class IV	0.3	0	LV %			
---Class V	0.0	0	LV %			
---Class VI	0.0	0	LV %			
---Class VII	0.0	0	LV %			
fractive Index	1.4816		67 Deg. C	ASTM D-1747	01/10/00	JDP

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CORE LAB

CORE LABORATORIES

LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 800-900 Deg. F (427-482 C)

LABORATORY I.D...: 995252-0013
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Refractive Index	1.4878			Calculated	01/17/00	D
Sulfur, Total by x-ray Fluoresc.	0.384	0.010	Wt. %	ASTM D-4294	01/05/00	K
Vanadium by ICP	<0.06	0.06	ppm wt.	ICP	01/12/00	J

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/25/00

OB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

:LIENT I.D.....: Crudo Mayna
:ATE SAMPLED.....: 11/23/99
'IME SAMPLED.....: :
:ORK DESCRIPTION...: 900-1045 Deg. F (482-563 C)

LABORATORY I.D...: 995252-0014
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

'EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
'ield Data Hyvac Potstill		*1		ASTM D-5236	01/10/00	DB
Yield L.V. %	12.85	0	L.V.%	ASTM D-5236		
Yield Wt. %	13.15	0	Wt. %	ASTM D-5236		
API Grav.	22.1	0	@ 60/60 Deg. F	ASTM D-287		
Spec. Grav.	0.9211	0	@ 60/60 Deg. F	ASTM D-1298		
:nitial Point	219.4		Deg. F	ASTM D-611	01/03/00	KC
ash Content,	<0.001		WT %	ASTM D-482	01/13/00	VS
asphaltene	0.33	0.05	Wt. %	IP-143	12/04/99	JD
·rosine Number	1.5		g/100g	ASTM D-1159	12/30/99	NA
arbon Residue, Conradson	1.02		Wt. %	ASTM D-189	01/10/00	JDI
arbon Residue, Ramsbottom	0.75		Wt. %	ASTM D-524	01/11/00	JDI
opper by ICP	0.05	0.05	ppm wt.	ICP	01/12/00	JW
acuum Distillation	Insuff.		Deg. F	ASTM D-1160	12/28/99	DBC
lash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	12/28/99	DBC
ron by ICP	1.6	0.08	ppm wt.	ICP	01/12/00	JW
inematic Viscosity	178.4		cSt @ 122 F	ASTM D-445	01/12/00	BB
inematic Viscosity	21.22		cSt @ 210 F	ASTM D-445	01/12/00	BB
inematic Viscosity	6.43		cSt @ 300 F	ASTM D-445	01/12/00	BB
Factor	12.0			UOP 375	01/13/00	DBC
cid Number by Poten. Titration	1.21		mg KOH/g	ASTM D-664	12/03/99	NA
ickel by ICP	0.38	0.18	ppm wt.	ICP	01/11/00	JW
itrogen, Basic,	306		ppm wt.	UOP 269	12/03/99	NA
itrogen, Total by Chemilum.	1064	10	ppm wt.	ASTM D-4629	01/11/00	JT
our Point	+110		Deg. F	ASTM D-97	01/11/00	VS

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CORE LABORATORIES

LABORATORY TESTS RESULTS

01/25/00

JOB-NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION....: 900-1045 Deg. F (482-563 C)

LABORATORY I.D....: 995252-0014
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
PNA of Gas Oil		*1		ASTM D2786,3239	01/18/00
Paraffins	18.9	0	LV %		
Naphthenes	42.4	0	LV %		
Aromatics	38.7	0	LV %		
NAPHTHENIC DISTRIBUTION	--	0			
---1 Ring	12.9	0	LV %		
---2 Ring	14.2	0	LV %		
---3 Ring	10.1	0	LV %		
---4 Ring	3.7	0	LV %		
---5 Ring	1.2	0	LV %		
---6 Ring	0.3	0	LV %		
AROMATIC DISTRIBUTION	--	0			
Monoaromatics	22.3	0	LV %		
---Alkylbenzenes	10.6	0	LV %		
---Naphthenobenzenes	5.7	0	LV %		
---Dinaphthenobenzenes	6.0	0	LV %		
Diaromatics	11.5	0	LV %		
---Naphthalenes	4.3	0	LV %		
---Acenaphthenes/Dibenzofurans	1.9	0	LV %		
---Fluorenes	5.3	0	LV %		
Triaromatics	1.4	0	LV %		
---Phenanthrenes	1.0	0	LV %		
---Naphthenophenanthrenes	0.4	0	LV %		
Tetraaromatics	1.0	0	LV %		
---Pyrenes	0.7	0	LV %		
---Chyrsenes	0.3	0	LV %		
Pentaaromatics	0.0	0	LV %		
---Perylenes	0.0	0	LV %		
---Dibenzanthracenes	0.0	0	LV %		
Thiophene Aromatics	2.2	0	LV %		
---Benzothiophenes	1.7	0	LV %		
---Dibenzothiophenes	0.5	0	LV %		
---Naphthobenzothiophenes	0.0	0	LV %		
Unidentified Aromatics	0.3	0	LV %		
---Class I (see Naph. Phen.)	0.0	0	LV %		
---Class II	0.0	0	LV %		
---Class III	0.0	0	LV %		
---Class IV	0.3	0	LV %		
---Class V	0.0	0	LV %		
---Class VI	0.0	0	LV %		
---Class VII	0.0	0	LV %		
Refractive Index	1.4906		67 Deg. C	ASTM D-1747	01/10/00

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CORE LABORATORIES

LABORATORY TESTS RESULTS

01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU-SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 900-1045 Deg. F (482-563 C)

LABORATORY I.D....: 995252-0014
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Refractive Index	1.4951			Calculated	01/17/00
Sulfur, Total by x-ray Fluoresc.	0.479	0.010	Wt. %	ASTM D-4294	01/05/00
Vanadium by ICP	0.10	0.06	ppm wt.	ICP	01/12/00

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 650+ Deg. F (343+ C)

LABORATORY I.D...: 995252-0013
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Yield Data		*1			01/10/00
Yield	65.76	0	L.V. %	ASTM D-2892	
Yield	68.95	0	Wt. %	ASTM D-2892	
API Gravity	18.4	0	@ 60/60 Deg. F	ASTM D-287	
Specific Gravity	0.9440	0	@ 60/60 Deg. F	ASTM D-1298	
Ash Content,	0.01		WT %	ASTM D-482	01/13/00
Asphaltene	3.20	0.05	Wt. %	IP-143	12/05/99
Bromine Number	1.2		g/100g	ASTM D-1159	12/30/99
Carbon Residue, Ramsbottom	4.97		Wt. %	ASTM D-524	01/11/00
Copper by ICP	0.11	0.05	ppm wt.	ICP	01/12/00
Flash Point, PMCC,	395		Deg. F	ASTM D-93	12/03/99
Iron by ICP	7.4	0.08	ppm wt.	ICP	01/12/00
Kinematic Viscosity	397.7		cSt @ 122 F	ASTM D-445	01/12/00
Kinematic Viscosity	42.04		cSt @ 210 F	ASTM D-445	01/12/00
K Factor	11.9			UOP 375	01/13/00
Acid Number by Poten. Titration	0.67		mg KOH/g	ASTM D-664	12/03/99
Nickel by ICP'	16	0.18	ppm wt.	ICP	01/11/00
Nitrogen, Basic,	546		ppm wt.	UOP 269	12/03/99
Nitrogen, Total by Chemilum.	1721	10	ppm wt.	ASTM D-4629	01/11/00
Pour Point	+70		Deg. F	ASTM D-97	01/11/00
Refractive Index	Too Dark		67 Deg. C	ASTM D-1747	01/10/00
Sulfur, Total by x-ray Fluoresc.	0.569	0.010	Wt. %	ASTM D-4294	01/05/00
Vanadium by ICP	20	0.06	ppm wt.	ICP	01/12/00

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LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 1045+ Deg. F (563+ C)

LABORATORY I.D...: 995252-0016
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Yield Data Nyvac Potstill		*1		ASTM D-5236	01/10/00
Yield L.V. %	22.26	0	L.V.%	ASTM D-5236	
Yield Wt. %	25.19	0	Wt. %	ASTM D-5236	
API Grav.	7.5	0	@ 60/60 Deg. F	ASTM D-70	
Spec. Grav.	1.0183	0	@ 60/60 Deg. F	ASTM D-70	
Ash Content,	0.04		WT %	ASTM D-482	01/13/00
Asphaltene	14.17	0.05	Wt. %	IP-143	12/05/99
Bromine Number	2.8		g/100g	ASTM D-1159	12/30/99
Carbon Residue, Conradson	17.19		Wt. %	ASTM D-189	01/10/00
Carbon Residue, Ramsbottom	16.0		Wt. %	Calculated	01/21/00
Copper by ICP	0.22	0.05	ppm wt.	ICP	01/12/00
Flash Point, COC,	695		Deg. F	ASTM D-92	01/17/00
Iron by ICP	21	0.08	ppm wt.	ICP	01/12/00
Kinematic Viscosity	Can't Run		cSt @ 210 F	ASTM D-445	01/14/00
Kinematic VPacosity	1409		cSt @ 300 F	ASTM D-445	01/12/00
Kinematic Viscosity	Can't Run		cSt @ 350 F	ASTM D-445	01/12/00
K Factor	Insuff.			UOP 375	01/13/00
Acid Number by Poten. Titration	0.51		mg KOH/g	ASTM D-664	12/03/99
Nickel by ICP	42	0.18	ppm wt.	ICP	01/11/00
Nitrogen, Basic,	903		ppm wt.	UOP 269	12/03/99
Nitrogen, Total by Chemilum.	3892	20	ppm wt.	ASTM D-4629	01/11/00
Penetration	10		1/10mm Div.	ASTM D-5	12/08/99
Refractive Index	Too Dark		67 Deg. C	ASTM D-1747	01/10/00
Softening Point	+153		Deg. F	ASTM D-36	01/11/00

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/25/00

JOB NUMBER: 995252 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Mayna
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 1045+ Deg. F (563+ C)

LABORATORY I.D...: 995252-0016
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:21
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Sulfur, Total by x-ray Fluoresc.	0.825	0.010	Wt. %	ASTM D-4294	01/05/00	E
Vanadium by ICP	56	0.06	ppm wt.	ICP	01/12/00	J

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CORE LABORATORIES

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Co. Name: Petro Peru
Job No: 995252
Sample ID: Crudo Mayna

FRACTIONAL DISTILLATION TABLE

Temp. Range Deg.F.@760mm	Yield, L.V. %	Cumulative Yield, L.V. %	Yield, Wt. %	Cumulative Yield, Wt. %
IBP - 200 Deg.F.	2.60	2.60	1.99	1.99
200 - 300 Deg.F.	4.96	7.56	4.07	6.06
300 - 350 Deg.F.	2.72	10.28	2.35	8.41
350 - 400 Deg.F.	2.37	12.65	2.13	10.54
400 - 500 Deg.F.	6.50	19.15	6.07	16.61
500 - 550 Deg.F.	2.80	21.95	2.66	19.27
550 - 650 Deg.F.	11.99	33.94	11.53	30.80
650 - 700 Deg.F.	6.37	40.31	6.24	37.04
700 - 800 Deg.F.	10.50	50.81	10.50	47.54
800 - 900 Deg.F.	13.78	64.59	13.87	61.41
900 - 1045 Deg.F.	12.85	77.44	13.15	74.56
1045+ Deg.F.	22.26	99.70	25.19	99.75

PDVSA Manufactura y Mercadeo

MESA 30 CRUDE OIL

CRUDE OIL CHARACTERISTICS		
API GRAVITY 60 ° F	deg	30.0
SPECIFIC GRAVITY 15/4 ° C		0.8762
KINEMATIC VISCOSITY AT 100 ° F	cSt	9.25
KINEMATIC VISCOSITY AT 122 ° F	cSt	6.33
SULPHUR	% wt	1.08
WAX CONTENT	% wt	5.26
POUR POINT	°C/°F	-37/-35
UOP K Characteristic Factor		11.9
H2S EXISTENT	ppm w	<1
REID VAPOR PRESSURE	psi	5.42
FLASH POINT	°C/°F	-20/-4
SALT CONTENT	lb/MBl	7.2
INORGANIC CHLORIDES	ppm	6.26

LIGHT HYDROCARBONS			
G.L.C. ANALYSI		%vol	
FRACTI	IP 20°C	20 100	100 15
YIELD	1.11	6.7	9.37
C1+C2	0.00		
C3	0.09		
ISO C4	0.14	0.02	0.00
N-C4	0.44	0.16	0.01
ISO C5	0.25	0.59	0.02
N-C5	0.16	0.80	0.03
C6+	0.04		

GENERAL INFORMATION

THE ANALITYCAL DATA OF THIS SHEET REPRESENTS THE RESULTS OF A DETAILED EVALUATION COMPLETED IN OCT 95 AT INTEVEP LABORATORIES.

ISSUED OCTOBER 1996

		CRUDE	DISTILLATION												
FRACTIONS	°C / °F	OIL	20-100 / 68-212	100-15 / 212-30	150-20 / 302-39	200-25 / 392-48	250-30 / 482-57	300-34 / 572-65	342-40 / 650-75	402-46 / 756-86	461-51 / 862-95	343+ / 650+	402+ / 756+	461+ / 862+	51[illegible]+ / 954+
YIELD ON CRUDE OIL	% vol		6.70	9.37	8.32	8.76	9.52	8.34	11.31	9.04	7.41	47.88	36.51	27.53	23.12
YIELD ON CRUDE OIL	% wt		5.32	8.14	7.53	8.28	9.27	8.34	11.62	9.48	7.90	52.37	40.75	31.27	23.37
MEAN BOILING POINT	°C/°F		70/156	22/25	72/34	21/43	67/51	15/59	90/73	36/81	89/912				
SPECIFIC GRAVITY 60/60 ° F		0.8762	0.6960	0.7608	0.7932	0.8285	0.8534	0.8762	0.9001	0.9188	0.9346	0.9574	0.9732	0.9930	1.0166
API GRAVITY AT 60 F		30.0	71.8	54.5	46.9	39.3	34.3	30.0	25.7	22.5	19.9	16.3	13.9	11.0	7.6
ASTM DISTILLATION, IBP	°C/°F		44/111	100/212	155/311	206/403	256/443	305/581	340/644	373/703	431/808	351/664	390/734	393/740	
" 5% VOL RECOVERED	°C/°F		54/129	111/232	163/325	214/417	261/502	309/588	373/703	407/765	460/860	369/696	427/801	477/891	
" 10% VOL RECOVERED	°C/°F		56/133	112/234	165/329	215/419	262/504	310/590	377/711	414/777	464/867	387/729	493/822	489/913	
" 30% VOL RECOVERED	°C/°F		66/151	117/243	169/336	219/426	264/507	312/594	383/721	423/793	477/891	422/792	481/898	534/993	
" 50% VOL RECOVERED	°C/°F		71/160	122/252	172/342	222/432	267/513	315/599	390/734	436/817	489/912	484/903	537/999	77/1071	
" 70% VOL RECOVERED	°C/°F		80/176	128/262	177/351	226/439	272/522	318/604	400/752	448/838	501/934	62/1044			
" 90% VOL RECOVERED	°C/°F		90/194	138/280	186/367	234/453	278/532	326/619	419/786	472/882	523/973				
" [illegible] VOL RECOVERED	°C/°F		94/201	142/288	190/374	237/459	282/540	330/626	438/802	480/896	537/999				
F[illegible]	°C/°F		113/23	167/333	218/424	248/478	284/543	346/655							
KINEMATIC VISCOSITY AT 100° F	cSt	8.25				1.68	3.21	6.68							
KINEMATIC VISCOSITY AT 122 ° F	cSt	6.33							14.14	39.71	136.6				
KINEMATIC VISCOSITY AT 140 ° F	cSt	5.05				1.28	2.17	3.91	10.06	25.37	77.3				
KINEMATIC VISCOSITY AT 180 ° F	cSt					0.98	1.24		5.34	11.79	28.6	52.36	183.5	766.2	
KINEMATIC VISCOSITY AT 210 ° F	cSt	2.78						1.93	3.96	7.50	16.1	30.29	84.52	279.8	1389
KINEMATIC VISCOSITY AT 260 ° F	cSt											13.35	29.33	75.59	263.3
KINEMATIC VISCOSITY AT 275 ° F	cSt														174.5
ABSOLUTE VISCOSITY AT 60°C	Poise												7.5	43.0	512.0
MERCAPTANS (AS S)	ppm wt	6.3	<1	<1	1.8	2.1	6.3	8.3							
SULPHUR	% wt	1.08	0.003	0.003	0.022	0.15	0.62	0.94	1.19	1.26	1.42	1.57	1.67	1.81	1.93
COPPER CORROSION			1A	1A	1A	1A									
POUR POINT	°C/°F	-37/-35						-1/30	21/70	35/95	43/110	2/35	32/90	35/95	46/115
CLOUD POINT	°C/°F					-48/-54	-17/2	0/32							
FLASH POINT	°C/°F	-20/-4				77/170	13/23	46/29	02/39	29/44	49/48	46/47	63/50	13/59	49/66
REID VAPOR PRESSURE	psi	5.42	8.56	1.88	1.05										
ORGANIC CHLORIDES	ppm		0.03	0.02	0.02	0.03									
TOTAL ACID NUMBER	gKOH/	0.0277				0.025	0.037	0.042	0.029	0.026	0.027	0.024	0.038	0.054	0.050
ASPHALTENES	% wt	2.15										4.5	6.5	9.4	11.2
RESEACH ON - CLEAR	ON		68.7	58.0	48.4										
MOTOR ON - CLEAR	ON		69.3	56.0	51.8										
RESEARCH ON - 3cc	ON		88.3	81.6	67.6										
MOTOR ON - 3cc	ON		87.4	78.5	65.7										
AROMATICS (HPLC)	% wt					29.0	35.0	38.0	36.1	39.1	46.2				
AROMATICS - FIA	% vol					21.5	29.8								
SATURATES - FIA	% vol					77.6	68.8								
C[illegible]NES - FIA	% vol					0.9	1.4								
PARAFFINS - PNA	% vol		33.6	18.7	19.4										
ISO PARAFFINS - PNA	% vol		37.0	30.9	27.7										
NAFTENOS - PNA	% vol		23.2	32.8	22.7										
AROMATICOS - PNA	% vol		6.2	17.0	29.4										
LUMINOMETER CALCULATED	Adim					41	31								
SMOKE POINT	mm					19	15								
FREEZING POINT	°C					-34/-29	-10/14								
NAPHTALENES	%wt					4.7	9.9								
REFRACTIVE INDEX AT 20C(67°C)	Adim					1.4603	1.4759	1.4870	(1.4836)	(1.4938)	(1.5048)				
C/H RATIO			5.6	5.9	6.1	6.3	6.3	6.6	6.8	6.9	7.1				
TOTAL NITROGEN	ppm wt	2222						379	1377	1843	2703	4237	5080	5751	6603
COLOR SAYBOLT	Adim		>+30	>+30	>+30	21	6								
COLOR ASTM	Adim							<1.0	L 2.0	L 3.5	L 5.5				
COLOR STABILITY (before/after 48 h 100 °C)						21/0.5	6/3.5								
ANILINE POINT	°C/°F					59/139	64/147	71/160	78/173	84/184	88/190				
CETANE NUMBER	CN					44.3	46.3	48.4							
CETANE INDEX	Adim					42.2	47.9	53.6	62.5						
CARBON RESIDUE (MICRO)	% wt	5.2						<0.1	<0.1	<0.1	0.9	9.8	13.9	17.6	22.6
ASH	% wt	0.024									0.002	0.016	0.010	0.031	0.041
VANADIUM	ppm wt	53							<0.03	<0.03	0.1	85	111	145	194
NICKEL	ppm wt	9							<0.03	<0.03	<0.03	20	24	31	43
SODIUM	ppm wt	3.9										9			
ALUMINIUM	ppm wt	<8													
PENETRATION AT 25 ° C	/10 mm											ND	>560	>560	126
SOFTENING POINT	°C/°F											ND	36/98	38/101	49/119

CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

JOB NUMBER:: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Oriente
DATE SAMPLED.....: 11/25/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 350-400 Deg. F

LABORATORY I.D...: 995294-0006
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Factor	11.6			UOP 375	01/28/00	DBC
rcaptan Sulfur, as Sulfur	2	1	ppm wt.	UOP-163	01/13/00	NA
phthalenes in Jet Fuel	0.50		L.V. %	ASTM D-1840	02/01/00	KC
trogen, Basic,	Insuff.		ppm wt.	UOP 313	12/03/99	DBC
trogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/19/00	JT
ur Point	< -90		Deg. F	ASTM D-97	01/13/00	AB
MA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/02/00	BT
Paraffins	45.21	0.00	LV %			
Olefins	0.7	0.00	LV %			
Monocycloparaffins	30.97	0.00	LV %			
Dicycloparaffins	18.18	0.00	LV %			
Alkylbenzenes	3.25	0.00	LV %			
Indanes/Tetralins	1.28	0.00	LV %			
Naphthalenes	0.41	0.00	LV %			
Total	100.00	0.00	LV %			
fractive Index	1.4250			Calculated	01/26/00	DBC
tane Analysis -- NIR		*1		NIR	01/05/00	DBC
Research Octane Number	70.6	0		NIR		
Motor Octane Number	66.9	0		NIR		
R+M/2	68.7	0				
ke Point	20		mm	ASTM D-1322	01/13/00	JJ
fur, Total by x-ray Fluoresc.	0.090	0.010	wt. %	ASTM D-4294	01/06/00	KC
d Vapor Pressure	0.01		psi	D-5191 ASTM Eqn.	01/05/00	NB

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

OB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

LIENT I.D.....: Crudo Oriente
ATE SAMPLED.....: 11/25/99
IME SAMPLED.....: :
ORK DESCRIPTION...: 400-500 Deg. F

LABORATORY I.D...: 995294-0007
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
ield Data		*1			01/07/00	DI
Yield	7.73	0	L.V. %	ASTM D-2892		
Yield	7.07	0	Wt. %	ASTM D-2892		
API Gravity	38.1	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8341	0	@ 60/60 Deg. F	ASTM D-1298		
romine Number	0.28		g/100g	ASTM D-1159	01/13/00	MA
etane Index	42.9			ASTM D-976	01/21/00	DB
loud Point	-50		Deg. F	ASTM D-2500	01/13/00	AB
olor	L of 0.5			ASTM D-1500	01/14/00	AB
olor, Saybolt	+19			ASTM D-156	01/14/00	JO
istillation		*1		ASTM D-86	12/03/99	DB
I.B.P.	432	0	Deg F.	ASTM D-86		
5% Recovered	438	1				
10% Recovered	436	1				
20% Recovered	440	1				
30% Recovered	442	1				
40% Recovered	446	1				
50% Recovered	448	1				
60% Recovered	452	1				
70% Recovered	458	1				
80% Recovered	464	1				
90% Recovered	472	1				
95% Recovered	478	1				
End Point	484	1	Deg F.			
% Recovered	97.9	0.1				
% Residue	1.3	0.1				
% Loss	0.8	0.1				
lash Point, PMCC,	196		Deg. F	ASTM D-93	01/12/00	AB
reeze Point	-49		Deg. F	ASTM D-2386	01/07/00	RB
ydrocarbon Type		*1		ASTM D-1319	01/07/00	VS
Aromatics	20.8	0.2	L.V. %			
Olefins	1.1	0.2	L.V. %			
Saturates	78.1	0.2	L.V. %			

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

JOB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA.

CLIENT I.D.....: Crudo Oriente
DATE SAMPLED.....: 11/25/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 400-500 Deg. F

LABORATORY I.D...: 995294-0007
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	T
Kinematic Viscosity	1.95		cSt @ 100 F	ASTM D-445	01/25/00	
Kinematic Viscosity	1.60		cSt @ 122 F	ASTM D-445	01/25/00	
K Factor	11.6			UOP 375	01/28/00	
Mercaptan Sulfur, as Sulfur	3	1	ppm wt.	UOP-163	01/13/00	
Naphthalenes in Jet Fuel	3.88		L.V. %	ASTM D-1840	02/01/00	
Acid Number by Poten. Titration	0.03		mg KOH/g	ASTM D-664	01/21/00	
Nitrogen, Basic,	3		ppm wt.	UOP 313	01/19/00	
Nitrogen, Total by Chemilum.	2	1	ppm wt.	ASTM D-4629	01/20/00	
Pour Point	-55		Deg. F	ASTM D-97	01/13/00	
PNA of Kerosene		*1		ASTM D2425 mod.	01/20/00	
Paraffins	50.9	0.1	LV %			
Monocycloparaffins	16.7	0.1	LV %			
Dicycloparaffins	11.5	0.1	LV %			
Tricycloparaffins	1.0	0.1	LV %			
Alkylbenzenes	7.0	0.1	LV %			
Indans	7.2	0.1	LV %			
Indenes	1.9	0.1	LV %			
Naphthalenes	3.8	0.1	LV %			
Acenaphthenes	<0.1	0.1	LV %			
Acenaphthalenes	<0.1	0.1	LV %			
Tricyclic Aromatics	<0.1	0.1	LV %			
Total	100.0	0	LV %			
Smoke Point	18		mm	ASTM D-1322	01/13/00	J
Sulfur, Total by x-ray Fluoresc.	0.307	0.010	Wt. %	ASTM D-4294	01/06/00	E

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LABORATORY TESTS RESULTS
02/13/00

JOB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Oriente
DATE SAMPLED.....: 11/25/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 500-550 Deg. F

LABORATORY I.D...: 995294-0008
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/POLLUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data		*1			01/07/00	DBC
Yield	4.28	0	L.V. %	ASTM D-2892		
Yield	4.03	0	Wt. %	ASTM D-2892		
API Gravity	33.2	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8593	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	141.4		Deg. F	ASTM D-611	01/07/00	KC
Bromine Number	0.27		g/100g	ASTM D-1159	01/13/00	NA
Cetane Index	Insuff.			ASTM D-976	12/03/99	DBC
Cloud Point	-10		Deg. F	ASTM D-2500	01/13/00	AB
Color	L of 0.5			ASTM D-1500	01/13/00	AB
Distillation		*1		ASTM D-86	12/03/99	DBC
I.B.P.	Insuff.	0	Deg F.	ASTM D-86		
5% Recovered	Sample	1				
10% Recovered	---	1				
20% Recovered	---	1				
30% Recovered	---	1				
40% Recovered	---	1				
50% Recovered	---	1				
60% Recovered	---	1				
70% Recovered	---	1				
80% Recovered	---	1				
90% Recovered	---	1				
95% Recovered	---	1				
End Point	---	1	Deg F.			
% Recovered	---	0.1				
% Residue	---	0.1				
% Loss	---	0.1				
Flash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	12/03/99	DBC
Freeze Point	-11		Deg. F	ASTM D-2386	01/07/00	RB
Hydrocarbon Type		*1		ASTM D-1319	01/07/00	VS
Aromatics	34.3	0.2	L.V. %			
Olefins	2.8	0.2	L.V. %			
Saturates	62.9	0.2	L.V. %			

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LABORATORY TESTS RESULTS
02/13/00

JOB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Oriente
DATE SAMPLED.....: 11/25/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 500-550 Deg. F

LABORATORY I.D...: 995294-0008
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Kinematic Viscosity	3.14		cSt @ 100 F	ASTM D-445	01/25/00	KC
Kinematic Viscosity	2.50		cSt @ 122 F	ASTM D-445	01/25/00	KC
K Factor	11.6			UOP 375	01/28/00	DBC
Mercaptan Sulfur, as Sulfur	4	1	ppm wt.	UOP-163	01/13/00	MA
Naphthalenes in Jet Fuel	9.37		L.V. %	ASTM D-1840	02/01/00	KC
Acid Number by Poten. Titration	0.05		mg KOH/g	ASTM D-664	01/24/00	MA
Nitrogen, Basic,	32		ppm wt.	UOP 269	01/11/00	MA
Nitrogen, Total by Chemilum.	32	1	ppm wt.	ASTM D-4629	01/20/00	JT
Pour Point	-30		Deg. F	ASTM D-97	01/13/00	AB
PNA of Kerosene		*1		ASTM D2425 mod.	01/20/00	LS
Paraffins	50.6	0.1	LV %			
Monocycloparaffins	14.3	0.1	LV %			
Dicycloparaffins	8.9	0.1	LV %			
Tricycloparaffins	1.4	0.1	LV %			
Alkylbenzenes	6.7	0.1	LV %			
Indans	5.9	0.1	LV %			
Indenes	3.4	0.1	LV %			
Naphthalenes	7.3	0.1	LV %			
Acenaphthenes	0.9	0.1	LV %			
Acenaphthalenes	0.5	0.1	LV %			
Tricyclic Aromatics	0.1	0.1	LV %			
Total	100.0	0	LV %			
Refractive Index	1.4587		67 Deg. C	ASTM D-1747	01/20/00	JDP
Refractive Index	1.4575			Calculated	01/26/00	DBC
Smoke Point	13		mm	ASTM D-1322	01/13/00	JJ
Sulfur, Total by x-ray Fluoresc.	0.809	0.010	Wt. %	ASTM D-4294	01/06/00	KC

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

JOB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Oriente
DATE SAMPLED.....: 11/25/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 550-650 Deg. F

LABORATORY I.D...: 995294-0009
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Yield Data		*1			01/07/00	DB
Yield	9.40	0	L.V. %	ASTM D-2892		
Yield	8.95	0	Wt. %	ASTM D-2892		
API Gravity	31.3	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8691	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	159.6		Deg. F	ASTM D-611	01/07/00	KC
Bromine Number	0.36		g/100g	ASTM D-1159	01/13/00	MA
Carbon Residue, Conradson	<0.01		Wt. %	ASTM D-189	01/24/00	JD
Carbon Residue, Ramsbottom	0.07		Wt. %	ASTM D-524	01/20/00	JD
Cetane Index	47.9			ASTM D-976	01/21/00	DB
Cloud Point	+20		Deg. F	ASTM D-2500	01/13/00	AB
Color	L of 1.0			ASTM D-1500	01/13/00	AB
Distillation		*1		ASTM D-86	12/03/99	DB
I.B.P.	558	0	Deg F.	ASTM D-86		
5% Recovered	571	1				
10% Recovered	574	1				
20% Recovered	578	1				
30% Recovered	581	1				
40% Recovered	583	1				
50% Recovered	586	1				
60% Recovered	590	1				
70% Recovered	594	1				
80% Recovered	600	1				
90% Recovered	609	1				
95% Recovered	618	1				
End Point	622	1	Deg F.			
% Recovered	97.0	0.1				
% Residue	2.2	0.1				
% Loss	0.8	0.1				
Flash Point, PMCC,	280		Deg. F	ASTM D-93	01/13/00	AB
Freeze Point	+19		Deg. F	ASTM D-2386	01/07/00	RB
Kinematic Viscosity	6.03		cSt @ 100 F	ASTM D-445	01/25/00	KC

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

B NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

IENT I.D.....: Crudo Oriente
TE SAMPLED.....: 11/25/99
ME SAMPLED.....: :
RX DESCRIPTION...: 550-650 Deg. F

LABORATORY I.D...: 995294-0009
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

ST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
nematic Viscosity	4.42		cSt @ 122 F	ASTM D-445	01/25/00	KC
Factor	11.7			UOP 375	01/28/00	DBC
rcaptan Sulfur, as Sulfur	6	1	ppm wt.	UOP-163	01/13/00	MA
phthalenes in Jet Fuel	9.79		L.V. %	ASTM D-1840	02/01/00	KC
id Number by Poten. Titration	0.10		mg KOH/g	ASTM D-664	01/24/00	MA
trogen, Basic,	101		ppm wt.	UOP 269	01/11/00	MA
trogen, Total by Chemilum.	135	1	ppm wt.	ASTM D-4629	01/20/00	JT
ur Point	-5		Deg. F	ASTM D-97	01/13/00	AB
A Middle Distillates, Mass Spec		*1		ASTM D-2425	01/20/00	LS
Paraffins	51.3	0	LV %			
Monocycloparaffins	13.0	0	LV %			
Dicycloparaffins	7.3	0	LV %			
Tricycloparaffins	1.3	0	LV %			
Alkylbenzenes	7.5	0	LV %			
Indanes/Tetralins	5.4	0	LV %			
Indenes	4.3	0	LV %			
Naphthalenes	5.2	0	LV %			
Acenaphthenes	2.2	0	LV %			
Acenaphthalenes	1.4	0	LV %			
Tricyclic Aromatics	1.1	0	LV %			
Total	100.0	0	LV %			
fractive Index	1.4641		67 Deg. C	ASTM D-1747	01/20/00	JDP
fractive Index	1.4639			Calculated	01/26/00	DBC
oke Point	11		mm	ASTM D-1322	01/13/00	JJ
lfur, Total by x-ray Fluoresc.	1.01	0.010	Wt. %	ASTM D-4294	01/06/00	KC

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LABORATORY TESTS RESULTS
02/13/00

JB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

.IENT I.D.....: Crudo Oriente
ATE-SAMPLED.....: 11/25/99
IME SAMPLED.....: :
RK DESCRIPTION...: 650-700 Deg. F

LABORATORY I.D...: 995294-0010
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/POLLUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
eld Data		*1			01/07/00	DBC
Yield	4.46	0	L.V. %	ASTM D-2892		
Yield	4.37	0	Wt. %	ASTM D-2892		
API Gravity	26.8	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8940	0	@ 60/60 Deg. F	ASTM D-1298		
iline Point	159.1		Deg. F	ASTM D-611	01/07/00	KC
amine Number	0.47		g/100g	ASTM D-1159	01/13/00	NA
rbon Residue, Conradson	<0.01		Wt. %	ASTM D-189	01/24/00	JDP
rbon Residue, Ramsbottom	0.07		Wt. %	ASTM D-524	01/20/00	JDP
tane Index	Insuff.			ASTM D-976	12/03/99	DBC
oud Point	+66		Deg. F	ASTM D-2500	01/13/00	AB
lor	L of 1.5			ASTM D-1500	01/13/00	AB
stillation		*1		ASTM D-86	12/03/99	DBC
I.B.P.	Insuff.	0	Deg F.	ASTM D-86		
5% Recovered	Sample	1				
10% Recovered	---	1				
20% Recovered	---	1				
30% Recovered	---	1				
40% Recovered	---	1				
50% Recovered	---	1				
60% Recovered	---	1				
70% Recovered	---	1				
80% Recovered	---	1				
90% Recovered	---	1				
95% Recovered	---	1				
End Point	---	1	Deg F.			
% Recovered	---	0.1				
% Residue	---	0.1				
% Loss	---	0.1				
ash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	12/03/99	DBC
nematic Viscosity	12.66		cSt @ 100 F	ASTM D-445	01/26/00	BB
nematic Viscosity	8.64		cSt @ 122 F	ASTM D-445	01/26/00	BB

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/13/00

JOB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Oriente
DATE SAMPLED.....: 11/25/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 650-700 Deg. F

LABORATORY I.D....: 995294-0010
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Cinematic Viscosity	2.77		cst @ 210 F	ASTM D-445	01/25/00	KC
C Factor	11.7			UOP 375	01/28/00	DBC
Mercaptan Sulfur, as Sulfur	9	1	ppm wt.	UOP-163	01/13/00	NA
Acid Number by Poten. Titration	0.14		mg KOH/g	ASTM D-664	01/24/00	NA
Nitrogen, Basic,	223		ppm wt.	UOP 269	01/11/00	NA
Nitrogen, Total by Chemilum.	534	1	ppm wt.	ASTM D-4629	01/20/00	JT
Pour Point	+50		Deg. F	ASTM D-97	01/13/00	AB
NA of Gas Oil		*1		ASTM D2786,3239	01/21/00	JJB
Paraffins	29.5	0	LV %			
Naphthenes	30.6	0	LV %			
Aromatics	39.9	0	LV %			
NAPHTHENIC DISTRIBUTION	ND	0				
---1 Ring	13.2	0	LV %			
---2 Ring	10.5	0	LV %			
---3 Ring	5.1	0	LV %			
---4 Ring	1.3	0	LV %			
---5 Ring	0.5	0	LV %			
---6 Ring	0	0	LV %			
AROMATIC DISTRIBUTION	ND	0				
Monoaromatics	18	0	LV %			
---Alkylbenzenes	6.5	0	LV %			
---Naphthenebenzenes	5.8	0	LV %			
---Dinaphthenebenzenes	5.7	0	LV %			
Diaromatics	12	0	LV %			
---Naphthalenes	4.1	0	LV %			
---Acenaphthenes/Dibenzofurans	4	0	LV %			
---Fluorenes	3.9	0	LV %			
Triaromatics	3.6	0	LV %			
---Phenanthrenes	3.3	0	LV %			
---Naphthenephenanthrenes	0.3	0	LV %			
Tetraaromatics	0.9	0	LV %			
---Pyrenes	0.7	0	LV %			
---Chyrsenes	0.2	0	LV %			
Pentaaromatics	0	0	LV %			
---Perylenes	0	0	LV %			
---Dibenzanthracenes	0	0	LV %			
Thiophene Aromatics	5.4	0	LV %			

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

JOB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Oriente
DATE SAMPLED.....: 11/25/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 650-700 Deg. F

LABORATORY I.D...: 995294-0010
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
---Benzothiophenes	3.3	0	LV %			
---Dibenzothiophenes	2.1	0	LV %			
---Naphthabenzothiophenes	0	0	LV %			
Unidentified Aromatics	0	0	LV %			
---Class I (see Naph. Phen.)	0	0	LV %			
---Class II	0	0	LV %			
---Class III	0	0	LV %			
---Class IV	0	0	LV %			
---Class V	0	0	LV %			
---Class VI	0	0	LV %			
---Class VII	0	0	LV %			
Refractive Index	1.4782		67 Deg. C	ASTM D-1747	01/20/00	JO
Refractive Index	1.4770			Calculated	01/26/00	DB
Sulfur, Total by x-ray Fluoresc.	1.41	0.010	Wt. %	ASTM D-4294	01/06/00	EC

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

MENT I.D.....: Crudo Oriente
E SAMPLED.....: 11/25/99
E SAMPLED.....: :
K DESCRIPTION...: 700+ Deg. F

LABORATORY I.D...: 995294-0011
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

T DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
ld Data		*1			01/07/00	DBC
Yield	54.60	0	L.V. %	ASTM D-2892		
Yield	59.46	0	Wt. %	ASTM D-2892		
API Gravity	10.9	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.9940	0	@ 60/60 Deg. F	ASTM D-1298		
Line Point (Thin Film)	Too Dark		Deg. F	ASTM D-611	01/07/00	KC

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

OB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

LIENT I.D.....: Crudo Oriente
ATE SAMPLED.....: 11/25/99
IME SAMPLED.....: :
ORK DESCRIPTION...: 700-800 Deg. F

LABORATORY I.D...: 995294-0012
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
ield Data Hyvac Potstill		*1		ASTM D-5236	01/07/00	DBC
Yield L.V. %	6.93	0	L.V.%	ASTM D-5236		
Yield Wt. %	6.92	0	Wt. %	ASTM D-5236		
API Grav.	23.6	0	@ 60/60 Deg. F	ASTM D-287		
Spec. Grav.	0.9121	0	@ 60/60 Deg. F	ASTM D-1298		
iline Point	172.6		Deg. F	ASTM D-611	01/07/00	KC
phaltene	<0.05	0.05	Wt. %	IP-143	12/06/99	JDP
omine Number	0.46		g/100g	ASTM D-1159	01/14/00	NA
rbon Residue, Conradson	0.11		Wt. %	ASTM D-189	01/24/00	JDP
rbon Residue, Ramsbottom	0.11		Wt. %	ASTM D-524	01/20/00	JDP
tane Index	Insuff.			ASTM D-976	12/03/99	DBC
lor	L of 4.0			ASTM D-1500	01/13/00	AB
ash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	12/03/99	DBC
nematic Viscosity	43.95		cSt @ 100 F	ASTM D-445	01/26/00	BB
nematic Viscosity	24.81		cSt @ 122 F	ASTM D-445	01/26/00	BB
nematic Viscosity	5.51		cSt @ 210 F	ASTM D-445	01/25/00	KC
Factor	11.7			UOP 375	01/28/00	DBC
id Number by Poten. Titration	0.02		mg KOH/g	ASTM D-664	01/24/00	NA
rogen, Basic,	Insuff.		ppm wt.	UOP 269	12/03/99	DBC
rogen, Total by Chemilum.	1029	3	ppm wt.	ASTM D-4629	01/24/00	JT
r Point	+65		Deg. F	ASTM D-97	01/12/00	AB
of Gas Oil		*1		ASTM D2786,3239	01/21/00	JJB
Paraffins	25.1	0	LV %			
Naphthenes	31.5	0	LV %			
Aromatics	43.4	0	LV %			
NAPHTHENIC DISTRIBUTION	ND	0				

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

OB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

LIENT I.D.....: Crudo Oriente
ATE SAMPLED.....: 11/25/99
IME SAMPLED.....: :
ORK DESCRIPTION...: 700-800 Deg. F

LABORATORY I.D....: 995294-0012
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
---1 Ring	12.3	0	LV %			
---2 Ring	10.4	0	LV %			
---3 Ring	6.7	0	LV %			
---4 Ring	1.5	0	LV %			
---5 Ring	0.6	0	LV %			
---6 Ring	0	0	LV %			
AROMATIC DISTRIBUTION	ND	0				
Monoaromatics	22.5	0	LV %			
---Alkylbenzenes	9.2	0	LV %			
---Naphthenebenzenes	6.9	0	LV %			
---Dinaphthenebenzenes	6.4	0	LV %			
Diaromatics	10.9	0	LV %			
---Naphthalenes	3.5	0	LV %			
---Acenaphthenes/Dibenzofurans	3.0	0	LV %			
---Fluorenes	4.4	0	LV %			
Triaromatics	3.0	0	LV %			
---Phenanthrenes	2.3	0	LV %			
---Naphthenephenanthrenes	0.7	0	LV %			
Tetraaromatics	1.8	0	LV %			
---Pyrenes	1.4	0	LV %			
---Chyrsenes	0.4	0	LV %			
Pentaaromatics	0	0	LV %			
---Perylenes	0	0	LV %			
---Dibenzanthracenes	0	0	LV %			
Thiophene Aromatics	4.9	0	LV %			
---Benzothiophenes	3.2	0	LV %			
---Dibenzothiophenes	1.6	0	LV %			
---Naphthabenzothiophenes	0.1	0	LV %			
Unidentified Aromatics	0.3	0	LV %			
---Class I (see Naph. Phen.)	0	0	LV %			
---Class II	0	0	LV %			
---Class III	0	0	LV %			
---Class IV	0.3	0	LV %			
---Class V	0	0	LV %			
---Class VI	0	0	LV %			
---Class VII	0	0	LV %			
fractive Index	1.4885		67 Deg. C	ASTM D-1747	01/20/00	JDP
fractive Index	1.4909			Calculated	01/26/00	DBC
lfur, Total by x-ray Fluoresc.	1.50	0.010	Wt. %	ASTM D-4294	01/06/00	KC
cuum Distillation		*1		ASTM D-1160	12/03/99	DBC

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

B NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

IENT I.D.....: Crudo Oriente
TE SAMPLED.....: 11/25/99
NE SAMPLED.....: :
RK DESCRIPTION...: 700-800 Deg. F

LABORATORY I.D...: 995294-0012
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

T DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
I.B.P.	Insuff.	1	Deg. F	ASTM D-1160		
5% Evaporated	Sample	1				
10% Evaporated	---	1				
20% Evaporated	---	1				
30% Evaporated	---	1				
40% Evaporated	---	1				
50% Evaporated	---	1				
60% Evaporated	---	1				
70% Evaporated	---	1				
80% Evaporated	---	1				
90% Evaporated	---	1				
95% Evaporated	---	1				
End Point	---	1	Deg. F			
% Recovered	---	0.1				
% Residue	---	0.1				
% Loss	---	0.1				

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

: NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

.ENT I.D.....: Crudo Oriente
TE SAMPLED.....: 11/25/99
E SAMPLED.....: :
K DESCRIPTION...: 800-900 Deg. F

LABORATORY I.D...: 995294-0013
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

ST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
eld Data Hyvac Potstill		*1		ASTM D-5236	01/07/00	DBC
Yield L.V. %	9.13	0	L.V.%	ASTM D-5236		
Yield Wt. %	9.26	0	Wt. %	ASTM D-5236		
API Grav.	21.3	0	@ 60/60 Deg. F	ASTM D-287		
Spec. Grav.	0.9258	0	@ 60/60 Deg. F	ASTM D-1298		
iline Point	178.0		Deg. F	ASTM D-611	01/07/00	KC
h Content,	<.001		WT %	ASTM D-482	01/21/00	AB
chaltene	<0.05	0.05	Wt. %	IP-143	12/06/99	JDP
omine Number	1.7		g/100g	ASTM D-1159	01/14/00	MA
rbon Residue, Conradson	0.30		Wt. %	ASTM D-189	01/24/00	JDP
rbon Residue, Ramsbottom	0.27		Wt. %	ASTM D-524	01/20/00	JDP
tane Index	Insuff.			ASTM D-976	12/03/99	DBC
pper by ICP	<0.05	0.05	ppm wt.	ICP	01/21/00	JW
ash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	12/03/99	DBC
on by ICP	3.7	0.08	ppm wt.	ICP	01/21/00	JW
nematic Viscosity	58.39		cSt @ 122 F	ASTM D-445	01/26/00	BB
nematic Viscosity	9.51		cSt @ 210 F	ASTM D-445	01/25/00	KC
Factor	11.8			UOP 375	01/28/00	DBC
id Number by Poten. Titration	0.08		mg KOH/g	ASTM D-664	01/24/00	MA
ckel by ICP	0.21	0.18	ppm wt.	ICP	01/21/00	JW
trogen, Basic,	Insuff.		ppm wt.	UOP 269	12/03/99	DBC
itrogen, Total by Chemilum.	1536	5	ppm wt.	ASTM D-4629	01/24/00	JT
our Point	+100		Deg. F	ASTM D-97	01/14/00	AB
NA of Gas Oil		*1		ASTM D2786,3239	01/21/00	JJB

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

B NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

IENT I.D.....: Crudo Oriente
TE SAMPLED.....: 11/25/99
ME SAMPLED.....: :
RK DESCRIPTION...: 800-900 Deg. F

LABORATORY I.D...: 995294-0013
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

ST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Paraffins	20.6	0	LV %			
Naphthenes	30.4	0	LV %			
Aromatics	49.0	0	LV %			
NAPHTHENIC DISTRIBUTION	ND	0				
---1 Ring	11.6	0	LV %			
---2 Ring	9.4	0	LV %			
---3 Ring	6.6	0	LV %			
---4 Ring	1.9	0	LV %			
---5 Ring	0.4	0	LV %			
---6 Ring	0.5	0	LV %			
AROMATIC DISTRIBUTION	24.9	0				
Monoaromatics	24.9	0	LV %			
---Alkylbenzenes	9.2	0	LV %			
---Naphthenebenzenes	7.9	0	LV %			
---Dinaphthenebenzenes	7.8	0	LV %			
Diaromatics	11.9	0	LV %			
---Naphthalenes	3.9	0	LV %			
---Acenaphthenes/Dibenzofurans	3.2	0	LV %			
---Fluorenes	4.8	0	LV %			
Triaromatics	3.0	0	LV %			
---Phenenanthrenes	1.9	0	LV %			
---Naphthenephenanthrenes	1.1	0	LV %			
Tetraaromatics	2.2	0	LV %			
---Pyrenes	1.7	0	LV %			
---Chyrsenes	0.5	0	LV %			
Pentaaromatics	0.2	0	LV %			
---Perylenes	0.2	0	LV %			
---Dibenzanthracenes	0	0	LV %			
Thiophene Aromatics	6.2	0	LV %			
---Benzothiophenes	4.5	0	LV %			
---Dibenzothiophenes	1.4	0	LV %			
---Naphthebenzothiophenes	0.3	0	LV %			
Unidentified Aromatics	0.6	0	LV %			
---Class I (see Naph. Phen.)	0	0	LV %			
---Class II	0	0	LV %			
---Class III	0	0	LV %			
---Class IV	0.6	0	LV %			
---Class V	0	0	LV %			
---Class VI	0	0	LV %			
---Class VII	0	0	LV %			
fractive Index	1.4960		67 Deg. C	ASTM D-1747	01/20/00	JDP
fractive Index	1.4999			Calculated	01/26/00	DBC

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

B NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

IENT I.D.....: Crudo Oriente
TE SAMPLED.....: 11/25/99
ME SAMPLED.....: :
AX DESCRIPTION...: 800-900 Deg. F

LABORATORY I.D...: 995294-0013
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

ST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
lfur, Total by x-ray Fluoresc.	1.55	0.010	Wt. %	ASTM D-4294	01/06/00	KC
nadium by ICP	0.10	0.06	ppm wt.	ICP	01/21/00	JV
cuum Distillation		*1		ASTM D-1160	12/03/99	DBC
I.B.P. :	Insuff.	1	Deg. F	ASTM D-1160		
5% Evaporated	Sample	1				
10% Evaporated	---	1				
20% Evaporated	---	1				
30% Evaporated	---	1				
40% Evaporated	---	1				
50% Evaporated	---	1				
60% Evaporated	---	1				
70% Evaporated	---	1				
80% Evaporated	---	1				
90% Evaporated	---	1				
95% Evaporated	---	1				
End Point	---	1	Deg. F			
% Recovered	---	0.1				
% Residue	---	0.1				
% Loss	---	0.1				

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

t NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

ENT I.D.....: Crudo Oriente
'E SAMPLED.....: 11/25/99
E SAMPLED.....: :
K DESCRIPTION...: 900-1025 Deg. F

LABORATORY I.D...: 995294-0014
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

T DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
-ld Data Nyvac Potstill		*1		ASTM D-5236	01/07/00	DBC
Yield L.V. %	10.32	0	L.V.%	ASTM D-5236		
Yield Wt. %	10.71	0	Wt. %	ASTM D-5236		
API Grav.	18.0	0	@ 60/60 Deg. F	ASTM D-287		
Spec. Grav.	0.9468	0	@ 60/60 Deg. F	ASTM D-1298		
line Point	183.9		Deg. F	ASTM D-611	01/07/00	KC
Content,	<.001		WT %	ASTM D-482	01/21/00	AB
haltene	0.41	0.05	Wt. % .	IP-143	12/04/99	JDP
aine Number	3.5		g/100g	ASTM D-1159	01/14/00	NA
con Residue, Conradson	1.60		Wt. %	ASTM D-189	01/24/00	JDP
con Residue, Ramsbottom	1.06		Wt. %	ASTM D-524	01/21/00	JDP
per by ICP	<0.05	0.05	ppm wt.	ICP	01/21/00	JM
sh Point, PMCC,	Insuff.		Deg. F	ASTM D-93	12/03/99	DBC
n by ICP	1.4	0.08	ppm wt.	ICP	01/21/00	JM
ematic Viscosity	Can't Run		cSt @ 122 F	ASTM D-445	01/28/00	BB
matic Viscosity	25.97		cSt @ 210 F	ASTM D-445	01/25/00	KC
matic Viscosity	7.31		cSt @ 300 F	ASTM D-445	01/28/00	BB
sctor	11.7			UOP 375	01/28/00	DBC
l Number by Poten. Titration	0.11		mg KOH/g	ASTM D-664	01/24/00	NA
el by ICP	0.51	0.18	ppm wt.	ICP	01/21/00	JM
ogen, Basic,	942		ppm wt.	UOP 269	01/11/00	NA
ogen, Total by Chemilum.	2399	5	ppm wt.	ASTM D-4629	01/24/00	JT
Point	+105		Deg. F	ASTM D-97	01/14/00	AB
of Gas Oil		*1		ASTM D2786,3239	01/21/00	JJB

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA-TALARA

ENT I.D.....: Crudo Oriente
E SAMPLED.....: 11/25/99
E SAMPLED.....: :
X DESCRIPTION...: 900-1025 Deg. F

LABORATORY I.D...: 995294-0014
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

T DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Paraffins	14.5	0	LV %			
Naphthenes	25.8	0	LV %			
Aromatics	59.7	0	LV %			
NAPHTHENIC DISTRIBUTION	ND	0				
---1 Ring	11.6	0	LV %			
---2 Ring	8.0	0	LV %			
---3 Ring	5.6	0	LV %			
---4 Ring	0	0	LV %			
---5 Ring	0.3	0	LV %			
---6 Ring	0.3	0	LV %			
AROMATIC DISTRIBUTION	33.0	0				
Monoaromatics	33.0	0	LV %			
---Alkylbenzenes	15.2	0	LV %			
---Naphthenebenzenes	9.0	0	LV %			
---Dinaphthenebenzenes	8.8	0	LV %			
Diaromatics	19.1	0	LV %			
---Naphthalenes	6.6	0	LV %			
---Acenaphthenes/Dibenzofurans	2.4	0	LV %			
---Fluorenes	10.1	0	LV %			
Triaromatics	0.4	0	LV %			
---Phenanthrenes	0.4	0	LV %			
---Naphthenephenanthrenes	0	0	LV %			
Tetraaromatics	0.8	0	LV %			
---Pyrenes	0.8	0	LV %			
---Chrysenes	0	0	LV %			
Pentaaromatics	0	0	LV %			
---Perylenes	0	0	LV %			
---Dibenzanthracenes	0	0	LV %			
Thiophene Aromatics	6.3	0	LV %			
---Benzothiophenes	6.3	0	LV %			
---Dibenzothiophenes	0	0	LV %			
---Naphthabenzothiophenes	0	0	LV %			
Unidentified Aromatics	0.1	0	LV %			
---Class I (see Naph. Phen.)	0	0	LV %			
---Class II	0	0	LV %			
---Class III	0	0	LV %			
---Class IV	0.1	0	LV %			
---Class V	0	0	LV %			
---Class VI	0	0	LV %			
---Class VII	0	0	LV %			
ractive Index	1.5091		67 Deg. C	ASTM D-1747	01/20/00	JDP
ractive Index	1.5127			Calculated	01/26/00	DBC

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

JOB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Oriente
DATE SAMPLED.....: 11/25/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 900-1025 Deg. F

LABORATORY I.D...: 995294-0014
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Sulfur, Total by x-ray Fluoresc.	1.85	0.010	Wt. %	ASTM D-4294	01/06/00	KC
Vanadium by ICP	0.84	0.06	ppm wt.	ICP	01/21/00	JW
Vacuum Distillation		*1		ASTM D-1160	12/03/99	DBC
I.B.P.	Insuff.	1	Deg. F	ASTM D-1160		
5% Evaporated	Sample	1				
10% Evaporated	---	1				
20% Evaporated	---	1				
30% Evaporated	---	1				
40% Evaporated	---	1				
50% Evaporated	---	1				
60% Evaporated	---	1				
70% Evaporated	---	1				
80% Evaporated	---	1				
90% Evaporated	---	1				
95% Evaporated	---	1				
End Point	---	1	Deg. F			
% Recovered	---	0.1				
% Residue	---	0.1				
% Loss	---	0.1				

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

: NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

:ENT I.D.....: Crudo Oriente
'E SAMPLED.....: 11/25/99
:E SAMPLED.....: :
:K DESCRIPTION...: 650+ Deg. F

LABORATORY I.D...: 995294-0015
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

:T DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
ıld Data		*1			01/07/00	DBC
Yield	59.06	0	L.V. %	ASTM D-2892		
Yield	63.83	0	Wt. %	ASTM D-2892		
API Gravity	11.9	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.9868	0	@ 60/60 Deg. F	ASTM D-1298		
Content,	0.07		WT %	ASTM D-482	01/25/00	AB
haltene	2.08	0.05	Wt. %	IP-143	12/04/99	JDP
oine Number	1.7		g/100g	ASTM D-1159	01/14/00	NA
con Residue, Ramsbottom	14.88		Wt. %	ASTM D-524	01/21/00	JDP
per by ICP	<0.05	0.05	ppm wt.	ICP	01/21/00	JW
sh Point, COC,	480		Deg. F	ASTM D-92	01/19/00	AB
n by ICP	7.3	0.08	ppm wt.	ICP	01/21/00	JW
ematic Viscosity	Can't Run		cSt @ 122 F	ASTM D-445	01/28/00	BB
ematic Viscosity	328.8		cSt @ 210 F	ASTM D-445	01/28/00	BB
actor	11.6			UOP 375	01/28/00	DBC
d Number by Poten. Titration	0.31		mg KOH/g	ASTM D-664	01/24/00	NA
kel by ICP	145	0.18	ppm wt.	ICP	01/21/00	JW
rogen, Basic,	1360		ppm wt.	UOP 269	01/13/00	NA
rogen, Total by Chemilum.	4885	20	ppm wt.	ASTM D-4629	01/24/00	JT
- Point	+95		Deg. F	ASTM D-97	01/14/00	AB
ractive Index	Too Dark		67 Deg. C	ASTM D-1747	01/20/00	JDP
fur, Total by x-ray Fluoresc.	2.16	0.010	Wt. %	ASTM D-4294	01/06/00	KC
edium by ICP	356	0.06	ppm wt.	ICP	01/21/00	JW

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

3 NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

EXT I.D.....: Crudo Oriente
E SAMPLED.....: 11/25/99
E SAMPLED.....: :
K DESCRIPTION...: 1025+ Deg. F

LABORATORY I.D....: 995294-0016
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

T DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
td Data Hyvac Potatill		*1		ASTM D-5236	01/07/00	DBC
Yield L.V. %	28.22	0	L.V.%	ASTM D-5236		
Yield Wt. %	32.57	0	Wt. %	ASTM D-5236		
API Grav.	2.6	0	@ 60/60 Deg. F	ASTM D-70		
Spec. Grav.	1.0534	0	@ 60/60 Deg. F	ASTM D-70		
Content,	0.17		WT %	ASTM D-482	02/01/00	KC
nsltene	1.13	0.05	Wt. %	IP-143	12/04/99	JDP
oine Number	1.7		g/100g	ASTM D-1159	01/14/00	NA
bon Residue, Conradson	27.55		Wt. %	ASTM D-189	01/24/00	JDP
bon Residue, Ramsbottom	27.0		Wt. %	Calculated	02/03/00	DBC
per by ICP	0.08	0.05	ppm wt.	ICP	01/21/00	JV
sh Point, COC,	+595		Deg. F	ASTM D-92	01/19/00	AS
n by ICP	16	0.08	ppm wt.	ICP	01/21/00	JV
ematic Viscosity	Can't Run		cSt @ 210 F	ASTM D-445	01/28/00	SS
ematic Viscosity	30209		cSt @ 300 F	ASTM D-445	01/28/00	SS
ematic Viscosity	Can't Run		cSt @ 350 F	ASTM D-445	01/28/00	SS
ector	Insuff.			UOP 375	01/28/00	DBC
d Number by Poten. Titration	0.20		mg KOH/g	ASTM D-664	01/24/00	NA
cel by ICP	276	0.18	ppm wt.	ICP	01/21/00	JV
ogen, Basic,	2116		ppm wt.	UOP 269	01/13/00	NA
ogen, Total by Chemilum.	7259	20	ppm wt.	ASTM D-4629	01/24/00	JT
tration	1		1/10mm Div.	ASTM D-5	02/03/00	DBC
ractive Index	Too Dark		67 Deg. C	ASTM D-1747	01/20/00	JDP
tening Point	+191		Deg. F	ASTM D-36	01/11/00	VB

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LABORATORY TESTS RESULTS

02/13/00

OB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

LIENT I.D.....: Crudo Oriente
ATE SAMPLED.....: 11/25/99
IME SAMPLED.....: :
ORK DESCRIPTION...: 1025+ Deg. F

LABORATORY I.D...: 995294-0016
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
lfur, Total by x-ray Fluoresc.	2.63	0.010	Wt. %	ASTM D-4294	01/06/00	KC
nadium by ICP	683	0.06	ppm wt.	ICP	01/21/00	JV

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Co. Name: Petroleos del Peru - Petroperu S.A.
Job No: 995294
Sample ID: Crudo Oriente
ATTN: Refineria Talara

FRACTIONAL DISTILLATION TABLE

Temp. Range Deg.F.@760mm	Yield, L.V. %	Cumulative Yield, L.V. %	Yield, Wt. %	Cumulative Yield, Wt. %
IBP - 82 Deg.F.	0.76	0.76	0.52	0.52
82 - 200 Deg.F.	4.74	5.50	3.55	4.07
200 - 300 Deg.F.	6.30	11.80	5.19	9.26
300 - 350 Deg.F.	3.53	15.33	3.02	12.28
350 - 400 Deg.F.	3.97	19.30	3.51	15.79
400 - 500 Deg.F.	7.73	27.03	7.07	22.86
500 - 550 Deg.F.	4.28	31.31	4.03	26.89
550 - 650 Deg.F.	9.40	40.71	8.95	35.84
650 - 700 Deg.F.	4.46	45.17	4.37	40.21
700 - 800 Deg.F.	6.93	52.10	6.92	47.13
800 - 900 Deg.F.	9.13	61.23	9.26	56.39
900 - 1025 Deg.F.	10.32	71.55	10.71	67.10
1025+ Deg.F.	28.22	99.77	32.57	99.67

CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

JOB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Oriente
DATE SAMPLED.....: 11/25/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: Sample as Received

LABORATORY I.D....: 995294-0001
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TI
Yield Data		*1			01/07/00	[illegible]
API Gravity	23.6	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.9125	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point (Thin Film)	Too Dark		Deg. F	ASTM D-611	01/07/00	K
Ash Content,	0.05		WT %	ASTM D-482	01/19/00	V
Asphaltene	0.09	0.05	Wt. %	IP-143	12/04/99	J
Carbon Residue, Conradson	9.69		Wt. %	ASTM D-189	01/24/00	J
Cloud Point	Too Dark		Deg. F	ASTM D-2500	01/13/00	A
Copper by ICP	<0.05	0.05	ppm wt.	ICP	01/21/00	J
Flash Point, PMCC,	< 20		Deg. F	ASTM D-93	01/13/00	A
Hydrogen Sulfide, as Sulfur	<1	1	ppm wt.	UOP-163	12/05/99	M
Iron by ICP	4.3	0.08	ppm wt.	ICP	01/21/00	J
Kinematic Viscosity	59.87		cSt @ 100 F	ASTM D-445	01/26/00	B
Kinematic Viscosity	35.06		cSt @ 122 F	ASTM D-445	01/26/00	B
K Factor	11.8			UOP 375	01/28/00	D
Light Hydrocarbons Analysis		*1			01/07/00	P
Methane	0	0	LV %			
Ethane	0	0	LV %			
Propane	0.24	0	LV %			
Isobutane	0.16	0	LV %			
N-Butane	0.58	0	LV %			
Neopentane	0	0	LV %			
Isopentane	0.59	0	LV %			
n-Pentane	0.69	0	LV %			
Hexanes	1.52	0	LV %			
Heptanes Plus	96.22	0	LV %			
Total	100.00	0				
Mercaptan Sulfur, as Sulfur	19	1	ppm wt.	UOP-163	12/05/99	MA

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LABORATORY TESTS RESULTS
02/13/00

JOB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Oriente
DATE SAMPLED.....: 11/25/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: Sample as Received

LABORATORY I.D...: 995294-0001
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Acid Number by Poten. Titration	<0.01		mg KOH/g	ASTM D-664	01/21/00	M
Nickel by ICP	92	0.18	ppm wt.	ICP	01/21/00	J
Nitrogen, Basic,	882		ppm wt.	UOP 269	01/11/00	M
Nitrogen, Total by Chemilum.	2975	10	ppm wt.	ASTM D-4629	01/24/00	J
Pour Point	-45		Deg. F	ASTM D-97	01/14/00	A
Salt Content	51.0		lbs/1000bbls	ASTM D-3230	01/13/00	*
Sediment and Water	0.10	0.05	L.V. %	ASTM D-4007	01/07/00	D
Sodium by ICP	8.4	1.0	ppm wt.	ICP	01/21/00	J
Sulfur, Total by x-ray Fluoresc.	1.58	0.010	Wt. %	ASTM D-4294	01/06/00	K
Simulated Distillation of Crude		*1		ASTM D-5307	01/07/00	L
% OFF	Deg. F.	0				
IBP	33	0				
5	213	0				
10	298	0				
15	377	0				
20	444	0				
25	504	0				
30	562	0				
35	619	0				
40	674	0				
45	728	0				
50	784	0				
55	837	0				
60	897	0				
65	963	0				
70	ND	0				
75	ND	0				
80	ND	0				
85	ND	0				
90	ND	0				
95	ND	0				
% Recovered	67.5	0	@ 1000 deg. F			
% Residue	32.5	0	@ 1000 deg. F			
Reid Vapor Pressure	2.25		psi	D-5191 ASTM Eqn.	01/05/00	M

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[illegible]

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LABORATORY TESTS RESULTS
02/13/00

OB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

LIENT I.D.....: Crudo Oriente
ATE SAMPLED.....: 11/25/99
IME SAMPLED.....: :
ORK DESCRIPTION...: Sample as Received

LABORATORY I.D...: 995294-0001
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
anadium by ICP	224	0.06	ppm wt.	ICP	01/21/00	J4

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LABORATORY TESTS RESULTS
02/13/00

JB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

.IENT I.D.....: Crudo Oriente
ATE SAMPLED.....: 11/25/99
IME SAMPLED.....: :
ORK DESCRIPTION...: IBP-82 Deg. F

LABORATORY I.D...: 995294-0002
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
eld Data		*1			01/07/00	DBC
Yield	0.76	0	L.V. %	ASTM D-2892		
Yield	0.52	0	Wt. %	ASTM D-2892		
API Gravity	95.9	0	@ 60/60 Deg. F	ASTM D-5002		
Specific Gravity	0.6223	0	@ 60/60 Deg. F	ASTM D-5002		

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LABORATORY TESTS RESULTS

02/13/00

JOB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Oriente
DATE SAMPLED.....: 11/25/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 82-200 Deg. F

LABORATORY I.D...: 995294-0003
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
ield Data		*1			01/07/00	DBC
Yield	4.74	0	L.V. %	ASTM D-2892		
Yield	3.55	0	Wt. %	ASTM D-2892		
API Gravity	75.5	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.6836	0	@ 60/60 Deg. F	ASTM D-1298		
enzene	0.40	0.1	L.V. %	ASTM D-3606	01/31/00	BT
istillation		*1		ASTM D-86	12/03/99	TJ
I.B.P.	102	0	Deg F.	ASTM D-86		
5% Recovered	118	1				
10% Recovered	125	1				
20% Recovered	136	1				
30% Recovered	146	1				
40% Recovered	154	1				
50% Recovered	162	1				
60% Recovered	170	1				
70% Recovered	178	1				
80% Recovered	187	1				
90% Recovered	202	1				
95% Recovered	232	1				
End Point	237	1	Deg F.			
% Recovered	92.8	0.1				
% Residue	0.2	0.1				
% Loss	7.0	0.1				
Factor	12.5			UOP 375	01/28/00	DBC
rcaptan Sulfur, as Sulfur	1	1	ppm wt.	UOP-163	01/13/00	MA
trogen, Basic,	<1		ppm wt.	UOP 313	01/19/00	MA
trogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/19/00	JT
MA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/02/00	BT
Paraffins	79.30	0.00	LV %			
Olefins	0.6	0.00	LV %			
Monocycloparaffins	17.07	0.00	LV %			
Dicycloparaffins	0	0.00	LV %			
Alkylbenzenes	3.23	0.00	LV %			
Indanes/Tetralins	0	0.00	LV %			
Naphthalenes	0	0.00	LV %			

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LABORATORY TESTS RESULTS
02/13/00

JB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTn: REFINERIA TALARA

.IENT I.D.....: Crudo Oriente
.TE SAMPLED.....: 11/25/99
ME SAMPLED.....: :
RK DESCRIPTION...: 82-200 Deg. F

LABORATORY I.D....: 995294-0003
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

ST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Total	100.00	0.00	LV %			
fractive Index	1.3601			Calculated	01/26/00	DBC
tane Analysis -- NIR		*1		NIR	01/05/00	DBC
Research Octane Number	79.0	0		NIR		
Motor Octane Number	76.3	0		NIR		
R+M/2	77.6	0				
.fur, Total by Microcoulometry	<1	1	ppm wt.	ASTM D-3120	12/05/99	JT
id Vapor Pressure	12.61		psi	D-5191 ASTM Eqn.	01/05/00	MB

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LABORATORY TESTS RESULTS
02/13/00

OB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

LIENT I.D.....: Crudo Oriente
ATE SAMPLED.....: 11/25/99
IME SAMPLED.....: :
ORK DESCRIPTION...: 200-300 Deg. F

LABORATORY I.D...: 995294-0004
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
eld Data		*1			01/07/00	DBC
Yield	6.30	0	L.V. %	ASTM D-2892		
Yield	5.19	0	Wt. %	ASTM D-2892		
API Gravity	56.8	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.7515	0	@ 60/60 Deg. F	ASTM D-1298		
nzene	<0.1	0.1	L.V. %	ASTM D-3606	01/31/00	BT
stillation		*1		ASTM D-86	12/03/99	TJ
I.B.P.	215	0	Deg F.	ASTM D-86		
5% Recovered	232	1				
10% Recovered	236	1				
20% Recovered	239	1				
30% Recovered	243	1				
40% Recovered	247	1				
50% Recovered	251	1				
60% Recovered	257	1				
70% Recovered	262	1				
80% Recovered	270	1				
90% Recovered	280	1				
95% Recovered	289	1				
End Point	300	1	Deg F.			
% Recovered	98.2	0.1				
% Residue	0.8	0.1				
% Loss	1.0	0.1				
ash Point, PMCC,	36		Deg. F	ASTM D-93	01/13/00	AB
ector	11.9			UOP 375	01/28/00	DBC
capten Sulfur as Sulfur	1	1	ppm wt.	UOP-163	01/17/00	NA
rogen, Basic,	<1		ppm wt.	UOP 313	01/19/00	NA
rogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/19/00	JT
A by Mass Spectrometer & FIA		*1		ASTM D-2789	01/02/00	BT
Paraffins	68.76	0.00	LV %			
Olefins	0.3	0.00	LV %			
Monocycloparaffins	26.35	0.00	LV %			
Dicycloparaffins	1.13	0.00	LV %			
Alkylbenzenes	3.46	0.00	LV %			

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/13/00

B NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

IENT I.D.....: Crudo Oriente
TE SAMPLED.....: 11/25/99
ME SAMPLED.....:
RK DESCRIPTION...: 200-300 Deg. F

LABORATORY I.D....: 995294-0004
DATE RECEIVED.....: 12/03/99
TIME RECEIVED.....: 16:00
REMARKS.....:

ST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Indanes/Tetralins	0	0.00	LV %			
Naphthalenes	0	0.00	LV %			
Total	100.00	0.00	LV %			
ractive Index	1.3948			Calculated	01/26/00	DBC
ane Analysis -- NIR		*1		NIR	01/05/00	DBC
Research Octane Number	71.0	0		NIR		
Motor Octane Number	68.6	0		NIR		
R+M/2	69.8	0				
fur, Total by Microcoulometry	21	1	ppm wt.	ASTM D-3120	12/05/99	JT
d Vapor Pressure	1.35		psi	D-5191 ASTM Eqn.	01/05/00	MB

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LABORATORY TESTS RESULTS
02/13/00

3 NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

:ENT I.D.....: Crudo Oriente
'E SAMPLED.....: 11/25/99
4E SAMPLED.....: :
:K DESCRIPTION...: 300-350 Deg. F

LABORATORY I.D...: 995294-0005
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

T DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
ld Data		*1			01/07/00	DBC
Yield	3.53	0	L.V. %	ASTM D-2892		
Yield	3.02	0	Wt. %	ASTM D-2892		
API Gravity	49.4	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.7821	0	@ 60/60 Deg. F	ASTM D-1298		
:ine Point	130.8		Deg. F	ASTM D-611	01/07/00	KC
tene	<0.1	0.1	L.V. %	ASTM D-3606	01/31/00	ST
ane Index	31.2			ASTM D-976	01/21/00	DBC
d Point	< -90		Deg. F	ASTM D-2500	01/13/00	AB
illation		*1		ASTM D-86	12/03/99	TJ
I.B.P.	293	0	Deg F.	ASTM D-86		
5% Recovered	305	1				
10% Recovered	307	1				
20% Recovered	310	1				
30% Recovered	313	1				
40% Recovered	316	1				
50% Recovered	318	1				
60% Recovered	322	1				
70% Recovered	325	1				
80% Recovered	330	1				
90% Recovered	336	1				
95% Recovered	342	1				
End Point	352	1	Deg F.			
% Recovered	98.9	0.1				
% Residue	1.0	0.1				
% Loss	0.1	0.1				
Point, PMCC,	92		Deg. F	ASTM D-93	01/12/00	AB
:e Point	<-100		Deg. F	ASTM D-2386	01/07/00	RB
etic Viscosity	0.89		cSt @ 100 F	ASTM D-445	01/25/00	KC
etic Viscosity	0.78		cSt @ 122 F	ASTM D-445	01/25/00	KC
tor	11.8			UOP 375	01/28/00	DBC
ptan Sulfur, as Sulfur	Insuff.	1	ppm wt.	UOP-163	01/11/00	DBC

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/13/00

B NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

IENT I.D.....: Crudo Oriente
TE SAMPLED.....: 11/25/99
ME SAMPLED.....: :
IK DESCRIPTION...: 300-350 Deg. F

LABORATORY I.D....: 995294-0005
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

T DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
rogen, Basic,	Insuff.		ppm wt.	UOP 313	01/11/00	DBC
rogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/19/00	JT
r Point	<-90		Deg. F	ASTM D-97	01/14/00	AB
A by Mass Spectrometer & FIA		*1		ASTM D-2789	01/02/00	BT
Paraffins	55.64	0.00	LV %			
Olefins	0.6	0.00	LV %			
Monocycloparaffins	29.55	0.00	LV %			
Dicycloparaffins	10.17	0.00	LV %			
Alkylbenzenes	3.98	0.00	LV %			
Indanes/Tetralins	0.06	0.00	LV %			
Naphthalenes	0	0.00	LV %			
Total	100.00	0.00	LV %			
ractive Index	1.4116			Calculated	01/26/00	DBC
ane Analysis -- NIR		*1		NIR	01/05/00	DBC
Research Octane Number	71.6	0		NIR		
Motor Octane Number	68.3	0		NIR		
R+M/2	70.0	0				
te Point	24			ASTM D-1322	01/13/00	JJ
fur, Total by x-ray Fluoresc.	0.028	0.010	Wt. %	ASTM D-4294	01/06/00	KC
l Vapor Pressure	0.25		psi	D-5191 ASTM Eqn.	01/05/00	RB

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[illegible]

CORE LABORATORIES

LABORATORY TESTS RESULTS

02/13/00

JOB NUMBER: 995294 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Oriente
DATE SAMPLED.....: 11/25/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 350-400 Deg. F

LABORATORY I.D...: 995294-0006
DATE RECEIVED....: 12/03/99
TIME RECEIVED....: 16:00
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Yield Data		*1			01/07/00	DI
Yield	3.97	0	L.V. %	ASTM D-2892		
Yield	3.51	0	Wt. %	ASTM D-2892		
API Gravity	43.7	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8076	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	128.8		Deg. F	ASTM D-611	01/07/00	KC
Benzene	<0.1	0.1	L.V. %	ASTM D-3606	01/31/00	BI
Cetane Index	Insuff.			ASTM D-976	12/03/99	DI
Cloud Point	< -90		Deg. F	ASTM D-2500	01/13/00	AI
Color	L of 0.5			ASTM D-1500	01/14/00	AI
Color, Saybolt	+29			ASTM D-156	01/14/00	JO
Distillation		*1		ASTM D-86	12/03/99	DI
I.B.P.	Insuff.	0	Deg F.	ASTM D-86		
5% Recovered	Sample	1				
10% Recovered	---	1				
20% Recovered	---	1				
30% Recovered	---	1				
40% Recovered	---	1				
50% Recovered	---	1				
60% Recovered	---	1				
70% Recovered	---	1				
80% Recovered	---	1				
90% Recovered	---	1				
95% Recovered	---	1				
End Point	---	1	Deg F.			
% Recovered	---	0.1				
% Residue	---	0.1				
% Loss	---	0.1				
Flash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	12/03/99	DI
Freeze Point	-96		Deg. F	ASTM D-2386	01/07/00	RB
Kinematic Viscosity	1.17		cSt @ 100 F	ASTM D-445	01/25/00	KC
Kinematic Viscosity	0.99		cSt @ 122 F	ASTM D-445	01/25/00	KC

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APPENDIX A.1.6 – ONO MIX

Ono mix is a blend of the following

41.6 LV %	PETROTECH
35.6 LV %	PEREZ COMPANC
22.8 LV %	CRUDO COMPOSITO VARIOUS

The crude assays for these three crudes can be found in Appendices A.1.7 – A.1.9.

CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 500-550 Deg. F

LABORATORY I.D...: 995270-0008
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Yield Data		*1			12/18/99	DC
Yield	5.64	0	L.V. %	ASTM D-2892		
Yield	5.71	0	Wt. %	ASTM D-2892		
API Gravity	35.1	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8493	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	158.4		Deg. F	ASTM D-611	01/06/00	KC
Bromine Number	0.19		g/100g	ASTM D-1159	01/13/00	NA
Cetane Index	47.3			ASTM D-976	01/12/00	DB
Cloud Point	+10		Deg. F	ASTM D-2500	01/14/00	AB
Color	L of 0.5			ASTM D-1500	01/12/00	AB
Distillation		*1		ASTM D-86	12/03/99	TJ
I.B.P.	238	0	Deg F.	ASTM D-86		
5% Recovered	480	1				
10% Recovered	496	1				
20% Recovered	502	1				
30% Recovered	505	1				
40% Recovered	509	1				
50% Recovered	511	1				
60% Recovered	514	1				
70% Recovered	517	1				
80% Recovered	520	1				
90% Recovered	527	1				
95% Recovered	532	1				
End Point	536	1	Deg F.			
% Recovered	97.9	0.1				
% Residue	1.9	0.1				
% Loss	0.2	0.1				
Flash Point, PMCC,	250		Deg. F	ASTM D-93	01/09/00	SA
Freeze Point	-16		Deg. F	ASTM D-2386	01/07/00	RB
Hydrocarbon Type		*1		ASTM D-1319	01/07/00	VS
Aromatics	19.7	0.2	L.V. %			
Olefins	1.6	0.2	L.V. %			
Saturates	78.7	0.2	L.V. %			

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 500-550 Deg. F

LABORATORY I.D...: 995270-0008
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Kinematic Viscosity	3.03		cSt @ 100 F	ASTM D-445	01/18/00	BB
Kinematic Viscosity	2.56		cSt @ 122 F	ASTM D-445	01/18/00	BB
K Factor	11.7			UOP 375	01/18/00	DBC
Mercaptan Sulfur, as Sulfur	3	1	ppm wt.	UOP-163	01/13/00	NA
Naphthalenes in Jet Fuel	3.32		L.V. %	ASTM D-1840	01/18/00	KC
Acid Number by Poten. Titration	0.91		mg KOH/g	ASTM D-664	01/17/00	NA
Nitrogen, Basic,	5		ppm wt.	UOP 269	01/11/00	NA
Nitrogen, Total by Chemilum.	5	1	ppm wt.	ASTM D-4629	01/17/00	JT
Pour Point	-5		Deg. F	ASTM D-97	01/14/00	AB
PNA of Kerosene		*1		ASTM D2425 mod.	01/20/00	LS
Paraffins	51.6	0.1	LV %			
Monocycloparaffins	16.6	0.1	LV %			
Dicycloparaffins	13.9	0.1	LV %			
Tricycloparaffins	2.4	0.1	LV %			
Alkylbenzenes	1.8	0.1	LV %			
Indans	6.3	0.1	LV %			
Indenes	4.5	0.1	LV %			
Naphthalenes	2.5	0.1	LV %			
Acenaphthenes	0.2	0.1	LV %			
Acenaphthalenes	0.2	0.1	LV %			
Tricyclic Aromatics	<0.1	0.1	LV %			
Total	100.0	0	LV %			
Refractive Index	1.4472		67 Deg. C	ASTM D-1747	01/17/00	JDP
Refractive Index	1.4491			Calculated	01/14/00	DBC
Smoke Point	15		mm	ASTM D-1322	01/13/00	JJ
Sulfur, Total by x-ray Fluoresc.	0.013	0.010	Wt. %	ASTM D-4294	01/19/00	KC

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 550-650 Deg. F

LABORATORY I.D....: 995270-0009
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Yield Data		*1			12/18/99	D
Yield	11.09	0	L.V. %	ASTM D-2892		
Yield	11.39	0	Wt. %	ASTM D-2892		
API Gravity	32.8	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8613	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	172.8		Deg. F	ASTM D-611	01/06/00	K
Bromine Number	0.29		g/100g	ASTM D-1159	01/13/00	K
Carbon Residue, Conradson	<0.01		Wt. %	ASTM D-189	01/18/90	J
Carbon Residue, Ramsbottom	0.03		Wt. %	ASTM D-524	01/14/00	J
Cetane Index	49.9			ASTM D-976	01/12/00	D
Cloud Point	+32		Deg. F	ASTM D-2500	01/14/00	A
Color	L of 0.5			ASTM D-1500	01/12/00	A
Distillation		*1		ASTM D-86	12/03/99	T
I.B.P.	525	0	Deg F.	ASTM D-86		
5% Recovered	556	1				
10% Recovered	563	1				
20% Recovered	566	1				
30% Recovered	570	1				
40% Recovered	576	1				
50% Recovered	580	1				
60% Recovered	585	1				
70% Recovered	590	1				
80% Recovered	597	1				
90% Recovered	608	1				
95% Recovered	617	1				
End Point	618	1	Deg F.			
% Recovered	97.7	0.1				
% Residue	1.4	0.1				
% Loss	0.9	0.1				
Flash Point, PMCC,	305		Deg. F	ASTM D-93	01/13/00	A
Freeze Point	+22		Deg. F	ASTM D-2386	01/07/00	T
Kinematic Viscosity	6.17		cSt @ 100 F	ASTM D-445	01/18/00	I

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 550-650 Deg. F

LABORATORY I.D...: 995270-0009
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Kinematic Viscosity	4.51		cst @ 122 F	ASTM D-445	01/18/00	BI
K Factor	11.9			UOP 375	01/18/00	DI
Mercaptan Sulfur, as Sulfur	4	1	ppm wt.	UOP-163	01/13/00	MJ
Naphthalenes in Jet Fuel	5.20		L.V. %	ASTM D-1840	01/18/00	KC
Acid Number by Poten. Titration	1.06		mg KOH/g	ASTM D-664	01/17/00	MA
Nitrogen, Basic,	17		ppm wt.	UOP 269	01/11/00	MA
Nitrogen, Total by Chemilum.	28	1	ppm wt.	ASTM D-4629	01/17/00	JT
Pour Point	-10 X		Deg. F	ASTM D-97	01/14/00	AB
PNA Middle Distillates, Mass Spec		*1		ASTM D-2425	01/20/00	LS
Paraffins	53.3	0	LV %			
Monocycloparaffins	15.5	0	LV %			
Dicycloparaffins	12.1	0	LV %			
Tricycloparaffins	2.2	0	LV %			
Alkylbenzenes	2.5	0	LV %			
Indanes/Tetralins	4.0	0	LV %			
Indenes	4.7	0	LV %			
Naphthalenes	2.7	0	LV %			
Acenaphthenes	1.3	0	LV %			
Acenaphthalenes	1.1	0	LV %			
Tricyclic Aromatics	0.6	0	LV %			
Total	100.0	0	LV %			
Refractive Index	1.4553		67 Deg. C	ASTM D-1747	01/17/00	JO
Refractive Index	1.4594			Calculated	01/14/00	DB
Smoke Point	15		mm	ASTM D-1322	01/13/00	JJ
Sulfur, Total by x-ray Fluoresc.	0.032	0.010	Wt. %	ASTM D-4294	01/19/00	KC

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 650-700 Deg. F

LABORATORY I.D...: 995270-0010
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	T
Yield Data		*1			12/18/99	
Yield	4.81	0	L.V. %	ASTM D-2892		
Yield	5.06	0	Wt. %	ASTM D-2892		
API Gravity	28.9	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8821	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	180.5		Deg. F	ASTM D-611	01/06/00	
Bromine Number	0.53		g/100g	ASTM D-1159	01/13/00	
Carbon Residue, Conradson	<0.01		Wt. %	ASTM D-189	01/18/90	J
Carbon Residue, Ramsbottom	0.06		Wt. %	ASTM D-524	01/17/00	J
Cetane Index	Insuff.			ASTM D-976	12/02/99	D
Cloud Point	+69		Deg. F	ASTM D-2500	01/12/00	A
Color	L of 5.5			ASTM D-1500	01/12/00	A
Distillation		*1		ASTM D-86	12/02/99	D
I.B.P.	Insuff.	0	Deg F.	ASTM D-86		
5% Recovered	Sample	1				
10% Recovered	---	1				
20% Recovered	---	1				
30% Recovered	---	1				
40% Recovered	---	1				
50% Recovered	---	1				
60% Recovered	---	1				
70% Recovered	---	1				
80% Recovered	---	1				
90% Recovered	---	1				
95% Recovered	---	1				
End Point	---	1	Deg F.			
% Recovered	---	0.1				
% Residue	---	0.1				
% Loss	---	0.1				
Flash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	12/02/99	DI
Kinematic Viscosity	13.66		cSt @ 100 F	ASTM D-445	01/18/00	BI
Kinematic Viscosity	9.06		cSt @ 122 F	ASTM D-445	01/18/00	BI

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 650-700 Deg. F

LABORATORY I.D...: 995270-0010
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Kinematic Viscosity	2.93		cSt @ 210 F	ASTM D-445	01/18/00	B
K Factor	11.8			UOP 375	01/18/00	D
Mercaptan Sulfur, as Sulfur	4	1	ppm wt.	UOP-163	01/13/00	N
Acid Number by Poten. Titration	1.05		mg KOH/g	ASTM D-664	01/17/00	N
Nitrogen, Basic,	75		ppm wt.	UOP 269	01/11/00	N
Nitrogen, Total by Chemilum.	156	2	ppm wt.	ASTM D-4629	01/17/00	J
Pour Point	+50		Deg. F	ASTM D-97	01/14/00	A
PNA of Gas Oil		*1		ASTM D2786,3239	01/20/00	L
Paraffins	36.8	0	LV %			
Naphthenes	40.9	0	LV %			
Aromatics	22.3	0	LV %			
NAPHTHENIC DISTRIBUTION	--	0				
---1 Ring	14.6	0	LV %			
---2 Ring	15.8	0	LV %			
---3 Ring	6.6	0	LV %			
---4 Ring	3.9	0	LV %			
---5 Ring	0.0	0	LV %			
---6 Ring	0.0	0	LV %			
AROMATIC DISTRIBUTION	--	0				
Monoaromatics	11.5	0	LV %			
---Alkylbenzenes	3.0	0	LV %			
---Naphthenebenzenes	3.8	0	LV %			
---Dinaphthenebenzenes	4.7	0	LV %			
Diaromatics	7.8	0	LV %			
---Naphthalenes	2.8	0	LV %			
---Acenaphthenes/Dibenzofurans	2.3	0	LV %			
---Fluorenes	2.7	0	LV %			
Triaromatics	1.6	0	LV %			
---Phenanthrenes	1.4	0	LV %			
---Naphthenophenanthrenes	0.2	0	LV %			
Tetraaromatics	0.2	0	LV %			
---Pyrenes	0.1	0	LV %			
---Chyrsenes	0.1	0	LV %			
Pentaaromatics	0.0	0	LV %			
---Perylenes	0.0	0	LV %			
---Dibenzanthracenes	0.0	0	LV %			
Thiophene Aromatics	1.1	0	LV %			

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 650-700 Deg. F

LABORATORY I.D...: 995270-0010
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
---Benzothiophenes	0.4	0	LV %			
---Dibenzothiophenes	0.7	0	LV %			
---Naphthabenzothiophenes	0.0	0	LV %			
Unidentified Aromatics	0.1	0	LV %			
---Class I (see Naph. Phen.)	0.0	0	LV %			
---Class II	0.0	0	LV %			
---Class III	0.0	0	LV %			
---Class IV	0.1	0	LV %			
---Class V	0.0	0	LV %			
---Class VI	0.0	0	LV %			
---Class VII	0.0	0	LV %			
Refractive Index	1.4669		67 Deg. C	ASTM D-1747	01/17/00	JDP
Refractive Index	1.4694			Calculated	01/14/00	DBC
Sulfur, Total by x-ray Fluoresc.	0.068	0.010	Wt. %	ASTM D-4294	01/19/00	KC

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 700+ Deg. F

LABORATORY I.D...: 995270-0011
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Yield Data		*1			12/18/99	D
Yield	29.30	0	L.V. %	ASTM D-2892		
Yield	32.78	0	Wt. %	ASTM D-2892		
API Gravity	19.3	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.9385	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point (Thin Film)	Too Dark		Deg. F	ASTM D-611	01/06/00	KC

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 700-800 Deg. F

LABORATORY I.D...: 995270-0012
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Yield Data Hyvac Potstill		*1		ASTM D-5236	12/20/99	DC
Yield L.V. %	5.67	0	L.V.%	ASTM D-5236		
Yield Wt. %	6.12	0	Wt. %	ASTM D-5236		
API Grav.	24.8	0	@ 60/60 Deg. F	ASTM D-287		
Spec. Grav.	0.9053	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	193.1		Deg. F	ASTM D-611	01/06/00	KC
Asphaltene	0.09	0.05	Wt. %	IP-143	01/12/00	JD
Bromine Number	0.60		g/100g	ASTM D-1159	01/13/00	MA
Carbon Residue, Conradson	<0.01		Wt. %	ASTM D-189	01/19/00	JD
Carbon Residue, Ramsbottom	0.09		Wt. %	ASTM D-524	01/21/00	JD
Cetane Index	Insuff.			ASTM D-976	12/02/99	DB
Color	L of 4.0			ASTM D-1500	01/12/00	AB
Flash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	12/02/99	DB
Kinematic Viscosity	50.50		cSt @ 100 F	ASTM D-445	01/18/00	BB
Kinematic Viscosity	28.36		cSt @ 122 F	ASTM D-445	01/18/00	BB
Kinematic Viscosity	6.03		cSt @ 210 F	ASTM D-445	01/18/00	BB
K Factor	11.8			UOP 375	01/18/00	DB
Acid Number by Poten. Titration	0.44		mg KOH/g	ASTM D-664	01/17/00	MA
Nitrogen, Basic,	255		ppm wt.	UOP 269	01/11/00	MA
Nitrogen, Total by Chemilum.	750	2	ppm wt.	ASTM D-4629	01/17/00	JT
Pour Point	+75		Deg. F	ASTM D-97	01/12/00	AB
PNA of Gas Oil		*1		ASTM D2786,3239	01/20/00	LS
Paraffins	32.3	0	LV %			
Naphthenes	41.3	0	LV %			
Aromatics	26.4	0	LV %			
NAPHTHENIC DISTRIBUTION	--	0				

P O BOX 34766
HOUSTON, TX 77234-4282
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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 700-800 Deg. F

LABORATORY I.D....: 995270-0012
DATE RECEIVED.....: 12/02/99
TIME RECEIVED.....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
---1 Ring	13.4	0	LV %			
---2 Ring	15.9	0	LV %			
---3 Ring	7.7	0	LV %			
---4 Ring	3.8	0	LV %			
---5 Ring	0.5	0	LV %			
---6 Ring	0.0	0	LV %			
AROMATIC DISTRIBUTION	--	0				
Monoaromatics	13.3	0	LV %			
---Alkylbenzenes	3.8	0	LV %			
---Naphthenebenzenes	4.5	0	LV %			
---Dinaphthenebenzenes	5.0	0	LV %			
Diaromatics	7.4	0	LV %			
---Naphthalenes	2.5	0	LV %			
---Acenaphthenes/Dibenzofurans	1.9	0	LV %			
---Fluorenes	3.0	0	LV %			
Triaromatics	3.0	0	LV %			
---Phenanthrenes	2.1	0	LV %			
---Naphthenephenanthrenes	0.9	0	LV %			
Tetraaromatics	1.3	0	LV %			
---Pyrenes	1.1	0	LV %			
---Chyrsenes	0.2	0	LV %			
Pentaaromatics	0.0	0	LV %			
---Perylenes	0.0	0	LV %			
---Dibenzanthracenes	0.0	0	LV %			
Thiopheno Aromatics	1.1	0	LV %			
---Benzothiophenes	0.6	0	LV %			
---Dibenzothiophenes	0.5	0	LV %			
---Naphthabenzothiophenes	0.0	0	LV %			
Unidentified Aromatics	0.3	0	LV %			
---Class I (see Naph. Phen.)	0.0	0	LV %			
---Class II	0.0	0	LV %			
---Class III	0.0	0	LV %			
---Class IV	0.3	0	LV %			
---Class V	0.0	0	LV %			
---Class VI	0.0	0	LV %			
---Class VII	0.0	0	LV %			
Refractive Index	1.4795		67 Deg. C	ASTM D-1747	01/17/00	JD
Refractive Index	1.4867			Calculated	01/14/00	DB
Sulfur, Total by x-ray Fluoresc.	0.110	0.010	Wt. %	ASTM D-4294	01/19/00	KC
Vacuum Distillation		*1		ASTM D-1160	12/02/99	DB

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 700-800 Deg. F

LABORATORY I.D....: 995270-0012
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
I.B.P.	Insuff.	1	Deg. F	ASTM D-1160		
5% Evaporated	Sample	1				
10% Evaporated	---	1				
20% Evaporated	---	1				
30% Evaporated	---	1				
40% Evaporated	---	1				
50% Evaporated	---	1				
60% Evaporated	---	1				
70% Evaporated	---	1				
80% Evaporated	---	1				
90% Evaporated	---	1				
95% Evaporated	---	1				
End Point	---	1	Deg. F			
% Recovered	---	0.1				
% Residue	---	0.1				
% Loss	---	0.1				

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 800-900 Deg. F

LABORATORY I.D...: 995270-0013
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Yield Data Hyvac Potstill		*1		ASTM D-5236	12/20/99	DC
Yield L.V. %	10.72	0	L.V.%	ASTM D-5236		
Yield Wt. %	11.68	0	Wt. %	ASTM D-5236		
API Grav.	23.4	0	@ 60/60 Deg. F	ASTM D-287		
Spec. Grav.	0.9138	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	200.1		Deg. F	ASTM D-611	01/06/00	KC
Ash Content,	0.002		WT %	ASTM D-482	01/24/00	AB
Asphaltene	<0.05	0.05	Wt. %	IP-143	01/19/00	JD
Bromine Number	2.0		g/100g	ASTM D-1159	01/13/00	NA
Carbon Residue, Conradson	0.11		Wt. %	ASTM D-189	01/19/00	JD
Carbon Residue, Ramsbottom	0.08		Wt. %	ASTM D-524	01/17/00	JD
Cetane Index	37.4			ASTM D-976	01/12/00	DB
Copper by ICP	<0.05	0.05	ppm wt.	ICP	01/21/00	JW
Flash Point, COC,	480		Deg. F	ASTM D-92	01/18/00	AB
Iron by ICP	3.3	0.08	ppm wt.	ICP	01/21/00	JW
Kinematic Viscosity	61.81		cSt @ 122 F	ASTM D-445	01/20/00	BB
Kinematic Viscosity	9.38		cSt @ 210 F	ASTM D-445	01/26/00	BB
K Factor	12.0			UOP 375	01/18/00	DB
Acid Number by Poten. Titration	0.49		mg KOH/g	ASTM D-664	01/18/00	NA
Nickel by ICP	<0.18	0.18	ppm wt.	ICP	01/21/00	JW
Nitrogen, Basic,	437		ppm wt.	UOP 269	01/11/00	NA
Nitrogen, Total by Chemilum.	1329	5	ppm wt.	ASTM D-4629	01/17/00	JT
Pour Point	+95		Deg. F	ASTM D-97	01/14/00	AB
PNA of Gas Oil		*1		ASTM D2786,3239	01/20/00	LS

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 800-900 Deg. F

LABORATORY I.D...: 995270-0013
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Paraffins	25.5	0	LV %			
Naphthenes	46.2	0	LV %			
Aromatics	28.3	0	LV %			
NAPHTHENIC DISTRIBUTION	--	0				
---1 Ring	14.0	0	LV %			
---2 Ring	15.4	0	LV %			
---3 Ring	11.1	0	LV %			
---4 Ring	5.0	0	LV %			
---5 Ring	0.7	0	LV %			
---6 Ring	0.0	0	LV %			
AROMATIC DISTRIBUTION	--	0				
Monoaromatics	15.7	0	LV %			
---Alkylbenzenes	4.7	0	LV %			
---Naphthenebenzenes	5.4	0	LV %			
---Dinaphthenebenzenes	5.6	0	LV %			
Diaromatics	7.9	0	LV %			
---Naphthalenes	3.2	0	LV %			
---Acenaphthenes/Dibenzofurans	1.7	0	LV %			
---Fluorenes	3.0	0	LV %			
Triaromatics	2.5	0	LV %			
---Phenanthrenes	1.6	0	LV %			
---Naphthenephenanthrenes	0.9	0	LV %			
Tetraaromatics	1.3	0	LV %			
---Pyrenes	1.0	0	LV %			
---Chyrsenes	0.3	0	LV %			
Pentaaromatics	0.0	0	LV %			
---Perylenes	0.0	0	LV %			
---Dibenzanthracenes	0.0	0	LV %			
Thiopheno Aromatics	0.8	0	LV %			
---Benzothiophenes	0.5	0	LV %			
---Dibenzothiophenes	0.2	0	LV %			
---Naphthabenzothiophenes	0.1	0	LV %			
Unidentified Aromatics	0.1	0	LV %			
---Class I (see Naph. Phen.)	0.0	0	LV %			
---Class II	0.0	0	LV %			
---Class III	0.0	0	LV %			
---Class IV	0.1	0	LV %			
---Class V	0.0	0	LV %			
---Class VI	0.0	0	LV %			
---Class VII	0.0	0	LV %			
ıfractive Index	1.4846		67 Deg. C	ASTM D-1747	01/17/00	JDP
ıfractive Index	1.4899			Calculated	01/14/00	DBC

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 800-900 Deg. F

LABORATORY I.D...: 995270-0013
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Sulfur, Total by x-ray Fluoresc.	0.124	0.010	Wt. %	ASTM D-4294	01/19/00	KC
Vanadium by ICP	<0.06	0.06	ppm wt.	ICP	01/21/00	JW
Vacuum Distillation		*1		ASTM D-1160	01/05/00	DC
I.B.P.	711	1	Deg. F	ASTM D-1160		
5% Evaporated	735	1				
10% Evaporated	746	1				
20% Evaporated	749	1				
30% Evaporated	754	1				
40% Evaporated	758	1				
50% Evaporated	772	1				
60% Evaporated	779	1				
70% Evaporated	789	1				
80% Evaporated	799	1				
90% Evaporated	822	1				
95% Evaporated	838	1				
End Point	865	1	Deg. F			
% Recovered	99.0	0.1				
% Residue	1.0	0.1				
% Loss	<0.1	0.1				

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 900-1050 Deg. F

LABORATORY I.D...: 995270-0014
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Yield Data Hyvac Potstill		*1		ASTM D-5236	12/20/99	DC
Yield L.V. %	6.51	0	L.V.%	ASTM D-5236		
Yield Wt. %	7.30	0	Wt. %	ASTM D-5236		
API Grav.	19.1	0	@ 60/60 Deg. F	ASTM D-287		
Spec. Grav.	0.9399	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	204.4		Deg. F	ASTM D-611	01/06/00	KC
Ash Content,	0.002		WT %	ASTM D-482	01/24/00	AB
Asphaltene	0.07	0.05	Wt. %	IP-143	01/19/00	JDP
Bromine Number	1.9		g/100g	ASTM D-1159	01/13/00	MA
Carbon Residue, Conradson	1.45		Wt. %	ASTM D-189	01/19/00	JDP
Carbon Residue, Ramsbottom	0.87		Wt. %	ASTM D-524	01/17/00	JDP
Copper by ICP	<0.05	0.05	ppm wt.	ICP	01/21/00	JM
Flash Point, COC,	570		Deg. F	ASTM D-92	01/18/00	AB
Iron by ICP	1.4	0.08	ppm wt.	ICP	01/21/00	JM
Kinematic Viscosity	476.6		cSt @ 122 F	ASTM D-445	01/21/00	BB
Kinematic Viscosity	32.6		cSt @ 210 F	ASTM D-445	01/20/00	BB
Kinematic Viscosity	8.52		cSt @ 300 F	ASTM D-445	01/21/00	BB
K Factor	11.8			UOP 375	01/18/00	DBC
Acid Number by Poten. Titration	0.62		mg KOH/g	ASTM D-664	01/18/00	MA
Nickel by ICP	<0.18	0.18	ppm wt.	ICP	01/21/00	JM
Nitrogen, Basic,	1101		ppm wt.	UOP 269	01/11/00	MA
Nitrogen, Total by Chemilum.	3648	10	ppm wt.	ASTM D-4629	01/12/00	JT
Pour Point	+100		Deg. F	ASTM D-97	01/14/00	AB
PNA of Gas Oil		*1		ASTM D2786,3239	01/20/00	LS

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 900-1050 Deg. F

LABORATORY I.D...: 995270-0014
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Paraffins	19.9	0	LV %			
Naphthenes	36.1	0	LV %			
Aromatics	44.0	0	LV %			
NAPHTHENIC DISTRIBUTION	--	0				
---1 Ring	10.9	0	LV %			
---2 Ring	12.0	0	LV %			
---3 Ring	8.7	0	LV %			
---4 Ring	3.9	0	LV %			
---5 Ring	0.6	0	LV %			
---6 Ring	0.0	0	LV %			
AROMATIC DISTRIBUTION	--	0				
Monoaromatics	24.7	0	LV %			
---Alkylbenzenes	8.4	0	LV %			
---Naphthenebenzenes	7.5	0	LV %			
---Dinaphthenebenzenes	8.8	0	LV %			
Diaromatics	11.4	0	LV %			
---Naphthalenes	4.4	0	LV %			
---Acenaphthenes/Dibenzofurans	2.2	0	LV %			
---Fluorenes	4.8	0	LV %			
Triaromatics	3.5	0	LV %			
---Phenenanthrenes	2.2	0	LV %			
---Naphthenephenanthrenes	1.3	0	LV %			
Tetraaromatics	2.5	0	LV %			
---Pyrenes	1.8	0	LV %			
---Chyrsenes	0.7	0	LV %			
Pentaaromatics	0.3	0	LV %			
---Perylenes	0.2	0	LV %			
---Dibenzanthracenes	0.1	0	LV %			
Thiopheno Aromatics	1.4	0	LV %			
---Benzothiophenes	0.7	0	LV %			
---Dibenzothiophenes	0.4	0	LV %			
---Naphthabenzothiophenes	0.3	0	LV %			
Unidentified Aromatics	0.2	0	LV %			
---Class I (see Naph. Phen.)	0.0	0	LV %			
---Class II	0.0	0	LV %			
---Class III	0.0	0	LV %			
---Class IV	0.2	0	LV %			
---Class V	0.0	0	LV %			
---Class VI	0.0	0	LV %			
---Class VII	0.0	0	LV %			
efractive Index	1.5023		67 Deg. C	ASTM D-1747	01/17/00	JDP
efractive Index	1.5072			Calculated	01/14/00	DBC

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 900-1050 Deg. F

LABORATORY I.D....: 995270-0014
DATE RECEIVED.....: 12/02/99
TIME RECEIVED.....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Sulfur, Total by x-ray Fluoresc.	0.190	0.010	Wt. %	ASTM D-4294	01/19/00	KC
Vanadium by ICP	<0.06	0.06	ppm wt.	ICP	01/21/00	JW
Vacuum Distillation		*1		ASTM D-1160	12/02/99	DBC
I.B.P.	Insuff.	1	Deg. F	ASTM D-1160		
5% Evaporated	Sample	1				
10% Evaporated	---	1				
20% Evaporated	---	1				
30% Evaporated	---	1				
40% Evaporated	---	1				
50% Evaporated	---	1				
60% Evaporated	---	1				
70% Evaporated	---	1				
80% Evaporated	---	1				
90% Evaporated	---	1				
95% Evaporated	---	1				
End Point	---	1	Deg. F			
% Recovered	---	0.1				
% Residue	---	0.1				
% Loss	---	0.1				

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 650+ Deg. F

LABORATORY I.D...: 995270-0015
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Yield Data		*1			12/18/99	DC
Yield	34.10	0	L.V. %	ASTM D-2892		
Yield	37.84	0	Wt. %	ASTM D-2892		
API Gravity	20.5	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.9309	0	@ 60/60 Deg. F	ASTM D-1298		
Ash Content,	0.018		WT %	ASTM D-482	01/21/00	AB
Asphaltene	0.17	0.05	Wt. %	IP-143	01/19/00	JDP
Bromine Number	2.3		g/100g	ASTM D-1159	01/13/00	NA
Carbon Residue, Ramsbottom	2.90		Wt. %	ASTM D-524	01/17/00	JDP
Copper by ICP	0.10	0.05	ppm wt.	ICP	01/21/00	JW
Flash Point, COC,	465		Deg. F	ASTM D-92	01/19/00	AB
Iron by ICP	18	0.08	ppm wt.	ICP	01/21/00	JW
Kinematic Viscosity	169.4		cSt @ 122 F	ASTM D-445	01/27/00	BB
Kinematic Viscosity	17.38		cSt @ 210 F	ASTM D-445	01/20/00	BB
K Factor	11.8			UOP 375	01/18/00	DBC
Acid Number by Poten. Titration	0.60		mg KOH/g	ASTM D-664	01/18/00	NA
Nickel by ICP	2.0	0.18	ppm wt.	ICP	01/21/00	JW
Nitrogen, Basic,	1056		ppm wt.	UOP 269	01/11/00	NA
Nitrogen, Total by Chemilum.	3160	10	ppm wt.	ASTM D-4629	01/12/00	JT
Pour Point	+85		Deg. F	ASTM D-97	01/14/00	AB
Refractive Index	Too Dark		67 Deg. C	ASTM D-1747	01/17/00	JDP
Sulfur, Total by x-ray Fluoresc.	0.161	0.010	Wt. %	ASTM D-4294	01/19/00	KC
Vanadium by ICP	0.12	0.06	ppm wt.	ICP	01/21/00	JW

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 1050+ Deg. F

LABORATORY I.D...: 995270-0016
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data Hyvac Potstill		*1		ASTM D-5236	12/20/99	DC
Yield L.V. %	6.39	0	L.V.%	ASTM D-5236		
Yield Wt. %	7.68	0	Wt. %	ASTM D-5236		
API Grav.	8.9	0	@ 60/60 Deg. F	ASTM D-287		
Spec. Grav.	1.0081	0	@ 60/60 Deg. F	ASTM D-1298		
Ash Content,	0.002		WT %	ASTM D-482	01/25/00	AB
Asphaltene	0.83	0.05	Wt. %	IP-143	01/19/00	JDP
Bromine Number	5.9		g/100g	ASTM D-1159	01/17/00	NA
Carbon Residue, Conradson	17.70		Wt. %	ASTM D-189	01/19/00	JDP
Carbon Residue, Ramsbottom	17.6		Wt. %	Calculated	01/19/00	DBC
Copper by ICP	0.39	0.05	ppm wt.	ICP	01/21/00	JV
Flash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	12/02/99	DB
Iron by ICP	80	0.08	ppm wt.	ICP	01/21/00	JV
Kinematic Viscosity	6651		cSt @ 210 F	ASTM D-445	01/28/00	BB
Kinematic Viscosity	204.7		cSt @ 300 F	ASTM D-445	01/28/00	BB
Kinematic Viscosity	Can't Run		cSt @ 350 F	ASTM D-445	01/28/00	BB
IK Factor	Insuff.			UOP 375	01/18/00	DBC
Acid Number by Poten. Titration	0.25		mg KOH/g	ASTM D-664	01/18/00	NA
Nickel by ICP	9.6	0.18	ppm wt.	ICP	01/21/00	JV
Nitrogen, Basic,	3000		ppm wt.	UOP 269	01/13/00	NA
Nitrogen, Total by Chemilum.	8586	20	ppm wt.	ASTM D-4629	01/12/00	JT
Penetration	23		1/10mm Div.	ASTM D-5	01/19/00	DC
Refractive Index	Too Dark		@7 Deg. C	ASTM D-1747	01/17/00	JDP
Softening Point	+115		Deg. F	ASTM D-36	01/11/00	VS

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 1050+ Deg. F

LABORATORY I.D...: 995270-0016
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Sulfur, Total by x-ray fluoresc.	0.312	0.010	Wt. %	ASTM D-4294	01/19/00	KC
Vanadium by ICP	0.53	0.06	ppm wt.	ICP	01/21/00	JW

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Co. Name: Petro Peru S.A.
Job No: 995270
Sample ID: Crudo Petrotech

FRACTIONAL DISTILLATION TABLE

Temp. Range Deg.F.@760mm	Yield, L.V. %	Cumulative Yield, L.V. %	Yield, Wt. %	Cumulative Yield, Wt. %
IBP - 82 Deg.F.	1.49	1.49	1.11	1.11
82 - 200 Deg.F.	9.99	11.48	8.29	9.40
200 - 300 Deg.F.	14.92	26.40	13.51	22.91
300 - 350 Deg.F.	5.90	32.30	5.57	28.48
350 - 400 Deg.F.	5.42	37.72	5.24	33.72
400 - 500 Deg.F.	11.22	48.94	11.11	44.83
500 - 550 Deg.F.	5.64	54.58	5.71	50.54
550 - 650 Deg.F.	11.09	65.67	11.39	61.93
650 - 700 Deg.F.	4.81	70.48	5.06	66.93
700 - 800 Deg.F.	5.67	76.15	6.12	73.11
800 - 900 Deg.F.	10.72	86.88	11.68	84.79
900- - 1050 Deg.F.	6.51	93.39	7.30	92.09
1050+ Deg.F.	6.39	99.78	7.68	99.77

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: Sample as Received

LABORATORY I.D...: 995270-0001
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data		*1			12/18/99	DC
API Gravity	37.2	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8389	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point (Thin Film)	159.6		Deg. F	ASTM D-611	01/06/00	KC
Ash Content,	0.01		WT %	ASTM D-482	01/19/00	VS
Asphaltene	0.15	0.05	Wt. %	IP-143	01/12/00	JDF
Carbon Residue, Conradson	1.28		Wt. %	ASTM D-189	01/18/90	JDF
Cloud Point	Too Dark		Deg. F	ASTM D-2500	01/12/00	AB
Copper by ICP	<0.05	0.05	ppm wt.	ICP	01/21/00	JW
Flash Point, PMCC,	<20		Deg. F	ASTM D-93	01/09/00	SAJ
Hydrogen Sulfide, as Sulfur	<1	1	ppm wt.	UOP-163	12/05/99	NA
Iron by ICP	3.6	0.08	ppm wt.	ICP	01/21/00	JW
Kinematic Viscosity	3.48		cSt @ 100 F	ASTM D-445	01/18/00	BB
Kinematic Viscosity	2.76		cSt @ 122 F	ASTM D-445	01/18/00	BB
K Factor	12.0			UOP 375	01/18/00	DB
Light Hydrocarbons Analysis		*1			01/07/00	PK
Methane	0	0	LV %			
Ethane	0	0	LV %			
Propane	0.19	0	LV %			
Isobutane	0.30	0	LV %			
N-Butane	0.76	0	LV %			
Neopentane	0	0	LV %			
Isopentane	1.22	0	LV %			
n-Pentane	1.07	0	LV %			
Hexanes	2.97	0	LV %			
Heptanes Plus	93.49	0	LV %			
Total	100.00	0				
Mercaptan Sulfur, as Sulfur	8	1	ppm wt.	UOP-163	12/05/99	NA

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: Sample as Received

LABORATORY I.D...: 995270-0001
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Acid Number by Poten. Titration	0.42		mg KOH/g	ASTM D-664	01/17/00	MA
Nickel by ICP	0.71	0.18	ppm wt.	ICP	01/21/00	JW
Nitrogen, Basic,	359		ppm wt.	UOP 269	01/11/00	MA
Nitrogen, Total by Chemilum.	1197	10	ppm wt.	ASTM D-4629	01/12/00	JT
Pour Point	-60		Deg. F	ASTM D-97	01/12/00	AB
Salt Content	18.0		lbs/1000bbls	ASTM D-3230	01/13/00	*0
Sediment and Water	<0.05	0.05	L.V. %	ASTM D-4007	12/23/99	DC
Sodium by ICP	4.0	1.0	ppm wt.	ICP	01/21/00	JW
Sulfur, Total by x-ray Fluoresc.	0.065	0.010	Wt. %	ASTM D-4294	01/19/00	KC
Simulated Distillation of Crude		*1		ASTM D-5307	01/07/00	LS
% OFF	Deg. F.	0				
IBP	29	0				
5	164	0				
10	210	0				
15	242	0				
20	278	0				
25	317	0				
30	359	0				
35	406	0				
40	446	0				
45	487	0				
50	533	0				
55	576	0				
60	627	0				
65	677	0				
70	730	0				
75	785	0				
80	839	0				
85	906	0				
90	995	0				
95	ND	0				
% Recovered	90.2	0	@ 1000 deg. F			
% Residue	9.8	0	@ 1000 deg. F			
Reid Vapor Pressure	2.95		psi	D-5191 ASTM Eqn.	01/05/00	MB

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: Sample as Received

LABORATORY I.D...: 995270-0001
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Vanadium by ICP	<0.06	0.06	ppm wt.	ICP	01/21/00	JW

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: IBP-82 Deg. F

LABORATORY I.D...: 995270-0002
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data		*1			12/18/99	DC
Yield	1.49	0	L.V. %	ASTM D-2892		
Yield	1.11	0	Wt. %	ASTM D-2892		
API Gravity	95.7	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.6227	0	@ 60/60 Deg. F	ASTM D-1298		

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 82-200 Deg. F

LABORATORY I.D...: 995270-0003
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	T
Yield Data		*1			12/18/99	I
Yield	9.99	0	L.V. %	ASTM D-2892		
Yield	8.29	0	Wt. %	ASTM D-2892		
API Gravity	71.7	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.6965	0	@ 60/60 Deg. F	ASTM D-1298		
Benzene	0.54	0.1	L.V. %	ASTM D-3606	01/21/00	I
Distillation		*1		ASTM D-86	01/09/00	I
I.B.P.	95	0	Deg F.	ASTM D-86		
5% Recovered	123	1				
10% Recovered	134	1				
20% Recovered	145	1				
30% Recovered	154	1				
40% Recovered	162	1				
50% Recovered	169	1				
60% Recovered	176	1				
70% Recovered	183	1				
80% Recovered	190	1				
90% Recovered	199	1				
95% Recovered	204	1				
End Point	214	1	Deg F.			
% Recovered	97.6	0.1				
% Residue	1.0	0.1				
% Loss	1.4	0.1				
K Factor	12.3			UOP 375	01/18/00	I
Mercaptan Sulfur, as Sulfur	2	1	ppm wt.	UOP-163	01/13/00	I
Nitrogen, Basic,	<1		ppm wt.	UOP 313	01/10/00	I
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/17/00	
PONA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/15/00	I
Paraffins	59.96	0.00	LV %			
Olefins	0.4	0.00	LV %			
Monocycloparaffins	38.49	0.00	LV %			
Dicycloparaffins	0.00	0.00	LV %			
Alkylbenzenes	1.15	0.00	LV %			
Indanes/Tetralins	0.00	0.00	LV %			
Naphthalenes	0.00	0.00	LV %			

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 82-200 Deg. F

LABORATORY I.D...: 995270-0003
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Total	100.00	0.00	LV %			
Refractive Index	1.3660			Calculated	01/14/00	DE
Octane Analysis -- NIR		*1		NIR	01/05/00	DC
Research Octane Number	75.9	0		NIR		
Motor Octane Number	73.8	0		NIR		
R+M/2	74.8	0				
Sulfur, Total by Microcoulometry	2	1	ppm wt.	ASTM D-3120	01/26/00	JT
Reid Vapor Pressure	9.26		psi	D-5191 ASTM Eqn.	01/05/00	MB

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 200-300 Deg. F

LABORATORY I.D...: 995270-0004
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Yield Data		*1			12/18/99	D
Yield	14.92	0	L.V. %	ASTM D-2892		
Yield	13.51	0	Wt. %	ASTM D-2892		
API Gravity	54.7	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.7598	0	@ 60/60 Deg. F	ASTM D-1298		
Benzene	<0.1	0.1	L.V. %	ASTM D-3606	01/21/00	BT
Distillation		*1		ASTM D-86	01/09/00	DE
I.B.P.	222	0	Deg F.	ASTM D-86		
5% Recovered	235	1				
10% Recovered	238	1				
20% Recovered	241	1				
30% Recovered	245	1				
40% Recovered	249	1				
50% Recovered	253	1				
60% Recovered	258	1				
70% Recovered	264	1				
80% Recovered	271	1				
90% Recovered	282	1				
95% Recovered	291	1				
End Point	308	1	Deg F.			
% Recovered	98.9	0.1				
% Residue	0.6	0.1				
% Loss	0.5	0.1				
Flash Point, PMCC,	46		Deg. F	ASTM D-93	01/09/00	SA
K Factor	11.8			UOP 375	01/18/00	DB
Mercaptan Sulfur, as Sulfur	3	1	ppm wt.	UOP-163	01/13/00	MA
Nitrogen, Basic,	<1		ppm wt.	UOP 313	01/10/00	MA
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/17/00	JT
IPONA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/15/00	BT
Paraffins	34.74	0.00	LV %			
Olefins	0.4	0.00	LV %			
Monocycloparaffins	59.80	0.00	LV %			
Dicycloparaffins	0.88	0.00	LV %			
Alkylbenzenes	4.18	0.00	LV %			

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 200-300 Deg. F

LABORATORY I.D...: 995270-0004
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/POLLUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Indanes/Tetralins	0.00	0.00	LV %			
Naphthalenes	0.00	0.00	LV %			
Total	100.00	0.00	LV %			
Refractive Index	1.3978			Calculated	01/14/00	DB
Octane Analysis -- NIR		*1		NIR	01/05/00	DC
Research Octane Number	67.4	0		NIR		
Motor Octane Number	66.2	0		NIR		
R+M/2	66.8	0				
Sulfur, Total by Microcoulometry	6	1	ppm wt.	ASTM D-3120	01/26/00	JT
Reid Vapor Pressure	0.98		psi	D-5191 ASTM Eqn.	01/05/00	NB

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 300-350 Deg. F

LABORATORY I.D....: 995270-0005
DATE RECEIVED.....: 12/02/99
TIME RECEIVED.....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data		*1			12/18/99	DC
Yield	5.90	0	L.V. %	ASTM D-2892		
Yield	5.57	0	Wt. %	ASTM D-2892		
API Gravity	47.3	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.7913	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	128.1		Deg. F	ASTM D-611	01/06/00	KC
Benzene	<0.1	0.1	L.V. %	ASTM D-3606	01/21/00	BT
Cetane Index	28.3			ASTM D-976	01/12/00	DBC
Cloud Point	< -90		Deg. F	ASTM D-2500	01/12/00	AB
Distillation		*1		ASTM D-86	01/09/00	DBC
I.B.P.	289	0	Deg F.	ASTM D-86		
5% Recovered	308	1				
10% Recovered	312	1				
20% Recovered	314	1				
30% Recovered	317	1				
40% Recovered	319	1				
50% Recovered	322	1				
60% Recovered	324	1				
70% Recovered	328	1				
80% Recovered	332	1				
90% Recovered	337	1				
95% Recovered	342	1				
End Point	350	1	Deg F.			
% Recovered	98.9	0.1				
% Residue	0.6	0.1				
% Loss	0.5	0.1				
Flash Point, PMCC,	108		Deg. F	ASTM D-93	01/09/00	SAK
Freeze Point	<-100		Deg. F	ASTM D-2386	01/07/00	RS
Kinematic Viscosity	0.94		cSt @ 100 F	ASTM D-445	01/18/00	BB
Kinematic Viscosity	0.82		cSt @ 122 F	ASTM D-445	01/18/00	BB
K Factor	11.6			UOP 375	01/18/00	DBC
Mercaptan Sulfur, as Sulfur	3	1	ppm wt.	UOP-163	01/13/00	MA

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 300-350 Deg. F

LABORATORY I.D...: 995270-0005
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Nitrogen, Basic,	2		ppm wt.	UOP 313	01/10/00	NA
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/17/00	JT
Pour Point	< -90		Deg. F	ASTM D-97	01/12/00	AB
PONA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/15/00	BT
Paraffins	33.36	0.00	LV %			
Olefins	0.9	0.00	LV %			
Monocycloparaffins	48.62	0.00	LV %			
Dicycloparaffins	8.43	0.00	LV %			
Alkylbenzenes	8.52	0.00	LV %			
Indanes/Tetralins	0.17	0.00	LV %			
Naphthalenes	0.00	0.00	LV %			
Total	100.00	0.00	LV %			
Refractive Index	1.4165			Calculated	01/14/00	DB
Octane Analysis -- NIR		*1		NIR	01/05/00	DC
Research Octane Number	70.7	0		NIR		
Motor Octane Number	67.9	0		NIR		
R+M/2	69.3	0				
Smoke Point	24		mm	ASTM D-1322	01/13/00	JJ
Sulfur, Total by Microcoulometry	14	1	ppm wt.	ASTM D-3120	01/26/00	JT
Reid Vapor P asc ir	0 09		psi	D-5191 ASTM Eqn.	01/05/00	NB

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 350-400 Deg. F

LABORATORY I.D...: 995270-0006
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Yield Data		*1			12/18/99
Yield	5.42	0	L.V. %	ASTM D-2892	
Yield	5.24	0	Wt. %	ASTM D-2892	
API Gravity	43.1	0	@ 60/60 Deg. F	ASTM D-287	
Specific Gravity	0.8105	0	@ 60/60 Deg. F	ASTM D-1298	
Aniline Point	132.3		Deg. F	ASTM D-611	01/06/00
Benzene	<0.1	0.1	L.V. %	ASTM D-3606	01/21/00
Cetane Index	35.2			ASTM D-976	01/12/00
Cloud Point	< -90		Deg. F	ASTM D-2500	01/12/00
Color	L of 0.5			ASTM D-1500	01/13/00
Color, Saybolt	+30			ASTM D-156	01/14/00
Distillation		*1		ASTM D-86	01/09/00
I.B.P.	354	0	Deg F.	ASTM D-86	
5% Recovered	363	1			
10% Recovered	365	1			
20% Recovered	366	1			
30% Recovered	368	1			
40% Recovered	370	1			
50% Recovered	372	1			
60% Recovered	374	1			
70% Recovered	378	1			
80% Recovered	382	1			
90% Recovered	388	1			
95% Recovered	398	1			
End Point	451	1	Deg F.		
% Recovered	98.4	0.1			
% Residue	0.8	0.1			
% Loss	0.8	0.1			
Flash Point, PMCC,	132		Deg. F	ASTM D-93	01/09/00
Freeze Point	-93		Deg. F	ASTM D-2386	01/07/00
Kinematic Viscosity	1.22		cSt @ 100 F	ASTM D-445	01/18/00
Kinematic Viscosity	1.04		cSt @ 122 F	ASTM D-445	01/18/00

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 350-400 Deg. F

LABORATORY I.D...: 995270-0006
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
K Factor	11.6			UOP 375	01/18/00	DBC
Mercaptan Sulfur, as Sulfur	8	1	ppm wt.	UOP-163	01/18/00	MA
Naphthalenes in Jet Fuel	0.32		L.V. %	ASTM D-1840	01/18/00	KC
Nitrogen, Basic,	2		ppm wt.	UOP 313	01/10/00	MA
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/17/00	JT
Pour Point	< -90		Deg. F	ASTM D-97	01/12/00	AB
PONA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/15/00	BT
Paraffins	39.58	0.00	LV %			
Olefins	1.1	0.00	LV %			
Monocycloparaffins	32.55	0.00	LV %			
Dicycloparaffins	17.03	0.00	LV %			
Alkylbenzenes	7.00	0.00	LV %			
Indanes/Tetralins	2.84	0.00	LV %			
Naphthalenes	0.00	0.00	LV %			
Total	100.00	0.00	LV %			
Refractive Index	1.4258			Calculated	01/14/00	DBC
Octane Analysis -- NIR		*1		NIR	01/05/00	DC
Research Octane Number	67.1	0		NIR		
Motor Octane Number	60.8	0		NIR		
R+M/2	65.9	0				
Smoke Point	20		mm	ASTM D-1322	01/13/00	JJ
Sulfur, Total by Microcoulometry	13	1	ppm wt.	ASTM D-3120	01/26/00	JT
Reid Vapor Pressure	<0.01		psi	D-5191 ASTM Eqn.	01/05/00	MB

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 400-500 Deg. F

LABORATORY I.D...: 995270-0007
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Yield Data		*1			12/18/99	D
Yield	11.22	0	L.V. %	ASTM D-2892		
Yield	11.11	0	Wt. %	ASTM D-2892		
API Gravity	38.8	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8307	0	@ 60/60 Deg. F	ASTM D-1298		
Bromine Number	0.11		g/100g	ASTM D-1159	01/14/00	M
Cetane Index	43.3			ASTM D-976	01/12/00	D
Cloud Point	-56		Deg. F	ASTM D-2500	01/12/00	A
Color	L of 0.5			ASTM D-1500	01/13/00	A
Color, Saybolt	+19			ASTM D-156	01/14/00	J
Distillation		*1		ASTM D-86	01/09/00	D
I.B.P.	417	0	Deg F.	ASTM D-86		
5% Recovered	429	1				
10% Recovered	430	1				
20% Recovered	433	1				
30% Recovered	437	1				
40% Recovered	440	1				
50% Recovered	443	1				
60% Recovered	447	1				
70% Recovered	452	1				
80% Recovered	460	1				
90% Recovered	470	1				
95% Recovered	482	1				
End Point	512	1	Deg F.			
% Recovered	98.4	0.1				
% Residue	1.1	0.1				
% Loss	0.5	0.1				
Flash Point, PMCC,	186		Deg. F	ASTM D-93	01/09/00	S
Freeze Point	-58		Deg. F	ASTM D-2386	01/07/00	F
Hydrocarbon Type		*1		ASTM D-1319	01/07/00	
Aromatics	14.1	0.2	L.V. %			
Olefins	1.1	0.2	L.V. %			
Saturates	84.8	0.2	L.V. %			

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995270 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Petrotech
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 400-500 Deg. F

LABORATORY I.D....: 995270-0007
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 14:37
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Kinematic Viscosity	1.95		cSt @ 100 F	ASTM D-445	01/18/00	BB
Kinematic Viscosity	1.60		cSt @ 122 F	ASTM D-445	01/18/00	BB
K Factor	11.7			UOP 375	01/18/00	DBC
Mercaptan Sulfur, as Sulfur	3	1	ppm wt.	UOP-163	01/13/00	NA
Naphthalenes in Jet Fuel	2.18		L.V. %	ASTM D-1840	01/18/00	KC
Acid Number by Poten. Titration	0.46		mg KOH/g	ASTM D-664	01/17/00	NA
Nitrogen, Basic,	2		ppm wt.	UOP 313	01/10/00	NA
Nitrogen, Total by Chemilum.	1	1	ppm wt.	ASTM D-4629	01/17/00	JT
Pour Point	-55		Deg. F	ASTM D-97	01/12/00	AB
PNA of Kerosene		*1		ASTM D2425 mod.	01/20/00	LS
Paraffins	50.3	0.1	LV %			
Monocycloparaffins	18.8	0.1	LV %			
Dicycloparaffins	19.0	0.1	LV %			
Tricycloparaffins	1.7	0.1	LV %			
Alkylbenzenes	1.4	0.1	LV %			
Indans	6.4	0.1	LV %			
Indenes	1.3	0.1	LV %			
Naphthalenes	1.1	0.1	LV %			
Acenaphthenes	<0.1	0.1	LV %			
Acenaphthalenes	<0.1	0.1	LV %			
Tricyclic Aromatics	<0.1	0.1	LV %			
Total	100.0	0	LV %			
Smoke Point	20		mm	ASTM D-1322	01/13/00	JJ
Sulfur, Total by Microcoulometry	43	1	ppm wt.	ASTM D-3120	01/26/00	JT

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LABORATORY TESTS RESULTS

01/19/00

OB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

LIENT I.D.....: Crude Perez Companc
ATE SAMPLED.....: 11/23/99
IME SAMPLED.....: :
ORK DESCRIPTION...: 200-300 Deg. F (93-149 C)

LABORATORY I.D....: 995249-0004
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data		*1			01/04/00	DB
Yield	10.41	0	L.V. %	ASTM D-2892		
Yield	9.19	0	Wt. %	ASTM D-2892		
API Gravity	55.1	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.7585	0	@ 60/60 Deg. F	ASTM D-1298		
Benzene	<0.1	0.1	L.V. %	ASTM D-3606	01/04/00	BT
Distillation		*1		ASTM D-86	12/28/99	DB
I.B.P.	217	0	Deg F.	ASTM D-86		
5% Recovered	236	1				
10% Recovered	238	1				
20% Recovered	238	1				
30% Recovered	244	1				
40% Recovered	246	1				
50% Recovered	251	1				
60% Recovered	255	1				
70% Recovered	262	1				
80% Recovered	270	1				
90% Recovered	280	1				
95% Recovered	292	1				
End Point	300	1	Deg F.			
% Recovered	97.9	0.1				
% Residue	1.0	0.1				
% Loss	1.1	0.1				
Flash Point, PMCC,	34		Deg. F	ASTM D-93	12/30/99	KC
K Factor	11.8			UOP 375	01/10/00	DI
Mercaptan Sulfur, as Sulfur	15	1	ppm wt.	UOP-163	12/04/99	MA
Nitrogen, Basic,	<1		ppm wt.	UOP 313	12/30/99	MA
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/11/00	JB
PONA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/12/00	LI
Paraffins	35.29	0.00	LV %			
Olefins	0.6	0.00	LV %			
Monocycloparaffins	60.55	0.00	LV %			
Dicycloparaffins	0.35	0.00	LV %			
Alkylbenzenes	3.21	0.00	LV %			

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LABORATORY TESTS RESULTS
01/19/00

JOB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crude Perez Companc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 200-300 Deg. F (93-149 C)

LABORATORY I.D...: 995249-0004
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Indanes/Tetralins	0.00	0.00	LV %		
Naphthalenes	0.00	0.00	LV %		
Total	100.00	0.00	LV %		
Refractive Index	1.3983			Calculated	01/12/00
Octane Analysis -- NIR		*1		NIR	12/21/99
Research Octane Number	67.0	0		NIR	
Motor Octane Number	66.0	0		NIR	
R+M/2	66.5	0			
Sulfur, Total by Microcoulometry	10	1	ppm wt.	ASTM D-3120	01/14/00
Reid Vapor Pressure	1.07		psi	D-5191 ASTM Eqn.	12/22/99

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LABORATORY TESTS RESULTS
01/19/00

JOB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crude Perez Companc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 300-350 Deg. F (149-177 C)

LABORATORY I.D....: 995249-0005
DATE RECEIVED.....: 12/02/99
TIME RECEIVED.....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data		*1			01/04/00	DRC
Yield	6.30	0	L.V. %	ASTM D-2892		
Yield	5.81	0	Wt. %	ASTM D-2892		
API Gravity	47.1	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.7921	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	129.4		Deg. F	ASTM D-611	12/28/99	KC
Benzene	<0.1	0.1	L.V. %	ASTM D-3606	01/04/00	BT
Cetane Index	27.3			ASTM D-976	12/08/99	DB
Cloud Point	<-90		Deg. F	ASTM D-2500	12/04/99	VG
Distillation		*1		ASTM D-86	12/28/99	DB
I.B.P.	291	0	Deg F.	ASTM D-86		
5% Recovered	307	1				
10% Recovered	310	1				
20% Recovered	312	1				
30% Recovered	316	1				
40% Recovered	318	1				
50% Recovered	320	1				
60% Recovered	324	1				
70% Recovered	328	1				
80% Recovered	332	1				
90% Recovered	338	1				
95% Recovered	342	1				
End Point	356	1	Deg F.			
% Recovered	99	0.1				
% Residue	0.7	0.1				
% Loss	0.3	0.1				
Flash Point, PMCC,	92		Deg. F	ASTM D-93	12/30/99	KI
Freeze Point	<-100		Deg. F	ASTM D-2386	01/07/00	RI
Kinematic Viscosity	0.94		cSt @ 100 F	ASTM D-445	12/01/99	BI
Kinematic Viscosity	0.83		cSt @ 122 F	ASTM D-445	12/02/99	BI
K Factor	11.6			UOP 375	01/10/00	DI
Mercaptan Sulfur, as Sulfur	23	1	ppm wt.	UOP-163	12/06/99	RI

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LABORATORY TESTS RESULTS
01/19/00

E NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

IENT I.D.....: Crude Perez Companc
TE SAMPLED.....: 11/23/99
ME SAMPLED.....: :
RK DESCRIPTION...: 300-350 Deg. F (149-177 C)

LABORATORY I.D....: 995249-0005
DATE RECEIVED.....: 12/02/99
TIME RECEIVED.....: 10:10
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
itrogen, Basic,	<1		ppm wt.	UOP 313	12/30/99	MA
itrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/11/00	JW
our Point	<-90		Deg. F	ASTM D-97	01/07/00	VS
OMA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/12/00	LS
Paraffins	32.60	0.00	LV %			
Olefins	0.7	0.00	LV %			
Monocycloparaffins	50.80	0.00	LV %			
Dicycloparaffins	9.37	0.00	LV %			
Alkylbenzenes	6.40	0.00	LV %			
Indanes/Tetralins	0.13	0.00	LV %			
Naphthalenes	0.00	0.00	LV %			
Total	100.00	0.00	LV %			
efractive Index	1.4169			Calculated	01/12/00	DB
ctane Analysis -- NIR		*1		NIR	12/21/99	DB
Research Octane Number	70.1	0		NIR		
Motor Octane Number	68.0	0		NIR		
R+M/2	69.1	0				
Smoke Point	21		mm	ASTM D-1322	01/13/00	JJ
Sulfur, Total by Microcoulometry	21	1	ppm wt.	ASTM D-3120	01/14/00	JT
Reid Vapor Pressure	0.12		psi	D-5191 ASTM Eqn.	12/22/99	MB

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CORE LABORATORIES

LABORATORY TESTS RESULTS

01/19/00

JOB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crude Perez Companc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 350-400 Deg. F (177-204 C)

LABORATORY I.D...: 995249-0006
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Yield Data		*1			01/04/00	D
Yield	5.21	0	L.V. %	ASTM D-2892		
Yield	4.95	0	Wt. %	ASTM D-2892		
API Gravity	41.9	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8161	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	133.9		Deg. F	ASTM D-611	12/28/99	K
Benzene	<0.1	0.1	L.V. %	ASTM D-3606	01/04/00	B
Cetane Index	34.0			ASTM D-976	12/08/99	D
Cloud Point	<-90		Deg. F	ASTM D-2500	12/04/99	V
Color	L 0.5			ASTM D-1500	12/03/99	V
Color, Saybolt	+30			ASTM D-156	01/11/00	K
Distillation		*1		ASTM D-86	12/28/99	D
I.B.P.	359	0	Deg F.	ASTM D-86		
5% Recovered	368	1				
10% Recovered	369	1				
20% Recovered	370	1				
30% Recovered	372	1				
40% Recovered	374	1				
50% Recovered	376	1				
60% Recovered	378	1				
70% Recovered	381	1				
80% Recovered	384	1				
90% Recovered	391	1				
95% Recovered	398	1				
End Point	402	1	Deg F.			
% Recovered	97.4	0.1				
% Residue	1.0	0.1				
% Loss	1.6	0.1				
Flash Point, PMCC,	142		Deg. F	ASTM D-93	12/30/99	K
Freeze Point	<-100		Deg. F	ASTM D-2386	01/07/00	B
Kinematic Viscosity	1.30		cSt @ 100 F	ASTM D-445	12/01/99	B
Kinematic Viscosity	1.11		cSt @ 122 F	ASTM D-445	12/02/99	B

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LABORATORY TESTS RESULTS

01/19/00

OR NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crude Perez Companc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 350-400 Deg. F (177-204 C)

LABORATORY I.D....: 995249-0006
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
C Factor	11.5			UOP 375	01/10/00	DB
Mercaptan Sulfur, as Sulfur	14	1	ppm wt.	UOP-163	12/04/99	MA
Naphthalenes in Jet Fuel	0.72		L.V. %	ASTM D-1840	01/14/00	JW
Nitrogen, Basic,	<1		ppm wt.	UOP 313	12/30/99	MA
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/11/00	JW
Pour Point	<-90		Deg. F	ASTM D-97	01/07/00	VS
PONA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/12/00	LS
Paraffins	33.69	0.00	LV %			
Olefins	1.2	0.00	LV %			
Monocycloparaffins	43.12	0.00	LV %			
Dicycloparaffins	13.57	0.00	LV %			
Alkylbenzenes	5.59	0.00	LV %			
Indanes/Tetralins	2.82	0.00	LV %			
Naphthalenes	0.01	0.00	LV %			
Total	100.00	0.00	LV %			
Refractive Index	1.4313			Calculated	01/12/00	DB
Octane Analysis -- NIR		*1		NIR	12/21/99	DB
Research Octane Number	66.7	0		NIR		
Motor Octane Number	64.8	0		NIR		
R+M/2	65.7	0				
Smoke Point	20		mm	ASTM D-1322	01/13/00	JJ
Sulfur, Total by Microcoulometry	18	1	ppm wt.	ASTM D-3120	01/14/00	JT
Reid Vapor Pressure	<0.01		psi	D-5191 ASTM Eqn.	12/22/99	MB

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LABORATORY TESTS RESULTS
01/19/00

OE NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crude Perez Companc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 400-500 Deg. F (204-260 C)

LABORATORY I.D...: 995249-0007
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data		*1			01/04/00	DBC
Yield	12.04	0	L.V. %	ASTM D-2892		
Yield	11.75	0	Wt. %	ASTM D-2892		
API Gravity	37.2	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8388	0	@ 60/60 Deg. F	ASTM D-1298		
Bromine Number	0.29		g/100g	ASTM D-1159	12/29/99	MA
Cetane Index	42.1			ASTM D-976	12/08/99	DBC
Cloud Point	-60		Deg. F	ASTM D-2500	12/04/99	VS
Color	L 0.5			ASTM D-1500	12/03/99	VS
Color, Saybolt	+28			ASTM D-156	01/11/00	KC
Distillation		*1		ASTM D-86	12/28/99	DBC
I.B.P.	427	0	Deg F.	ASTM D-86		
5% Recovered	436	1				
10% Recovered	438	1				
20% Recovered	442	1				
30% Recovered	445	1				
40% Recovered	448	1				
50% Recovered	452	1				
60% Recovered	456	1				
70% Recovered	460	1				
80% Recovered	466	1				
90% Recovered	476	1				
95% Recovered	483	1				
End Point	494	1	Deg F.			
% Recovered	97.6	0.1				
% Residue	0.8	0.1				
% Loss	1.6	0.1				
Flash Point, PMCC,	194		Deg F	ASTM D-93	12/30/99	KC
Freeze Point	-57		Deg. F	ASTM D-2386	01/07/00	RB
Hydrocarbon Type		*1		ASTM D-1319	12/30/99	VS
Aromatics	13.2	0.2	L.V. %			
Olefins	1.2	0.2	L.V. %			
Saturates	85.6	0.2	L.V. %			

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LABORATORY TESTS RESULTS
01/19/00

JB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

LIENT I.D.....: Crude Perez Companc
ATE SAMPLED.....: 11/23/99
IME SAMPLED.....: :
ORK DESCRIPTION...: 400-500 Deg. F (204-260 C)

LABORATORY I.D...: 995249-0007
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
inematic Viscosity	2.11		cSt @ 100 F	ASTM D-445	12/01/99	BB
inematic Viscosity	1.74		cSt @ 122 F	ASTM D-445	12/02/99	BG
Factor	11.6			UOP 375	01/10/00	DBC
ercaptan Sulfur, as Sulfur	13	1	ppm wt.	UOP-163	12/04/99	NA
aphthalenes in Jet Fuel	2.18		L.V. %	ASTM D-1840	01/14/00	JW
cid Number by Poten. Titration	0.29		mg KOH/g	ASTM D-664	12/28/99	NA
itrogen, Basic,	<1		ppm wt.	UOP 313	12/30/99	NA
itrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/11/00	JW
our Point	-60		Deg. F	ASTM D-97	01/07/00	VS
NA of Kerosene		*1		ASTM D2425 mod.	01/12/00	LS
Paraffins	45.6	0.1	LV %			
Monocycloparaffins	20.0	0.1	LV %			
Dicycloparaffins	19.9	0.1	LV %			
Tricycloparaffins	3.0	0.1	LV %			
Alkylbenzenes	2.4	0.1	LV %			
Indans	6.7	0.1	LV %			
Indenes	1.6	0.1	LV %			
Naphthalenes	0.8	0.1	LV %			
Acenaphthenes	<0.1	0.1	LV %			
Acenaphthalenes	<0.1	0.1	LV %			
Tricyclic Aromatics	<0.1	0.1	LV %			
Total	100.0	0	LV %			
Refractive Index	1.4236			Calculated	01/12/00	DBC
Smoke Point	14		mm	ASTM D-1322	01/13/00	JJ
Sulfur, Total by Microcoulometry	39	1	µgm wt.	ASTM D-3120	01/14/00	JT

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CORE LABORATORIES

LABORATORY TESTS RESULTS

01/19/00

JOB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crude Perez Companc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 500-550 Deg. F (260-288 C)

LABORATORY I.D...: 995249-0008
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data		*1			01/04/00	DM
Yield	6.25	0	L.V. %	ASTM D-2892		
Yield	6.23	0	Wt. %	ASTM D-2892		
API Gravity	33.7	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8568	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	156.4		Deg. F	ASTM D-611	12/29/99	KC
Bromine Number	0.21		g/100g	ASTM D-1159	12/29/99	MA
Cetane Index	45.2			ASTM D-976	12/08/99	DB
Cloud Point	-20		Deg. F	ASTM D-2500	12/04/99	VS
Color	L 0.5			ASTM D-1500	12/03/99	VS
Distillation		*1		ASTM D-86	12/28/99	DB
I.B.P.	487	0	Deg F.	ASTM D-86		
5% Recovered	503	1				
10% Recovered	505	1				
20% Recovered	509	1				
30% Recovered	510	1				
40% Recovered	512	1				
50% Recovered	513	1				
60% Recovered	515	1				
70% Recovered	517	1				
80% Recovered	521	1				
90% Recovered	525	1				
95% Recovered	529	1				
End Point	534	1	Deg F.			
% Recovered	98.9	0.1				
% Residue	0.6	0.1				
% Loss	0.5	0.1				
Smoke Point (Kero)	27		Deg.	ASTM D-[illegible]	12/31/99	[illegible]
Freeze Point	-16		Deg. F	ASTM D-2386	01/07/00	RB
Hydrocarbon Type		*1		ASTM D-1319	12/31/99	VS
Aromatics	20.7	0.2	L.V. %			
Olefins	2.4	0.2	L.V. %			
Saturates	76.9	0.2	L.V. %			

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CORE LABORATORIES

LABORATORY TESTS RESULTS

01/19/00

JOB NUMBER: 995269 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crude Perez Companc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 500-550 Deg. F (260-288 C)

LABORATORY I.D....: 995269-0008
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Kinematic Viscosity	3.55		cSt @ 100 F	ASTM D-445	12/01/99	BB
Kinematic Viscosity	2.78		cSt @ 122 F	ASTM D-445	12/02/99	BB
K Factor	11.7			UOP 375	01/10/00	DBC
Mercaptan Sulfur, as Sulfur	14	1	ppm wt.	UOP-163	12/04/99	MA
Naphthalenes in Jet Fuel	3.01		L.V. %	ASTM D-1840	01/14/00	JV
Acid Number by Poten. Titration	0.68		mg KOH/g	ASTM D-664	12/28/99	MA
Nitrogen, Basic,	3		ppm wt.	UOP 269	12/03/99	MA
Nitrogen, Total by Chemilum.	4	1	ppm wt.	ASTM D-4629	01/11/00	JV
Pour Point	-20		Deg. F	ASTM D-97	01/07/00	VS
PNA of Kerosene		*1		ASTM D2425 mod.	01/12/00	LS
Paraffins	47.2	0.1	LV %			
Monocycloparaffins	18.6	0.1	LV %			
Dicycloparaffins	15.3	0.1	LV %			
Tricycloparaffins	3.4	0.1	LV %			
Alkylbenzenes	1.9	0.1	LV %			
Indans	5.9	0.1	LV %			
Indenes	5.2	0.1	LV %			
Naphthalenes	1.9	0.1	LV %			
Acenaphthenes	0.3	0.1	LV %			
Acenaphthalenes	0.3	0.1	LV %			
Tricyclic Aromatics	<0.1	0.1	LV %			
Total	100.0	0	LV %			
Refractive Index	1.4497		70 Deg. C	ASTM D-1747	12/08/99	JDP
Refractive Index	1.4561			Calculated	01/12/00	DBC
Smoke Point	13		mm	ASTM D-1322	01/13/00	JJ
Sulfur, Total by x-ray Fluoresc.	0.014	0.010	Wt. %	ASTM D-4294	01/12/00	KC

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LABORATORY TESTS RESULTS
01/19/00

JB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

LIENT I.D.....: Crude Perez Companc
ATE SAMPLED.....: 11/23/99
IME SAMPLED.....: :
ORK DESCRIPTION...: 550-650 Deg. F (288-343 C)

LABORATORY I.D....: 995249-0009
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
ield Data		*1			01/04/00	DS
Yield	13.41	0	L.V. %	ASTM D-2892		
Yield	13.51	0	Wt. %	ASTM D-2892		
API Gravity	32.0	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8657	0	@ 60/60 Deg. F	ASTM D-1298		
niline Point	172.8		Deg. F	ASTM D-611	12/29/99	KC
ramine Number	0.30		g/100g	ASTM D-1159	12/29/99	MA
rbon Residue, Conradson	<0.01		Wt. %	ASTM D-189	12/03/99	JD
rbon Residue, Ramsbottom	0.04		Wt. %	ASTM D-524	01/10/00	JDF
tane Index	48.4			ASTM D-976	12/08/99	DBC
oud Point	+20		Deg. F	ASTM D-2500	12/04/99	VS
lor	L 0.5			ASTM D-1500	12/03/99	VS
stillation		*1		ASTM D-86	12/30/99	DBC
I.B.P.	548	0	Deg F.	ASTM D-86		
5% Recovered	562	1				
10% Recovered	564	1				
20% Recovered	566	1				
30% Recovered	570	1				
40% Recovered	573	1				
50% Recovered	576	1				
60% Recovered	580	1				
70% Recovered	582	1				
80% Recovered	590	1				
90% Recovered	603	1				
95% Recovered	---	1				
End Point	608	1	Deg F.			
% Recovered	93.5	0.1				
% Residue	5.8	0.1				
% Loss	0.7	0.1				
ash Point, PMCC,	310		Deg. F	ASTM D-93	12/03/99	VS
eeze Point	+17		Deg. F	ASTM D-2386	01/07/00	RB
nematic Viscosity	6.59		cSt @ 100 F	ASTM D-445	12/02/99	BB

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CORE LABORATORIES

LABORATORY TESTS RESULTS

01/19/00

JOB NUMBER: 995249 CUSTOMER: PETROPERU-SA ATTN:

CLIENT I.D.....: Crude Perez Companc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 550-650 Deg. F.(288-343 C)

LABORATORY I.D....: 995249-0009
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TI
Kinematic Viscosity	4.81		cSt @ 122 F	ASTM D-445	12/02/99	[illegible]
K Factor	11.8			UOP 375	01/10/00	D
Mercaptan Sulfur, as Sulfur	11	1	ppm wt.	UOP-163	12/04/99	N
Naphthalenes in Jet Fuel	4.10		L.V. %	ASTM D-1840	01/14/00	J
Acid Number by Poten. Titration	0.79		mg KOH/g	ASTM D-664	12/28/99	M
Nitrogen, Basic,	12		ppm wt.	UOP 269	12/03/99	M
Nitrogen, Total by Chemilum.	20	1	ppm wt.	ASTM D-4629	01/11/00	JA
Pour Point	+15		Deg. F	ASTM D-97	01/07/00	V
PNA Middle Distillates, Mass Spec		*1		ASTM D-2425	01/12/00	LI
Paraffins	51.0	0	LV %			
Monocycloparaffins	17.2	0	LV %			
Dicycloparaffins	12.9	0	LV %			
Tricycloparaffins	2.9	0	LV %			
Alkylbenzenes	2.3	0	LV %			
Indenes/Tetralins	3.4	0	LV %			
Indenes	4.7	0	LV %			
Naphthalenes	2.7	0	LV %			
Acenaphthenes	1.4	0	LV %			
Acenaphthalenes	1.0	0	LV %			
Tricyclic Aromatics	0.5	0	LV %			
Total	100.0	0	LV %			
Refractive Index	1.4556		70 Deg. C	ASTM D-1747	12/08/99	JD
Refractive Index	1.4619			Calculated	01/12/00	DB
Smoke Point	N/A		mm	ASTM D-1322	N/A	N/
Sulfur, Total by X-ray Fluorsc.	0.031	0.010	Wt. %	ASTM D-4294	01/12/00	KC

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LABORATORY TESTS RESULTS

01/19/00

JOB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crude Perez Cosmanc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 650-700 Deg. F (343-371 C)

LABORATORY I.D...: 995249-0010
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Field Data		*1			01/04/00
Yield	5.95	0	L.V. %	ASTM D-2892	
Yield	6.13	0	Wt. %	ASTM D-2892	
API Gravity	28.6	0	@ 60/60 Deg. F	ASTM D-287	
Specific Gravity	0.8841	0	@ 60/60 Deg. F	ASTM D-1298	
Aniline Point	181.2		Deg. F	ASTM D-611	12/29/99
Iodine Number	0.45		g/100g	ASTM D-1159	12/29/99
Carbon Residue, Conradson	0.01		Wt. %	ASTM D-189	12/03/99
Carbon Residue, Ramsbottom	0.05		Wt. %	ASTM D-524	01/10/00
Cetane Index	46.0			ASTM D-976	12/08/99
Cloud Point	+52		Deg. F	ASTM D-2500	12/03/99
Color	L 1.0			ASTM D-1500	12/03/99
Distillation		*1		ASTM D-86	12/30/99
I.B.P.	599	0	Deg F.	ASTM D-86	
5% Recovered	628	1			
10% Recovered	635	1			
20% Recovered	638	1			
30% Recovered	640	1			
40% Recovered	642	1			
50% Recovered	643	1			
60% Recovered	645	1			
70% Recovered	646	1			
80% Recovered	649	1			
90% Recovered	653	1			
95% Recovered	656	1			
End Point	661	1	Deg F.		
% Recovered	98.9	0.1			
% Residue	0.6	0.1			
% Loss	0.5	0.1			
Flash Point, PMCC,	345		Deg. F	ASTM D-93	12/03/99
Kinematic Viscosity	13.99		cSt @ 100 F	ASTM D-445	12/02/99
Kinematic Viscosity	9.38		cSt @ 122 F	ASTM D-445	12/02/99

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LABORATORY TESTS RESULTS
01/19/00

JOB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crude Perez Companc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 650-700 Deg. F (343-371 C)

LABORATORY I.D...: 995249-0010
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Kinematic Viscosity	2.96		cSt @ 210 F	ASTM D-445	12/02/99
K Factor	11.8			UOP 375	01/10/00
Mercaptan Sulfur, as Sulfur	13	1	ppm wt.	UOP-163	12/04/99
Acid Number by Poten. Titration	0.78		mg KOH/g	ASTM D-664	12/28/99
Nitrogen, Basic,	44		ppm wt.	UOP 269	12/03/99
Nitrogen, Total by Chemilum.	99	1	ppm wt.	ASTM D-4629	01/11/00
Pour Point	+45		Deg. F	ASTM D-97	12/03/99
PNA of Gas Oil		*1		ASTM D2786,3239	01/12/00
Paraffins	42.7	0	LV %		
Naphthenes	38.6	0	LV %		
Aromatics	18.7	0	LV %		
NAPHTHENIC DISTRIBUTION	-----	0			
---1 Ring	14.2	0	LV %		
---2 Ring	15.6	0	LV %		
---3 Ring	5.5	0	LV %		
---4 Ring	3.3	0	LV %		
---5 Ring	0.0	0	LV %		
---6 Ring	0.0	0	LV %		
AROMATIC DISTRIBUTION	-----	0			
Monoaromatics	8.6	0	LV %		
---Alkylbenzenes	2.0	0	LV %		
---Naphthenebenzenes	2.8	0	LV %		
---Dinaphthenebenzenes	3.8	0	LV %		
Diaromatics	6.8	0	LV %		
---Naphthalenes	2.1	0	LV %		
---Acenaphthenes/Dibenzofurans	2.2	0	LV %		
---Fluorenes	2.5	0	LV %		
Triaromatics	1.4	0	LV %		
---Phenanthrenes	1.2	0	LV %		
---Naphthenephenanthrenes	0.1	0	LV %		
Tetraaromatics	0.3	0	LV %		
---Pyrenes	0.1	0	LV %		
---Chyrsenes	0.2	0	LV %		
Pentaaromatics	0.1	0	LV %		
---Perylenes	0.1	0	LV %		
---Dibenzanthracenes	0.0	0	LV %		
Thiophene Aromatics	1.2	0	LV %		

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LABORATORY TESTS RESULTS
01/19/00

OB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

LIENT I.D.....: Crude Perez Companc
ATE SAMPLED.....: 11/23/99
IME SAMPLED.....: :
ORK DESCRIPTION...: 650-700 Deg. F (343-371 C)

LABORATORY I.D...: 995249-0010
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
---Benzothiophenes	0.4	0	LV %			
---Dibenzothiophenes	0.8	0	LV %			
---Naphthabenzothiophenes	0.0	0	LV %			
Unidentified Aromatics	0.3	0	LV %			
---Class I (see Naph. Phen.)	0.0	0	LV %			
---Class II	0.0	0	LV %			
---Class III	0.0	0	LV %			
---Class IV	0.3	0	LV %			
---Class V	0.0	0	LV %			
---Class VI	0.0	0	LV %			
---Class VII	0.0	0	LV %			
efractive Index	1.4659		70 Deg. C	ASTM D-1747	12/08/99	JD
efractive Index	1.4733			Calculated	01/12/00	DB
ulfur, Total by x-ray Fluoresc.	0.063	0.010	Wt. %	ASTM D-4294	01/12/00	KC

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CORE LABORATORIES

LABORATORY TESTS RESULTS

01/19/00

E NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

IENT I.D.....: Crude Perez Companc
TE SAMPLED.....: 11/23/99
ME SAMPLED.....: :
MPLE DESCRIPTION...: 700+ Deg. F (371+ C)

LABORATORY I.D...: 995249-0011
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

ST DESCRIPTION	FINAL RESULT	LIMITS/POLLUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
eld Data		*1			01/04/00	DBC
Yield	35.29	0	L.V. %	ASTM D-2892		
Yield	38.30	0	Wt. %	ASTM D-2892		
API Gravity	20.2	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.9325	0	@ 60/60 Deg. F	ASTM D-1298		
iline Point (Thin Film)	Too Dark		Deg. F	ASTM D-611	12/29/99	KC

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/19/00

B NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

IENT I.D.....: Crude Perez Companc
TE SAMPLED.....: 11/23/99
NE SAMPLED.....: :
RK DESCRIPTION...: 700-800 Deg. F (371-427 C)

LABORATORY I.D...: 995249-0012
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

ST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
eld Data Hyvac Potstill		*1		ASTM D-5236	04/04/00	DB
Yield L.V. %	8.88	0	L.V.%	ASTM D-5236		
Yield Wt. %	9.35	0	Wt. %	ASTM D-5236		
API Grav.	24.9	0	@ 60/60 Deg. F	ASTM D-287		
Spec. Grav.	0.9047	0	@ 60/60 Deg. F	ASTM D-1298		
iline Point	200.7		Deg. F	ASTM D-611	12/29/99	EC
phaltene	<0.05	0.05	Wt. %	IP-143	12/05/99	JO
·omine Number	0.41		g/100g	ASTM D-1159	12/29/99	MA
rbon Residue, Conradson	0.01		Wt. %	ASTM D-189	12/03/99	JO
rbon Residue, Ramsbottom	0.05		Wt. %	ASTM D-524	01/10/00	JO
tane Index	Insuff.			ASTM D-976	12/08/99	DB
lor	L 5.0			ASTM D-1500	01/11/00	VS
cuum Distillation	Insuff.		Deg. F	ASTM D-1160	12/21/99	DB
ash Point, PMCC,	375		Deg. F	ASTM D-93	01/14/00	AB
nematic Viscosity	49.27		cSt @ 100 F	ASTM D-445	12/03/99	BB
nematic Viscosity	28.45		cSt @ 122 F	ASTM D-445	12/03/99	BB
nematic Viscosity	5.96		cSt @ 210 F	ASTM D-445	12/02/99	BB
Factor	11.9			UOP 375	01/10/00	DB
id Number by Poten. Titration	0.26		mg KOH/g	ASTM D-664	12/28/99	MA
trogen, Basic,	160		ppm wt.	UOP 269	12/03/99	MA
trogen, Total by Chemilum.	575	10	ppm wt.	ASTM D-4629	01/11/00	JM
ur Point	+75		Deg. F	ASTM D-97	01/07/00	VS
A of Gas Oil		*1		ASTM D2786,3239	01/12/00	LS
Paraffins	26.9	0	LV %			
Naphthenes	48.6	0	LV %			

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LABORATORY TESTS RESULTS
01/19/00

B NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

.IENT I.D.....: Crude Perez Companc
ITE SAMPLED.....: 11/23/99
NE SAMPLED.....: :
RK DESCRIPTION...: 700-800 Deg. F (371-427 C)

LABORATORY I.D...: 995249-0012
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

ST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Aromatics	24.5	0	LV %			
NAPHTHENIC DISTRIBUTION	-----	0				
---1 Ring	11.8	0	LV %			
---2 Ring	15.3	0	LV %			
---3 Ring	13.4	0	LV %			
---4 Ring	5.3	0	LV %			
---5 Ring	2.8	0	LV %			
---6 Ring	0.0	0	LV %			
AROMATIC DISTRIBUTION	-----	0				
Monoaromatics	10.9	0	LV %			
---Alkylbenzenes	2.9	0	LV %			
---Naphthenebenzenes	3.6	0	LV %			
---Dinaphthenebenzenes	4.4	0	LV %			
Diaromatics	7.2	0	LV %			
---Naphthalenes	2.1	0	LV %			
---Acenaphthenes/Dibenzofurans	2.1	0	LV %			
---Fluorenes	3.0	0	LV %			
Triaromatics	3.1	0	LV %			
---Phenenanthrenes	2.1	0	LV %			
---Naphthenephenanthrenes	1.0	0	LV %			
Tetraaromatics	1.4	0	LV %			
---Pyrenes	1.1	0	LV %			
---Chyrsenes	0.3	0	LV %			
Pentaaromatics	0.1	0	LV %			
---Perylenes	0.1	0	LV %			
---Dibenzanthracenes	0.0	0	LV %			
Thiopheno Aromatics	1.2	0	LV %			
---Benzothiophenes	0.6	0	LV %			
---Dibenzothiophenes	0.5	0	LV %			
---Naphthabenzothiophenes	0.1	0	LV %			
Unidentified Aromatics	0.6	0	LV %			
---Class I (see Naph. Phen.)	0.0	0	LV %			
---Class II	0.0	0	LV %			
---Class III	0.0	0	LV %			
---Class IV	0.6	0	LV %			
---Class V	0.0	0	LV %			
---Class VI	0.0	0	LV %			
---Class VII	0.0	0	LV %			
fractive Index	1.4772		70 Deg. C	ASTM D-1747	12/08/99	JDP
fractive Index	1.4864			Calculated	01/12/00	DBC
lfur, Total by x-ray Fluoresc.	0.097	0.010	Wt. %	ASTM D-4294	01/12/00	KC

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/19/00

NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

IENT I.D.....: Crude Perez Companc
TE SAMPLED.....: 11/23/99
ME SAMPLED.....: :
RK DESCRIPTION...: 800-900 Deg. F (427-482 C)

LABORATORY I.D...: 995249-0013
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

ST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
eld Data Hyvac Potstill		*1		ASTM D-5236	04/04/00	DBC
Yield L.V. %	12.32	0	L.V.%	ASTM D-5236		
Yield Wt. %	13.09	0	Wt. %	ASTM D-5236		
API Grav.	23.5	0	@ 60/60 Deg. F	ASTM D-287		
Spec. Grav.	0.9127	0	@ 60/60 Deg. F	ASTM D-1298		
iline Point	204.1		Deg. F	ASTM D-611	12/29/99	KC
n Content,	< 0.001		WT %	ASTM D-482	01/11/00	KC
phaltene	<0.05	0.05	Wt. %	IP-143	12/05/99	JDP
amine Number	0.88		g/100g	ASTM D-1159	12/29/99	MA
rbon Residue, Conradson	0.03		Wt. %	ASTM D-189	12/03/99	JDP
rbon Residue, Ramsbottom	0.16		Wt. %	ASTM D-524	01/11/00	JDP
tane Index	34.9			ASTM D-976	12/08/99	DBC
pper by ICP	<0.05	0.05	ppm wt.	ICP	01/12/00	JM
ash Point, COC,	470		Deg. F	ASTM D-92	01/13/00	KC
on by ICP	2.9	0.08	ppm wt.	ICP	01/12/00	JM
nematic Viscosity	58.40		cSt @ 122 F	ASTM D-445	12/03/99	BB
nematic Viscosity	9.48		cSt @ 210 F	ASTM D-445	12/03/99	BB
Factor	11.9			UOP 375	01/10/00	DBC
id Number by Poten. Titration	0.14		mg KOH/g	ASTM D-664	12/28/99	MA
ckel by ICP	0.71	0.18	ppm wt.	ICP	01/11/00	JM
trogen, basic,	302		ppm wt.	UOP 269	12/03/99	MA
trogen, Total by Chemilum.	978	10	ppm wt.	ASTM D-4629	01/11/00	JM
ur Point	+90		Deg. F	ASTM D-97	01/10/00	VS
A of Gas Oil		*1		ASTM D2786,3239	01/12/00	LS

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/19/00

I NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

IENT I.D.....: Crude Perez Companc
TE SAMPLED.....: 11/23/99
ME SAMPLED.....: :
RK DESCRIPTION...: 800-900 Deg. F (427-482 C)

LABORATORY I.D...: 995249-0013
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

ST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Paraffins	24.3	0	LV %			
Naphthenes	48.7	0	LV %			
Aromatics	27.0	0	LV %			
NAPHTHENIC DISTRIBUTION	-----	0				
---1 Ring	10.7	0	LV %			
---2 Ring	14.1	0	LV %			
---3 Ring	12.6	0	LV %			
---4 Ring	7.0	0	LV %			
---5 Ring	4.3	0	LV %			
---6 Ring	0.0	0	LV %			
AROMATIC DISTRIBUTION	-----	0				
Monoaromatics	13.4	0	LV %			
---Alkylbenzenes	4.1	0	LV %			
---Naphthenebenzenes	4.4	0	LV %			
---Dinaphthenebenzenes	4.9	0	LV %			
Diaromatics	7.2	0	LV %			
---Naphthalenes	2.0	0	LV %			
---Acenaphthenes/Dibenzofurans	2.0	0	LV %			
---Fluorenes	3.2	0	LV %			
Triaromatics	2.7	0	LV %			
---Phenanenthrenes	1.8	0	LV %			
---Naphthenephenanthrenes	0.9	0	LV %			
Tetraaromatics	1.7	0	LV %			
---Pyrenes	1.1	0	LV %			
---Chyrsenes	0.6	0	LV %			
Pentaaromatics	0.2	0	LV %			
---Perylenes	0.2	0	LV %			
---Dibenzanthracenes	0.0	0	LV %			
Thiopheno Aromatics	1.4	0	LV %			
---Benzothiophenes	0.4	0	LV %			
---Dibenzothiophenes	0.5	0	LV %			
---Naphthabenzothiophenes	0.2	0	LV %			
Unidentified Aromatics	0.7	0	LV %			
---Class I (see Naph. Phen.)	0.0	0	LV %			
---Class II	0.0	0	LV %			
---Class III	0.0	0	LV %			
---Class IV	0.7	0	LV %			
---Class V	0.0	0	LV %			
---Class VI	0.0	0	LV %			
---Class VII	0.0	0	LV %			
fractive Index	1.4827		70 Deg. C	ASTM D-1747	12/08/99	JDP
fractive Index	1.4918			Calculated	01/12/00	DBC

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/19/00

JB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

.IENT I.D.....: Crude Perez Companc
ATE SAMPLED.....: 11/23/99
IME SAMPLED.....: :
ORK DESCRIPTION...: 800-900 Deg. F (427-482 C)

LABORATORY I.D...: 995269-0013
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
ulfur, Total by x-ray Fluoresc.	0.123	0.010	Wt. %	ASTM D-4294	01/12/00	KC
anadium by ICP	<0.06	0.06	ppm Wt.	ICP	01/12/00	JW
acuum Distillation		*1		ASTM D-1160	12/28/99	DBC
I.B.P.	742	1	Deg. F	ASTM D-1160		
5% Evaporated	768	1				
10% Evaporated	770	1				
20% Evaporated	786	1				
30% Evaporated	798	1				
40% Evaporated	811	1				
50% Evaporated	826	1				
60% Evaporated	840	1				
70% Evaporated	855	1				
80% Evaporated	872	1				
90% Evaporated	896	1				
95% Evaporated	918	1				
End Point	949	1	Deg. F			
% Recovered	99	0.1				
% Residue	1.0	0.1				
% Loss	<0.1	0.1				

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LABORATORY TESTS RESULTS
01/19/00

JOB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crude Perez Companc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 900-1050 Deg. F (482-566 C)

LABORATORY I.D...: 995269-0014
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Yield Data Hyvac Potstill		*1		ASTM D-5236	04/04/00
Yield L.V. %	7.85	0	L.V.%	ASTM D-5236	
Yield Wt. %	8.56	0	Wt. %	ASTM D-5236	
API Grav.	19.5	0	@ 60/60 Deg. F	ASTM D-287	
Spec. Grav.	0.9373	0	@ 60/60 Deg. F	ASTM D-1298	
Aniline Point	218.5		Deg. F	ASTM D-611	12/29/99
Ash Content,	< 0.001		WT %	ASTM D-482	01/11/00
Asphaltene	0.41	0.05	Wt. %	IP-143	12/05/99
Bromine Number	2.3		g/100g	ASTM D-1159	12/29/99
Carbon Residue, Conradson	0.95		Wt. %	ASTM D-189	12/03/99
Carbon Residue, Ramsbottom	1.10		Wt. %	ASTM D-524	01/11/00
Copper by ICP	<0.05	0.05	ppm wt.	ICP	01/12/00
Vacuum Distillation	Insuff.		Deg. F	ASTM D-1160	12/21/99
Flash Point, COC,	570		Deg. F	ASTM D-92	01/13/00
Iron by ICP	2.0	0.08	ppm wt.	ICP	01/12/00
Kinematic Viscosity	393.0		cSt @ 122 F	ASTM D-445	12/03/99
Kinematic Viscosity	31.05		cSt @ 210 F	ASTM D-445	12/02/99
Kinematic Viscosity	7.81		cSt @ 300 F	ASTM D-445	12/03/99
K Factor	11.9			UOP 375	01/10/00
Acid Number by Poten. Titration	0.25		mg KOH/g	ASTM D-664	12/29/99
Nickel by ICP	0.82	0.18	ppm wt.	ICP	01/11/00
Nitrogen, Basic,	966		ppm wt.	UOP 269	12/03/99
Nitrogen, Total by Chemilum.	2939	10	ppm wt.	ASTM D-4629	01/11/00
Pour Point	+115		Deg. F	ASTM D-97	01/07/00

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/19/00

JOB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crude Perez Companc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 900-1050 Deg. F (482-566 C)

LABORATORY I.D....: 995249-0014
DATE RECEIVED.....: 12/02/99
TIME RECEIVED.....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
PNA of Gas Oil		*1		ASTM D2786,3239	01/12/00
Paraffins	15.8	0	LV %		
Naphthenes	38.7	0	LV %		
Aromatics	45.5	0	LV %		
NAPHTHENIC DISTRIBUTION	-----	0			
---1 Ring	10.6	0	LV %		
---2 Ring	11.5	0	LV %		
---3 Ring	9.5	0	LV %		
---4 Ring	4.9	0	LV %		
---5 Ring	2.2	0	LV %		
---6 Ring	0.0	0	LV %		
AROMATIC DISTRIBUTION	-----	0			
Monoaromatics	22.7	0	LV %		
---Alkylbenzenes	7.3	0	LV %		
---Naphthenebenzenes	7.2	0	LV %		
---Dinaphthenebenzenes	8.2	0	LV %		
Diaromatics	17.3	0	LV %		
---Naphthalenes	5.4	0	LV %		
---Acenaphthenes/Dibenzofurans	2.5	0	LV %		
---Fluorenes	9.4	0	LV %		
Triaromatics	2.3	0	LV %		
---Phenenanthrenes	1.4	0	LV %		
---Naphthenephenanthrenes	0.9	0	LV %		
Tetraaromatics	1.9	0	LV %		
---Pyrenes	1.5	0	LV %		
---Chyrsenes	0.4	0	LV %		
Pentaaromatics	0.1	0	LV %		
---Perylenes	0.1	0	LV %		
---Dibenzanthracenes	0.0	0	LV %		
Thiophene Aromatics	1.2	0	LV %		
---Benzothiophenes	0.3	0	LV %		
---Dibenzothiophenes	0.9	0	LV %		
---Naphthabenzothiophenes	0.0	0	LV %		
Unidentified Aromatics	0.0	0	LV %		
---Class I (see Naph. Phen.)	0.0	0	LV %		
---Class II	0.0	0	LV %		
---Class III	0.0	0	LV %		
---Class IV	0.0	0	LV %		
---Class V	0.0	0	LV %		
---Class VI	0.0	0	LV %		
---Class VII	0.0	0	LV %		
Refractive Index	1.4964		70 Deg. C	ASTM D-1747	12/08/99

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CORE LABORATORIES

LABORATORY TESTS RESULTS

01/19/00

JOB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crude Perez Companc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 900-1050 Deg. F (482-566 C)

LABORATORY I.D...: 995249-0014
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Refractive Index	1.5073			Calculated	01/12/00
Sulfur, Total by x-ray Fluoresc.	0.199	0.010	Wt. %	ASTM D-4294	01/12/00
Vanadium by ICP	<0.06	0.06	ppm wt.	ICP	01/12/00

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/19/00

JOB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crude Perez Companc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 650+ Deg. F (343+ C)

LABORATORY I.D...: 995249-0015
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Yield Data		*1			01/04/00
Yield	41.24	0	L.V. %	ASTM D-2892	
Yield	44.43	0	Wt. %	ASTM D-2892	
API Gravity	21.4	0	@ 60/60 Deg. F	ASTM D-287	
Specific Gravity	0.9525	0	@ 60/60 Deg. F	ASTM D-1298	
Ash Content,	0.02		WT %	ASTM D-482	01/11/00
Asphaltene	0.45	0.05	Wt. %	IP-143	01/17/00
Bromine Number	1.7		g/100g	ASTM D-1159	12/29/99
Carbon Residue, Ramsbottom	2.46		Wt. %	ASTM D-524	01/11/00
Copper by ICP	0.11	0.05	ppm wt.	ICP	01/12/00
Flash Point, COC,	440		Deg. F	ASTM D-92	01/13/00
Iron by ICP	61	0.06	ppm wt.	ICP	01/12/00
Kinematic Viscosity	114.9		cSt @ 122 F	ASTM D-445	12/04/99
Kinematic Viscosity	14.34		cSt @ 210 F	ASTM D-445	12/03/99
K Factor	11.9			UOP 375	01/10/00
Acid Number by Poten. Titration	0.23		mg KOH/g	ASTM D-664	12/28/99
Nickel by ICP	2.2	0.18	ppm wt.	ICP	01/11/00
Nitrogen, Basic,	594		ppm wt.	UOP 269	12/03/99
Nitrogen, Total by Chemilum.	2374	10	ppm wt.	ASTM D-4629	01/11/00
Pour Point	+85		Deg. F	ASTM D-97	01/10/00
Refractive Index	Too Dark		70 Deg. C	ASTM D-1747	12/08/99
Sulfur, Total by x-ray Fluoresc.	0.203	0.010	Wt. %	ASTM D-4294	01/12/00
Vanadium by ICP	5.4	0.06	ppm wt.	ICP	01/12/00

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/19/00

:OB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

.LIENT I.D.....: Crude Perez Companc
IATE SAMPLED.....: 11/23/99
'IME SAMPLED.....: :
ORK DESCRIPTION...: 1050+ Deg. F (566+ C)

LABORATORY I.D...: 995249-0016
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
ield Data Hyvac Potstill		*1		ASTM D-5236	04/04/00	DB
Yield L.V. %	6.24	0	L.V.%	ASTM D-5236		
Yield Wt. %	7.30	0	Wt. %	ASTM D-5236		
API Grav.	9.3	0	@ 60/60 Deg. F	ASTM D-70		
Spec. Grav.	1.0052	0	@ 60/60 Deg. F	ASTM D-70		
ash Content,	0.11		WT %	ASTM D-482	01/11/00	KC
sphaltene	1.13	0.05	Wt. %	IP-143	12/05/99	JDP
romine Number	0.61		g/100g	ASTM D-1159	12/29/99	NA
arbon Residue, Conradson	16.06		Wt. %	ASTM D-189	12/05/99	JDP
arbon Residue, Ramsbottom	Can't Run		Wt. %	ASTM D-524	01/12/00	DBC
opper by ICP	0.60	0.05	ppm wt.	ICP	01/12/00	JM
ron by ICP	332	0.08	ppm wt.	ICP	01/12/00	JM
inematic Viscosity	3131		cSt @ 210 F	ASTM D-445	12/04/99	DB
inematic Viscosity	159.2		cSt @ 300 F	ASTM D-445	12/03/99	DB
inematic Viscosity	Can't Run		cSt @ 350 F	ASTM D-445	12/08/99	DBC
inematic Viscosity	Can't Run		cSt @ 122 F	ASTM D-445	12/04/99	DBC
Factor	Insuff.			UOP 375	01/10/00	DBC
cid Number by Poten. Titration	0.10		mg KOH/g	ASTM D-664	12/29/99	NA
ickel by ICP	18	0.18	ppm wt.	ICP	01/11/00	JM
itrogen, Basic,	2442		ppm wt.	UOP 269	12/29/99	NA
itrogen, Total by Chemilum.	7183	20	ppm wt.	ASTM D-4629	01/11/00	JM
enetration	24		1/10mm Div.	ASTM D-5	01/10/00	DBC
efractive Index	Too Dark		70 Deg. C	ASTM D-1747	12/08/99	JDP
oftening Point	+115		Deg. F	ASTM D-36	01/11/00	VS

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/19/00

OB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

LIENT I.D.....: Crude Perez Companc
ATE SAMPLED.....: 11/23/99
IME SAMPLED.....: :
ORK DESCRIPTION...: 1050+ Deg. F (566+ C)

LABORATORY I.D...: 995249-0016
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
ulfur, Total by x-ray Fluoresc.	0.526	0.010	Wt. %	ASTM D-4294	01/12/00	EC
anadium by ICP	38	0.06	ppm wt.	ICP	01/12/00	Ja

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/19/00

JOB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Perez Companc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: Sample as Received

LABORATORY I.D....: 995249-0001
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Yield Data		*1			01/04/00
API Gravity	33.2	0	@ 60/60 Deg. F	ASTM D-287	
Specific Gravity	0.8593	0	@ 60/60 Deg. F	ASTM D-1298	
Aniline Point (Thin Film)	168.1		Deg. F	ASTM D-611	12/28/99
Ash Content,	< 0.001		WT %	ASTM D-482	01/10/00
Asphaltene	0.09	0.05	Wt. %	IP-143	12/05/99
Carbon Residue, Conradson	1.03		Wt. %	ASTM D-189	12/03/99
Cloud Point	Too Dark		Deg. F	ASTM D-2500	12/03/99
Copper by ICP	0.16	0.05	ppm wt.	ICP	01/12/00
Flash Point, PMCC,	<20		Deg. F	ASTM D-93	12/03/99
Hydrogen Sulfide, as Sulfur	<1	1	ppm wt.	UOP-163	12/04/99
Iron by ICP	10	0.08	ppm wt.	ICP	01/12/00
Kinematic Viscosity	5.85		cSt @ 100 F	ASTM D-445	12/01/99
Kinematic Viscosity	4.44		cSt @ 122 F	ASTM D-445	12/02/99
K Factor	11.8			UOP 375	01/10/00
Light Hydrocarbons Analysis		*1			01/05/00
Methane	0	0	LV %		
Ethane	0	0	LV %		
Propane	0	0	LV %		
Isobutane	0.06	0	LV %		
N-Butane	0.15	0	LV %		
Neopentane	0	0	LV %		
Isopentane	0.35	0	LV %		
n-Pentane	0.32	0	LV %		
Hexanes	0.87	0	LV %		
Heptanes Plus	98.25	0	LV %		
Total	100.00	0			
Mercaptan Sulfur, as Sulfur	4	1	ppm wt.	UOP-163	12/04/99

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LABORATORY TESTS RESULTS

01/19/00

JOB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Perez Companc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: Sample as Received

LABORATORY I.D...: 995249-0001
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/**DILUTION	UNITS OF MEASURE	TEST METHOD	DATE
Acid Number by Poten. Titration	0.36		mg KOH/g	ASTM D-664	12/28/99
Nickel by ICP	0.88	0.18	ppm wt.	ICP	01/11/00
Nitrogen, Basic,	222		ppm wt.	UOP 269	12/30/99
Nitrogen, Total by Chemilum.	1015	10	ppm wt.	ASTM D-4629	01/11/00
Pour Point	-30		Deg. F	ASTM D-97	01/07/00
Salt Content	100.0		lbs/1000bbls	ASTM D-3230	01/13/00
Sediment and Water	0.10	0.05	L.V. %	ASTM D-4007	12/08/99
Sodium by ICP	3.9	1.0	ppm wt.	ICP	01/12/00
Sulfur, Total by x-ray Fluoresc.	0.094	0.010	Wt. %	ASTM D-4294	01/12/00
Simulated Distillation of Crude		*1		ASTM D-5307	12/23/99
% OFF	Deg. F.	0			
IBP	96	0			
5	216	0			
10	270	0			
15	324	0			
20	379	0			
25	430	0			
30	474	0			
35	515	0			
40	561	0			
45	604	0			
50	648	0			
55	693	0			
60	739	0			
65	788	0			
70	837	0			
75	877	0			
80	976	0			
85	ND	0			
90	ND	0			
95	ND	0			
% Recovered	81.2	0	@ 1000 deg. F		
% Residue	18.8	0	@ 1000 deg. F		
Reid Vapor Pressure	0.92		psi	D-5191 ASTM Eqn.	12/22/99

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CORE LABORATORIES

LABORATORY TESTS RESULTS

01/19/00

JOB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crudo Perez Companc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: Sample as Received

LABORATORY I.D....: 995249-0001
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/POLLUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Vanadium by ICP	2.3	0.06	ppm wt.	ICP	01/12/00	J

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CORE LABORATORIES

LABORATORY TESTS RESULTS
01/19/00

JB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

LIENT I.D.....: Crude Perez Companc
ATE SAMPLED.....: 11/23/99
IME SAMPLED.....: :
ORK DESCRIPTION...: IBP-200 Deg. F (IBP-93 C)

LABORATORY I.D...: 995249-0003
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
ield Date		*1			01/04/00	DB
Yield	4.79	0	L.V. %	ASTM D-2892		
Yield	3.89	0	Wt. %	ASTM D-2892		
API Gravity	71.2	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.6981	0	@ 60/60 Deg. F	ASTM D-1298		
enzene	0.41	0.1	L.V. %	ASTM D-3606	01/04/00	BT
istillation		*1		ASTM D-86	12/28/99	DB
I.B.P.	97	0	Deg F.	ASTM D-86		
5% Recovered	129	1				
10% Recovered	138	1				
20% Recovered	149	1				
30% Recovered	157	1				
40% Recovered	164	1				
50% Recovered	170	1				
60% Recovered	176	1				
70% Recovered	182	1				
80% Recovered	188	1				
90% Recovered	196	1				
95% Recovered	202	1				
End Point	217	1	Deg F.			
% Recovered	98.6	0.1				
% Residue	0.7	0.1				
% Loss	0.7	0.1				
Factor	12.2			UOP 375	01/10/00	DB
ercaptan Sulfur, as Sulfur	8	1	ppm wt.	UOP-163	12/04/99	BA
itrogen, Basic,	<1		ppm wt.	UOP 313	12/30/99	BA
itrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/11/00	JW
HA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/12/00	LS
Paraffins	61.02	0.00	LV %			
Olefins	0.4	0.00	LV %			
Monocycloparaffins	37.85	0.00	LV %			
Dicycloparaffins	0.00	0.00	LV %			
Alkylbenzenes	0.73	0.00	LV %			
Indanes/Tetralins	0.00	0.00	LV %			
Naphthalenes	0.00	0.00	LV %			

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Co. Name: Petro Peru
Job No: 995249
Sample ID: Crudo Perez Companc

FRACTIONAL DISTILLATION TABLE

Temp. Range Deg.F.@760mm	Yield, L.V. %	Cumulative Yield, L.V. %	Yield, Wt. %	Cumulative Yield, Wt. %
IBP - 200 Deg.F.	4.79	4.79	3.89	3.89
200 - 300 Deg.F.	10.41	15.20	9.19	13.08
300 - 350 Deg.F.	6.30	21.50	5.81	18.89
350 - 400 Deg.F.	5.21	26.71	4.95	23.84
400 - 500 Deg.F.	12.04	38.75	11.75	35.59
500 - 550 Deg.F.	6.25	45.00	6.23	41.82
550 - 650 Deg.F.	13.41	58.41	13.51	55.33
650 - 700 Deg.F.	5.95	64.36	6.13	61.46
700 - 800 Deg.F.	8.88	73.24	9.35	70.81
800 - 900 Deg.F.	12.32	85.56	13.09	83.90
900 - 1050 Deg.F.	7.85	93.41	8.56	92.46
1050+ Deg.F.	6.24	99.65	7.30	99.76

CORE LABORATORIES

LABORATORY TESTS RESULTS
01/19/00

JOB NUMBER: 995249 CUSTOMER: PETROPERU SA ATTN:

CLIENT I.D.....: Crude Perez Companc
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: IBP-200 Deg. F (IBP-93 C)

LABORATORY I.D...: 995249-0003
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:10
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEI
Total	100.00	0.00	LV %			
Refractive Index	1.3675			Calculated	01/12/00	DI
Octane Analysis -- NIR		*1		NIR	12/21/99	DI
Research Octane Number	75.7	0		NIR		
Motor Octane Number	74.0	0		NIR		
R+M/2	74.8	0				
Sulfur, Total by Microcoulometry	5	1	ppm wt.	ASTM D-3120	01/14/00	JT
Reid Vapor Pressure	8.71		psi	D-5191 ASTM Eqn.	12/22/99	MB

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Co. Name: Petroleos Del Peru - Petrofero S.A.
Job No: 995256
Sample ID: Crudo Composito Varios
ATTN: Refineria Talara

FRACTIONAL DISTILLATION TABLE

Temp. Range Deg.F.@760mm	Yield, L.V. %	Cumulative Yield, L.V. %	Yield, Wt. %	Cumulative Yield, Wt. %
IBP - 200 Deg.F.	3.86	3.86	3.15	3.15
200 - 300 Deg.F.	10.74	14.60	9.52	12.67
300 - 350 Deg.F.	6.03	20.63	5.58	18.25
350 - 400 Deg.F.	6.70	27.33	6.36	24.61
400 - 500 Deg.F.	13.73	41.06	13.33	37.94
500 - 550 Deg.F.	6.65	47.71	6.59	44.53
550 - 650 Deg.F.	14.29	62.00	14.33	58.86
650 - 700 Deg.F.	5.51	67.51	5.66	64.52
700 - 800 Deg.F.	7.70	75.21	8.10	72.62
800 - 900 Deg.F.	11.35	86.56	12.08	84.70
900 - 1050 Deg.F.	7.18	93.74	7.85	92.55
1050+ Deg.F.	6.03	99.77	7.08	99.63

CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 550-650 Deg. F (288-343 C)

LABORATORY I.D....: 995256-0009
DATE RECEIVED.....: 12/02/99
TIME RECEIVED.....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data		*1			01/07/00	DI
Yield	14.29	0	L.V. %	ASTM D-2892		
Yield	14.33	0	Wt. %	ASTM D-2892		
API Gravity	33.7	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8565	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	176.9		Deg. F	ASTM D-611	01/07/00	KI
Bromine Number	0.29		g/100g	ASTM D-1159	01/13/00	MJ
Carbon Residue, Conradson	<0.01		Wt. %	ASTM D-189	01/14/00	JC
Carbon Residue, Ramsbottom	0.07		Wt. %	ASTM D-524	01/12/00	
Cetane Index	51.6			ASTM D-976	01/24/00	DI
Cloud Point	+30		Deg. F	ASTM D-2500	01/10/00	VS
Color	L 0.5			ASTM D-1500	01/11/00	VS
Distillation		*1		ASTM D-86	01/18/00	DI
I.B.P.	569	0	Deg F.	ASTM D-86		
5% Recovered	571	1				
10% Recovered	574	1				
20% Recovered	576	1				
30% Recovered	579	1				
40% Recovered	581	1				
50% Recovered	584	1				
60% Recovered	587	1				
70% Recovered	591	1				
80% Recovered	596	1				
90% Recovered	605	1				
95% Recovered	614	1				
End Point	618	1	Deg F.			
% Recovered	98.0	0.1				
% Residue	1.3	0.1				
% Loss	0.7	0.1				
Flash Point, PMCC,	285		Deg. F	ASTM D-93	01/09/00	SA
Freeze Point	+20		Deg. F	ASTM D-2386	01/07/00	RB
Kinematic Viscosity	6.28		cSt @ 100 F	ASTM D-445	01/14/00	BB

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 550-650 Deg. F (288-343 C)

LABORATORY I.D....: 995256-0009
DATE RECEIVED.....: 12/02/99
TIME RECEIVED.....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/POLLUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Kinematic Viscosity	4.61		cSt @ 122 F	ASTM D-445	01/28/00	BB
K Factor	11.9			UOP 375	01/26/00	DBC
Mercaptan Sulfur, as Sulfur	10	1	ppm wt.	UOP-163	12/04/99	MA
Naphthalenes in Jet Fuel	3.26		L.V. %	ASTM D-1840	01/28/00	KC
Acid Number by Poten. Titration	0.55		mg KOH/g	ASTM D-664	01/14/00	MA
Nitrogen, Basic,	11		ppm wt.	UOP 269	01/10/00	MA
Nitrogen, Total by Chemilum.	15	1	ppm wt.	ASTM D-4629	01/13/00	JT
Pour Point	+25		Deg. F	ASTM D-97	01/10/00	VS
PNA Middle Distillates, Mass Spec		*1		ASTM D-2425	01/14/00	LS
Paraffins	56.3	0	LV %			
Monocycloparaffins	15.7	0	LV %			
Dicycloparaffins	11.1	0	LV %			
Tricycloparaffins	2.2	0	LV %			
Alkylbenzenes	2.5	0	LV %			
Indanes/Tetralins	3.3	0	LV %			
Indanes	4.4	0	LV %			
Naphthalenes	2.3	0	LV %			
Acenaphthenes	1.0	0	LV %			
Acenaphthalenes	0.8	0	LV %			
Tricyclic Aromatics	0.4	0	LV %			
Total	100.0	0	LV %			
Refractive Index	1.4519		67 Deg. C	ASTM D-1747	01/10/00	JDP
Refractive Index	1.4566			Calculated	01/24/00	DBC
Smoke Point	16		mm	ASTM D-1322	01/13/00	JJ
Sulfur, Total by x-ray Fluoresc.	0.025	0.010	Wt. %	ASTM D-4294	01/19/00	KC

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LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 650-700 Deg. F (343-371 C)

LABORATORY I.D...: 995256-0010
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/POLLUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Yield Date		*1			01/07/00	DBI
Yield	5.51	0	L.V. %	ASTM D-2892		
Yield	5.66	0	Wt. %	ASTM D-2892		
API Gravity	29.9	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8767	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	185.9		Deg. F	ASTM D-611	01/07/00	KC
Bromine Number	0.44		g/100g	ASTM D-1159	01/13/00	MA
Carbon Residue, Conradson	<0.01		Wt. %	ASTM D-189	01/14/00	JDP
Carbon Residue, Ramsbottom	0.06		Wt. %	ASTM D-524	01/12/00	
Cetane Index	48.1			ASTM D-976	01/24/00	DBC
Cloud Point	*61		Deg. F	ASTM D-2500	01/10/00	VS
Color	L 1.0			ASTM D-1500	01/11/00	VS
Distillation		*1		ASTM D-86	01/18/00	DBC
I.B.P.	633	0	Deg F.	ASTM D-86		
5% Recovered	645	1				
10% Recovered	649	1				
20% Recovered	652	1				
30% Recovered	653	1				
40% Recovered	655	1				
50% Recovered	656	1				
60% Recovered	657	1				
70% Recovered	659	1				
80% Recovered	661	1				
90% Recovered	666	1				
95% Recovered	669	1				
End Point	672	1	Deg F.			
% Recovered	98.0	0.1				
% Residue	1.5	0.1				
% Loss	0.5	0.1				
Flash Point, PMCC,	335		Deg. F	ASTM D-93	01/09/00	SAK
Kinematic Viscosity	13.04		cSt @ 100 F	ASTM D-445	01/14/00	BB
Kinematic Viscosity	2.86		cSt @ 210 F	ASTM D-445	01/14/00	BB

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LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
CRUDE DESCRIPTION...: 650-700 Deg. F (343-371 C)

LABORATORY I.D....: 995256-0010
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Kinematic Viscosity	8.94		cSt @ 122 F	ASTM D-445	01/28/00	BB
Factor	11.9			UOP 375	01/24/00	DBC
Mercaptan Sulfur, as Sulfur	10	1	ppm wt.	UOP-163	12/04/99	NA
Acid Number by Poten. Titration	0.69		mg KOH/g	ASTM D-664	01/14/00	NA
Nitrogen, Basic,	42		ppm wt.	UOP 269	01/10/00	NA
Nitrogen, Total by Chemilum.	78	1	ppm wt.	ASTM D-4629	01/13/00	JT
Pour Point	+45		Deg. F	ASTM D-97	01/10/00	VS
PNA of Gas Oil		+1		ASTM D2786,3239	01/18/00	LS
Paraffins	36.4	0	LV %			
Naphthenes	42.0	0	LV %			
Aromatics	21.6	0	LV %			
NAPHTHENIC DISTRIBUTION	--	0				
---1 Ring	14.7	0	LV %			
---2 Ring	15.1	0	LV %			
---3 Ring	8.4	0	LV %			
---4 Ring	3.8	0	LV %			
---5 Ring	0.0	0	LV %			
---6 Ring	0.0	0	LV %			
AROMATIC DISTRIBUTION	--	0				
Monoaromatics	11.3	0	LV %			
---Alkylbenzenes	3.1	0	LV %			
---Naphthenebenzenes	3.6	0	LV %			
---Dinaphthenebenzenes	4.6	0	LV %			
Diaromatics	7.2	0	LV %			
---Naphthalenes	2.5	0	LV %			
---Acenaphthenes/Dibenzofurans	2.2	0	LV %			
---Fluorenes	2.5	0	LV %			
Triaromatics	1.3	0	LV %			
---Phenanthrenes	1.2	0	LV %			
---Naphthenephenanthrenes	0.1	0	LV %			
Tetraaromatics	0.3	0	LV %			
---Pyrenes	0.1	0	LV %			
---Chrysenes	0.2	0	LV %			
Pentaaromatics	0.0	0	LV %			
---Perylenes	0.0	0	LV %			
---Dibenzanthracenes	0.0	0	LV %			
Thiophene Aromatics	1.2	0	LV %			

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 650-700 Deg. F (343-371 C)

LABORATORY I.D...: 995256-0010
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
---Benzothiophenes	0.3	0	LV %			
---Dibenzothiophenes	0.9	0	LV %			
---Naphthobenzothiophenes	0.0	0	LV %			
Unidentified Aromatics	0.3	0	LV %			
---Class I (see Naph. Phen.)	0.0	0	LV %			
---Class II	0.0	0	LV %			
---Class III	0.0	0	LV %			
---Class IV	0.3	0	LV %			
---Class V	0.0	0	LV %			
---Class VI	0.0	0	LV %			
---Class VII	0.0	0	LV %			
Refractive Index	1.4629		67 Deg. C	ASTM D-1747	01/10/00	JD
Refractive Index	1.4689			Calculated	01/24/00	DB
Sulfur, Total by x-ray Fluoresc.	0.051	0.010	Wt. %	ASTM D-4294	01/19/00	KC

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 700+ Deg. F (371+ C)

LABORATORY I.D....: 995256-0011
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Yield Data		*1			01/07/00	DI
Yield	32.26	0	L.V. %	ASTM D-2892		
Yield	35.11	0	Wt. %	ASTM D-2892		
API Gravity	20.7	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.9296	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point (Thin Film)	Too Dark		Deg. F	ASTM D-611	01/07/00	KC

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 700-800 Deg. F (371-427 C)

LABORATORY I.D...: 995256-0012
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/POLLUTION	UNITS OF MEASURE	TEST METHOD	DATE	T
Yield Data Hyvac Potstill		*1		ASTM D-5236	01/07/00	I
Yield L.V. %	7.70	0	L.V.%	ASTM D-5236		
Yield Wt. %	8.10	0	Wt. %	ASTM D-5236		
API Grav.	25.9	0	@ 60/60 Deg. F	ASTM D-287		
Spec. Grav.	0.8991	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	197.2		Deg. F	ASTM D-611	01/07/00	K
Asphaltene	<0.05	0.05	Wt. %	IP-143	01/12/00	J
Bromine Number	1.1		g/100g	ASTM D-1159	01/13/00	M
Carbon Residue, Conradson	0.11		Wt. %	ASTM D-189	01/14/00	J
Carbon Residue, Ramsbottom	0.18		Wt. %	ASTM D-524	01/12/00	
Cetane Index	Insuff.			ASTM D-976	12/31/99	D
Color	D of 8.0			ASTM D-1500	01/14/00	J
Flash Point, PMCC,	355		Deg. F	ASTM D-93	01/13/00	A
Kinematic Viscosity	44.22		cSt @ 100 F	ASTM D-445	01/18/00	M
Kinematic Viscosity	26.26		cSt @ 122 F	ASTM D-445	01/14/00	M
Kinematic Viscosity	5.98		cSt @ 210 F	ASTM D-445	01/28/00	M
Factor	11.9			UOP 375	01/24/00	D
Acid Number by Poten. Titration	0.33		mg KOH/g	ASTM D-664	01/14/00	M
Nitrogen, Basic,	137		ppm wt.	UOP 269	01/11/00	M
Nitrogen, Total by Chemilum.	453	5	ppm wt.	ASTM D-4629	01/13/00	JT
Pour Point	+80		Deg. F	ASTM D-97	01/13/00	AB
NA of Gas Oil		*1		ASTM D2786,3239	01/18/00	LS
Paraffins	24.5	0	LV %			
Naphthenes	51.2	0	LV %			
Aromatics	24.3	0	LV %			
NAPHTHENIC DISTRIBUTION	--	0				

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CLIENT: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 700-800 Deg. F (371-427 C)

LABORATORY I.D...: 995256-0012
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
---1 Ring	12.8	0	LV %			
---2 Ring	15.3	0	LV %			
---3 Ring	12.9	0	LV %			
---4 Ring	9.4	0	LV %			
---5 Ring	0.8	0	LV %			
---6 Ring	0.0	0	LV %			
AROMATIC DISTRIBUTION	--	0				
Monoaromatics	12.7	0	LV %			
---Alkylbenzenes	3.9	0	LV %			
---Naphthenebenzenes	4.1	0	LV %			
---Dinaphthenebenzenes	4.8	0	LV %			
Diaromatics	6.8	0	LV %			
---Naphthalenes	2.4	0	LV %			
---Acenaphthenes/Dibenzofurans	1.8	0	LV %			
---Fluorenes	2.6	0	LV %			
Triaromatics	2.5	0	LV %			
---Phenanenthrenes	1.8	0	LV %			
---Naphthenephenanthrenes	0.7	0	LV %			
Tetraaromatics	1.1	0	LV %			
---Pyrenes	0.9	0	LV %			
---Chyrsenes	0.2	0	LV %			
Pentaaromatics	0.1	0	LV %			
---Perylenes	0.1	0	LV %			
---Dibenzanthracenes	0.0	0	LV %			
Thiophene Aromatics	0.8	0	LV %			
---Benzothiophenes	0.4	0	LV %			
---Dibenzothiophenes	0.4	0	LV %			
---Naphthabenzothiophenes	0.0	0	LV %			
Unidentified Aromatics	0.3	0	LV %			
---Class I (see Naph. Phen.)	0.0	0	LV %			
---Class II	0.0	0	LV %			
---Class III	0.0	0	LV %			
---Class IV	0.3	0	LV %			
---Class V	0.0	0	LV %			
---Class VI	0.0	0	LV %			
---Class VII	0.0	0	LV %			
·fractive Index	1.4751		67 Deg. C	ASTM D-1747	01/10/00	JDP
·fractive Index	1.4824			Calculated	01/24/00	DBC
·lfur, Total by x-ray Fluoresc.	0.084	0.010	Wt. %	ASTM D-4294	01/19/00	KC
·cuum Distillation		*1		ASTM D-1160	12/31/99	DBC

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. LAB: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 700-800 Deg. F (371-427 C)

LABORATORY I.D...: 995256-0012
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/POLLUTION	UNITS OF MEASURE	TEST METHOD	DATE
I.B.P.	Insuff.	1	Deg. F	ASTM D-1160	
5% Evaporated	Sample	1			
10% Evaporated	---	1			
20% Evaporated	---	1			
30% Evaporated	---	1			
40% Evaporated	---	1			
50% Evaporated	---	1			
60% Evaporated	---	1			
70% Evaporated	---	1			
80% Evaporated	---	1			
90% Evaporated	---	1			
95% Evaporated	---	1			
End Point	---	1	Deg. F		
% Recovered	---	0.1			
% Residue	---	0.1			
% Loss	---	0.1			

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Compesito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 800-900 Deg. F (427-482 C)

LABORATORY I.D...: 995256-0013
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	
Yield Data Hyvac Potstill		*1		ASTM D-5236	01/07/00	
Yield L.V. %	11.35	0	L.V.%	ASTM D-5236		
Yield Wt. %	12.08	0	Wt. %	ASTM D-5236		
API Grav.	24.2	0	@ 60/60 Deg. F	ASTM D-287		
Spec. Grav.	0.9091	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	205.5		Deg. F	ASTM D-611	01/07/00	
Ash Content,	0.01		WT %	ASTM D-482	01/19/00	
Asphaltene	0.34	0.05	Wt. %	IP-143	01/12/00	
Bromine Number	1.4		g/100g	ASTM D-1159	01/13/00	
Carbon Residue, Conradson	0.22		Wt. %	ASTM D-189	01/14/00	
Carbon Residue, Ramsbottom	0.29		Wt. %	ASTM D-524	01/12/00	
Cetane Index	35.8			ASTM D-976	01/24/00	[illegible]
Copper by ICP	<0.05	0.05	ppm wt.	ICP	01/21/00	J
Flash Point, COC,	495		Deg. F	ASTM D-92	01/18/00	A
Iron by ICP	1.8	0.08	ppm wt.	ICP	01/21/00	J
Kinematic Viscosity	54.56		cst @ 122 F	ASTM D-445	01/14/00	B
Kinematic Viscosity	9.50		cst @ 210 F	ASTM D-445	01/18/00	R
K Factor	12.0			UOP 375	01/26/00	D
Acid Number by Poten. Titration	0.03		mg KOH/g	ASTM D-664	01/14/00	B
Nickel by ICP	0.44	0.18	ppm wt.	ICP	01/21/00	J
Nitrogen, Basic,	289		ppm wt.	UOP 269	01/11/00	M
Nitrogen, Total by Chemilum.	926	5	ppm wt.	ASTM D-4629	01/13/00	J
Pour Point	+85		Deg. F	ASTM D-97	01/13/00	A
RNA of Gas Oil		*1		ASTM D2786,3239	01/18/00	L

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 800-900 Deg. F (427-482 C)

LABORATORY I.D...: 995256-0013
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	INIT
Paraffins	22.1	0	LV %			
Naphthenes	49.0	0	LV %			
Aromatics	28.9	0	LV %			
NAPHTHENIC DISTRIBUTION	--	0				
---1 Ring	12.7	0	LV %			
---2 Ring	15.6	0	LV %			
---3 Ring	13.0	0	LV %			
---4 Ring	6.4	0	LV %			
---5 Ring	1.3	0	LV %			
---6 Ring	0.0	0	LV %			
AROMATIC DISTRIBUTION	--	0				
Monoaromatics	15.8	0	LV %			
---Alkylbenzenes	4.8	0	LV %			
---Naphthenebenzenes	5.2	0	LV %			
---Dinaphthenebenzenes	5.8	0	LV %			
Diaromatics	7.2	0	LV %			
---Naphthalenes	2.4	0	LV %			
---Acenaphthenes/Dibenzofurans	2.0	0	LV %			
---Fluorenes	2.8	0	LV %			
Triaromatics	2.6	0	LV %			
---Phenanthrenes	1.7	0	LV %			
---Naphthenephenanthrenes	0.9	0	LV %			
Tetraaromatics	1.5	0	LV %			
---Pyrenes	1.1	0	LV %			
---Chyrsenes	0.4	0	LV %			
Pentaaromatics	0.1	0	LV %			
---Perylenes	0.1	0	LV %			
---Dibenzanthracenes	0.0	0	LV %			
Thiophene Aromatics	1.2	0	LV %			
---Benzothiophenes	0.5	0	LV %			
---Dibenzothiophenes	0.6	0	LV %			
---Naphthabenzothiophenes	0.1	0	LV %			
Unidentified Aromatics	0.5	0	LV %			
---Class I (see Naph. Phen.)	0.0	0	LV %			
---Class II	0.0	0	LV %			
---Class III	0.0	0	LV %			
---Class IV	0.5	0	LV %			
---Class V	0.0	0	LV %			
---Class VI	0.0	0	LV %			
---Class VII	0.0	0	LV %			
fractive Index	1.4806		67 Deg. C	ASTM D-1747	01/10/00	JDP
fractive Index	1.4896			Calculated	01/24/00	DBC

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA CALUNA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 800-900 Deg. F (427-482 C)

LABORATORY I.D...: 995256-0013
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Sulfur, Total by x-ray Fluoresc.	0.112	0.010	Wt. %	ASTM D-4294	01/19/00	KC
Vanadium by ICP	<0.06	0.06	ppm wt.	ICP	01/21/00	JM
Vacuum Distillation		*1		ASTM D-1160	01/20/00	DB
I.B.P.	673	1	Deg. F	ASTM D-1160		
5% Evaporated	768	1				
10% Evaporated	782	1				
20% Evaporated	791	1				
30% Evaporated	795	1				
40% Evaporated	812	1				
50% Evaporated	827	1				
60% Evaporated	838	1				
70% Evaporated	853	1				
80% Evaporated	874	1				
90% Evaporated	900	1				
95% Evaporated	916	1				
End Point	949	1	Deg. F			
% Recovered	99.0	0.1				
% Residue	1.0	0.1				
% Loss	<0.1	0.1				

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REYNOSO TALARA

CLIENT I.D.....: Crudo Composite Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 900-1050 Deg. F (482-566 C)

LABORATORY I.D....: 995256-0014
DATE RECEIVED.....: 12/02/99
TIME RECEIVED.....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Yield Data Hyvac Potstill		*1		ASTM D-5236	01/07/00	DM
Yield L.V. %	7.18	0	L.V.%	ASTM D-5236		
Yield Wt. %	7.85	0	Wt. %	ASTM D-5236		
API Grav.	20.1	0	@ 60/60 Deg. F	ASTM D-287		
Spec. Grav.	0.9334	0	@ 60/60 Deg. F	ASTM D-1298		
niline Point (Thin Film)	209.7		Deg. F	ASTM D-611	01/07/00	KC
sh Content,	0.004		WT %	ASTM D-482	01/19/00	VS
sphaltene	0.07	0.05	Wt. %	IP-143	01/12/00	JDP
rosine Number	3.1		g/100g	ASTM D-1159	01/13/00	MA
arbon Residue, Conradson	0.73		Wt. %	ASTM D-189	01/14/00	JDP
arbon Residue, Ramsbottom	0.74		Wt. %	ASTM D-524	01/14/00	JDP
opper by ICP	0.178	0.05	ppm wt.	ICP	01/21/00	JV
ash Point, COC,	585		Deg. F	ASTM D-92	01/18/00	AB
on by ICP	29	0.08	ppm wt.	ICP	01/21/00	JV
nematic Viscosity	318.5		cSt @ 122 F	ASTM D-445	01/18/00	BB
nematic Viscosity	28.15		cSt @ 210 F	ASTM D-445	01/18/00	BB
nematic Viscosity	7.49		cSt @ 300 F	ASTM D-445	01/18/00	BB
Factor	11.9			UOP 375	01/24/00	DGC
id Number by Poten. Titration	<0.01		mg KOH/g	ASTM D-664	01/14/00	MA
ckel by ICP	1.4	0.18	ppm wt.	ICP	01/21/00	JV
rogen, Basic,	759		ppm wt.	UOP 269	01/11/00	MA
rogen, Total by Chemilum.	2652	10	ppm wt.	ASTM D-4629	01/12/00	JT
r Point	+115		Deg. F	ASTM D-97	01/13/00	AB
of Gas Oil		*1		ASTM D2786,3239	01/18/00	LS

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU-S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....:
WORK DESCRIPTION...: 1050+ Deg. F (566+ C)

LABORATORY I.D...: 995256-0016
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMIT/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Sulfur, Total by x-ray Fluoresc.	0.379	0.010	Wt. %	ASTM D-4294	01/19/00	KC
Vanadium by ICP	9.5	0.06	ppm wt.	ICP	01/21/00	JM

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LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU (PETROPERU S.A.) ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 1050+ Deg. F (566+ C)

LABORATORY I.D....: 995256-0016
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data Hyvac Potstill		*1		ASTM D-5236	01/07/00	DBC
Yield L.V. %	6.03	0	L.V.%	ASTM D-5236		
Yield Wt. %	7.08	0	Wt. %	ASTM D-5236		
API Grav.	9.7	0	@ 60/60 Deg. F	ASTM D-70		
Spec. Grav.	1.0025	0	@ 60/60 Deg. F	ASTM D-70		
h Content,	0.09		WT %	ASTM D-482	01/18/00	VS
maltene	0.35	0.05	Wt. %	IP-143	01/12/00	JDP
amine Number	1.8		g/100g	ASTM D-1159	01/13/00	MA
rbon Residue, Conradson	15.71		Wt. %	ASTM D-189	01/14/00	JDP
rbon Residue, Ramsbottom	15.6		Wt. %	Calculated	01/12/00	
ppor by ICP	0.70	0.05	ppm wt.	ICP	01/21/00	JV
ash Point, PMCC,	Insuff.		Deg. F	ASTM D-93	12/31/99	DBC
n by ICP	173	0.08	ppm wt.	ICP	01/21/00	JV
matic Viscosity	3990		cSt @ 210 F	ASTM D-445	01/20/00	BB
matic Viscosity	150.5		cSt @ 300 F	ASTM D-445	01/21/00	BB
matic Viscosity	can't Run		cSt @ 350 F	ASTM D-445	01/21/00	DBC
actor	Insuff.			UOP 375	01/24/00	DRC
Number by Poten. Titration	0.42		mg KOH/g	ASTM D-664	01/17/00	MA
el by ICP	8.8	0.18	ppm wt.	ICP	01/21/00	JV
gen, Basic,	Insuff.		ppm wt.	UOP 269	12/31/99	DBC
gen, Total by Chemilum.	7240	20	ppm wt.	ASTM D-4629	01/12/00	JT
ration	11		1/10mm Div.	ASTM D-5	01/19/00	DC
ctive Index	Too Dark		67 Deg. C	ASTM D-1747	01/10/00	JDP
ning Point	+108		Deg. F	ASTM D-36	01/11/00	VS

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....:
WORK DESCRIPTION...: 650+ Deg. F (343+ C)

LABORATORY I.D...: 995256-0015
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DETECTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Yield Data		*1			01/07/00	DBI
Yield	37.77	0	L.V. %	ASTM D-2892		
Yield	40.77	0	Wt. %	ASTM D-2892		
API Gravity	22.0	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.9923	0	@ 60/60 Deg. F	ASTM D-1298		
ash Content,	0.017		WT %	ASTM D-482	01/21/00	AB
asphaltene	0.09	0.05	Wt. %	IP-143	01/12/00	JDP
rosine Number	4.4		g/100g	ASTM D-1159	01/13/00	MA
arbon Residue, Ramsbottom	2.44		Wt. %	ASTM D-524	01/14/00	JDP
opper by ICP	0.08	0.05	ppm wt.	ICP	01/21/00	JV
ron by ICP	33	0.08	ppm wt.	ICP	01/21/00	JV
inematic Viscosity	95.82		cSt @ 122 F	ASTM D-445	01/26/00	BS
inematic Viscosity	13.49		cSt @ 210 F	ASTM D-445	01/18/00	BS
Factor	12.1			UOP 375	01/24/00	DBC
id Number by Poten. Titration	0.09		mg KOH/g	ASTM D-664	01/17/00	MA
ckel by ICP	2.0	0.18	ppm wt.	ICP	01/21/00	JV
trogen, Basic,	687		ppm wt.	UOP 269	01/11/00	M
trogen, Total [illegible], [illegible]amium.	2207	10	ppm wt.	ASTM D-4629	01/12/00	JT
ur Point	+85		Deg. F	ASTM D-97	01/13/00	AB
ractive Index	Too Dark		67 Deg. C	ASTM D-1747	01/10/00	JDP
fur, Total by x-ray Fluoresc.	0.178	0.010	Wt. %	ASTM D-4294	01/19/00	KC
odium by ICP	1.6	0.06	ppm wt.	ICP	01/21/00	JV

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....:
WORK DESCRIPTION...: 900-1050 Deg. F (482-566 C)

LABORATORY I.D...: 995256-0016
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
ulfur, Total by x-ray Fluoresc.	0.170	0.010	Wt. %	ASTM D-4294	01/19/00	KC
anadium by ICP	0.20	0.06	ppm wt.	ICP	01/21/00	JM
acuum Distillation		*1		ASTM D-1160	12/31/99	DBC
I.B.P.	Insuff.	1	Deg. F	ASTM D-1160		
5% Evaporated	Sample	1				
10% Evaporated	---	1				
20% Evaporated	---	1				
30% Evaporated	---	1				
40% Evaporated	---	1				
50% Evaporated	---	1				
60% Evaporated	---	1				
70% Evaporated	---	1				
80% Evaporated	---	1				
90% Evaporated	---	1				
95% Evaporated	---	1				
End Point	---	1				
% Recovered	---	1	Deg. F			
% Residue	---	0.1				
% Loss	---	0.1				
		0.1				

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: PREJIMENA TAGARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: 1
WORK DESCRIPTION...: 900-1050 Deg. F (482-566 C)

LABORATORY I.D....: 995256-0014
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Paraffins	18.8	0	LV %			
Naphthenes	44.6	0	LV %			
Aromatics	36.6	0	LV %			
NAPHTHENIC DISTRIBUTION	--	0				
---1 Ring	11.4	0	LV %			
---2 Ring	13.7	0	LV %			
---3 Ring	11.6	0	LV %			
---4 Ring	6.5	0	LV %			
---5 Ring	1.1	0	LV %			
---6 Ring	0.3	0	LV %			
AROMATIC DISTRIBUTION	--	0				
Monoaromatics	20.2	0	LV %			
---Alkylbenzenes	6.4	0	LV %			
---Naphthenebenzenes	6.5	0	LV %			
---Dinaphthenebenzenes	7.3	0	LV %			
Diaromatics	9.2	0	LV %			
---Naphthalenes	3.1	0	LV %			
---Acenaphthenes/Dibenzofurans	2.5	0	LV %			
---Fluorenes	3.6	0	LV %			
Triaromatics	3.3	0	LV %			
---Phenanthrenes	2.2	0	LV %			
---Naphthenephenanthrenes	1.1	0	LV %			
Tetraaromatics	1.9	0	LV %			
---Pyrenes	1.4	0	LV %			
---Chyrsenes	0.5	0	LV %			
Pentaaromatics	0.1	0	LV %			
---Perylenes	0.1	0	LV %			
---Dibenzanthracenes	0.0	0	LV %			
Thiophene Aromatics	1.6	0	LV %			
---Benzothiophenes	0.6	0	LV %			
---Dibenzothiophenes	0.8	0	LV %			
---Naphthabenzothiophenes	0.2	0	LV %			
Unidentified Aromatics	0.3	0	LV %			
---Class I (see Naph. Phen.)	0.0	0	LV %			
---Class II	0.0	0	LV %			
---Class III	0.0	0	LV %			
---Class IV	0.3	0	LV %			
---Class V	0.0	0	LV %			
---Class VI	0.0	0	LV %			
---Class VII	0.0	0	LV %			
fractive Index	1.4963		67 Deg. C	ASTM D-1747	01/10/00	JDP
fractive Index	1.5043			Calculated	01/24/00	DBC

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: Sample as Received

LABORATORY I.D....: 995256-0001
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Yield Data		*1			01/07/00	D
API Gravity	34.2	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8542	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point (Thin Film)	169.9		Deg. F	ASTM D-611	01/07/00	K
Ash Content,	0.02		WT %	ASTM D-482	01/19/00	V
Asphaltene	0.14	0.05	Wt. %	IP-143	01/12/00	J
Carbon Residue, Conradson	0.99		Wt. %	ASTM D-189	01/14/00	J
Cloud Point	Too Dark		Deg. F	ASTM D-2500	01/10/00	V
Copper by ICP	0.05	0.05	ppm wt.	ICP	01/21/00	J
Flash Point, PMCC,	34		Deg. F	ASTM D-93	12/03/99	V
Hydrogen Sulfide, as Sulfur	<1	1	ppm wt.	UOP-163	12/04/99	M
Iron by ICP	14	0.08	ppm wt.	ICP	01/21/00	J
Kinematic Viscosity	5.31		cSt @ 100 F	ASTM D-445	01/14/00	B
Kinematic Viscosity	3.97		cSt @ 122 F	ASTM D-445	01/14/00	B
K Factor	11.9			UOP 375	01/26/00	D
Light Hydrocarbons Analysis		*1			01/07/00	P
Methane	0	0	LV %			
Ethane	0	0	LV %			
Propane	0	0	LV %			
Isobutane	0.05	0	LV %			
N-Butane	0.13	0	LV %			
Neopentane	0	0	LV %			
Isopentane	0.33	0	LV %			
n-Pentane	0.29	0	LV %			
Hexanes	1.19	0	LV %			
Heptanes Plus	98.01	0	LV %			
Total	100.00	0				
Mercaptan Sulfur, as Sulfur	4	1	ppm wt.	UOP-163	12/04/99	M

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: Sample as Received

LABORATORY I.D...: 995256-0001
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
cid Number by Poten. Titration	0.31		mg KOH/g	ASTM D-664	01/14/00	MA
ickel by ICP	1.9	0.18	ppm wt.	ICP	01/21/00	JW
itrogen, Basic,	237		ppm wt.	UOP 269	01/10/00	MA
itrogen, Total by Chemilum.	890	10	ppm wt.	ASTM D-4629	01/12/00	JT
our Point	*20		Deg. F	ASTM D-97	01/10/00	VS
alt Content	85.0		lbs/1000bbls	ASTM D-3230	01/13/00	*01
ediment and Water	0.30	0.05	L.V. %	ASTM D-4007	01/04/00	DBC
odium by ICP	5.7	1.0	ppm wt.	ICP	01/21/00	JW
ulfur, Total by x-ray Fluoresc.	0.071	0.010	wt. %	ASTM D-4294	01/19/00	KC
mulated Distillation of Crude		*1		ASTM D-5307	01/07/00	LS
% OFF	Deg. F.					
IBP	96	0				
5	213	0				
10	264	0				
15	309	0				
20	350	0				
25	396	0				
30	436	0				
35	473	0				
40	505	0				
45	543	0				
50	575	0				
55	615	0				
60	654	0				
65	695	0				
70	738	0				
75	785	0				
80	832	0				
85	890	0				
90	966	0				
95	ND	0				
% Recovered	90.9	0	@ 1000 deg. F			
% Residue	9.1	0	@ 1000 deg. F			
d Vapor Pressure	0.89		psi	D-5191 ASTM Eqn.	01/03/00	MB

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: Sample as Received

LABORATORY I.D...: 995256-0001
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Vanadium by ICP	0.67	0.06	ppm wt.	ICP	01/21/00	JV

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LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: IBP-200 Deg. F (IBP-93 C)

LABORATORY I.D....: 995256-0003
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATES	TE
Yield Data		*1			01/07/00	D
Yield	3.86	0	L.V. %	ASTM D-2892		
Yield	3.15	0	Wt. %	ASTM D-2892		
API Gravity	71.3	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.6978	0	@ 60/60 Deg. F	ASTM D-1298		
Benzene	0.25	0.1	L.V. %	ASTM D-3606	01/31/00	BI
Distillation		*1		ASTM D-86	12/29/99	DI
I.B.P.	Insuff.	0	Deg F.	ASTM D-86		
5% Recovered	Sample	1				
10% Recovered	---	1				
20% Recovered	---	1				
30% Recovered	---	1				
40% Recovered	---	1				
50% Recovered	---	1				
60% Recovered	---	1				
70% Recovered	---	1				
80% Recovered	---	1				
90% Recovered	---	1				
95% Recovered	---	1				
End Point	---	1	Deg F.			
% Recovered	---	0.1				
% Residue	---	0.1				
% Loss	---	0.1				
Factor	12.1			UOP 375	01/24/00	DBC
ercaptan sulfur, as Sulfur	7	1	ppm wt.	UOP-163	12/04/99	NA
itrogen, Basic,	<1		ppm wt.	UOP 313	01/10/00	NA
itrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/13/00	JT
HA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/15/00	BT
Paraffins	61.83	0.00	LV %			
Olefins	0.5	0.00	LV %			
Monocycloparaffins	36.58	0.00	LV %			
Dicycloparaffins	0.00	0.00	LV %			
Alkylbenzenes	1.09	0.00	LV %			
Indanes/Tetralins	0.00	0.00	LV %			
Naphthalenes	0.00	0.00	LV %			

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: IBP-200 Deg. F (IBP-93 C)

LABORATORY I.D...: 995256-0003
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Total	100.00	0.00	LV %			
Refractive Index	1.3666			Calculated	01/24/00	DBC
Octane Analysis -- NIR		*1		NIR	12/31/99	TJ
Research Octane Number	76.6	0		NIR		
Motor Octane Number	74.7	0		NIR		
R+M/2	75.6	0				
Sulfur, Total by Microcoulometry	6	1	ppm wt.	ASTM D-3120	01/26/00	JT
Reid Vapor Pressure	8.64		psi	D-5191 ASTM Eqn.	01/03/00	MB

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LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 200-300 Deg. F (93-149 C)

LABORATORY I.D...: 995256-0004
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TE
Yield Data		*1			01/07/00	DI
Yield	10.74	0	L.V. %	ASTM D-2892		
Yield	9.52	0	Wt. %	ASTM D-2892		
API Gravity	55.4	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.7572	0	@ 60/60 Deg. F	ASTM D-1298		
Benzene	<0.1	0.1	L.V. %	ASTM D-3606	01/31/00	BT
Distillation		*1		ASTM D-86	12/02/99	TM
I.B.P.	208	0	Deg F.	ASTM D-86		
5% Recovered	230	1				
10% Recovered	234	1				
20% Recovered	238	1				
30% Recovered	241	1				
40% Recovered	245	1				
50% Recovered	250	1				
60% Recovered	255	1				
70% Recovered	261	1				
80% Recovered	268	1				
90% Recovered	279	1				
95% Recovered	289	1				
End Point	296	1	Deg F.			
% Recovered	97.4	0.1				
% Residue	1.4	0.1				
% Loss	1.2	0.1				
Flash Point, PMCC,	30		Deg. F	ASTM D-93	12/03/99	VS
Factor	11.8			UOP 375	01/24/00	DBC
Mercaptan Sulfur, as Sulfur	8	1	ppm wt.	UOP-163	12/04/99	MA
Nitrogen, Basic,	<1		ppm wt.	UOP 313	01/10/00	MA
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/13/00	JT
PNA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/15/00	BT
Paraffins	37.33	0.00	LV %			
Olefins	0.5	0.00	LV %			
Monocycloparaffins	55.13	0.00	LV %			
Dicycloparaffins	1.24	0.00	LV %			
Alkylbenzenes	5.12	0.00	LV %			

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 200-300 Deg. F (93-149 C)

LABORATORY I.D...: 995256-0004
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Indanes/Tetralins	0.68	0.00	LV %			
Naphthalenes	0.00	0.00	LV %			
Total	100.00	0.00	LV %			
efractive Index	1.3976			Calculated	01/24/00	DAC
ctane Analysis -- NIR		*1		NIR	12/31/99	TJ
Research Octane Number	68.2	0		NIR		
Motor Octane Number	67.0	0		NIR		
R+M/2	67.6	0				
ulfur, Total by Microcoulometry	28	1	ppm wt.	ASTM D-3120	01/26/00	JT
id Vapor Pressure	1.34		psi	D-5191 ASTM Eqn.	01/03/00	RB

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LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 300-350 Deg. F (149-177 C)

LABORATORY I.D...: 995256-0005
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data		*1			01/07/00	DBC
Yield	6.03	0	L.V. %	ASTM D-2892		
Yield	5.58	0	Wt. %	ASTM D-2892		
API Gravity	47.7	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.7896	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	132.4		Deg. F	ASTM D-611	01/07/00	KC
Benzene	<0.1	0.1	L.V. %	ASTM D-3606	01/31/00	ST
Cetane Index	27.8			ASTM D-976	01/24/00	DBC
Cloud Point	<-90		Deg. F	ASTM D-2500	01/10/00	VS
Distillation		*1		ASTM D-86	12/02/99	TMJ
I.B.P.	295	0	Deg F.	ASTM D-86		
5% Recovered	307	1				
10% Recovered	308	1				
20% Recovered	310	1				
30% Recovered	313	1				
40% Recovered	316	1				
50% Recovered	318	1				
60% Recovered	321	1				
70% Recovered	324	1				
80% Recovered	329	1				
90% Recovered	336	1				
95% Recovered	342	1				
End Point	348	1	Deg F.			
% Recovered	97.6	0.				
% Residue	1.5	0.1				
% Loss	0.9	0.1				
Flash Point, PMCC,	90		Deg. F	ASTM D-93	01/09/00	SAK
Freeze Point	<-100		Deg. F	ASTM D-2386	01/07/00	RB
Kinematic Viscosity	0.93		cSt @ 100 F	ASTM D-445	01/14/00	BB
Kinematic Viscosity	0.81		cSt @ 122 F	ASTM D-445	01/14/00	BB
Aromatics	11.7			UOP 375	01/24/00	DBC
Mercaptan Sulfur, as Sulfur	6	1	ppm wt.	UOP-163	12/04/99	MA

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....:
WORK DESCRIPTION...: 300-350 Deg. F (149-177 C)

LABORATORY I.D....: 995256-0005
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Nitrogen, Basic,	<1		ppm wt.	UOP 313	01/10/00	MA
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/13/00	JT
Pour Point	<-90		Deg. F	ASTM D-97	01/10/00	VS
PONA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/15/00	MT
Paraffins	36.93	0.00	LV %			
Olefins	0.6	0.00	LV %			
Monocycloparaffins	48.33	0.00	LV %			
Dicycloparaffins	7.07	0.00	LV %			
Alkylbenzenes	5.98	0.00	LV %			
Indanes/Tetralins	1.09	0.00	LV %			
Naphthalenes	0.00	0.00	LV %			
Total	100.00	0.00	LV %			
Refractive Index	1.4156			Calculated	01/24/00	DBC
Octane Analysis -- NIR		*1		NIR	12/31/99	TJ
Research Octane Number	69.7	0		NIR		
Motor Octane Number	67.2	0		NIR		
R+M/2	68.4	0				
Smoke Point	24		mm	ASTM D-1322	01/13/00	JJ
Sulfur, Total by Microcoulometry	56	1	ppm wt.	ASTM D-3120	01/26/00	JT
Reid Vapor Pressure	0.23		psi	D-5191 ASTM Eqn.	01/03/00	MB

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. PLANT: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 350-400 Deg. F (177-204 C)

LABORATORY I.D....: 995256-0006
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/POLLUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Yield Data		*1			01/07/00	DBC
Yield	6.70	0	L.V. %	ASTM D-2892		
Yield	6.36	0	Wt. %	ASTM D-2892		
API Gravity	43.2	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8101	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	135.0		Deg. F	ASTM D-611	01/07/00	KC
Benzene	<0.1	0.1	L.V. %	ASTM D-3606	01/31/00	BT
Cetane Index	34.3			ASTM D-976	01/24/00	DBC
Cloud Point	<-90		Deg. F	ASTM D-2500	01/10/00	VS
Color	L 0.5			ASTM D-1500	01/11/00	VS
Color, Saybolt	+30			ASTM D-156	01/14/00	JDP
Distillation		*1		ASTM D-86	01/18/00	DBC
I.B.P.	345	0	Deg F.	ASTM D-86		
5% Recovered	355	1				
10% Recovered	358	1				
20% Recovered	360	1				
30% Recovered	363	1				
40% Recovered	365	1				
50% Recovered	368	1				
60% Recovered	370	1				
70% Recovered	374	1				
80% Recovered	378	1				
90% Recovered	385	1				
95% Recovered	390	1				
End Point	397	1	Deg F.			
% Recovered	98.0	0.1				
% Residue	0.8	0.1				
% Loss	1.2	0.1				
Flash Point, PMCC,	122		Deg. F	ASTM D-93	01/09/00	SAK
Freeze Point	-99		Deg. F	ASTM D-2386	01/07/00	RS
Kinematic Viscosity	1.23		cSt @ 100 F	ASTM D-445	01/14/00	BB
Kinematic Viscosity	1.05		cSt @ 122 F	ASTM D-445	01/14/00	BB

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LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 350-400 Deg. F (177-204 C)

LABORATORY I.D...: 995256-0006
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/POLLUTION	UNITS OF MEASURE	TEST METHOD	DATE	TI
K Factor	11.7			UOP 375	01/24/00	0
Mercaptan Sulfur, as Sulfur	7	1	ppm wt.	UOP-163	12/04/99	M
Naphthalenes in Jet Fuel	0.48		L.V. %	ASTM D-1840	01/28/00	K
Nitrogen, Basic,	<1		ppm wt.	UOP 313	01/10/00	M
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/13/00	J
Pour Point	<-90		Deg. F	ASTM D-97	01/10/00	V
PONA by Mass Spectrometer & FIA		*1		ASTM D-2789	01/15/00	B
Paraffins	39.56	0.00	LV %			
Olefins	0.9	0.00	LV %			
Monocycloparaffins	35.14	0.00	LV %			
Dicycloparaffins	17.23	0.00	LV %			
Alkylbenzenes	5.06	0.00	LV %			
Indanes/Tetralins	2.11	0.00	LV %			
Naphthalenes	0.00	0.00	LV %			
Total	100.00	0.00	LV %			
Refractive Index	1.4280			Calculated	01/24/00	D
Octane Analysis -- NIR		*1		NIR	12/31/99	T.
Research Octane Number	66.7	0		NIR		
Motor Octane Number	64.8	0		NIR		
R+M/2	65.8	0				
Smoke Point	19		mm	ASTM D-1322	01/13/00	J.
Sulfur, Total by Microcoulometry	43	1	ppm wt.	ASTM D-3120	01/26/00	J1
Reid Vapor Pressure	<0.01		psi	D-5191 ASTM Eqn.	01/03/00	M

P O BOX 34766
HOUSTON, TX 77234-4282
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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: INGENIERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 400-500 Deg. F (204-260 C)

LABORATORY I.D...: 995256-0007
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DEFINITION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Yield Data		*1			01/07/00	DE
Yield	13.73	0	L.V. %	ASTM D-2892		
Yield	13.33	0	Wt. %	ASTM D-2892		
API Gravity	39.1	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8294	0	@ 60/60 Deg. F	ASTM D-1298		
Bromine Number	0.29		g/100g	ASTM D-1159	01/13/00	MA
Cetane Index	44.9			ASTM D-976	01/26/00	DB
Cloud Point	-54		Deg. F	ASTM D-2500	01/10/00	VS
Color	L 0.5			ASTM D-1500	01/11/00	VS
Color, Saybolt	+28			ASTM D-156	01/14/00	JD
Distillation		*1		ASTM D-86	01/18/00	DB
I.B.P.	424	0	Deg F.	ASTM D-86		
5% Recovered	434	1				
10% Recovered	435	1				
20% Recovered	440	1				
30% Recovered	442	1				
40% Recovered	445	1				
50% Recovered	449	1				
60% Recovered	452	1				
70% Recovered	458	1				
80% Recovered	464	1				
90% Recovered	472	1				
95% Recovered	480	1				
End Point	488	1	Deg F.			
% Recovered	96.9	0.1				
% Residue	1.4	0.1				
% Loss	1.7	0.1				
Flash Point, PMCC,	190		Deg. F	ASTM D-93	01/09/00	SAI
Freeze Point	-48		Deg. F	ASTM D-2386	01/07/00	RB
Hydrocarbon Type		*1		ASTM D-1319	12/02/99	VS
Aromatics	11.5	0.2	L.V. %			
Olefins	1.5	0.2	L.V. %			
Saturates	87.0	0.2	L.V. %			

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CORELAB

CORE LABORATORIES

LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 400-500 Deg. F (204-260 C)

LABORATORY I.D...: 995256-0007
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Kinematic Viscosity	2.08		cSt @ 100 F	ASTM D-445	01/14/00	BB
Kinematic Viscosity	1.69		cSt @ 122 F	ASTM D-445	01/28/00	BB
K Factor	11.8			UOP 375	01/24/00	DBC
Mercaptan Sulfur, as Sulfur	9	1	ppm wt.	UOP-163	12/04/99	MA
Naphthalenes in Jet Fuel	2.73		L.V. %	ASTM D-1840	01/28/00	KC
Acid Number by Poten. Titration	0.37		mg KOH/g	ASTM D-664	01/14/00	MA
Nitrogen, Basic,	<1		ppm wt.	UOP 313	01/10/00	MA
Nitrogen, Total by Chemilum.	<1	1	ppm wt.	ASTM D-4629	01/13/00	JT
Pour Point	-55		Deg. F	ASTM D-97	01/10/00	VS
PNA of Kerosene		*1		ASTM D2425 mod.	01/14/00	LS
Paraffins	51.2	0.1	LV %			
Monocycloparaffins	17.8	0.1	LV %			
Dicycloparaffins	17.8	0.1	LV %			
Tricycloparaffins	2.0	0.1	LV %			
Alkylbenzenes	2.5	0.1	LV %			
Indans	6.5	0.1	LV %			
Indenes	1.5	0.1	LV %			
Naphthalenes	0.7	0.1	LV %			
Acenaphthenes	<0.1	0.1	LV %			
Acenaphthalenes	<0.1	0.1	LV %			
Tricyclic Aromatic	<0.1	0.1	LV %			
Total	100.0	0	LV %			
Refractive Index	1.4373			Calculated	01/24/00	DBC
Smoke Point	17		mm	ASTM D-1322	01/13/00	JJ
Sulfur, Total by Microcoulometry	38	1	ppm wt.	ASTM D-3120	01/26/00	JT

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CORE LABORATORIES

LABORATORY TESTS RESULTS

02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 500-550 Deg. F (260-288 C)

LABORATORY I.D....: 995256-0008
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Yield Data		*1			01/07/00	DBC
Yield	6.65	0	L.V. %	ASTM D-2892		
Yield	6.59	0	Wt. %	ASTM D-2892		
API Gravity	35.7	0	@ 60/60 Deg. F	ASTM D-287		
Specific Gravity	0.8464	0	@ 60/60 Deg. F	ASTM D-1298		
Aniline Point	163.0		Deg. F	ASTM D-611	01/07/00	KC
Bromine Number	0.27		g/100g	ASTM D-1159	01/13/00	MA
Cetane Index	48.6			ASTM D-976	01/24/00	DBC
Cloud Point	-11		Deg. F	ASTM D-2500	01/10/00	VS
Color	L 0.5			ASTM D-1500	01/11/00	VS
Distillation		*1		ASTM D-86	01/18/00	DBC
I.B.P.	498	0	Deg F.	ASTM D-86		
5% Recovered	508	1				
10% Recovered	509	1				
20% Recovered	510	1				
30% Recovered	512	1				
40% Recovered	512	1				
50% Recovered	514	1				
60% Recovered	516	1				
70% Recovered	518	1				
80% Recovered	522	1				
90% Recovered	526	1				
95% Recovered	532	1				
End Point	535	1	Deg F.			
% Recovered	98.0	0.1				
% Residue	1.2	0.1				
% Loss	0.8	0.1				
Flash Point, PMCC,	255		Deg. F	ASTM D-93	01/09/00	BAK
Freeze Point	-10		Deg. F	ASTM D-2386	01/07/00	RS
Hydrocarbon Type		*1		ASTM D-1319	12/02/99	VS
Aromatics	17.9	0.2	L.V. %			
Olefins	2.2	0.2	L.V. %			
Saturates	79.9	0.2	L.V. %			

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CORE LABORATORIES

LABORATORY TESTS RESULTS
02/10/00

JOB NUMBER: 995256 CUSTOMER: PETROLEOS DEL PERU-PETROPERU S.A. ATTN: REFINERIA TALARA

CLIENT I.D.....: Crudo Composito Varios
DATE SAMPLED.....: 11/23/99
TIME SAMPLED.....: :
WORK DESCRIPTION...: 500-550 Deg. F (260-288 C)

LABORATORY I.D....: 995256-0008
DATE RECEIVED....: 12/02/99
TIME RECEIVED....: 10:42
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TEC
Kinematic Viscosity	3.44		cSt @ 100 F	ASTM D-445	01/14/00	BI
Kinematic Viscosity	2.67		cSt @ 122 F	ASTM D-445	01/14/00	BI
K Factor	11.8			UOP 375	01/24/00	DI
Mercaptan Sulfur, as Sulfur	6	1	ppm wt.	UOP-163	12/04/99	MA
Naphthalenes in Jet Fuel	2.93		L.V. %	ASTM D-1840	01/28/00	KC
Acid Number by Poten. Titration	0.55		mg KOH/g	ASTM D-664	01/14/00	MA
Nitrogen, Basic,	4		ppm wt.	UOP 269	01/10/00	MA
Nitrogen, Total by Chemilum.	3	1	ppm wt.	ASTM D-4629	01/13/00	JT
Pour Point	-10		Deg. F	ASTM D-97	01/10/00	VS
PNA of Kerosene		*1		ASTM D2425 mod.	01/14/00	LS
Paraffins	53.0	0.1	LV %			
Monocycloparaffins	16.9	0.1	LV %			
Dicycloparaffins	13.2	0.1	LV %			
Tricycloparaffins	2.6	0.1	LV %			
Alkylbenzenes	2.0	0.1	LV %			
Indans	5.5	0.1	LV %			
Indenes	4.6	0.1	LV %			
Naphthalenes	1.8	0.1	LV %			
Acenaphthenes	0.2	0.1	LV %			
Acenaphthalenes	0.2	0.1	LV %			
Tricyclic Aromatics	<0.1	0.1	LV %			
Total	100.0	0	LV %			
Refractive Index	1.4464		67 Deg. C	ASTM D-1747	01/10/00	JD
Refractive Index	1.4501			Calculated	01/24/00	DB
Smoke Point	15		mm	ASTM D-1322	01/13/00	JJ
Sulfur, Total by x-ray Fluoresc.	0.012	0.010	Wt. %	ASTM D-4294	01/19/00	KC

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APPENDIX A.2 – CURRENT CASE CRUDE CUT PROPERTIES REPORTS (CAL II OUTPUT)

This appendix contains the current case crude cut properties reports (CAL II Output)

A.2.1 CUISIANA

A.2.2 LORETO

A.2.3 MAYNA

A.2.4 MESA

A.2.5 ORIENTE

A.2.6 ONO

A.2.7 PETROTECH

A.2.8 PEREZ COMPANC

A.2.9 CRUDO COMPOSITO VARIOS

CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: Cuisia39 - Cuisiana
Country: Columbia
Library: CORPORATE

Run Date: 04/04/02 (16:17:56)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: Cuisiana crude assay received from PetroPeru on 12/12/01

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	39.4		C2	0.07	0.03
SG 60/60	.8280		C3	0.73	0.45
Dens @15			IC4	0.79	0.54
S, WT%	.17		NC4	1.67	1.18
N2, ppm			IC5	1.91	1.44
H2, WT%			NC5	1.82	1.39
RVP		1.09	CP	0.00	0.00
Va, ppm	2.00			----	----
Ni, ppm	2.00			7.00	5.03
POUR, F	38.0				
VOL YLD					
NEUT	.05				
SALT pkb					

	X5	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	292.	316.
TBP TEMP AT END-OF-CUT, F	292.	316.	240.	316.	321.
YIELD AT START-OF-CUT, LV%	4.67	27.01	11.74	27.01	30.24
YIELD AT END-OF-CUT, LV%	27.01	30.24	19.43	30.24	30.88
YIELD OF CUT (LV% OF CRUDE)	22.34	3.24	7.69	3.24	.63
API GRAVITY 60F	63.9	48.6	64.5	48.6	47.9
SPECIFIC GRAVITY 60/60	.7240	.7857	.7218	.7857	.7889
CHARACT. FACTOR (K-FACTOR)	12.11c	11.63c	12.13c	11.63c	11.66c
MOLECULAR WEIGHT	113.s	135.c	113.s	135.c	139.c
SULFUR, WT%	.001*	<.001	.001	<.001	.001
MERCAPTAN SULFUR, ppm	2.*	2.	2.	2.	2.
VL TBP BOILING CURVE,DEG F - ST	55.	292.	180.	292.	316.
VL TBP BOILING CURVE,DEG F - 5%	92.	293.	184.	293.	316.
VL TBP BOILING CURVE,DEG F - 10%	119.	294.	187.	294.	316.
VL TBP BOILING CURVE,DEG F - 30%	176.	299.	200.	299.	317.
VL TBP BOILING CURVE,DEG F - 50%	214.	304.	212.	304.	318.
VL TBP BOILING CURVE,DEG F - 70%	246.	309.	224.	309.	319.
VL TBP BOILING CURVE,DEG F - 90%	276.	313.	235.	313.	320.
VL TBP BOILING CURVE,DEG F - 95%	284.	315.	237.	315.	321.
VL TBP BOILING CURVE,DEG F - EP	292.	316.	240.	316.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	124.c	298.c	202.c	298.c	315.c
ASTM BOILING CURVE, DEG F - 5%	143.	298.	202.	298.	315.
ASTM BOILING CURVE, DEG F - 10%	160.c	298.c	202.c	298.c	315.c
ASTM BOILING CURVE, DEG F - 30%	191.c	299.c	206.c	299.c	315.c
ASTM BOILING CURVE, DEG F - 50%	214.c	301.c	212.c	301.c	315.c
ASTM BOILING CURVE, DEG F - 70%	236.c	303.c	218.c	303.c	315.c
ASTM BOILING CURVE, DEG F - 90%	257.c	305.c	224.c	305.c	315.c
ASTM BOILING CURVE, DEG F - 95%	266.	308.	228.	308.	317.
ASTM BOILING CURVE, DEG F - EP	276.c	311.c	234.c	311.c	318.c
PERCENT EVAP @ 70C (E70), LV%	9.4	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	48.4	0.0	49.8	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	99.6	0.0	100.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	59.7*	47.9	60.2	47.9	46.5
MOT. OCTANE F-2 CLEAR	59.7c	47.9c	60.2c	47.9c	46.5c
TOTAL PARAFFINS, LV%	63.8a	41.5a	61.5a	41.5a	38.8a
NAPHTHENES, LV%	25.3a	36.3a	26.8a	36.3a	38.1a
AROMATICS, LV%	10.9a	22.2a	11.6a	22.2a	23.2a
REID VAPOR PRESSURE, psi	4.54*	.24*	2.47	.24*	.11*
FLASH PT(API Pen-Mar clsd cup),F	-18.c	93.c	17.c	93.c	105.c
Flash Point Measured		68.	32.	68.	74.

FLASH PT(CHV Pen-Mar clsd cup),F		92.c		92.c	105.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.18@	5.51c	5.17c	5.51c	5.53c
FREEZE POINT, F		-106.n	-127.n	-106.n	-102.n
CLOUD POINT, F		-112.c	-133.c	-112.c	-108.c
POUR POINT, F		-116.c	-137.c	-116.c	-112.c
SMOKE POINT (ASTM), mm		23.		23.	23.
ANILINE POINT, F		118.*		118.*	121.
CETANE INDEX		34.5*		34.5*	35.1
DIESEL INDEX		57.5@		57.5@	57.9c
VISCOSITY, cSt @ 122 F (50 C)		.1		.1	.1
VISCOSITY, cSt @ 140 F (60 C)		1.0*		1.0*	.9

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	30.88	36.53	46.79	58.10	59.21
YIELD AT END-OF-CUT, LV%	36.53	46.79	58.10	59.21	68.47
YIELD OF CUT (LV% OF CRUDE)	5.66	10.26	11.32	1.10	9.26
API GRAVITY 60F	46.3	41.8	35.4	32.1	30.0
SPECIFIC GRAVITY 60/60	.7957	.8166	.8476	.8649	.8762
CHARACT. FACTOR (K-FACTOR)	11.69c	11.74c	11.68c	11.64c	11.65c
MOLECULAR WEIGHT	147.c	173.c	207.c	229.c	250.c
SULFUR, WT%	<.001	.006	.055	.101	.177
MERCAPTAN SULFUR, ppm	2.	2.*			
NITROGEN, ppm				76.8	160.3
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	323.	380.	469.	557.	570.
VL TBP BOILING CURVE,DEG F - 10%	326.	386.	475.	558.	574.
VL TBP BOILING CURVE,DEG F - 30%	335.	405.	491.	560.	589.
VL TBP BOILING CURVE,DEG F - 50%	346.	422.	510.	561.	604.
VL TBP BOILING CURVE,DEG F - 70%	357.	439.	529.	563.	620.
VL TBP BOILING CURVE,DEG F - 90%	369.	455.	548.	565.	636.
VL TBP BOILING CURVE,DEG F - 95%	372.	459.	552.	566.	641.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	333.c	397.c	481.c	547.c	574.c
ASTM BOILING CURVE, DEG F - 5%	334.	398.	482.	547.	575.
ASTM BOILING CURVE, DEG F - 10%	334.c	399.c	483.c	547.c	575.c
ASTM BOILING CURVE, DEG F - 30%	336.c	406.c	488.c	547.c	580.c
ASTM BOILING CURVE, DEG F - 50%	341.c	415.c	498.c	547.c	588.c
ASTM BOILING CURVE, DEG F - 70%	347.c	424.c	510.c	548.c	597.c
ASTM BOILING CURVE, DEG F - 90%	353.c	434.c	521.c	549.c	607.c
ASTM BOILING CURVE, DEG F - 95%	358.	439.	527.	550.	613.
ASTM BOILING CURVE, DEG F - EP	364.c	446.c	535.c	552.c	620.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	92.8	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	44.0				
MOT. OCTANE F-2 CLEAR	44.0c				
TOTAL PARAFFINS, LV%	34.0a				
NAPHTHENES, LV%	41.3a				
AROMATICS, LV%	24.6a	23.1	24.0*	24.4*	
REID VAPOR PRESSURE, psi	.10c	.02c	.00c		
FLASH PT(API Pen-Mar clsd cup),F	119.c	163.c	213.c	244.c	257.c
Flash Point Measured	86.	123.	202.	246.	274.
FLASH PT(CHV Pen-Mar clsd cup),F	119.c	167.c	230.c	279.c	300.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.56c	5.68c	5.83c	5.91c	5.97c
FREEZE POINT, F	-92.n	-63.n	-14.n	8.n	38.n
CLOUD POINT, F	-98.c	-69.c	-19.c	2.c	33.c
POUR POINT, F	-102.c	-73.c	-24.n	-3.n	28.n
SMOKE POINT (ASTM), mm	23.	21.	17.	15.	14.
ANILINE POINT, F	125.	136.	150.	157.	164.
CETANE INDEX	36.3	40.4	45.4	46.3	46.7
DIESEL INDEX	58.0c	56.8c	53.1c	50.5c	49.2c
VISCOSITY, cSt @ 104 F (40 C)		.1c	.3c	2.4c	5.0c
VISCOSITY, cSt @ 122 F (50 C)	.1	.1	.8	4.1	6.6
VISCOSITY, cSt @ 140 F (60 C)	.8	1.7	6.5	7.9	9.1
VISCOSITY, cSt @ 212 F (100 C)			.7	1.6	2.1
VISCOSITY, cSt @ 275 F (135 C)			.6c	1.0c	1.2c
CONRADSON CARBON, WT%					.00*
VANADIUM, ppm				0.00z	.00*
NICKEL, ppm				0.00z	.01*

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1447.s	1447.s
YIELD AT START-OF-CUT, LV%	68.47	73.67	68.47	94.19	68.47
YIELD AT END-OF-CUT, LV%	73.67	94.19	94.19	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	5.20	20.52	25.72	5.81	31.53
API GRAVITY 60F	28.3	25.2	25.8	12.7	23.2b
SPECIFIC GRAVITY 60/60	.8855	.9031	.8995	.9814	.9146b
CHARACT. FACTOR (K-FACTOR)	11.76c	12.01c	11.96c	11.84c	11.89c
MOLECULAR WEIGHT	289.c	395.c	370.c,		394.c
SULFUR, WT%	.299	.386	.369	.788	.452b
NITROGEN, ppm	267.9	763.8	665.1	2337.1	995.7b
BASIC NITROGEN, ppm		170.0		759.5	215.4*
HYDROGEN, WT%				11.4c	13.8c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	647.	709.	657.	1021.	660.
VL TBP BOILING CURVE,DEG F - 10%	650.	721.	670.	1033.	675.
VL TBP BOILING CURVE,DEG F - 30%	660.	768.	726.	1090.	746.
VL TBP BOILING CURVE,DEG F - 50%	670.	816.	785.	1161.s	819.
VL TBP BOILING CURVE,DEG F - 70%	680.	869.	848.	1268.s	912.
VL TBP BOILING CURVE,DEG F - 90%	691.	950.	937.	1389.s	1144.s
VL TBP BOILING CURVE,DEG F - 95%	694.	979.	971.	1418.s	1286.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1447.s	1447.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	652.c	724.c	673.c	1038.s	677.c
ASTM BOILING CURVE, DEG F - 5%	653.	729.	679.	1043.	683.
ASTM BOILING CURVE, DEG F - 10%	654.c	736.c	686.c	1049.c	692.c
ASTM BOILING CURVE, DEG F - 30%	662.c	775.c	734.c	1098.c	755.c
ASTM BOILING CURVE, DEG F - 50%	670.c	816.c	785.c	1161.s	819.c
ASTM BOILING CURVE, DEG F - 70%	680.c	869.c	848.c	1268.s	912.c
ASTM BOILING CURVE, DEG F - 90%	691.c	950.c	937.c	1389.s	1144.s
ASTM BOILING CURVE, DEG F - 95%	694.	980.	972.	1418.s	1284.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1447.s	1447.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	20.2	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	91.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	18.3	0.0	11.3
FLASH PT(API Pen-Mar clsd cup),F	282.c	308.c	296.c	341.c	299.c
Flash Point Measured	334.	427.	408.	611.	468.
FLASH PT(CHV Pen-Mar clsd cup),F	351.c				
HEATING VAL, GROSS 10**6 Btu/bbl	6.01c	6.11c	6.09c	6.43c	6.15c
HEATING VAL, NET, 10**6 Btu/bbl				6.07c	5.75c
FREEZE POINT, F	63.*				
CLOUD POINT, F	61.c				
POUR POINT, F	59.n	102.b	93.b	118.	107.b
SMOKE POINT (ASTM), mm	12.*				
ANILINE POINT, F	178.	205.	200.		
CETANE INDEX	47.5*				
DIESEL INDEX	50.4c	51.7c	51.6c		
VISCOSITY, cSt @ 104 F (40 C)	5.6c	38.6c	24.3c		74.6c
VISCOSITY, cSt @ 122 F (50 C)	8.0	30.5	22.6		46.2b
VISCOSITY, cSt @ 140 F (60 C)	11.9	24.6	21.0		30.5c
VISCOSITY, cSt @ 212 F (100 C)	2.7	7.0	5.7	240.8	8.9b
VISCOSITY, cSt @ 275 F (135 C)	1.7c	3.7c	3.1c		4.4c
RAMSBOTTOM CARBON, WT%	.04c	.19c	.16c	10.77c	1.86c
CONRADSON CARBON, WT%	.02	.18	.15	12.20	2.47b
VANADIUM, ppm	.01	.18	.14	9.55	1.98b
NICKEL, ppm	.03	.19	.16	3.84	1.98b
ASPHALTENES, WT%				1.3	.2*
SOFTENING POINT				118.2	
PENETRATION, dmm				>300.0	

*** Meaning of the codes which follow table values:

* - Obtained by curve extrapolation
c - Calculated from other properties
@ - Calculated from curve extrapolation of other properties
g - Calculated from GC analysis data
= - Calculated from combination of GC and dist. curve data
+ - As above, but had to extrapolate dist. curve
d - Distillate property curve used for resid property
r - Resid property curve used for distillate property
b - Both distillate and resid property curves used
s - Suspect value - may be inaccurate
n - Cloud Point, Pour Point, or Freeze Point interpolated from property curve
o - Calculated with distillate separation inefficiency modeling
p - Cloud, Pour, Freeze interpolated from property curve with distillate separation inefficiency modeling
q - Cloud Point suspect negative area under cloud point index curve for cut
i - Property value adjusted after integration
z - Property value reset to zero after being estimated negative
w - This property is not whole crude balanced and is interpolated from the resid curve
m - Value suspect 1 or more of the crudes did not include this property
a - PNA Adjustment Applied

CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: Loreto19 - Loreto
Country: Peru
Library: CORPORATE

Run Date: 04/04/02 (16:18:05)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: Core Labs assay of Loreto crude received from PetroPeru on 12/12/01

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	18.9	19.6*	C2	0.00	0.00
SG 60/60	.9408	.9362*	C3	0.05	0.03
Dens @15			IC4	0.08	0.05
S, WT%	1.24	1.24*	NC4	0.19	0.12
N2, ppm	3194.0	2970.*	IC5	0.31	0.21
H2, WT%			NC5	0.38	0.26
RVP	1.11	.24	CP	0.00	0.00
Va, ppm	207.00	207.36		----	----
Ni, ppm	90.00	92.16		1.01	0.66
CCR, wt%		13.16			
RAMSBOTT		13.17			
POUR, F	-10.0				
VOL YLD					
NEUT					
SALT pkb					
cSt@ 60F		917.36			
cSt@ 77F		442.15			
cSt@104F		168.09			
cSt@100F	191.50		K Factor	11.60	
cSt@122F	98.07		ASH	.05	
MERCAP S	23.00				

	X5	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	292.	316.
TBP TEMP AT END-OF-CUT, F	292.	316.	240.	316.	321.
YIELD AT START-OF-CUT, LV%	1.68	8.20	3.89	8.20	10.19
YIELD AT END-OF-CUT, LV%	8.20	10.19	5.46	10.19	10.59
YIELD OF CUT (LV% OF CRUDE)	6.52	1.99	1.57	1.99	.40
YIELD AT START-OF-CUT, WT%	1.00@	6.02@	2.58@	6.02@	7.67@
YIELD AT END-OF-CUT, WT%	6.02@	7.67@	3.80@	7.67@	8.01@
YIELD OF CUT (WT% OF CRUDE)	5.02@	1.65@	1.22@	1.65@	.33@
API GRAVITY 60F	64.9	50.6	63.3	50.6	48.8
SPECIFIC GRAVITY 60/60	.7206	.7769	.7264	.7769	.7846
CHARACT. FACTOR (K-FACTOR)	12.22c	11.76c	12.07c	11.76c	11.72c
MOLECULAR WEIGHT	116.c	135.c	113.8	135.c	139.c
SULFUR, WT%	0.000z	.017	0.000z	.017	.027
BASIC NITROGEN, ppm	4.0*	3.9	4.0	3.9	3.8
VL TBP BOILING CURVE,DEG F - ST	55.	292.	180.	292.	316.
VL TBP BOILING CURVE,DEG F - 5%	75.	293.	184.	293.	316.
VL TBP BOILING CURVE,DEG F - 10%	95.	294.	187.	294.	316.
VL TBP BOILING CURVE,DEG F - 30%	168.	299.	201.	299.	317.
VL TBP BOILING CURVE,DEG F - 50%	223.	304.	214.	304.	318.
VL TBP BOILING CURVE,DEG F - 70%	260.	309.	225.	309.	319.
VL TBP BOILING CURVE,DEG F - 90%	283.	314.	235.	314.	320.
VL TBP BOILING CURVE,DEG F - 95%	288.	315.	238.	315.	321.
VL TBP BOILING CURVE,DEG F - EP	292.	316.	240.	316.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	125.c	298.c	202.c	298.c	315.c
ASTM BOILING CURVE, DEG F - 5%	133.	298.	203.	298.	315.
ASTM BOILING CURVE, DEG F - 10%	142.c	298.c	203.c	298.c	315.c
ASTM BOILING CURVE, DEG F - 30%	185.c	299.c	208.c	299.c	315.c
ASTM BOILING CURVE, DEG F - 50%	223.c	301.c	214.c	301.c	315.c
ASTM BOILING CURVE, DEG F - 70%	249.c	303.c	220.c	303.c	315.c
ASTM BOILING CURVE, DEG F - 90%	264.c	305.c	225.c	305.c	315.c
ASTM BOILING CURVE, DEG F - 95%	270.	308.	229.	308.	317.
ASTM BOILING CURVE, DEG F - EP	277.c	311.c	234.c	311.c	318.c
PERCENT EVAP @ 70C (E70), LV%	18.1	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	43.7	0.0	45.4	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	98.6	0.0	100.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0

RES. OCTANE F-1 CLEAR	71.9*	70.7	70.8	70.7	71.4
MOT. OCTANE F-2 CLEAR	69.7*	67.5	68.9	67.5	67.9
TOTAL PARAFFINS, LV%	55.1a	44.4a	54.5a	44.4a	42.0a
OLEFINS, LV%	.8*	.9	.8*	.9	1.0
NAPHTHENES, LV%	38.3a	42.3a	39.2a	42.3a	43.2a
AROMATICS, LV%	5.9a	12.4a	5.5a	12.4a	13.8a
REID VAPOR PRESSURE, psi	5.75*	.62	2.26	.62	.31
FLASH PT(API Pen-Mar clsd cup),F		93.c	18.c	93.c	105.c
Flash Point Measured	46.*	93.	43.	93.	106.
FLASH PT(CHV Pen-Mar clsd cup),F		92.c		92.c	105.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.17c	5.46c	5.20c	5.46c	5.50c
FREEZE POINT, F	-126.n	-115.n	-129.n	-115.n	-113.n
CLOUD POINT, F	-132.c	-114.c	-135.c	-114.c	-110.c
POUR POINT, F	-136.c	-112.*	-139.c	-112.*	-108.*
SMOKE POINT (ASTM), mm	27.*	24.	28.	24.	23.
ANILINE POINT, F		124.*	122.*	124.*	125.
CETANE INDEX		36.7*	35.7*	36.7*	37.0
DIESEL INDEX		62.9@	77.4@	62.9@	61.0c
VISCOSITY, cSt @ 100 F (38 C)		.8*		.8*	.9*
VISCOSITY, cSt @ 104 F (40 C)		.8c		.8c	.9c
VISCOSITY, cSt @ 122 F (50 C)		.7*	.5*	.7*	.8
VISCOSITY, cSt @ 140 F (60 C)		.6c		.6c	.7c
VISCOSITY, cSt @ 212 F (100 C)		.5c		.5c	.5c
VISCOSITY, cSt @ 275 F (135 C)		.4@		.4@	.4c

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	10.59	14.01	20.01	27.27	28.01
YIELD AT END-OF-CUT, LV%	14.01	20.01	27.27	28.01	36.33
YIELD OF CUT (LV% OF CRUDE)	3.42	6.00	7.26	.74	8.32
YIELD AT START-OF-CUT, WT%	8.01@	10.93@	16.30@	23.06@	23.75@
YIELD AT END-OF-CUT, WT%	10.93@	16.30@	23.06@	23.75@	31.69@
YIELD OF CUT (WT% OF CRUDE)	2.92@	5.37@	6.76@	.69@	7.94@
API GRAVITY 60F	45.1	37.5	31.0	29.1	26.9
SPECIFIC GRAVITY 60/60	.8014	.8373	.8708	.8813	.8932
CHARACT. FACTOR (K-FACTOR)	11.61c	11.47c	11.35c	11.43c	11.44c
MOLECULAR WEIGHT	147.c	172.c	202.c	226.c	249.c
SULFUR, WT%	.043	.150	.450	.594	.697
MERCAPTAN SULFUR, ppm			7.	9.	11.
NITROGEN, ppm			17.6	30.5	115.2
BASIC NITROGEN, ppm	3.6	3.7	12.8	32.2	79.8
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	323.	381.	467.	557.	571.
VL TBP BOILING CURVE,DEG F - 10%	325.	386.	471.	558.	576.
VL TBP BOILING CURVE,DEG F - 30%	335.	407.	489.	560.	593.
VL TBP BOILING CURVE,DEG F - 50%	345.	425.	507.	562.	609.
VL TBP BOILING CURVE,DEG F - 70%	356.	441.	528.	563.	624.
VL TBP BOILING CURVE,DEG F - 90%	369.	456.	548.	565.	638.
VL TBP BOILING CURVE,DEG F - 95%	372.	459.	552.	566.	641.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	333.c	398.c	479.c	547.c	577.c
ASTM BOILING CURVE, DEG F - 5%	333.	399.	480.	547.	578.
ASTM BOILING CURVE, DEG F - 10%	334.c	400.c	480.c	547.c	579.c
ASTM BOILING CURVE, DEG F - 30%	336.c	408.c	486.c	547.c	585.c
ASTM BOILING CURVE, DEG F - 50%	341.c	417.c	496.c	547.c	593.c
ASTM BOILING CURVE, DEG F - 70%	347.c	427.c	508.c	548.c	601.c
ASTM BOILING CURVE, DEG F - 90%	353.c	435.c	521.c	549.c	609.c
ASTM BOILING CURVE, DEG F - 95%	358.	440.	527.	550.	614.
ASTM BOILING CURVE, DEG F - EP	364.c	447.c	535.c	552.c	621.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	93.1	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	70.5*				
MOT. OCTANE F-2 CLEAR	67.2*				
TOTAL PARAFFINS, LV%	36.3a	34.3a	38.5a	36.6a	36.7a
OLEFINS, LV%	1.3	1.5	.8	.5	.2
NAPHTHENES, LV%	46.9a	45.1a	34.8a	33.4a	32.9a
AROMATICS, LV%	15.6a	19.1a	25.9a	29.5a	30.1a
REID VAPOR PRESSURE, psi	.07	.02*	.00c		
FLASH PT(API Pen-Mar clsd cup),F	119.c	164.c	211.c	244.c	258.c
Flash Point Measured	127.	176.	239.	274.	307.
FLASH PT(CHV Pen-Mar clsd cup),F	119.c	168.c	229.c	279.c	302.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.59c	5.76c	5.92c	5.97c	6.02c
FREEZE POINT, F	-106.n	-76.n	-21.n	-6.n	7.*
CLOUD POINT, F	-102.c	-74.c	-26.c	-9.c	6.c
POUR POINT, F	-97.n	-72.n	-30.n	-13.n	5.n
SMOKE POINT (ASTM), mm	22.	19.	15.	13.	12.*
ANILINE POINT, F	126.	131.	136.	139.	146.
CETANE INDEX	37.4	38.5	40.1	41.0	42.1
DIESEL INDEX	56.7c	49.1c	42.0c	40.5c	39.2c
VISCOSITY, cSt @ 100 F (38 C)	1.1*	1.7	3.1	4.7	7.3
VISCOSITY, cSt @ 104 F (40 C)	1.0c	1.6c	3.0c	4.5c	6.8c
VISCOSITY, cSt @ 122 F (50 C)	.9	1.3	2.4	3.6	5.3
VISCOSITY, cSt @ 140 F (60 C)	.8c	1.1c	2.0c	3.0c	4.2c
VISCOSITY, cSt @ 212 F (100 C)	.5c	.7c	1.1c	1.6c	2.1c
VISCOSITY, cSt @ 275 F (135 C)	.4c	.5c	.7c	1.1c	1.3c
RAMSBOTTOM CARBON, WT%					.03c
CONRADSON CARBON, WT%				.01*	.01*

VANADIUM, ppm	.02*	.02*
NICKEL, ppm	0.00z	.01*

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1382.s	1382.s
YIELD AT START-OF-CUT, LV%	36.33	41.70	36.33	69.42	36.33
YIELD AT END-OF-CUT, LV%	41.70	69.42	69.42	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	5.37	27.72	33.09	30.58	63.67
YIELD AT START-OF-CUT, WT%	31.69@	36.92@	31.69@	64.92@	31.69@
YIELD AT END-OF-CUT, WT%	36.92@	64.92@	64.92@	100.00@	100.00@
YIELD OF CUT (WT% OF CRUDE)	5.24@	28.00@	33.24@	35.08@	68.31@
API GRAVITY 60F	23.4	18.1	19.0	.3	9.4b
SPECIFIC GRAVITY 60/60	.9135	.9456	.9404	1.0736	1.0043b
CHARACT. FACTOR (K-FACTOR)	11.39c	11.61c	11.61c	11.45c	11.47c
MOLECULAR WEIGHT	280.c	421.c	403.c		
SULFUR, WT%	1.028	1.180	1.156	2.156	1.670
MERCAPTAN SULFUR, ppm	13.*				
NITROGEN, ppm	479.9	1902.2	1678.1	6853.0	4335.0
BASIC NITROGEN, ppm	194.2	680.5b	603.9b	2099.8	1337.5b
HYDROGEN, WT%				8.5c	10.6c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	647.	715.	659.	1031.	673.
VL TBP BOILING CURVE,DEG F - 10%	650.	735.	675.	1051.	710.
VL TBP BOILING CURVE,DEG F - 30%	659.	813.	762.	1128.s	862.
VL TBP BOILING CURVE,DEG F - 50%	669.	863.	841.	1203.s	994.
VL TBP BOILING CURVE,DEG F - 70%	679.	909.	894.	1275.s	1157.s
VL TBP BOILING CURVE,DEG F - 90%	691.	975.	968.	1346.s	1308.s
VL TBP BOILING CURVE,DEG F - 95%	694.	993.	989.	1364.s	1345.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1382.s	1382.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	652.c	732.c	676.c	1047.s	683.c
ASTM BOILING CURVE, DEG F - 5%	653.	740.	682.	1057.	698.
ASTM BOILING CURVE, DEG F - 10%	654.c	751.c	691.c	1068.c	718.c
ASTM BOILING CURVE, DEG F - 30%	661.c	821.c	771.c	1137.s	867.c
ASTM BOILING CURVE, DEG F - 50%	669.c	863.c	841.c	1203.s	994.c
ASTM BOILING CURVE, DEG F - 70%	679.c	909.c	894.c	1275.s	1157.s
ASTM BOILING CURVE, DEG F - 90%	691.c	975.c	968.c	1346.s	1308.s
ASTM BOILING CURVE, DEG F - 95%	694.	993.	989.	1364.s	1345.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1382.s	1382.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	26.5	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	91.8	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	10.6	0.0	3.6
TOTAL PARAFFINS, LV%	19.9a	12.3a	13.6a		
OLEFINS, LV%	.0*				
NAPHTHENES, LV%	41.4a	37.3a	38.0a		
AROMATICS, LV%	38.7a	50.4a	48.5a		
FLASH PT(API Pen-Mar clsd cup),F	282.c	313.c	299.c	341.c	306.c
Flash Point Measured	348.	432.b	419.b	528.	474.b
FLASH PT(CHV Pen-Mar clsd cup),F	350.c				
HEATING VAL, GROSS 10**6 Btu/bbl	6.10c	6.25c	6.23c	6.69c	6.46c
HEATING VAL, NET, 10**6 Btu/bbl				6.40c	6.13c
FREEZE POINT, F	43.c				
CLOUD POINT, F	37.c				
POUR POINT, F	33.n	89.n	83.n	150.	124.
ANILINE POINT, F	148.	173.	169.		
CETANE INDEX	44.8*				
DIESEL INDEX	34.6c	31.4c	32.1c		
VISCOSITY, cSt @ 100 F (38 C)	15.5				
VISCOSITY, cSt @ 104 F (40 C)	14.3c	228.5c	134.4c	5.7E+11c	2.98E+5c
VISCOSITY, cSt @ 122 F (50 C)	10.4	116.0	72.2	2.8E+10	43800.1b
VISCOSITY, cSt @ 140 F (60 C)	7.3c	65.1c	42.5c	2.09E+9c	9018.3c
VISCOSITY, cSt @ 210 F (99 C)	2.7*	13.1	9.8*	1.44E+6	163.4
VISCOSITY, cSt @ 212 F (100 C)	2.7c	12.7c	9.5c	1.23E+6c	150.9c
VISCOSITY, cSt @ 275 F (135 C)	1.5c	5.2c	4.2c	22396.3c	22.3c
RAMSBOTTOM CARBON, WT%	.03c	.44c	.39c	36.52	19.28
CONRADSON CARBON, WT%	.02	.52	.44	33.95	19.27

VANADIUM, ppm	.02	.28	.23	593.99	303.57
NICKEL, ppm	.04	.26	.23	261.63	134.92
ASPHALTENES, WT%				74.3	15.0
SOFTENING POINT				237.5	115.7*
PENETRATION, dmm					86.0c

*** Meaning of the codes which follow table values:

- * - Obtained by curve extrapolation
- c - Calculated from other properties
- @ - Calculated from curve extrapolation of other properties
- g - Calculated from GC analysis data
- = - Calculated from combination of GC and dist. curve data
- + - As above, but had to extrapolate dist. curve
- d - Distillate property curve used for resid property
- r - Resid property curve used for distillate property
- b - Both distillate and resid property curves used
- s - Suspect value - may be inaccurate
- n - Cloud Point, Pour Point, or Freeze Point interpolated from property curve
- o - Calculated with distillate separation inefficiency modeling
- p - Cloud, Pour, Freeze interpolated from property curve with distillate separation inefficiency modeling
- q - Cloud Point suspect negative area under cloud point index curve for cut
- i - Property value adjusted after integration
- z - Property value reset to zero after being estimated negative
- w - This property is not whole crude balanced and is interpolated from the resid curve
- m - Value suspect 1 or more of the crudes did not include this property
- a - PNA Adjustment Applied

CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: Mayna25 - Mayna
Country: Peru.
Library: CORPORATE

Run Date: 04/04/02 (16:18:13)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: Core Labs Mayna crude assay received from PetroPeru on 12/12/01

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	25.7	25.9*	C2	0.00	0.00
SG 60/60	.9001	.8992*	C3	0.04	0.02
Dens @15			IC4	0.05	0.03
S, WT%	.42	.41*	NC4	0.06	0.04
N2, ppm	1217.0	1240.*	IC5	0.16	0.11
H2, WT%			NC5	0.18	0.13
RVP	.52	.42	CP	0.00	0.00
Va, ppm	14.00	13.87		----	----
Ni, ppm	9.20	11.10		0.49	0.33
CCR, wt%		10.93			
RAMSBOTT		3.45			
POUR, F	10.0				
VOL YLD					
NEUT	.48				
SALT pkb					
cSt@ 60F		147.13			
cSt@ 77F		83.19			
cSt@104F		39.21			
cSt@100F	43.39		MERCAP S	10.00	
cSt@122F	25.82		K Factor	11.90	

	X5	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	292.	316.
TBP TEMP AT END-OF-CUT, F	292.	316.	240.	316.	321.
YIELD AT START-OF-CUT, LV%	.33	7.16	1.96	7.16	8.42
YIELD AT END-OF-CUT, LV%	7.16	8.42	4.68	8.42	8.70
YIELD OF CUT (LV% OF CRUDE)	6.84	1.25	2.72	1.25	.28
YIELD AT START-OF-CUT, WT%	.21@	5.59@	1.36@	5.59@	6.66@
YIELD AT END-OF-CUT, WT%	5.59@	6.66@	3.53@	6.66@	6.90@
YIELD OF CUT (WT% OF CRUDE)	5.38@	1.07@	2.17@	1.07@	.24@
API GRAVITY 60F	68.5	53.3	66.0	53.3	51.4
SPECIFIC GRAVITY 60/60	.7073	.7655	.7165	.7655	.7738
CHARACT. FACTOR (K-FACTOR)	12.45c	11.94c	12.25c	11.94c	11.89c
MOLECULAR WEIGHT	116.c	137.c	114.s	137.c	140.c
SULFUR, WT%	0.000z	.003	0.000z	.003	.005
MERCAPTAN SULFUR, ppm	10.*	6.	11.	6.	6.
NITROGEN, ppm		.0		.0	.0
BASIC NITROGEN, ppm	.0*		.0		
VL TBP BOILING CURVE,DEG F - ST	55.	292.	180.	292.	316.
VL TBP BOILING CURVE,DEG F - 5%	140.	293.	184.	293.	316.
VL TBP BOILING CURVE,DEG F - 10%	165.	295.	189.	295.	317.
VL TBP BOILING CURVE,DEG F - 30%	193.	300.	205.	300.	318.
VL TBP BOILING CURVE,DEG F - 50%	224.	304.	217.	304.	319.
VL TBP BOILING CURVE,DEG F - 70%	248.	309.	226.	309.	320.
VL TBP BOILING CURVE,DEG F - 90%	278.	314.	235.	314.	321.
VL TBP BOILING CURVE,DEG F - 95%	285.	315.	237.	315.	321.
VL TBP BOILING CURVE,DEG F - EP	292.	316.	240.	316.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	106.c	298.c	204.c	298.c	315.c
ASTM BOILING CURVE, DEG F - 5%	155.	298.	205.	298.	315.
ASTM BOILING CURVE, DEG F - 10%	194.c	299.c	205.c	299.c	315.c
ASTM BOILING CURVE, DEG F - 30%	205.c	300.c	211.c	300.c	315.c
ASTM BOILING CURVE, DEG F - 50%	223.c	301.c	216.c	301.c	315.c
ASTM BOILING CURVE, DEG F - 70%	239.c	304.c	221.c	304.c	315.c
ASTM BOILING CURVE, DEG F - 90%	259.c	305.c	225.c	305.c	316.c
ASTM BOILING CURVE, DEG F - 95%	268.	308.	230.	308.	317.
ASTM BOILING CURVE, DEG F - EP	277.c	311.c	235.c	311.c	318.c
PERCENT EVAP @ 70C (E70), LV%	5.3	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	42.0	0.0	34.3	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	98.8	0.0	100.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0

PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	62.1*	47.4	65.0	47.4	45.5
MOT. OCTANE F-2 CLEAR	64.8*	64.5	64.5*	64.5	64.5
TOTAL PARAFFINS, LV%	72.9a	59.0a	73.7a	59.0a	56.5a
OLEFINS, LV%	.2*	.5	.1	.5	.6
NAPHTHENES, LV%	23.7a	37.2a	22.8a	37.2a	39.3a
AROMATICS, LV%	3.2a	3.2a	3.3a	3.2a	3.7a
REID VAPOR PRESSURE, psi	5.03*	.22	3.69	.22	.15
FLASH PT(API Pen-Mar clsd cup),F	10.c	93.c	20.c	93.c	105.c
Flash Point Measured	38.*	93.	31.	93.	105.
FLASH PT(CHV Pen-Mar clsd cup),F		93.c		93.c	105.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.10c	5.41c	5.15c	5.41c	5.45c
FREEZE POINT, F		-87.n		-87.n	-84.n
CLOUD POINT, F		-93.c		-93.c	-90.c
POUR POINT, F		-100.n		-100.n	-95.n
SMOKE POINT (ASTM), mm	29.*	26.	29.	26.	25.
ANILINE POINT, F		142.*		142.*	143.
CETANE INDEX		33.8c		33.8c	37.8*
DIESEL INDEX		76.0@		76.0@	73.4c
VISCOSITY, cSt @ 100 F (38 C)		.8*		.8*	.9
VISCOSITY, cSt @ 104 F (40 C)		.8c		.8c	.9c
VISCOSITY, cSt @ 122 F (50 C)		.7*		.7*	.8
VISCOSITY, cSt @ 140 F (60 C)		.7c		.7c	.8c
VISCOSITY, cSt @ 212 F (100 C)		.5c		.5c	.5c
VISCOSITY, cSt @ 275 F (135 C)		.4@		.4@	.4c

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	8.70	11.46	16.67	22.38	22.98
YIELD AT END-OF-CUT, LV%	11.46	16.67	22.38	22.98	33.09
YIELD OF CUT (LV% OF CRUDE)	2.77	5.20	5.72	.60	10.10
YIELD AT START-OF-CUT, WT%	6.90@	9.33@	14.12@	19.55@	20.12@
YIELD AT END-OF-CUT, WT%	9.33@	14.12@	19.55@	20.12@	29.85@
YIELD OF CUT (WT% OF CRUDE)	2.44@	4.79@	5.42@	.57@	9.73@
API GRAVITY 60F	47.2	39.5	34.3	33.2	31.9
SPECIFIC GRAVITY 60/60	.7920	.8276	.8534	.8589	.8660
CHARACT. FACTOR (K-FACTOR)	11.75c	11.60c	11.58c	11.72c	11.83c
MOLECULAR WEIGHT	148.c	173.c	204.c	231.c	260.c
SULFUR, WT%	.010	.037	.089	.126	.164
MERCAPTAN SULFUR, ppm	7.	12.	15.	16.	16.
NITROGEN, ppm		.2	2.4	5.1	17.4
BASIC NITROGEN, ppm	.1	.9	3.4	5.8	13.1
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	323.	381.	467.	557.	573.
VL TBP BOILING CURVE,DEG F - 10%	326.	386.	471.	558.	579.
VL TBP BOILING CURVE,DEG F - 30%	336.	407.	488.	560.	601.
VL TBP BOILING CURVE,DEG F - 50%	346.	425.	506.	562.	616.
VL TBP BOILING CURVE,DEG F - 70%	357.	441.	527.	563.	629.
VL TBP BOILING CURVE,DEG F - 90%	369.	456.	548.	565.	639.
VL TBP BOILING CURVE,DEG F - 95%	372.	459.	552.	566.	642.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	334.c	399.c	479.c	547.c	581.c
ASTM BOILING CURVE, DEG F - 5%	334.	399.	479.	547.	583.
ASTM BOILING CURVE, DEG F - 10%	334.c	401.c	480.c	547.c	584.c
ASTM BOILING CURVE, DEG F - 30%	337.c	408.c	485.c	547.c	592.c
ASTM BOILING CURVE, DEG F - 50%	342.c	417.c	495.c	547.c	600.c
ASTM BOILING CURVE, DEG F - 70%	348.c	427.c	508.c	548.c	606.c
ASTM BOILING CURVE, DEG F - 90%	354.c	435.c	521.c	549.c	612.c
ASTM BOILING CURVE, DEG F - 95%	358.	440.	527.	550.	616.
ASTM BOILING CURVE, DEG F - EP	364.c	447.c	534.c	552.c	622.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	92.7	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	41.3				
MOT. OCTANE F-2 CLEAR	63.7	59.8*			
TOTAL PARAFFINS, LV%	54.5a	50.5a	47.8a	47.6a	47.8a
OLEFINS, LV%	.6	.9	1.3*	1.5*	
NAPHTHENES, LV%	39.0a	40.2a	39.7a	37.2a	36.1a
AROMATICS, LV%	5.9a	8.4a	11.2a	13.7a	16.2a
REID VAPOR PRESSURE, psi	.06	.01c	.00c		
FLASH PT(API Pen-Mar clsd cup),F	119.c	164.c	211.c	244.c	260.c
Flash Point Measured	129.	178.	219.	241.	270.
FLASH PT(CHV Pen-Mar clsd cup),F	119.c	168.c	228.c	279.c	306.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.55c	5.73c	5.85c	5.89c	5.93c
FREEZE POINT, F	-78.n	-55.n	-19.n	-8.n	3.n
CLOUD POINT, F	-79.c	-54.c	-24.c	-13.c	1.c
POUR POINT, F	-80.n	-53.n	-29.n	-17.n	-.n
SMOKE POINT (ASTM), mm	24.	21.	17.	15.	13.
ANILINE POINT, F	144.	148.	155.	160.	169.
CETANE INDEX	38.8*	41.2*	45.6	48.2	48.4
DIESEL INDEX	68.0c	58.3c	53.0c	53.3c	54.0c
VISCOSITY, cSt @ 100 F (38 C)	1.2	1.7	3.0	3.9	5.9
VISCOSITY, cSt @ 104 F (40 C)	1.1c	1.7c	2.8c	3.7c	5.5c
VISCOSITY, cSt @ 122 F (50 C)	1.0	1.5	2.3	2.8	4.2
VISCOSITY, cSt @ 140 F (60 C)	.9c	1.4c	1.9c	2.2c	3.3c
VISCOSITY, cSt @ 212 F (100 C)	.6c	1.0c	1.1c	1.1c	1.6c
VISCOSITY, cSt @ 275 F (135 C)	.5c	.8c	.7c	.7c	1.0c
CONRADSON CARBON, WT%				0.00	0.00

VANADIUM, ppm	0.00z	.00*
NICKEL, ppm	0.00z	.00*

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1300.s	1300.s
YIELD AT START-OF-CUT, LV%	33.09	39.98	33.09	74.66	33.09
YIELD AT END-OF-CUT, LV%	39.98	74.66	74.66	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	6.90	34.67	41.57	25.34	66.91
YIELD AT START-OF-CUT, WT%	29.85@	36.61@	29.85@	71.61@	29.85@
YIELD AT END-OF-CUT, WT%	36.61@	71.61@	71.61@	100.00@	100.00@
YIELD OF CUT (WT% OF CRUDE)	6.76@	35.00@	41.76@	28.39@	70.15@
API GRAVITY 60F	29.1	24.4	25.1	9.0	18.6
SPECIFIC GRAVITY 60/60	.8810	.9078	.9034	1.0074	.9428
CHARACT. FACTOR (K-FACTOR)	11.81c	12.04c	12.03c	12.07c	11.97c
MOLECULAR WEIGHT	288.c	422.c	402.c		479.c
SULFUR, WT%	.280	.402	.383	.798	.551b
MERCAPTAN SULFUR, ppm	11.				
NITROGEN, ppm	67.5	573.7	491.8	3638.5	1765.4b
BASIC NITROGEN, ppm	34.0	168.2	146.5	886.9	540.0b
HYDROGEN, WT%				10.5c	12.7c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	647.	713.	658.	1027.	667.
VL TBP BOILING CURVE,DEG F - 10%	649.	730.	673.	1042.	695.
VL TBP BOILING CURVE,DEG F - 30%	658.	796.	751.	1102.s	818.
VL TBP BOILING CURVE,DEG F - 50%	668.	846.	823.	1160.s	918.
VL TBP BOILING CURVE,DEG F - 70%	679.	897.	880.	1217.s	1075.
VL TBP BOILING CURVE,DEG F - 90%	691.	969.	961.	1272.s	1227.s
VL TBP BOILING CURVE,DEG F - 95%	694.	990.	986.	1286.s	1263.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1300.s	1300.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	651.c	729.c	676.c	1043.s	683.c
ASTM BOILING CURVE, DEG F - 5%	652.	737.	682.	1050.	693.
ASTM BOILING CURVE, DEG F - 10%	653.c	747.c	690.c	1058.c	709.c
ASTM BOILING CURVE, DEG F - 30%	660.c	804.c	760.c	1110.s	826.c
ASTM BOILING CURVE, DEG F - 50%	668.c	846.c	823.c	1160.s	918.c
ASTM BOILING CURVE, DEG F - 70%	679.c	897.c	880.c	1217.s	1075.c
ASTM BOILING CURVE, DEG F - 90%	691.c	969.c	961.c	1272.s	1227.s
ASTM BOILING CURVE, DEG F - 95%	694.	990.	986.	1286.s	1263.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1300.s	1300.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	31.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	91.9	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	11.8	0.0	3.3
TOTAL PARAFFINS, LV%	32.4a	22.3a	24.0a		
NAPHTHENES, LV%	49.1a	49.3a	49.3a		
AROMATICS, LV%	18.6a	28.3a	26.7a		
FLASH PT(API Pen-Mar clsd cup),F	282.c	311.c	299.c	341.c	304.c
Flash Point Measured	312.	263.b	271.b	674.	394.b
FLASH PT(CHV Pen-Mar clsd cup),F	350.c				
HEATING VAL, GROSS 10**6 Btu/bbl	6.00c	6.13c	6.11c	6.54c	6.28c
HEATING VAL, NET, 10**6 Btu/bbl				6.21c	5.90c
FREEZE POINT, F	37.c				
CLOUD POINT, F	31.c				
POUR POINT, F	27.n	88.n	82.n	120.	69.
ANILINE POINT, F	177.	203.	199.		
CETANE INDEX	46.7				
DIESEL INDEX	51.5c	49.5c	50.0c		
VISCOSITY, cSt @ 100 F (38 C)	11.1				
VISCOSITY, cSt @ 104 F (40 C)	10.3c	76.8c	52.0c	2.11E+8c	706.2c
VISCOSITY, cSt @ 122 F (50 C)	7.5	46.4	32.6	3.15E+7	368.0b
VISCOSITY, cSt @ 140 F (60 C)	5.7c	30.0c	21.8c	5.96E+6c	207.9c
VISCOSITY, cSt @ 210 F (99 C)	2.5*	8.6	6.9*	49342.8	39.7b
VISCOSITY, cSt @ 212 F (100 C)	2.5c	8.4c	6.7c	44351.0c	38.3c
VISCOSITY, cSt @ 275 F (135 C)	1.5c	4.1c	3.4c	2809.6c	14.5c
RAMSBOTTOM CARBON, WT%		.27c	.24c	14.39	4.91
CONRADSON CARBON, WT%	0.00	.29	.24	15.46	6.26
VANADIUM, ppm	.01	.06	.05	50.37	19.77

NICKEL, ppm	.01	.18	.15	37.78	15.82
ASPHALTENES, WT%				12.7	3.2
SOFTENING POINT				110.9	.9*
PENETRATION, dmm				112.4c	>300.0

*** Meaning of the codes which follow table values:

- * - Obtained by curve extrapolation
- c - Calculated from other properties
- @ - Calculated from curve extrapolation of other properties
- g - Calculated from GC analysis data
- = - Calculated from combination of GC and dist. curve data
- + - As above, but had to extrapolate dist. curve
- d - Distillate property curve used for resid property
- r - Resid property curve used for distillate property
- b - Both distillate and resid property curves used
- s - Suspect value - may be inaccurate
- n - Cloud Point, Pour Point, or Freeze Point interpolated from property curve
- o - Calculated with distillate separation inefficiency modeling
- p - Cloud, Pour, Freeze interpolated from property curve with distillate separation inefficiency modeling
- q - Cloud Point suspect negative area under cloud point index curve for cut
- i - Property value adjusted after integration
- z - Property value reset to zero after being estimated negative
- w - This property is not whole crude balanced and is interpolated from the resid curve
- m - Value suspect 1 or more of the crudes did not include this property
- a - PNA Adjustment Applied

CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: Mesa30 - Mesa 30
Country: Venezuela
Library: CORPORATE

Run Date: 04/04/02 (16:18:19)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: PDVSA assay received from PetroPeru on 12/12/01

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	30.0	29.9*	C2	0.00	0.00
SG 60/60	.8762	.8766*	C3	0.09	0.05
Dens @15			IC4	0.16	0.10
S, WT%	1.08	.97*	NC4	0.61	0.41
N2, ppm	2222.0	2106.*	IC5	0.86	0.61
H2, WT%			NC5	0.99	0.71
RVP	5.42	1.01	CP	0.00	0.00
Va, ppm	53.00	44.45		----	----
Ni, ppm	9.00	10.46		2.71	1.89
CCR, wt%		5.35			
POUR, F	-35.0				
VOL YLD					
NEUT	.03				
SALT pkb					
cSt@ 60F		14.84			
cSt@ 77F		11.34			
cSt@104F		7.84			
cSt@100F	8.25		K Factor	11.90	
cSt@122F	6.33		WAX	5.26	
MERCAP S	6.30		ASH	.02	

	XS	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	292.	316.
TBP TEMP AT END-OF-CUT, F	292.	316.	240.	316.	321.
YIELD AT START-OF-CUT, LV%	.74	16.27	3.75	16.27	18.45
YIELD AT END-OF-CUT, LV%	16.27	18.45	11.29	18.45	18.91
YIELD OF CUT (LV% OF CRUDE)	15.53	2.18	7.54	2.18	.46
YIELD AT START-OF-CUT, WT%	.52@	13.44@	2.86@	13.44@	15.37@
YIELD AT END-OF-CUT, WT%	13.44@	15.37@	9.11@	15.37@	15.78@
YIELD OF CUT (WT% OF CRUDE)	12.92@	1.93@	6.26@	1.93@	.41@
API GRAVITY 60F	62.5	50.5	63.1	50.5	49.2
SPECIFIC GRAVITY 60/60	.7293	.7775	.7272	.7775	.7830
CHARACT. FACTOR (K-FACTOR)	12.04c	11.76c	12.03c	11.76c	11.75c
MOLECULAR WEIGHT	113.s	135.c	112.s	135.c	140.c
SULFUR, WT%	.002*	.011	<.001	.011	.015
MERCAPTAN SULFUR, ppm	1.*	1.	1.	1.	2.
VL TBP BOILING CURVE,DEG F - ST	55.	292.	180.	292.	316.
VL TBP BOILING CURVE,DEG F - 5%	132.	293.	185.	293.	316.
VL TBP BOILING CURVE,DEG F - 10%	156.	294.	189.	294.	317.
VL TBP BOILING CURVE,DEG F - 30%	196.	299.	201.	299.	318.
VL TBP BOILING CURVE,DEG F - 50%	217.	304.	210.	304.	319.
VL TBP BOILING CURVE,DEG F - 70%	243.	309.	221.	309.	320.
VL TBP BOILING CURVE,DEG F - 90%	275.	314.	233.	314.	321.
VL TBP BOILING CURVE,DEG F - 95%	283.	315.	237.	315.	321.
VL TBP BOILING CURVE,DEG F - EP	292.	316.	240.	316.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	110.c	298.c	201.c	298.c	315.c
ASTM BOILING CURVE, DEG F - 5%	153.	298.	202.	298.	315.
ASTM BOILING CURVE, DEG F - 10%	187.c	298.c	202.c	298.c	315.c
ASTM BOILING CURVE, DEG F - 30%	206.c	299.c	206.c	299.c	315.c
ASTM BOILING CURVE, DEG F - 50%	216.c	301.c	210.c	301.c	315.c
ASTM BOILING CURVE, DEG F - 70%	234.c	303.c	216.c	303.c	315.c
ASTM BOILING CURVE, DEG F - 90%	256.c	305.c	222.c	305.c	316.c
ASTM BOILING CURVE, DEG F - 95%	266.	308.	227.	308.	317.
ASTM BOILING CURVE, DEG F - EP	276.c	311.c	234.c	311.c	318.c
PERCENT EVAP @ 70C (E70), LV%	5.6	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	45.4	0.0	56.5	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	99.4	0.0	100.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0

RES. OCTANE F-1 CLEAR	63.2*	52.5	64.1	52.5	50.8
MOT. OCTANE F-2 CLEAR	61.8*	53.7	62.6	53.7	53.1
TOTAL PARAFFINS, LV%	59.2a	48.9a	58.8a	48.9a	48.5a
ISO-PARAFFINS, LV%	33.6*	29.6	33.4	29.6	29.1
NORMAL-PARAFFINS, LV%	25.7*	19.3	25.3	19.3	19.4
NAPHTHENES, LV%	27.2a	27.9a	27.3a	27.9a	26.1a
AROMATICS, LV%	13.5a	23.2a	13.9a	23.2a	25.4a
REID VAPOR PRESSURE, psi	4.61*	1.49	4.18	1.49	1.33
FLASH PT(API Pen-Mar clsd cup),F	4.c	93.c	17.c	93.c	105.c
Flash Point Measured	103.*	128.	100.	128.	132.
FLASH PT(CHV Pen-Mar clsd cup),F		92.c		92.c	105.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.21@	5.47c	5.20c	5.47c	5.50c
FREEZE POINT, F		-64.n		-64.n	-62.n
CLOUD POINT, F		-70.c		-70.c	-68.c
POUR POINT, F		-74.c		-74.c	-72.c
SMOKE POINT (ASTM), mm		23.	25.*	23.	23.
CETANE INDEX		27.6c		27.6c	30.0c
VISCOSITY, cSt @ 122 F (50 C)		1.7*		1.7*	1.8*

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	18.91	23.90	32.35	42.18	43.14
YIELD AT END-OF-CUT, LV%	23.90	32.35	42.18	43.14	51.57
YIELD OF CUT (LV% OF CRUDE)	4.99	8.44	9.83	.96	8.43
YIELD AT START-OF-CUT, WT%	15.78@	20.31@	28.23@	37.75@	38.69@
YIELD AT END-OF-CUT, WT%	20.31@	28.23@	37.75@	38.69@	47.11@
YIELD OF CUT (WT% OF CRUDE)	4.53@	7.92@	9.52@	.95@	8.41@
API GRAVITY 60F	46.5	40.7	35.2	32.5	30.3
SPECIFIC GRAVITY 60/60	.7951	.8217	.8488	.8627	.8746
CHARACT. FACTOR (K-FACTOR)	11.71c	11.66c	11.66c	11.67c	11.68c
MOLECULAR WEIGHT	148.c	172.c	207.c	230.c	252.c
SULFUR, WT%	.022	.087	.517	.776	.922
MERCAPTAN SULFUR, ppm	2.	2.	5.	7.	8.
NITROGEN, ppm					320.9*
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	324.	380.	468.	557.	570.
VL TBP BOILING CURVE,DEG F - 10%	326.	384.	473.	558.	574.
VL TBP BOILING CURVE,DEG F - 30%	337.	402.	492.	560.	590.
VL TBP BOILING CURVE,DEG F - 50%	348.	420.	511.	561.	606.
VL TBP BOILING CURVE,DEG F - 70%	359.	437.	529.	563.	622.
VL TBP BOILING CURVE,DEG F - 90%	370.	454.	548.	565.	637.
VL TBP BOILING CURVE,DEG F - 95%	372.	459.	552.	566.	641.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	335.c	396.c	481.c	547.c	575.c
ASTM BOILING CURVE, DEG F - 5%	335.	396.	482.	547.	576.
ASTM BOILING CURVE, DEG F - 10%	336.c	397.c	483.c	547.c	576.c
ASTM BOILING CURVE, DEG F - 30%	339.c	403.c	489.c	547.c	581.c
ASTM BOILING CURVE, DEG F - 50%	344.c	412.c	499.c	547.c	589.c
ASTM BOILING CURVE, DEG F - 70%	349.c	423.c	511.c	548.c	599.c
ASTM BOILING CURVE, DEG F - 90%	355.c	433.c	521.c	549.c	608.c
ASTM BOILING CURVE, DEG F - 95%	359.	439.	528.	550.	613.
ASTM BOILING CURVE, DEG F - EP	365.c	446.c	535.c	552.c	620.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	91.7	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	47.9				
MOT. OCTANE F-2 CLEAR	51.7*				
TOTAL PARAFFINS, LV%	47.5a				
ISO-PARAFFINS, LV%	27.9				
NORMAL-PARAFFINS, LV%	19.6				
NAPHTHENES, LV%	22.7a				
AROMATICS, LV%	29.9a				
REID VAPOR PRESSURE, psi	1.03	.02c	.00c		
FLASH PT(API Pen-Mar clsd cup),F	120.c	162.c	212.c	244.c	257.c
Flash Point Measured	140.	163.	222.	257.	292.
FLASH PT(CHV Pen-Mar clsd cup),F	120.c	166.c	230.c	279.c	300.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.56c	5.70c	5.82c	5.88c	5.94c
FREEZE POINT, F	-55.n	-36.n	6.n	25.n	37.c
CLOUD POINT, F	-61.c	-42.c	-.c	14.c	31.c
POUR POINT, F	-65.c	-46.c	-4.c	3.*	27.n
SMOKE POINT (ASTM), mm	22.	20.	16.	13.	
ANILINE POINT, F		137.*	145.	152.	159.
CETANE INDEX	33.7c	41.1*	46.8	50.1	53.3
DIESEL INDEX		55.9@	51.2c	49.4c	48.2c
VISCOSITY, cSt @ 100 F (38 C)		1.3*	2.9	4.6	6.4
VISCOSITY, cSt @ 104 F (40 C)		1.4c	2.9c	4.4c	6.0c
VISCOSITY, cSt @ 122 F (50 C)	1.8*	2.1	2.7	3.4	4.8
VISCOSITY, cSt @ 140 F (60 C)		1.1*	2.0	2.7	3.7
VISCOSITY, cSt @ 180 F (82 C)		.9*	1.2	1.7	2.8
VISCOSITY, cSt @ 210 F (99 C)				.9*	1.7*
VISCOSITY, cSt @ 212 F (100 C)		.8c	.9c	.8c	1.6c
VISCOSITY, cSt @ 275 F (135 C)		.5c	.5c	.5c	1.0c

RAMSBOTTOM CARBON, WT%	.08c	.10c	.11c
CONRADSON CARBON, WT%	.06*	.08	.09
VANADIUM, ppm		0.00*	0.00*
NICKEL, ppm		0.00z	<.001*

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1204.s	1204.s
YIELD AT START-OF-CUT, LV%	51.57	57.34	51.57	84.47	51.57
YIELD AT END-OF-CUT, LV%	57.34	84.47	84.47	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	5.77	27.12	32.89	15.53	48.43
YIELD AT START-OF-CUT, WT%	47.11@	52.99@	47.11@	81.59@	47.11@
YIELD AT END-OF-CUT, WT%	52.99@	81.71@	81.71@	100.00@	100.00@
YIELD OF CUT (WT% OF CRUDE)	5.88@	28.72@	34.60@	18.41@	52.89@
API GRAVITY 60F	27.0	20.9b	22.0b	4.7*	16.3b
SPECIFIC GRAVITY 60/60	.8928	.9282b	.9220b	1.0390*	.9574b
CHARACT. FACTOR (K-FACTOR)	11.67c	11.76c	11.74c	11.51@	11.69c
MOLECULAR WEIGHT	287.c	410.c	381.c		456.c
SULFUR, WT%	1.124	1.373b	1.330b	2.027*	1.563b
NITROGEN, ppm	1100.3	2348.0b	2136.0b	7466.1*	3956.4
HYDROGEN, WT%				9.5@	12.2c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	648.	709.	660.	1021.	667.
VL TBP BOILING CURVE,DEG F - 10%	650.	722.	675.	1030.	689.
VL TBP BOILING CURVE,DEG F - 30%	661.	778.	736.	1069.	785.
VL TBP BOILING CURVE,DEG F - 50%	671.	843.	808.	1107.s	903.
VL TBP BOILING CURVE,DEG F - 70%	681.	910.	888.	1146.s	1023.
VL TBP BOILING CURVE,DEG F - 90%	692.	977.	970.	1185.s	1144.s
VL TBP BOILING CURVE,DEG F - 95%	694.	994.	991.	1194.s	1174.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1204.s	1204.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	652.c	726.c	676.c	1034.s	680.c
ASTM BOILING CURVE, DEG F - 5%	654.	732.	683.	1039.	690.
ASTM BOILING CURVE, DEG F - 10%	655.c	739.c	691.c	1044.c	703.c
ASTM BOILING CURVE, DEG F - 30%	663.c	787.c	744.c	1076.c	792.c
ASTM BOILING CURVE, DEG F - 50%	671.c	843.c	808.c	1107.s	903.c
ASTM BOILING CURVE, DEG F - 70%	681.c	910.c	888.c	1146.s	1023.c
ASTM BOILING CURVE, OEG F - 90%	692.c	977.c	970.c	1185.s	1144.s
ASTM BOILING CURVE, DEG F - 95%	694.	994.	991.	1194.s	1174.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1204.s	1204.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	12.8	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	90.1	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	13.1	0.0	4.5
FLASH PT(API Pen-Mar clsd cup),F	283.c	310.c	298.c	341.c	302.c
Flash Point Measured	364.	461.b	444.b	700.*	473.b
FLASH PT(CHV Pen-Mar clsd cup),F	351.c				
HEATING VAL, GROSS 10**6 Btu/bbl	6.02c	6.18c	6.15c	6.58@	6.29c
HEATING VAL, NET, 10**6 Btu/bbl				6.27@	5.92c
FREEZE POINT, F	65.c				
CLOUD POINT, F	59.c				
POUR POINT, F	55.n	91.b	85.b	123.	35.b
ANILINE POINT, F	169.	186.*	183.*		
CETANE INDEX	59.4				
DIESEL INDEX	45.6c	39.0@	40.2@		
VISCOSITY, cSt @ 104 F (40 C)	13.3c	263.5c	137.6c	8.93E+5c	355.2c
VISCOSITY, cSt @ 122 F (50 C)	9.6	88.0b	55.4b	2.81E+5*	203.1b
VISCOSITY, cSt @ 140 F (60 C)	7.3	37.1*	26.7*	1.01E+5c	124.2c
VISCOSITY, cSt @ 180 F (82 C)	4.5	19.8b	14.7b		50.4b
VISCOSITY, cSt @ 210 F (99 C)	3.3	11.3b	8.9b	4677.6*	29.3b
VISCOSITY, cSt @ 212 F (100 C)	3.3c	11.0c	8.7c	5530.2c	28.3c
VISCOSITY, cSt @ 275 F (135 C)	2.0c	4.7c	4.0c	5.63E+6*	11.9c
RAMSBOTTOM CARBON, WT%	.12c	.42c	.38c	25.41c	8.15c
CONRADSON CARBON, WT%	.10	.49	.42	25.41*	9.69b
VANADIUM, ppm	0.00	.07	.05	221.73*	84.04b
NICKEL, ppm	.00	.01	.01	49.82*	19.77b
ASPHALTENES, WT%				12.2*	4.4*
SOFTENING POINT				140.4*	94.1*
PENETRATION, dmm				34.7c	>300.0

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- i - Property value adjusted after integration
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- w - This property is not whole crude balanced and is interpolated from the resid curve
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CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: Orient23 - Oriente
Country: Equador
Library: CORPORATE

Run Date: 04/04/02 (16:18:27)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: Core Labs assay received from PetroPeru on 12/12/01

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	23.6	23.7*	C2	0.00	0.00
SG 60/60	.9123	.9119*	C3	0.24	0.13
Dens @15			IC4	0.16	0.10
S, WT%	1.58	1.52*	NC4	0.58	0.37
N2, ppm	2975.0	2997.*	IC5	0.59	0.40
H2, WT%			NC5	0.69	0.48
RVP	2.25	.99	CP	0.00	0.00
Va, ppm	224.00	228.39		----	----
Ni, ppm	92.00	93.02		2.26	1.49
CCR, wt%		16.22			
RAMSBOTT		9.55			
POUR, F	-45.0				
VOL YLD					
NEUT	.01				
SALT pkb					
cSt@ 60F		208.94			
cSt@ 77F		116.74			
cSt@104F		53.95			
cSt@100F	59.87		K Factor	11.80	
cSt@122F	35.06		ASH	.05	
MERCAP S	19.00				

	X5	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	292.	316.
TBP TEMP AT END-OF-CUT, F	292.	316.	240.	316.	321.
YIELD AT START-OF-CUT, LV%	.63	11.26	4.42	11.26	12.89
YIELD AT END-OF-CUT, LV%	11.26	12.89	7.89	12.89	13.24
YIELD OF CUT (LV% OF CRUDE)	10.63	1.63	3.47	1.63	.35
YIELD AT START-OF-CUT, WT%	.42@	8.79@	3.20@	8.79@	10.17@
YIELD AT END-OF-CUT, WT%	8.79@	10.17@	5.98@	10.17@	10.47@
YIELD OF CUT (WT% OF CRUDE)	8.37@	1.38@	2.78@	1.38@	.30@
API GRAVITY 60F	65.5*	51.4	62.3	51.4	50.3
SPECIFIC GRAVITY 60/60	.7182*	.7736	.7301	.7736	.7784
CHARACT. FACTOR (K-FACTOR)	12.17@	11.82c	11.99c	11.82c	11.82c
MOLECULAR WEIGHT	112.s	136.c	112.s	136.c	140.c
SULFUR, WT%	.001*	.010	.001	.010	.018
MERCAPTAN SULFUR, ppm	1.*	1.	1.*	1.	1.
NITROGEN, ppm	1.0*	.9	1.0	.9	1.0
BASIC NITROGEN, ppm	1.0*	1.1	1.0	1.1	1.1
VL TBP BOILING CURVE,DEG F - ST	55.	292.	180.	292.	316.
VL TBP BOILING CURVE,DEG F - 5%	92.	293.	183.	293.	316.
VL TBP BOILING CURVE,DEG F - 10%	105.	294.	187.	294.	317.
VL TBP BOILING CURVE,DEG F - 30%	167.	299.	199.	299.	318.
VL TBP BOILING CURVE,DEG F - 50%	208.	304.	211.	304.	319.
VL TBP BOILING CURVE,DEG F - 70%	243.	309.	223.	309.	320.
VL TBP BOILING CURVE,DEG F - 90%	276.	314.	234.	314.	321.
VL TBP BOILING CURVE,DEG F - 95%	284.	315.	237.	315.	321.
VL TBP BOILING CURVE,DEG F - EP	292.	316.	240.	316.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	124.c	298.c	201.c	298.c	315.c
ASTM BOILING CURVE, DEG F - 5%	136.	298.	201.	298.	315.
ASTM BOILING CURVE, DEG F - 10%	147.c	298.c	202.c	298.c	315.c
ASTM BOILING CURVE, DEG F - 30%	182.c	299.c	206.c	299.c	315.c
ASTM BOILING CURVE, DEG F - 50%	208.c	301.c	211.c	301.c	315.c
ASTM BOILING CURVE, DEG F - 70%	232.c	303.c	218.c	303.c	315.c
ASTM BOILING CURVE, DEG F - 90%	256.c	305.c	223.c	305.c	316.c
ASTM BOILING CURVE, DEG F - 95%	265.	308.	228.	308.	317.
ASTM BOILING CURVE, DEG F - EP	275.c	311.c	234.c	311.c	318.c
PERCENT EVAP @ 70C (E70), LV%	15.2	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	53.4	0.0	52.5	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	99.9	0.0	100.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0

PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	62.2*	50.6	60.6	50.6	48.4
MOT. OCTANE F-2 CLEAR	72.6*	68.4	71.5	68.4	68.4
TOTAL PARAFFINS, LV%	73.7a	60.6a	72.6a	60.6a	57.5a
OLEFINS, LV%	.4*	.5	.3	.5	.5
NAPHTHENES, LV%	22.6a	35.2a	23.7a	35.2a	38.1a
AROMATICS, LV%	3.4a	3.7a	3.4a	3.7a	3.9a
REID VAPOR PRESSURE, psi	7.01*	.41	4.32	.41	.29
FLASH PT(API Pen-Mar clsd cup),F		93.c	17.c	93.c	105.c
Flash Point Measured	16.*	74.	15.	74.	86.
FLASH PT(CHV Pen-Mar clsd cup),F		92.c		92.c	105.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.15@	5.45c	5.21c	5.45c	5.48c
FREEZE POINT, F		-100.n	-104.*	-100.n	-100.n
CLOUD POINT, F		-95.c	-110.c	-95.c	-95.c
POUR POINT, F		-90.n	-114.c	-90.n	-90.n
SMOKE POINT (ASTM), mm	27.*	25.	27.*	25.	24.
ANILINE POINT, F		132.*		132.*	131.
CETANE INDEX		29.3*		29.3*	30.6
DIESEL INDEX		67.7@		67.7@	65.9c
VISCOSITY, cSt @ 100 F (38 C)		.8*		.8*	.9
VISCOSITY, cSt @ 104 F (40 C)		.8c		.8c	.8c
VISCOSITY, cSt @ 122 F (50 C)		.7*		.7*	.8
VISCOSITY, cSt @ 140 F (60 C)		.6c		.6c	.7c
VISCOSITY, cSt @ 212 F (100 C)		.5c		.5c	.5c
VISCOSITY, cSt @ 275 F (135 C)		.4@		.4@	.4c

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	13.24	17.29	24.14	31.94	32.76
YIELD AT END-OF-CUT, LV%	17.29	24.14	31.94	32.76	40.23
YIELD OF CUT (LV% OF CRUDE)	4.05	6.85	7.80	.82	7.47
YIELD AT START-OF-CUT, WT%	10.47@	14.00@	20.18@	27.48@	28.25@
YIELD AT END-OF-CUT, WT%	14.00@	20.18@	27.48@	28.25@	35.38@
YIELD OF CUT (WT% OF CRUDE)	3.53@	6.19@	7.29@	.78@	7.13@
API GRAVITY 60F	46.5	40.3	34.5	32.2	31.1
SPECIFIC GRAVITY 60/60	.7948	.8236	.8525	.8644	.8704
CHARACT. FACTOR (K-FACTOR)	11.72c	11.62c	11.62c	11.65c	11.73c
MOLECULAR WEIGHT	149.c	171.c	207.c	230.c	253.c
SULFUR, WT%	.049	.184	.685	.920	1.017
MERCAPTAN SULFUR, ppm	1.	3.	4.	5.	6.
NITROGEN, ppm	1.1	1.0	18.5	27.8	148.2
BASIC NITROGEN, ppm	.6	1.7	24.4	60.8	110.9
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	324.	379.	468.	557.	570.
VL TBP BOILING CURVE,DEG F - 10%	327.	383.	473.	558.	574.
VL TBP BOILING CURVE,DEG F - 30%	338.	401.	493.	560.	590.
VL TBP BOILING CURVE,DEG F - 50%	349.	418.	512.	562.	606.
VL TBP BOILING CURVE,DEG F - 70%	360.	436.	531.	563.	622.
VL TBP BOILING CURVE,DEG F - 90%	370.	454.	548.	565.	637.
VL TBP BOILING CURVE,DEG F - 95%	372.	459.	553.	566.	641.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	336.c	395.c	482.c	547.c	575.c
ASTM BOILING CURVE, DEG F - 5%	336.	395.	482.	547.	576.
ASTM BOILING CURVE, DEG F - 10%	336.c	396.c	483.c	547.c	577.c
ASTM BOILING CURVE, DEG F - 30%	339.c	402.c	491.c	547.c	582.c
ASTM BOILING CURVE, DEG F - 50%	344.c	411.c	501.c	547.c	590.c
ASTM BOILING CURVE, DEG F - 70%	350.c	421.c	512.c	548.c	599.c
ASTM BOILING CURVE, DEG F - 90%	355.c	432.c	522.c	549.c	608.c
ASTM BOILING CURVE, DEG F - 95%	359.	438.	528.	550.	613.
ASTM BOILING CURVE, DEG F - EP	365.c	446.c	535.c	552.c	620.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	91.1	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	41.6				
MOT. OCTANE F-2 CLEAR	67.7				
TOTAL PARAFFINS, LV%	49.8a	48.0a	51.0a	51.6a	49.7a
OLEFINS, LV%	.6	.6	.1	.0	
NAPHTHENES, LV%	44.9a	39.0a	25.2a	23.0a	22.7a
AROMATICS, LV%	4.6a	12.4a	23.7a	25.4a	27.7a
REID VAPOR PRESSURE, psi	.13	.02c	.00c		
FLASH PT(API Pen-Mar clsd cup),F	121.c	161.c	213.c	244.c	257.c
Flash Point Measured	112.	172.	233.	260.	283.
FLASH PT(CHV Pen-Mar clsd cup),F	121.c	165.c	231.c	279.c	301.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.56c	5.70c	5.83c	5.89c	5.92c
FREEZE POINT, F	-100.n	-71.n	-14.n	1.n	20.n
CLOUD POINT, F	-95.c	-72.c	-23.c	-11.c	8.c
POUR POINT, F	-90.n	-72.n	-32.n	-23.n	-4.n
SMOKE POINT (ASTM), mm	22.	19.	14.	12.	11.
ANILINE POINT, F	130.	132.	141.	150.	158.
CETANE INDEX	33.3	39.9	46.7	47.7	48.2
DIESEL INDEX	60.3c	53.2c	48.6c	48.5c	49.2c
VISCOSITY, cSt @ 100 F (38 C)	1.0	1.6	2.9	4.2	6.2
VISCOSITY, cSt @ 104 F (40 C)	1.0c	1.5c	2.8c	4.0c	5.8c
VISCOSITY, cSt @ 122 F (50 C)	.9	1.3	2.3	3.2	4.6
VISCOSITY, cSt @ 140 F (60 C)	.8c	1.1c	2.0c	2.7c	3.7c
VISCOSITY, cSt @ 212 F (100 C)	.5c	.7c	1.2c	1.5c	1.9c
VISCOSITY, cSt @ 275 F (135 C)	.4c	.5c	.8c	1.0c	1.3c
RAMSBOTTOM CARBON, WT%				.02c	.02c
CONRADSON CARBON, WT%				.01	.01

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1370.s	1370.s
YIELD AT START-OF-CUT, LV%	40.23	44.94	40.23	70.45	40.23
YIELD AT END-OF-CUT, LV%	44.94	70.45	70.45	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	4.71	25.51	30.22	29.55	59.77
YIELD AT START-OF-CUT, WT%	35.38@	39.98@	35.38@	65.97@	35.38@
YIELD AT END-OF-CUT, WT%	39.98@	65.97@	65.97@	100.00@	100.00@
YIELD OF CUT (WT% OF CRUDE)	4.60@	25.99@	30.59@	34.03@	64.62@
API GRAVITY 60F	27.2	20.8	21.8	3.3	12.0b
SPECIFIC GRAVITY 60/60	.8914	.9290	.9231	1.0500	.9859b
CHARACT. FACTOR (K-FACTOR)	11.68c	11.82c	11.82c	11.78c	11.81c
MOLECULAR WEIGHT	287.c	429.c	409.c		
SULFUR, WT%	1.398	1.650	1.612	2.611	2.138b
MERCAPTAN SULFUR, ppm	9.				
NITROGEN, ppm	506.5	1698.8	1519.4	7405.7	4619.2
BASIC NITROGEN, ppm	216.7	661.5	594.6	2092.9	1351.5b
HYDROGEN, WT%				9.2c	11.2c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	647.	714.	661.	1030.	677.
VL TBP BOILING CURVE,DEG F - 10%	650.	732.	677.	1048.	714.
VL TBP BOILING CURVE,DEG F - 30%	660.	806.	759.	1122.s	868.
VL TBP BOILING CURVE,DEG F - 50%	670.	864.	839.	1194.s	1007.
VL TBP BOILING CURVE,DEG F - 70%	680.	917.	902.	1264.s	1155.s
VL TBP BOILING CURVE,DEG F - 90%	691.	979.	973.	1335.s	1299.s
VL TBP BOILING CURVE,DEG F - 95%	694.	995.	992.	1352.s	1334.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1370.s	1370.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	652.c	731.c	677.c	1046.s	684.s
ASTM BOILING CURVE, DEG F - 5%	653.	739.	684.	1055.	700.
ASTM BOILING CURVE, DEG F - 10%	654.c	749.c	694.c	1065.c	722.c
ASTM BOILING CURVE, DEG F - 30%	662.c	815.c	768.c	1130.s	873.c
ASTM BOILING CURVE, DEG F - 50%	670.c	864.c	839.c	1194.s	1007.c
ASTM BOILING CURVE, DEG F - 70%	680.c	917.c	902.c	1264.s	1155.s
ASTM BOILING CURVE, DEG F - 90%	691.c	979.c	973.c	1335.s	1299.s
ASTM BOILING CURVE, DEG F - 95%	694.	995.	992.	1352.s	1334.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1370.s	1370.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	20.5	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	91.1	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	9.3	0.0	3.5
TOTAL PARAFFINS, LV%	32.3a	19.7a	21.7a		
OLEFINS, LV%		<.001*			
NAPHTHENES, LV%	29.6a	29.1a	29.2a		
AROMATICS, LV%	38.2a	51.2a	49.1a		
FLASH PT(API Pen-Mar clsd cup),F	282.c	312.c	300.c	341.c	307.c
Flash Point Measured	320.	426.	410.	595.	474.
FLASH PT(CHV Pen-Mar clsd cup),F	351.c				
HEATING VAL, GROSS 10**6 Btu/bbl	6.00c	6.18c	6.15c	6.62c	6.40c
HEATING VAL, NET, 10**6 Btu/bbl				6.31c	6.05c
FREEZE POINT, F	38.*				
CLOUD POINT, F	43.c				
POUR POINT, F	48.n	102.n	104.n	148.	94.
SMOKE POINT (ASTM), mm	9.*				
ANILINE POINT, F	160.	178.	175.		
CETANE INDEX	50.3*				
DIESEL INDEX	43.4c	37.1c	38.2c		
VISCOSITY, cSt @ 100 F (38 C)	12.3				
VISCOSITY, cSt @ 104 F (40 C)	11.4c	4542.4c	1150.6c	4.2E+11c	25036.7c
VISCOSITY, cSt @ 122 F (50 C)	8.3	841.0b	307.6b	3.3E+10	9229.3b
VISCOSITY, cSt @ 140 F (60 C)	6.6c	226.0c	108.1c	3.52E+9c	3852.7c
VISCOSITY, cSt @ 210 F (99 C)	3.2*	11.2*	9.0*	5.27E+6	309.0b
VISCOSITY, cSt @ 212 F (100 C)	3.1c	10.6c	8.5c	4.55E+6c	292.1c
VISCOSITY, cSt @ 275 F (135 C)	2.0c	2.9c	2.7c	1.02E+5c	67.7c
RAMSBOTTOM CARBON, WT%	.02c	.55c	.48c	26.08	14.77
CONRADSON CARBON, WT%	.01	.67	.57	26.61	14.01

VANADIUM, ppm	.02	.35	.30	659.73	353.44
NICKEL, ppm	.03	.28	.24	266.59	143.96
ASPHALTENES, WT%				1.1	2.1
SOFTENING POINT				188.8	

*** Meaning of the codes which follow table values:

- * - Obtained by curve extrapolation
- c - Calculated from other properties
- @ - Calculated from curve extrapolation of other properties
- g - Calculated from GC analysis data
- = - Calculated from combination of GC and dist. curve data
- + - As above, but had to extrapolate dist. curve
- d - Distillate property curve used for resid property
- r - Resid property curve used for distillate property
- b - Both distillate and resid property curves used
- s - Suspect value - may be inaccurate
- n - Cloud Point, Pour Point, or Freeze Point interpolated from property curve
- o - Calculated with distillate separation inefficiency modeling
- p - Cloud, Pour, Freeze interpolated from property curve with distillate separation inefficiency modeling
- q - Cloud Point suspect negative area under cloud point index curve for cut
- i - Property value adjusted after integration
- z - Property value reset to zero after being estimated negative
- w - This property is not whole crude balanced and is interpolated from the resid curve
- m - Value suspect 1 or more of the crudes did not include this property
- a - PNA Adjustment Applied

CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: ONO - MIXTURE
Country:
Library: CORPORATE

Run Date: 04/04/02 (16:15:47)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: ** Mixture of crude(s)
41.6 LV% Petrotec
35.6 LV% PerezCom
22.8 LV% Composit

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	35.1	35.3	C2	0.00	0.00
SG 60/60	.8495	.8482	C3	0.08	0.05
Dens @15			IC4	0.16	0.10
S, WT%	.08	.08	NC4	0.40	0.28
N2, ppm	1062.2	1050.	IC5	0.71	0.52
H2, WT%			NC5	0.63	0.47
RVP	1.76	.86	CP	0.00	0.00
Va, ppm	1.01	.89		----	----
Ni, ppm	1.04	.84		1.97	1.41
CCR, wt%		3.85			
RAMSBOTT		.92			
POUR, F	-30.6				
VOL YLD					
NEUT	.37				
SALT pkb					
cSt@ 60F		8.21			
cSt@ 77F		6.27			
cSt@104F		4.35			
cSt@100F	4.57		K Factor	11.91	
cSt@122F	3.53		ASH	.01	
MERCAP S	5.64				

	X5	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	292.	316.
TBP TEMP AT END-OF-CUT, F	292.	316.	240.	316.	321.
YIELD AT START-OF-CUT, LV%	.93	18.62	6.12	18.62	21.79
YIELD AT END-OF-CUT, LV%	18.62	21.79	11.27	21.79	22.40
YIELD OF CUT (LV% OF CRUDE)	17.69	3.16	5.15	3.16	.62
YIELD OF CUT (WT% OF CRUDE)	15.22@	2.91@	4.47@	2.91@	.57@
API GRAVITY 60F	62.5	49.5	60.6	49.5	47.9
SPECIFIC GRAVITY 60/60	.7295	.7819	.7365	.7819	.7886
CHARACT. FACTOR (K-FACTOR)	12.07c	11.69c	11.87c	11.69c	11.66c
MOLECULAR WEIGHT	116.c	135.c	113.s	135.c	139.c
SULFUR, WT%	<.001*	.002	<.001	.002	.003
MERCAPTAN SULFUR, ppm	6.*	11.	5.*	11.	11.
VL TBP BOILING CURVE,DEG F - ST	55.	292.	195.	292.	316.
VL TBP BOILING CURVE,DEG F - 5%	92.	293.	191.	293.	316.
VL TBP BOILING CURVE,DEG F - 10%	121.	294.	187.	294.	316.
VL TBP BOILING CURVE,DEG F - 30%	184.	299.	197.	299.	317.
VL TBP BOILING CURVE,DEG F - 50%	222.	304.	209.	304.	318.
VL TBP BOILING CURVE,DEG F - 70%	253.	308.	225.	308.	319.
VL TBP BOILING CURVE,DEG F - 90%	279.	313.	237.	313.	320.
VL TBP BOILING CURVE,DEG F - 95%	286.	315.	239.	315.	321.
VL TBP BOILING CURVE,DEG F - EP	292.	316.	241.	316.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	125.c	298.c		298.c	315.c
ASTM BOILING CURVE, DEG F - 5%	145.	298.		298.	315.
ASTM BOILING CURVE, DEG F - 10%	163.c	298.c		298.c	315.c
ASTM BOILING CURVE, DEG F - 30%	198.c	299.c		299.c	315.c
ASTM BOILING CURVE, DEG F - 50%	222.c	301.c		301.c	315.c
ASTM BOILING CURVE, DEG F - 70%	243.c	303.c		303.c	315.c
ASTM BOILING CURVE, DEG F - 90%	260.c	305.c		305.c	315.c
ASTM BOILING CURVE, DEG F - 95%	268.	308.		308.	317.
ASTM BOILING CURVE, DEG F - EP	277.c	311.c		311.c	318.c
PERCENT EVAP @ 70C (E70), LV%	8.6	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	41.7	0.0	35.8	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	98.8	0.0	100.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0

PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	71.0*	62.9	71.5*	62.9	61.6
MOT. OCTANE F-2 CLEAR	70.1*	67.3	69.3*	67.3	67.8
TOTAL PARAFFINS, LV%	47.4a	33.0a	46.1a	33.0a	33.6a
OLEFINS, LV%	.5*	.7	.4*	.7	.7
NAPHTHENES, LV%	49.4a	59.6a	51.2a	59.6a	58.3a
AROMATICS, LV%	2.8a	6.7a	2.4a	6.7a	7.3a
REID VAPOR PRESSURE, psi	5.18*	.21	3.82	.21	.15
FLASH PT(API Pen-Mar clsd cup),F	-16.c	93.c	20.c	93.c	105.c
Flash Point Measured		82.	14.	82.	94.
FLASH PT(CHV Pen-Mar clsd cup),F		92.c		92.c	105.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.21@	5.49c	5.24c	5.49c	5.52c
FREEZE POINT, F		-128.n		-128.n	-125.n
CLOUD POINT, F		-134.c		-134.c	-131.c
POUR POINT, F		-138.c		-138.c	-135.c
SMOKE POINT (ASTM), mm		24.		24.	23.
ANILINE POINT, F		128.*		128.*	129.
CETANE INDEX		25.2*		25.2*	27.1
DIESEL INDEX		63.3@		63.3@	61.9c
VISCOSITY, cSt @ 100 F (38 C)		.8*		.8*	.9
VISCOSITY, cSt @ 104 F (40 C)		.8c		.8c	.9c
VISCOSITY, cSt @ 122 F (50 C)		.7*		.7*	.8*
VISCOSITY, cSt @ 140 F (60 C)		.7c		.7c	.7c
VISCOSITY, cSt @ 212 F (100 C)		.5c		.5c	.5c
VISCOSITY, cSt @ 275 F (135 C)		.4@		.4@	.4@

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	22.40	28.60	38.96	50.46	51.58
YIELD AT END-OF-CUT, LV%	28.60	38.96	50.46	51.58	61.61
YIELD OF CUT (LV% OF CRUDE)	6.20	10.37	11.50	1.12	10.03
YIELD OF CUT (WT% OF CRUDE)	5.85@	10.09@	11.49@	1.13@	10.19@
API GRAVITY 60F	45.1	40.0	35.5	33.4	32.7
SPECIFIC GRAVITY 60/60	.8012	.8253	.8473	.8579	.8615
CHARACT. FACTOR (K-FACTOR)	11.62c	11.61c	11.68c	11.74c	11.85c
MOLECULAR WEIGHT	147.c	171.c	207.c	231.c	255.c
SULFUR, WT%	.002	.003	.011	.020	.032
MERCAPTAN SULFUR, ppm	10.	3.			
NITROGEN, ppm			2.3*	14.4	26.9
BASIC NITROGEN, ppm			2.9*	10.0	13.9
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	324.	380.	468.	557.	570.
VL TBP BOILING CURVE,DEG F - 10%	326.	384.	472.	558.	574.
VL TBP BOILING CURVE,DEG F - 30%	337.	402.	491.	560.	590.
VL TBP BOILING CURVE,DEG F - 50%	347.	420.	510.	562.	605.
VL TBP BOILING CURVE,DEG F - 70%	358.	437.	529.	563.	621.
VL TBP BOILING CURVE,DEG F - 90%	369.	455.	548.	565.	637.
VL TBP BOILING CURVE,DEG F - 95%	372.	459.	552.	566.	641.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	334.c	396.c	481.c	547.c	575.c
ASTM BOILING CURVE, DEG F - 5%	335.	396.	481.	547.	575.
ASTM BOILING CURVE, DEG F - 10%	335.c	397.c	482.c	547.c	576.c
ASTM BOILING CURVE, DEG F - 30%	338.c	404.c	489.c	547.c	581.c
ASTM BOILING CURVE, DEG F - 50%	343.c	413.c	498.c	547.c	589.c
ASTM BOILING CURVE, DEG F - 70%	349.c	423.c	510.c	548.c	598.c
ASTM BOILING CURVE, DEG F - 90%	354.c	433.c	521.c	549.c	607.c
ASTM BOILING CURVE, DEG F - 95%	359.	439.	528.	550.	613.
ASTM BOILING CURVE, DEG F - EP	364.c	446.c	535.c	552.c	620.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	92.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	59.9				
MOT. OCTANE F-2 CLEAR	66.0				
TOTAL PARAFFINS, LV%	35.3a	44.4a	50.3a	52.6a	51.7a
OLEFINS, LV%	.9				
NAPHTHENES, LV%	55.7a	45.4a	35.4a	31.7a	31.9a
AROMATICS, LV%	8.1a	9.8a	14.2a	15.7a	16.4a
REID VAPOR PRESSURE, psi	.02*	.02c	.00c		
FLASH PT(API Pen-Mar clsd cup),F	120.c	162.c	212.c	244.c	257.c
Flash Point Measured	115.	165.	240.	279.	305.
FLASH PT(CHV Pen-Mar clsd cup),F	120.c	166.c	230.c	279.c	300.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.59c	5.72c	5.83c	5.89c	5.91c
FREEZE POINT, F	-112.n	-74.n	-19.n	-1.n	20.n
CLOUD POINT, F	-118.c	-77.c	18.c	-.c	19.c
POUR POINT, F	-122.c	-80.n	-16.n	.n	17.n
SMOKE POINT (ASTM), mm	22.	18.	15.	14.	
ANILINE POINT, F	131.	139.	156.	167.	174.
CETANE INDEX	30.9	40.2	46.5	49.4	50.2
DIESEL INDEX	59.2c	55.6c	55.3c	55.9c	57.0c
VISCOSITY, cSt @ 100 F (38 C)	1.1	1.7	3.0	4.5	6.6
VISCOSITY, cSt @ 104 F (40 C)	1.0c	1.6c	2.9c	4.3c	6.2c
VISCOSITY, cSt @ 122 F (50 C)	.9*	1.4	2.4	3.5	4.9
VISCOSITY, cSt @ 140 F (60 C)	.8c	1.2c	2.1c	2.9c	3.9c
VISCOSITY, cSt @ 212 F (100 C)	.6c	.8c	1.3c	1.6c	2.0c
VISCOSITY, cSt @ 275 F (135 C)	.4@	.6c	.9c	1.1c	1.3c
CONRADSON CARBON, WT%					.00*

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1202.s	1202.s
YIELD AT START-OF-CUT, LV%	61.61	67.38	61.61	91.78	61.61
YIELD AT END-OF-CUT, LV%	67.38	91.78	91.78	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	5.77	24.40	30.17	8.22	38.39
YIELD OF CUT (WT% OF CRUDE)	5.98@	26.31@	32.29@	9.63@	41.91@
API GRAVITY 60F	29.4	23.2	24.4	11.0	21.3b
SPECIFIC GRAVITY 60/60	.8792	.9145	.9077	.9927	.9259b
CHARACT. FACTOR (K-FACTOR)	11.84c	11.94c	11.96c	12.01c	11.91c
MOLECULAR WEIGHT	289.c	411.c	395.c		413.c
SULFUR, WT%	.060	.134	.121	.397	.180b
NITROGEN, ppm	108.4	1359.2	1127.5	7097.0	2498.4b
BASIC NITROGEN, ppm	52.0	427.8	358.2		
HYDROGEN, WT%				11.0c	13.3c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	647.	712.	658.	1024.	661.
VL TBP BOILING CURVE,DEG F - 10%	650.	729.	671.	1037.	678.
VL TBP BOILING CURVE,DEG F - 30%	659.	799.	744.	1079.	779.
VL TBP BOILING CURVE,DEG F - 50%	669.	844.	820.	1113.s	852.
VL TBP BOILING CURVE,DEG F - 70%	680.	885.	870.	1145.s	926.
VL TBP BOILING CURVE,DEG F - 90%	691.	947.	937.	1171.s	1114.s
VL TBP BOILING CURVE,DEG F - 95%	694.	974.	967.	1185.s	1151.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1202.s	1202.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	652.c	729.c	675.c	1037.s	677.c
ASTM BOILING CURVE, DEG F - 5%	653.	736.	680.	1043.	683.
ASTM BOILING CURVE, DEG F - 10%	654.c	745.c	688.c	1050.c	694.c
ASTM BOILING CURVE, DEG F - 30%	662.c	807.c	753.c	1086.c	787.c
ASTM BOILING CURVE, DEG F - 50%	669.c	844.c	820.c	1113.s	852.c
ASTM BOILING CURVE, DEG F - 70%	680.c	885.c	870.c	1145.s	926.c
ASTM BOILING CURVE, DEG F - 90%	691.c	947.c	937.c	1171.s	1114.s
ASTM BOILING CURVE, DEG F - 95%	694.	977.	971.	1185.s	1159.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1202.s	1202.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	28.4	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	92.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	15.0	0.0	9.6
TOTAL PARAFFINS, LV%	40.0a	24.2a	27.3a		
NAPHTHENES, LV%	39.5a	45.5a	44.3a		
AROMATICS, LV%	20.4a	30.3a	28.4a		
FLASH PT(API Pen-Mar clsd cup),F	282.c	311.c	298.c	341.c	300.c
Flash Point Measured	346.	467.	444.		
FLASH PT(CHV Pen-Mar clsd cup),F	350.c				
HEATING VAL, GROSS 10**6 Btu/bbl	6.00c	6.16c	6.13c	6.50c	6.21c
HEATING VAL, NET, 10**6 Btu/bbl				6.15c	5.82c
FREEZE POINT, F	50.c				
CLOUD POINT, F	47.c				
POUR POINT, F	45.n	92.n	89.n	112.	85.
ANILINE POINT, F	182.	203.	199.		
CETANE INDEX	49.2				
DIESEL INDEX	53.5c	47.1c	48.5c		
VISCOSITY, cSt @ 100 F (38 C)	13.2				
VISCOSITY, cSt @ 104 F (40 C)	12.4c	114.0c		2.51E+6c	67.3c
VISCOSITY, cSt @ 122 F (50 C)	9.5	65.7b	42.7b	5.20E+5	48.6
VISCOSITY, cSt @ 140 F (60 C)	7.5c	40.8c		1.33E+5c	36.2c
VISCOSITY, cSt @ 210 F (99 C)		10.6		2783.3	14.7b
VISCOSITY, cSt @ 212 F (100 C)	3.6c	10.3c		2557.5c	14.3c
VISCOSITY, cSt @ 275 F (135 C)	2.3c	4.7c		293.8c	8.0c
RAMSBOTTOM CARBON, WT%		.23c	.19c	12.84	2.58
CONRADSON CARBON, WT%	.01	.23	.19	13.40	3.08
VANADIUM, ppm	.03	.05	.04	12.82	2.49
NICKEL, ppm	.31	.47	.44	10.00	2.05
ASPHALTENES, WT%				.7	.3

SOFTENING POINT	109.7
PENETRATION, dmm	120.5c

*** Meaning of the codes which follow table values:

- * - Obtained by curve extrapolation
- c - Calculated from other properties
- @ - Calculated from curve extrapolation of other properties
- g - Calculated from GC analysis data
- ≈ - Calculated from combination of GC and dist. curve data
- + - As above, but had to extrapolate dist. curve
- d - Distillate property curve used for resid property
- r - Resid property curve used for distillate property
- b - Both distillate and resid property curves used
- s - Suspect value - may be inaccurate
- n - Cloud Point, Pour Point, or Freeze Point interpolated from property curve
- o - Calculated with distillate separation inefficiency modeling
- p - Cloud, Pour, Freeze interpolated from property curve with distillate separation inefficiency modeling
- q - Cloud Point suspect negative area under cloud point index curve for cut
- i - Property value adjusted after integration
- z - Property value reset to zero after being estimated negative
- w - This property is not whole crude balanced and is interpolated from the resid curve
- m - Value suspect 1 or more of the crudes did not include this property
- a - PNA Adjustment Applied

CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: Petrotec - Petrotech
Country: Peru
Library: CORPORATE

Run Date: 04/04/02 (16:18:37)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: Core Assay for Petrotech crude received from PetroPeru on 12/12/01

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	37.2	37.3*	C2	0.00	0.00
SG 60/60	.8388	.8384*	C3	0.19	0.12
Dens @15			IC4	0.30	0.20
S, WT%	.07	.07*	NC4	0.76	0.53
N2, ppm	1197.0	1166.*	IC5	1.22	0.91
H2, WT%			NC5	1.07	0.81
RVP	2.95	1.47	CP	0.00	0.00
Va, ppm	.06	.06		----	----
Ni, ppm	.71	.92		3.54	2.56
CCR, wt%		5.11			
RAMSBOTT		1.11			
POUR, F	-60.0				
VOL YLD					
NEUT	.42				
SALT pkb					
cSt@ 60F		5.84			
cSt@ 77F		4.61			
cSt@104F		3.33			
cSt@100F	3.48		K Factor	12.00	
cSt@122F	2.76		ASH	.01	
MERCAP S	8.00				

	X5	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	292.	316.
TBP TEMP AT END-OF-CUT, F	292.	316.	240.	316.	321.
YIELD AT START-OF-CUT, LV%	1.14	25.27	9.42	25.27	28.44
YIELD AT END-OF-CUT, LV%	25.27	28.44	16.74	28.44	29.03
YIELD OF CUT (LV% OF CRUDE)	24.13	3.16	7.32	3.16	.60
YIELD AT START-OF-CUT, WT%	.78@	21.79@	7.53@	21.79@	24.74@
YIELD AT END-OF-CUT, WT%	21.79@	24.74@	14.00@	24.74@	25.31@
YIELD OF CUT (WT% OF CRUDE)	21.01@	2.95@	6.47@	2.95@	.56@
API GRAVITY 60F	62.4	49.3	59.4	49.3	47.8
SPECIFIC GRAVITY 60/60	.7299	.7828	.7413	.7828	.7892
CHARACT. FACTOR (K-FACTOR)	12.01c	11.67c	11.82c	11.67c	11.65c
MOLECULAR WEIGHT	113.s	135.c	112.s	135.c	139.c
SULFUR, WT%	<.001*	.001	<.001	.001	.001
MERCAPTAN SULFUR, ppm	3.*	3.	3.	3.	3.
NITROGEN, ppm			.0		
BASIC NITROGEN, ppm	.1*	1.7		1.7	1.9
VL TBP BOILING CURVE,DEG F - ST	55.	292.	180.	292.	316.
VL TBP BOILING CURVE,DEG F - 5%	93.	293.	184.	293.	316.
VL TBP BOILING CURVE,DEG F - 10%	108.	294.	187.	294.	316.
VL TBP BOILING CURVE,DEG F - 30%	170.	299.	201.	299.	317.
VL TBP BOILING CURVE,DEG F - 50%	215.	303.	214.	303.	318.
VL TBP BOILING CURVE,DEG F - 70%	248.	308.	225.	308.	319.
VL TBP BOILING CURVE,DEG F - 90%	276.	313.	235.	313.	320.
VL TBP BOILING CURVE,DEG F - 95%	284.	315.	238.	315.	321.
VL TBP BOILING CURVE,DEG F - EP	292.	316.	240.	316.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	125.c	298.c	202.c	298.c	315.c
ASTM BOILING CURVE, DEG F - 5%	139.	298.	203.	298.	315.
ASTM BOILING CURVE, DEG F - 10%	151.c	298.c	203.c	298.c	315.c
ASTM BOILING CURVE, DEG F - 30%	185.c	299.c	208.c	299.c	315.c
ASTM BOILING CURVE, DEG F - 50%	215.c	300.c	214.c	300.c	315.c
ASTM BOILING CURVE, DEG F - 70%	238.c	303.c	220.c	303.c	315.c
ASTM BOILING CURVE, DEG F - 90%	257.c	305.c	225.c	305.c	315.c
ASTM BOILING CURVE, DEG F - 95%	266.	307.	229.	307.	317.
ASTM BOILING CURVE, DEG F - EP	276.c	311.c	234.c	311.c	318.c
PERCENT EVAP @ 70C (E70), LV%	13.2	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	48.2	0.0	45.2	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	99.6	0.0	100.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0

PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	71.2*	62.5	71.3	62.5	61.4
MOT. OCTANE F-2 CLEAR	70.0*	67.4	68.3	67.4	67.9
TOTAL PARAFFINS, LV%	46.9a	32.1a	43.7a	32.1a	33.0a
OLEFINS, LV%	.4*	.8	.3	.8	.9
NAPHTHENES, LV%	49.8a	59.4a	53.6a	59.4a	57.7a
AROMATICS, LV%	2.9a	7.7a	2.4a	7.7a	8.5a
REID VAPOR PRESSURE, psi	5.18*	.10	3.67	.10	.10
FLASH PT(API Pen-Mar clsd cup),F	-26.c	93.c	18.c	93.c	105.c
Flash Point Measured		94.	25.	94.	105.
FLASH PT(CHV Pen-Mar clsd cup),F		92.c		92.c	105.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.21@	5.49c	5.27c	5.49c	5.53c
FREEZE POINT, F		-122.n	-139.n	-122.n	-118.n
CLOUD POINT, F		-128.c	-145.c	-128.c	-124.c
POUR POINT, F		-132.c	-149.c	-132.c	-128.c
SMOKE POINT (ASTM), mm		25.		25.	24.
ANILINE POINT, F		126.*		126.*	128.*
CETANE INDEX		25.6*		25.6*	27.6
DIESEL INDEX		62.3@		62.3@	61.0@
VISCOSITY, cSt @ 100 F (38 C)		.8*		.8*	.9
VISCOSITY, cSt @ 104 F (40 C)		.8c		.8c	.9c
VISCOSITY, cSt @ 122 F (50 C)		.7*		.7*	.8
VISCOSITY, cSt @ 140 F (60 C)		.7c		.7c	.7c
VISCOSITY, cSt @ 212 F (100 C)		.5c		.5c	.5c
VISCOSITY, cSt @ 275 F (135 C)		.4@		.4@	.4c

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	29.03	35.01	44.73	55.35	56.33
YIELD AT END-OF-CUT, LV%	35.01	44.73	55.35	56.33	65.08
YIELD OF CUT (LV% OF CRUDE)	5.98	9.72	10.62	.98	8.74
YIELD AT START-OF-CUT, WT%	25.31@	31.02@	40.56@	51.26@	52.27@
YIELD AT END-OF-CUT, WT%	31.02@	40.56@	51.26@	52.27@	61.26@
YIELD OF CUT (WT% OF CRUDE)	5.71@	9.54@	10.71@	1.00@	9.00@
API GRAVITY 60F	45.2	40.5	35.9	33.5	32.6
SPECIFIC GRAVITY 60/60	.8006	.8228	.8455	.8574	.8624
CHARACT. FACTOR (K-FACTOR)	11.63c	11.64c	11.70c	11.74c	11.84c
MOLECULAR WEIGHT	147.c	171.c	207.c	231.c	255.c
SULFUR, WT%	.001	.003	.011	.020	.035
MERCAPTAN SULFUR, ppm	5.	5.*			
NITROGEN, ppm	.3	1.0	4.3	14.6	33.6
BASIC NITROGEN, ppm	2.0	2.1	4.5	12.9	17.6
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	324.	380.	468.	557.	570.
VL TBP BOILING CURVE,DEG F - 10%	326.	384.	472.	558.	574.
VL TBP BOILING CURVE,DEG F - 30%	337.	402.	491.	560.	590.
VL TBP BOILING CURVE,DEG F - 50%	347.	420.	510.	561.	606.
VL TBP BOILING CURVE,DEG F - 70%	358.	437.	528.	563.	622.
VL TBP BOILING CURVE,DEG F - 90%	369.	454.	547.	565.	637.
VL TBP BOILING CURVE,DEG F - 95%	372.	459.	552.	566.	641.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	334.c	396.c	480.c	547.c	575.c
ASTM BOILING CURVE, DEG F - 5%	335.	396.	481.	547.	576.
ASTM BOILING CURVE, DEG F - 10%	335.c	397.c	482.c	547.c	577.c
ASTM BOILING CURVE, DEG F - 30%	338.c	403.c	488.c	547.c	582.c
ASTM BOILING CURVE, DEG F - 50%	343.c	412.c	498.c	547.c	590.c
ASTM BOILING CURVE, DEG F - 70%	349.c	423.c	510.c	548.c	599.c
ASTM BOILING CURVE, DEG F - 90%	354.c	433.c	521.c	549.c	608.c
ASTM BOILING CURVE, DEG F - 95%	359.	439.	527.	550.	613.
ASTM BOILING CURVE, DEG F - EP	364.c	446.c	535.c	552.c	620.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	92.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE P-1 CLEAR	59.5				
MOT. OCTANE P-2 CLEAR	65.1				
TOTAL PARAFFINS, LV%	36.0a	46.0a	51.6a	54.2a	51.1a
OLEFINS, LV%	1.0	1.0	.2*		
NAPHTHENES, LV%	53.6a	43.2a	34.1a	29.5a	31.5a
AROMATICS, LV%	9.4a	9.8a	14.2a	16.3a	17.4a
REID VAPOR PRESSURE, psi	.01*	.02c	.00c		
FLASH PT(API Pen-Mar clsd cup),F	120.c	162.c	212.c	244.c	257.c
Flash Point Measured	119.	162.	237.	277.	309.
FLASH PT(CHV Pen-Mar clsd cup),F	120.c	166.c	230.c	279.c	301.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.59c	5.70c	5.82c	5.88c	5.91c
FREEZE POINT, F	-104.n	-73.n	-21.n	-.n	23.n
CLOUD POINT, F	-110.c	-77.c	-15.c	1.c	17.c
POUR POINT, F	-114.c	-81.n	-9.n	2.n	11.n
SMOKE POINT (ASTM), mm	22.	20.	17.	15.	15.
ANILINE POINT, F	130.*	138.	155.	166.	173.
CETANE INDEX	31.5	40.4	46.7	49.1	50.3
DIESEL INDEX	58.8@	55.9c	55.6c	55.8c	56.3c
VISCOSITY, cSt @ 100 F (38 C)	1.1	1.6	2.8	4.2	6.4
VISCOSITY, cSt @ 104 F (40 C)	1.0c	1.5c	2.7c	4.0c	6.0c
VISCOSITY, cSt @ 122 F (50 C)	.9	1.3	2.3	3.4	4.6
VISCOSITY, cSt @ 140 F (60 C)	.8c	1.2c	2.0c	2.9c	3.7c
VISCOSITY, cSt @ 212 F (100 C)	.6c	.7c	1.3c	1.8c	1.8c
VISCOSITY, cSt @ 275 F (135 C)	.4c	.5c	1.0c	1.3c	1.2c
CONRADSON CARBON, WT%				0.00	0.00

VANADIUM, ppm	.05*	.05*
NICKEL, ppm	.15	.15

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1202.s	1202.s
YIELD AT START-OF-CUT, LV%	65.08	70.28	65.08	91.85	65.08
YIELD AT END-OF-CUT, LV%	70.28	91.85	91.85	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	5.20	21.58	26.78	8.15	34.92
YIELD AT START-OF-CUT, WT%	61.26@	66.72@	61.26@	90.33@	61.26@
YIELD AT END-OF-CUT, WT%	66.72@	90.33@	90.33@	100.00@	100.00@
YIELD OF CUT (WT% OF CRUDE)	5.46@	23.61@	29.07@	9.67@	38.74@
API GRAVITY 60F	29.2	22.8	24.0	10.7	20.7b
SPECIFIC GRAVITY 60/60	.8807	.9172	.9102	.9950	.9299b
CHARACT. FACTOR (K-FACTOR)	11.81c	11.91c	11.95c	12.02c	11.89c
MOLECULAR WEIGHT	288.c	416.c	402.c		420.c
SULFUR, WT%	.066	.137b	.124b	.319	.169b
NITROGEN, ppm	143.8	1640.2	1359.0	7934.5	3000.0b
BASIC NITROGEN, ppm	68.8	527.1	441.0	2925.2	1039.7b
HYDROGEN, WT%				10.9c	13.2c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	647.	714.	656.	1021.	660.
VL TBP BOILING CURVE,DEG F - 10%	649.	734.	668.	1032.	676.
VL TBP BOILING CURVE,DEG F - 30%	658.	808.	747.	1072.	791.
VL TBP BOILING CURVE,DEG F - 50%	667.	845.	826.	1111.s	854.
VL TBP BOILING CURVE,DEG F - 70%	678.	879.	864.	1148.s	953.
VL TBP BOILING CURVE,DEG F - 90%	690.	957.	945.	1184.s	1124.s
VL TBP BOILING CURVE,DEG F - 95%	693.	984.	977.	1193.s	1164.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1202.s	1202.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	651.c	730.c	673.c	1035.s	675.c
ASTM BOILING CURVE, DEG F - 5%	652.	738.	677.	1040.	680.
ASTM BOILING CURVE, DEG F - 10%	654.c	749.c	685.c	1046.c	691.c
ASTM BOILING CURVE, DEG F - 30%	660.c	815.c	755.c	1079.c	799.c
ASTM BOILING CURVE, DEG F - 50%	667.c	845.c	826.c	1111.s	854.c
ASTM BOILING CURVE, DEG F - 70%	678.c	879.c	864.c	1148.s	953.c
ASTM BOILING CURVE, DEG F - 90%	690.c	957.c	945.c	1184.s	1124.s
ASTM BOILING CURVE, DEG F - 95%	693.	984.	977.	1193.s	1164.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1202.s	1202.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	32.3	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	92.5	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	15.0	0.0	10.1
TOTAL PARAFFINS, LV%	37.9a	26.1a	28.4a		
NAPHTHENES, LV%	40.1a	42.6a	42.2a		
AROMATICS, LV%	22.0a	31.2a	29.5a		
FLASH PT(API Pen-Mar clsd cup),F	282.c	312.c	297.c	341.c	299.c
Flash Point Measured	358.	477.b	454.b	644.	462.
FLASH PT(CHV Pen-Mar clsd cup),F	350.c				
HEATING VAL, GROSS 10**6 Btu/bbl	6.00c	6.18c	6.15c	6.51c	6.23c
HEATING VAL, NET, 10**6 Btu/bbl				6.16c	5.84c
FREEZE POINT, F	45.*				
CLOUD POINT, F	46.c				
POUR POINT, F	48.n	96.n	94.n	94.*	85.
SMOKE POINT (ASTM), mm	15.*				
ANILINE POINT, F	180.	199.*	195.*		
CETANE INDEX	52.2	40.3*	42.6*		
DIESEL INDEX	52.6c	45.3@	46.8@		
VISCOSITY, cSt @ 100 F (38 C)	13.2				
VISCOSITY, cSt @ 104 F (40 C)	12.2c	119.2c		4.22E+6c	315.2c
VISCOSITY, cSt @ 122 F (50 C)	8.7	67.9	42.6	8.48E+5	157.0b
VISCOSITY, cSt @ 140 F (60 C)	6.5c	41.8c		2.10E+5c	86.4c
VISCOSITY, cSt @ 210 F (99 C)		10.6*		3994.8	16.5*
VISCOSITY, cSt @ 212 F (100 C)	2.8c	10.3c		3661.8c	15.9c
VISCOSITY, cSt @ 275 F (135 C)	1.7c	4.7c		393.0c	6.3c
RAMSBOTTOM CARBON, WT%		.28c	.24c	14.47	2.85
CONRADSON CARBON, WT%	0.00	.30	.24	14.55	3.63
VANADIUM, ppm	.05	.05	.05	.44	.12

NICKEL, ppm	.15	.15	.15	7.89	1.97
ASPHALTENES, WT%				.7	.2
SOFTENING POINT				111.2	
PENETRATION, dmm				110.1c	

*** *Meaning of the codes which follow table values:*

- * - Obtained by curve extrapolation
- c - Calculated from other properties
- @ - Calculated from curve extrapolation of other properties
- g - Calculated from GC analysis data
- = - Calculated from combination of GC and dist. curve data
- + - As above, but had to extrapolate dist. curve
- d - Distillate property curve used for resid property
- r - Resid property curve used for distillate property
- b - Both distillate and resid property curves used
- s - Suspect value - may be inaccurate
- n - Cloud Point, Pour Point, or Freeze Point interpolated from property curve
- o - Calculated with distillate separation inefficiency modeling
- p - Cloud, Pour, Freeze interpolated from property curve with distillate separation inefficiency modeling
- q - Cloud Point suspect negative area under cloud point index curve for cut
- i - Property value adjusted after integration
- z - Property value reset to zero after being estimated negative
- w - This property is not whole crude balanced and is interpolated from the resid curve
- m - Value suspect 1 or more of the crudes did not include this property
- a - PNA Adjustment Applied

CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: PerezCom - Perez Companc
Country: Peru
Library: CORPORATE

Run Date: 04/04/02 (16:18:33)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: Core Laboratory assay for Perez Companc crude received from PetroPeru on

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	33.2	33.4*	C2	0.00	0.00
SG 60/60	.8591	.8579*	C3	0.00	0.00
Dens @15			IC4	0.06	0.04
S, WT%	.09	.10*	NC4	0.15	0.10
N2, ppm	1015.0	1012.*	IC5	0.35	0.25
H2, WT%			NC5	0.32	0.24
RVP	.92	.47	CP	0.00	0.00
Va, ppm	2.30	2.43		----	----
Ni, ppm	.88	1.18		0.88	0.63
CCR, wt%		3.95			
RAMSBOTT		1.10			
POUR, F	-30.0				
VOL YLD					
NEUT	.36				
SALT pkb					
cSt@ 60F		10.90			
cSt@ 77F		8.18			
cSt@104F		5.55			
cSt@100F	5.85		MERCAP S	4.00	
cSt@122F	4.44		K Factor	11.80	

	X5	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	292.	316.
TBP TEMP AT END-OF-CUT, F	292.	316.	240.	316.	321.
YIELD AT START-OF-CUT, LV%	.80	14.15	4.10	14.15	17.32
YIELD AT END-OF-CUT, LV%	14.15	17.32	7.01	17.32	17.97
YIELD OF CUT (LV% OF CRUDE)	13.34	3.17	2.91	3.17	.65
YIELD AT START-OF-CUT, WT%	.55@	11.87@	3.06@	11.87@	14.76@
YIELD AT END-OF-CUT, WT%	11.87@	14.76@	5.52@	14.76@	15.36@
YIELD OF CUT (WT% OF CRUDE)	11.32@	2.89@	2.46@	2.89@	.60@
API GRAVITY 60F	62.9	49.8	63.7	49.8	48.0
SPECIFIC GRAVITY 60/60	.7279	.7805	.7249	.7805	.7882
CHARACT. FACTOR (K-FACTOR)	12.22c	11.71c	12.11c	11.71c	11.67c
MOLECULAR WEIGHT	121.c	135.c	114.s	135.c	139.c
SULFUR, WT%	<.001*	.002	<.001	.002	.002
MERCAPTAN SULFUR, ppm	12.*	23.	9.	23.	23.
VL TBP BOILING CURVE,DEG F - ST	55.	292.	180.	292.	316.
VL TBP BOILING CURVE,DEG F - 5%	81.	293.	185.	293.	316.
VL TBP BOILING CURVE,DEG F - 10%	108.	294.	189.	294.	316.
VL TBP BOILING CURVE,DEG F - 30%	200.	299.	205.	299.	317.
VL TBP BOILING CURVE,DEG F - 50%	245.	304.	218.	304.	318.
VL TBP BOILING CURVE,DEG F - 70%	263.	309.	228.	309.	319.
VL TBP BOILING CURVE,DEG F - 90%	282.	314.	236.	314.	320.
VL TBP BOILING CURVE,DEG F - 95%	287.	315.	238.	315.	321.
VL TBP BOILING CURVE,DEG F - EP	292.	316.	240.	316.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	129.c	298.c	205.c	298.c	315.c
ASTM BOILING CURVE, DEG F - 5%	141.	298.	205.	298.	315.
ASTM BOILING CURVE, DEG F - 10%	155.c	298.c	206.c	298.c	315.c
ASTM BOILING CURVE, DEG F - 30%	215.c	299.c	211.c	299.c	315.c
ASTM BOILING CURVE, DEG F - 50%	244.c	301.c	217.c	301.c	315.c
ASTM BOILING CURVE, DEG F - 70%	255.c	303.c	223.c	303.c	315.c
ASTM BOILING CURVE, DEG F - 90%	266.c	305.c	227.c	305.c	315.c
ASTM BOILING CURVE, DEG F - 95%	273.	308.	230.	308.	317.
ASTM BOILING CURVE, DEG F - EP	281.c	311.c	234.c	311.c	318.c
PERCENT EVAP @ 70C (E70), LV%	11.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	28.7	0.0	32.8	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	96.5	0.0	100.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0

RES. OCTANE F-1 CLEAR	70.2*	61.2	71.5	61.2	58.9
MOT. OCTANE F-2 CLEAR	70.4*	67.6	70.4	67.6	68.0
TOTAL PARAFFINS, LV%	47.8a	31.6a	53.4a	31.6a	32.4a
OLEFINS, LV%	.5*	.6	.5	.6	.7
NAPHTHENES, LV%	49.5a	62.3a	44.8a	62.3a	60.7a
AROMATICS, LV%	2.1a	5.5a	1.3a	5.5a	6.3a
REID VAPOR PRESSURE, psi	5.38*	.24	5.33	.24	.14
FLASH PT(API Pen-Mar clsd cup),F	-23.c	93.c	20.c	93.c	105.c
Flash Point Measured	10.*	73.	-6.	73.	87.
FLASH PT(CHV Pen-Mar clsd cup),F		92.c		92.c	105.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.21@	5.48c	5.19c	5.48c	5.52c
FREEZE POINT, F	-141.n	-131.n	-145.n	-131.n	-128.n
CLOUD POINT, F	-147.c	-137.c	-151.c	-137.c	-134.c
POUR POINT, F	-151.c	-141.c	-155.c	-141.c	-138.c
SMOKE POINT (ASTM), mm	25.*	22.	25.*	22.	21.
ANILINE POINT, F		128.*		128.*	129.
CETANE INDEX		24.7*		24.7*	26.6
DIESEL INDEX		63.6@		63.6@	61.9c
VISCOSITY, cSt @ 100 F (38 C)		.8*		.8*	.9
VISCOSITY, cSt @ 104 F (40 C)		.8c		.8c	.9c
VISCOSITY, cSt @ 122 F (50 C)		.7*		.7*	.8
VISCOSITY, cSt @ 140 F (60 C)		.7c		.7c	.7c
VISCOSITY, cSt @ 212 F (100 C)		.5c		.5c	.5c
VISCOSITY, cSt @ 275 F (135 C)		.4@		.4@	.4c

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	17.97	24.14	34.06	45.90	47.06
YIELD AT END-OF-CUT, LV%	24.14	34.06	45.90	47.06	57.73
YIELD OF CUT (LV% OF CRUDE)	6.17	9.92	11.83	1.17	10.67
YIELD AT START-OF-CUT, WT%	15.36@	21.14@	30.74@	42.50@	43.67@
YIELD AT END-OF-CUT, WT%	21.14@	30.74@	42.50@	43.67@	54.43@
YIELD OF CUT (WT% OF CRUDE)	5.77@	9.61@	11.76@	1.17@	10.75@
API GRAVITY 60F	44.6	38.9	34.5	32.6	32.1
SPECIFIC GRAVITY 60/60	.8034	.8305	.8523	.8623	.8647
CHARACT. FACTOR (K-FACTOR)	11.58c	11.54c	11.61c	11.68c	11.81c
MOLECULAR WEIGHT	147.c	171.c	206.c	230.c	254.c
SULFUR, WT%	.002	.003	.012	.021	.033
MERCAPTAN SULFUR, ppm	19.	12.	14.	12.	11.
NITROGEN, ppm			.9*	12.6	26.7
BASIC NITROGEN, ppm			1.3*	8.3	12.2
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	323.	380.	468.	557.	570.
VL TBP BOILING CURVE,DEG F - 10%	326.	385.	472.	558.	574.
VL TBP BOILING CURVE,DEG F - 30%	336.	404.	491.	560.	590.
VL TBP BOILING CURVE,DEG F - 50%	346.	422.	510.	562.	606.
VL TBP BOILING CURVE,DEG F - 70%	357.	439.	529.	563.	622.
VL TBP BOILING CURVE,DEG F - 90%	369.	455.	548.	565.	637.
VL TBP BOILING CURVE,DEG F - 95%	372.	459.	552.	566.	641.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	334.c	397.c	480.c	547.c	575.c
ASTM BOILING CURVE, DEG F - 5%	334.	397.	481.	547.	576.
ASTM BOILING CURVE, DEG F - 10%	334.c	398.c	482.c	547.c	576.c
ASTM BOILING CURVE, DEG F - 30%	337.c	405.c	488.c	547.c	582.c
ASTM BOILING CURVE, DEG F - 50%	342.c	414.c	498.c	547.c	590.c
ASTM BOILING CURVE, DEG F - 70%	348.c	424.c	510.c	548.c	599.c
ASTM BOILING CURVE, DEG F - 90%	354.c	434.c	521.c	549.c	607.c
ASTM BOILING CURVE, DEG F - 95%	358.	439.	528.	550.	613.
ASTM BOILING CURVE, DEG F - EP	364.c	446.c	535.c	552.c	620.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	92.7	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	55.9				
MOT. OCTANE F-2 CLEAR	66.7				
TOTAL PARAFFINS, LV%	32.9a	40.9a	47.3a	49.2a	50.3a
OLEFINS, LV%	.9*				
NAPHTHENES, LV%	58.8a	48.9a	38.1a	34.8a	33.5a
AROMATICS, LV%	7.5a	10.1a	14.6a	16.0a	16.1a
REID VAPOR PRESSURE, psi	.02*	.02c	.00c		
FLASH PT(API Pen-Mar clsd cup),F	119.c	163.c	212.c	244.c	257.c
Flash Point Measured	116.	173.	242.	283.	312.
FLASH PT(CHV Pen-Mar clsd cup),F	119.c	167.c	230.c	279.c	301.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.60c	5.74c	5.85c	5.91c	5.92c
FREEZE POINT, F	-117.n	-79.n	-20.n	-3.n	18.n
CLOUD POINT, F	-123.c	-80.c	-22.c	-4.c	17.c
POUR POINT, F	-127.c	-80.n	-24.n	-6.n	16.n
SMOKE POINT (ASTM), mm	21.	17.	13.*	13.*	
ANILINE POINT, F	131.	139.	154.	165.	173.
CETANE INDEX	30.4	39.4	45.1	48.5	48.9
DIESEL INDEX	58.7c	54.0c	53.0c	53.8c	55.5c
VISCOSITY, cSt @ 100 F (38 C)	1.1	1.7	3.2	4.8	6.8
VISCOSITY, cSt @ 104 F (40 C)	1.1c	1.7c	3.0c	4.5c	6.4c
VISCOSITY, cSt @ 122 F (50 C)	1.0	1.4	2.5	3.6	5.0
VISCOSITY, cSt @ 140 F (60 C)	.9c	1.3c	2.1c	3.0c	3.9c
VISCOSITY, cSt @ 212 F (100 C)	.6c	.8c	1.2c	1.6c	2.0c
VISCOSITY, cSt @ 275 F (135 C)	.5c	.6c	.9c	1.1c	1.3c
RAMSBOTTOM CARBON, WT%					.02c
CONRADSON CARBON, WT%				.01*	.01*

VANADIUM, ppm	.01*

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1176.s	1176.s
YIELD AT START-OF-CUT, LV%	57.73	64.07	57.73	91.53	57.73
YIELD AT END-OF-CUT, LV%	64.07	91.53	91.53	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	6.33	27.46	33.80	8.47	42.27
YIELD AT START-OF-CUT, WT%	54.43@	60.93@	54.43@	90.20@	54.43@
YIELD AT END-OF-CUT, WT%	60.93@	90.20@	90.20@	100.00@	100.00@
YIELD OF CUT (WT% OF CRUDE)	6.50@	29.27@	35.77@	9.80@	45.57@
API GRAVITY 60F	29.2	23.3	24.3	11.1	21.5b
SPECIFIC GRAVITY 60/60	.8806	.9143	.9080	.9925	.9249b
CHARACT. FACTOR (K-FACTOR)	11.82c	11.91c	11.93c	11.98c	11.90c
MOLECULAR WEIGHT	289.c	406.c	390.c		407.c
SULFUR, WT%	.061	.143b	.128b	.517	.204
MERCAPTAN SULFUR, ppm	13.*				
NITROGEN, ppm	99.8	1240.4	1033.1	6521.2	2213.4
BASIC NITROGEN, ppm	42.7	391.2	327.9	2369.5	585.1b
HYDROGEN, WT%				11.0c	13.4c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	647.	712.	658.	1020.	661.
VL TBP BOILING CURVE,DEG F - 10%	650.	728.	671.	1029.	678.
VL TBP BOILING CURVE,DEG F - 30%	659.	791.	740.	1063.	771.
VL TBP BOILING CURVE,DEG F - 50%	669.	832.	811.	1097.	838.
VL TBP BOILING CURVE,DEG F - 70%	679.	873.	856.	1129.s	928.
VL TBP BOILING CURVE,DEG F - 90%	691.	955.	943.	1160.s	1097.
VL TBP BOILING CURVE,DEG F - 95%	694.	983.	976.	1168.s	1137.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1176.s	1176.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	652.c	727.c	674.c	1032.s	677.c
ASTM BOILING CURVE, DEG F - 5%	653.	734.	680.	1036.	684.
ASTM BOILING CURVE, DEG F - 10%	654.c	743.c	687.c	1041.c	694.c
ASTM BOILING CURVE, DEG F - 30%	661.c	798.c	749.c	1070.c	779.c
ASTM BOILING CURVE, DEG F - 50%	669.c	832.c	811.c	1097.c	838.c
ASTM BOILING CURVE, DEG F - 70%	679.c	873.c	856.c	1129.s	928.c
ASTM BOILING CURVE, DEG F - 90%	691.c	955.c	943.c	1160.s	1097.c
ASTM BOILING CURVE, DEG F - 95%	694.	982.	976.	1168.s	1137.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1176.s	1176.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	24.4	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	91.6	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	14.6	0.0	9.0
TOTAL PARAFFINS, LV%	43.2a	23.6a	27.3a		
NAPHTHENES, LV%	38.2a	46.2a	44.7a		
AROMATICS, LV%	18.5a	30.2a	28.0a		
FLASH PT(API Pen-Mar clsd cup),F	282.c	310.c	298.c	341.c	300.c
Flash Point Measured	343.	457.	436.		
FLASH PT(CHV Pen-Mar clsd cup),F	350.c				
HEATING VAL, GROSS 10**6 Btu/bbl	6.00c	6.16c	6.13c	6.49c	6.21c
HEATING VAL, NET, 10**6 Btu/bbl				6.14c	5.81c
FREEZE POINT, F	53.c				
CLOUD POINT, F	47.c				
POUR POINT, F	43.n	91.n	88.n	131.	85.
ANILINE POINT, F	181.	206.	201.		
CETANE INDEX	46.6				
DIESEL INDEX	52.8c	47.9c	49.0c		
VISCOSITY, cSt @ 100 F (38 C)	13.5				
VISCOSITY, cSt @ 104 F (40 C)	12.5c	102.0c	64.7c	1.46E+6c	202.8c
VISCOSITY, cSt @ 122 F (50 C)	9.1	61.2	40.4	3.18E+5	108.3b
VISCOSITY, cSt @ 140 F (60 C)	6.7c	39.3c	26.8c	84645.4c	63.1c
VISCOSITY, cSt @ 210 F (99 C)	2.8*	11.0b	8.2b	2019.0	13.9b
VISCOSITY, cSt @ 212 F (100 C)	2.8c	10.7c	8.0c	1860.6c	13.4c
VISCOSITY, cSt @ 275 F (135 C)	1.6c	5.0c	4.0c	230.6c	5.7c
RAMSBOTTOM CARBON, WT%	.02c	.16c	.14c	11.26	2.42
CONRADSON CARBON, WT%	.01	.14	.12	12.65	2.72
VANADIUM, ppm	.01	.03	.03	29.93	5.32

NICKEL, ppm	.63	.71	.70	14.18	2.17
ASPHALTENES, WT%				.9	.4
SOFTENING POINT				111.2	
PENETRATION, dmm				110.1c	

*** Meaning of the codes which follow table values:

- * - Obtained by curve extrapolation
- c - Calculated from other properties
- @ - Calculated from curve extrapolation of other properties
- g - Calculated from GC analysis data
- = - Calculated from combination of GC and dist. curve data
- + - As above, but had to extrapolate dist. curve
- d - Distillate property curve used for resid property
- r - Resid property curve used for distillate property
- b - Both distillate and resid property curves used
- s - Suspect value - may be inaccurate
- n - Cloud Point, Pour Point, or Freeze Point interpolated from property curve
- o - Calculated with distillate separation inefficiency modeling
- p - Cloud, Pour, Freeze interpolated from property curve with distillate separation inefficiency modeling
- q - Cloud Point suspect negative area under cloud point index curve for cut
- i - Property value adjusted after integration
- z - Property value reset to zero after being estimated negative
- w - This property is not whole crude balanced and is interpolated from the resid curve
- m - Value suspect 1 or more of the crudes did not include this property
- a - PNA Adjustment Applied

CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: Composit - Crudo Composito Varios
Country: Peru
Library: CORPORATE

Run Date: 04/04/02 (16:17:50)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: Core Labs Assay of Crudo Composito Varios received from PetrPeru on 12/1
0.0 LV% composit

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	34.2	34.8*	C2	0.00	0.00
SG 60/60	.8540	.8508*	C3	0.00	0.00
Dens @15			IC4	0.05	0.03
S, WT%	.07	.07*	NC4	0.13	0.09
N2, ppm	890.0	903.*	IC5	0.33	0.24
H2, WT%			NC5	0.29	0.22
RVP	.89	.37	CP	0.00	0.00
Va, ppm	.67	.66		----	----
Ni, ppm	1.90	.83		0.80	0.58
CCR, wt%		4.42			
RAMSBOTT		1.00			
POUR, F	20.0				
VOL YLD					
NEUT	.31				
SALT pkb					
cSt@ 60F		10.33			
cSt@ 77F		7.59			
cSt@104F		5.02			
cSt@100F	5.31		K Factor	11.90	
cSt@122F	3.97		ASH	.02	
MERCAP S	4.00				

	X5	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	292.	316.
TBP TEMP AT END-OF-CUT, F	292.	316.	240.	316.	321.
YIELD AT START-OF-CUT, LV%	.75	13.49	3.24	13.49	16.62
YIELD AT END-OF-CUT, LV%	13.49	16.62	7.94	16.62	17.21
YIELD OF CUT (LV% OF CRUDE)	12.73	3.13	4.70	3.13	.60
YIELD AT START-OF-CUT, WT%	.52@	11.45@	2.41@	11.45@	14.33@
YIELD AT END-OF-CUT, WT%	11.45@	14.33@	6.47@	14.33@	14.89@
YIELD OF CUT (WT% OF CRUDE)	10.93@	2.88@	4.05@	2.88@	.55@
API GRAVITY 60F	62.2	49.3	61.3	49.3	48.0
SPECIFIC GRAVITY 60/60	.7304	.7826	.7340	.7826	.7882
CHARACT. FACTOR (K-FACTOR)	12.10c	11.68c	11.98c	11.68c	11.67c
MOLECULAR WEIGHT	117.c	135.c	114.s	135.c	139.c
SULFUR, WT%	.002*	.005	.002	.005	.006
MERCAPTAN SULFUR, ppm	8.*	7.	8.*	7.	6.
VL TBP BOILING CURVE,DEG F - ST	55.	292.	180.	292.	316.
VL TBP BOILING CURVE,DEG F - 5%	89.	293.	188.	293.	316.
VL TBP BOILING CURVE,DEG F - 10%	124.	294.	196.	294.	316.
VL TBP BOILING CURVE,DEG F - 30%	213.	299.	214.	299.	317.
VL TBP BOILING CURVE,DEG F - 50%	230.	303.	220.	303.	318.
VL TBP BOILING CURVE,DEG F - 70%	261.	308.	225.	308.	319.
VL TBP BOILING CURVE,DEG F - 90%	283.	313.	234.	313.	320.
VL TBP BOILING CURVE,DEG F - 95%	287.	315.	237.	315.	321.
VL TBP BOILING CURVE,DEG F - EP	292.	316.	240.	316.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	123.c	298.c	208.c	298.c	315.c
ASTM BOILING CURVE, DEG F - 5%	143.	298.	209.	298.	315.
ASTM BOILING CURVE, DEG F - 10%	163.c	298.c	211.c	298.c	315.c
ASTM BOILING CURVE, DEG F - 30%	221.c	299.c	217.c	299.c	315.c
ASTM BOILING CURVE, DEG F - 50%	230.c	300.c	220.c	300.c	315.c
ASTM BOILING CURVE, DEG F - 70%	250.c	303.c	222.c	303.c	315.c
ASTM BOILING CURVE, DEG F - 90%	264.c	305.c	226.c	305.c	315.c
ASTM BOILING CURVE, DEG F - 95%	271.	307.	231.	307.	317.
ASTM BOILING CURVE, DEG F - EP	278.c	311.c	237.c	311.c	318.c
PERCENT EVAP @ 70C (E70), LV%	8.6	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	25.2	0.0	12.2	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	98.0	0.0	100.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0

PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	71.6*	66.5	72.0*	66.5	66.4
MOT. OCTANE F-2 CLEAR	70.4*	66.8	71.3*	66.8	67.2
TOTAL PARAFFINS, LV%	48.2a	36.9a	45.8a	36.9a	36.9a
OLEFINS, LV%	.5*	.5	.5*	.5	.6
NAPHTHENES, LV%	47.7a	55.7a	50.7a	55.7a	55.5a
AROMATICS, LV%	3.6a	6.9a	3.0a	6.9a	7.0a
REID VAPOR PRESSURE, psi	4.86*	.36	2.73	.36	.26
FLASH PT(API Pen-Mar clsd cup),F	-15.c	93.c	25.c	93.c	105.c
Flash Point Measured	13.*	74.	1.	74.	86.
FLASH PT(CHV Pen-Mar clsd cup),F		92.c		92.c	105.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.22@	5.49c	5.24c	5.49c	5.52c
FREEZE POINT, F		-136.n		-136.n	-133.n
CLOUD POINT, F		-142.c		-142.c	-139.c
POUR POINT, F		-146.c		-146.c	-143.c
SMOKE POINT (ASTM), mm	29.*	25.	30.*	25.	24.
ANILINE POINT, F		131.*		131.*	132.
CETANE INDEX		25.2*		25.2*	27.1
DIESEL INDEX		64.8@		64.8@	63.4c
VISCOSITY, cSt @ 100 F (38 C)		.8*		.8*	.9
VISCOSITY, cSt @ 104 F (40 C)		.8c		.8c	.9c
VISCOSITY, cSt @ 122 F (50 C)		.7*		.7*	.8*
VISCOSITY, cSt @ 140 F (60 C)		.7c		.7c	.7c
VISCOSITY, cSt @ 212 F (100 C)		.5c		.5c	.5c
VISCOSITY, cSt @ 275 F (135 C)		.4@		.4@	.4@

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	17.21	23.85	36.08	48.68	49.96
YIELD AT END-OF-CUT, LV%	23.85	36.08	48.68	49.96	61.33
YIELD OF CUT (LV% OF CRUDE)	6.64	12.23	12.60	1.28	11.37
YIELD AT START-OF-CUT, WT%	14.89@	21.12@	32.94@	45.42@	46.70@
YIELD AT END-OF-CUT, WT%	21.12@	32.94@	45.42@	46.70@	58.13@
YIELD OF CUT (WT% OF CRUDE)	6.24@	11.82@	12.48@	1.28@	11.43@
API GRAVITY 60F	45.6	40.6	36.4	34.5	33.9
SPECIFIC GRAVITY 60/60	.7991	.8223	.8428	.8524	.8556
CHARACT. FACTOR (K-FACTOR)	11.66c	11.65c	11.74c	11.81c	11.93c
MOLECULAR WEIGHT	148.c	171.c	208.c	232.c	256.c
SULFUR, WT%	.005	.004	.010	.018	.027
MERCAPTAN SULFUR, ppm	6.	8.	7.	7.	10.
NITROGEN, ppm			1.5*	16.6	17.7
BASIC NITROGEN, ppm			2.7*	8.3	11.4
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	324.	379.	468.	557.	570.
VL TBP BOILING CURVE,DEG F - 10%	327.	384.	472.	558.	574.
VL TBP BOILING CURVE,DEG F - 30%	338.	401.	491.	560.	589.
VL TBP BOILING CURVE,DEG F - 50%	349.	419.	510.	562.	605.
VL TBP BOILING CURVE,DEG F - 70%	360.	436.	529.	563.	621.
VL TBP BOILING CURVE,DEG F - 90%	370.	454.	548.	565.	637.
VL TBP BOILING CURVE,DEG F - 95%	373.	459.	552.	566.	641.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	336.c	395.c	481.c	547.c	575.c
ASTM BOILING CURVE, DEG F - 5%	336.	396.	481.	547.	575.
ASTM BOILING CURVE, DEG F - 10%	336.c	397.c	482.c	547.c	576.c
ASTM BOILING CURVE, DEG F - 30%	339.c	402.c	488.c	547.c	581.c
ASTM BOILING CURVE, DEG F - 50%	345.c	411.c	498.c	547.c	589.c
ASTM BOILING CURVE, DEG F - 70%	350.c	422.c	510.c	548.c	598.c
ASTM BOILING CURVE, DEG F - 90%	355.c	432.c	521.c	549.c	607.c
ASTM BOILING CURVE, DEG F - 95%	360.	438.	528.	550.	613.
ASTM BOILING CURVE, DEG F - EP	365.c	446.c	535.c	552.c	620.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	91.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	66.3				
MOT. OCTANE F-2 CLEAR	66.4				
TOTAL PARAFFINS, LV%	37.7a	46.7a	52.9a	55.4a	54.6a
OLEFINS, LV%	.7				
NAPHTHENES, LV%	54.5a	44.0a	33.3a	30.3a	30.1a
AROMATICS, LV%	7.1a	9.3a	13.8a	14.3a	15.3a
REID VAPOR PRESSURE, psi	.01*	.02c	.00c		
FLASH PT(API Pen-Mar clsd cup),F	121.c	161.c	212.c	244.c	257.c
Flash Point Measured	105.	161.	242.	274.	289.
FLASH PT(CHV Pen-Mar clsd cup),F	121.c	166.c	230.c	279.c	300.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.58c	5.70c	5.81c	5.86c	5.89c
FREEZE POINT, F	-116.n	-68.n	-14.n	2.n	21.n
CLOUD POINT, F	-122.c	-72.c	-14.c	4.c	23.c
POUR POINT, F	-126.c	-77.n	-15.n	6.n	26.n
SMOKE POINT (ASTM), mm	22.	18.	15.	15.	16.
ANILINE POINT, F	133.	141.	160.	170.	177.
CETANE INDEX	30.7	40.8	48.1	50.9	51.8
DIESEL INDEX	60.8c	57.3c	58.1c	58.8c	60.1c
VISCOSITY, cSt @ 100 F (38 C)	1.1	1.7	3.1	4.6	6.5
VISCOSITY, cSt @ 104 F (40 C)	1.0c	1.6c	3.0c	4.3c	6.2c
VISCOSITY, cSt @ 122 F (50 C)	.9*	1.4	2.4	3.3	5.0
VISCOSITY, cSt @ 140 F (60 C)	.8c	1.2c	2.0c	2.7c	4.2c
VISCOSITY, cSt @ 212 F (100 C)	.5c	.8c	1.2c	1.3c	2.3c
VISCOSITY, cSt @ 275 F (135 C)	.4@	.6c	.8c	.9c	1.6c
CONRADSON CARBON, WT%					.00*

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1181.s	1181.s
YIELD AT START-OF-CUT, LV%	61.33	67.25	61.33	92.02	61.33
YIELD AT END-OF-CUT, LV%	67.25	92.02	92.02	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	5.92	24.77	30.69	7.98	38.67
YIELD AT START-OF-CUT, WT%	58.13@	64.22@	58.13@	90.73@	58.13@
YIELD AT END-OF-CUT, WT%	64.22@	90.73@	90.73@	100.00@	100.00@
YIELD OF CUT (WT% OF CRUDE)	6.09@	26.51@	32.59@	9.27@	41.87@
API GRAVITY 60F	30.3	23.9	25.1	11.6	22.1b
SPECIFIC GRAVITY 60/60	.8746	.9103	.9034	.9890	.9211b
CHARACT. FACTOR (K-FACTOR)	11.90c	11.97c	12.00c	12.05c	11.96c
MOLECULAR WEIGHT	290.c	410.c	393.c		412.c
SULFUR, WT%	.050	.115	.103	.342	.156b
MERCAPTAN SULFUR, ppm	10.*				
NITROGEN, ppm	65.7	1115.7	919.6	6485.1	2152.2b
BASIC NITROGEN, ppm	40.3	332.2	277.7		
HYDROGEN, WT%				11.1c	13.5c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	647.	712.	657.	1020.	660.
VL TBP BOILING CURVE,DEG F - 10%	649.	729.	669.	1029.	676.
VL TBP BOILING CURVE,DEG F - 30%	658.	794.	740.	1065.	773.
VL TBP BOILING CURVE,DEG F - 50%	668.	834.	814.	1099.	841.
VL TBP BOILING CURVE,DEG F - 70%	679.	874.	857.	1132.s	932.
VL TBP BOILING CURVE,DEG F - 90%	690.	956.	943.	1165.s	1102.s
VL TBP BOILING CURVE,DEG F - 95%	694.	983.	976.	1173.s	1142.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1181.s	1181.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	652.c	728.c	674.c	1033.s	676.c
ASTM BOILING CURVE, DEG F - 5%	653.	735.	679.	1037.	682.
ASTM BOILING CURVE, DEG F - 10%	654.c	744.c	686.c	1042.c	692.c
ASTM BOILING CURVE, DEG F - 30%	661.c	801.c	748.c	1071.c	781.c
ASTM BOILING CURVE, DEG F - 50%	668.c	834.c	814.c	1099.c	841.c
ASTM BOILING CURVE, DEG F - 70%	679.c	874.c	857.c	1132.s	932.c
ASTM BOILING CURVE, DEG F - 90%	690.c	956.c	943.c	1165.s	1102.s
ASTM BOILING CURVE, DEG F - 95%	694.	983.	976.	1173.s	1142.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1181.s	1181.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	28.7	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	92.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	15.5	0.0	9.8
TOTAL PARAFFINS, LV%	38.2a	22.3a	25.4a		
NAPHTHENES, LV%	40.8a	48.6a	47.1a		
AROMATICS, LV%	21.0a	29.0a	27.5a		
FLASH PT(API Pen-Mar clsd cup),F	282.c	311.c	297.c	341.c	299.c
Flash Point Measured	330.	467.	440.		
FLASH PT(CHV Pen-Mar clsd cup),F	350.c				
HEATING VAL, GROSS 10**6 Btu/bbl	5.98c	6.15c	6.12c	6.49c	6.19c
HEATING VAL, NET, 10**6 Btu/bbl				6.13c	5.80c
FREEZE POINT, F	53.c				
CLOUD POINT, F	47.c				
POUR POINT, F	43.n	86.n	84.n	109.	85.
ANILINE POINT, F	186.	203.	200.		
CETANE INDEX	48.7				
DIESEL INDEX	56.2c	48.7c	50.3c		
VISCOSITY, cSt @ 100 F (38 C)	12.6				
VISCOSITY, cSt @ 104 F (40 C)	12.4c	129.1c	84.0c	2.45E+6c	3.8c
VISCOSITY, cSt @ 122 F (50 C)	11.8	70.6b	47.5b	4.93E+5	4.6
VISCOSITY, cSt @ 140 F (60 C)	8.0c	42.1c	29.1c	1.23E+5c	5.6c
VISCOSITY, cSt @ 210 F (99 C)	2.7*	10.0	7.5*	2487.6	13.3b
VISCOSITY, cSt @ 212 F (100 C)	2.6c	9.7c	7.3c	2284.7c	13.7c
VISCOSITY, cSt @ 275 F (135 C)	1.4c	4.3c	3.4c	261.0c	34.9c
RAMSBOTTOM CARBON, WT%	.05c	.26c	.22c	12.41	2.40
CONRADSON CARBON, WT%	.03	.27	.22	12.49	2.77
VANADIUM, ppm	.01	.07	.06	7.55	1.57

NICKEL, ppm	.03	.55	.45	7.00	1.97
ASPHALTENES, WT%				.3	.1
SOFTENING POINT				104.5	
PENETRATION, dmm				165.8c	

*** Meaning of the codes which follow table values:

- * - Obtained by curve extrapolation
- c - Calculated from other properties
- @ - Calculated from curve extrapolation of other properties
- g - Calculated from GC analysis data
- = - Calculated from combination of GC and dist. curve data
- + - As above, but had to extrapolate dist. curve
- d - Distillate property curve used for resid property
- r - Resid property curve used for distillate property
- b - Both distillate and resid property curves used
- s - Suspect value - may be inaccurate
- n - Cloud Point, Pour Point, or Freeze Point interpolated from property curve
- o - Calculated with distillate separation inefficiency modeling
- p - Cloud, Pour, Freeze interpolated from property curve with distillate separation inefficiency modeling
- q - Cloud Point suspect negative area under cloud point index curve for cut
- i - Property value adjusted after integration
- z - Property value reset to zero after being estimated negative
- w - This property is not whole crude balanced and is interpolated from the resid curve
- m - Value suspect 1 or more of the crudes did not include this property
- a - PNA Adjustment Applied

APPENDIX A.3 – BASE AND ALTERNATE CASES CRUDE CUT PROPERTIES REPORTS (CAL II OUTPUT)

This appendix contains the base and alternate cases crude cut properties reports (CAL II Output).

A.3.1 CUISIANA

A.3.2 LORETO

A.3.3 MAYNA

A.3.4 MESA

A.3.5 ORIENTE

A.3.6 ONO

A.3.7 PETROTECH

A.3.8 PEREZ COMPANC

A.3.9 CRUDO COMPOSITO VARIOS

CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: Cuisia39 - Cuisiana
Country: Columbia
Library: CORPORATE

Run Date: 04/07/02 (13:37:33)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: Cuisiana crude assay received from PetroPeru on 12/12/01

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	39.4		C2	0.07	0.03
SG 60/60	.8280		C3	0.73	0.45
Dens @15			IC4	0.79	0.54
S, WT%	.17		NC4	1.67	1.18
N2, ppm			IC5	1.91	1.44
H2, WT%			NC5	1.82	1.39
RVP		1.09	CP	0.00	0.00
Va, ppm	2.00			----	----
Ni, ppm	2.00			7.00	5.03
POUR, F	38.0				
VOL YLD					
NEUT	.05				
SALT pkb					

	X5	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	180.	316.
TBP TEMP AT END-OF-CUT, F	180.	316.	292.	292.	321.
YIELD AT START-OF-CUT, LV%	4.67	27.01	11.74	11.74	30.24
YIELD AT END-OF-CUT, LV%	11.74	30.24	27.01	27.01	30.88
YIELD OF CUT (LV% OF CRUDE)	7.07	3.24	15.27	15.27	.63
API GRAVITY 60F	78.7	48.6	57.8	57.8	47.9
SPECIFIC GRAVITY 60/60	.6730	.7857	.7476	.7476	.7889
CHARACT. FACTOR (K-FACTOR)	12.52c	11.63c	11.87c	11.87c	11.66c
MOLECULAR WEIGHT	97.8	135.c	119.c	119.c	139.c
SULFUR, WT%	<.001*	<.001	.001	.001	.001
MERCAPTAN SULFUR, ppm	2.*	2.	2.	2.	2.
VL TBP BOILING CURVE,DEG F - ST	55.	292.	180.	180.	316.
VL TBP BOILING CURVE,DEG F - 5%	68.	293.	187.	187.	316.
VL TBP BOILING CURVE,DEG F - 10%	79.	294.	194.	194.	316.
VL TBP BOILING CURVE,DEG F - 30%	117.	299.	218.	218.	317.
VL TBP BOILING CURVE,DEG F - 50%	139.	304.	240.	240.	318.
VL TBP BOILING CURVE,DEG F - 70%	158.	309.	260.	260.	319.
VL TBP BOILING CURVE,DEG F - 90%	173.	313.	281.	281.	320.
VL TBP BOILING CURVE,DEG F - 95%	177.	315.	287.	287.	321.
VL TBP BOILING CURVE,DEG F - EP	180.	316.	292.	292.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	104.c	298.c	215.c	215.c	315.c
ASTM BOILING CURVE, DEG F - 5%	108.	298.	216.	216.	315.
ASTM BOILING CURVE, DEG F - 10%	111.c	298.c	218.c	218.c	315.c
ASTM BOILING CURVE, DEG F - 30%	129.c	299.c	227.c	227.c	315.c
ASTM BOILING CURVE, DEG F - 50%	141.c	301.c	239.c	239.c	315.c
ASTM BOILING CURVE, DEG F - 70%	152.c	303.c	252.c	252.c	315.c
ASTM BOILING CURVE, DEG F - 90%	160.c	305.c	265.c	265.c	315.c
ASTM BOILING CURVE, DEG F - 95%	166.	308.	271.	271.	317.
ASTM BOILING CURVE, DEG F - EP	172.c	311.c	280.c	280.c	318.c
PERCENT EVAP @ 70C (E70), LV%	86.8	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	100.0	0.0	97.2	97.2	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	66.6*	47.9	56.5	56.5	46.5
MOT. OCTANE F-2 CLEAR	66.6c	47.9c	56.5c	56.5c	46.5c
TOTAL PARAFFINS, LV%	81.3a	41.5a	55.3a	55.3a	38.8a
NAPHTHENES, LV%	16.9a	36.3a	29.4a	29.4a	38.1a
AROMATICS, LV%	1.8a	22.2a	15.3a	15.3a	23.2a
REID VAPOR PRESSURE, psi	10.07*	.24*	1.60	1.60	.11*
FLASH PT(API Pen-Mar clsd cup),F		93.c	30.c	30.c	105.c
Flash Point Measured		68.	42.	42.	74.

FLASH PT(CHV Pen-Mar clsd cup),F		92.c			105.c
HEATING VAL, GROSS 10**6 Btu/bbl	4.90@	5.51c	5.31c	5.31c	5.53c
FREEZE POINT, F		-106.n	-120.n	-120.n	-102.n
CLOUD POINT, F		-112.c	-126.c	-126.c	-108.c
POUR POINT, F		-116.c	-130.c	-130.c	-112.c
SMOKE POINT (ASTM), mm		23.			23.
ANILINE POINT, F		118.*			121.
CETANE INDEX		34.5*			35.1
DIESEL INDEX		57.5@			57.9c
VISCOSITY, cSt @ 100 F (38 C)		.8	.6*	.6*	.9
VISCOSITY, cSt @ 122 F (50 C)		.1			.1
VISCOSITY, cSt @ 140 F (60 C)		1.0*			.9

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	30.88	36.53	46.79	58.10	59.21
YIELD AT END-OF-CUT, LV%	36.53	46.79	58.10	59.21	68.47
YIELD OF CUT (LV% OF CRUDE)	5.66	10.26	11.32	1.10	9.26
API GRAVITY 60F	46.3	41.8	35.4	32.1	30.0
SPECIFIC GRAVITY 60/60	.7957	.8166	.8476	.8649	.8762
CHARACT. FACTOR (K-FACTOR)	11.69c	11.74c	11.68c	11.64c	11.65c
MOLECULAR WEIGHT	147.c	173.c	207.c	229.c	250.c
SULFUR, WT%	<.001	.006	.055	.101	.177
MERCAPTAN SULFUR, ppm	2.	2.*			
NITROGEN, ppm				76.8	160.3
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	323.	380.	469.	557.	570.
VL TBP BOILING CURVE,DEG F - 10%	326.	386.	475.	558.	574.
VL TBP BOILING CURVE,DEG F - 30%	335.	405.	491.	560.	589.
VL TBP BOILING CURVE,DEG F - 50%	346.	422.	510.	561.	604.
VL TBP BOILING CURVE,DEG F - 70%	357.	439.	529.	563.	620.
VL TBP BOILING CURVE,DEG F - 90%	369.	455.	548.	565.	636.
VL TBP BOILING CURVE,DEG F - 95%	372.	459.	552.	566.	641.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	333.c	397.c	481.c	547.c	574.c
ASTM BOILING CURVE, DEG F - 5%	334.	398.	482.	547.	575.
ASTM BOILING CURVE, DEG F - 10%	334.c	399.c	483.c	547.c	575.c
ASTM BOILING CURVE, DEG F - 30%	336.c	406.c	488.c	547.c	580.c
ASTM BOILING CURVE, DEG F - 50%	341.c	415.c	498.c	547.c	588.c
ASTM BOILING CURVE, DEG F - 70%	347.c	424.c	510.c	548.c	597.c
ASTM BOILING CURVE, DEG F - 90%	353.c	434.c	521.c	549.c	607.c
ASTM BOILING CURVE, DEG F - 95%	358.	439.	527.	550.	613.
ASTM BOILING CURVE, DEG F - EP	364.c	446.c	535.c	552.c	620.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	92.8	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	44.0				
MOT. OCTANE F-2 CLEAR	44.0c				
TOTAL PARAFFINS, LV%	34.0a				
NAPHTHENES, LV%	41.3a				
AROMATICS, LV%	24.6a	23.1	24.0*	24.4*	
REID VAPOR PRESSURE, psi	.10c	.02c	.00c		
FLASH PT(API Pen-Mar clsd cup),F	119.c	163.c	213.c	244.c	257.c
Flash Point Measured	86.	123.	202.	246.	274.
FLASH PT(CHV Pen-Mar clsd cup),F	119.c	167.c	230.c	279.c	300.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.56c	5.68c	5.83c	5.91c	5.97c
FREEZE POINT, F	-92.n	-63.n	-14.n	8.n	38.n
CLOUD POINT, F	-98.c	-69.c	-19.c	2.c	33.c
POUR POINT, F	-102.c	-73.c	-24.n	-3.n	28.n
SMOKE POINT (ASTM), mm	23.	21.	17.	15.	14.
ANILINE POINT, F	125.	136.	150.	157.	164.
CETANE INDEX	36.3	40.4	45.4	46.3	46.7
DIESEL INDEX	58.0c	56.8c	53.1c	50.5c	49.2c
VISCOSITY, cSt @ 100 F (38 C)	1.0	1.4	2.5	3.5	5.1
VISCOSITY, cSt @ 104 F (40 C)		.7c	1.9c	3.6c	5.4c
VISCOSITY, cSt @ 122 F (50 C)	.1	.1	.8	4.1	6.6
VISCOSITY, cSt @ 140 F (60 C)	.8	1.7	6.5	7.9	9.1
VISCOSITY, cSt @ 212 F (100 C)			.7	1.6	2.1
VISCOSITY, cSt @ 275 F (135 C)			.6c	1.0c	1.2c
CONRADSON CARBON, WT%					.00*
VANADIUM, ppm				0.00z	.00*
NICKEL, ppm				0.00z	.01*

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1447.s	1447.s
YIELD AT START-OF-CUT, LV%	68.47	73.67	68.47	94.19	68.47
YIELD AT END-OF-CUT, LV%	73.67	94.19	94.19	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	5.20	20.52	25.72	5.81	31.53
API GRAVITY 60F	28.3	25.2	25.8	12.7	23.2b
SPECIFIC GRAVITY 60/60	.8855	.9031	.8995	.9814	.9146b
CHARACT. FACTOR (K-FACTOR)	11.76c	12.01c	11.96c	11.84c	11.89c
MOLECULAR WEIGHT	289.c	395.c	370.c		394.c
SULFUR, WT%	.299	.386	.369	.788	.452b
NITROGEN, ppm	267.9	763.8	665.1	2337.1	995.7b
BASIC NITROGEN, ppm		170.0		759.5	215.4*
HYDROGEN, WT%				11.4c	13.8c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	647.	709.	657.	1021.	660.
VL TBP BOILING CURVE,DEG F - 10%	650.	721.	670.	1033.	675.
VL TBP BOILING CURVE,DEG F - 30%	660.	768.	726.	1090.	746.
VL TBP BOILING CURVE,DEG F - 50%	670.	816.	785.	1161.s	819.
VL TBP BOILING CURVE,DEG F - 70%	680.	869.	848.	1268.s	912.
VL TBP BOILING CURVE,DEG F - 90%	691.	950.	937.	1389.s	1144.s
VL TBP BOILING CURVE,DEG F - 95%	694.	979.	971.	1418.s	1286.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1447.s	1447.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	652.c	724.c	673.c	1038.s	677.c
ASTM BOILING CURVE, DEG F - 5%	653.	729.	679.	1043.	683.
ASTM BOILING CURVE, DEG F - 10%	654.c	736.c	686.c	1049.c	692.c
ASTM BOILING CURVE, DEG F - 30%	662.c	775.c	734.c	1098.c	755.c
ASTM BOILING CURVE, DEG F - 50%	670.c	816.c	785.c	1161.s	819.c
ASTM BOILING CURVE, DEG F - 70%	680.c	869.c	848.c	1268.s	912.c
ASTM BOILING CURVE, DEG F - 90%	691.c	950.c	937.c	1389.s	1144.s
ASTM BOILING CURVE, DEG F - 95%	694.	980.	972.	1418.s	1284.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1447.s	1447.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	20.2	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	91.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	18.3	0.0	11.3
FLASH PT(API Pen-Mar clsd cup),F	282.c	308.c	296.c	341.c	299.c
Flash Point Measured	334.	427.	408.	611.	468.
FLASH PT(CHV Pen-Mar clsd cup),F	351.c				
HEATING VAL, GROSS 10**6 Btu/bbl	6.01c	6.11c	6.09c	6.43c	6.15c
HEATING VAL, NET, 10**6 Btu/bbl				6.07c	5.75c
FREEZE POINT, F	63.*				
CLOUD POINT, F	61.c				
POUR POINT, F	59.n	102.b	93.b	118.	107.b
SMOKE POINT (ASTM), mm	12.*				
ANILINE POINT, F	178.	205.	200.		
CETANE INDEX	47.5*				
DIESEL INDEX	50.4c	51.7c	51.6c		
VISCOSITY, cSt @ 100 F (38 C)	10.2				
VISCOSITY, cSt @ 104 F (40 C)	9.8c	38.6c	24.3c		74.6c
VISCOSITY, cSt @ 122 F (50 C)	8.0	30.5	22.6		46.2b
VISCOSITY, cSt @ 140 F (60 C)	11.9	24.6	21.0		30.5c
VISCOSITY, cSt @ 212 F (100 C)	2.7	7.0	5.7	240.8	8.9b
VISCOSITY, cSt @ 275 F (135 C)	1.7c	3.7c	3.1c		4.4c
RAMSBOTTOM CARBON, WT%	.04c	.19c	.16c	10.77c	1.86c
CONRADSON CARBON, WT%	.02	.18	.15	12.20	2.47b
VANADIUM, ppm	.01	.18	.14	9.55	1.98b
NICKEL, ppm	.03	.19	.16	3.84	1.98b
ASPHALTENES, WT%				1.3	.2*
SOFTENING POINT				118.2	
PENETRATION, dmm				>300.0	

*** Meaning of the codes which follow table values:

- * - Obtained by curve extrapolation
- c - Calculated from other properties
- @ - Calculated from curve extrapolation of other properties
- g - Calculated from GC analysis data
- = - Calculated from combination of GC and dist. curve data
- + - As above, but had to extrapolate dist. curve
- d - Distillate property curve used for resid property
- r - Resid property curve used for distillate property
- b - Both distillate and resid property curves used
- s - Suspect value - may be inaccurate
- n - Cloud Point, Pour Point, or Freeze Point interpolated from property curve
- o - Calculated with distillate separation inefficiency modeling
- p - Cloud, Pour, Freeze interpolated from property curve with distillate separation inefficiency modeling
- q - Cloud Point suspect negative area under cloud point index curve for cut
- i - Property value adjusted after integration
- z - Property value reset to zero after being estimated negative
- w - This property is not whole crude balanced and is interpolated from the resid curve
- m - Value suspect 1 or more of the crudes did not include this property
- a - PNA Adjustment Applied

CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: Loreto19 - Loreto
Country: Peru
Library: CORPORATE

Run Date: 04/07/02 (13:37:51)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: Core Labs assay of Loreto crude received from PetroPeru on 12/12/01

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	18.9	19.6*	C2	0.00	0.00
SG 60/60	.9408	.9362*	C3	0.05	0.03
Dens @15			IC4	0.08	0.05
S, WT%	1.24	1.24*	NC4	0.19	0.12
N2, ppm	3194.0	2970.*	IC5	0.31	0.21
H2, WT%			NC5	0.38	0.26
RVP	1.11	.24	CP	0.00	0.00
Va, ppm	207.00	207.36		----	----
Ni, ppm	90.00	92.16		1.01	0.66
CCR, wt%		13.16			
RAMSBOTT		13.17			
POUR, F	-10.0				
VOL YLD					
NEUT					
SALT pkb					
cSt@ 60F		917.36			
cSt@ 77F		442.15			
cSt@104F		168.09			
cSt@100F	191.50		K Factor	11.60	
cSt@122F	98.07		ASH	.05	
MERCAP S	23.00				

	X5	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	180.	316.
TBP TEMP AT END-OF-CUT, F	180.	316.	292.	292.	321.
YIELD AT START-OF-CUT, LV%	1.68	8.20	3.89	3.89	10.19
YIELD AT END-OF-CUT, LV%	3.89	10.19	8.20	8.20	10.59
YIELD OF CUT (LV% OF CRUDE)	2.21	1.99	4.31	4.31	.40
YIELD AT START-OF-CUT, WT%	1.00@	6.02@	2.58@	2.58@	7.67@
YIELD AT END-OF-CUT, WT%	2.58@	7.67@	6.02@	6.02@	8.01@
YIELD OF CUT (WT% OF CRUDE)	1.58@	1.65@	3.44@	3.44@	.33@
API GRAVITY 60F	79.7	50.6	58.0	58.0	48.8
SPECIFIC GRAVITY 60/60	.6698	.7769	.7466	.7466	.7846
CHARACT. FACTOR (K-FACTOR)	12.46c	11.76c	11.98c	11.98c	11.72c
MOLECULAR WEIGHT	93.s	135.c	123.c	123.c	139.c
SULFUR, WT%	0.000z	.017	0.000z	0.000z	.027
BASIC NITROGEN, ppm	4.0*	3.9	4.0	4.0	3.8
VL TBP BOILING CURVE,DEG F - ST	55.	292.	180.	180.	316.
VL TBP BOILING CURVE,DEG F - 5%	62.	293.	190.	190.	316.
VL TBP BOILING CURVE,DEG F - 10%	69.	294.	200.	200.	316.
VL TBP BOILING CURVE,DEG F - 30%	95.	299.	232.	232.	317.
VL TBP BOILING CURVE,DEG F - 50%	121.	304.	255.	255.	318.
VL TBP BOILING CURVE,OEG F - 70%	146.	309.	273.	273.	319.
VL TBP BOILING CURVE,DEG F - 90%	169.	314.	286.	286.	320.
VL TBP BOILING CURVE,DEG F - 95%	175.	315.	289.	289.	321.
VL TBP BOILING CURVE,DEG F - EP	180.	316.	292.	292.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	95.c	298.c	222.c	222.c	315.c
ASTM BOILING CURVE, DEG F - 5%	96.	298.	224.	224.	315.
ASTM BOILING CURVE, DEG F - 10%	98.c	298.c	227.c	227.c	315.c
ASTM BOILING CURVE, DEG F - 30%	108.c	299.c	241.c	241.c	315.c
ASTM BOILING CURVE, DEG F - 50%	123.c	301.c	254.c	254.c	315.c
ASTM BOILING CURVE, DEG F - 70%	139.c	303.c	265.c	265.c	315.c
ASTM BOILING CURVE, DEG F - 90%	154.c	305.c	272.c	272.c	315.c
ASTM BOILING CURVE, DEG F - 95%	161.	308.	276.	276.	317.
ASTM BOILING CURVE, DEG F - EP	169.c	311.c	282.c	282.c	318.c
PERCENT EVAP @ 70C (E70), LV%	93.2	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	100.0	0.0	93.7	93.7	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0

RES. OCTANE F-1 CLEAR	76.6*	70.7	69.5	69.5	71.4
MOT. OCTANE F-2 CLEAR	74.5*	67.5	67.3	67.3	67.9
TOTAL PARAFFINS, LV%	62.4a	44.4a	50.9a	50.9a	42.0a
OLEFINS, LV%	.7*	.9	.8*	.8*	1.0
NAPHTHENES, LV%	34.2a	42.3a	40.6a	40.6a	43.2a
AROMATICS, LV%	2.8a	12.4a	7.7a	7.7a	13.8a
REID VAPOR PRESSURE, psi	12.79*	.62	1.55	1.55	.31
FLASH PT(API Pen-Mar clsd cup),F		93.c	37.c	37.c	105.c
Flash Point Measured	22.*	93.	58.	58.	106.
FLASH PT(CHV Pen-Mar clsd cup),F		92.c			105.c
HEATING VAL, GROSS 10**6 Btu/bbl	4.88c	5.46c	5.31c	5.31c	5.50c
FREEZE POINT, F	-135.*	-115.n	-123.n	-123.n	-113.n
CLOUD POINT, F	-141.c	-114.c	-129.c	-129.c	-110.c
POUR POINT, F	-145.c	-112.*	-133.c	-133.c	-108.*
SMOKE POINT (ASTM), mm	29.*	24.	26.	26.	23.
ANILINE POINT, F		124.*	123.*	123.*	125.
CETANE INDEX		36.7*	36.0*	36.0*	37.0
DIESEL INDEX		62.9@	71.3@	71.3@	61.0c
VISCOSITY, cSt @ 100 F (38 C)		.8*			.9*
VISCOSITY, cSt @ 104 F (40 C)		.8c			.9c
VISCOSITY, cSt @ 122 F (50 C)		.7*	.5*	.5*	.8
VISCOSITY, cSt @ 140 F (60 C)		.6c			.7c
VISCOSITY, cSt @ 212 F (100 C)		.5c			.5c
VISCOSITY, cSt @ 275 F (135 C)		.4@			.4c

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	10.59	14.01	20.01	27.27	28.01
YIELD AT END-OF-CUT, LV%	14.01	20.01	27.27	28.01	36.33
YIELD OF CUT (LV% OF CRUDE)	3.42	6.00	7.26	.74	8.32
YIELD AT START-OF-CUT, WT%	8.01@	10.93@	16.30@	23.06@	23.75@
YIELD AT END-OF-CUT, WT%	10.93@	16.30@	23.06@	23.75@	31.69@
YIELD OF CUT (WT% OF CRUDE)	2.92@	5.37@	6.76@	.69@	7.94@
API GRAVITY 60F	45.1	37.5	31.0	29.1	26.9
SPECIFIC GRAVITY 60/60	.8014	.8373	.8708	.8813	.8932
CHARACT. FACTOR (K-FACTOR)	11.61c	11.47c	11.35c	11.43c	11.44c
MOLECULAR WEIGHT	147.c	172.c	202.c	226.c	249.c
SULFUR, WT%	.043	.150	.450	.594	.697
MERCAPTAN SULFUR, ppm			7.	9.	11.
NITROGEN, ppm			17.6	30.5	115.2
BASIC NITROGEN, ppm	3.6	3.7	12.8	32.2	79.8
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	323.	381.	467.	557.	571.
VL TBP BOILING CURVE,DEG F - 10%	325.	386.	471.	558.	576.
VL TBP BOILING CURVE,DEG F - 30%	335.	407.	489.	560.	593.
VL TBP BOILING CURVE,DEG F - 50%	345.	425.	507.	562.	609.
VL TBP BOILING CURVE,DEG F - 70%	356.	441.	528.	563.	624.
VL TBP BOILING CURVE,DEG F - 90%	369.	456.	548.	565.	638.
VL TBP BOILING CURVE,DEG F - 95%	372.	459.	552.	566.	641.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	333.c	398.c	479.c	547.c	577.c
ASTM BOILING CURVE, DEG F - 5%	333.	399.	480.	547.	578.
ASTM BOILING CURVE, DEG F - 10%	334.c	400.c	480.c	547.c	579.c
ASTM BOILING CURVE, DEG F - 30%	336.c	408.c	486.c	547.c	585.c
ASTM BOILING CURVE, DEG F - 50%	341.c	417.c	496.c	547.c	593.c
ASTM BOILING CURVE, DEG F - 70%	347.c	427.c	508.c	548.c	601.c
ASTM BOILING CURVE, DEG F - 90%	353.c	435.c	521.c	549.c	609.c
ASTM BOILING CURVE, DEG F - 95%	358.	440.	527.	550.	614.
ASTM BOILING CURVE, DEG F - EP	364.c	447.c	535.c	552.c	621.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	93.1	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	70.5*				
MOT. OCTANE F-2 CLEAR	67.2*				
TOTAL PARAFFINS, LV%	36.3a	34.3a	38.5a	36.6a	36.7a
OLEFINS, LV%	1.3	1.5	.8	.5	.2
NAPHTHENES, LV%	46.9a	45.1a	34.8a	33.4a	32.9a
AROMATICS, LV%	15.6a	19.1a	25.9a	29.5a	30.1a
REID VAPOR PRESSURE, psi	.07	.02*	.00c		
FLASH PT(API Pen-Mar clsd cup),F	119.c	164.c	211.c	244.c	258.c
Flash Point Measured	127.	176.	239.	274.	307.
FLASH PT(CHV Pen-Mar clsd cup),F	119.c	168.c	229.c	279.c	302.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.59c	5.76c	5.92c	5.97c	6.02c
FREEZE POINT, F	-106.n	-76.n	-21.n	-6.n	7.*
CLOUD POINT, F	-102.c	-74.c	-26.c	-9.c	6.c
POUR POINT, F	-97.n	-72.n	-30.n	-13.n	5.n
SMOKE POINT (ASTM), mm	22.	19.	15.	13.	12.*
ANILINE POINT, F	126.	131.	136.	139.	146.
CETANE INDEX	37.4	38.5	40.1	41.0	42.1
DIESEL INDEX	56.7c	49.1c	42.0c	40.5c	39.2c
VISCOSITY, cSt @ 100 F (38 C)	1.1*	1.7	3.1	4.7	7.3
VISCOSITY, cSt @ 104 F (40 C)	1.0c	1.6c	3.0c	4.5c	6.8c
VISCOSITY, cSt @ 122 F (50 C)	.9	1.3	2.4	3.6	5.3
VISCOSITY, cSt @ 140 F (60 C)	.8c	1.1c	2.0c	3.0c	4.2c
VISCOSITY, cSt @ 212 F (100 C)	.5c	.7c	1.1c	1.6c	2.1c
VISCOSITY, cSt @ 275 F (135 C)	.4c	.5c	.7c	1.1c	1.3c
RAMSBOTTOM CARBON, WT%					.03c
CONRADSON CARBON, WT%				.01*	.01*

VANADIUM, ppm	.02*	.02*
NICKEL, ppm	0.00z	.01*

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1382.s	1382.s
YIELD AT START-OF-CUT, LV%	36.33	41.70	36.33	69.42	36.33
YIELD AT END-OF-CUT, LV%	41.70	69.42	69.42	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	5.37	27.72	33.09	30.58	63.67
YIELD AT START-OF-CUT, WT%	31.69@	36.92@	31.69@	64.92@	31.69@
YIELD AT END-OF-CUT, WT%	36.92@	64.92@	64.92@	100.00@	100.00@
YIELD OF CUT (WT% OF CRUDE)	5.24@	28.00@	33.24@	35.08@	68.31@
API GRAVITY 60F	23.4	18.1	19.0	.3	9.4b
SPECIFIC GRAVITY 60/60	.9135	.9456	.9404	1.0736	1.0043b
CHARACT. FACTOR (K-FACTOR)	11.39c	11.61c	11.61c	11.45c	11.47c
MOLECULAR WEIGHT	280.c	421.c	403.c		
SULFUR, WT%	1.028	1.180	1.156	2.156	1.670
MERCAPTAN SULFUR, ppm	13.*				
NITROGEN, ppm	479.9	1902.2	1678.1	6853.0	4335.0
BASIC NITROGEN, ppm	194.2	680.5b	603.9b	2099.8	1337.5b
HYDROGEN, WT%				8.5c	10.6c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	647.	715.	659.	1031.	673.
VL TBP BOILING CURVE,DEG F - 10%	650.	735.	675.	1051.	710.
VL TBP BOILING CURVE,DEG F - 30%	659.	813.	762.	1128.s	862.
VL TBP BOILING CURVE,DEG F - 50%	669.	863.	841.	1203.s	994.
VL TBP BOILING CURVE,DEG F - 70%	679.	909.	894.	1275.s	1157.s
VL TBP BOILING CURVE,DEG F - 90%	691.	975.	968.	1346.s	1308.s
VL TBP BOILING CURVE,DEG F - 95%	694.	993.	989.	1364.s	1345.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1382.s	1382.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	652.c	732.c	676.c	1047.s	683.c
ASTM BOILING CURVE, DEG F - 5%	653.	740.	682.	1057.	698.
ASTM BOILING CURVE, DEG F - 10%	654.c	751.c	691.c	1068.c	718.c
ASTM BOILING CURVE, DEG F - 30%	661.c	821.c	771.c	1137.s	867.c
ASTM BOILING CURVE, DEG F - 50%	669.c	863.c	841.c	1203.s	994.c
ASTM BOILING CURVE, DEG F - 70%	679.c	909.c	894.c	1275.s	1157.s
ASTM BOILING CURVE, DEG F - 90%	691.c	975.c	968.c	1346.s	1308.s
ASTM BOILING CURVE, DEG F - 95%	694.	993.	989.	1364.s	1345.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1382.s	1382.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	26.5	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	91.8	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	10.6	0.0	3.6
TOTAL PARAFFINS, LV%	19.9a	12.3a	13.6a		
OLEFINS, LV%	.0*				
NAPHTHENES, LV%	41.4a	37.3a	38.0a		
AROMATICS, LV%	38.7a	50.4a	48.5a		
FLASH PT(API Pen-Mar clsd cup),F	282.c	313.c	299.c	341.c	306.c
Flash Point Measured	348.	432.b	419.b	528.	474.b
FLASH PT(CHV Pen-Mar clsd cup),F	350.c				
HEATING VAL, GROSS 10**6 Btu/bbl	6.10c	6.25c	6.23c	6.69c	6.46c
HEATING VAL, NET, 10**6 Btu/bbl				6.40c	6.13c
FREEZE POINT F	43.c				
CLOUD POINT, F	37.c				
POUR POINT, F	33.n	89.n	83.n	150.	124.
ANILINE POINT, F	148.	173.	169.		
CETANE INDEX	44.8*				
DIESEL INDEX	34.6c	31.4c	32.1c		
VISCOSITY, cSt @ 100 F (38 C)	15.5				
VISCOSITY, cSt @ 104 F (40 C)	14.3c	228.5c	134.4c	5.7E+11c	2.98E+5c
VISCOSITY, cSt @ 122 F (50 C)	10.4	116.0	72.2	2.8E+10	43800.1b
VISCOSITY, cSt @ 140 F (60 C)	7.3c	65.1c	42.5c	2.09E+9c	9018.3c
VISCOSITY, cSt @ 210 F (99 C)	2.7*	13.1	9.8*	1.44E+6	163.4
VISCOSITY, cSt @ 212 F (100 C)	2.7c	12.7c	9.5c	1.23E+6c	150.9c
VISCOSITY, cSt @ 275 F (135 C)	1.5c	5.2c	4.2c	22396.3c	22.3c
RAMSBOTTOM CARBON, WT%	.03c	.44c	.39c	36.52	19.28
CONRADSON CARBON, WT%	.02	.52	.44	33.95	19.27

VANADIUM, ppm	.02	.28	.23	593.99	303.57
NICKEL, ppm	.04	.26	.23	261.63	134.92
ASPHALTENES, WT%				74.3	15.0
SOFTENING POINT				237.5	115.7*
PENETRATION, dmm					86.0c

*** Meaning of the codes which follow table values:

- * - Obtained by curve extrapolation
- c - Calculated from other properties
- @ - Calculated from curve extrapolation of other properties
- g - Calculated from GC analysis data
- = - Calculated from combination of GC and dist. curve data
- + - As above, but had to extrapolate dist. curve
- d - Distillate property curve used for resid property
- r - Resid property curve used for distillate property
- b - Both distillate and resid property curves used
- s - Suspect value - may be inaccurate
- n - Cloud Point, Pour Point, or Freeze Point interpolated from property curve
- o - Calculated with distillate separation inefficiency modeling
- p - Cloud, Pour, Freeze interpolated from property curve with distillate separation inefficiency modeling
- q - Cloud Point suspect negative area under cloud point index curve for cut
- i - Property value adjusted after integration
- z - Property value reset to zero after being estimated negative
- w - This property is not whole crude balanced and is interpolated from the resid curve
- m - Value suspect 1 or more of the crudes did not include this property
- a - PNA Adjustment Applied

CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: Mayna25 - Mayna
Country: Peru.
Library: CORPORATE

Run Date: 04/07/02 (13:38:00)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: Core Labs Mayna crude assay received from PetroPeru on 12/12/01

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	25.7	25.9*	C2	0.00	0.00
SG 60/60	.9001	.8992*	C3	0.04	0.02
Dens @15			IC4	0.05	0.03
S, WT%	.42	.41*	NC4	0.06	0.04
N2, ppm	1217.0	1240.*	IC5	0.16	0.11
H2, WT%			NC5	0.18	0.13
RVP	.52	.42	CP	0.00	0.00
Va, ppm	14.00	13.87		----	----
Ni, ppm	9.20	11.10		0.49	0.33
CCR, wt%		10.93			
RAMSBOTT		3.45			
POUR, F	10.0				
VOL YLD					
NEUT	.48				
SALT pkb					
cSt@ 60F		147.13			
cSt@ 77F		83.19			
cSt@104F		39.21			
cSt@100F	43.39		MERCAP S	10.00	
cSt@122F	25.82		K Factor	11.90	

	XS	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	180.	316.
TBP TEMP AT END-OF-CUT, F	180.	316.	292.	292.	321.
YIELD AT START-OF-CUT, LV%	.33	7.16	1.96	1.96	8.42
YIELD AT END-OF-CUT, LV%	1.96	8.42	7.16	7.16	8.70
YIELD OF CUT (LV% OF CRUDE)	1.63	1.25	5.20	5.20	.28
YIELD AT START-OF-CUT, WT%	.21@	5.59@	1.36@	1.36@	6.66@
YIELD AT END-OF-CUT, WT%	1.36@	6.66@	5.59@	5.59@	6.90@
YIELD OF CUT (WT% OF CRUDE)	1.15@	1.07@	4.23@	4.23@	.24@
API GRAVITY 60F	92.2	53.3	62.1	62.1	51.4
SPECIFIC GRAVITY 60/60	.6325	.7655	.7308	.7308	.7738
CHARACT. FACTOR (K-FACTOR)	13.53c	11.94c	12.13c	12.13c	11.89c
MOLECULAR WEIGHT	104.6	137.c	119.c	119.c	140.c
SULFUR, WT%	0.000z	.003	<.001	<.001	.005
MERCAPTAN SULFUR, ppm	13.*	6.	10.	10.	6.
NITROGEN, ppm		.0			.0
BASIC NITROGEN, ppm	.0*		<.001	<.001	
VL TBP BOILING CURVE,DEG F - ST	55.	292.	180.	180.	316.
VL TBP BOILING CURVE,DEG F - 5%	82.	293.	188.	188.	316.
VL TBP BOILING CURVE,DEG F - 10%	105.	295.	196.	196.	317.
VL TBP BOILING CURVE,DEG F - 30%	156.	300.	220.	220.	318.
VL TBP BOILING CURVE,DEG F - 50%	166.	304.	238.	238.	319.
VL TBP BOILING CURVE,DEG F - 70%	169.	309.	259.	259.	320.
VL TBP BOILING CURVE,DEG F - 90%	175.	314.	281.	281.	321.
VL TBP BOILING CURVE,DEG F - 95%	178.	315.	287.	287.	321.
VL TBP BOILING CURVE,DEG F - EP	180.	316.	292.	292.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	112.c	298.c	215.c	215.c	315.c
ASTM BOILING CURVE, DEG F - 5%	125.	298.	217.	217.	315.
ASTM BOILING CURVE, DEG F - 10%	136.c	299.c	219.c	219.c	315.c
ASTM BOILING CURVE, DEG F - 30%	163.c	300.c	228.c	228.c	315.c
ASTM BOILING CURVE, DEG F - 50%	167.c	301.c	237.c	237.c	315.c
ASTM BOILING CURVE, DEG F - 70%	168.c	304.c	250.c	250.c	315.c
ASTM BOILING CURVE, DEG F - 90%	171.c	305.c	264.c	264.c	316.c
ASTM BOILING CURVE, DEG F - 95%	175.	308.	271.	271.	317.
ASTM BOILING CURVE, DEG F - EP	180.c	311.c	279.c	279.c	318.c
PERCENT EVAP @ 70C (E70), LV%	24.4	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	100.0	0.0	97.4	97.4	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0

PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	70.2*	47.4	59.5	59.5	45.5
MOT. OCTANE F-2 CLEAR	65.8*	64.5	64.5*	64.5*	64.5
TOTAL PARAFFINS, LV%	82.8a	59.0a	69.8a	69.8a	56.5a
OLEFINS, LV%		.5	.3	.3	.6
NAPHTHENES, LV%	14.4a	37.2a	26.6a	26.6a	39.3a
AROMATICS, LV%	2.8a	3.2a	3.3a	3.3a	3.7a
REID VAPOR PRESSURE, psi	12.78*	.22	2.24	2.24	.15
FLASH PT(API Pen-Mar clsd cup),F		93.c	31.c	31.c	105.c
Flash Point Measured	9.*	93.	47.	47.	105.
FLASH PT(CHV Pen-Mar clsd cup),F		93.c			105.c
HEATING VAL, GROSS 10**6 Btu/bbl	4.69c	5.41c	5.22c	5.22c	5.45c
FREEZE POINT, F		-87.n			-84.n
CLOUD POINT, F		-93.c			-90.c
POUR POINT, F		-100.n			-95.n
SMOKE POINT (ASTM), mm	30.*	26.	29.	29.	25.
ANILINE POINT, F		142.*			143.
CETANE INDEX		33.8c			37.8*
DIESEL INDEX		76.0@			73.4c
VISCOSITY, cSt @ 100 F (38 C)		.8*			.9
VISCOSITY, cSt @ 104 F (40 C)		.8c			.9c
VISCOSITY, cSt @ 122 F (50 C)		.7*			.8
VISCOSITY, cSt @ 140 F (60 C)		.7c			.8c
VISCOSITY, cSt @ 212 F (100 C)		.5c			.5c
VISCOSITY, cSt @ 275 F (135 C)		.4@			.4c

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	8.70	11.46	16.67	22.38	22.98
YIELD AT END-OF-CUT, LV%	11.46	16.67	22.38	22.98	33.09
YIELD OF CUT (LV% OF CRUDE)	2.77	5.20	5.72	.60	10.10
YIELD AT START-OF-CUT, WT%	6.90@	9.33@	14.12@	19.55@	20.12@
YIELD AT END-OF-CUT, WT%	9.33@	14.12@	19.55@	20.12@	29.85@
YIELD OF CUT (WT% OF CRUDE)	2.44@	4.79@	5.42@	.57@	9.73@
API GRAVITY 60F	47.2	39.5	34.3	33.2	31.9
SPECIFIC GRAVITY 60/60	.7920	.8276	.8534	.8589	.8660
CHARACT. FACTOR (K-FACTOR)	11.75c	11.60c	11.58c	11.72c	11.83c
MOLECULAR WEIGHT	148.c	173.c	204.c	231.c	260.c
SULFUR, WT%	.010	.037	.089	.126	.164
MERCAPTAN SULFUR, ppm	7.	12.	15.	16.	16.
NITROGEN, ppm		.2	2.4	5.1	17.4
BASIC NITROGEN, ppm	.1	.9	3.4	5.8	13.1
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	323.	381.	467.	557.	573.
VL TBP BOILING CURVE,DEG F - 10%	326.	386.	471.	558.	579.
VL TBP BOILING CURVE,DEG F - 30%	336.	407.	488.	560.	601.
VL TBP BOILING CURVE,DEG F - 50%	346.	425.	506.	562.	616.
VL TBP BOILING CURVE,DEG F - 70%	357.	441.	527.	563.	629.
VL TBP BOILING CURVE,DEG F - 90%	369.	456.	548.	565.	639.
VL TBP BOILING CURVE,DEG F - 95%	372.	459.	552.	566.	642.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	334.c	399.c	479.c	547.c	581.c
ASTM BOILING CURVE, DEG F - 5%	334.	399.	479.	547.	583.
ASTM BOILING CURVE, DEG F - 10%	334.c	401.c	480.c	547.c	584.c
ASTM BOILING CURVE, DEG F - 30%	337.c	408.c	485.c	547.c	592.c
ASTM BOILING CURVE, DEG F - 50%	342.c	417.c	495.c	547.c	600.c
ASTM BOILING CURVE, DEG F - 70%	348.c	427.c	508.c	548.c	606.c
ASTM BOILING CURVE, DEG F - 90%	354.c	435.c	521.c	549.c	612.c
ASTM BOILING CURVE, DEG F - 95%	358.	440.	527.	550.	616.
ASTM BOILING CURVE, DEG F - EP	364.c	447.c	534.c	552.c	622.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	92.7	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	41.3				
MOT. OCTANE F-2 CLEAR	63.7	59.8*			
TOTAL PARAFFINS, LV%	54.5a	50.5a	47.8a	47.6a	47.8a
OLEFINS, LV%	.6	.9	1.3*	1.5*	
NAPHTHENES, LV%	39.0a	40.2a	39.7a	37.2a	36.1a
AROMATICS, LV%	5.9a	8.4a	11.2a	13.7a	16.2a
REID VAPOR PRESSURE, psi	.06	.01c	.00c		
FLASH PT(API Pen-Mar clsd cup),F	119.c	164.c	211.c	244.c	260.c
Flash Point Measured	129.	178.	219.	241.	270.
FLASH PT(CHV Pen-Mar clsd cup),F	119.c	168.c	228.c	279.c	306.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.55c	5.73c	5.85c	5.89c	5.93c
FREEZE POINT, F	-78.n	-55.n	-19.n	-8.n	3.n
CLOUD POINT, F	-79.c	-54.c	-24.c	-13.c	1.c
POUR POINT, F	-80.n	-53.n	-29.n	-17.n	-.n
SMOKE POINT (ASTM), mm	24.	21.	17.	15.	13.
ANILINE POINT, F	144.	148.	155.	160.	169.
CETANE INDEX	38.8*	41.2*	45.6	48.2	48.4
DIESEL INDEX	68.0c	58.3c	53.0c	53.3c	54.0c
VISCOSITY, cSt @ 100 F (38 C)	1.2	1.7	3.0	3.9	5.9
VISCOSITY, cSt @ 104 F (40 C)	1.1c	1.7c	2.8c	3.7c	5.5c
VISCOSITY, cSt @ 122 F (50 C)	1.0	1.5	2.3	2.8	4.2
VISCOSITY, cSt @ 140 F (60 C)	.9c	1.4c	1.9c	2.2c	3.3c
VISCOSITY, cSt @ 212 F (100 C)	.6c	1.0c	1.1c	1.1c	1.6c
VISCOSITY, cSt @ 275 F (135 C)	.5c	.8c	.7c	.7c	1.0c
CONRADSON CARBON, WT%				0.00	0.00

VANADIUM, ppm	0.00z	.00*
NICKEL, ppm	0.00z	.00*

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1300.s	1300.s
YIELD AT START-OF-CUT, LV%	33.09	39.98	33.09	74.66	33.09
YIELD AT END-OF-CUT, LV%	39.98	74.66	74.66	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	6.90	34.67	41.57	25.34	66.91
YIELD AT START-OF-CUT, WT%	29.85@	36.61@	29.85@	71.61@	29.85@
YIELD AT END-OF-CUT, WT%	36.61@	71.61@	71.61@	100.00@	100.00@
YIELD OF CUT (WT% OF CRUDE)	6.76@	35.00@	41.76@	28.39@	70.15@
API GRAVITY 60F	29.1	24.4	25.1	9.0	18.6
SPECIFIC GRAVITY 60/60	.8810	.9078	.9034	1.0074	.9428
CHARACT. FACTOR (K-FACTOR)	11.81c	12.04c	12.03c	12.07c	11.97c
MOLECULAR WEIGHT	288.c	422.c	402.c		479.c
SULFUR, WT%	.280	.402	.383	.798	.551b
MERCAPTAN SULFUR, ppm	11.				
NITROGEN, ppm	67.5	573.7	491.8	3638.5	1765.4b
BASIC NITROGEN, ppm	34.0	168.2	146.5	886.9	540.0b
HYDROGEN, WT%				10.5c	12.7c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	647.	713.	658.	1027.	667.
VL TBP BOILING CURVE,DEG F - 10%	649.	730.	673.	1042.	695.
VL TBP BOILING CURVE,DEG F - 30%	658.	796.	751.	1102.s	818.
VL TBP BOILING CURVE,DEG F - 50%	668.	846.	823.	1160.s	918.
VL TBP BOILING CURVE,DEG F - 70%	679.	897.	880.	1217.s	1075.
VL TBP BOILING CURVE,DEG F - 90%	691.	969.	961.	1272.s	1227.s
VL TBP BOILING CURVE,DEG F - 95%	694.	990.	986.	1286.s	1263.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1300.s	1300.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	651.c	729.c	676.c	1043.s	683.c
ASTM BOILING CURVE, DEG F - 5%	652.	737.	682.	1050.	693.
ASTM BOILING CURVE, DEG F - 10%	653.c	747.c	690.c	1058.c	709.c
ASTM BOILING CURVE, DEG F - 30%	660.c	804.c	760.c	1110.s	826.c
ASTM BOILING CURVE, DEG F - 50%	668.c	846.c	823.c	1160.s	918.c
ASTM BOILING CURVE, DEG F - 70%	679.c	897.c	880.c	1217.s	1075.c
ASTM BOILING CURVE, DEG F - 90%	691.c	969.c	961.c	1272.s	1227.s
ASTM BOILING CURVE, DEG F - 95%	694.	990.	986.	1286.s	1263.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1300.s	1300.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	31.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	91.9	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	11.8	0.0	3.3
TOTAL PARAFFINS, LV%	32.4a	22.3a	24.0a		
NAPHTHENES, LV%	49.1a	49.3a	49.3a		
AROMATICS, LV%	18.6a	28.3a	26.7a		
FLASH PT(API Pen-Mar clsd cup),F	282.c	311.c	299.c	341.c	304.c
Flash Point Measured	312.	263.b	271.b	674.	394.b
FLASH PT(CHV Pen-Mar clsd cup),F	350.c				
HEATING VAL, GROSS 10**6 Btu/bbl	6.00c	6.13c	6.11c	6.54c	6.28c
HEATING VAL, NET, 10**6 Btu/bbl				6.21c	5.90c
FREEZE POINT, F	37.c				
CLOUD POINT, F	31.c				
POUR POINT, F	27.n	88.n	82.n	120.	69.
ANILINE POINT, F	177.	203.	199.		
CETANE INDEX	46.7				
DIESEL INDEX	51.5c	49.5c	50.0c		
VISCOSITY, cSt @ 100 F (38 C)	11.1				
VISCOSITY, cSt @ 104 F (40 C)	10.3c	76.8c	52.0c	2.11E+8c	706.2c
VISCOSITY, cSt @ 122 F (50 C)	7.5	46.4	32.6	3.15E+7	368.0b
VISCOSITY, cSt @ 140 F (60 C)	5.7c	30.0c	21.8c	5.96E+6c	207.9c
VISCOSITY, cSt @ 210 F (99 C)	2.5*	8.6	6.9*	49342.8	39.7b
VISCOSITY, cSt @ 212 F (100 C)	2.5c	8.4c	6.7c	44351.0c	38.3c
VISCOSITY, cSt @ 275 F (135 C)	1.5c	4.1c	3.4c	2809.6c	14.5c
RAMSBOTTOM CARBON, WT%		.27c	.24c	14.39	4.91
CONRADSON CARBON, WT%	0.00	.29	.24	15.46	6.26
VANADIUM, ppm	.01	.06	.05	50.37	19.77

NICKEL, ppm	.01	.18	.15	37.78	15.82
ASPHALTENES, WT%				12.7	3.2
SOFTENING POINT				110.9	.9*
PENETRATION, dmm				112.4c	>300.0

*** Meaning of the codes which follow table values:

- * - Obtained by curve extrapolation
- c - Calculated from other properties
- @ - Calculated from curve extrapolation of other properties
- g - Calculated from GC analysis data
- = - Calculated from combination of GC and dist. curve data
- + - As above, but had to extrapolate dist. curve
- d - Distillate property curve used for resid property
- r - Resid property curve used for distillate property
- b - Both distillate and resid property curves used
- s - Suspect value - may be inaccurate
- n - Cloud Point, Pour Point, or Freeze Point interpolated from property curve
- o - Calculated with distillate separation inefficiency modeling
- p - Cloud, Pour, Freeze interpolated from property curve with distillate separation inefficiency modeling
- q - Cloud Point suspect negative area under cloud point index curve for cut
- i - Property value adjusted after integration
- z - Property value reset to zero after being estimated negative
- w - This property is not whole crude balanced and is interpolated from the resid curve
- m - Value suspect 1 or more of the crudes did not include this property
- a - PNA Adjustment Applied

CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: Mesa30 - Mesa 30
Country: Venezuela
Library: CORPORATE

Run Date: 04/07/02 (13:38:08)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: PDVSA assay received from PetroPeru on 12/12/01

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	30.0	29.9*	C2	0.00	0.00
SG 60/60	.8762	.8766*	C3	0.09	0.05
Dens @15			IC4	0.16	0.10
S, WT%	1.08	.97*	NC4	0.61	0.41
N2, ppm	2222.0	2106.*	IC5	0.86	0.61
H2, WT%			NC5	0.99	0.71
RVP	5.42	1.01	CP	0.00	0.00
Va, ppm	53.00	44.45		----	----
Ni, ppm	9.00	10.46		2.71	1.89
CCR, wt%		5.35			
POUR, F	-35.0				
VOL YLD					
NEUT	.03				
SALT pkb					
cSt@ 60F		14.84			
cSt@ 77F		11.34			
cSt@104F		7.84			
cSt@100F	8.25		K Factor	11.90	
cSt@122F	6.33		WAX	5.26	
MERCAP S	6.30		ASH	.02	

	X5	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	180.	316.
TBP TEMP AT END-OF-CUT, F	180.	316.	292.	292.	321.
YIELD AT START-OF-CUT, LV%	.74	16.27	3.75	3.75	18.45
YIELD AT END-OF-CUT, LV%	3.75	18.45	16.27	16.27	18.91
YIELD OF CUT (LV% OF CRUDE)	3.01	2.18	12.52	12.52	.46
YIELD AT START-OF-CUT, WT%	.52@	13.44@	2.86@	2.86@	15.37@
YIELD AT END-OF-CUT, WT%	2.86@	15.37@	13.44@	13.44@	15.78@
YIELD OF CUT (WT% OF CRUDE)	2.34@	1.93@	10.59@	10.59@	.41@
API GRAVITY 60F	76.4	50.5	59.4	59.4	49.2
SPECIFIC GRAVITY 60/60	.6806	.7775	.7410	.7410	.7830
CHARACT. FACTOR (K-FACTOR)	12.50c	11.76c	11.91c	11.91c	11.75c
MOLECULAR WEIGHT	100.8	135.c	116.c	116.c	140.c
SULFUR, WT%	.003*	.011	.002	.002	.015
MERCAPTAN SULFUR, ppm	1.*	1.	1.	1.	2.
VL TBP BOILING CURVE,DEG F - ST	55.	292.	180.	180.	316.
VL TBP BOILING CURVE,DEG F - 5%	76.	293.	187.	187.	316.
VL TBP BOILING CURVE,DEG F - 10%	94.	294.	193.	193.	317.
VL TBP BOILING CURVE,DEG F - 30%	139.	299.	210.	210.	318.
VL TBP BOILING CURVE,DEG F - 50%	155.	304.	229.	229.	319.
VL TBP BOILING CURVE,DEG F - 70%	167.	309.	252.	252.	320.
VL TBP BOILING CURVE,DEG F - 90%	176.	314.	278.	278.	321.
VL TBP BOILING CURVE,DEG F - 95%	178.	315.	285.	285.	321.
VL TBP BOILING CURVE,DEG F - EP	180.	316.	292.	292.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	110.c	298.c	210.c	210.c	315.c
ASTM BOILING CURVE, DEG F - 5%	119.	298	211.	211.	315.
ASTM BOILING CURVE, DEG F - 10%	126.c	298.c	213.c	213.c	315.c
ASTM BOILING CURVE, DEG F - 30%	148.c	299.c	218.c	218.c	315.c
ASTM BOILING CURVE, DEG F - 50%	156.c	301.c	228.c	228.c	315.c
ASTM BOILING CURVE, DEG F - 70%	163.c	303.c	243.c	243.c	315.c
ASTM BOILING CURVE, DEG F - 90%	167.c	305.c	260.c	260.c	316.c
ASTM BOILING CURVE, DEG F - 95%	171.	308.	269.	269.	317.
ASTM BOILING CURVE, DEG F - EP	175.c	311.c	278.c	278.c	318.c
PERCENT EVAP @ 70C (E70), LV%	54.4	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	100.0	0.0	7.2	7.2	0.0
PERCENT EVAP @ 135C (E135), LV%	100.0	0.0	98.5	98.5	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0

RES. OCTANE F-1 CLEAR	69.9*	52.5	61.6	61.6	50.8
MOT. OCTANE F-2 CLEAR	70.0*	53.7	59.8	59.8	53.1
TOTAL PARAFFINS, LV%	75.0a	48.9a	55.4a	55.4a	48.5a
ISO-PARAFFINS, LV%	38.2*	29.6	32.4	32.4	29.1
NORMAL-PARAFFINS, LV%	36.8*	19.3	23.0	23.0	19.4
NAPHTHENES, LV%	20.2a	27.9a	28.9a	28.9a	26.1a
AROMATICS, LV%	4.8a	23.2a	15.7a	15.7a	25.4a
REID VAPOR PRESSURE, psi	9.69*	1.49	3.28	3.28	1.33
FLASH PT(API Pen-Mar clsd cup),F		93.c	26.c	26.c	105.c
Flash Point Measured	84.*	128.	107.	107.	132.
FLASH PT(CHV Pen-Mar clsd cup),F		92.c			105.c
HEATING VAL, GROSS 10**6 Btu/bbl	4.94@	5.47c	5.27c	5.27c	5.50c
FREEZE POINT, F		-64.n			-62.n
CLOUD POINT, F		-70.c			-68.c
POUR POINT, F		-74.c			-72.c
SMOKE POINT (ASTM), mm		23.	24.*	24.*	23.
CETANE INDEX		27.6c			30.0c
VISCOSITY, cSt @ 100 F (38 C)		.5			.5
VISCOSITY, cSt @ 104 F (40 C)		.6c			.6c
VISCOSITY, cSt @ 122 F (50 C)		1.7*			1.8*
VISCOSITY, cSt @ 140 F (60 C)		14.8c			11.8c

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	18.91	23.90	32.35	42.18	43.14
YIELD AT END-OF-CUT, LV%	23.90	32.35	42.18	43.14	51.57
YIELD OF CUT (LV% OF CRUDE)	4.99	8.44	9.83	.96	8.43
YIELD AT START-OF-CUT, WT%	15.78@	20.31@	28.23@	37.75@	38.69@
YIELD AT END-OF-CUT, WT%	20.31@	28.23@	37.75@	38.69@	47.11@
YIELD OF CUT (WT% OF CRUDE)	4.53@	7.92@	9.52@	.95@	8.41@
API GRAVITY 60F	46.5	40.7	35.2	32.5	30.3
SPECIFIC GRAVITY 60/60	.7951	.8217	.8488	.8627	.8746
CHARACT. FACTOR (K-FACTOR)	11.71c	11.66c	11.66c	11.67c	11.68c
MOLECULAR WEIGHT	148.c	172.c	207.c	230.c	252.c
SULFUR, WT%	.022	.087	.517	.776	.922
MERCAPTAN SULFUR, ppm	2.	2.	5.	7.	8.
NITROGEN, ppm					320.9*
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	324.	380.	468.	557.	570.
VL TBP BOILING CURVE,DEG F - 10%	326.	384.	473.	558.	574.
VL TBP BOILING CURVE,DEG F - 30%	337.	402.	492.	560.	590.
VL TBP BOILING CURVE,DEG F - 50%	348.	420.	511.	561.	606.
VL TBP BOILING CURVE,DEG F - 70%	359.	437.	529.	563.	622.
VL TBP BOILING CURVE,DEG F - 90%	370.	454.	548.	565.	637.
VL TBP BOILING CURVE,DEG F - 95%	372.	459.	552.	566.	641.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	335.c	396.c	481.c	547.c	575.c
ASTM BOILING CURVE, DEG F - 5%	335.	396.	482.	547.	576.
ASTM BOILING CURVE, DEG F - 10%	336.c	397.c	483.c	547.c	576.c
ASTM BOILING CURVE, DEG F - 30%	339.c	403.c	489.c	547.c	581.c
ASTM BOILING CURVE, DEG F - 50%	344.c	412.c	499.c	547.c	589.c
ASTM BOILING CURVE, DEG F - 70%	349.c	423.c	511.c	548.c	599.c
ASTM BOILING CURVE, DEG F - 90%	355.c	433.c	521.c	549.c	608.c
ASTM BOILING CURVE, DEG F - 95%	359.	439.	528.	550.	613.
ASTM BOILING CURVE, DEG F - EP	365.c	446.c	535.c	552.c	620.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	91.7	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	47.9				
MOT. OCTANE F-2 CLEAR	51.7*				
TOTAL PARAFFINS, LV%	47.5a				
ISO-PARAFFINS, LV%	27.9				
NORMAL-PARAFFINS, LV%	19.6				
NAPHTHENES, LV%	22.7a				
AROMATICS, LV%	29.9a				
REID VAPOR PRESSURE, psi	1.03	.02c	.00c		
FLASH PT(API Pen-Mar clsd cup),F	120.c	162.c	212.c	244.c	257.c
Flash Point Measured	140.	163.	222.	257.	292.
FLASH PT(CHV Pen-Mar clsd cup),F	120.c	166.c	230.c	279.c	300.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.56c	5.70c	5.82c	5.88c	5.94c
FREEZE POINT, F	-55.n	-36.n	6.n	25.n	37.c
CLOUD POINT, F	-61.c	-42.c	-.c	14.c	31.c
POUR POINT, F	-65.c	-46.c	-4.c	3.*	27.n
SMOKE POINT (ASTM), mm	22.	20.	16.	13.	
ANILINE POINT, F		137.*	145.	152.	159.
CETANE INDEX	33.7c	41.1*	46.8	50.1	53.3
DIESEL INDEX		55.9@	51.2c	49.4c	48.2c
VISCOSITY, cSt @ 100 F (38 C)	.6	1.3	2.9	4.6	6.4
VISCOSITY, cSt @ 104 F (40 C)	.8c	1.4c	2.9c	4.4c	6.0c
VISCOSITY, cSt @ 122 F (50 C)	1.8*	2.1	2.7	3.4	4.8
VISCOSITY, cSt @ 140 F (60 C)	7.6c	1.1*	2.0	2.7	3.7
VISCOSITY, cSt @ 180 F (82 C)		.9*	1.2	1.7	2.8
VISCOSITY, cSt @ 210 F (99 C)				.9*	1.7*
VISCOSITY, cSt @ 212 F (100 C)	1.9E+19c	.8c	.9c	.8c	1.6c
VISCOSITY, cSt @ 275 F (135 C)		.5c	.5c	.5c	1.0c

RAMSBOTTOM CARBON, WT%	.08c	.10c	.11c
CONRADSON CARBON, WT%	*.06**	*.08*	*.09*
VANADIUM, ppm		0.00*	0.00*
NICKEL, ppm		0.00z	<.001*

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1204.s	1204.s
YIELD AT START-OF-CUT, LV%	51.57	57.34	51.57	84.47	51.57
YIELD AT END-OF-CUT, LV%	57.34	84.47	84.47	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	5.77	27.12	32.89	15.53	48.43
YIELD AT START-OF-CUT, WT%	47.11@	52.99@	47.11@	81.59@	47.11@
YIELD AT END-OF-CUT, WT%	52.99@	81.71@	81.71@	100.00@	100.00@
YIELD OF CUT (WT% OF CRUDE)	5.88@	28.72@	34.60@	18.41@	52.89@
API GRAVITY 60F	27.0	20.9b	22.0b	4.7*	16.3b
SPECIFIC GRAVITY 60/60	.8928	.9282b	.9220b	1.0390*	.9574b
CHARACT. FACTOR (K-FACTOR)	11.67c	11.76c	11.74c	11.51@	11.69c
MOLECULAR WEIGHT	287.c	410.c	381.c		456.c
SULFUR, WT%	1.124	1.373b	1.330b	2.027*	1.563b
NITROGEN, ppm	1100.3	2348.0b	2136.0b	7466.1*	3956.4
HYDROGEN, WT%				9.5@	12.2c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	648.	709.	660.	1021.	667.
VL TBP BOILING CURVE,DEG F - 10%	650.	722.	675.	1030.	689.
VL TBP BOILING CURVE,DEG F - 30%	661.	778.	736.	1069.	785.
VL TBP BOILING CURVE,DEG F - 50%	671.	843.	808.	1107.s	903.
VL TBP BOILING CURVE,DEG F - 70%	681.	910.	888.	1146.s	1023.
VL TBP BOILING CURVE,DEG F - 90%	692.	977.	970.	1185.s	1144.s
VL TBP BOILING CURVE,DEG F - 95%	694.	994.	991.	1194.s	1174.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1204.s	1204.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	652.c	726.c	676.c	1034.s	680.c
ASTM BOILING CURVE, DEG F - 5%	654.	732.	683.	1039.	690.
ASTM BOILING CURVE, DEG F - 10%	655.c	739.c	691.c	1044.c	703.c
ASTM BOILING CURVE, DEG F - 30%	663.c	787.c	744.c	1076.c	792.c
ASTM BOILING CURVE, DEG F - 50%	671.c	843.c	808.c	1107.s	903.c
ASTM BOILING CURVE, DEG F - 70%	681.c	910.c	888.c	1146.s	1023.c
ASTM BOILING CURVE, DEG F - 90%	692.c	977.c	970.c	1185.s	1144.s
ASTM BOILING CURVE, DEG F - 95%	694.	994.	991.	1194.s	1174.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1204.s	1204.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	12.8	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	90.1	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	13.1	0.0	4.5
FLASH PT(API Pen-Mar clsd cup),F	283.c	310.c	298.c	341.c	302.c
Flash Point Measured	364.	461.b	444.b	700.*	473.b
FLASH PT(CHV Pen-Mar clsd cup),F	351.c				
HEATING VAL, GROSS 10**6 Btu/bbl	6.02c	6.18c	6.15c	6.58@	6.29c
HEATING VAL, NET, 10**6 Btu/bbl				6.27@	5.92c
FREEZE POINT, F	65.c				
CLOUD POINT, F	59.c				
POUR POINT, F	55.n	91.b	85.b	123.	35.b
ANILINE POINT, F	169.	186.*	183.*		
CETANE INDEX	59.4				
DIESEL INDEX	45.6c	39.0@	40.2@		
VISCOSITY, cSt @ 100 F (38 C)	9.2				
VISCOSITY, cSt @ 104 F (40 C)	9.3c	263.5c	137.6c	8.93E+5c	355.2c
VISCOSITY, cSt @ 122 F (50 C)	9.6	88.0b	55.4b	2.81E+5*	203.1b
VISCOSITY, cSt @ 140 F (60 C)	7.3	37.1*	26.7*	1.01E+5c	124.2c
VISCOSITY, cSt @ 180 F (82 C)	4.5	19.8b	14.7b		50.4b
VISCOSITY, cSt @ 210 F (99 C)	3.3	11.3b	8.9b	4677.6*	29.3b
VISCOSITY, cSt @ 212 F (100 C)	3.3c	11.0c	8.7c	5530.2c	28.3c
VISCOSITY, cSt @ 275 F (135 C)	2.0c	4.7c	4.0c	5.63E+6*	11.9c
RAMSBOTTOM CARBON, WT%	.12c	.42c	.38c	25.41c	8.15c
CONRADSON CARBON, WT%	.10	.49	.42	25.41*	9.69b
VANADIUM, ppm	0.00	.07	.05	221.73*	84.04b
NICKEL, ppm	.00	.01	.01	49.82*	19.77b
ASPHALTENES, WT%				12.2*	4.4*
SOFTENING POINT				140.4*	94.1*

PENETRATION, dmm	34.7c	>300.0

*** Meaning of the codes which follow table values:

- * - Obtained by curve extrapolation
- c - Calculated from other properties
- @ - Calculated from curve extrapolation of other properties
- g - Calculated from GC analysis data
- = - Calculated from combination of GC and dist. curve data
- + - As above, but had to extrapolate dist. curve
- d - Distillate property curve used for resid property
- r - Resid property curve used for distillate property
- b - Both distillate and resid property curves used
- s - Suspect value - may be inaccurate
- n - Cloud Point, Pour Point, or Freeze Point interpolated from property curve
- o - Calculated with distillate separation inefficiency modeling
- p - Cloud, Pour, Freeze interpolated from property curve with distillate separation inefficiency modeling
- q - Cloud Point suspect negative area under cloud point index curve for cut
- i - Property value adjusted after integration
- z - Property value reset to zero after being estimated negative
- w - This property is not whole crude balanced and is interpolated from the resid curve
- m - Value suspect 1 or more of the crudes did not include this property
- a - PNA Adjustment Applied

CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: Orient23 - Oriente
Country: Equador
Library: CORPORATE

Run Date: 04/07/02 (13:38:18)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: Core Labs assay received from PetroPeru on 12/12/01

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	23.6	23.7*	C2	0.00	0.00
SG 60/60	.9123	.9119*	C3	0.24	0.13
Dens @15			IC4	0.16	0.10
S, WT%	1.58	1.52*	NC4	0.58	0.37
N2, ppm	2975.0	2997.*	IC5	0.59	0.40
H2, WT%			NC5	0.69	0.48
RVP	2.25	.99	CP	0.00	0.00
Va, ppm	224.00	228.39		----	----
Ni, ppm	92.00	93.02		2.26	1.49
CCR, wt%		16.22			
RAMSBOTT		9.55			
POUR, F	-45.0				
VOL YLD					
NEUT	.01				
SALT pkb					
cSt@ 60F		208.94			
cSt@ 77F		116.74			
cSt@104F		53.95			
cSt@100F	59.87		K Factor	11.80	
cSt@122F	35.06		ASH	.05	
MERCAP S	19.00				

	X5	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	180.	316.
TBP TEMP AT END-OF-CUT, F	180.	316.	292.	292.	321.
YIELD AT START-OF-CUT, LV%	.63	11.26	4.42	4.42	12.89
YIELD AT END-OF-CUT, LV%	4.42	12.89	11.26	11.26	13.24
YIELD OF CUT (LV% OF CRUDE)	3.79	1.63	6.84	6.84	.35
YIELD AT START-OF-CUT, WT%	.42@	8.79@	3.20@	3.20@	10.17@
YIELD AT END-OF-CUT, WT%	3.20@	10.17@	8.79@	8.79@	10.47@
YIELD OF CUT (WT% OF CRUDE)	2.79@	1.38@	5.59@	5.59@	.30@
API GRAVITY 60F	79.7*	51.4	58.5	58.5	50.3
SPECIFIC GRAVITY 60/60	.6701*	.7736	.7448	.7448	.7784
CHARACT. FACTOR (K-FACTOR)	12.50@	11.82c	11.91c	11.91c	11.82c
MOLECULAR WEIGHT	94.s	136.c	119.c	119.c	140.c
SULFUR, WT%	0.000z	.010	.002	.002	.018
MERCAPTAN SULFUR, ppm	1.*	1.	1.*	1.*	1.
NITROGEN, ppm	1.0*	.9	1.0	1.0	1.0
BASIC NITROGEN, ppm	1.0*	1.1	1.0	1.0	1.1
VL TBP BOILING CURVE,DEG F - ST	55.	292.	180.	180.	316.
VL TBP BOILING CURVE,DEG F - 5%	88.	293.	187.	187.	316.
VL TBP BOILING CURVE,DEG F - 10%	91.	294.	193.	193.	317.
VL TBP BOILING CURVE,DEG F - 30%	107.	299.	217.	217.	318.
VL TBP BOILING CURVE,DEG F - 50%	129.	304.	239.	239.	319.
VL TBP BOILING CURVE,DEG F - 70%	153.	309.	261.	261.	320.
VL TBP BOILING CURVE,DEG F - 90%	172.	314.	282.	282.	321.
VL TBP BOILING CURVE,DEG F - 95%	176.	315.	287.	287.	321.
VL TBP BOILING CURVE,DEG F - EP	180.	316.	292.	292.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	99.c	298.c	214.c	214.c	315.c
ASTM BOILING CURVE, DEG F - 5%	107.	298.	216.	216.	315.
ASTM BOILING CURVE, DEG F - 10%	113.c	298.c	217.c	217.c	315.c
ASTM BOILING CURVE, DEG F - 30%	118.c	299.c	226.c	226.c	315.c
ASTM BOILING CURVE, DEG F - 50%	130.c	301.c	238.c	238.c	315.c
ASTM BOILING CURVE, DEG F - 70%	146.c	303.c	252.c	252.c	315.c
ASTM BOILING CURVE, DEG F - 90%	157.c	305.c	265.c	265.c	316.c
ASTM BOILING CURVE, DEG F - 95%	163.	308.	272.	272.	317.
ASTM BOILING CURVE, DEG F - EP	170.c	311.c	280.c	280.c	318.c
PERCENT EVAP @ 70C (E70), LV%	90.8	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	100.0	0.0	97.2	97.2	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0

PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	71.9*	50.6	56.9	56.9	48.4
MOT. OCTANE F-2 CLEAR	77.1*	68.4	70.1	70.1	68.4
TOTAL PARAFFINS, LV%	80.7a	60.6a	69.8a	69.8a	57.5a
OLEFINS, LV%	.4*	.5	.3	.3	.5
NAPHTHENES, LV%	15.6a	35.2a	26.4a	26.4a	38.1a
AROMATICS, LV%	3.2a	3.7a	3.4a	3.4a	3.9a
REID VAPOR PRESSURE, psi	13.78*	.41	2.78	2.78	.29
FLASH PT(API Pen-Mar clsd cup),F		93.c	29.c	29.c	105.c
Flash Point Measured	-11.*	74.	30.	30.	86.
FLASH PT(CHV Pen-Mar clsd cup),F		92.c			105.c
HEATING VAL, GROSS 10**6 Btu/bbl	4.88@	5.45c	5.29c	5.29c	5.48c
FREEZE POINT, F		-100.n	-102.n	-102.n	-100.n
CLOUD POINT, F		-95.c	-108.c	-108.c	-95.c
POUR POINT, F		-90.n	-112.c	-112.c	-90.n
SMOKE POINT (ASTM), mm	28.*	25.	27.*	27.*	24.
ANILINE POINT, F		132.*			131.
CETANE INDEX		29.3*			30.6
DIESEL INDEX		67.7@			65.9c
VISCOSITY, cSt @ 100 F (38 C)		.8*			.9
VISCOSITY, cSt @ 104 F (40 C)		.8c			.8c
VISCOSITY, cSt @ 122 F (50 C)		.7*			.8
VISCOSITY, cSt @ 140 F (60 C)		.6c			.7c
VISCOSITY, cSt @ 212 F (100 C)		.5c			.5c
VISCOSITY, cSt @ 275 F (135 C)		.4@			.4c

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	13.24	17.29	24.14	31.94	32.76
YIELD AT END-OF-CUT, LV%	17.29	24.14	31.94	32.76	40.23
YIELD OF CUT (LV% OF CRUDE)	4.05	6.85	7.80	.82	7.47
YIELD AT START-OF-CUT, WT%	10.47@	14.00@	20.18@	27.48@	28.25@
YIELD AT END-OF-CUT, WT%	14.00@	20.18@	27.48@	28.25@	35.38@
YIELD OF CUT (WT% OF CRUDE)	3.53@	6.19@	7.29@	.78@	7.13@
API GRAVITY 60F	46.5	40.3	34.5	32.2	31.1
SPECIFIC GRAVITY 60/60	.7948	.8236	.8525	.8644	.8704
CHARACT. FACTOR (K-FACTOR)	11.72c	11.62c	11.62c	11.65c	11.73c
MOLECULAR WEIGHT	149.c	171.c	207.c	230.c	253.c
SULFUR, WT%	.049	.184	.685	.920	1.017
MERCAPTAN SULFUR, ppm	1.	3.	4.	5.	6.
NITROGEN, ppm	1.1	1.0	18.5	27.8	148.2
BASIC NITROGEN, ppm	.6	1.7	24.4	60.8	110.9
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	324.	379.	468.	557.	570.
VL TBP BOILING CURVE,DEG F - 10%	327.	383.	473.	558.	574.
VL TBP BOILING CURVE,DEG F - 30%	338.	401.	493.	560.	590.
VL TBP BOILING CURVE,DEG F - 50%	349.	418.	512.	562.	606.
VL TBP BOILING CURVE,DEG F - 70%	360.	436.	531.	563.	622.
VL TBP BOILING CURVE,DEG F - 90%	370.	454.	548.	565.	637.
VL TBP BOILING CURVE,DEG F - 95%	372.	459.	553.	566.	641.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	336.c	395.c	482.c	547.c	575.c
ASTM BOILING CURVE, DEG F - 5%	336.	395.	482.	547.	576.
ASTM BOILING CURVE, DEG F - 10%	336.c	396.c	483.c	547.c	577.c
ASTM BOILING CURVE, DEG F - 30%	339.c	402.c	491.c	547.c	582.c
ASTM BOILING CURVE, DEG F - 50%	344.c	411.c	501.c	547.c	590.c
ASTM BOILING CURVE, DEG F - 70%	350.c	421.c	512.c	548.c	599.c
ASTM BOILING CURVE, DEG F - 90%	355.c	432.c	522.c	549.c	608.c
ASTM BOILING CURVE, DEG F - 95%	359.	438.	528.	550.	613.
ASTM BOILING CURVE, DEG F - EP	365.c	446.c	535.c	552.c	620.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	91.1	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	41.6				
MOT. OCTANE F-2 CLEAR	67.7				
TOTAL PARAFFINS, LV%	49.8a	48.0a	51.0a	51.6a	49.7a
OLEFINS, LV%	.6	.6	.1	.0	
NAPHTHENES, LV%	44.9a	39.0a	25.2a	23.0a	22.7a
AROMATICS, LV%	4.6a	12.4a	23.7a	25.4a	27.7a
REID VAPOR PRESSURE, psi	.13	.02c	.00c		
FLASH PT(API Pen-Mar clsd cup),F	121.c	161.c	213.c	244.c	257.c
Flash Point Measured	112.	172.	233.	260.	283.
FLASH PT(CHV Pen-Mar clsd cup),F	121.c	165.c	231.c	279.c	301.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.56c	5.70c	5.83c	5.89c	5.92c
FREEZE POINT, F	-100.n	-71.n	-14.n	1.n	20.n
CLOUD POINT, F	-95.c	-72.c	-23.c	-11.c	8.c
POUR POINT, F	-90.n	-72.n	-32.n	-23.n	-4.n
SMOKE POINT (ASTM), mm	22.	19.	14.	12.	11.
ANILINE POINT, F	130.	132.	141.	150.	158.
CETANE INDEX	33.3	39.9	46.7	47.7	48.2
DIESEL INDEX	60.3c	53.2c	48.6c	48.5c	49.2c
VISCOSITY, cSt @ 100 F (38 C)	1.0	1.6	2.9	4.2	6.2
VISCOSITY, cSt @ 104 F (40 C)	1.0c	1.5c	2.8c	4.0c	5.8c
VISCOSITY, cSt @ 122 F (50 C)	.9	1.3	2.3	3.2	4.6
VISCOSITY, cSt @ 140 F (60 C)	.8c	1.1c	2.0c	2.7c	3.7c
VISCOSITY, cSt @ 212 F (100 C)	.5c	.7c	1.2c	1.5c	1.9c
VISCOSITY, cSt @ 275 F (135 C)	.4c	.5c	.8c	1.0c	1.3c
RAMSBOTTOM CARBON, WT%				.02c	.02c
CONRADSON CARBON, WT%				.01	.01

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1370.s	1370.s
YIELD AT START-OF-CUT, LV%	40.23	44.94	40.23	70.45	40.23
YIELD AT END-OF-CUT, LV%	44.94	70.45	70.45	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	4.71	25.51	30.22	29.55	59.77
YIELD AT START-OF-CUT, WT%	35.38@	39.98@	35.38@	65.97@	35.38@
YIELD AT END-OF-CUT, WT%	39.98@	65.97@	65.97@	100.00@	100.00@
YIELD OF CUT (WT% OF CRUDE)	4.60@	25.99@	30.59@	34.03@	64.62@
API GRAVITY 60F	27.2	20.8	21.8	3.3	12.0b
SPECIFIC GRAVITY 60/60	.8914	.9290	.9231	1.0500	.9859b
CHARACT. FACTOR (K-FACTOR)	11.68c	11.82c	11.82c	11.78c	11.81c
MOLECULAR WEIGHT	287.c	429.c	409.c		
SULFUR, WT%	1.398	1.650	1.612	2.611	2.138b
MERCAPTAN SULFUR, ppm	9.				
NITROGEN, ppm	506.5	1698.8	1519.4	7405.7	4619.2
BASIC NITROGEN, ppm	216.7	661.5	594.6	2092.9	1351.5b
HYDROGEN, WT%				9.2c	11.2c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	647.	714.	661.	1030.	677.
VL TBP BOILING CURVE,DEG F - 10%	650.	732.	677.	1048.	714.
VL TBP BOILING CURVE,DEG F - 30%	660.	806.	759.	1122.s	868.
VL TBP BOILING CURVE,DEG F - 50%	670.	864.	839.	1194.s	1007.
VL TBP BOILING CURVE,DEG F - 70%	680.	917.	902.	1264.s	1155.s
VL TBP BOILING CURVE,DEG F - 90%	691.	979.	973.	1335.s	1299.s
VL TBP BOILING CURVE,DEG F - 95%	694.	995.	992.	1352.s	1334.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1370.s	1370.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	652.c	731.c	677.c	1046.s	684.s
ASTM BOILING CURVE, DEG F - 5%	653.	739.	684.	1055.	700.
ASTM BOILING CURVE, DEG F - 10%	654.c	749.c	694.c	1065.c	722.c
ASTM BOILING CURVE, DEG F - 30%	662.c	815.c	768.c	1130.s	873.c
ASTM BOILING CURVE, DEG F - 50%	670.c	864.c	839.c	1194.s	1007.c
ASTM BOILING CURVE, DEG F - 70%	680.c	917.c	902.c	1264.s	1155.s
ASTM BOILING CURVE, DEG F - 90%	691.c	979.c	973.c	1335.s	1299.s
ASTM BOILING CURVE, DEG F - 95%	694.	995.	992.	1352.s	1334.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1370.s	1370.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	20.5	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	91.1	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	9.3	0.0	3.5
TOTAL PARAFFINS, LV%	32.3a	19.7a	21.7a		
OLEFINS, LV%		<.001*			
NAPHTHENES, LV%	29.6a	29.1a	29.2a		
AROMATICS, LV%	38.2a	51.2a	49.1a		
FLASH PT(API Pen-Mar clsd cup),F	282.c	312.c	300.c	341.c	307.c
Flash Point Measured	320.	426.	410.	595.	474.
FLASH PT(CHV Pen-Mar clsd cup),F	351.c				
HEATING VAL, GROSS 10**6 Btu/bbl	6.00c	6.18c	6.15c	6.62c	6.40c
HEATING VAL, NET, 10**6 Btu/bbl				6.31c	6.05c
FREEZE POINT, F	38.*				
CLOUD POINT, F	43.c				
POUR POINT, F	48.n	102.n	104.n	148.	94.
SMOKE POINT (ASTM), mm	9.*				
ANILINE POINT, F	160.	178.	175.		
CETANE INDEX	50.3*				
DIESEL INDEX	43.4c	37.1c	38.2c		
VISCOSITY, cSt @ 100 F (38 C)	12.3				
VISCOSITY, cSt @ 104 F (40 C)	11.4c	4542.4c	1150.6c	4.2E+11c	25036.7c
VISCOSITY, cSt @ 122 F (50 C)	8.3	841.0b	307.6b	3.3E+10	9229.3b
VISCOSITY, cSt @ 140 F (60 C)	6.6c	226.0c	108.1c	3.52E+9c	3852.7c
VISCOSITY, cSt @ 210 F (99 C)	3.2*	11.2*	9.0*	5.27E+6	309.0b
VISCOSITY, cSt @ 212 F (100 C)	3.1c	10.6c	8.5c	4.55E+6c	292.1c
VISCOSITY, cSt @ 275 F (135 C)	2.0c	2.9c	2.7c	1.02E+5c	67.7c
RAMSBOTTOM CARBON, WT%	.02c	.55c	.48c	26.08	14.77
CONRADSON CARBON, WT%	.01	.67	.57	26.61	14.01

VANADIUM, ppm	.02	.35	.30	659.73	353.44
NICKEL, ppm	.03	.28	.24	266.59	143.96
ASPHALTENES, WT%				1.1	2.1
SOFTENING POINT				188.8	

*** Meaning of the codes which follow table values:

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- p - Cloud, Pour, Freeze interpolated from property curve with distillate separation inefficiency modeling
- q - Cloud Point suspect negative area under cloud point index curve for cut
- i - Property value adjusted after integration
- z - Property value reset to zero after being estimated negative
- w - This property is not whole crude balanced and is interpolated from the resid curve
- m - Value suspect 1 or more of the crudes did not include this property
- a - PNA Adjustment Applied

CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: ONO - MIXTURE
Country:
Library: CORPORATE

Run Date: 04/07/02 (13:38:38)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: ** Mixture of crude(s)
41.6 LV% Petrotec
35.6 LV% PerezCom
22.8 LV% Composit

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	35.1	35.3	C2	0.00	0.00
SG 60/60	.8495	.8482	C3	0.08	0.05
Dens @15			IC4	0.16	0.10
S, WT%	.08	.08	NC4	0.40	0.28
N2, ppm	1062.2	1050.	IC5	0.71	0.52
H2, WT%			NC5	0.63	0.47
RVP	1.76	.86	CP	0.00	0.00
Va, ppm	1.01	.89		----	----
Ni, ppm	1.04	.84		1.97	1.41
CCR, wt%		3.85			
RAMSBOTT		.92			
POUR, F	-30.6				
VOL YLD					
NEUT	.37				
SALT pkb					
cSt@ 60F		8.21			
cSt@ 77F		6.27			
cSt@104F		4.35			
cSt@100P	4.57		K Factor	11.91	
cSt@122P	3.53		ASH	.01	
MERCAP S	5.64				

	X5	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	180.	316.
TBP TEMP AT END-OF-CUT, F	180.	316.	292.	292.	321.
YIELD AT START-OF-CUT, LV%	.93	18.62	6.12	6.12	21.79
YIELD AT END-OF-CUT, LV%	6.12	21.79	18.62	18.62	22.40
YIELD OF CUT (LV% OF CRUDE)	5.19	3.16	12.51	12.51	.62
YIELD OF CUT (WT% OF CRUDE)	4.11@	2.91@	11.10@	11.10@	.57@
API GRAVITY 60F	78.9	49.5	56.4	56.4	47.9
SPECIFIC GRAVITY 60/60	.6726	.7819	.7530	.7530	.7886
CHARACT. FACTOR (K-FACTOR)	12.52c	11.69c	11.82c	11.82c	11.66c
MOLECULAR WEIGHT	95.8	135.c	120.c	120.c	139.c
SULFUR, WT%	<.001m	.002	.001	.001	.003
MERCAPTAN SULFUR, ppm	4.*	11.	7.*	7.*	11.
VL TBP BOILING CURVE,DEG F - ST	55.	292.	195.	195.	316.
VL TBP BOILING CURVE,DEG F - 5%	75.	293.	196.	196.	316.
VL TBP BOILING CURVE,DEG F - 10%	81.	294.	196.	196.	316.
VL TBP BOILING CURVE,DEG F - 30%	111.	299.	221.	221.	317.
VL TBP BOILING CURVE,DEG F - 50%	137.	304.	245.	245.	318.
VL TBP BOILING CURVE,DEG F - 70%	156.	308.	264.	264.	319.
VL TBP BOILING CURVE,DEG F - 90%	179.	313.	283.	283.	320.
VL TBP BOILING CURVE,DEG F - 95%	189.	315.	288.	288.	321.
VL TBP BOILING CURVE,DEG F - EP	195.	316.	292.	292.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST		298.c	221.c	221.c	315.c
ASTM BOILING CURVE, DEG F - 5%		298.	221.	221.	315.
ASTM BOILING CURVE, DEG F - 10%		298.c	221.c	221.c	315.c
ASTM BOILING CURVE, DEG F - 30%		299.c	231.c	231.c	315.c
ASTM BOILING CURVE, DEG F - 50%		301.c	244.c	244.c	315.c
ASTM BOILING CURVE, DEG F - 70%		303.c	256.c	256.c	315.c
ASTM BOILING CURVE, DEG F - 90%		305.c	267.c	267.c	315.c
ASTM BOILING CURVE, DEG F - 95%		308.	273.	273.	317.
ASTM BOILING CURVE, DEG F - EP		311.c	281.c	281.c	318.c
PERCENT EVAP @ 70C (E70), LV%	89.5	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	100.0	0.0	96.3	96.3	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0

PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE P-1 CLEAR	76.0*	62.9	68.9*	68.9*	61.6
MOT. OCTANE P-2 CLEAR	76.3*	67.3	67.6*	67.6*	67.8
TOTAL PARAFFINS, LV%	65.8a	33.0a	39.5a	39.5a	33.6a
OLEFINS, LV%	.4*	.7	.5*	.5*	.7
NAPHTHENES, LV%	33.1a	59.6a	56.3a	56.3a	58.3a
AROMATICS, LV%	.8m	6.7a	3.7a	3.7a	7.3a
REID VAPOR PRESSURE, psi	11.64*	.21	2.13	2.13	.15
FLASH PT(API Pen-Mar clsd cup),F		93.c	32.c	32.c	105.c
Flash Point Measured		82.	34.	34.	94.
FLASH PT(CHV Pen-Mar clsd cup),F		92.c			105.c
HEATING VAL, GROSS 10**6 Btu/bbl	4.90c	5.49c	5.34c	5.34c	5.52c
FREEZE POINT, F		-128.n			-125.n
CLOUD POINT, F		-134.c			-131.c
POUR POINT, F		-138.c			-135.c
SMOKE POINT (ASTM), mm		24.			23.
ANILINE POINT, F		128.*			129.
CETANE INDEX		25.2*			27.1
DIESEL INDEX		63.3@			61.9c
VISCOSITY, cSt @ 100 F (38 C)		.8*			.9
VISCOSITY, cSt @ 104 F (40 C)		.8c			.9c
VISCOSITY, cSt @ 122 F (50 C)		.7*			.8*
VISCOSITY, cSt @ 140 F (60 C)		.7c			.7c
VISCOSITY, cSt @ 212 F (100 C)		.5c			.5c
VISCOSITY, cSt @ 275 F (135 C)		.4@			.4@

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	22.40	28.60	38.96	50.46	51.58
YIELD AT END-OF-CUT, LV%	28.60	38.96	50.46	51.58	61.61
YIELD OF CUT (LV% OF CRUDE)	6.20	10.37	11.50	1.12	10.03
YIELD OF CUT (WT% OF CRUDE)	5.85@	10.09@	11.49@	1.13@	10.19@
API GRAVITY 60F	45.1	40.0	35.5	33.4	32.7
SPECIFIC GRAVITY 60/60	.8012	.8253	.8473	.8579	.8615
CHARACT. FACTOR (K-FACTOR)	11.62c	11.61c	11.68c	11.74c	11.85c
MOLECULAR WEIGHT	147.c	171.c	207.c	231.c	255.c
SULFUR, WT%	.002	.003	.011	.020	.032
MERCAPTAN SULFUR, ppm	10.	9.			
NITROGEN, ppm			2.3*	14.4	26.9
BASIC NITROGEN, ppm			2.9*	10.0	13.9
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	324.	380.	468.	557.	570.
VL TBP BOILING CURVE,DEG F - 10%	326.	384.	472.	558.	574.
VL TBP BOILING CURVE,DEG F - 30%	337.	402.	491.	560.	590.
VL TBP BOILING CURVE,DEG F - 50%	347.	420.	510.	562.	605.
VL TBP BOILING CURVE,DEG F - 70%	358.	437.	529.	563.	621.
VL TBP BOILING CURVE,DEG F - 90%	369.	455.	548.	565.	637.
VL TBP BOILING CURVE,DEG F - 95%	372.	459.	552.	566.	641.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	334.c	396.c	481.c	547.c	575.c
ASTM BOILING CURVE, DEG F - 5%	335.	396.	481.	547.	575.
ASTM BOILING CURVE, DEG F - 10%	335.c	397.c	482.c	547.c	576.c
ASTM BOILING CURVE, DEG F - 30%	338.c	404.c	489.c	547.c	581.c
ASTM BOILING CURVE, DEG F - 50%	343.c	413.c	498.c	547.c	589.c
ASTM BOILING CURVE, DEG F - 70%	349.c	423.c	510.c	548.c	598.c
ASTM BOILING CURVE, DEG F - 90%	354.c	433.c	521.c	549.c	607.c
ASTM BOILING CURVE, DEG F - 95%	359.	439.	528.	550.	613.
ASTM BOILING CURVE, DEG F - EP	364.c	446.c	535.c	552.c	620.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	92.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	59.9				
MOT. OCTANE F-2 CLEAR	66.0				
TOTAL PARAFFINS, LV%	35.3a	44.4a	50.3a	52.6a	51.7a
OLEFINS, LV%	.9				
NAPHTHENES, LV%	55.7a	45.4a	35.4a	31.7a	31.9a
AROMATICS, LV%	8.1a	9.8a	14.2a	15.7a	16.4a
REID VAPOR PRESSURE, psi	.02*	.02c	.00c		
FLASH PT(API Pen-Mar clsd cup),F	120.c	162.c	212.c	244.c	257.c
Flash Point Measured	115.	165.	240.	279.	305.
FLASH PT(CHV Pen-Mar clsd cup),F	120.c	166.c	230.c	279.c	300.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.59c	5.72c	5.83c	5.89c	5.91c
FREEZE POINT, F	-112.n	-74.n	-19.n	-1.n	20.n
CLOUD POINT, F	-118.c	-77.c	-18.c	-.c	19.c
POUR POINT, F	-122.c	-80.n	-16.n	.n	17.n
SMOKE POINT (ASTM), mm	22.	18.	15.	14.	
ANILINE POINT, F	131.	139.	156.	167.	174.
CETANE INDEX	30.9	40.2	46.5	49.4	50.2
DIESEL INDEX	59.2c	55.6c	55.3c	55.9c	57.0c
VISCOSITY, cSt @ 100 F (38 C)	1.1	1.7	3.0	4.5	6.6
VISCOSITY, cSt @ 104 F (40 C)	1.0c	1.6c	2.9c	4.3c	6.2c
VISCOSITY, cSt @ 122 F (50 C)	.9*	1.4	2.4	3.5	4.9
VISCOSITY, cSt @ 140 F (60 C)	.8c	1.2c	2.1c	2.9c	3.9c
VISCOSITY, cSt @ 212 F (100 C)	.6c	.8c	1.3c	1.6c	2.0c
VISCOSITY, cSt @ 275 F (135 C)	.4@	.6c	.9c	1.1c	1.3c
CONRADSON CARBON, WT%					.00*

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1202.s	1202.s
YIELD AT START-OF-CUT, LV%	61.61	67.38	61.61	91.78	61.61
YIELD AT END-OF-CUT, LV%	67.38	91.78	91.78	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	5.77	24.40	30.17	8.22	38.39
YIELD OF CUT (WT% OF CRUDE)	5.98@	26.31@	32.29@	9.63@	41.91@
API GRAVITY 60F	29.4	23.2	24.4	11.0	21.3b
SPECIFIC GRAVITY 60/60	.8792	.9145	.9077	.9927	.9259b
CHARACT. FACTOR (K-FACTOR)	11.84c	11.94c	11.96c	12.01c	11.91c
MOLECULAR WEIGHT	289.c	411.c	395.c		413.c
SULFUR, WT%	.060	.134	.121	.397	.180b
NITROGEN, ppm	108.4	1359.2	1127.5	7097.0	2498.4b
BASIC NITROGEN, ppm	52.0	427.8	358.2		
HYDROGEN, WT%				11.0c	13.3c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	647.	712.	658.	1024.	661.
VL TBP BOILING CURVE,DEG F - 10%	650.	729.	671.	1037.	678.
VL TBP BOILING CURVE,DEG F - 30%	659.	799.	744.	1079.	779.
VL TBP BOILING CURVE,DEG F - 50%	669.	844.	820.	1113.s	852.
VL TBP BOILING CURVE,DEG F - 70%	680.	885.	870.	1145.s	926.
VL TBP BOILING CURVE,DEG F - 90%	691.	947.	937.	1171.s	1114.s
VL TBP BOILING CURVE,DEG F - 95%	694.	974.	967.	1185.s	1151.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1202.s	1202.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	652.c	729.c	675.c	1037.s	677.c
ASTM BOILING CURVE, DEG F - 5%	653.	736.	680.	1043.	683.
ASTM BOILING CURVE, DEG F - 10%	654.c	745.c	688.c	1050.c	694.c
ASTM BOILING CURVE, DEG F - 30%	662.c	807.c	753.c	1086.c	787.c
ASTM BOILING CURVE, DEG F - 50%	669.c	844.c	820.c	1113.s	852.c
ASTM BOILING CURVE, DEG F - 70%	680.c	885.c	870.c	1145.s	926.c
ASTM BOILING CURVE, DEG F - 90%	691.c	947.c	937.c	1171.s	1114.s
ASTM BOILING CURVE, DEG F - 95%	694.	977.	971.	1185.s	1159.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1202.s	1202.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	28.4	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	92.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	15.0	0.0	9.6
TOTAL PARAFFINS, LV%	40.0a	24.2a	27.3a		
NAPHTHENES, LV%	39.5a	45.5a	44.3a		
AROMATICS, LV%	20.4a	30.3a	28.4a		
FLASH PT(API Pen-Mar clsd cup),F	282.c	311.c	298.c	341.c	300.c
Flash Point Measured	346.	467.	444.		
FLASH PT(CHV Pen-Mar clsd cup),F	350.c				
HEATING VAL, GROSS 10**6 Btu/bbl	6.00c	6.16c	6.13c	6.50c	6.21c
HEATING VAL, NET, 10**6 Btu/bbl				6.15c	5.82c
FREEZE POINT, F	50.c				
CLOUD POINT, F	47.c				
POUR POINT, F	45.n	92.n	89.n	112.	85.
ANILINE POINT, F	182.	203.	199.		
CETANE INDEX	49.2				
DIESEL INDEX	53.5c	47.1c	48.5c		
VISCOSITY, cSt @ 100 F (38 C)	13.2				
VISCOSITY, cSt @ 104 F (40 C)	12.4c	114.0c		2.51E+6c	67.3c
VISCOSITY, cSt @ 122 F (50 C)	9.5	65.7b	42.7b	5.20E+5	48.6
VISCOSITY, cSt @ 140 F (60 C)	7.5c	40.8c		1.33E+5c	36.2c
VISCOSITY, cSt @ 210 F (99 C)		10.6		2783.3	14.7b
VISCOSITY, cSt @ 212 F (100 C)	3.6c	10.3c		2557.5c	14.3c
VISCOSITY, cSt @ 275 F (135 C)	2.3c	4.7c		293.8c	8.0c
RAMSBOTTOM CARBON, WT%		.23c	.19c	12.84	2.58
CONRADSON CARBON, WT%	.01	.23	.19	13.40	3.08
VANADIUM, ppm	.03	.05	.04	12.82	2.49
NICKEL, ppm	.31	.47	.44	10.00	2.05
ASPHALTENES, WT%				.7	.3

SOFTENING POINT	109.7
PENETRATION, dmm	120.5c

*** Meaning of the codes which follow table values:

- * - Obtained by curve extrapolation
- c - Calculated from other properties
- @ - Calculated from curve extrapolation of other properties
- g - Calculated from GC analysis data
- = - Calculated from combination of GC and dist. curve data
- + - As above, but had to extrapolate dist. curve
- d - Distillate property curve used for resid property
- r - Resid property curve used for distillate property
- b - Both distillate and resid property curves used
- s - Suspect value - may be inaccurate
- n - Cloud Point, Pour Point, or Freeze Point interpolated from property curve
- o - Calculated with distillate separation inefficiency modeling
- p - Cloud, Pour, Freeze interpolated from property curve with distillate separation inefficiency modeling
- q - Cloud Point suspect negative area under cloud point index curve for cut
- i - Property value adjusted after integration
- z - Property value reset to zero after being estimated negative
- w - This property is not whole crude balanced and is interpolated from the resid curve
- m - Value suspect 1 or more of the crudes did not include this property
- a - PNA Adjustment Applied

CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: Petrotec - Petrotech
Country: Peru
Library: CORPORATE

Run Date: 04/07/02 (13:38:31)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: Core Assay for Petrotech crude received from PetroPeru on 12/12/01

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	37.2	37.3*	C2	0.00	0.00
SG 60/60	.8388	.8384*	C3	0.19	0.12
Dens @15			IC4	0.30	0.20
S, WT%	.07	.07*	NC4	0.76	0.53
N2', ppm	1197.0	1166.*	IC5	1.22	0.91
H2, WT%			NC5	1.07	0.81
RVP	2.95	1.47	CP	0.00	0.00
Va, ppm	.06	.06		----	----
Ni, ppm	.71	.92		3.54	2.56
CCR, wt%		5.11			
RAMSBOTT		1.11			
POUR, F	-60.0				
VOL YLD					
NEUT	.42				
SALT pkb					
cSt@ 60F		5.84			
cSt@ 77F		4.61			
cSt@104F		3.33			
cSt@100F	3.48		K Factor	12.00	
cSt@122F	2.76		ASH	.01	
MERCAP S	8.00				

	X5	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	180.	316.
TBP TEMP AT END-OF-CUT, F	180.	316.	292.	292.	321.
YIELD AT START-OF-CUT, LV%	1.14	25.27	9.42	9.42	28.44
YIELD AT END-OF-CUT, LV%	9.42	28.44	25.27	25.27	29.03
YIELD OF CUT (LV% OF CRUDE)	8.28	3.16	15.85	15.85	.60
YIELD AT START-OF-CUT, WT%	.78@	21.79@	7.53@	7.53@	24.74@
YIELD AT END-OF-CUT, WT%	7.53@	24.74@	21.79@	21.79@	25.31@
YIELD OF CUT (WT% OF CRUDE)	6.75@	2.95@	14.26@	14.26@	.56@
API GRAVITY 60F	75.6	49.3	56.1	56.1	47.8
SPECIFIC GRAVITY 60/60	.6834	.7828	.7542	.7542	.7892
CHARACT. FACTOR (K-FACTOR)	12.35c	11.67c	11.79c	11.79c	11.65c
MOLECULAR WEIGHT	97.s	135.c	119.c	119.c	139.c
SULFUR, WT%	<.001*	.001	<.001	<.001	.001
MERCAPTAN SULFUR, ppm	2.*	3.	3.	3.	3.
NITROGEN, ppm	.0*				
BASIC NITROGEN, ppm		1.7	.1	.1	1.9
VL TBP BOILING CURVE,DEG F - ST	55.	292.	180.	180.	316.
VL TBP BOILING CURVE,DEG F - 5%	86.	293.	188.	188.	316.
VL TBP BOILING CURVE,DEG F - 10%	102.	294.	196.	196.	316.
VL TBP BOILING CURVE,DEG F - 30%	109.	299.	222.	222.	317.
VL TBP BOILING CURVE,DEG F - 50%	142.	303.	244.	244.	318.
VL TBP BOILING CURVE,DEG F - 70%	156.	308.	263.	263.	319.
VL TBP BOILING CURVE,DEG F - 90%	172.	313.	282.	282.	320.
VL TBP BOILING CURVE,DEG F - 95%	176.	315.	287.	287.	321.
VL TBP BOILING CURVE,DEG F - EP	180.	316.	292.	292.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	100.c	298.c	217.c	217.c	315.c
ASTM BOILING CURVE, DEG F - 5%	113.	298.	219.	219.	315.
ASTM BOILING CURVE, DEG F - 10%	122.c	298.c	221.c	221.c	315.c
ASTM BOILING CURVE, DEG F - 30%	124.c	299.c	231.c	231.c	315.c
ASTM BOILING CURVE, DEG F - 50%	143.c	300.c	243.c	243.c	315.c
ASTM BOILING CURVE, DEG F - 70%	152.c	303.c	254.c	254.c	315.c
ASTM BOILING CURVE, DEG F - 90%	160.c	305.c	266.c	266.c	315.c
ASTM BOILING CURVE, DEG F - 95%	166.	307.	272.	272.	317.
ASTM BOILING CURVE, DEG F - EP	173.c	311.c	280.c	280.c	318.c
PERCENT EVAP @ 70C (E70), LV%	87.7	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	100.0	0.0	96.7	96.7	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0

PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	76.1*	62.5	68.6	68.6	61.4
MOT. OCTANE F-2 CLEAR	75.3*	67.4	67.2	67.2	67.9
TOTAL PARAFFINS, LV%	62.9a	32.1a	38.3a	38.3a	33.0a
OLEFINS, LV%	.4*	.8	.4	.4	.9
NAPHTHENES, LV%	35.6a	59.4a	57.5a	57.5a	57.7a
AROMATICS, LV%	1.0a	7.7a	3.9a	3.9a	8.5a
REID VAPOR PRESSURE, psi	10.49*	.10	2.04	2.04	.10
FLASH PT(API Pen-Mar clsd cup),F		93.c	32.c	32.c	105.c
Flash Point Measured		94.	43.	43.	105.
FLASH PT(CHV Pen-Mar clsd cup),F		92.c			105.c
HEATING VAL, GROSS 10**6 Btu/bbl	4.95@	5.49c	5.34c	5.34c	5.53c
FREEZE POINT, F		-122.n	-135.n	-135.n	-118.n
CLOUD POINT, F		-128.c	-141.c	-141.c	-124.c
POUR POINT, F		-132.c	-145.c	-145.c	-128.c
SMOKE POINT (ASTM), mm		25.			24.
ANILINE POINT, F		126.*			128.*
CETANE INDEX		25.6*			27.6
DIESEL INDEX		62.3@			61.0@
VISCOSITY, cSt @ 100 F (38 C)		.8*			.9
VISCOSITY, cSt @ 104 F (40 C)		.8c			.9c
VISCOSITY, cSt @ 122 F (50 C)		.7*			.8
VISCOSITY, cSt @ 140 F (60 C)		.7c			.7c
VISCOSITY, cSt @ 212 F (100 C)		.5c			.5c
VISCOSITY, cSt @ 275 F (135 C)		.4@			.4c

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	29.03	35.01	44.73	55.35	56.33
YIELD AT END-OF-CUT, LV%	35.01	44.73	55.35	56.33	65.08
YIELD OF CUT (LV% OF CRUDE)	5.98	9.72	10.62	.98	8.74
YIELD AT START-OF-CUT, WT%	25.31@	31.02@	40.56@	51.26@	52.27@
YIELD AT END-OF-CUT, WT%	31.02@	40.56@	51.26@	52.27@	61.26@
YIELD OF CUT (WT% OF CRUDE)	5.71@	9.54@	10.71@	1.00@	9.00@
API GRAVITY 60F	45.2	40.5	35.9	33.5	32.6
SPECIFIC GRAVITY 60/60	.8006	.8228	.8455	.8574	.8624
CHARACT. FACTOR (K-FACTOR)	11.63c	11.64c	11.70c	11.74c	11.84c
MOLECULAR WEIGHT	147.c	171.c	207.c	231.c	255.c
SULFUR, WT%	.001	.003	.011	.020	.035
MERCAPTAN SULFUR, ppm	5.	5.*			
NITROGEN, ppm	.3	1.0	4.3	14.6	33.6
BASIC NITROGEN, ppm	2.0	2.1	4.5	12.9	17.6
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	324.	380.	468.	557.	570.
VL TBP BOILING CURVE,DEG F - 10%	326.	384.	472.	558.	574.
VL TBP BOILING CURVE,DEG F - 30%	337.	402.	491.	560.	590.
VL TBP BOILING CURVE,DEG F - 50%	347.	420.	510.	561.	606.
VL TBP BOILING CURVE,DEG F - 70%	358.	437.	528.	563.	622.
VL TBP BOILING CURVE,DEG F - 90%	369.	454.	547.	565.	637.
VL TBP BOILING CURVE,DEG F - 95%	372.	459.	552.	566.	641.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	334.c	396.c	480.c	547.c	575.c
ASTM BOILING CURVE, DEG F - 5%	335.	396.	481.	547.	576.
ASTM BOILING CURVE, DEG F - 10%	335.c	397.c	482.c	547.c	577.c
ASTM BOILING CURVE, DEG F - 30%	338.c	403.c	488.c	547.c	582.c
ASTM BOILING CURVE, DEG F - 50%	343.c	412.c	498.c	547.c	590.c
ASTM BOILING CURVE, DEG F - 70%	349.c	423.c	510.c	548.c	599.c
ASTM BOILING CURVE, DEG F - 90%	354.c	433.c	521.c	549.c	608.c
ASTM BOILING CURVE, DEG F - 95%	359.	439.	527.	550.	613.
ASTM BOILING CURVE, DEG F - EP	364.c	446.c	535.c	552.c	620.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	92.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	59.5				
MOT. OCTANE F-2 CLEAR	65.1				
TOTAL PARAFFINS, LV%	36.0a	46.0a	51.6a	54.2a	51.1a
OLEFINS, LV%	1.0	1.0	.2*		
NAPHTHENES, LV%	53.6a	43.2a	34.1a	29.5a	31.5a
AROMATICS, LV%	9.4a	9.8a	14.2a	16.3a	17.4a
REID VAPOR PRESSURE, psi	.01*	.02c	.00c		
FLASH PT(API Pen-Mar clsd cup),F	120.c	162.c	212.c	244.c	257.c
Flash Point Measured	119.	162.	237.	277.	309.
FLASH PT(CHV Pen-Mar clsd cup),F	120.c	166.c	230.c	279.c	301.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.59c	5.70c	5.82c	5.88c	5.91c
FREEZE POINT, F	-104.n	-73.n	-21.n	-.n	23.n
CLOUD POINT, F	-110.c	-77.c	-15.c	1.c	17.c
POUR POINT, F	-114.c	-81.n	-9.n	2.n	11.n
SMOKE POINT (ASTM), mm	22.	20.	17.	15.	15.
ANILINE POINT, F	130.*	138.	155.	166.	173.
CETANE INDEX	31.5	40.4	46.7	49.1	50.3
DIESEL INDEX	58.8@	55.9c	55.6c	55.8c	56.3c
VISCOSITY, cSt @ 100 F (38 C)	1.1	1.6	2.8	4.2	6.4
VISCOSITY, cSt @ 104 F (40 C)	1.0c	1.5c	2.7c	4.0c	6.0c
VISCOSITY, cSt @ 122 F (50 C)	.9	1.3	2.3	3.4	4.6
VISCOSITY, cSt @ 140 F (60 C)	.8c	1.2c	2.0c	2.9c	3.7c
VISCOSITY, cSt @ 212 F (100 C)	.6c	.7c	1.3c	1.8c	1.8c
VISCOSITY, cSt @ 275 F (135 C)	.4c	.5c	1.0c	1.3c	1.2c
CONRADSON CARBON, WT%				0.00	0.00

VANADIUM, ppm	.05*	.05*
NICKEL, ppm	.15	.15

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1202.s	1202.s
YIELD AT START-OF-CUT, LV%	65.08	70.28	65.08	91.85	65.08
YIELD AT END-OF-CUT, LV%	70.28	91.85	91.85	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	5.20	21.58	26.78	8.15	34.92
YIELD AT START-OF-CUT, WT%	61.26@	66.72@	61.26@	90.33@	61.26@
YIELD AT END-OF-CUT, WT%	66.72@	90.33@	90.33@	100.00@	100.00@
YIELD OF CUT (WT% OF CRUDE)	5.46@	23.61@	29.07@	9.67@	38.74@
API GRAVITY 60F	29.2	22.8	24.0	10.7	20.7b
SPECIFIC GRAVITY 60/60	.8807	.9172	.9102	.9950	.9299b
CHARACT. FACTOR (K-FACTOR)	11.81c	11.91c	11.95c	12.02c	11.89c
MOLECULAR WEIGHT	288.c	416.c	402.c		420.c
SULFUR, WT%	.066	.137b	.124b	.319	.169b
NITROGEN, ppm	143.8	1640.2	1359.0	7934.5	3000.0b
BASIC NITROGEN, ppm	68.8	527.1	441.0	2925.2	1039.7b
HYDROGEN, WT%				10.9c	13.2c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	647.	714.	656.	1021.	660.
VL TBP BOILING CURVE,DEG F - 10%	649.	734.	668.	1032.	676.
VL TBP BOILING CURVE,DEG F - 30%	658.	808.	747.	1072.	791.
VL TBP BOILING CURVE,DEG F - 50%	667.	845.	826.	1111.s	854.
VL TBP BOILING CURVE,DEG F - 70%	678.	879.	864.	1148.s	953.
VL TBP BOILING CURVE,DEG F - 90%	690.	957.	945.	1184.s	1124.s
VL TBP BOILING CURVE,DEG F - 95%	693.	984.	977.	1193.s	1164.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1202.s	1202.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	651.c	730.c	673.c	1035.s	675.c
ASTM BOILING CURVE, DEG F - 5%	652.	738.	677.	1040.	680.
ASTM BOILING CURVE, DEG F - 10%	654.c	749.c	685.c	1046.c	691.c
ASTM BOILING CURVE, DEG F - 30%	660.c	815.c	755.c	1079.c	799.c
ASTM BOILING CURVE, DEG F - 50%	667.c	845.c	826.c	1111.s	854.c
ASTM BOILING CURVE, DEG F - 70%	678.c	879.c	864.c	1148.s	953.c
ASTM BOILING CURVE, DEG F - 90%	690.c	957.c	945.c	1184.s	1124.s
ASTM BOILING CURVE, DEG F - 95%	693.	984.	977.	1193.s	1164.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1202.s	1202.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	32.3	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	92.5	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	15.0	0.0	10.1
TOTAL PARAFFINS, LV%	37.9a	26.1a	28.4a		
NAPHTHENES, LV%	40.1a	42.6a	42.2a		
AROMATICS, LV%	22.0a	31.2a	29.5a		
FLASH PT(API Pen-Mar clsd cup),F	282.c	312.c	297.c	341.c	299.c
Flash Point Measured	358.	477.b	454.b	644.	462.
FLASH PT(CHV Pen-Mar clsd cup),F	350.c				
HEATING VAL, GROSS 10**6 Btu/bbl	6.00c	6.18c	6.15c	6.51c	6.23c
HEATING VAL, NET, 10**6 Btu/bbl				6.16c	5.84c
FREEZE POINT, F	45.*				
CLOUD POINT, F	46.c				
POUR POINT, F	48.n	96.n	94.n	94.*	95.
SMOKE POINT (ASTM), mm	15.*				
ANILINE POINT, F	180.	199.*	195.*		
CETANE INDEX	52.2	40.3*	42.6*		
DIESEL INDEX	52.6c	45.3@	46.8@		
VISCOSITY, cSt @ 100 F (38 C)	13.2				
VISCOSITY, cSt @ 104 F (40 C)	12.2c	119.2c		4.22E+6c	315.2c
VISCOSITY, cSt @ 122 F (50 C)	8.7	67.9	42.6	8.48E+5	157.0b
VISCOSITY, cSt @ 140 F (60 C)	6.5c	41.8c		2.10E+5c	86.4c
VISCOSITY, cSt @ 210 F (99 C)		10.6*		3994.8	16.5*
VISCOSITY, cSt @ 212 F (100 C)	2.8c	10.3c		3661.8c	15.9c
VISCOSITY, cSt @ 275 F (135 C)	1.7c	4.7c		393.0c	6.3c
RAMSBOTTOM CARBON, WT%		.28c	.24c	14.47	2.85
CONRADSON CARBON, WT%	0.00	.30	.24	14.55	3.63
VANADIUM, ppm	.05	.05	.05	.44	.12

NICKEL, ppm	.15	.15	.15	7.89	1.97
ASPHALTENES, WT%				.7	.2
SOFTENING POINT				111.2	
PENETRATION, dmm				110.1c	

*** Meaning of the codes which follow table values:

- * - Obtained by curve extrapolation
- c - Calculated from other properties
- @ - Calculated from curve extrapolation of other properties
- g - Calculated from GC analysis data
- = - Calculated from combination of GC and dist. curve data
- + - As above, but had to extrapolate dist. curve
- d - Distillate property curve used for resid property
- r - Resid property curve used for distillate property
- b - Both distillate and resid property curves used
- s - Suspect value - may be inaccurate
- n - Cloud Point, Pour Point, or Freeze Point interpolated from property curve
- o - Calculated with distillate separation inefficiency modeling
- p - Cloud, Pour, Freeze interpolated from property curve with distillate separation inefficiency modeling
- q - Cloud Point suspect negative area under cloud point index curve for cut
- i - Property value adjusted after integration
- z - Property value reset to zero after being estimated negative
- w - This property is not whole crude balanced and is interpolated from the resid curve
- m - Value suspect 1 or more of the crudes did not include this property
- a - PNA Adjustment Applied

CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: PerezCom - Perez Companc
Country: Peru
Library: CORPORATE

Run Date: 04/07/02 (13:38:25)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: Core Laboratory assay for Perez Companc crude received from PetroPeru on

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	33.2	33.4*	C2	0.00	0.00
SG 60/60	.8591	.8579*	C3	0.00	0.00
Dens @15			IC4	0.06	0.04
S, WT%	.09	.10*	NC4	0.15	0.10
N2, ppm	1015.0	1012.*	IC5	0.35	0.25
H2, WT%			NC5	0.32	0.24
RVP	.92	.47	CP	0.00	0.00
Va, ppm	2.30	2.43		----	----
Ni, ppm	.88	1.18		0.88	0.63
CCR, wt%		3.95			
RAMSBOTT		1.10			
POUR, F	-30.0				
VOL YLD					
NEUT	.36				
SALT pkb					
cSt@ 60F		10.90			
cSt@ 77F		8.18			
cSt@104F		5.55			
cSt@100F	5.85		MERCAP S	4.00	
cSt@122F	4.44		K Factor	11.80	

	X5	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	180.	316.
TBP TEMP AT END-OF-CUT, F	180.	316.	292.	292.	321.
YIELD AT START-OF-CUT, LV%	.80	14.15	4.10	4.10	17.32
YIELD AT END-OF-CUT, LV%	4.10	17.32	14.15	14.15	17.97
YIELD OF CUT (LV% OF CRUDE)	3.30	3.17	10.04	10.04	.65
YIELD AT START-OF-CUT, WT%	.55@	11.87@	3.06@	3.06@	14.76@
YIELD AT END-OF-CUT, WT%	3.06@	14.76@	11.87@	11.87@	15.36@
YIELD OF CUT (WT% OF CRUDE)	2.51@	2.89@	8.81@	8.81@	.60@
API GRAVITY 60F	85.2	49.8	56.5	56.5	48.0
SPECIFIC GRAVITY 60/60	.6530	.7805	.7525	.7525	.7862
CHARACT. FACTOR (K-FACTOR)	12.77c	11.71c	11.89c	11.89c	11.67c
MOLECULAR WEIGHT	93.s	135.c	123.c	123.c	139.c
SULFUR, WT%	<.001*	.002	<.001	<.001	.002
MERCAPTAN SULFUR, ppm	6.*	23.	14.	14.	23.
VL TBP BOILING CURVE,DEG F - ST	55.	292.	180.	180.	316.
VL TBP BOILING CURVE,DEG F - 5%	61.	293.	195.	195.	316.
VL TBP BOILING CURVE,DEG F - 10%	68.	294.	208.	208.	316.
VL TBP BOILING CURVE,DEG F - 30%	94.	299.	241.	241.	317.
VL TBP BOILING CURVE,DEG F - 50%	121.	304.	257.	257.	318.
VL TBP BOILING CURVE,DEG F - 70%	146.	309.	270.	270.	319.
VL TBP BOILING CURVE,DEG F - 90%	169.	314.	284.	284.	320.
VL TBP BOILING CURVE,DEG F - 95%	175.	315.	288.	288.	321.
VL TBP BOILING CURVE,DEG F - EP	180.	316.	292.	292.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	94.c	298.c	224.c	224.c	315.c
ASTM BOILING CURVE, DEG F - 5%	95.	298.	229.	229.	315.
ASTM BOILING CURVE, DEG F - 10%	97.c	298.c	233.c	233.c	315.c
ASTM BOILING CURVE, DEG F - 30%	107.c	299.c	248.c	248.c	315.c
ASTM BOILING CURVE, DEG F - 50%	122.c	301.c	255.c	255.c	315.c
ASTM BOILING CURVE, DEG F - 70%	139.c	303.c	263.c	263.c	315.c
ASTM BOILING CURVE, DEG F - 90%	154.c	305.c	271.c	271.c	315.c
ASTM BOILING CURVE, DEG F - 95%	161.	308.	276.	276.	317.
ASTM BOILING CURVE, DEG F - EP	169.c	311.c	283.c	283.c	318.c
PERCENT EVAP @ 70C (E70), LV%	93.2	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	100.0	0.0	94.0	94.0	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0

RES. OCTANE F-1 CLEAR	74.1*	61.2	68.9	68.9	58.9
MOT. OCTANE F-2 CLEAR	78.8*	67.6	67.6	67.6	68.0
TOTAL PARAFFINS, LV%	69.2a	31.6a	40.8a	40.8a	32.4a
OLEFINS, LV%	.3*	.6	.6	.6	.7
NAPHTHENES, LV%	30.4a	62.3a	55.6a	55.6a	60.7a
AROMATICS, LV%	.1a	5.5a	2.8a	2.8a	6.3a
REID VAPOR PRESSURE, psi	13.15*	.24	2.46	2.46	.14
FLASH PT(API Pen-Mar clsd cup),F		93.c	42.c	42.c	105.c
Flash Point Measured	-36.*	73.	25.	25.	87.
FLASH PT(CHV Pen-Mar clsd cup),F		92.c			105.c
HEATING VAL, GROSS 10**6 Btu/bbl	4.78@	5.48c	5.34c	5.34c	5.52c
FREEZE POINT, F	-150.*	-131.n	-140.n	-140.n	-128.n
CLOUD POINT, F	-156.c	-137.c	-146.c	-146.c	-134.c
POUR POINT, F	-160.c	-141.c	-150.c	-150.c	-138.c
SMOKE POINT (ASTM), mm	27.*	22.	24.*	24.*	21.
ANILINE POINT, F		128.*			129.
CETANE INDEX		24.7*			26.6
DIESEL INDEX		63.6@			61.9c
VISCOSITY, cSt @ 100 F (38 C)		.8*			.9
VISCOSITY, cSt @ 104 F (40 C)		.8c			.9c
VISCOSITY, cSt @ 122 F (50 C)		.7*			.8
VISCOSITY, cSt @ 140 F (60 C)		.7c			.7c
VISCOSITY, cSt @ 212 F (100 C)		.5c			.5c
VISCOSITY, cSt @ 275 F (135 C)		.4@			.4c

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	17.97	24.14	34.06	45.90	47.06
YIELD AT END-OF-CUT, LV%	24.14	34.06	45.90	47.06	57.73
YIELD OF CUT (LV% OF CRUDE)	6.17	9.92	11.83	1.17	10.67
YIELD AT START-OF-CUT, WT%	15.36@	21.14@	30.74@	42.50@	43.67@
YIELD AT END-OF-CUT, WT%	21.14@	30.74@	42.50@	43.67@	54.43@
YIELD OF CUT (WT% OF CRUDE)	5.77@	9.61@	11.76@	1.17@	10.75@
API GRAVITY 60F	44.6	38.9	34.5	32.6	32.1
SPECIFIC GRAVITY 60/60	.8034	.8305	.8523	.8623	.8647
CHARACT. FACTOR (K-FACTOR)	11.58c	11.54c	11.61c	11.68c	11.81c
MOLECULAR WEIGHT	147.c	171.c	206.c	230.c	254.c
SULFUR, WT%	.002	.003	.012	.021	.033
MERCAPTAN SULFUR, ppm	19.	12.	14.	12.	11.
NITROGEN, ppm			.9*	12.6	26.7
BASIC NITROGEN, ppm			1.3*	8.3	12.2
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	323.	380.	468.	557.	570.
VL TBP BOILING CURVE,DEG F - 10%	326.	385.	472.	558.	574.
VL TBP BOILING CURVE,DEG F - 30%	336.	404.	491.	560.	590.
VL TBP BOILING CURVE,DEG F - 50%	346.	422.	510.	562.	606.
VL TBP BOILING CURVE,DEG F - 70%	357.	439.	529.	563.	622.
VL TBP BOILING CURVE,DEG F - 90%	369.	455.	548.	565.	637.
VL TBP BOILING CURVE,DEG F - 95%	372.	459.	552.	566.	641.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	334.c	397.c	480.c	547.c	575.c
ASTM BOILING CURVE, DEG F - 5%	334.	397.	481.	547.	576.
ASTM BOILING CURVE, DEG F - 10%	334.c	398.c	482.c	547.c	576.c
ASTM BOILING CURVE, DEG F - 30%	337.c	405.c	488.c	547.c	582.c
ASTM BOILING CURVE, DEG F - 50%	342.c	414.c	498.c	547.c	590.c
ASTM BOILING CURVE, DEG F - 70%	348.c	424.c	510.c	548.c	599.c
ASTM BOILING CURVE, DEG F - 90%	354.c	434.c	521.c	549.c	607.c
ASTM BOILING CURVE, DEG F - 95%	358.	439.	528.	550.	613.
ASTM BOILING CURVE, DEG F - EP	364.c	446.c	535.c	552.c	620.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	92.7	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	55.9				
MOT. OCTANE F-2 CLEAR	66.7				
TOTAL PARAFFINS, LV%	32.9a	40.9a	47.3a	49.2a	50.3a
OLEFINS, LV%	.9*				
NAPHTHENES, LV%	58.8a	48.9a	38.1a	34.8a	33.5a
AROMATICS, LV%	7.5a	10.1a	14.6a	16.0a	16.1a
REID VAPOR PRESSURE, psi	.02*	.02c	.00c		
FLASH PT(API Pen-Mar clsd cup),F	119.c	163.c	212.c	244.c	257.c
Flash Point Measured	116.	173.	242.	283.	312.
FLASH PT(CHV Pen-Mar clsd cup),F	119.c	167.c	230.c	279.c	301.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.60c	5.74c	5.85c	5.91c	5.92c
FREEZE POINT, F	-117.n	-79.n	-20.n	-3.n	18.n
CLOUD POINT, F	-123.c	-80.c	-22.c	-4.c	17.c
POUR POINT, F	-127.c	-80.n	-24.n	-6.n	16.n
SMOKE POINT (ASTM), mm	21.	17.	13.*	13.*	
ANILINE POINT, F	131.	139.	154.	165.	173.
CETANE INDEX	30.4	39.4	45.1	48.5	48.9
DIESEL INDEX	58.7c	54.0c	53.0c	53.8c	55.5c
VISCOSITY, cSt @ 100 F (38 C)	1.1	1.7	3.2	4.8	6.8
VISCOSITY, cSt @ 104 F (40 C)	1.1c	1.7c	3.0c	4.5c	6.4c
VISCOSITY, cSt @ 122 F (50 C)	1.0	1.4	2.5	3.6	5.0
VISCOSITY, cSt @ 140 F (60 C)	.9c	1.3c	2.1c	3.0c	3.9c
VISCOSITY, cSt @ 212 F (100 C)	.6c	.8c	1.2c	1.6c	2.0c
VISCOSITY, cSt @ 275 F (135 C)	.5c	.6c	.9c	1.1c	1.3c
RAMSBOTTOM CARBON, WT%					.02c
CONRADSON CARBON, WT%				.01*	.01*

VANADIUM, ppm	.01*

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1176.s	1176.s
YIELD AT START-OF-CUT, LV%	57.73	64.07	57.73	91.53	57.73
YIELD AT END-OF-CUT, LV%	64.07	91.53	91.53	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	6.33	27.46	33.80	8.47	42.27
YIELD AT START-OF-CUT, WT%	54.43@	60.93@	54.43@	90.20@	54.43@
YIELD AT END-OF-CUT, WT%	60.93@	90.20@	90.20@	100.00@	100.00@
YIELD OF CUT (WT% OF CRUDE)	6.50@	29.27@	35.77@	9.80@	45.57@
API GRAVITY 60F	29.2	23.3	24.3	11.1	21.5b
SPECIFIC GRAVITY 60/60	.8806	.9143	.9080	.9925	.9249b
CHARACT. FACTOR (K-FACTOR)	11.82c	11.91c	11.93c	11.98c	11.90c
MOLECULAR WEIGHT	289.c	406.c	390.c		407.c
SULFUR, WT%	.061	.143b	.128b	.517	.204
MERCAPTAN SULFUR, ppm	13.*				
NITROGEN, ppm	99.8	1240.4	1033.1	6521.2	2213.4
BASIC NITROGEN, ppm	42.7	391.2	327.9	2369.5	585.1b
HYDROGEN, WT%				11.0c	13.4c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	647.	712.	658.	1020.	661.
VL TBP BOILING CURVE,DEG F - 10%	650.	728.	671.	1029.	678.
VL TBP BOILING CURVE,DEG F - 30%	659.	791.	740.	1063.	771.
VL TBP BOILING CURVE,DEG F - 50%	669.	832.	811.	1097.	838.
VL TBP BOILING CURVE,DEG F - 70%	679.	873.	856.	1129.s	928.
VL TBP BOILING CURVE,DEG F - 90%	691.	955.	943.	1160.s	1097.
VL TBP BOILING CURVE,DEG F - 95%	694.	983.	976.	1168.s	1137.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1176.s	1176.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	652.c	727.c	674.c	1032.s	677.c
ASTM BOILING CURVE, DEG F - 5%	653.	734.	680.	1036.	684.
ASTM BOILING CURVE, DEG F - 10%	654.c	743.c	687.c	1041.c	694.c
ASTM BOILING CURVE, DEG F - 30%	661.c	798.c	749.c	1070.c	779.c
ASTM BOILING CURVE, DEG F - 50%	669.c	832.c	811.c	1097.c	838.c
ASTM BOILING CURVE, DEG F - 70%	679.c	873.c	856.c	1129.s	928.c
ASTM BOILING CURVE, DEG F - 90%	691.c	955.c	943.c	1160.s	1097.c
ASTM BOILING CURVE, DEG F - 95%	694.	982.	976.	1168.s	1137.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1176.s	1176.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	24.4	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	91.6	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	14.6	0.0	9.0
TOTAL PARAFFINS, LV%	43.2a	23.6a	27.3a		
NAPHTHENES, LV%	38.2a	46.2a	44.7a		
AROMATICS, LV%	18.5a	30.2a	28.0a		
FLASH PT(API Pen-Mar clsd cup),F	282.c	310.c	298.c	341.c	300.c
Flash Point Measured	343.	457.	436.		
FLASH PT(CHV Pen-Mar clsd cup),F	350.c				
HEATING VAL, GROSS 10**6 Btu/bbl	6.00c	6.16c	6.13c	6.49c	6.21c
HEATING VAL, NET, 10**6 Btu/bbl				6.14c	5.81c
FREEZE POINT, F	53.c				
CLOUD POINT, F	47.c				
POUR POINT, F	43.n	91.n	88.n	131.	85.
ANILINE POINT, F	181.	206.	201.		
CETANE INDEX	46.6				
DIESEL INDEX	52.8c	47.9c	49.0c		
VISCOSITY, cSt @ 100 F (38 C)	13.5				
VISCOSITY, cSt @ 104 F (40 C)	12.5c	102.0c	64.7c	1.46E+6c	202.8c
VISCOSITY, cSt @ 122 F (50 C)	9.1	61.2	40.4	3.18E+5	108.3b
VISCOSITY, cSt @ 140 F (60 C)	6.7c	39.3c	26.8c	84645.4c	63.1c
VISCOSITY, cSt @ 210 F (99 C)	2.8*	11.0b	8.2b	2019.0	13.9b
VISCOSITY, cSt @ 212 F (100 C)	2.8c	10.7c	8.0c	1860.6c	13.4c
VISCOSITY, cSt @ 275 F (135 C)	1.6c	5.0c	4.0c	230.6c	5.7c
RAMSBOTTOM CARBON, WT%	.02c	.16c	.14c	11.26	2.42
CONRADSON CARBON, WT%	.01	.14	.12	12.65	2.72
VANADIUM, ppm	.01	.03	.03	29.93	5.32

NICKEL, ppm	.63	.71	.70	14.18	2.17
ASPHALTENES, WT%				.9	.4
SOFTENING POINT				111.2	
PENETRATION, dmm				110.1c	

*** Meaning of the codes which follow table values:

- * - Obtained by curve extrapolation
- c - Calculated from other properties
- @ - Calculated from curve extrapolation of other properties
- g - Calculated from GC analysis data
- = - Calculated from combination of GC and dist. curve data
- + - As above, but had to extrapolate dist. curve
- d - Distillate property curve used for resid property
- r - Resid property curve used for distillate property
- b - Both distillate and resid property curves used
- s - Suspect value - may be inaccurate
- n - Cloud Point, Pour Point, or Freeze Point interpolated from property curve
- o - Calculated with distillate separation inefficiency modeling
- p - Cloud, Pour, Freeze interpolated from property curve with distillate separation inefficiency modeling
- q - Cloud Point suspect negative area under cloud point index curve for cut
- i - Property value adjusted after integration
- z - Property value reset to zero after being estimated negative
- w - This property is not whole crude balanced and is interpolated from the resid curve
- m - Value suspect 1 or more of the crudes did not include this property
- a - PNA Adjustment Applied

CAL II - CRUDE ANALYSIS SYSTEM
CUT PROPERTIES REPORT

Foster Wheeler USA Corporation
Crude: Composit - Crudo Composito Varios
Country: Peru
Library: CORPORATE

Run Date: 04/07/02 (13:23:47)
Crude Survey No.:
Area:
CAL II Version: PC 6.67

Note: Core Labs Assay of Crudo Composito Varios received from PetrPeru on 12/1
0.0 LV% composit

Whole-Crude Properties

	LAB DATA	CALC (BALANCE)		LV%	WT%
API 60F	34.2	34.8*	C2	0.00	0.00
SG 60/60	.8540	.8508*	C3	0.00	0.00
Dens @15			IC4	0.05	0.03
S, WT%	.07	.07*	NC4	0.13	0.09
N2, ppm	890.0	903.*	IC5	0.33	0.24
H2, WT%			NC5	0.29	0.22
RVP	.89	.37	CP	0.00	0.00
Va, ppm	.67	.66		----	----
Ni, ppm	1.90	.83		0.80	0.58
CCR, wt%		4.42			
RAMSBOTT		1.00			
POUR, F	20.0				
VOL YLD					
NEUT	.31				
SALT pkb					
cSt@ 60F		10.33			
cSt@ 77F		7.59			
cSt@104F		5.02			
cSt@100F	5.31		K Factor	11.90	
cSt@122F	3.97		ASH	.02	
MERCAP S	4.00				

	X5	LN	LA	LB	HN
TBP TEMP AT START-OF-CUT, F	55.	292.	180.	180.	316.
TBP TEMP AT END-OF-CUT, F	180.	316.	292.	292.	321.
YIELD AT START-OF-CUT, LV%	.75	13.49	3.24	3.24	16.62
YIELD AT END-OF-CUT, LV%	3.24	16.62	13.49	13.49	17.21
YIELD OF CUT (LV% OF CRUDE)	2.49	3.13	10.25	10.25	.60
YIELD AT START-OF-CUT, WT%	.52@	11.45@	2.41@	2.41@	14.33@
YIELD AT END-OF-CUT, WT%	2.41@	14.33@	11.45@	11.45@	14.89@
YIELD OF CUT (WT% OF CRUDE)	1.89@	2.88@	9.04@	9.04@	.55@
API GRAVITY 60F	86.9	49.3	57.1	57.1	48.0
SPECIFIC GRAVITY 60/60	.6480	.7826	.7505	.7505	.7882
CHARACT. FACTOR (K-FACTOR)	12.88c	11.68c	11.86c	11.86c	11.67c
MOLECULAR WEIGHT	93.s	135.c	120.c	120.c	139.c
SULFUR, WT%	0.000z	.005	.003	.003	.006
MERCAPTAN SULFUR, ppm	7.*	7.	8.*	8.*	6.
VL TBP BOILING CURVE,DEG F - ST	55.	292.	180.	180.	316.
VL TBP BOILING CURVE,DEG F - 5%	62.	293.	197.	197.	316.
VL TBP BOILING CURVE,DEG F - 10%	68.	294.	209.	209.	316.
VL TBP BOILING CURVE,DEG F - 30%	95.	299.	224.	224.	317.
VL TBP BOILING CURVE,DEG F - 50%	122.	303.	245.	245.	318.
VL TBP BOILING CURVE,DEG F - 70%	147.	308.	268.	268.	319.
VL TBP BOILING CURVE,DEG F - 90%	170.	313.	285.	285.	320.
VL TBP BOILING CURVE,DEG F - 95%	175.	315.	288.	288.	321.
VL TBP BOILING CURVE,DEG F - EP	180.	316.	292.	292.	321.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	95.c	298.c	218.c	218.c	315.c
ASTM BOILING CURVE, DEG F - 5%	96.	298.	224.	224.	315.
ASTM BOILING CURVE, DEG F - 10%	98.c	298.c	228.c	228.c	315.c
ASTM BOILING CURVE, DEG F - 30%	109.c	299.c	233.c	233.c	315.c
ASTM BOILING CURVE, DEG F - 50%	124.c	300.c	244.c	244.c	315.c
ASTM BOILING CURVE, DEG F - 70%	140.c	303.c	259.c	259.c	315.c
ASTM BOILING CURVE, DEG F - 90%	155.c	305.c	268.c	268.c	315.c
ASTM BOILING CURVE, DEG F - 95%	161.	307.	274.	274.	317.
ASTM BOILING CURVE, DEG F - EP	169.c	311.c	280.c	280.c	318.c
PERCENT EVAP @ 70C (E70), LV%	92.7	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	100.0	0.0	96.0	96.0	0.0
PERCENT EVAP @ 180C (E180), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0

PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	79.7*	66.5	69.6*	69.6*	66.4
MOT. OCTANE F-2 CLEAR	76.9*	66.8	68.8*	68.8*	67.2
TOTAL PARAFFINS, LV%	76.5a	36.9a	41.1a	41.1a	36.9a
OLEFINS, LV%	.5*	.5	.5*	.5*	.6
NAPHTHENES, LV%	23.0a	55.7a	53.9a	53.9a	55.5a
AROMATICS, LV%		6.9a	4.5a	4.5a	7.0a
REID VAPOR PRESSURE, psi	15.35*	.36	1.85	1.85	.26
FLASH PT(API Pen-Mar clsd cup),F		93.c	38.c	38.c	105.c
Flash Point Measured	-28.*	74.	23.	23.	86.
FLASH PT(CHV Pen-Mar clsd cup),F		92.c			105.c
HEATING VAL, GROSS 10**6 Btu/bbl	4.76c	5.49c	5.32c	5.32c	5.52c
FREEZE POINT, F		-136.n			-133.n
CLOUD POINT, F		-142.c			-139.c
POUR POINT, F		-146.c			-143.c
SMOKE POINT (ASTM), mm	31.*	25.	28.*	28.*	24.
ANILINE POINT, F		131.*			132.
CETANE INDEX		25.2*			27.1
DIESEL INDEX		64.8@			63.4c
VISCOSITY, cSt @ 100 F (38 C)		.8*			.9
VISCOSITY, cSt @ 104 F (40 C)		.8c			.9c
VISCOSITY, cSt @ 122 F (50 C)		.7*			.8*
VISCOSITY, cSt @ 140 F (60 C)		.7c			.7c
VISCOSITY, cSt @ 212 F (100 C)		.5c			.5c
VISCOSITY, cSt @ 275 F (135 C)		.4@			.4@

	NK	LK	MK	HK	LG
TBP TEMP AT START-OF-CUT, F	321.	375.	463.	557.	566.
TBP TEMP AT END-OF-CUT, F	375.	463.	557.	566.	645.
YIELD AT START-OF-CUT, LV%	17.21	23.85	36.08	48.68	49.96
YIELD AT END-OF-CUT, LV%	23.85	36.08	48.68	49.96	61.33
YIELD OF CUT (LV% OF CRUDE)	6.64	12.23	12.60	1.28	11.37
YIELD AT START-OF-CUT, WT%	14.89@	21.12@	32.94@	45.42@	46.70@
YIELD AT END-OF-CUT, WT%	21.12@	32.94@	45.42@	46.70@	58.13@
YIELD OF CUT (WT% OF CRUDE)	6.24@	11.82@	12.48@	1.28@	11.43@
API GRAVITY 60F	45.6	40.6	36.4	34.5	33.9
SPECIFIC GRAVITY 60/60	.7991	.8223	.8428	.8524	.8556
CHARACT. FACTOR (K-FACTOR)	11.66c	11.65c	11.74c	11.81c	11.93c
MOLECULAR WEIGHT	148.c	171.c	208.c	232.c	256.c
SULFUR, WT%	.005	.004	.010	.018	.027
MERCAPTAN SULFUR, ppm	6.	8.	7.	7.	10.
NITROGEN, ppm			1.5*	16.6	17.7
BASIC NITROGEN, ppm			2.7*	8.3	11.4
VL TBP BOILING CURVE,DEG F - ST	321.	375.	463.	557.	566.
VL TBP BOILING CURVE,DEG F - 5%	324.	379.	468.	557.	570.
VL TBP BOILING CURVE,DEG F - 10%	327.	384.	472.	558.	574.
VL TBP BOILING CURVE,DEG F - 30%	338.	401.	491.	560.	589.
VL TBP BOILING CURVE,DEG F - 50%	349.	419.	510.	562.	605.
VL TBP BOILING CURVE,DEG F - 70%	360.	436.	529.	563.	621.
VL TBP BOILING CURVE,DEG F - 90%	370.	454.	548.	565.	637.
VL TBP BOILING CURVE,DEG F - 95%	373.	459.	552.	566.	641.
VL TBP BOILING CURVE,DEG F - EP	375.	463.	557.	566.	645.
ASTM DISTILLATION METHOD	D86	D86	D86	D86	D86
ASTM BOILING CURVE, DEG F - ST	336.c	395.c	481.c	547.c	575.c
ASTM BOILING CURVE, DEG F - 5%	336.	396.	481.	547.	575.
ASTM BOILING CURVE, DEG F - 10%	336.c	397.c	482.c	547.c	576.c
ASTM BOILING CURVE, DEG F - 30%	339.c	402.c	488.c	547.c	581.c
ASTM BOILING CURVE, DEG F - 50%	345.c	411.c	498.c	547.c	589.c
ASTM BOILING CURVE, DEG F - 70%	350.c	422.c	510.c	548.c	598.c
ASTM BOILING CURVE, DEG F - 90%	355.c	432.c	521.c	549.c	607.c
ASTM BOILING CURVE, DEG F - 95%	360.	438.	528.	550.	613.
ASTM BOILING CURVE, DEG F - EP	365.c	446.c	535.c	552.c	620.c
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	91.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 350C (E350), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 360C (E360), LV%	100.0	100.0	100.0	100.0	100.0
PERCENT EVAP @ 370C (E370), LV%	100.0	100.0	100.0	100.0	100.0
RES. OCTANE F-1 CLEAR	66.3				
MOT. OCTANE F-2 CLEAR	66.4				
TOTAL PARAFFINS, LV%	37.7a	46.7a	52.9a	55.4a	54.6a
OLEFINS, LV%	.7				
NAPHTHENES, LV%	54.5a	44.0a	33.3a	30.3a	30.1a
AROMATICS, LV%	7.1a	9.3a	13.8a	14.3a	15.3a
REID VAPOR PRESSURE, psi	.01*	.02c	.00c		
FLASH PT(API Pen-Mar clsd cup),F	121.c	161.c	212.c	244.c	257.c
Flash Point Measured	105.	161.	242.	274.	289.
FLASH PT(CHV Pen-Mar clsd cup),F	121.c	166.c	230.c	279.c	300.c
HEATING VAL, GROSS 10**6 Btu/bbl	5.58c	5.70c	5.81c	5.86c	5.89c
FREEZE POINT, F	-116.n	-68.n	-14.n	2.n	21.n
CLOUD POINT, F	-122.c	-72.c	-14.c	4.c	23.c
POUR POINT, F	-126.c	-77.n	-15.n	6.n	26.n
SMOKE POINT (ASTM), mm	22.	18.	15.	15.	16.
ANILINE POINT, F	133.	141.	160.	170.	177.
CETANE INDEX	30.7	40.8	48.1	50.9	51.8
DIESEL INDEX	60.8c	57.3c	58.1c	58.8c	60.1c
VISCOSITY, cSt @ 100 F (38 C)	1.1	1.7	3.1	4.6	6.5
VISCOSITY, cSt @ 104 F (40 C)	1.0c	1.6c	3.0c	4.3c	6.2c
VISCOSITY, cSt @ 122 F (50 C)	.9*	1.4	2.4	3.3	5.0
VISCOSITY, cSt @ 140 F (60 C)	.8c	1.2c	2.0c	2.7c	4.2c
VISCOSITY, cSt @ 212 F (100 C)	.5c	.8c	1.2c	1.3c	2.3c
VISCOSITY, cSt @ 275 F (135 C)	.4@	.6c	.8c	.9c	1.6c
CONRADSON CARBON, WT%					.00*

	LV	HV	HG	VB	AR
TBP TEMP AT START-OF-CUT, F	645.	697.	645.	1011.	645.
TBP TEMP AT END-OF-CUT, F	697.	1011.	1011.	1181.s	1181.s
YIELD AT START-OF-CUT, LV%	61.33	67.25	61.33	92.02	61.33
YIELD AT END-OF-CUT, LV%	67.25	92.02	92.02	100.00	100.00
YIELD OF CUT (LV% OF CRUDE)	5.92	24.77	30.69	7.98	38.67
YIELD AT START-OF-CUT, WT%	58.13@	64.22@	58.13@	90.73@	58.13@
YIELD AT END-OF-CUT, WT%	64.22@	90.73@	90.73@	100.00@	100.00@
YIELD OF CUT (WT% OF CRUDE)	6.09@	26.51@	32.59@	9.27@	41.87@
API GRAVITY 60F	30.3	23.9	25.1	11.6	22.1b
SPECIFIC GRAVITY 60/60	.8746	.9103	.9034	.9890	.9211b
CHARACT. FACTOR (K-FACTOR)	11.90c	11.97c	12.00c	12.05c	11.96c
MOLECULAR WEIGHT	290.c	410.c	393.c		412.c
SULFUR, WT%	.050	.115	.103	.342	.156b
MERCAPTAN SULFUR, ppm	10.*				
NITROGEN, ppm	65.7	1115.7	919.6	6485.1	2152.2b
BASIC NITROGEN, ppm	40.3	332.2	277.7		
HYDROGEN, WT%				11.1c	13.5c
VL TBP BOILING CURVE,DEG F - ST	645.	697.	645.	1011.	645.
VL TBP BOILING CURVE,DEG F - 5%	647.	712.	657.	1020.	660.
VL TBP BOILING CURVE,DEG F - 10%	649.	729.	669.	1029.	676.
VL TBP BOILING CURVE,DEG F - 30%	658.	794.	740.	1065.	773.
VL TBP BOILING CURVE,DEG F - 50%	668.	834.	814.	1099.	841.
VL TBP BOILING CURVE,DEG F - 70%	679.	874.	857.	1132.s	932.
VL TBP BOILING CURVE,DEG F - 90%	690.	956.	943.	1165.s	1102.s
VL TBP BOILING CURVE,DEG F - 95%	694.	983.	976.	1173.s	1142.s
VL TBP BOILING CURVE,DEG F - EP	697.	1011.	1011.	1181.s	1181.s
ASTM DISTILLATION METHOD	D1160	D1160	D1160	D1160	D1160
ASTM BOILING CURVE, DEG F - ST	652.c	728.c	674.c	1033.s	676.c
ASTM BOILING CURVE, DEG F - 5%	653.	735.	679.	1037.	682.
ASTM BOILING CURVE, DEG F - 10%	654.c	744.c	686.c	1042.c	692.c
ASTM BOILING CURVE, DEG F - 30%	661.c	801.c	748.c	1071.c	781.c
ASTM BOILING CURVE, DEG F - 50%	668.c	834.c	814.c	1099.c	841.c
ASTM BOILING CURVE, DEG F - 70%	679.c	874.c	857.c	1132.s	932.c
ASTM BOILING CURVE, DEG F - 90%	690.c	956.c	943.c	1165.s	1102.s
ASTM BOILING CURVE, DEG F - 95%	694.	983.	976.	1173.s	1142.s
ASTM BOILING CURVE, DEG F - EP	697.c	1011.c	1011.c	1181.s	1181.s
PERCENT EVAP @ 70C (E70), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 100C (E100), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 135C (E135), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 180C (E180), LV%	0.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 340C (E340), LV%	28.7	0.0	0.0	0.0	0.0
PERCENT EVAP @ 350C (E350), LV%	92.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 360C (E360), LV%	100.0	0.0	0.0	0.0	0.0
PERCENT EVAP @ 370C (E370), LV%	100.0	0.0	15.5	0.0	9.8
TOTAL PARAFFINS, LV%	38.2a	22.3a	25.4a		
NAPHTHENES, LV%	40.8a	48.6a	47.1a		
AROMATICS, LV%	21.0a	29.0a	27.5a		
FLASH PT(API Pen-Mar clsd cup),F	282.c	311.c	297.c	341.c	299.c
Flash Point Measured	330.	467.	440.		
FLASH PT(CHV Pen-Mar clsd cup),F	350.c				
HEATING VAL, GROSS 10**6 Btu/bbl	5.98c	6.15c	6.12c	6.49c	6.19c
HEATING VAL, NET, 10**6 Btu/bbl				6.13c	5.80c
FREEZE POINT, F	53.c				
CLOUD POINT, F	47.c				
POUR POINT, F	43.n	86.n	84.n	109.	85.
ANILINE POINT, F	186.	203.	200.		
CETANE INDEX	48.7				
DIESEL INDEX	56.2c	48.7c	50.3c		
VISCOSITY, cSt @ 100 F (38 C)	12.6				
VISCOSITY, cSt @ 104 F (40 C)	12.4c	129.1c	84.0c	2.45E+6c	3.8c
VISCOSITY, cSt @ 122 F (50 C)	11.8	70.6b	47.5b	4.93E+5	4.6
VISCOSITY, cSt @ 140 F (60 C)	8.0c	42.1c	29.1c	1.23E+5c	5.6c
VISCOSITY, cSt @ 210 F (99 C)	2.7*	10.0	7.5*	2487.6	13.3b
VISCOSITY, cSt @ 212 F (100 C)	2.6c	9.7c	7.3c	2284.7c	13.7c
VISCOSITY, cSt @ 275 F (135 C)	1.4c	4.3c	3.4c	261.0c	34.9c
RAMSBOTTOM CARBON, WT%	.05c	.26c	.22c	12.41	2.40
CONRADSON CARBON, WT%	.03	.27	.22	12.49	2.77
VANADIUM, ppm	.01	.07	.06	7.55	1.57

NICKEL, ppm	.03	.55	.45	7.00	1.97
ASPHALTENES, WT%				.3	.1
SOFTENING POINT				104.5	
PENETRATION, dmm				165.8c	

*** Meaning of the codes which follow table values:

- * - Obtained by curve extrapolation
- c - Calculated from other properties
- @ - Calculated from curve extrapolation of other properties
- g - Calculated from GC analysis data
- = - Calculated from combination of GC and dist. curve data
- + - As above, but had to extrapolate dist. curve
- d - Distillate property curve used for resid property
- r - Resid property curve used for distillate property
- b - Both distillate and resid property curves used
- s - Suspect value - may be inaccurate
- n - Cloud Point, Pour Point, or Freeze Point interpolated from property curve
- o - Calculated with distillate separation inefficiency modeling
- p - Cloud, Pour, Freeze interpolated from property curve with distillate separation inefficiency modeling
- q - Cloud Point suspect negative area under cloud point index curve for cut
- i - Property value adjusted after integration
- z - Property value reset to zero after being estimated negative
- w - This property is not whole crude balanced and is interpolated from the resid curve
- m - Value suspect 1 or more of the crudes did not include this property
- a - PNA Adjustment Applied

APPENDIX A.4 – PURVIN & GERTZ MARKET OUTLOOK REPORT

This appendix contains the Market Outlook Report prepared by Purvin & Gertz, Inc.

PERU REFINED PRODUCTS MARKET OUTLOOK

TALARA REFINERY UPGRADE FEASIBILITY STUDY

Prepared for:

FOSTER WHEELER USA CORPORATION

Prepared by:

PURVIN & GERTZ INC.

Houston - Los Angeles -London - Calgary
Buenos Aires - Singapore

April 2002

T.J. Manning
A. L. Luaces
D. K. Faulkner

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I. INTRODUCTION

Foster Wheeler USA Corporation ("Foster Wheeler") has retained Purvin & Gertz, Inc. to prepare a market analysis for refined products in Peru, in support of the Talara Refinery Upgrade Project Feasibility Study. The market analysis considers LPG, naphtha, gasoline, kerosene/jet fuel, diesel, and residual fuel oil. Markets considered include the domestic Peru market, as well as regional export markets, where applicable.

This report has been prepared specifically for the purpose of presentation to the U.S. Trade & Development Agency (TDA) as a part of their review of the Talara Refinery Upgrade Project. Distribution and usage of the report is permissible only for that purpose. Any third party in possession of the report may not rely upon its conclusions without the written consent of Purvin & Gertz. Possession of the report does not carry with it the right of publication.

Purvin & Gertz conducted this analysis and prepared this report utilizing reasonable care and skill in applying methods of analysis consistent with normal industry practice. All results are based on information available at the time of review. Changes in factors upon which the review is based could affect the results. Forecasts are inherently uncertain because of events or combinations of events that cannot reasonably be foreseen including the actions of government, individuals, third parties and competitors. **NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY.**

Some of the information on which this report is based has been provided by others including the client. Purvin & Gertz has utilized such information without verification unless specifically noted otherwise. Purvin & Gertz accepts no liability for errors or inaccuracies in information provided by others.

II. SUMMARY AND CONCLUSIONS

Purvin & Gertz, Inc. has prepared this market analysis in support of the Talara Refinery Upgrade Project Feasibility Study. The goal of the overall Feasibility Study, of which this market analysis forms a part, is to identify the modifications required for the Talara refinery to meet World Bank product specifications. In summary, adopting the World Bank specifications will require the refinery to produce unleaded gasoline, reduce the sulfur content of diesel, and reduce the butane content of LPG.

In this market analysis we have developed supply and demand forecasts for petroleum products in Peru, taking into consideration development of the Camisea Project and expected refinery expansion projects, including an expansion of the Talara refinery. We have also developed an outlook for crude oil and refined products prices, as included in the tables at the end of this section. Table II-1 includes our outlook for delivered crude prices into the Talara refinery, and Tables II-2 and II-3 include a forecast of product prices for domestic sales and export sales, where applicable. Prices are presented in both current and constant dollars.

Demand for petroleum products in Peru will depend strongly on future economic growth in the country. The large increase in natural gas and gas liquids production from Camisea will change the energy mix in Peru and affect the demand for refined products, particularly residual fuel oil and diesel fuel. Historically, economic growth and the demand for petroleum products have been quite variable because of political instability, government intervention in the economy, dependence on cyclical industries, and adverse weather from the "El Niño" phenomena. Future developments in all these areas are also uncertain, but the Toledo government seems to be progressing in the proper direction to provide a sound economic foundation for future growth. Given that almost half of the population of Peru lives in subsistence conditions, the potential for economic growth is very high.

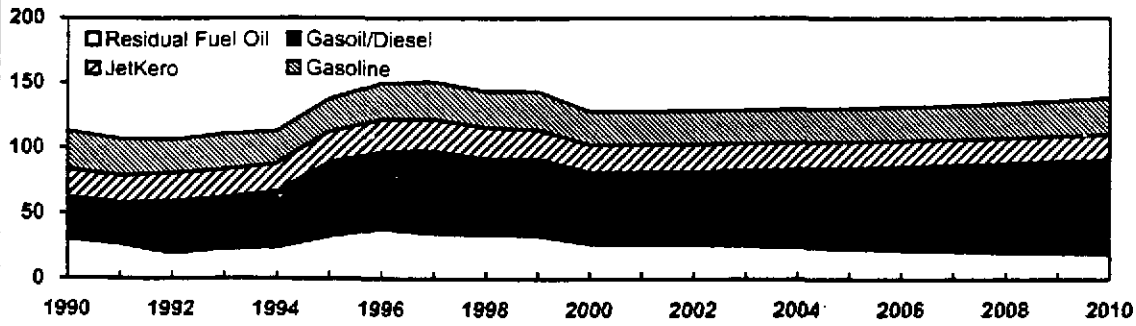
Our economic outlook takes a moderately positive view of future developments. Peru will be affected by the current worldwide recession, but should rebound strongly as other world economies recover in 2002-2003. Longer term, we project an economic growth rate for Peru of about 3.6% per year, slightly higher than the world average. Potentially, growth could be significantly higher if progress continues to be made in increasing the participation of more people in the overall economy.

Based on this economic outlook, the demand for total energy is projected to grow longer term at a rate of about 2.5% per year. Natural gas will become a major contributor to the energy balance increasing from 6% of the mix in 2000 to 15% in 2010.

REFINED PRODUCT DEMAND

The demand for refined products is projected to grow at a rate of only about 1.0-1.5% per year between 2000 and 2010 (Figure II-1) because of stagnant gasoline demand and declining residual fuel oil demand.

FIGURE II-1
PERU REFINED PRODUCTS DEMAND
(Thousand Barrels per Day)



Demand for residual fuel oil peaked at 38,000 B/D in 1996, but has been in a steady decline since then. Natural gas is expected to displace residual fuel oil in base load power generation applications. As a result, we expect that domestic demand for residual fuel oil will continue to decline over the forecast period.

The majority of demand for gasoil/diesel is in the transportation sector, making up approximately 60% of the total. The residential/commercial sector comprises about 8% of total gasoil/diesel demand, with the balance of demand coming from the industrial and power generation sectors. We expect the demand for diesel as a transportation fuel will continue to increase over time, growing at a rate of about 3.5% annually, while its use in the residential/commercial sector will grow at a rate of slightly over 1% annually. We do not expect that natural gas will displace gasoil/diesel use in the power generation sector to a significant degree. Overall, we expect total gasoil/diesel demand to grow at a rate only slightly below the growth rate of the economy.

Jet fuel and kerosene are similar products serving different applications. The demand for kerosene will continue to decline as LPG displaces it. Jet fuel demand is projected to increase, but at a rate below the rate of growth in the economy. Growth in the economy and more participation in the international business community will increase international travel. Likewise, growth in the domestic economy will increase domestic travel as well. However, service routes are well established and growth from new routes will be more limited.

REFINED PRODUCT BALANCE

Both of the large Peruvian refineries have expansion and modernization projects underway or planned. These projects will enable the refineries to produce higher quality products such as unleaded gasoline and lower sulfur diesel, in line with the recommended World Bank specifications. The Camisea splitter will add to the supply of diesel and, to a lesser extent, jet fuel. Peru has been a significant importer of diesel because the refineries cannot produce the high yield requirement with their existing configuration. Even with the Camisea condensate splitter, we anticipate that Peru will continue to require diesel imports to meet demand.

The country is approximately balanced on jet fuel/kerosene and is expected to remain similarly balanced in the future. Peru is a significant exporter of residual fuel oil because of the relatively heavy crude oil processed and the lack of sophisticated conversion equipment. Our balances assume that some additional conversion capacity will be added to the refineries, but the declining domestic demand for residual fuel oil will likely cause exports to increase over the forecast period.

CRUDE PRICES

Purvin & Gertz has developed an outlook for crude oil prices relevant to the Talara Refinery Upgrade Project. We have developed crude prices for six crudes identified by PetroPeru as potential inputs to the Talara refinery. These include Cusiana, Mesa 30, Oriente, Mayna, Loreto and Ono.

In general, prices for crudes produced and consumed in the Americas are projected based on refining value equalization at the U.S. Gulf Coast. For the Loreto and Oriente crudes, the price forecast is based on a cracking differential compared to ANS in the U.S. West Coast. A cracking yield differential was used to establish value differences as that configuration is considered representative of incremental processing economics and explains market price differentials effectively. Product yields and expected product qualities are developed for each crude based on assay data and Purvin & Gertz' refinery yield model.

The relative value of products obtained from Purvin & Gertz' refinery yield model sets the relative differentials for each crude in the appropriate market. Transportation costs for the crude oils from various load ports to Talara were then calculated, and any other applicable fees assessed, to arrive at the delivered price into Talara. Table II-1 presents our outlook for prices of the crudes relevant to this project. For reference, we have also provided a forecast for West Texas Intermediate at the U.S. Gulf Coast.

REFINED PRODUCT PRICES

Refined product prices in Peru are based on import parity for product imports from the U.S. Gulf Coast and the large Caribbean refining industries. As such, prices are directly related to U.S. Gulf Coast prices plus transportation and related charges. Peru has a 12% import duty on products except those sourced from Andean Community countries for which the duty is 9.6%. Product prices are based on an import parity calculation performed by PetroPeru and used as a

basis for their postings. The parity formula includes a 9.6% duty, the rate applicable to Venezuela, the principal source of imports. This duty will be eliminated beginning in 2006 as part of the Andean Community agreement. However, duties will remain for imports from other sources. Our forecast assumes duties are eliminated beginning in 2006 for all imports from Andean Community countries. The continuance of import duties past their scheduled phase out would represent an upward sensitivity on prices.

Tables II-2 and II-3 include Purvin & Gertz' forecast of product prices for the domestic market and export markets, where applicable. The prices for product exports were developed for use in the refinery configuration study which will be developed as part of the overall Talara Refinery Upgrade Project. The export markets identified do not necessarily represent the best product netback prices to the Talara refinery, nor do they represent Purvin & Gertz' recommendations for where excess production should be marketed. These export prices are intended to be used as floor prices in a linear programming model, to be developed by Foster Wheeler, to determine the relative economic value of increasing production of a given product over the domestic demand requirements.

LPG MARKETS

Peru is presently an importer of LPG and receives shipments from points east of the Panama Canal. We estimate that the Peruvian marketplace requires approximately 5,400 B/D of LPG imports annually to cover its total demand. Peru has one of the fastest growing LPG markets in all of Latin America, growing at about 10% per year for the last five years.

When the Camisea LPG production comes on-line (currently scheduled during 2004), Peru will have plentiful supplies of LPG, and is likely to become a net exporter of LPG soon after the startup of the Camisea project. Approximately 25% of the Talara refinery's LPG production currently serves the local northern market, with the balance moving by truck into the jungle areas or southward by ship to the terminals along the coast, including the Callao terminal in Lima. We expect that the majority of Talara's LPG production will continue to be absorbed into the domestic Peruvian market, especially given the government's plans to continue increasing domestic LPG demand. When the Camisea project comes online, the Talara refinery LPG production that currently serves the metropolitan Lima area will compete with the Camisea production in that market. We expect that PetroPeru may begin exporting some portion of its LPG production to nearby Ecuador, due to competition with the Camisea LPG production in the Lima area.

PRICING OF LPG

At roughly $375 per tonne, ex-plant (wholesale) LPG prices in Callao, Peru are high by most standards, equivalent to approximately 4 cents per gallon over Mont Belvieu propane. Wholesale LPG prices are high because Peru, like many of its Latin neighbors including Chile, sets the price of ex-plant LPG on a theoretical Mont Belvieu import parity basis – capturing a markup for freight, canal costs, duties, tariffs, terminal charges, etc. for shipments from Mont Belvieu in small pressurized vessels. Peru has very small LPG pressurized storage facilities (ranging from 50,000 to 144,000 barrels) and shipments in larger semi-refrigerated vessels are

not feasible. As a result, waterborne freight costs run high, and the wholesale price must reflect considerable margin to cover freight from distant producing markets.

NAPHTHA MARKETS & PRICING

Generally, there are two types of feedstock naphtha, each with certain qualities and specific usage. The first type is light or paraffinic naphtha, which is typically used as a feedstock for petrochemical facilities producing ethylene or propylene. Naphtha from gas processing plants falls into this category of feedstock. The second type of naphtha is heavy naphtha, also called reforming naphtha, which is used for gasoline and aromatics production. The range of qualities for naphtha contained within crudes as well as naphtha traded on the open market is broad.

The most likely market for excess naphtha from the Talara refinery is the large refining and petrochemical complexes along the U.S. Gulf Coast. PetroPeru regularly exports cargoes of reforming grade naphtha to this large market. Refiners on the USGC typically purchase naphtha as a feedstock for reformers to produce a high octane gasoline blending component and aromatic feedstock for chemical plants. Netback prices for Talara's excess naphtha production were calculated based on Purvin & Gertz' forecast of prices on the U.S. Gulf Coast. The key specification for this naphtha is a minimum naphthenes + aromatics content of 40%. Freight rates were estimated based on a Medium Range tanker transporting product from the Talara refinery dock through the Panama Canal and to a refiner on the Houston Ship Channel.

TABLE II-1
DELIVERED CRUDE OIL PRICES, CIF TALARA
(Dollars per Barrel)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Current Dollars													
West Texas Intermediate, Spot USGC	30.24	25.73	19.12	21.94	22.32	22.80	23.66	24.59	25.30	25.89	26.53	30.14	34.82
Cusiana	33.55	29.00	20.97	23.94	24.46	25.06	23.70	24.53	25.12	25.64	26.17	29.62	34.26
Mesa 30	31.44	26.19	19.69	22.63	22.97	23.45	22.18	22.98	23.54	24.03	24.53	27.80	32.22
Oriente	27.29	21.41	15.21	16.01	18.20	18.59	17.73	18.49	18.95	19.34	19.73	22.41	26.15
Mayna	28.65	21.88	15.45	18.32	18.60	19.01	19.73	20.47	20.99	21.43	21.88	24.86	28.94
Loreto	24.45	19.11	13.01	15.71	15.84	16.17	16.99	17.77	18.21	18.58	18.95	21.52	25.17
Ono	28.17	23.61	17.06	19.90	20.36	20.90	21.71	22.51	23.07	23.56	24.06	27.30	31.70
Constant 2001 Dollars													
West Texas Intermediate, Spot USGC	30.24	25.73	18.75	21.09	21.03	21.07	21.43	21.84	22.02	22.10	22.20	22.84	23.90
Cusiana	33.55	29.00	20.56	23.01	23.05	23.16	21.47	21.78	21.86	21.88	21.90	22.45	23.52
Mesa 30	31.44	26.19	19.31	21.75	21.64	21.67	20.09	20.40	20.49	20.51	20.53	21.07	22.12
Oriente	27.29	21.41	14.91	17.31	17.15	17.17	16.06	16.42	16.50	16.51	16.51	18.98	17.95
Mayna	28.65	21.88	15.15	17.61	17.53	17.56	17.87	18.18	18.27	18.29	18.31	18.84	19.86
Loreto	24.45	19.11	12.75	15.10	14.92	14.94	15.39	15.78	15.86	15.86	15.86	18.31	17.28
Ono	28.17	23.61	16.72	19.13	19.19	19.31	19.68	19.99	20.09	20.11	20.13	20.69	21.76

TABLE II-2
TALARA NETBACK PRICES
(Current Dollars per Barrel)

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Domestic Sales into Callao														
LPG		27.47	22.15	15.32	17.63	18.40	18.83	17.29	17.82	18.12	18.45	18.82	21.51	24.87
Unleaded Regular Gasoline		39.67	35.33	25.15	28.69	29.33	30.02	28.10	28.90	29.43	29.95	30.51	34.44	39.56
Unleaded Premium Gasoline		41.30	37.40	27.04	31.06	31.48	32.34	30.67	31.46	32.02	32.57	33.16	37.32	42.80
Jet/ Kerosene		40.34	34.77	25.34	28.48	29.00	29.63	27.84	28.77	29.43	30.04	30.68	34.63	39.87
Diesel (0.05% S)		39.48	34.24	25.09	28.08	28.69	29.37	27.61	28.54	29.19	29.80	30.43	34.38	39.62
Diesel (0.2% S)		38.68	33.42	24.14	27.30	27.86	28.53	26.81	27.73	28.36	28.96	29.57	33.41	38.51
Residual F.O. (1% S)		29.93	24.57	16.67	19.41	19.24	19.36	18.17	18.84	19.26	19.65	20.05	22.80	26.61
Residual F.O. (3% S)		23.83	19.43	14.97	17.10	16.71	16.66	15.63	16.24	16.62	16.97	17.31	19.75	23.19
Export Sales														
	Destination													
LPG	Guayaquil, Ecuador	25.88	21.04	14.83	16.97	17.71	18.14	18.68	19.24	19.56	19.92	20.32	23.16	26.75
Naphtha	U.S. Gulf Coast	30.84	25.66	18.17	21.45	21.81	22.27	22.68	23.46	23.94	24.38	24.85	28.25	32.72
Unleaded Regular Gasoline	New York Harbor	32.64	27.39	19.63	22.91	23.48	24.23	25.31	26.05	26.54	27.01	27.51	31.09	35.88
Unleaded Premium Gasoline	New York Harbor	34.29	29.96	21.47	25.05	25.40	26.17	27.68	28.39	28.90	29.38	29.90	33.60	38.59
Jet/ Kerosene	New York Harbor	34.50	27.44	20.22	23.16	23.63	24.17	25.04	25.92	26.52	27.08	27.66	31.25	36.05
Diesel (0.05% S)	New York Harbor	33.57	27.04	20.14	22.97	23.53	24.12	24.99	25.87	26.48	27.04	27.62	31.22	36.06
Diesel (0.2% S)	New York Harbor	32.73	26.30	19.28	22.26	22.78	23.35	24.20	25.07	25.66	26.20	26.76	30.26	34.96
Residual F.O. (1% S)	New York Harbor	22.46	18.15	13.63	16.09	15.96	16.05	16.65	17.30	17.70	18.07	18.44	21.02	24.62
Residual F.O. (3% S)	New York Harbor	18.11	14.87	12.09	14.00	13.66	13.60	14.13	14.71	15.08	15.40	15.72	17.99	21.22

PURVIN & GERTZ

TABLE II-3
TALARA NETBACK PRICES
(Constant Dollars per Barrel)

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Domestic Sales into Callao														
LPG		27.47	22.15	15.01	16.94	17.34	17.39	15.66	15.82	15.77	15.75	15.75	16.30	17.07
Unleaded Regular Gasoline		39.67	35.33	24.65	27.58	27.64	27.74	25.45	25.66	25.62	25.56	25.53	26.10	27.15
Unleaded Premium Gasoline		41.30	37.40	26.51	29.85	29.67	29.88	27.78	27.93	27.88	27.80	27.75	28.29	29.38
Jet/ Kerosene		40.34	34.77	24.85	27.37	27.33	27.37	25.21	25.55	25.62	25.64	25.67	26.25	27.36
Diesel (0.05% S)		39.48	34.24	24.60	26.99	27.04	27.14	25.00	25.34	25.41	25.44	25.46	26.05	27.20
Diesel (0.2% S)		38.68	33.42	23.66	26.24	26.25	26.35	24.28	24.62	24.69	24.71	24.74	25.32	26.44
Residual F.O. (1% S)		29.93	24.57	16.34	18.66	18.13	17.88	16.46	16.73	16.77	16.77	16.78	17.28	18.27
Residual F.O. (3% S)		23.83	19.43	14.68	16.44	15.75	15.40	14.15	14.42	14.47	14.48	14.49	14.97	15.92
Export Sales														
	Destination													
LPG	Guayaquil, Ecuador	25.88	21.04	14.54	16.31	16.69	16.76	16.92	17.08	17.03	17.01	17.00	17.55	18.36
Naphtha	U.S. Gulf Coast	30.84	25.66	17.82	20.62	20.55	20.58	20.55	20.84	20.84	20.81	20.80	21.41	22.46
Unleaded Regular Gasoline	New York Harbor	32.64	27.39	19.24	22.02	22.12	22.38	22.93	23.13	23.11	23.05	23.02	23.56	24.63
Unleaded Premium Gasoline	New York Harbor	34.29	29.96	21.04	24.07	23.93	24.17	25.07	25.21	25.16	25.07	25.02	25.47	26.49
Jet/ Kerosene	New York Harbor	34.50	27.44	19.83	22.26	22.27	22.33	22.68	23.01	23.09	23.11	23.14	23.68	24.75
Diesel (0.05% S)	New York Harbor	33.57	27.04	19.74	22.07	22.17	22.28	22.64	22.98	23.05	23.08	23.11	23.66	24.75
Diesel (0.2% S)	New York Harbor	32.73	26.30	18.90	21.40	21.46	21.57	21.92	22.26	22.34	22.36	22.39	22.93	24.00
Residual F.O. (1% S)	New York Harbor	22.46	18.15	13.37	15.47	15.03	14.82	15.08	15.36	15.41	15.42	15.43	15.93	16.90
Residual F.O. (3% S)	New York Harbor	18.11	14.87	11.86	13.45	12.87	12.57	12.79	13.07	13.13	13.14	13.15	13.64	14.57

III. ENERGY/ECONOMIC OUTLOOK

In order to develop a forecast of the demand for refined products in Peru, a consistent framework must be established on the outlook for economic growth, the relationship between energy and economic growth, and the component of energy demand supplied by petroleum. The economic outlook for Peru depends on a number of local factors, but also will be tied to worldwide economic growth.

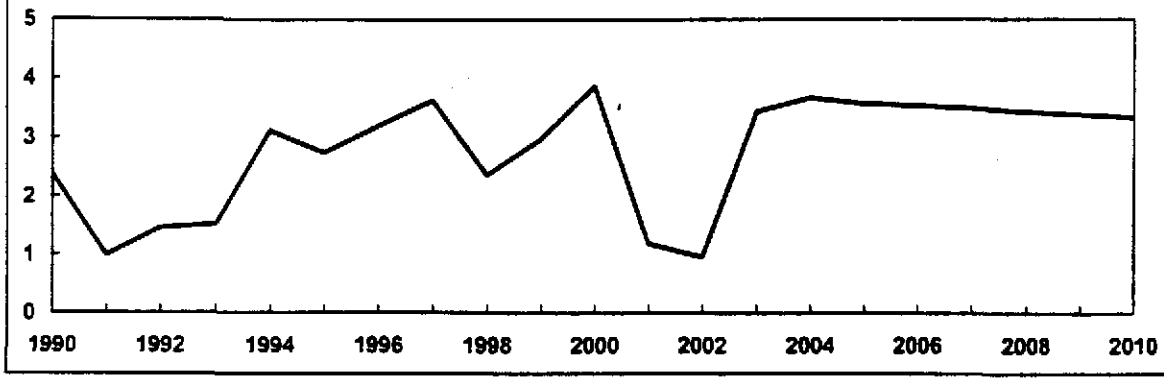
WORLD ECONOMIC OUTLOOK

The United States entered into a recession in the third quarter of 2001. The U.S. recession is leading to economic downturns in many other parts of the world. The United States, and most of the rest of the world to varying degrees, was in an economic slowdown prior to the terrorist attacks of September 11. The slowdown was a reaction to the rapid economic expansion of the late 1990s. The large amount of capital poured into technology companies in the late 1990s generated strong but unsustainable economic growth. As these companies began failing, the many companies providing goods and services to support them began to experience downturns in their businesses. A rapidly declining stock market made capital formation more difficult. As a result of these factors, the American economy began to slow and turn downward. Other countries experienced the same factors. Lesser developed countries which depend on the U.S. for a market for many of their goods found the demand for their products declining. As a result, these economies also began to slow down and decline.

The terrorist acts of September 11 caused damage to many other industries, especially travel related businesses. However, these events may lead to a quicker resolution of the downturn than would have been possible otherwise. Economic stimulus packages appear to be moving swiftly through Congress. The Federal Reserve has further reduced interest rates. The military spending involved with the war on the terrorists adds further stimulation to the economy. Although many uncertainties still exist, we expect a recovery in the American economy by the first half of 2003. With its recovery, other world economies should also respond positively.

Our economic outlook for the world is presented in Figure III-1. The worldwide economy will not decline to the same extent as the U.S. economy, but will follow the same general path.

FIGURE III-1
WORLD ECONOMIC GROWTH RATE
(Percent Annual Growth)



Looking beyond all the short term issues, we expect strong economic growth in the longer term. This growth is based on the net effect of four primary drivers we see determining economic growth, some of which are positive and some negative. The four primary drivers are: technological progress, transition from undeveloped to developed, world economic integration, and weakness in social and political infrastructure.

Although technological expansion progressed too rapidly in the last several years, the longer term trend will be continued rapid expansion. As computers become faster, cheaper, and smaller, they will become pervasive in almost all human activities. The communication revolution will also continue. As well as generating demand for product and services itself, the increase in communication will accelerate the rate of technical and scientific advances. Other technological gains in medicine and a number of other areas will contribute to technological growth. This rapid development of new knowledge and its instantaneous dissemination is a very powerful, positive force.

Approximately two-thirds of the world population is still mired in subsistence circumstances. Although the transition of this population from a subsistence existence to being part of the world economy will be a slow process, the impact of a small change is large. Countries such as China and India will experience rapid economic growth as more of their population becomes integrated in the overall economy.

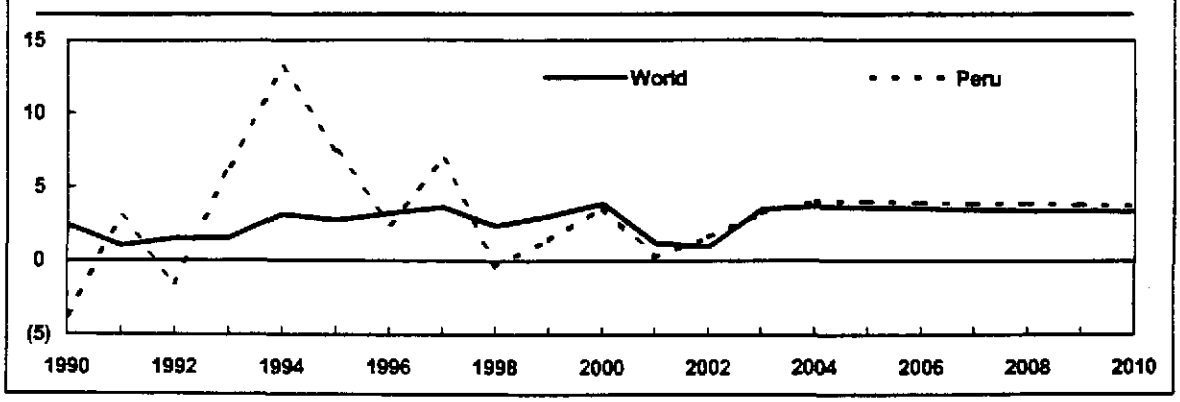
World economic integration will help support this trend. Although some opposition to globalization has arisen, trade groups such as the European Union, NAFTA, Mercosur, and the Andean Community are generating trade and economic activity between countries at rates never experienced previously.

The primary negative factor on economic growth is continued weakness in the economic and political systems. Conflicts, terrorist activities, and civil wars will continue to sap strength from the world economies. Weighing all these factors, we expect longer term world economic growth to average about 3.3% per year.

PERU ECONOMIC OUTLOOK

Peru has experienced a very uneven economic growth rate in the last ten years relative to the world as a whole (Figure III-2). The uneven growth in Peru has been related to an unstable political situation as well as to dramatic weather changes such as El Niño and to reliance on cyclical industries such as mining.

FIGURE III-2
PERU ECONOMIC GROWTH RATE
(Percent Annual Growth)



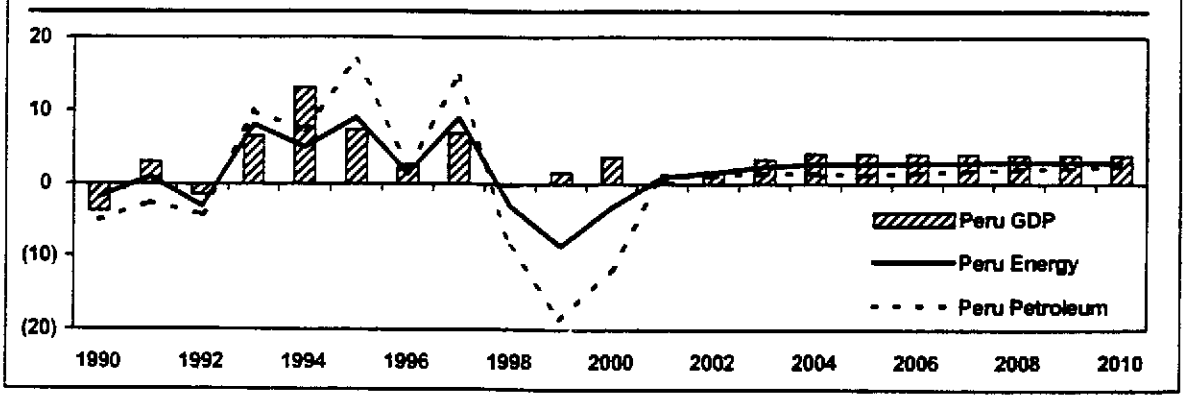
After his election in 1990, President Alberto Fujimori took many positive steps to bring about strong economic growth in the early 1990s. Problems that had inhibited economic growth included terrorism, hyper-inflation, and excessive government intervention in the economy. With the reforms and privatization, substantial foreign investment came into Peru. However, this investment slowed considerably in the late 1990s after the government delayed privatizations and political uncertainty increased. Government intervention in the economy and a failure to continue the privatization process largely resulted from Fujimori's attempt to be reelected in 2000. Now, after a very volatile and uncertain period, a democratically elected president is in office.

Although it is very early in the government of President Toledo, his administration appears to be taking the right steps towards resuming the privatization process and increasing the confidence of international investors. While Peru's GDP grew by only about 0.2% in 2001, we anticipate a strong recovery along with the rest of the world, and longer term economic growth rates in the 3.5% to 4.0% per year range. The relatively low per capita GDP in Peru, and the large portion of the population living in a subsistence economy, gives it the potential for substantial and sustainable long term growth. However, this growth will only occur if the needed economic policies can be implemented in the political environment.

PERU ENERGY BALANCE

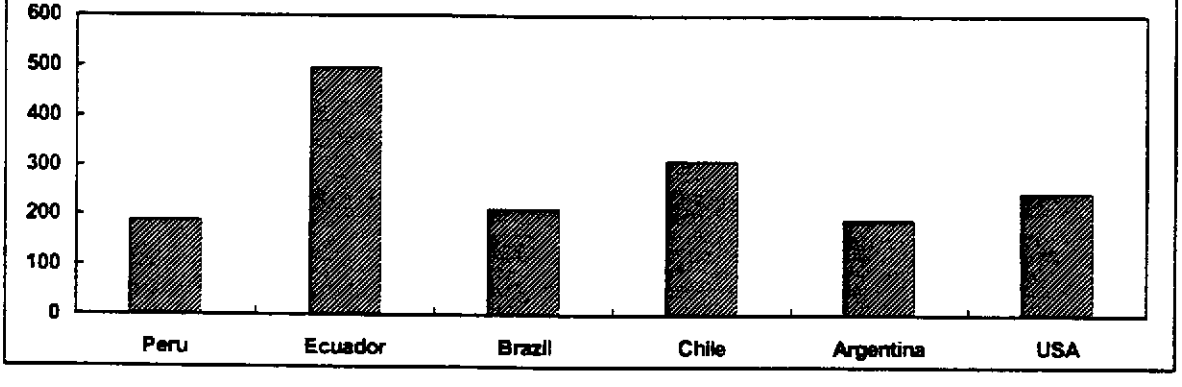
In order to forecast the demand for refined products, an overall energy balance must be considered. Energy consumption is largely related to economic growth. Year-to-year variations are quite volatile, but over a long term, energy use and economic growth form a consistent pattern (Figure III-3).

FIGURE III-3
GDP, ENERGY & PETROLEUM GROWTH
(Percent Annual Growth)



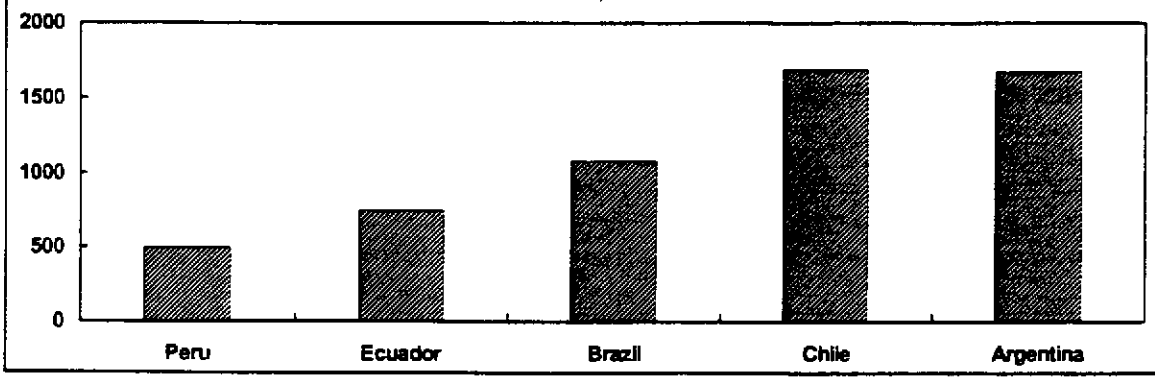
Peru's energy use expressed in TOE (Tonnes Oil Equivalent) per unit of GDP is fairly typical of neighboring countries and even the United States (Figure III-4).

FIGURE III-4
ENERGY USE PER UNIT OF GDP
(TOE/GDP)



However, per capita consumption in Peru is quite low compared to the neighboring countries.

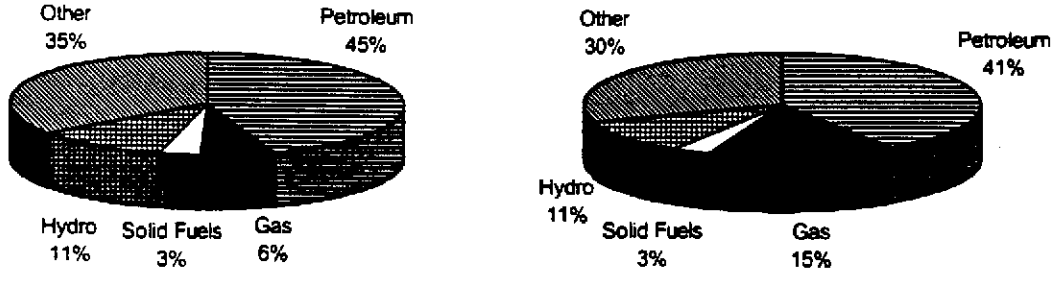
FIGURE III-5
ENERGY USE PER CAPITA
(TOE per Capita)



For comparison, the TOE per capita consumption in the United States is over 8,000. The low per capita energy consumption in Peru is largely related to the low GDP per capita in Peru. As economic growth occurs in the future, the per capita energy consumption is expected to increase.

The rapid introduction of gas into the energy mix is an important development in the Peru energy balance. Gas is expected to increase from approximately 6% of the energy supply in 2000 to almost 15% in 2010 (Figure III-6). The development of future hydro projects will likely occur at about the same rate as overall energy demand growth, keeping hydro's share of the energy mix about the same as current levels. The relative contribution of other energy sources will decline, including petroleum. Total demand for petroleum is expected to grow significantly, even though gas will displace petroleum products in power generation and, to some extent, industrial markets. This competitive fuel interaction will mainly be with residual fuel oil. Transportation fuels are not expected to be adversely affected by gas penetration.

FIGURE III-6
PERU ENERGY MIX
(Percent of Total)



The overall balance of energy ensures a consistency between our forecasts for individual petroleum products and the overall energy requirements. Our procedure is to use both a "top-down" and "bottom-up" approach. The "top-down" approach balances overall energy based on the relationship between energy and GDP. The "bottom-up" approach analyzes the demand for individual petroleum products based on trends in their market. Displacement by gas and other fuels is considered in arriving at a demand for individual petroleum products which, in aggregate, matches petroleum's total contribution to energy supply.

IV. REFINED PRODUCTS MARKETS IN PERU

In this section, Purvin & Gertz' outlook for refined products is presented for the Peru market. A brief summary of economy and energy factors is first presented, followed by a discussion of major trends in supply and demand for each product considered. The operation of the refineries is also considered in this section, due to their impact on supply and overall trade balances.

ECONOMY

As discussed in the previous section, political and economic developments in Peru were heavily dominated by President Fujimori over the past decade. He was first elected in 1990, reelected in 1995, and was widely expected to run for a third term in 2000 until he announced he was not running due to the scandal. An autocratic leader, he was firmly in command of Parliament and of the country as a whole. He has fled the country and returned to Japan. Peru's new President Alejandro Toledo appears to be taking the right steps towards resuming the privatization process and increasing the confidence of international investors.

Peru's GDP in 2000 was $67 billion, which reflects a sizable population of about 26 million and a relatively low per capita income. The economy essentially stagnated in 2001 along with most other world economies. While future growth is not likely to be as strong as in the 1990-97 period, we anticipate a strong recovery from the current downturn, and longer term economic growth rates in the 3.5% to 4.0% range (Table IV-1).

ENERGY

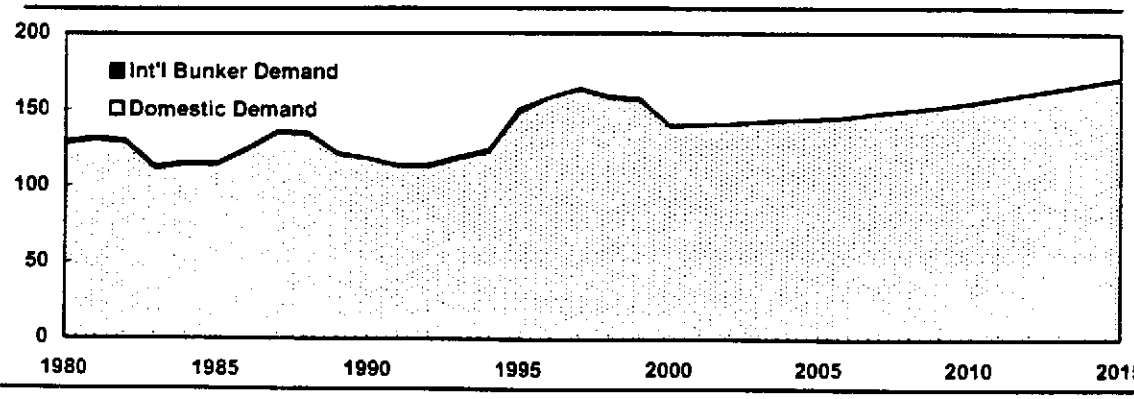
Energy consumption in Peru increased on a per capita basis to about 600 TOE/capita in 1997 but has since declined back to about 500 TOE/capita range (Table IV-1). Relative to neighboring countries, Peru's energy consumption per capita is quite low, although it is expected to increase over the forecast period.

Peru relies heavily on petroleum as it accounts for over 40% of total energy supply. Historically, Peru was self-sufficient, but in recent years, product imports have begun to be required. Natural gas is becoming a more important energy source but still meets only about 6% of total energy requirements in Peru. Following the development of Peru's large Camisea gas reserves, gas is expected to capture a much larger share of the energy market, increasing its contribution to about 15% of the total energy mix by 2010. Most (75%) of Peru's electricity is hydroelectric power and hydropower accounts for over 10% of total energy requirements. When the gas is developed, some will be used to generate power. Biomass still accounts for over 30% of total energy supply.

REFINED PRODUCTS

The demand for refined products in Peru has largely tracked the patterns of economic growth and retraction. Due to political instability, unfavorable weather, and the cyclic nature of the mining industry, economic growth (and therefore energy demand), has fluctuated dramatically over the past two decades (Figure IV-1). The economy showed signs of recovery in 2000 but then stagnated in 2001. Relative to total domestic demand, the amount of reported bunkers is quite small.

FIGURE IV-1
PERU TOTAL REFINED PRODUCT DEMAND
(Thousand Barrels per Day)

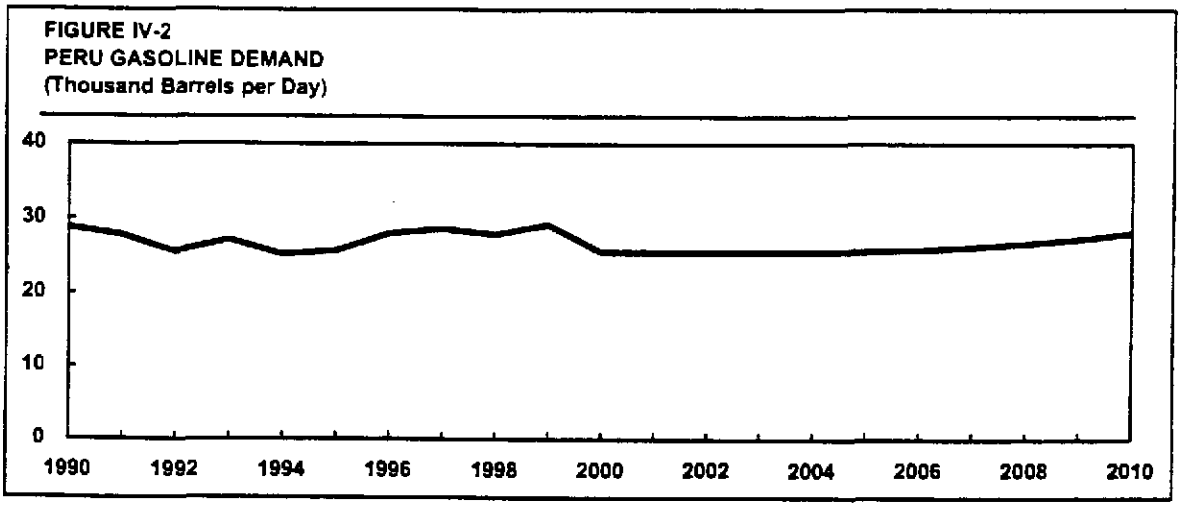


The future consumption of petroleum products will depend largely on the rate of economic growth in Peru. However, demand for refined products will also change with changes in the energy mix (Table IV-2). On the positive side, improvements in lifestyle will lead to a lower reliance on biomass (largely firewood). On the other hand, natural gas will satisfy much of the growth in the power generation and industrial markets.

In this section, the markets for each of the refined products considered in the study is presented along with the supply/demand balance for that product. After discussing the products, the refinery operations on which production was based will be discussed.

GASOLINE

Gasoline has shown very little growth in Peru over an extended period of time (Figure IV-2). Demand has cycled but the overall trend has actually been downward. Peru has a low per capita income so private ownership of vehicles is low. Road conditions make longer distance travel difficult. The movement of Peruvian product prices to world market levels and substantial taxation make ownership of a car and driving it very expensive. Traffic congestion in major cities makes transportation by private automobile impractical in many cases. As a result of these factors, we see only modest growth in gasoline demand, until the economy reaches a stage of development well beyond its current status.

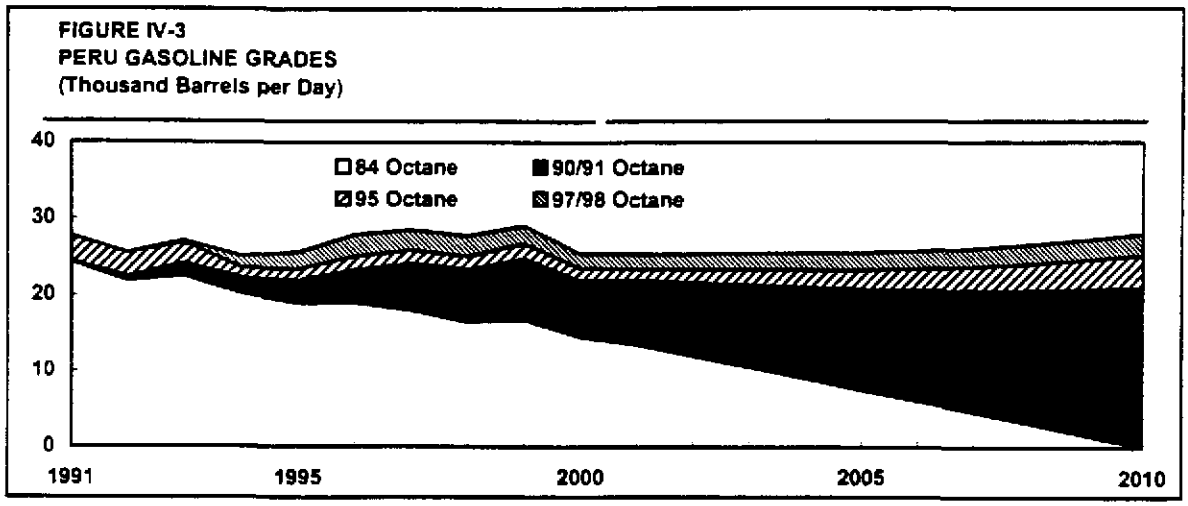


Despite the relatively flat demand for gasoline, Peru imports a small amount of gasoline, primarily premium grades required because of octane limitations at the refineries. Peru exports a small volume of low octane gasoline (probably more accurately classified as naphtha) from the Talara refinery. Planned upgrading projects, including the Talara Refinery Upgrade Project, will help the refineries improve the quality of gasoline produced in Peru. However, given the low level of consumption of gasoline and the slow growth outlook, Peruvian refineries are expected to continue to have surplus gasoline (Table IV-3). Exports are forecast to initially increase with expansion projects at the refinery, but then to gradually decrease over time as demand grows. A small volume of imports has been maintained to reflect border movements and occasional trading volumes.

Currently four grades of gasoline are produced:

LEADED	UNLEADED
84 Octane	90 Octane
	95 Octane
	97 Octane

The leaded 84 Octane grade still makes up roughly 50% of Peru's total gasoline production, but this percentage has fallen steadily over the last decade as the higher octane grades were introduced and gained market share (Figure IV-3).

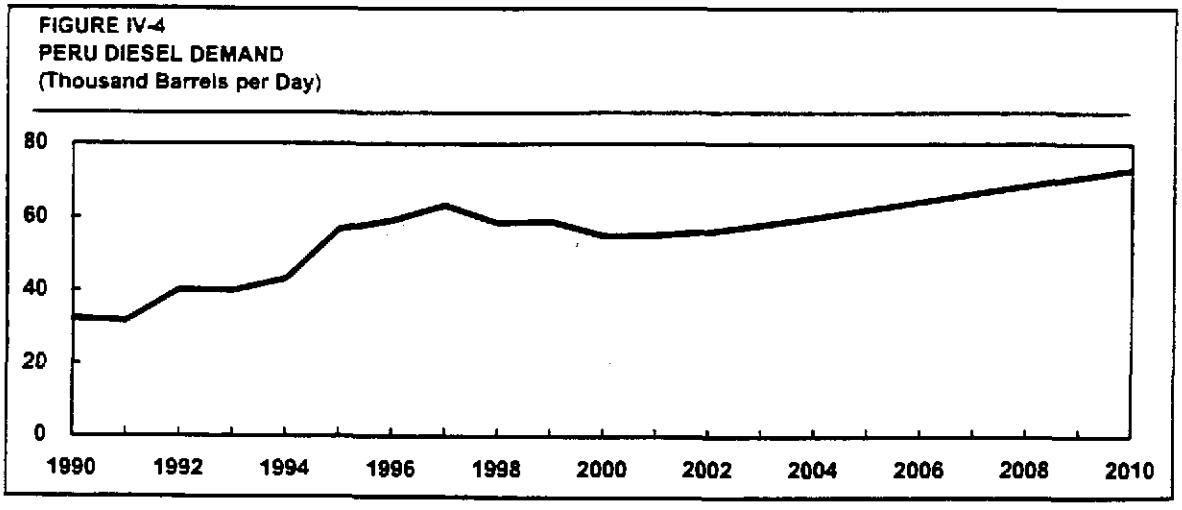


The World Bank has recommended that leaded gasoline be phased out in Peru by 2005, with two grades of gasoline to be sold in the future: a 91 RON regular and a 95 RON premium. Sulfur content will be limited to 400 ppm maximum. PetroPeru has indicated that the leaded 84 octane grade will be phased out by 2010 and that the 97 RON grade may continue to be sold domestically. Figure IV-3 reflects the phase-out timeline advocated by PetroPeru, with the assumption that the majority of leaded gasoline volume will be replaced by the 90 octane grade. We have assumed moderate growth in demand for the higher octane grades.

In preparing to meet the lead phaseout schedule, the Talara refinery should be configured to produce all unleaded gasoline by 2007, the reference year used in the Feasibility Study. The addition of a catalytic reformer is being considered as part of the Upgrade Project to meet these gasoline specifications.

GASOIL/DIESEL

Gasoil/diesel comprises approximately 40% of total refined product demand in Peru. Growth in demand was consistent through the 1990s except during the recession in the later part of the decade. Gasoil/diesel demand peaked at over 60,000 B/D in 1997, primarily due to peak loading requirements brought on by low rainfall and the ensuing drag on hydropower production. However, consumption has declined to about 55,000 B/D currently, due in part to the economic slowdown. Once the economy recovers from the current downturn, we expect that demand for gasoil/diesel will increase substantially and will grow on average at about 3% annually (Figure IV-4).

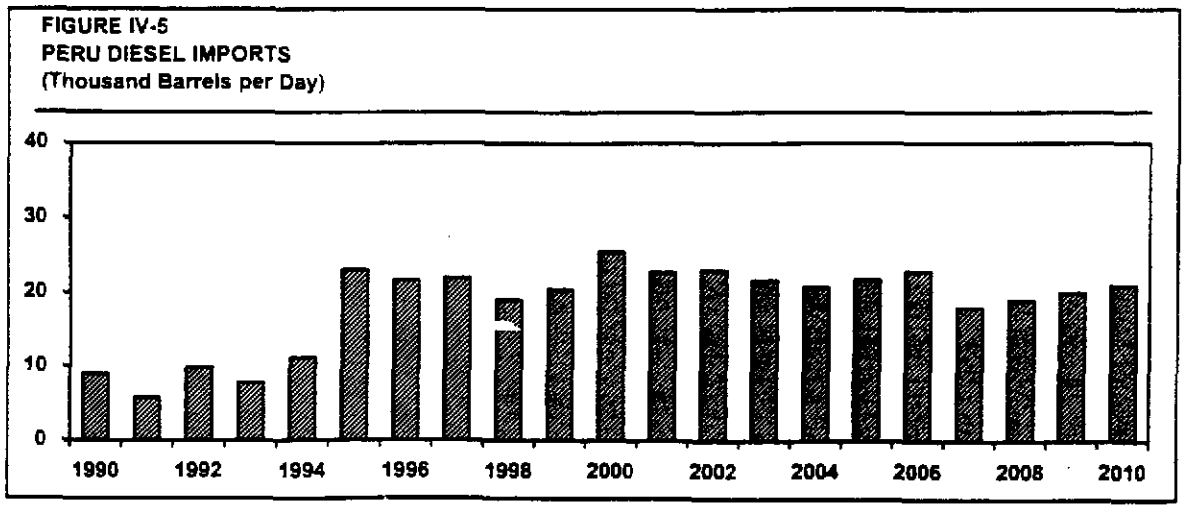


The primary use for gasoil/diesel is in the transportation sector, which makes up about 60% of total demand. The heavy reliance on bus transportation, both in the cities and for intercity travel, contributes to the strong demand in the transportation sector. Trucks hauling freight within the metropolitan areas and to the more remote areas of Peru are also a major contributor to diesel demand in the transportation sector. A small amount (2,000 B/D) is reportedly burned directly in refineries as fuel.

Power generation currently comprises approximately 13% of the demand for diesel. We expect that gasoil/diesel will maintain an important role in "peak shaving" and load balancing on the power generation system. Thus, we expect diesel's displacement by natural gas to be relatively limited although the majority of future increases in power demand will be met by natural gas. The remaining portion of the gasoil/diesel market includes residential and commercial use, industrial applications, and fuel used in oil production and refinery operations.

Current diesel regulations require a maximum sulfur content of 1.0% and a cetane of 45. Actual quality is better, and diesel sulfur is believed to be about 0.3% S in most cases. Peru has announced that it plans to comply with World Bank specifications for diesel by 2005, which will require the sulfur to be reduced to 0.2% maximum, and the minimum cetane to be increased to 47. While there has been some discussion of lowering the sulfur content even further for the metropolitan Lima area, no firm plans have been announced. Our analysis assumes that Peru's diesel will conform to World Bank specifications.

Peruvian refineries are not able to produce enough diesel to meet local demand without producing excessive volumes of other products for export. As a result, Peru has been a consistent importer of diesel and is expected to remain a net importer over the forecast period (Figure IV-5).



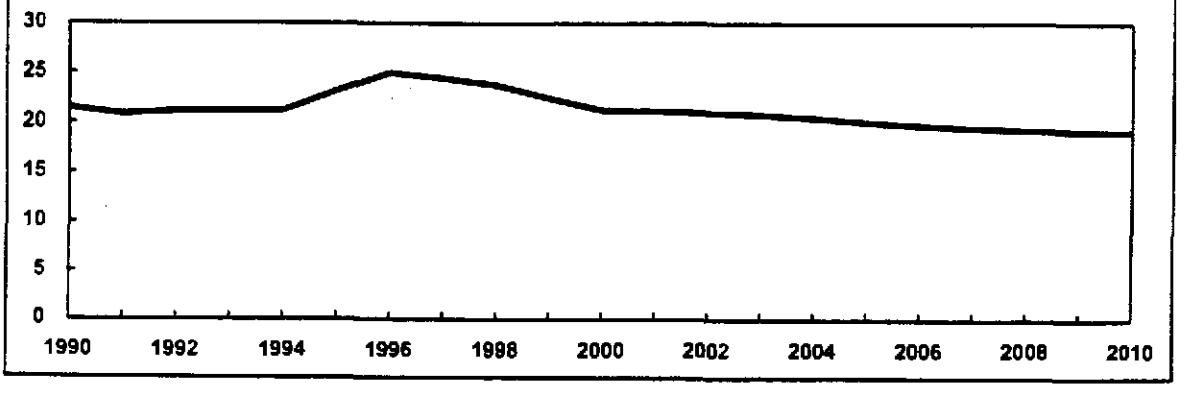
As production of diesel from the condensate splitter from Camisea enters the market, the growth in diesel imports will slow. Longer term, imports will increase again unless further condensate is produced and split or major refinery expansions are implemented. Refinery yields have been adjusted over time to reflect the likelihood of installing processes that selectively produce more diesel. However, without very expensive processing, it will be difficult for the refineries to produce sufficient diesel without excessive gasoline or residual fuel oil production.

KEROSENE/JET FUEL

Kerosene and jet fuel are essentially the same physical product but serve different markets. Kerosene is primarily a household fuel, although a small amount is used by mining and other industries. In economies such as Peru, kerosene is often the first higher grade fuel to replace firewood. Over time, LPG, a much more desirable household fuel displaces kerosene in many of its uses. This displacement phenomena is evident by the declining demand for kerosene/jet fuel and the increasing demand for LPG (Table IV-3). We expect a continuation of the declining pattern in domestic kerosene consumption. Although jet fuel demand is expected to rebound over time, total kerosene/jet fuel demand will remain in decline (Figure IV-6).

Jet fuel demand is determined by air traffic into the major airport at Lima, as well as domestic flights between cities in Peru. Jet fuel consumption grew rapidly in the 1990s with the expansion of the economy and the large amount of international investments in Peru. The unfavorable political events of the late 1990s reduced interest in doing business in Peru and resulted in a reduction of the number of passengers served at the airports. Consequently, jet fuel demand declined from a peak of 10,000 B/D in 1996 to below 7,500 B/D currently. With our positive outlook for the Peruvian economy, we expect air traffic to increase again as more Peruvians are able to fly and interest in international business in Peru increases. However, the growth in jet fuel consumption is forecast to be considerably less than the rate of economic growth. While small amounts of trade have been recorded in the past, Peru is essentially balanced on kerosene/jet fuel.

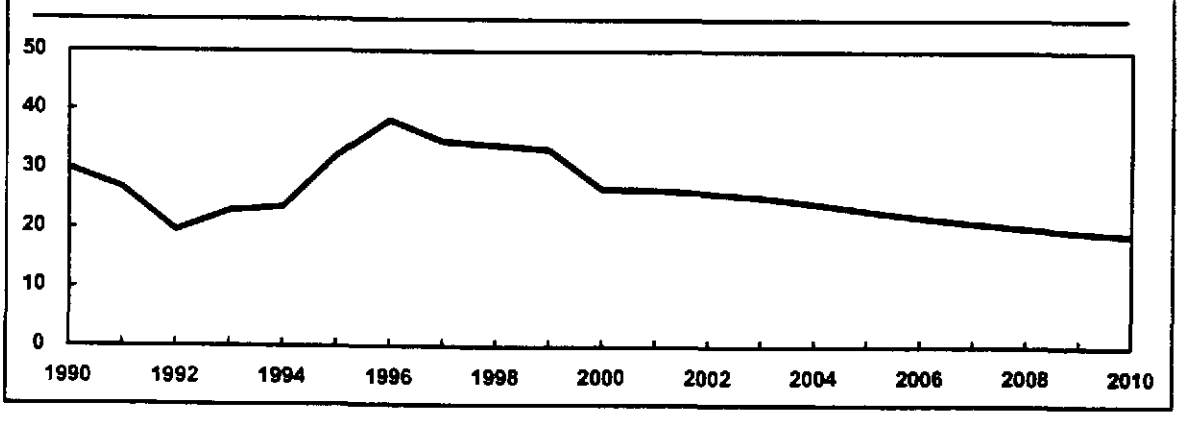
FIGURE IV-6
PERU KEROSENE/JET FUEL DEMAND
(Thousand Barrels per Day)



RESIDUAL FUEL OIL

Residual fuel oil demand currently comprises about 20% of Peru's total energy requirements, and is used primarily in the industrial and power generation sectors. Resid demand increased over the 1990s because resid offered a convenient way of meeting rapidly growing electrical power demand. About half of the residual fuel oil is consumed in the industrial sector and about 25% in power generation. However, over a longer term, the historical trend in resid demand is downward, mainly due to inter-fuel competition from new sources of gas. As more gas becomes available from the Camisea project, more displacement will occur. We expect that Peru will face a continually declining market for residual fuel oil over the forecast period (Figure IV-7).

FIGURE IV-7
PERU RESIDUAL FUEL OIL DEMAND
(Thousand Barrels per Day)



Peruvian refineries produce considerably more residual fuel oil than can be utilized in the domestic market. As a result, Peru has been a significant exporter of residual fuel oil (Table IV-3). The domestic crude oil production from the jungle areas of Peru is very heavy. Some of this crude oil is exported, and light crude oil is imported. However, the volumes run at the local refineries, and the lack of sophisticated conversion equipment causes excess residual fuel oil to

be produced. The residual fuel oil produced is relatively low sulfur and finds a ready market as a blending stock in the Caribbean for supplying Atlantic Basin markets.

Our balances reflect the assumption that resid conversion capacity will be added to Peru's refineries over time as domestic demand continues its declining pattern. Even so, we expect Peru will remain a significant exporter of residual fuel oil.

LPG

Peru's LPG industry has shown phenomenal growth during the last decade, due in large part to the lifting of government subsidies on kerosene and fuel oil. When these subsidies were lifted consumers quickly began switching to LPG. At about the same time PetroPeru's retail LPG division was privatized and became the business enterprise Solgas. Spain's Repsol Butano purchased Solgas in 1999. Solgas and a number of smaller retailers continue to aggressively convert consumers to LPG.

Although Peru is currently a net importer of LPG, requiring an estimated 5,000 B/D to balance demand in 2000, we expect Peru to become a net exporter of LPG during the next decade, as production from the Camisea field comes online. Our analysis assumes that the Camisea production will begin in 2004, which will significantly affect the country's supply/demand balance (Table IV-3).

Reserve forecasts for both gas and natural gas liquids (NGL) from Camisea are enormous. Total gas reserves are estimated at 16.6 trillion cubic feet (Tcf), with 2.8 Tcf estimated as recoverable from San Martin and 8.0 Tcf estimated as recoverable from Cashiriari. Total NGL reserves for both fields are estimated to exceed 1 billion barrels. Assuming 69% recovery of San Martin liquids and 66% of Cashiriari liquids, recoverable NGL reserves are estimated at 230 million barrels (19.7 million tonnes) for San Martin and 495 million barrels (42.3 million tonnes) for Cashiriari.

Pipelines would be constructed to transport the gas liquids to markets in Cusco, La Oroya, and Lima. Our forecast assumes the total LPG produced from Camisea will be in the range of 12,000 B/D initially and will increase to about 25,000 B/D by 2015. The production of LPG will be roughly equal in magnitude to the total naphtha, jet/kero and diesel produced from the condensate splitter, which is discussed in the following section. Exports of surplus LPG from Camisea would be made from a refrigerated sea terminal at or near Lima. The sea terminal presently does not exist and would likely be part of the overall Camisea project.

REFINERY OPERATIONS

Peru has five refineries with a total capacity of about 182,000 barrels per day as shown in the following table.

PERU REFINERIES

Owner	Location	Capacity (B/D)
Maple Gas	Pucallpa	3,300
PetroPeru	Conchan	13,500
PetroPeru	Iquitos	10,500
PetroPeru	Talara	62,000
Repsol YPF	La Pampilla	100,000
		189,300

The refineries at Pucallpa and Iquitos are small refineries serving isolated local markets. The Conchan refinery is an asphalt operation. The large refineries at Talara and La Pampilla (near Lima) provide most of the product requirements of the country. The Talara refinery is owned by PetroPeru while the La Pampilla refinery was privatized in 1996. Repsol YPF is the primary owner with ExxonMobil having a small minority share. PetroPeru still owns 40% of the La Pampilla refinery. When La Pampilla was privatized, it was also planned to privatize the Talara refinery. However, a number of difficulties related to environmental issues at the refinery and the social infrastructure (schools, hospitals, etc.) owned and operated by the refinery proved to be challenging issues for privatization. As the Fujimori regime lost interest in the privatization process, the Talara privatization was essentially taken off the table. Recently the Toledo government has announced plans to resume the privatization process for Talara.

The Talara refinery has a catalytic cracking unit but no catalytic reforming or desulfurization facilities. In order to meet the forthcoming 0.2% sulfur requirement on diesel, some hydrotreating will likely be required even though the refinery runs low sulfur crude oil. The lack of a catalytic reformer makes the refinery very octane deficient. As lead is removed from gasoline, it will be difficult to meet gasoline octane requirements without the addition of a reformer and/or imports of high octane blend components. The refinery is currently considering an expansion of crude capacity and the addition of a naphtha reformer, a distillate desulfurization unit and an alkylation unit.

While the ultimate configuration of the Talara refinery is subject to results obtained from the overall Refinery Upgrade Feasibility Study, the market analysis has assumed the Talara refinery capacity will be 90,000 B/D by 2007, as agreed during the Kickoff Meeting for this Project. As we understand, some investments have already been made at the refinery to support the future expansion plans, although firm plans have not been announced.

The La Pampilla refinery has an expansion and upgrading project currently underway. This project is basically the project that was defined to be undertaken as a condition of the privatization process. It includes expanding the catalytic cracking unit from 8,000 to 13,500 barrels per day, expanding crude distillation to 115,000 barrels per day, a new vacuum unit, and a new visbreaker. The vacuum unit will supply the additional feedstock requirement for the expanded cat cracker. The visbreaker will partially crack the residual material and modestly reduce fuel oil yield. These projects are scheduled for completion in 2003. These projects do not include a naphtha reformer. The refinery has a very small unit which has been shut down for a number of years. Without imports of high octane blending stocks, it appears that the refinery

will have difficulty in making future requirements of 100% unleaded gasoline without further capital expenditures.

The proposed Camisea splitter project will produce significant volumes of jet fuel and diesel for the domestic market. The naphtha produced is assumed to be exported. Condensate production from Camisea is projected to begin in 2004 at 12,000 B/D and increase to 25,000 B/D by 2010. The production of diesel from the splitter will reduce, but not eliminate, the need for imports to supplement refinery supplies. The splitter yields used are as follows.

	Condensate Splitter Yields, Volume %
Naphtha	75
Jet/Kero	5
Diesel	20
	100

CRUDE OIL

Peru currently produces about 95,000 barrels per day of crude oil. Of this, approximately 33,000 is lighter crude oil produced in the vicinity of the Talara refinery. Heavy crude produced in the eastern province comprises most of the balance of production. The Loreto crude oil from the eastern production is very heavy, and it is not well suited for processing in the Peruvian refineries. As a result, some of it has been exported while lighter crudes have been imported. In 2000, the exports were reduced to about 14,000 barrels per day, while imports were 62,000 barrels per day.

Overall, crude oil production in Peru has been in a declining pattern for a number of years. Recent licensing to foreign companies gives some hope of reversing this decline. However, drilling results thus far have not been overly encouraging and our forecast assumes the downward trend in domestic production will continue, and that imports will therefore continue to increase to meet the refineries' demand. As a result, we expect that imports will make up roughly 65% of the crude oil consumed in Peru's refineries by 2015, up from about 50% currently.

Puerto Bayovar is Peru's only crude oil export terminal. Mayna and Loreto crude oils from Peru's interior reach the terminal via pipeline. Most of the Mayna crude oil is loaded on to vessels destined for domestic refiners. The heavier Loreto crude oil is typically exported, but a small portion is also used in the domestic refineries.

Peru and neighboring Ecuador recently agreed to build a pipeline connecting a portion of Ecuador's crude oil production into Peru's northern transportation network. This agreement will help to satisfy Peru's increasing demand for oil imports in the face of declining domestic production.

TABLE IV-1
PERU ENERGY BALANCE
(Thousand Tonnes Oil Equivalent)

ECONOMIC/ENERGY INDICATORS

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2010	2015
GDP (Bil 97$)	58.37	59.83	63.90	63.64	64.54	66.86	66.99	68.06	70.24	73.05	75.97	91.77	108.99
GDP Growth (%)	7.34	2.49	6.81	(0.40)	1.40	3.80	0.20	1.60	3.20	4.00	4.00	3.75	3.50
Population (MM)	23.53	23.95	24.37	24.80	25.23	25.66	26.10	26.55	27.00	27.45	27.91	30.29	32.78
Population Growth (%)	1.65	1.76	1.77	1.76	1.73	1.72	1.71	1.70	1.69	1.69	1.68	1.63	1.59
Energy Growth (%)	8.85	1.23	8.92	(3.01)	(8.80)	(3.31)	0.71	1.40	2.24	2.63	2.66	2.90	2.89
TOE/$GNP	230	227	231	225	203	189	190	190	188	186	183	175	169
TOE Per Capita	570	567	606	578	519	494	489	487	490	494	499	529	563
Energy% / GNP%	1.21	0.50	1.31	7.53	(6.14)	(0.92)	3.57	0.88	0.70	0.66	0.66	0.77	0.82

ENERGY DEMAND BY TYPE

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2010	2015
Petroleum	7,373	7,530	8,623	7,868	6,396	5,640	5,694	5,754	5,829	5,901	5,965	6,545	7,506
Natural Gas	361	366	344	477	647	772	863	969	1,100	1,252	1,419	2,389	3,547
Solid Fuels	385	306	351	435	400	410	407	410	419	432	444	508	569
Nuclear	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydropower	1,113	1,146	1,136	1,188	1,251	1,382	1,354	1,356	1,390	1,443	1,502	1,699	1,760
Other	4,172	4,221	4,324	4,367	4,409	4,463	4,440	4,447	4,488	4,547	4,606	4,875	5,085
Total Energy	13,404	13,570	14,779	14,334	13,101	12,667	12,757	12,937	13,227	13,574	13,935	16,018	18,467

ENERGY DEMAND BY SECTOR

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2010	2015
Industry	2,225	2,512	2,764	3,014	3,141	2,880	2,873	2,888	2,930	2,985	3,038	3,372	3,771
Transport	3,234	3,341	3,350	3,398	3,407	3,124	3,143	3,186	3,261	3,349	3,442	4,013	4,779
Res./Com./Other	6,036	6,124	6,033	5,790	5,897	5,982	5,987	6,024	6,099	6,193	6,287	6,745	7,156
Other Transformation	887	495	1,344	908	(509)	(527)	(528)	(536)	(553)	(573)	(594)	(702)	(801)
Non-Energy	75	52	146	162	154	159	159	162	167	174	180	217	255
Power Generation	947	1,047	1,143	1,062	1,012	1,049	1,124	1,212	1,321	1,447	1,583	2,372	3,307
Total Energy	13,404	13,570	14,779	14,334	13,101	12,667	12,757	12,937	13,227	13,574	13,935	16,018	18,467

TABLE IV-2
PERU PRODUCT DEMAND BY SECTOR
(Thousand Barrels per Day)

GASOIL/DIESEL CONSUMPTION

Sector	1990	1995	1996	1997	1998	1999	2000	2005	2010
Transformation	9	11	11	13	9	8	7	7	7
Energy	0	2	2	2	2	2	2	2	2
Industry	2	6	6	6	7	9	8	9	10
Transportation	18	32	33	35	36	35	33	40	49
Other	4	6	7	6	4	5	4	5	5
Total	32	57	59	63	58	59	55	62	73

KEROSENE/JET FUEL CONSUMPTION

Sector	1990	1995	1996	1997	1998	1999	2000	2005	2010
Transformation	0	0	0	0	0	0	0	0	0
Energy	1	0	0	1	1	1	1	0	0
Industry	0	1	1	1	1	1	1	1	1
Transportation	6	9	10	9	9	8	7	8	9
Other	15	14	14	14	13	12	12	11	9
Total	21	23	25	24	24	22	21	20	19

RESIDUAL FUEL OIL CONSUMPTION

Sector	1990	1995	1996	1997	1998	1999	2000	2005	2010
Transformation	6	7	9	9	10	9	7	6	5
Energy	2	2	2	2	2	2	2	2	1
Industry	11	11	17	16	18	18	14	12	10
Transportation	2	3	1	1	1	1	1	1	1
Other	10	10	9	7	3	3	3	2	2
Total	30	32	38	35	34	33	27	23	19

TABLE IV-3
PERU REFINED PRODUCT DEMAND
(Thousand Barrels per Day)

Product	Flow	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Crude	Production	122	120	118	116	106	99	96	93	90	88	86	84	82	81	80	78	77	76
Crude	Imports	47	56	79	94	58	62	76	75	82	79	76	79	100	102	104	106	112	119
Crude	Exports	29	37	45	43	29	14	19	14	10	5	0	0	0	0	0	0	0	0
Crude	Int'l Marine Bunkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude	Supply Adjustments	1	11	11	1	16	(4)	0	0	0	12	14	16	19	21	23	25	25	25
Crude	Consumption	141	150	163	168	153	144	153	153	163	174	176	179	201	204	207	210	215	220
Crude	Refinery Capacity	182	182	182	182	182	189	189	189	202	227	227	227	255	255	255	255	255	255
Crude	Refinery Utilization, %	77	82	89	92	84	76	81	81	81	77	78	79	79	80	81	82	84	86
Total LPG	Production	5	5	6	8	6	7	7	7	8	20	24	26	28	30	31	33	34	37
Total LPG	Imports	4	4	3	4	4	5	5	7	7	0	0	0	0	0	0	0	0	0
Total LPG	Exports	0	0	0	0	0	0	0	0	0	3	6	6	7	7	7	8	5	3
Total LPG	Int'l Marine Bunkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total LPG	Supply Adjustments	(0)	(0)	(0)	(1)	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Total LPG	Consumption	8	9	9	11	13	14	15	16	17	19	20	22	23	25	26	27	31	35
Naphtha	Production	4	4	3	5	6	7	9	8	8	17	19	20	22	24	25	27	27	27
Naphtha	Imports	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naphtha	Exports	2	2	2	3	1	4	5	5	5	14	15	17	19	20	22	24	24	24
Naphtha	Int'l Marine Bunkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naphtha	Supply Adjustments	(3)	(2)	(1)	(3)	(4)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Naphtha	Consumption	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline	Production	24	26	27	29	28	26	27	29	32	33	33	34	41	42	43	44	48	53
Gasoline	Imports	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gasoline	Exports	0	1	2	1	0	2	3	5	8	8	9	10	16	16	17	17	16	13
Gasoline	Int'l Marine Bunkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline	Supply Adjustments	1	1	2	(2)	0	(0)	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline	Consumption	26	28	29	28	29	25	25	25	25	26	26	26	26	27	27	28	33	41
Kero/Jet Fuel	Production	22	24	22	23	22	22	22	22	22	21	21	21	20	20	20	20	20	20
Kero/Jet Fuel	Imports	1	1	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Kero/Jet Fuel	Exports	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Kero/Jet Fuel	Int'l Marine Bunkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kero/Jet Fuel	Supply Adjustments	0	0	0	1	1	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Kero/Jet Fuel	Consumption	23	25	24	24	22	21	21	21	21	20	20	20	19	19	19	19	19	20
Distillate	Production	32	32	41	41	38	34	37	37	41	44	45	46	53	54	55	57	61	65
Distillate	Imports	23	22	22	19	20	25	23	23	22	21	22	23	18	19	20	21	29	38
Distillate	Exports	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Distillate	Int'l Marine Bunkers	3	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Distillate	Supply Adjustments	5	5	0	(1)	2	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Distillate	Consumption	57	59	63	58	59	55	55	56	58	60	62	64	66	69	71	73	85	99
Residual Fuel	Production	49	53	52	60	49	51	55	54	57	57	57	56	64	63	63	62	59	55
Residual Fuel	Imports	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residual Fuel	Exports	19	15	18	27	16	20	23	23	27	28	29	29	38	38	38	38	37	35
Residual Fuel	Int'l Marine Bunkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residual Fuel	Supply Adjustments	1	0	1	1	0	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Residual Fuel	Consumption	32	38	35	34	33	27	27	26	25	24	23	22	21	20	20	19	17	15

V. OTHER REGIONAL REFINED PRODUCTS MARKETS

The outlook for refined product supply and demand is provided in this section for neighboring Ecuador and Chile. Both countries have historically been important trade partners with Peru.

CHILE ECONOMY

Chile's historical economic performance has been exemplary. Its GDP, in constant terms, grew during the 1980s at 3.5% per year, about as fast as Brazil, faster than all of South America, and much faster than neighboring Argentina.

During the first half of the 1990s, these trends have been sharply accentuated. Chile's economic growth averaged over 7% annually in the 1990-97 period, more than double the growth rate of all of South America (3.3% per year) and considerably exceeding that of all other major South American countries. This Chilean "economic miracle" can be ascribed primarily to:

1. The rigorous application of conservative market-oriented macroeconomic policies ("The Chicago School"),

2. The diligent pursuit of far reaching structural reforms (privatization, downsizing of government, etc.), and

3. The return of political stability and public, as well as business, confidence.

Unfortunately, rapid growth cannot be sustained indefinitely, and Chile's growth has slowed in the past several years. With the continuation of structural reforms, Chile is expected to recover from the current economic downturn and post annual gains of 4.0 - 4.5% on average over the forecast period.

The association agreement with Mercosur is a very favorable development, which will contribute to Chile's continued growth. Similar arrangements may also be possible with the European Union and even with the North American Free Trade Agreement, in view of the Chilean economy's desirable characteristics as a partner. If so, Chile may very well reach the enviable position of having optimum involvement with several major trade areas, without the duties of full membership.

CHILE ENERGY

Energy demand has grown steadily as Chile's economy has expanded (Table V-1). Per capita energy consumption increased from around 1,100 TOE/capita in 1990 to about 1,700 TOE/capita currently. Continued strong economic growth will cause this trend to continue but at a somewhat slower rate.

Petroleum, as in most South American countries, is the dominant energy source (about 40%) but gas, which is about 20% currently, is increasing its share rapidly as the new gas pipelines from Argentina begin operation.

Hydropower accounts for about 35% of total electricity generation with the remainder from thermal power plants. Most of these thermal units are operated by industry to produce their own electricity. Most of the plants are coal-based. Chilean coal is poor quality and costly to extract. The government improved the efficiency by closing about half of the mines. Coal production dropped but not proportionately due to efficiency gains. Solid fuels account for about 17% of total energy requirements, and biomass another 16%.

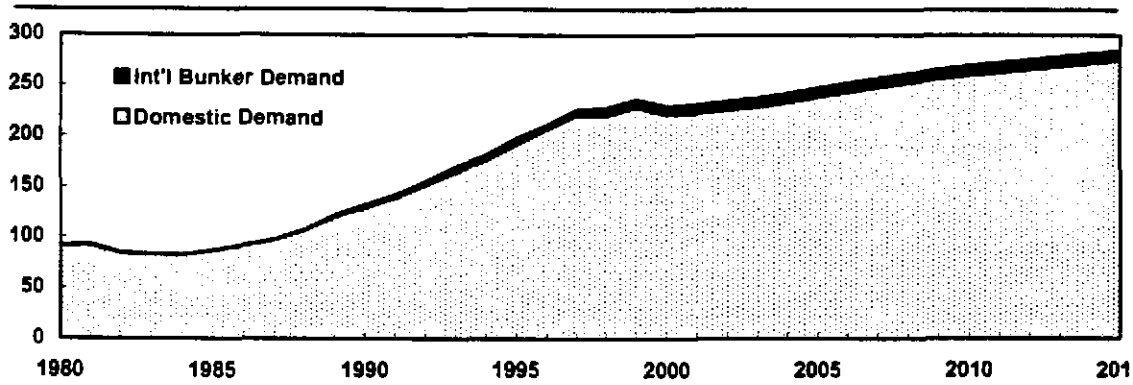
CHILE REFINED PRODUCTS

Chile is a moderate sized market for refined products (220,000 B/D) and the country has remained nearly self-sufficient but imports about 10% of its refinery products requirements. Product imports have averaged about 30,000 B/D in recent years and not much change is expected. Unfortunately, Chile has limited crude oil and natural gas reserves so it is dependent on imports. Chile has become heavily dependent on Argentina crude oil and new gas pipelines from Argentina were recently completed to serve Chile as well.

Empresa Nacional del Petroleo (ENAP), like Petrobras, has a monopoly on refining but, unlike Petrobras, does not participate in retail marketing. Anyone is free to import and market products in Chile but historically, ENAP has produced about 90% of the country's product requirements. Privatization has been debated, but no firm decision to privatize the refinery business has been taken.

Product consumption was relatively static during the early 1980s, but the economy showed steady growth during the 1985-97 period and product consumption grew as well. The stagnation in product demand in the last few years reflects the economic slowdown (Figure V-1). In addition to internal consumption, about 10,000 B/D of residual fuel is reported for bunker fuel use.

FIGURE V-1
CHILE TOTAL REFINED PRODUCT DEMAND
(Thousand Barrels per Day)



CHILE GASOLINE

Gasoline consumption grew very rapidly from the late 1980s through 1999 but growth has stagnated with the economic slowdown. Growth will resume when the economy recovers. The refineries have been modified to increase gasoline output and to produce higher-octane gasoline to allow reduction of lead in gasoline. Leaded gasoline still accounts for about one-third of total consumption but consumption of leaded gasoline is dropping rapidly. It fell over 12% in 2000, whereas unleaded increased by over 4%.

Chile has been able to essentially match production and consumption of gasoline but requires between 5,000 to 8,000 B/D of imports. Gasoline is typically imported mainly from the U.S. Gulf Coast, but Argentina was a major supplier during 2001. Imports are expected to be held to a minimum as the Chilean refineries are expanded to roughly keep pace with demand.

CHILE GASOIL/DIESEL

Consumption of gasoil/diesel grew strongly through 1997, but dropped off in 1998 as the economy went into recession. Demand rebounded in 1999 but dropped off again in 2000/2001. The principal use of this material is for diesel fuel, but the industrial sector accounts for about 25% of the total as more gas becomes available usage in this sector is expected to decline. Increased amounts were used for power generation in 1999 and 2000 due to the drought, but this is not typical and this use is expected to decline back to normal levels.

Imports increased to 15,000 to 20,000 B/D in recent years and refinery expansion will be needed to reduce the import requirements. Historically, the sulfur content of diesel was 0.5%, but sulfur levels have been reduced. Distillate hydrotreaters were installed to reduce the sulfur content of diesel fuel.

CHILE KEROSENE/JET FUEL

Kerosene use peaked in 1996/97 at about 7,000 B/D but usage has dropped off to about 4,500 B/D as LPG use increased to 33,000 B/D. LPG is used extensively for heating fuel as commercial butane and commercial propane-butane mixtures (30% maximum butane) but about 5% is used for transportation. LPG growth is expected to slow as more natural gas becomes available. Refineries presently supply about 50% of the LPG market as a by-product from refining. The remainder of the market is supplied by ENAP's natural gas liquids from the south and from imports.

Jet fuel use peaked in 1998 at about 14,000 B/D but consumption has dropped to about 11,000 B/D currently due to the economic slowdown. Growth will resume along with the economy.

Chile is basically self-sufficient, but in recent years small quantities of some imports are reported. There is also a small (120 B/D) market for aviation fuel.

CHILE RESIDUAL FUEL OIL

Residual fuel oil accounts for 10 to 15% of total product demand. Residual fuel oil demand peaked in Chile in 1996/97 at about 34,000 B/D, plus about 6,000 B/D of international bunkers. New supplies of gas from Argentina has caused demand to decline to about 23,000 B/D currently.

Chile became a net importer in 1992 due to the rapid growth in demand and imports peaked at about 9,000 B/D in 1996. The imports come from Peru and were used by the mining industry in Northern Chile. However, imports dropped off with reduced demand and Chile became a net exporter in 2000. Bunker sales also increased and are up 9,000 B/D. As residual fuel oil is displaced by natural gas, exports will increase until more coking is added.

CHILE LPG

LPG was first introduced as a fuel in Chile during the 1950's. Due to the absence of other fuel options of similar quality and price (until the recent introduction of natural gas imports), consumption of LPG has grown rapidly since its introduction. Demand for LPG is currently about 35,000 B/D, most of which is used in the residential/commercial sector.

Historically, LPG supply and demand in Chile were in balance. But over the past decade increasing domestic demand and lack of additions to domestic production have led to a greater dependence on imports. Of the total demand, about 60% is met through imports. Total demand for LPG is expected to grow over the forecast period and import requirements will increase accordingly (Table V-3). Because refinery produced LPG is the major contributor (75%) to the total supply, the two sources are reported together as total production.

CHILE REFINERY OPERATIONS

Chile has three refineries with a combined capacity of about 205,000 B/D. Two of the refineries are mid-sized (95,000 and 100,000 B/D) and reasonably complex, but the third plant is a 10,000 B/D topping unit located in a crude oil producing region. The refineries are running near capacity but the country is still a net importer of most products.

The 100,000 B/D Petrox refinery at Talcahuano added a delayed coking facility in 1998, with a cogeneration unit to generate steam and electric power for the refinery as well as the local power grid. A letter of agreement was also recently signed for a project which will add a coker at the 95,000 B/D Concón refinery. This project, which will also include a distillate hydrotreater, is to be onstream by 2005. The addition of bottoms upgrading capacity will help Chile to meet its growing diesel demand although some imports may still be required. Chile's domestic demand for residual fuel oil is declining, and the country will likely remain a slight net exporter even with the addition of the coker projects.

CHILE CRUDE OIL

Chile's crude oil production has declined from a high of about 43,000 B/D in 1982 to less than 7,000 B/D currently and the decline is forecast to continue. Chile's oil is a naphthenic/sweet crude plus a small amount of condensate. Chile relies heavily on imported crude. About half of the crude runs are based on Latin American crudes with Africa accounting for most of the balance. The Middle East accounted for only 2% in 1990. With the inauguration of the 100,000 B/D crude line from Argentina, most of the African crude has been displaced by Argentina's light sweet crude. The original contract called for delivery of 40,000 B/D, but additional volumes have been purchased, total imports from Argentina averages about 90,000 B/D.

Heavy crudes are imported from Ecuador and Venezuela but a coker was installed to reduce the yield of resid rather than to increase heavy crude runs. Resid yields have been reduced from over 30% to below 15%.

ECUADOR ECONOMY

Ecuador is a small country with a population of about 13 million and a relatively low per capita income. The economy grew at an average rate of over 3% per year over the 1990-97 period but slowed in 1998 and was in recession in 1999. A modest recovery occurred in 2000, followed by excellent growth in GDP of over 4.0% in 2001, the highest growth in Latin America. Over the longer term, we expect that completion of the new 500,000 B/D crude oil pipeline, which will generate hard currency through increased exports, will continue to fuel Ecuador's economic growth.

In accordance with International Monetary Fund guidelines, Ecuador continues to stress structural reform and fiscal stabilization policies. Fuel subsidies were phased out during 2001, but not without protest. A presidential election is scheduled during 2001 and we expect that the new administration will likely continue the economic and fiscal reform policies already in motion.

ECUADOR ENERGY

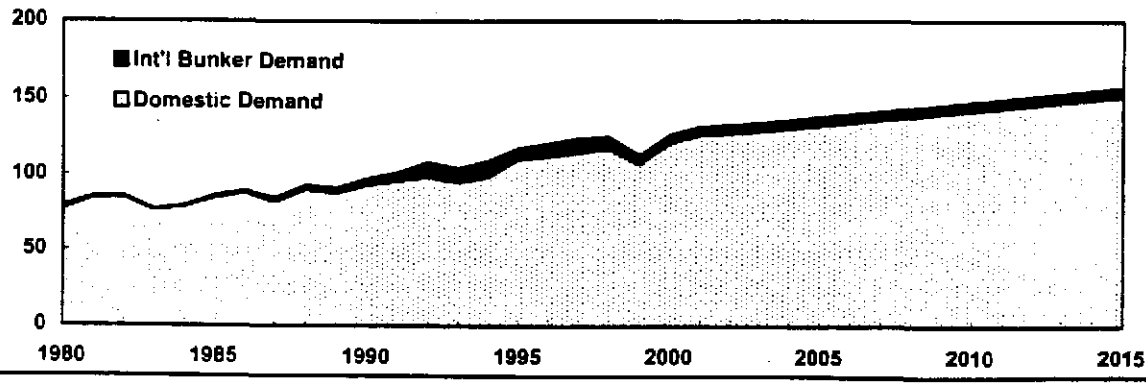
Energy consumption has grown unevenly in Ecuador and per capita consumption (700 TOE/capita) has slowly increased over the past 10 years (Table V-4). Petroleum accounts for about 75% of total energy demand, biomass 15%, hydroelectric (8%), and natural gas (2%) making up the balance. Ecuador has small coal reserves, but they are inaccessible, and the lack of infrastructure has prevented gas from being utilized. Hydropower accounts for about 50% of the electricity generated but the amount of petroleum use varies with the amount of rainfall.

ECUADOR REFINED PRODUCTS

Refined product demand has increased from 90,000 B/D in 1993 to nearly 130,000 B/D in 1998 but dropped off in 1999/2000 due to the recession. The completion of the new pipeline, which will allow a significant increase in crude oil exports, is expected to give the economy a

real boost and product demand will grow rapidly. In addition to internal consumption, bunker use of about 7,000 B/D of jet fuel and residual fuel oil is reported.

FIGURE V-2
ECUADOR TOTAL REFINED PRODUCT DEMAND
(Thousand Barrels per Day)



Product demand by sector is shown in Table V-5 and supply/demand balances in Table V-6. The following trends in the consumption of refined products in Ecuador are forecast:

ECUADOR GASOLINE

Gasoline consumption has been virtually stagnant at around 30,000 B/D the past 10 years with some year to year variations. Consumption is expected to increase very slowly. There are now two primary grades of gasoline which are produced and marketed in Ecuador, as shown in the following table. All gasoline in Ecuador was to be unleaded as of 2001.

Grade	B/D	Percent
Extra 85	26,907	85.7
Super[1] 92	4,473	14.3
	31,380	100.0

(1) Unleaded (92 octane) was introduced in early 1991.

Ecuador is able to produce its gasoline requirements and no changes are expected. Ecuador imports and exports naphtha to balance its gasoline requirements. Avgas is not produced but is imported from Chile. Imports average about 100 B/D. Ecuador has deregulated gasoline prices and opened the retail market to private investment. This led to a surge in investment in new service stations by major oil companies.

ECUADOR GASOIL/DIESEL

Gasoil/diesel demand increased rapidly (about 9% annually) through 1998. About 60% of the distillate is used as diesel in the transportation sector and this is the fastest growing use. Use for power generation varies from year to year depending on the availability of hydropower. Use was up in recent years due to the drought.

Demand is currently outstripping local supplies so until new refinery capacity becomes fully operational, imports will increase.

ECUADOR KEROSENE/JET FUEL

Demand for kerosene for household use dropped rapidly after 1990 and is currently only 600 B/D. Natural gas that was being flared is being processed to recover LPG so LPG demand is growing rapidly and is over 20,000 B/D. Imports account for about 70% of total demand for LPG.

Jet fuel demand increased rapidly over the 1994/98 period but domestic consumption dropped of in 1999/00. International bunkering is another 1,000 B/D. Increased international business activity, as the new pipeline construction gets underway, should stimulate demand. Ecuador is a small net importer of jet fuel but produces its kerosene needs.

ECUADOR RESIDUAL FUEL

Demand averaged about 20,000 B/D over the 10 year period prior to 1998. Demand increased to over 25,000 B/D in 1998/99 as use in the power sector increased. International bunkers average about 6,000 B/D but will increase when crude exports increase after the pipeline comes online in 2004. Residual fuel use in the power sector has varied between 3,000 and 10,000 B/D for the past several years while use in the domestic transportation sector and direct burning by the refiners has not changed much. Since Ecuador has very little gas infrastructure, residual fuel oil demand will exhibit some growth as the economy recovers.

Export markets will continue to be a principal market for fuel oil produced in Ecuador. Unfortunately, the combination of a fairly heavy crude slate (27°API) and fairly simple refineries result in a very high yield (nearly 45%) of residual fuel oil. The vacuum column capacity at Esmaraldes has been expanded, together with the visbreakers, in order to increase gas oil yield and reduce resid output.

ECUADOR LPG

Despite Ecuador's abundant oil and gas reserves, the country is not capable of producing its total LPG supply requirements. Ecuador's famous Oriente crude oil is produced in the Amazon jungle regions far from the country's two largest cities and LPG consumption centers of Quito, the country's capital, and Guayaquil. Because it has been cost-prohibitive to process gas in these remote jungle regions, or to bring the gas to market, much of the gas and liquids in the Oriente is being flared. Ecuador hopes to one day extract these liquids and consume them in Ecuador to become less dependent on LPG imports.

Ecuador's current LPG demand is estimated at 21,000 B/D annually, about 45% of which is produced internally from both the refineries and gas plant operations. Refinery production accounts for roughly 60% of total domestic supplies. Ecuador is expected to remain a net importer of LPG over the forecast period due to continuing high rates of demand growth, primarily in the residential/commercial sector.

ECUADOR REFINERY OPERATIONS

There are four refineries in Ecuador, but only the Esmeraldas refinery is a large (110,000 B/D) high conversion refinery. The rest, with combined capacity of 68,000 B/D, are simple toppers with no downstream conversion units. The topper at Sta. Elena is fairly large (47,000 B/D), but the Amazonas Refinery is 20,000 B/D and the very small plant at Lago-Argrio is only 1,000 B/D.

Petroecuador is the only refining company, but has sold most of its retail stations to independents. A number of international marketers were aggressively pursuing retail marketing opportunities, but the political uncertainty has caused them to defer further involvement.

ECUADOR CRUDE OIL

While Ecuador was a member of OPEC, it totally disregarded its quota allocation and produced near its maximum. Ecuador withdrew from OPEC and production increased to about 385,000 B/D in 1995. Output has been constrained to below 400,000 B/D by lack of adequate pipeline capacity and cannot increase much further until its export pipelines are debottlenecked and/or new lines built. Some temporary modifications are planned to boost capacity by 40,000 B/D. Plans call for a new 500,000 B/D line parallel to the existing one to be operational in 2004. The pipeline expansion will allow a significant production increase.

Ecuador and its neighbor Peru also recently agreed to build a pipeline linking Ecuador's producing blocks in the southeast into Peru's oil pipeline network. This project will help to alleviate Ecuador's pipeline constraints.

Historically, most of the Ecuadorian production came from the Oriente field which is heavy/medium sour crude (28°API). However, increasing amounts of heavy crude are being blended in so the export blend is getting heavier (about 25°API). When the new crude oil export line is completed in 2004, a segregated heavy crude stream (18°API) will be available for export and the quality of the light crude stream will improve back to around 28°API and 1% sulfur.

TABLE V-1
CHILE ENERGY BALANCE
(Thousand Tonnes Oil Equivalent)

ECONOMIC/ENERGY INDICATORS

	1995	2000	2001	2002	2003	2004	2005	2010	2015
GDP (Bil 97$)	66.82	83.45	85.62	88.44	92.60	96.77	101.12	125.11	152.22
GDP Growth (%)	10.63	5.38	2.60	3.30	4.70	4.50	4.50	4.25	4.00
Population (MM)	14.21	15.22	15.42	15.62	15.82	16.03	16.23	17.30	18.41
Population Growth (%)	1.54	1.32	1.31	1.31	1.30	1.30	1.29	1.27	1.25
Energy Growth (%)	7.19	1.61	1.48	1.92	2.66	2.69	2.80	2.32	2.03
TOE/$GNP	276	308	305	301	295	290	285	261	237
TOE Per Capita	1,298	1,690	1,695	1,706	1,729	1,752	1,778	1,889	1,963
Energy% / GNP%	0.68	0.30	0.57	0.58	0.57	0.60	0.62	0.55	0.51

ENERGY DEMAND BY TYPE

	1995	2000	2001	2002	2003	2004	2005	2010	2015
Petroleum	9,430	10,703	10,863	11,067	11,317	11,608	11,942	13,417	14,581
Natural Gas	1,447	5,218	5,422	5,656	5,956	6,254	6,559	8,215	10,017
Solid Fuels	2,396	4,425	4,430	4,460	4,537	4,608	4,680	5,009	5,239
Nuclear	0	0	0	0	0	0	0	0	0
Hydropower	1,704	1,292	1,306	1,329	1,367	1,405	1,444	1,647	1,849
Other	3,463	4,118	4,115	4,128	4,171	4,209	4,245	4,390	4,448
Total Energy	18,439	25,756	26,136	26,639	27,349	28,084	28,869	32,677	36,134

ENERGY DEMAND BY SECTOR

	1995	2000	2001	2002	2003	2004	2005	2010	2015
Industry	5,033	6,353	6,433	6,545	6,709	6,882	7,067	7,976	8,804
Transport	4,760	5,789	5,884	6,003	6,145	6,312	6,504	7,301	7,840
Res./Com./Other	4,701	5,452	5,523	5,614	5,746	5,875	6,007	6,689	7,386
Other Transformation	2,074	4,213	4,289	4,386	4,525	4,661	4,800	5,501	6,170
Non-Energy	0	0	0	0	0	0	0	0	0
Power Generation	1,871	3,949	4,008	4,091	4,223	4,354	4,491	5,209	5,934
Total Energy	18,439	25,756	26,136	26,639	27,349	28,084	28,869	32,677	36,134

TABLE V-2
CHILE PRODUCT DEMAND BY SECTOR
(Thousand Barrels per Day)

GASOIL/DIESEL CONSUMPTION

Sector	1990	1995	1996	1997	1998	1999	2000	2005	2010
Transformation	4	1	2	4	4	10	10	9	9
Energy	0	0	0	0	0	0	0	0	0
Industry	12	18	20	25	23	21	20	23	28
Transportation	27	43	47	50	52	54	51	56	65
Other	3	4	2	2	1	1	1	1	1
Total	46	66	72	81	80	87	82	90	104

KEROSENE/JET FUEL CONSUMPTION

Sector	1990	1995	1996	1997	1998	1999	2000	2005	2010
Transformation	0	0	0	0	0	0	0	0	0
Energy	0	0	0	0	0	0	0	0	0
Industry	1	1	3	3	3	1	1	1	1
Transportation	6	9	9	12	14	13	12	13	14
Other	3	4	4	4	3	4	3	3	3
Total	10	14	16	19	20	18	16	17	18

RESIDUAL FUEL OIL CONSUMPTION

Sector	1990	1995	1996	1997	1998	1999	2000	2005	2010
Transformation	5	8	10	8	7	7	6	5	4
Energy	3	2	3	1	3	2	2	2	1
Industry	13	19	18	22	16	13	13	11	9
Transportation	0	0	0	0	0	0	0	0	0
Other	2	2	3	3	2	2	2	2	1
Total	23	32	34	33	27	25	24	19	16

TABLE V-3
CHILE REFINED PRODUCT DEMAND
(Thousand Barrels per Day)

Product	Flow	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Crude	Production	10	9	8	9	8	7	6	6	5	5	5	5	4	4	4	4	4	4
Crude	Imports	148	153	165	179	185	195	199	214	218	222	225	229	232	236	239	243	260	277
Crude	Exports	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude	Int'l Marine Bunkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude	Supply Adjustments	(2)	(1)	(5)	(5)	1	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Crude	Consumption	156	161	169	183	194	196	199	214	217	220	224	227	231	234	237	241	258	275
Crude	Refinery Capacity	178	192	205	205	205	205	205	217	217	217	217	217	217	217	217	217	217	217
Crude	Refinery Utilization, %	88	84	83	90	95	96	97	98	100	102	103	105	106	108	109	111	119	127
Total LPG	Production	10	10	11	12	13	15	16	17	17	17	18	18	18	18	19	19	20	22
Total LPG	Imports	15	16	16	16	17	21	22	22	23	24	25	25	26	27	27	27	29	30
Total LPG	Exports	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total LPG	Int'l Marine Bunkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total LPG	Supply Adjustments	3	2	3	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0
Total LPG	Consumption	26	29	30	32	33	36	38	39	40	41	42	43	44	45	46	46	49	52
Naphtha	Production	1	3	5	6	5	4	4	5	5	5	5	5	5	5	5	5	5	5
Naphtha	Imports	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naphtha	Exports	0	0	0	0	0	2	2	3	3	3	3	3	3	3	3	3	3	3
Naphtha	Int'l Marine Bunkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naphtha	Supply Adjustments	3	2	0	(1)	0	3	3	3	3	3	3	3	3	3	3	3	3	3
Naphtha	Consumption	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Gasoline	Production	43	43	46	48	50	51	52	57	58	59	60	61	62	64	65	66	72	78
Gasoline	Imports	2	7	7	7	5	7	8	5	6	6	7	7	7	7	7	7	5	3
Gasoline	Exports	0	0	1	1	1	3	3	3	3	3	3	3	3	3	3	3	3	3
Gasoline	Int'l Marine Bunkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline	Supply Adjustments	2	0	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Gasoline	Consumption	47	50	52	54	55	56	58	60	62	64	65	67	68	69	71	72	76	80
Kero/Jet Fuel	Production	13	15	18	17	18	15	15	16	16	16	17	17	17	17	17	17	18	19
Kero/Jet Fuel	Imports	2	4	2	5	1	2	2	1	1	1	2	2	2	2	2	2	3	3
Kero/Jet Fuel	Exports	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kero/Jet Fuel	Int'l Marine Bunkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kero/Jet Fuel	Supply Adjustments	(1)	(3)	(1)	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Kero/Jet Fuel	Consumption	14	16	19	20	18	16	16	16	16	16	17	17	17	18	18	18	19	20
Distillate	Production	55	58	60	70	70	76	78	85	86	88	90	92	94	96	98	100	110	120
Distillate	Imports	11	18	19	13	15	13	11	5	4	5	6	7	8	8	9	9	7	4
Distillate	Exports	0	1	1	1	2	6	5	5	5	5	5	4	4	4	4	3	2	1
Distillate	Int'l Marine Bunkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Distillate	Supply Adjustments	0	(3)	3	(2)	4	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Distillate	Consumption	66	72	81	80	87	82	82	83	84	87	90	93	96	99	101	104	113	122
Residual Fuel	Production	32	30	30	29	26	29	29	31	31	31	31	31	31	31	31	31	31	30
Residual Fuel	Imports	8	9	7	3	6	2	2	2	2	2	2	2	2	2	2	2	2	2
Residual Fuel	Exports	0	0	0	0	0	4	5	8	8	9	10	11	11	12	13	13	15	17
Residual Fuel	Int'l Marine Bunkers	7	5	6	8	8	9	9	9	9	9	9	10	10	10	10	10	10	10
Residual Fuel	Supply Adjustments	(1)	(1)	1	3	1	5	5	5	5	5	5	5	5	5	5	5	5	5
Residual Fuel	Consumption	32	34	33	27	25	24	23	22	21	20	19	18	18	17	16	16	13	10

TABLE V-4
ECUADOR ENERGY BALANCE
(Thousand Tonnes Oil Equivalent)

ECONOMIC/ENERGY INDICATORS

	1995	2000	2001	2002	2003	2004	2005	2010	2015
GDP (Bil 97$)	18.78	18.86	19.65	20.36	20.91	21.64	22.40	26.31	30.14
GDP Growth (%)	2.34	2.30	4.20	3.60	2.70	3.50	3.50	3.13	2.75
Population (MM)	11.46	12.65	12.89	13.14	13.38	13.63	13.88	15.17	16.49
Population Growth (%)	2.18	1.93	1.91	1.90	1.88	1.86	1.84	1.76	1.67
Energy Growth (%)	4.38	1.40	2.60	2.37	1.96	2.51	2.50	2.21	1.90
TOE/$GNP	407	496	463	458	454	450	446	426	408
TOE Per Capita	666	740	706	709	710	714	719	738	746
Energy% / GNP%	1.87	0.61	0.62	0.66	0.73	0.72	0.71	0.71	0.69

ENERGY DEMAND BY TYPE

	1995	2000	2001	2002	2003	2004	2005	2010	2015
Petroleum	5,687	6,510	6,575	6,657	6,750	6,877	7,004	7,621	8,197
Natural Gas	278	273	294	315	333	355	377	498	625
Solid Fuels	0	1	2	3	4	5	6	13	22
Nuclear	0	0	0	0	0	0	0	0	0
Hydropower	447	697	810	901	960	1,030	1,104	1,509	1,901
Other	1,223	1,392	1,421	1,443	1,453	1,472	1,491	1,556	1,559
Total Energy	7,635	8,872	9,103	9,318	9,501	9,739	9,983	11,198	12,304

ENERGY DEMAND BY SECTOR

	1995	2000	2001	2002	2003	2004	2005	2010	2015
Industry	1,189	1,277	1,302	1,327	1,348	1,377	1,406	1,556	1,700
Transport	2,576	2,468	2,483	2,508	2,542	2,587	2,632	2,872	3,132
Res./Com./Other	2,578	2,840	2,946	3,039	3,110	3,203	3,297	3,755	4,142
Other Transformation	523	1,381	1,433	1,478	1,513	1,558	1,604	1,826	2,014
Non-Energy	122	191	198	204	209	215	222	253	279
Power Generation	648	714	739	762	778	800	822	935	1,038
Total Energy	7,635	8,672	9,103	9,318	9,501	9,739	9,983	11,198	12,304

TABLE V-5
ECUADOR PRODUCT DEMAND BY SECTOR
(Thousand Barrels per Day)

GASOIL/DIESEL CONSUMPTION

Sector	1990	1995	1996	1997	1998	1999	2000	2005	2010
Transformation	1	5	8	8	8	3	3	4	5
Energy	1	1	1	1	1	0	0	0	0
Industry	3	5	4	5	5	5	5	6	6
Transportation	15	21	19	21	20	20	22	27	30
Other	6	10	10	11	11	10	11	13	13
Total	25	41	41	45	45	38	41	50	54

KEROSENE/JET FUEL CONSUMPTION

Sector	1990	1995	1996	1997	1998	1999	2000	2005	2010
Transformation	0	0	0	0	0	0	0	0	0
Energy	0	0	0	0	0	0	0	0	0
Industry	2	0	0	0	0	0	0	0	0
Transportation	3	3	4	4	2	2	5	5	5
Other	2	0	0	0	0	1	1	0	0
Total	7	4	4	4	3	3	6	5	6

RESIDUAL FUEL OIL CONSUMPTION

Sector	1990	1995	1996	1997	1998	1999	2000	2005	2010
Transformation	7	9	10	9	12	11	15	15	15
Energy	1	0	1	0	0	0	0	0	0
Industry	5	5	4	5	4	4	5	6	7
Transportation	6	6	5	5	5	4	6	7	8
Other	0	0	0	0	0	0	0	0	0
Total	18	21	20	20	22	20	26	28	30

TABLE V-6
ECUADOR REFINED PRODUCT DEMAND
(Thousand Barrels per Day)

Product	Flow	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Crude	Production	387	384	368	375	373	400	400	400	400	660	737	813	890	927	963	1,000	1,000	1,000
Crude	Imports	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude	Exports	254	242	269	254	237	257	255	254	252	511	586	661	736	771	806	841	831	821
Crude	Int'l Marine Bunkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude	Supply Adjustments	4	7	34	14	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
Crude	Consumption	136	148	153	135	125	133	134	135	137	138	140	141	143	145	146	148	158	168
Crude	Refinery Capacity	158	158	178	178	176	178	178	178	178	178	178	178	178	178	178	178	178	178
Crude	Refinery Utilization, %	86	94	86	76	70	74	75	76	77	78	78	79	80	81	82	83	89	94
Total LPG	Production	7	8	7	7	9	8	7	7	7	7	7	7	7	7	8	8	8	8
Total LPG	Imports	11	11	13	13	14	13	15	11	12	14	15	16	17	18	19	20	23	25
Total LPG	Exports	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total LPG	Int'l Marine Bunkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total LPG	Supply Adjustments	(0)	(0)	0	0	(3)	4	4	4	4	4	5	5	5	6	6	6	8	10
Total LPG	Consumption	18	18	20	20	19	21	22	22	24	25	27	28	30	31	32	33	39	44
Naphtha	Production	5	5	3	6	5	6	4	4	4	4	4	4	4	4	4	4	4	4
Naphtha	Imports	0	0	3	8	7	7	8	8	8	8	8	8	8	8	8	8	8	9
Naphtha	Exports	0	0	4	6	5	6	5	5	5	5	5	5	5	5	5	5	5	5
Naphtha	Int'l Marine Bunkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naphtha	Supply Adjustments	0	0	3	(3)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Naphtha	Consumption	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6	7
Gasoline	Production	28	37	31	31	29	36	27	27	27	28	28	28	29	29	30	30	34	38
Gasoline	Imports	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline	Exports	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline	Int'l Marine Bunkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline	Supply Adjustments	(2)	(6)	0	(0)	1	(5)	6	6	6	6	6	6	6	6	6	6	6	6
Gasoline	Consumption	29	31	31	32	30	31	33	33	33	33	34	34	34	35	35	36	40	44
Kero/Jet Fuel	Production	6	6	6	7	8	7	6	6	6	6	6	7	7	7	7	7	8	8
Kero/Jet Fuel	Imports	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kero/Jet Fuel	Exports	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	1	1
Kero/Jet Fuel	Int'l Marine Bunkers	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Kero/Jet Fuel	Supply Adjustments	(1)	(0)	(1)	(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kero/Jet Fuel	Consumption	4	4	4	3	3	6	5	5	5	5	5	5	6	6	6	6	6	7
Distillate	Production	31	33	38	27	22	33	39	39	39	40	40	40	41	41	41	42	43	45
Distillate	Imports	6	7	9	20	15	8	9	9	10	11	11	12	13	13	14	14	16	17
Distillate	Exports	0	0	0	0	0	2	3	3	3	3	3	3	3	3	3	3	3	3
Distillate	Int'l Marine Bunkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Distillate	Supply Adjustments	4	1	(1)	(1)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Distillate	Consumption	41	41	45	45	38	41	46	47	47	49	50	51	52	53	53	54	57	60
Residual Fuel	Production	62	63	68	60	57	68	67	67	67	67	68	68	68	68	68	69	69	70
Residual Fuel	Imports	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residual Fuel	Exports	30	36	40	33	32	39	34	34	34	34	34	34	34	34	33	33	32	31
Residual Fuel	Int'l Marine Bunkers	8	7	8	7	4	4	4	4	4	4	4	5	5	5	5	5	5	5
Residual Fuel	Supply Adjustments	(4)	1	(0)	1	(1)	2	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Residual Fuel	Consumption	21	20	20	22	20	26	27	27	27	28	28	28	29	29	29	30	31	33

PURVIN & GERTZ

VI. CRUDE OIL AND REFINED PRODUCTS PRICES

Prices for refined products in Peru are based on import parity. PetroPeru calculates an import parity price for each product inclusive of the applicable import duty to establish prices at major import facilities such as the Callao terminal in the Lima area. Prices at the various terminals are based on onward shipping costs to reach each location. Other suppliers of refined products, mainly Repsol YPF, follow the PetroPeru prices. Chile and Ecuador follow a similar procedure for establishing prices.

This system of establishing prices in Peru has been in effect for some time. In the future, competitive influences and changes in duties because of trade pacts could cause some change in the structure. Peru is actually an exporter of residual fuel oil and is projected to be a modest exporter of gasoline. In a competitive environment, the prices of these products could fall towards export parity. However, in the current system, the policy of maintaining import parity has been continued even though the products are exported.

In order to establish the import parity prices, we must first establish an overall pricing basis represented by the price of a marker crude oil, such as WTI. Next, we develop a forecast of U.S. Gulf Coast prices. The U.S. Gulf Coast is the major commercial market in the region. Other products are typically sold referenced to Gulf Coast prices. The actual source of products for imports to Peru would primarily come from large Caribbean refineries such as those in Venezuela, Aruba, Curaçao, and Trinidad. Caribbean prices closely follow U.S. Gulf Coast prices. As a result, Peru uses the more transparent U.S. Gulf Coast price quotations as a basis for parity price calculations. Each of these factors is discussed below.

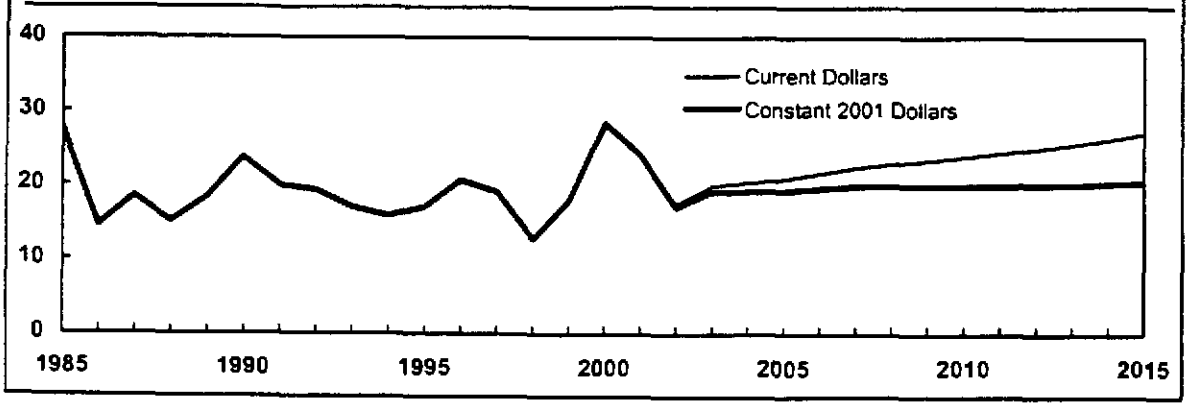
CRUDE OIL PRICES

The overall level of crude oil prices is set by the cost of production and supply/demand pressures. When prices are high, cash flow will sustain large capital programs and attract outside capital from the capital markets. The timing of responses from expenditures covers a wide range from the almost immediate response of stripper well workovers in the U.S. to deep water and Arctic development projects, which take years to complete. The combination of lower demand and increasing production will eventually produce surplus supply and declining prices. Because of the time lags involved, an "overshoot" will occur, driving prices to relatively low levels. Actions by the large producers will be necessary to curb excess supply and give support to prices. The low prices reduce industry cash flow and capital expenditures. Outside capital seeks more attractive options. Thus, the stage is set for another cycle to begin. Initially, producers are cautious in committing capital, but as prices rise and stay at relatively high levels, confidence returns. Experts warn of the finite nature of reserves and the decreasing number of unexplored prospects. Producers increase their price targets for capital justification and the cycle starts again.

In the future, the excess capacity in OPEC will be much lower and large capital expenditures will be needed within OPEC as well. This scenario suggests that oil prices will follow a cyclic pattern typical of capital-intensive industries. The tighter capacity suggests somewhat stronger prices than historically OPEC will find it easier to manage supply when the capacity overhang is relatively small.

The price of WTI (light, sweet) crude oil at Cushing, Oklahoma is used as the indicator for forecasting the prices of major world crude oils. The shift away from a surplus market should allow prices to remain relatively high for the next few years, although lower near-term prices are projected. Longer term, WTI is expected to remain in the $22-25 per barrel range (in constant 2001 dollars) ranging from lows in the teens to highs in the $30s per barrel. Due to the inherent unpredictability of new discoveries and demand shocks, we have not attempted to forecast the timing of cycles, except the regression of the current cycle toward the long-term mean. The forecast is shown in Figure VI-1 and detailed in Table VI-1 (current dollars) and VI-2 (constant dollars).

FIGURE VI-1
WTI CRUDE OIL PRICE FORECAST
(Dollars per Barrel)



The prices of other crude oils can be established from the WTI price based on flow patterns and the resulting transportation cost differentials and on quality differences among the crude oils.

DELIVERED CRUDE PRICES

Prices for crudes produced and consumed in the Americas are projected based on refining value equalization at the U.S. Gulf Coast or U.S. West Coast. A cracking yield differential was used to establish value differences as that configuration is considered representative of incremental processing economics and explains market price differentials effectively. FOB prices at the respective load ports for the crude oils of interest to the Talara refinery are presented in Tables VI-1 and VI-2 along with the key marker crude oil prices in both current and constant 2001 dollars.

For Cusiana and Mesa 30, the U.S. Gulf Coast market is used to establish FOB prices at the load ports. FOB prices are determined by the value differential to the appropriate marker

crude price, with the appropriate deductions for freight, insurance, credit costs, and canal tolls (if applicable).

An example calculation is provided below:

EXAMPLE FOB CRUDE PRICE CALCULATION
MESA 30 CRUDE

	$/B
Marker Crude (Isthmus) Price at USGC	22.10
Mesa 30 - Isthmus Differential	0.57
Mesa 30 Value at USGC	22.67
Freight	0.90
Losses and Insurance	0.12
Credit Cost	0.09
Other Fees	0.16
Total Transportation	-1.09
Mesa 30 FOB Puerto la Cruz	21.58

For Oriente and Loreto, the U.S. West Coast market is used to establish FOB prices. Loreto is currently exported from Peru to the West Coast although the traded volumes are small. The cracking value differentials are compared against ANS crude to estimate the value at the USWC, and then the appropriate transportation component is deducted to arrive at the FOB price. Because the Loreto crude is not widely traded, historical prices may not closely track the value differential. A small market adjustment has been applied to account for this in the forecast.

The Ono crude is produced domestically by several producers. The Talara refinery has established contracts with the producers, based on various reference crudes, quality adjustments and other relevant factors. Mayna crude is produced in the Peruvian jungle and transported to Puerto Bayovar via pipeline. The Talara refinery has typically purchased Mayna on a spot basis.

We have reviewed the historical prices provided by PetroPeru and have developed the forecast for Ono and Mayna based on a cracking yield differential at the U.S. Gulf Coast. The methodology to develop the Ono and Mayna crude price forecasts is similar to that used for Cusiana or Mesa 30, that is, an export parity basis. Isthmus has been used as the marker crude for Mayna, and LLS as the marker crude for Ono. The calculated values using this methodology are generally consistent with the historical delivered crude prices provided by PetroPeru. While an import parity calculation would yield higher prices for these domestic crudes, we have assumed that the pricing arrangements with the domestic producers will remain in effect.

To derive the delivered prices for each crude oil to the Talara refinery, competitive pricing and transportation costs were employed to establish first the FOB price at the load port, as discussed previously. To determine the delivered crude price to the Talara refinery, transportation costs for crude oils from the various load ports to Talara were calculated

assuming the use of a 60,000 to 70,000 deadweight (DWT) tonne crude tanker capable of navigating the Panama Canal. This tanker is of the size normally found operating in the Americas for short and intermediate crude movements. Although the possibility of accepting tankers up to 80,000 DWT will be available with the new single buoy mooring system that will be installed, we believe that the short distances from Esmeraldas, Ecuador and Puerto Bayovar, Peru to Talara will preclude the consistent use of tankers larger than 70,000 DWT. A summary of the delivered prices is provided below and in Tables VI-1 and VI-2.

CRUDE VALUES CIF TALARA, PERU
(Current Dollars per Barrel)

	2001	2002	2003	2004	2005	2007	2010	2015	2020
Cusiana	29.00	20.97	23.94	24.46	25.06	24.53	26.17	29.62	34.26
Mesa 30	26.19	19.69	22.63	22.97	23.45	22.98	24.53	27.80	32.22
Oriente	21.41	15.21	18.01	18.20	18.59	18.49	19.73	22.41	26.15
Mayna	21.88	15.45	18.32	18.60	19.01	20.47	21.88	24.86	28.94
Loreto	19.11	13.01	15.71	15.84	16.17	17.77	18.95	21.52	25.17
Ono	23.61	17.06	19.90	20.36	20.90	22.51	24.06	27.30	31.70

An import duty was assessed on the CIF (cargo, insurance, freight) price of imported crude oils until the end of 2005. The current rate used in the formula is 9.6%, the rate applicable to imports from Andean Community countries (Colombia, Ecuador, Venezuela). Calculations for 2006 and beyond did not include the duty because they are projected to be rescinded for imports from the Andean Community. This caused calculated values of imported crudes at Talara to fall relative to the domestically produced grades (Mayna, Loreto, Ono).

REFINERY MARGINS AND PRODUCT PRICES

Crude oil differentials, refined product prices, and the margins for different types of refinery processing form an equilibrium relationship with one another. Supply/demand for individual products, the availability of different types of refining capacity, and the supply of crude oils of varying quality grades are the important factors in determining the equilibrium. The development of the price forecast structure primarily involves determining the marginal supply sources for the major petroleum products.

U.S. GULF COAST

Product prices, refinery margins and crude oil differentials are determined in an iterative fashion. Two key variables, refining margins for a cracking refinery and incremental coking return for a light sour crude refinery, are input to the pricing models along with the crude oil forecast. The margin forecast basically sets the spread between products and crude oil, while the coking return sets the spread between light and heavy products. Prices are then iteratively adjusted by the model until it converges on the single set of prices consistent with all the input relationships. Prices of most other light products and various grades of gasoline are related to unleaded gasoline based on refining economics and trends in supply requirements. The prices

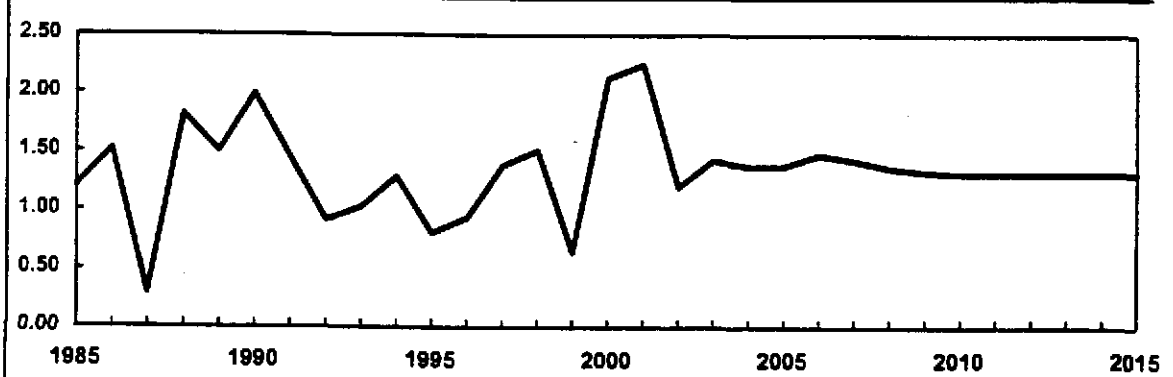
of other fuels or other product grades are calculated on a similar basis. U.S. Gulf Coast pricing forecasts are presented in Table VI-3 at the end of this section.

U.S. Gulf Coast Refinery Margins

Refinery margins on the Gulf Coast were depressed for most of the 1990s. Even though capacity utilization was quite high by historical standards, the highly transparent markets for products caused even small imbalances to depress prices. In the late 1990s and into 2000 and 2001, capacity became sufficiently tight to improve margins substantially. The large amount of consolidation in the industry also reduced the number of spot sellers and gave more discipline to the market.

For forecasting purposes, we measure margins by reference to the marginal production mode, the light crude cracking refineries. Although almost all Gulf Coast refineries are more complex than this model, it represents marginal throughput in most refineries and therefore is the balancing mechanism for supply and demand. Recent history and our forecast are shown in Figure VI-2.

FIGURE VI-2
USGC LLS CRACKING MARGINS AFTER VARIABLE COSTS
(Forecast in Constant 2001 Dollars per Barrel)



In periods of tight supply, the margin will exceed fully allocated costs and yield a modest return on investment. In normal markets this operation will have an incentive above variable costs to run incremental crude oil. When markets are over supplied, the margin will drop below variable costs, thereby stopping incremental runs. Our outlook shown above is based on our assessment of the relative frequency of these market modes. In general, we expect capacity to remain tight, but with growth of 1-2 percent per year, severe tightness is not likely to persist for long periods. As a result, we expect margins, on average, to reflect an incentive for incremental runs but to give only a small return on capital for the marginal facilities. More complex refineries should be profitable based upon our forecast of light/heavy spreads as discussed below.

Light/Heavy Differentials

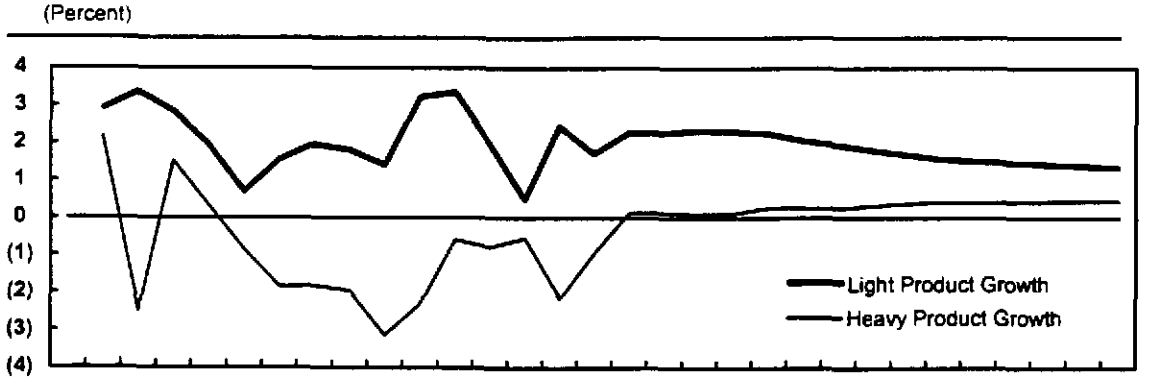
The light/heavy differential establishes the basic relationship among product prices. The light/heavy balance must be viewed on a worldwide basis, because crude oil and product trade

will arbitrage any imbalances. Local factors have some influence, but the same basic pricing pattern will prevail in all world markets. It is also the main driver of the variation of refinery profitability with complexity. The light/heavy differential depends on the utilization of conversion capacity. The conversion capacity balance is complex involving the following factors:

- **Product demand and crude oil runs:** Increases in crude runs require proportionate increases in conversion capacity, even if light and heavy products are growing at the same rate.
- **Light product versus heavy product growth rates:** If light product demand is growing faster than heavy product demand, relatively more conversion capacity is required.
- **Crude oil quality:** As crude oil quality becomes heavier, relatively more conversion capacity is required to meet the requirements of the market.
- **Amount of conversion capacity:** The need for conversion capacity determines the numerator of capacity utilization. The amount of conversion capacity existing and being built determines the denominator of the utilization rate.

Worldwide product demand is forecast to grow at a rate of about two percent. Thus, even if demand patterns do not change, conversion capacity would have to grow by this percentage to make the correct mix of products. In fact, light product demand is growing considerably faster than residual fuel oil demand, as shown in Figure VI-3. After a long period of declining demand, residual fuel oil demand has now bottomed out and is expected to increase slowly. Between now and 2010, we project an annual growth rate of only 0.6 percent.

FIGURE VI-3
LIGHT PRODUCT VERSUS HEAVY PRODUCT DEMAND GROWTH
(Percent)



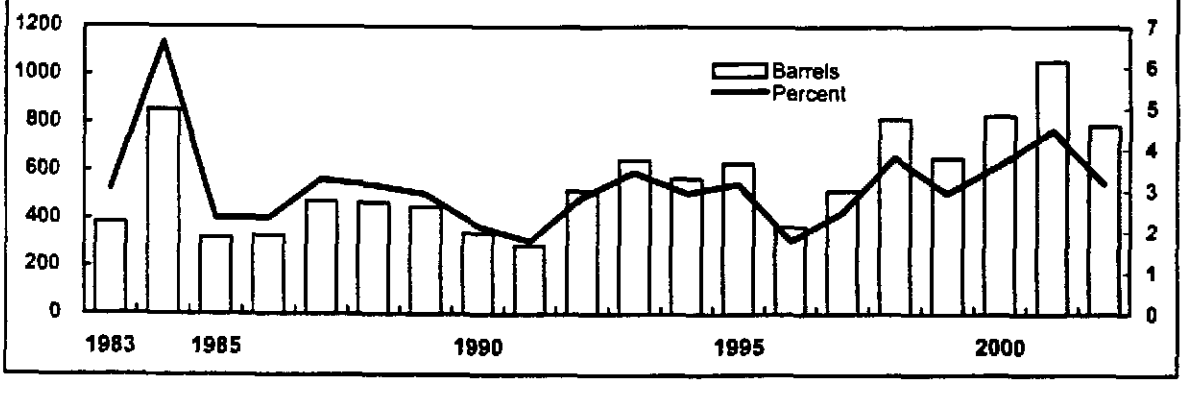
Light product demand, on the other hand, is forecast to grow during this period at a rate of 2.1 percent. Light product demand is driven primarily by the need for transportation fuels. As a result, conversion capacity additions will need to grow at a considerably faster rate than the rate of increase in crude oil runs.

The amount of residue inherently present in the world crude oil supply is also an important factor in the balance. The supply of residue (defined as 680+°F material) held fairly steady through the early 1990s due to the rapidly increasing production of light crude oils from the North Sea and other locations. Over the next decade, increasing production from OPEC countries, the rapidly increasing production of heavy crude oils from Mexico and Venezuela, increased heavy crude oil production from Canada, Ecuador and other locations and the large increase in moderately heavy offshore Gulf of Mexico crude oil will all cause the crude oil slate to gradually become heavier. This heavier crude oil slate will further increase the need for conversion capacity.

Conversion capacity additions and announced projects are shown in Figure VI-4. During the early 1990s, a large amount of conversion capacity came onstream. Healthy refinery margins of the late 1980s and the very wide light/heavy spreads during and after the Gulf War encouraged considerable expansions of conversion capacity. In the U.S., the need to invest in refineries to produce low sulfur diesel and reformulated gasoline resulted in large increases in conversion capacity. The net result was a surplus of conversion capacity that in turn led to a decline in light/heavy spreads in the mid-1990s. By late 1997 the conversion capacity surplus was largely eliminated in the U.S. In the Western Hemisphere, much of the increase in conversion capacity was in response to increased availability of residue, particularly from the heavy Mexican, Venezuelan, and Canadian crude oils.

In Asia, excess conversion capacity continues to exist due to the demand impacts of the Asian financial crisis, coupled with a high level of recent conversion investment. Although demand growth should begin to erode excess conversion capacity, some large-scale regional refining projects have recently been completed that are exacerbating the excess capacity situation.

FIGURE VI-4
WORLD CONVERSION CAPACITY CHANGES
(Thousand Barrels per Day) (Percent)



The light/heavy differential is closely linked to the growth rate in conversion capacity needed. If the growth rate of conversion capacity is relatively low, rather modest returns are sufficient to generate the needed capacity. At growth rates in the 1.0 to 1.5 percent range, technological improvement, debottlenecking projects, and normal replacements of older units typically are sufficient to meet the growth requirement of the market. As the growth rate

exceeds this level, stronger returns are necessary to generate the needed capacity. At the projected growth rate of 3 to 4 percent, the capacity deficit cannot be met merely by debottlenecking and expansion of existing units. Instead, completely new facilities will be required, thus the economics must justify their construction.

The large amount of conversion capacity coming onstream in 2002 through 2003 will cause the light/heavy differential to narrow compared to recent levels. By around 2004, the light/heavy differential will begin to return to our forecast long-term equilibrium levels, as the building boom subsides and more heavy crude oil is available, especially in the Western Hemisphere.

Cyclic behavior is common in this type of capital sensitive environment, as illustrated in the conversion returns in the U.S. Gulf Coast market. Typically, when margins become very attractive, an overbuilding of capacity results. Returns then decline and capital expenditures for expansion correspondingly decline. The down cycle in Europe is not expected to be as dramatic, as the capacity overbuilding is expected to be limited to the U.S. Gulf Coast. Asian conversion returns are forecast to remain depressed by the regional capacity overhang, moving up only as the region's product supply and demand balance improves.

Gasoline Grades

The basic relationship between gasoline and crude oil follows from the forecasts of refinery margin and the light/heavy differential. The relationships between gasoline octane grades and formulations (conventional and reformulated) can be analyzed and forecast primarily based on octane values. Future requirements for ultra low sulfur gasoline will require extensive desulfurization of gasoline stocks or feedstocks to gasoline producing processes such as catalytic cracking.

Distillate Fuels

Distillate fuel oil prices are projected based on a relationship versus unleaded regular, conventional gasoline. Distillate price differentials are somewhat more difficult to calculate on a strict refining economics basis due to the seasonal nature of price trends. Typically, the summer differentials will rise to a level that more than supports the maximized conversion of this material to gasoline through revised cutpoints for FCCU charge. At maximum utilization of cracking capacity the differential often rises above balanced levels. Our forecasts are based on a summertime (second and third quarter) No. 2 fuel oil/diesel (2,000 ppm S) discount averaging in the 5 cent per gallon range, though peaks well over this level are typical.

Wintertime balances can be erratic and the typical premium on distillate during the winter season is both a function of the distillate balance, the weather conditions and the relative strength or weakness of the gasoline balance. Under typical conditions we estimate the wintertime premium (first and last quarters of the year) to be near zero. The combination of the expected averages yields a long-term forecast for a 2.5 cent discount for standard distillates relative to conventional gasoline on an annual average basis. Recently, the spreads have been wider due to an oversupply of distillate caused by mild winters and chronic overproduction due

to a lighter crude slate. This has resulted in weak jet fuel prices as well. Product demand growth will absorb extra capacity and distillate discounts should return to more normal levels through the forecast, assuming a return to more normal weather conditions, on average.

Low Sulfur Fuel Oil

We do not envision tight supplies of low sulfur crude oils in the international market, and expect that low sulfur fuel oil will continue to be made from low sulfur crude residue and indirect desulfurization/blending. We do not expect the demand for low sulfur residual fuel oil to be high enough to require desulfurization of sour vacuum residue to produce low sulfur fuel oil in most markets. Consequently, the differential will be set by the alternative of additional processing to produce light products rather than fuel oil. This processing requires significant desulfurization investment and higher operating costs for sour residual fuels versus low sulfur residual fuels. Thus, the differential between high and low sulfur fuel oils closely follows the heavy/light differential and returns on conversion capacity (discussed below). However, at times, low sulfur fuel oil prices will be set by the markets for fuel oil, rather than by relative conversion economics. A good example is the winter of 2000/2001 when tight supplies of natural gas caused a record run-up in prices. Industrial customers with dual capabilities switched to low sulfur fuel oil, driving up its price. Because high sulfur fuel oils could not be used for environmental reasons, their price did not escalate proportionately. Undoubtedly, this type of circumstance will occur again, but we believe it will be the exception and not be the basic price-setting mechanism.

Applying the methodology discussed above, a forecast of product prices was developed from the refinery margin forecast, the light/heavy forecast (conversion return) and various product relationships. These prices are shown in Table VI-3.

IMPORT PARITY PRICES IN PERU

Import parity prices for Peru are developed from the U.S. Gulf Coast prices plus transportation, related costs, and import duties. Products were assumed to be transported in a Medium Range tanker. This class of tanker ranges from 25,000 to 45,000 DWT and is typically used in this product trade. It is capable of passing through the Panama Canal and the carrying capacity is consistent with the volumetric level of imports to countries on the Pacific coast of South America including Peru. Our forecast of the freight rates for this class of tanker are based on cost-of-service calculations adjusted for market conditions.

Other assumptions used in performing the calculations are itemized below.

- The Peru import tax rate is 9.6% for all products except gasoline which is taxed at 10.2%.
- Losses and Insurance at 0.5% of the value of the cargo plus freight.
- Credit cost resulting from the difference in voyage time minus typical payment terms for refined products (net due 10 days after loading).

The main importing location in Peru is the Callao terminal in the Lima area. Ex-refinery prices at La Pampilla are basically the same as Callao prices. The Callao terminal was privatized in 1996 and operates as a terminal open to all users. Prices at smaller terminals are based on the cost of moving smaller volumes of product from Callao or one of the refineries to these locations. The prices for volumes used in a local market would be Callao plus transportation.

Longer term, the status of the import duty in the import parity calculation is uncertain. The current rate used in the formula is 9.6%, the rate applicable to imports from Andean Community countries. For most other countries, including the U.S., the applicable rate is 12%. Most imports currently are from Venezuela, the logical source because of both location and duty preference. Other Andean Community countries and Chile would not have the capability of providing the imports.

In 2006, the import duty from Andean Community countries is scheduled to be eliminated. However, duties will remain for imports from other sources. Our forecast assumes duties are eliminated beginning in 2006 for all imports from Andean Community countries. Prices in Peru are expected to fall to the new import parity level in 2006 consistent with free market economics. The continuance of import duties past their scheduled phase out would represent an upward sensitivity on prices.

The full results of the price forecast for Callao, Peru are shown in Table VI-4.

NETBACK PRICES FOR TALARA REFINERY

Prices received at the Talara refinery gate will vary depending on their final disposition. In general, sales to the local area could be expected to command a higher price than sales to other terminals along the Peruvian coast. However, the local market can only absorb about one-quarter of the total production. Once the local market demand is met the remaining production must be sold to other domestic terminals such as Callao or exported.

Purvin & Gertz calculated netback prices that the Talara refinery could be expected to receive for various refined products. For sales to domestic locations, we used the Callao import parity prices developed earlier. Callao serves the major consumption center of Lima and is geographically in the center of the Peruvian coast. Netback prices for exports were calculated based on the most likely markets for the products. In most cases, export markets were Peru's neighboring countries of Ecuador and Chile. Other export markets considered were the U.S. Gulf Coast and New York Harbor; both are major market centers for petroleum products.

Netback prices to Talara were calculated starting with our forecast of market prices for the potential markets. Transportation, insurance and losses (0.5% of market price), credit costs and any applicable duties were subtracted to arrive at the Talara FOB netback price. Transportation costs included all applicable port charges and vessel chartering expenses. Products were assumed to be transported in a Medium Range tanker. Transportation costs for tanker movements to Callao were provided by PetroPeru and were $1.37 per barrel for most

products except LPG which was $3.00 per barrel. Freight rates provided by PetroPeru were escalated consistent with our long-term outlook of the tanker market.

Tables VI-5 through VI-16 provide the results of our analysis. A review of the netback pricing results for each product is presented below.

LPG

LPG prices peaked in 2000 along with the run up in gas and oil prices, but prices fell in 2001 as the U.S. economy slipped into recession and gas and oil prices dropped. We expect prices to remain low this year consistent with our crude oil forecast, but a gradual recovery will commence within the next twelve months.

LPG prices for Talara's likely markets were calculated based on import parity from the U.S. Gulf Coast. All LPG prices assume a specification product containing 70% propane and 30% butane. Freight rates were estimated based on a 54,000 cubic meter fully refrigerated LPG tanker. This type of vessel is the largest LPG tanker that can pass through the Panama Canal and provides a lower overall transportation cost than a semi-refrigerated 32,000 cubic meter class vessel.

Both Ecuador and Chile have very good facilities to efficiently receive LPG. Ecuador uses the Berge Eagle, a 72,000 cubic meter floating storage vessel located offshore Guayaquil, to efficiently receive imports from other large refrigerated vessels. Chile has a large LPG terminal at Quintero Bay capable of handling large vessels thus allowing very efficient offloading of large cargoes. The terminal at Callao operated by Vopak-Serlipsa is not as capable of handling large vessels due to limited LPG storage (8,700 cubic meters) and demurrage of large vessels is typically necessary to allow them to fully discharge. Other terminals in the Lima area include the Zeta Gas terminal with 21,000 cubic meters of storage and the Solgas terminal with 20,000 cubic meters of storage. We have included an extra 12 days of demurrage in the freight cost to account for limited storage in the Lima area.

Tables VI-5 and VI-6 provide our forecast of Talara netback prices for LPG in current and constant dollars. Freight rates were based on a 3,000 cubic meter vessel; the typical LPG vessel size loaded at the Talara refinery's dock. Domestic sales of LPG appear to be the best option for Talara up to 2006 when the import duty is eliminated. Ecuador currently does not have an import duty on LPG. In 2007, the reference year selected for the project, netback prices for domestic sales are expected to average $17.82 per barrel. Export sales to Ecuador are expected to provide a higher netback, $19.24 per barrel, because of the shorter distance to Guayaquil versus Callao (360 versus 1068 nautical miles). Chile is a much less attractive destination for exports with a netback price of $14.79 per barrel. This forecast assumes LPG prices in Callao would remain at import parity even though the Camisea project will be exporting LPG from a terminal near Lima. We would expect PetroPeru to continue moving LPG from Talara to Callao to serve its customer base, but any marginal supplies currently being sold in the Lima market would likely get squeezed out. Given this price structure, we would expect Talara to begin exporting some of its marginal supplies to the Guayaquil area which is expected to remain on an import parity pricing basis.

NAPHTHA

The most likely market for excess naphtha from the Talara refinery is the large refining and petrochemical complexes along the U.S. Gulf Coast. PetroPeru regularly exports cargos of reforming grade naphtha to this large market. Refiners on the USGC typically purchase naphtha as a feedstock for reformers to produce a high octane gasoline blending component and aromatic feedstock for chemical plants. Naphtha prices in the USGC are based on the economics of the reforming process.

Netback prices for Talara's excess naphtha production were calculated based on Purvin & Gertz' forecast of prices on the U.S. Gulf Coast. The key specification for this naphtha is a minimum naphthenes + aromatics (N+A) content of 40%. Freight rates were estimated based on a Medium Range tanker transporting product from the Talara refinery dock through the Panama Canal and to a refiner on the Houston Ship Channel. Tables VI-7 and VI-8 provide our forecast for naphtha in both current and constant dollars. Should Talara's naphtha quality fall below 40% N+A, it may be possible to sell the material as a natural gasoline for a discount of no more than 6-8 cents per gallon. Export prices for FCCU naphtha (90 RON) are not provided because the more economical disposition for this material is likely as a gasoline blend component.

GASOLINE

With gasoline production rising faster than demand in Peru over the forecast period, we expect to see an increase in exports. Talara is expected to continue supplying the local marketing territory and PetroPeru's domestic market share in other parts of the country. As gasoline production from Talara increases, some of the additional supplies are likely to be exported. Neighboring countries are not expected to provide a large market for exports thus surplus production would likely be exported to the U.S. East Coast. Prices along the U.S. East Coast are linked to New York Harbor prices by waterborne transportation costs. We use New York Harbor prices as a convenient reference point. The U.S. Gulf Coast is a net exporter of gasoline via pipeline to the eastern United States and via waterborne movements to the Atlantic coast.

Peru currently uses four grades of gasoline; one leaded and three unleaded. Leaded gasoline production has been decreasing for a number of years and is expected to be phased out by 2010 based on PetroPeru's current plans. Gasoline octane in Peru is reported as Research Octane Number (RON). Octane values in the U.S. are calculated as the average of the RON and the Motor Octane Number (MON). Unleaded regular gasoline has an octane of 87 and unleaded premium has an octane of 93. The three unleaded grades of gasoline used in Peru today (97/95/90) correspond to the premium (93), plus (91), and regular (87) grades used in the U.S.

Tables VI-9 and VI-10 provide market and netback prices for conventional unleaded regular and premium gasoline in both current and constant dollars. Netback prices to Callao are much higher than for exports to New York Harbor, and this is attributed to the higher waterborne transportation costs to New York combined with the import parity pricing basis at Callao. For exports, freight rates were estimated based on a Medium Range tanker carrying product from

the Talara refinery dock through the Panama Canal and to a terminal in New York Harbor. A duty of $0.525 per barrel is assessed when the product enters the U.S. If PetroPeru chooses to sell its excess gasoline to a trader, the netback prices would be reduced by the trader's margin.

JET/KEROSENE

Production of jet/kerosene in Peru is expected to be in balance with demand. Any excess production within the refinery would likely be blended into the diesel pool and sold in the country. Talara is expected to continue supplying all of the local market demand for jet/kerosene as well as PetroPeru's market share in other parts of Peru. Neighboring countries are not expected to provide a large market for exports. Nevertheless, we have provided netback prices for exports to New York Harbor as a floor price for jet/kerosene.

Tables VI-11 and VI-12 provide market and netback prices for jet/kerosene in both current and constant dollars. As was the case for gasoline, netback prices to Callao are much higher than for exports to New York Harbor.

DIESEL

Peru imports 20,000 to 25,000 barrels per day of diesel. Increasing production from domestic refineries, as well as from the Camisea Project, will cover growth in demand over the next ten years, but will not be great enough to back out imports. Longer term, demand forecasts indicate a growing level of imports after 2010. Talara is expected to continue supplying all of the local market demand for diesel with the balance going to other domestic terminals. Although we do not expect a sustained level of exports, we have provided netback prices for exports to New York Harbor as a floor price for diesel. As diesel production from Talara increases, all of the additional supplies are likely to be sold in Peru. Tables VI-13 and VI-14 provide market and netback prices for low sulfur and regular sulfur diesel fuel in both current and constant dollars.

Diesel specifications in Peru currently limit sulfur to 1.0 weight percent (wt%S) and set a minimum cetane limit of 45. There has been some talk of lowering the sulfur specification to 0.05 wt%S for the Lima metropolitan area, but no definitive regulatory plan has been revealed. At a minimum, we would expect diesel sulfur limits to be reduced to 0.2 wt%S in an effort to be more consistent with World Bank standards.

RESIDUAL FUEL OIL

Demand for residual fuel oil in Peru has been decreasing over the last 10 years at the same time production from refineries has essentially remained constant. This has resulted in growing export volumes. Peru is expected to continue being a net exporter of residual fuel oil as domestic demand continues its gradual decline. Talara is expected to continue supplying the local marketing territory and PetroPeru's domestic market share in other parts of the country. Sales to domestic clients are not expected to grow as the overall market is in decline. Talara already exports a significant portion of its residual fuel oil production to other countries. As more residual fuel oil is produced at Talara, most of the additional supplies are likely to be exported.

Neighboring countries are not expected to provide a large market for exports thus surplus production would likely be exported to the U.S. East Coast.

Prices along the U.S. East Coast are linked to New York Harbor prices by waterborne transportation costs. We use New York Harbor prices as a convenient reference point. Residual fuel oil produced at Talara is of reasonably good quality with sulfur typically between 0.7 and 1.4%. This quality is generally in line with the fuel oil used by electric generating stations on the East Coast of the United States. Thus, we expect prices for 1% sulfur residual fuel oil in New York Harbor to be representative of the value of Talara's residual fuel oil in that market.

Tables VI-15 and VI-16 provide market and netback prices for residual fuel oil in both current and constant dollars. Netback prices to Callao are much higher than for exports to New York Harbor, and this is attributed to the higher waterborne transportation costs to New York combined with the import parity pricing basis at Callao. Marketers in Lima have been able to keep the price of fuel oil at import parity even though the region is a net exporter. If their pricing power is eroded and the price drops toward export parity, Callao netback values will approximate New York Harbor netback values. For exports, freight rates were estimated based on a Medium Range tanker carrying product from the Talara refinery dock through the Panama Canal and to a terminal in New York Harbor. A duty of $0.05 per barrel is assessed when the product enters the U.S. If PetroPeru chooses to sell its excess residual fuel oil to a trader, the netback prices would be reduced by the trader's margin.

TABLE VI-1
CRUDE OIL VALUES
(Current Dollars per Barrel)

				2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Benchmark Crudes																
West Texas Intermediate, Spot USGC				30.24	25.73	19.12	21.94	22.32	22.80	23.66	24.59	25.30	25.89	26.53	30.14	34.82
Light Louisiana Sweet, FOB St. James				30.31	25.72	18.99	21.70	22.14	22.66	23.46	24.29	24.87	25.39	25.92	29.34	33.95
Isthmus, CIF USGC				28.54	22.60	17.30	19.93	20.19	20.60	21.33	22.10	22.65	23.12	23.59	26.74	31.01
ANS, Spot USWC				28.26	22.98	17.22	19.73	19.87	20.22	20.94	21.69	22.22	22.68	23.14	26.23	30.43
Crude Values, FOB Load Ports		°API	%S													
Cusiana	Coveñas, Colombia	36	0.3	29.23	25.20	18.07	20.80	21.28	21.81	22.60	23.40	23.97	24.47	24.98	28.31	32.80
Mesa 30	Puerto La Cruz, Venezuela	30	1.1	26.93	22.31	16.65	19.34	19.65	20.08	20.81	21.58	22.12	22.59	23.05	26.17	30.42
Oriente	Esmeraldas, Ecuador	25	1.6	24.21	18.93	13.40	15.97	16.15	16.49	17.26	18.01	18.46	18.85	19.23	21.85	25.53
Mayna	Puerto Bayovar, Peru	26	0.4	28.17	21.45	15.11	17.99	18.28	18.68	19.40	20.14	20.65	21.09	21.53	24.47	28.51
Loreto	Puerto Bayovar, Peru	19	1.2	23.91	18.63	12.62	15.34	15.48	15.80	16.62	17.40	17.83	18.20	18.56	21.09	24.69
Ono	Talara, Peru	33	0.1	28.17	23.61	17.06	19.90	20.36	20.90	21.71	22.51	23.07	23.56	24.06	27.30	31.70
Crude Values, CIF Talara																
Cusiana				33.55	29.00	20.97	23.94	24.46	25.06	23.70	24.53	25.12	25.64	26.17	29.62	34.26
Mesa 30				31.44	26.19	19.69	22.63	22.97	23.45	22.18	22.98	23.54	24.03	24.53	27.80	32.22
Oriente				27.29	21.41	15.21	18.01	18.20	18.59	17.73	18.49	18.95	19.34	19.73	22.41	26.15
Mayna				28.65	21.88	15.45	18.32	18.60	19.01	19.73	20.47	20.99	21.43	21.88	24.86	28.94
Loreto				24.45	19.11	13.01	15.71	15.84	16.17	16.99	17.77	18.21	18.58	18.95	21.52	25.17
Ono				28.17	23.61	17.06	19.90	20.36	20.90	21.71	22.51	23.07	23.56	24.06	27.30	31.70

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TABLE VI-2
CRUDE OIL VALUES
(Constant Dollars per Barrel)

		°API	%S	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Benchmark Crudes																
West Texas Intermediate, Spot USGC				30.24	25.73	18.75	21.09	21.03	21.07	21.43	21.84	22.02	22.10	22.20	22.84	23.90
Light Louisiana Sweet, FOB St. James				30.31	25.72	18.62	20.86	20.86	20.94	21.25	21.57	21.65	21.67	21.69	22.24	23.31
Isthmus, CIF USGC				28.54	22.60	16.96	19.15	19.02	19.03	19.32	19.63	19.71	19.73	19.74	20.27	21.29
ANS, Spot USWC				28.26	22.98	16.88	18.97	18.72	18.68	18.97	19.26	19.34	19.35	19.36	19.88	20.88
Crude Values, FOB Load Ports																
Cusiana	Coveñas, Colombia	36	0.3	29.23	25.20	17.72	19.99	20.05	20.15	20.47	20.78	20.87	20.89	20.90	21.46	22.52
Mesa 30	Puerto La Cruz, Venezuela	30	1.1	26.93	22.31	16.33	18.59	18.52	18.55	18.85	19.16	19.25	19.28	19.29	19.84	20.88
Oriente	Esmeraldas, Ecuador	25	1.6	24.21	18.93	13.13	15.35	15.22	15.24	15.63	15.99	16.07	16.08	16.09	16.56	17.53
Mayna	Puerto Bayovar, Peru	26	0.4	28.17	21.45	14.81	17.29	17.23	17.26	17.57	17.88	17.98	18.00	18.01	18.55	19.57
Loreto	Puerto Bayovar, Peru	19	1.2	23.91	18.63	12.38	14.75	14.59	14.60	15.05	15.45	15.53	15.53	15.53	15.98	16.94
Ono	Talara, Peru	33	0.1	28.17	23.61	16.72	19.13	19.19	19.31	19.66	19.99	20.09	20.11	20.13	20.69	21.76
Crude Values, CIF Talara																
Cusiana				33.55	29.00	20.56	23.01	23.05	23.16	21.47	21.78	21.86	21.88	21.90	22.45	23.52
Mesa 30				31.44	26.19	19.31	21.75	21.64	21.67	20.09	20.40	20.49	20.51	20.53	21.07	22.12
Oriente				27.29	21.41	14.91	17.31	17.15	17.17	16.06	16.42	16.50	16.51	16.51	16.98	17.95
Mayna				28.65	21.88	15.15	17.61	17.53	17.56	17.87	18.18	18.27	18.29	18.31	18.84	19.86
Loreto				24.45	19.11	12.75	15.10	14.92	14.94	15.39	15.78	15.86	15.86	15.86	16.31	17.28
Ono				28.17	23.61	16.72	19.13	19.19	19.31	19.66	19.99	20.09	20.11	20.13	20.69	21.76

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TABLE VI-3
USGC PRODUCT PRICES
(Dollars per Barrel)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Current Dollars													
LPG (see Note)	25.48	20.68	14.49	16.65	17.41	17.87	18.42	18.97	19.28	19.63	20.02	22.63	26.47
Naphtha for Reforming	33.19	28.20	20.27	23.54	23.92	24.41	24.86	25.68	26.19	26.68	27.20	30.84	35.61
Unleaded Regular Gasoline	34.93	30.73	21.97	25.24	25.83	26.46	27.42	28.21	28.74	29.25	29.80	33.65	38.77
Premium Gasoline	36.41	32.60	23.69	27.39	27.79	28.56	29.99	30.77	31.33	31.86	32.44	36.53	42.01
Jet/Kerosene	35.57	30.21	22.13	25.04	25.53	26.10	27.00	27.93	28.57	29.18	29.80	33.65	38.77
0.05% S Diesel	34.65	29.56	21.77	24.55	25.12	25.73	26.64	27.55	28.19	28.79	29.40	33.24	38.35
No.2/Diesel	33.92	28.82	20.90	23.84	24.36	24.96	25.84	26.74	27.37	27.95	28.54	32.27	37.24
3% HSFO	20.71	16.90	13.25	15.21	14.88	14.84	15.38	15.99	16.38	16.72	17.07	19.48	22.88
1% LSFO	26.28	21.59	14.80	17.32	17.19	17.29	17.92	18.59	19.02	19.40	19.80	22.53	26.30
Constant Dollars													
LPG (see Note)	25.48	20.68	14.21	16.00	16.41	16.51	16.68	16.84	16.79	16.76	16.75	17.31	18.17
Naphtha for Reforming	33.19	28.20	19.87	22.63	22.54	22.55	22.52	22.81	22.80	22.77	22.76	23.37	24.44
Unleaded Regular Gasoline	34.93	30.73	21.54	24.26	24.34	24.44	24.84	25.05	25.02	24.96	24.93	25.51	26.61
Premium Gasoline	36.41	32.60	23.23	26.32	26.18	26.38	27.16	27.32	27.27	27.20	27.15	27.69	28.84
Jet/Kerosene	35.57	30.21	21.70	24.07	24.06	24.11	24.46	24.80	24.87	24.90	24.93	25.51	26.61
0.05% S Diesel	34.65	29.56	21.34	23.59	23.67	23.77	24.13	24.47	24.54	24.57	24.60	25.19	26.32
No.2/Diesel	33.92	28.82	20.49	22.92	22.95	23.06	23.41	23.75	23.82	23.85	23.88	24.46	25.56
3% HSFO	20.71	16.90	12.99	14.62	14.02	13.71	13.93	14.20	14.26	14.27	14.28	14.76	15.70
1% LSFO	26.28	21.59	14.51	16.65	16.19	15.98	16.23	16.51	16.56	16.56	16.57	17.07	18.05

Note: LPG quality is 70% Propane, 30% Butane mix

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TABLE VI-4
PRODUCT PRICES (CIF + Duty) AT CALLAO, PERU
(Dollars per Barrel)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Current Dollars													
LPG (see Note)	32.04	26.66	19.88	22.32	23.22	23.78	22.31	22.94	23.33	23.77	24.24	27.47	31.62
Unleaded Regular Gasoline	41.25	36.89	26.68	30.27	30.93	31.67	29.76	30.59	31.16	31.71	32.31	36.43	41.76
Premium Gasoline	42.88	38.96	28.58	32.65	33.10	33.99	32.34	33.16	33.77	34.35	34.97	39.33	45.02
Jet/Kerosene	41.91	36.32	26.88	30.05	30.60	31.26	29.50	30.47	31.16	31.81	32.48	36.62	42.07
0.05% S Diesel	41.05	35.79	26.62	29.65	30.29	31.01	29.26	30.23	30.92	31.56	32.23	36.37	41.83
No.2/Diesel	40.25	34.97	25.66	28.87	29.46	30.16	28.47	29.42	30.09	30.71	31.36	35.39	40.71
3% HSFO	25.33	20.90	16.45	18.62	18.26	18.24	17.23	17.87	18.29	18.66	19.04	21.67	25.31
1% LSFO	31.46	26.07	18.16	20.94	20.80	20.95	19.78	20.48	20.94	21.36	21.80	24.73	28.75
Constant Dollars													
LPG (see Note)	32.04	26.66	19.49	21.45	21.88	21.97	20.21	20.37	20.31	20.28	20.28	20.82	21.70
Unleaded Regular Gasoline	41.25	36.89	26.15	29.09	29.15	29.25	26.95	27.16	27.13	27.07	27.03	27.61	28.66
Premium Gasoline	42.88	38.96	28.02	31.38	31.19	31.40	29.29	29.45	29.39	29.31	29.26	29.80	30.90
Jet/Kerosene	41.91	36.32	26.35	28.89	28.84	28.88	26.72	27.05	27.12	27.15	27.18	27.75	28.88
0.05% S Diesel	41.05	35.79	26.10	28.50	28.55	28.65	26.51	26.84	26.92	26.94	26.97	27.56	28.71
No.2/Diesel	40.25	34.97	25.16	27.75	27.76	27.86	25.78	26.12	26.19	26.21	26.24	26.82	27.95
3% HSFO	25.33	20.90	16.13	17.90	17.21	16.85	15.60	15.87	15.92	15.93	15.94	16.42	17.37
1% LSFO	31.46	26.07	17.80	20.13	19.60	19.35	17.92	18.19	18.23	18.23	18.24	18.74	19.73

Note: LPG quality is 70% Propane, 30% Butane mix

TABLE VI-5
LPG PRICES
(Current Dollars per Barrel)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Market Prices, CIF including duty													
U.S. Gulf Coast	25.48	20.68	14.49	16.65	17.41	17.87	18.42	18.97	19.28	19.63	20.02	22.83	26.47
Callao, Peru	32.04	26.66	19.88	22.32	23.22	23.78	22.31	22.94	23.33	23.77	24.24	27.47	31.62
Guayaquil, Ecuador	28.45	23.57	17.38	19.59	20.40	20.90	21.50	22.10	22.48	22.90	23.35	26.50	30.54
Quintero Bay, Chile	31.30	25.98	19.28	21.68	22.56	23.09	22.00	22.62	23.01	23.43	23.90	27.11	31.22
Talara Netback Prices													
Domestic Sales													
Callao, Peru	27.47	22.15	15.32	17.63	16.40	18.83	17.29	17.82	18.12	18.45	18.82	21.51	24.87
Export Sales													
Guayaquil, Ecuador	25.88	21.04	14.83	16.97	17.71	18.14	18.68	19.24	19.56	19.92	20.32	23.16	26.75
Quintero Bay, Chile	21.84	17.05	10.76	12.82	13.49	13.81	14.31	14.79	15.04	15.32	15.64	18.02	20.68
Differentials to USGC													
Callao, Peru	1.99	1.47	0.82	0.98	0.99	0.96	(1.13)	(1.15)	(1.16)	(1.18)	(1.20)	(1.32)	(1.60)
Guayaquil, Ecuador	0.40	0.36	0.34	0.32	0.30	0.27	0.26	0.27	0.28	0.29	0.30	0.32	0.28
Quintero Bay, Chile	(3.64)	(3.63)	(3.73)	(3.63)	(3.92)	(4.06)	(4.11)	(4.18)	(4.24)	(4.31)	(4.39)	(4.82)	(5.79)

TABLE VI-6
LPG PRICES
(Constant 2001 Dollars per Barrel)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Market Prices, CIF including duty													
U.S. Gulf Coast	25.48	20.68	14.21	16.00	16.41	16.51	16.68	16.84	16.79	16.76	16.75	17.31	18.17
Callao, Peru	32.04	26.66	19.49	21.45	21.88	21.97	20.21	20.37	20.31	20.28	20.28	20.82	21.70
Guayaquil, Ecuador	28.45	23.57	17.04	18.83	19.22	19.31	19.47	19.63	19.57	19.54	19.54	20.08	20.96
Quintero Bay, Chile	31.30	25.98	18.90	20.84	21.25	21.34	19.93	20.08	20.03	20.00	19.99	20.54	21.43
Talara Netback Prices													
Domestic Sales													
Callao, Peru	27.47	22.15	15.01	16.94	17.34	17.39	15.66	15.82	15.77	15.75	15.75	16.30	17.07
Export Sales													
Guayaquil, Ecuador	25.88	21.04	14.54	16.31	16.69	16.76	16.92	17.08	17.03	17.01	17.00	17.55	18.36
Quintero Bay, Chile	21.84	17.05	10.55	12.32	12.71	12.76	12.96	13.13	13.09	13.08	13.08	13.66	14.19
Differentials to USGC													
Callao, Peru	1.99	1.47	0.80	0.94	0.93	0.88	(1.02)	(1.02)	(1.01)	(1.01)	(1.00)	(1.00)	(1.10)
Guayaquil, Ecuador	0.40	0.36	0.33	0.31	0.28	0.25	0.24	0.24	0.25	0.25	0.25	0.25	0.20
Quintero Bay, Chile	(3.64)	(3.63)	(3.66)	(3.68)	(3.69)	(3.75)	(3.72)	(3.71)	(3.69)	(3.68)	(3.67)	(3.65)	(3.98)

TABLE VI-7
NAPHTHA PRICES
(Current Dollars per Barrel)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Market Prices													
U.S. Gulf Coast Naphtha	33.19	28.20	20.27	23.54	23.92	24.41	24.86	25.68	26.19	26.68	27.20	30.84	35.61
Talara Netback Prices													
Export Sales													
U.S. Gulf Coast	30.84	25.66	18.17	21.45	21.81	22.27	22.68	23.46	23.94	24.38	24.85	28.25	32.72
Differentials to USGC													
U.S. Gulf Coast	(2.35)	(2.54)	(2.10)	(2.09)	(2.11)	(2.14)	(2.18)	(2.22)	(2.26)	(2.30)	(2.34)	(2.59)	(2.88)

TABLE VI-8
NAPHTHA PRICES
(Constant 2001 Dollars per Barrel)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Market Prices													
U.S. Gulf Coast Naphtha	33.19	28.20	19.87	22.63	22.54	22.55	22.52	22.81	22.80	22.77	22.76	23.37	24.44
Talara Netback Prices													
Export Sales													
U.S. Gulf Coast	30.84	25.66	17.82	20.62	20.55	20.58	20.55	20.84	20.84	20.81	20.80	21.41	22.46
Differentials to USGC													
U.S. Gulf Coast	(2.35)	(2.54)	(2.06)	(2.01)	(1.99)	(1.98)	(1.97)	(1.97)	(1.97)	(1.96)	(1.96)	(1.96)	(1.98)

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TABLE VI-9
GASOLINE PRICES
(Current Dollars per Barrel)

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Market Prices														
U.S. Gulf Coast Regular Unleaded		34.93	30.73	21.97	25.24	25.83	26.46	27.42	28.21	28.74	29.25	29.80	33.65	38.77
U.S. Gulf Coast Premium Unleaded		36.41	32.60	23.69	27.39	27.79	28.56	29.99	30.77	31.33	31.86	32.44	36.53	42.01
New York Harbor Regular Unleaded		35.73	30.70	22.43	25.71	26.31	27.11	28.24	29.04	29.58	30.10	30.66	34.58	39.76
New York Harbor Premium Unleaded		38.13	33.71	24.44	28.16	28.57	29.40	31.01	31.80	32.37	32.92	33.52	37.68	43.25
Callao CIF Regular Unleaded		41.25	36.89	26.68	30.27	30.93	31.67	29.76	30.59	31.16	31.71	32.31	36.43	41.76
Callao CIF Premium Unleaded		42.88	38.96	28.58	32.65	33.10	33.99	32.34	33.16	33.77	34.35	34.97	39.33	45.02
Talara Netback Prices														
Domestic Sales														
Callao, Peru	Regular	39.67	35.33	25.15	28.69	29.33	30.02	28.10	28.90	29.43	29.95	30.51	34.44	39.56
	Premium	41.30	37.40	27.04	31.06	31.48	32.34	30.67	31.46	32.02	32.57	33.16	37.32	42.80
Export Sales														
New York Harbor	Regular	32.64	27.39	19.63	22.91	23.48	24.23	25.31	26.05	26.54	27.01	27.51	31.09	35.88
	Premium	34.29	29.96	21.47	25.05	25.40	26.17	27.68	28.39	28.90	29.38	29.90	33.60	38.59
Differentials to USGC														
Callao, Peru	Regular	4.74	4.60	3.17	3.45	3.50	3.57	0.68	0.69	0.69	0.70	0.71	0.79	0.79
	Premium	4.89	4.80	3.35	3.67	3.70	3.78	0.68	0.69	0.70	0.71	0.72	0.79	0.79
New York Harbor	Regular	(2.29)	(3.34)	(2.34)	(2.33)	(2.35)	(2.23)	(2.11)	(2.16)	(2.20)	(2.24)	(2.29)	(2.56)	(2.89)
	Premium	(2.12)	(2.65)	(2.23)	(2.34)	(2.39)	(2.39)	(2.31)	(2.37)	(2.43)	(2.49)	(2.55)	(2.93)	(3.42)

TABLE VI-10
GASOLINE PRICES
(Constant 2001 Dollars per Barrel)

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Market Prices														
U.S. Gulf Coast Regular Unleaded		34.93	30.73	21.54	24.26	24.34	24.44	24.84	25.05	25.02	24.96	24.93	25.51	26.61
U.S. Gulf Coast Premium Unleaded		36.41	32.60	23.23	26.32	26.18	26.38	27.16	27.32	27.27	27.20	27.15	27.69	28.84
New York Harbor Regular Unleaded		35.73	30.70	21.99	24.71	24.79	25.04	25.58	25.79	25.75	25.69	25.66	26.21	27.29
New York Harbor Premium Unleaded		38.13	33.71	23.96	27.06	26.92	27.17	28.09	28.24	28.18	28.10	28.05	28.56	29.68
Callao CIF Regular Unleaded		41.25	36.89	26.15	29.09	29.15	29.25	26.95	27.16	27.13	27.07	27.03	27.61	28.66
Callao CIF Premium Unleaded		42.88	38.96	28.02	31.38	31.19	31.40	29.29	29.45	29.39	29.31	29.26	29.80	30.90
Talara Netback Prices														
Domestic Sales														
Callao, Peru	Regular	39.67	35.33	24.65	27.58	27.64	27.74	25.45	25.66	25.62	25.56	25.53	26.10	27.15
	Premium	41.30	37.40	26.51	29.85	29.67	29.88	27.78	27.93	27.88	27.80	27.75	28.29	29.38
Export Sales														
New York Harbor	Regular	32.64	27.39	19.24	22.02	22.12	22.38	22.93	23.13	23.11	23.05	23.02	23.56	24.63
	Premium	34.29	29.96	21.04	24.07	23.93	24.17	25.07	25.21	25.16	25.07	25.02	25.47	26.49
Differentials to USGC														
Callao, Peru	Regular	4.74	4.60	3.11	3.32	3.30	3.29	0.61	0.61	0.60	0.60	0.60	0.60	0.54
	Premium	4.89	4.80	3.28	3.53	3.49	3.49	0.62	0.61	0.61	0.60	0.60	0.60	0.54
New York Harbor	Regular	(2.29)	(3.34)	(2.30)	(2.24)	(2.22)	(2.06)	(1.91)	(1.91)	(1.91)	(1.91)	(1.92)	(1.94)	(1.98)
	Premium	(2.12)	(2.65)	(2.19)	(2.25)	(2.25)	(2.21)	(2.09)	(2.11)	(2.12)	(2.12)	(2.13)	(2.22)	(2.35)

TABLE VI-11
JET/KEROSENE PRICES
(Current Dollars per Barrel)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Market Prices													
U.S. Gulf Coast	35.57	30.21	22.13	25.04	25.53	26.10	27.00	27.93	28.57	29.18	29.80	33.65	38.77
New York Harbor	37.78	30.94	23.18	26.12	26.62	27.20	28.13	29.07	29.73	30.35	30.99	34.93	40.14
Callao	41.91	36.32	26.88	30.05	30.60	31.26	29.50	30.47	31.16	31.81	32.48	36.62	42.07
Talara Netback Prices													
Domestic Sales													
Callao, Peru	40.34	34.77	25.34	28.48	29.00	29.63	27.84	28.77	29.43	30.04	30.68	34.63	39.87
Export Sales													
New York Harbor	34.50	27.44	20.22	23.16	23.63	24.17	25.04	25.92	26.52	27.08	27.66	31.25	36.05
Differentials to USGC													
Callao, Peru	4.76	4.56	3.21	3.43	3.47	3.53	0.83	0.85	0.86	0.87	0.88	0.98	1.10
New York Harbor	(1.07)	(2.77)	(1.91)	(1.89)	(1.90)	(1.93)	(1.97)	(2.01)	(2.05)	(2.09)	(2.14)	(2.40)	(2.71)

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TABLE VI-12
JET/KEROSENE PRICES
(Constant 2001 Dollars per Barrel)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Market Prices													
U.S. Gulf Coast	35.57	30.21	21.70	24.07	24.06	24.11	24.46	24.80	24.87	24.90	24.93	25.51	26.61
New York Harbor	37.78	30.94	22.72	25.11	25.08	25.13	25.48	25.81	25.88	25.90	25.93	26.47	27.56
Callao	41.91	36.32	26.35	28.89	28.84	28.88	26.72	27.05	27.12	27.15	27.18	27.75	28.88
Talara Netback Prices													
Domestic Sales													
Callao, Peru	40.34	34.77	24.85	27.37	27.33	27.37	25.21	25.55	25.62	25.64	25.67	26.25	27.36
Export Sales													
New York Harbor	34.50	27.44	19.83	22.26	22.27	22.33	22.68	23.01	23.09	23.11	23.14	23.68	24.75
Differentials to USGC													
Callao, Peru	4.76	4.56	3.15	3.30	3.27	3.26	0.75	0.75	0.75	0.74	0.74	0.74	0.75
New York Harbor	(1.07)	(2.77)	(1.87)	(1.81)	(1.79)	(1.78)	(1.78)	(1.79)	(1.79)	(1.79)	(1.79)	(1.82)	(1.86)

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TABLE VI-13
DIESEL PRICES
(Current Dollars per Barrel)

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Market Prices														
U.S. Gulf Coast 0.05%S Diesel		34.65	29.56	21.77	24.55	25.12	25.73	26.64	27.55	28.19	28.79	29.40	33.24	38.35
U.S. Gulf Coast 0.2%S Diesel		33.92	28.82	20.90	23.84	24.36	24.96	25.84	26.74	27.37	27.95	28.54	32.27	37.24
New York Harbor 0.05%S Diesel		36.57	30.29	22.81	25.62	26.21	26.84	27.76	28.69	29.35	29.96	30.59	34.52	39.72
New York Harbor 0.2%S Diesel		35.72	29.54	21.95	24.92	25.45	26.06	26.97	27.88	28.52	29.12	29.73	33.55	38.61
Callao 0.05%S Diesel		41.05	35.79	26.62	29.65	30.29	31.01	29.26	30.23	30.92	31.56	32.23	36.37	41.83
Callao 0.2%S Diesel		40.25	34.97	25.66	28.87	29.46	30.16	28.47	29.42	30.09	30.71	31.36	35.39	40.71
Talara Netback Prices														
Domestic Sales														
Callao, Peru	0.05%S	39.48	34.24	25.09	28.08	28.69	29.37	27.61	28.54	29.19	29.80	30.43	34.38	39.62
	0.20%S	38.68	33.42	24.14	27.30	27.86	28.53	26.81	27.73	28.36	28.96	29.57	33.41	38.51
Export Sales														
New York Harbor	0.05%S	33.57	27.04	20.14	22.97	23.53	24.12	24.99	25.87	26.48	27.04	27.62	31.22	36.06
	0.20%S	32.73	26.30	19.28	22.26	22.78	23.35	24.20	25.07	25.66	26.20	26.76	30.26	34.96
Differentials to USGC														
Callao, Peru	0.05%S	4.83	4.67	3.32	3.53	3.57	3.64	0.97	0.98	1.00	1.01	1.03	1.14	1.28
	0.20%S	4.76	4.60	3.24	3.46	3.50	3.57	0.97	0.98	1.00	1.01	1.03	1.14	1.28
New York Harbor	0.05%S	(1.08)	(2.52)	(1.63)	(1.58)	(1.59)	(1.61)	(1.65)	(1.68)	(1.71)	(1.75)	(1.79)	(2.01)	(2.29)
	0.20%S	(1.19)	(2.52)	(1.62)	(1.58)	(1.58)	(1.61)	(1.64)	(1.68)	(1.71)	(1.74)	(1.78)	(2.01)	(2.28)

TABLE VI-14
DIESEL PRICES
(Constant 2001 Dollars per Barrel)

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Market Prices														
U.S. Gulf Coast 0.05%S Diesel		34.65	29.56	21.34	23.59	23.67	23.77	24.13	24.47	24.54	24.57	24.60	25.19	26.32
U.S. Gulf Coast 0.2%S Diesel		33.92	28.82	20.49	22.92	22.95	23.06	23.41	23.75	23.82	23.85	23.88	24.46	25.56
New York Harbor 0.05%S Diesel		36.57	30.29	22.37	24.63	24.69	24.79	25.14	25.48	25.55	25.57	25.60	26.16	27.27
New York Harbor 0.2%S Diesel		35.72	29.54	21.52	23.95	23.98	24.08	24.43	24.76	24.83	24.85	24.88	25.42	26.51
Callao 0.05%S Diesel		41.05	35.79	26.10	28.50	28.55	28.65	26.51	26.84	26.92	26.94	26.97	27.56	28.71
Callao 0.2%S Diesel		40.25	34.97	25.16	27.75	27.76	27.86	25.78	26.12	26.19	26.21	26.24	26.82	27.95
Talara Netback Prices														
Domestic Sales														
Callao, Peru	0.05%S	39.48	34.24	24.60	26.99	27.04	27.14	25.00	25.34	25.41	25.44	25.46	26.05	27.20
	0.20%S	38.68	33.42	23.66	26.24	26.25	26.35	24.28	24.62	24.69	24.71	24.74	25.32	26.44
Export Sales														
New York Harbor	0.05%S	33.57	27.04	19.74	22.07	22.17	22.28	22.64	22.98	23.05	23.08	23.11	23.66	24.75
	0.20%S	32.73	26.30	18.90	21.40	21.46	21.57	21.92	22.26	22.34	22.36	22.39	22.93	24.00
Differentials to USGC														
Callao, Peru	0.05%S	4.83	4.67	3.26	3.39	3.37	3.36	0.88	0.87	0.87	0.86	0.86	0.86	0.88
	0.20%S	4.76	4.60	3.18	3.33	3.30	3.30	0.88	0.87	0.87	0.86	0.86	0.86	0.88
New York Harbor	0.05%S	(1.08)	(2.52)	(1.59)	(1.52)	(1.50)	(1.49)	(1.49)	(1.49)	(1.49)	(1.49)	(1.50)	(1.53)	(1.57)
	0.20%S	(1.19)	(2.52)	(1.59)	(1.52)	(1.49)	(1.49)	(1.49)	(1.49)	(1.49)	(1.49)	(1.49)	(1.52)	(1.57)

PURVIN & GERTZ

TABLE VI-15
RESIDUAL FUEL OIL PRICES
(Current Dollars per Barrel)

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Market Prices														
U.S. Gulf Coast 1.0%S Residual Fuel Oil		26.28	21.59	14.80	17.32	17.19	17.29	17.92	18.59	19.02	19.40	19.80	22.53	26.30
U.S. Gulf Coast 3.0%S Residual Fuel Oil		20.71	16.90	13.25	15.21	14.88	14.84	15.38	15.99	16.38	16.72	17.07	19.48	22.88
New York Harbor 1.0%S Residual Fuel Oil		25.02	20.45	15.49	17.98	17.84	17.96	18.60	19.28	19.72	20.12	20.53	23.33	27.19
New York Harbor 3.0%S Residual Fuel Oil		20.65	17.14	13.95	15.87	15.54	15.50	16.06	16.68	17.08	17.43	17.79	20.29	23.77
Callao 1.0%S Residual Fuel Oil		31.46	26.07	18.16	20.94	20.80	20.95	19.78	20.48	20.94	21.36	21.80	24.73	28.75
Callao 3.0%S Residual Fuel Oil		25.33	20.90	16.45	18.62	18.26	18.24	17.23	17.67	18.29	18.66	19.04	21.67	25.31
Talara Netback Prices														
Domestic Sales														
Callao, Peru	1.0%S	29.93	24.57	16.67	19.41	19.24	19.36	18.17	18.84	19.26	19.65	20.05	22.80	26.61
	3.0%S	23.83	19.43	14.97	17.10	16.71	16.66	15.63	16.24	16.62	16.97	17.31	19.75	23.19
Export Sales														
New York Harbor	1.0%S	22.46	18.15	13.63	16.09	15.96	16.05	16.65	17.30	17.70	18.07	18.44	21.02	24.62
	3.0%S	18.11	14.87	12.09	14.00	13.66	13.60	14.13	14.71	15.08	15.40	15.72	17.99	21.22
Differentials to USGC														
Callao, Peru	1.0%S	3.66	2.98	1.87	2.09	2.06	2.07	0.25	0.25	0.25	0.25	0.25	0.27	0.31
	3.0%S	3.12	2.53	1.72	1.89	1.84	1.83	0.25	0.25	0.24	0.24	0.25	0.27	0.31
New York Harbor	1.0%S	(3.82)	(3.44)	(1.16)	(1.23)	(1.23)	(1.25)	(1.27)	(1.29)	(1.31)	(1.34)	(1.36)	(1.51)	(1.68)
	3.0%S	(2.60)	(2.03)	(1.15)	(1.21)	(1.22)	(1.23)	(1.26)	(1.28)	(1.30)	(1.32)	(1.35)	(1.49)	(1.66)

PURVIN & GERTZ

TABLE VI-16
RESIDUAL FUEL OIL PRICES
(Constant 2001 Dollars per Barrel)

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Market Prices														
U.S. Gulf Coast 1.0%S Residual Fuel Oil		26.28	21.59	14.51	16.65	16.19	15.98	16.23	16.51	16.56	16.56	16.57	17.07	18.05
U.S. Gulf Coast 3.0%S Residual Fuel Oil		20.71	16.90	12.99	14.62	14.02	13.71	13.93	14.20	14.26	14.27	14.28	14.76	15.70
New York Harbor 1.0%S Residual Fuel Oil		25.02	20.45	15.19	17.28	16.82	16.59	16.85	17.12	17.17	17.17	17.18	17.68	18.66
New York Harbor 3.0%S Residual Fuel Oil		20.65	17.14	13.67	15.25	14.64	14.32	14.55	14.81	14.87	14.88	14.89	15.37	16.32
Callao 1.0%S Residual Fuel Oil		31.46	26.07	17.80	20.13	19.60	19.35	17.92	18.19	18.23	18.23	18.24	18.74	19.73
Callao 3.0%S Residual Fuel Oil		25.33	20.90	16.13	17.90	17.21	16.85	15.60	15.87	15.92	15.93	15.94	16.42	17.37
Talara Netback Prices														
Domestic Sales														
Callao, Peru	1.0%S	29.93	24.57	16.34	18.66	18.13	17.88	16.46	16.73	16.77	16.77	16.78	17.28	18.27
	3.0%S	23.83	19.43	14.68	16.44	15.75	15.40	14.15	14.42	14.47	14.48	14.49	14.97	15.92
Export Sales														
New York Harbor	1.0%S	22.46	18.15	13.37	15.47	15.03	14.82	15.08	15.36	15.41	15.42	15.43	15.93	16.90
	3.0%S	18.11	14.87	11.86	13.45	12.87	12.57	12.79	13.07	13.13	13.14	13.15	13.64	14.57
Differentials to USGC														
Callao, Peru	1.0%S	3.66	2.98	1.83	2.01	1.94	1.91	0.22	0.22	0.21	0.21	0.21	0.21	0.22
	3.0%S	3.12	2.53	1.69	1.82	1.73	1.69	0.22	0.22	0.21	0.21	0.21	0.21	0.21
New York Harbor	1.0%S	(3.82)	(3.44)	(1.14)	(1.18)	(1.16)	(1.15)	(1.15)	(1.15)	(1.14)	(1.14)	(1.14)	(1.14)	(1.15)
	3.0%S	(2.60)	(2.03)	(1.13)	(1.17)	(1.15)	(1.14)	(1.14)	(1.13)	(1.13)	(1.13)	(1.13)	(1.13)	(1.14)

PURVIN & GERTZ INC.
INTERNATIONAL ENERGY CONSULTANTS

July 11, 2002

Mr. Michael Stewart
Foster-Wheeler USA Corporation
2020 Dairy Ashford Road
Houston, TX 77077

Dear Michael:

As requested, we are providing tabular data for graphs shown in our presentation to PetroPeru during our meeting on June 25, 2002. The presentation explained our market outlook for refined products in Peru and other regional markets in connection with the Talara Refinery Upgrade Feasibility Study. The following tables are attached to fulfill this request:

- **Table IV-3:** Peru Refined Product Demand. This table is in the written report. The only change is that we have added one decimal place to the numbers in an effort to better show changes for low volume products.
- **Table IV-4:** Peru Gasoline Demand by Grade. This table shows numerical values for Figure IV-3 that is in the report.
- **Table IV-5:** Peru Jet/Kero Demand. This table shows the demand figures for jet and kerosene separately.

Purvin & Gertz considers that it has fully completed and explained all aspects of this market outlook to Foster-Wheeler and PetroPeru. If Foster-Wheeler wishes to have Purvin & Gertz give the same presentation in Lima or another location, we would bill for consulting time and travel expenses consistent with our standard fee schedule and the terms and conditions that were previously agreed upon.

Sincerely,

PURVIN & GERTZ, INC.

Alfred L. Luaces

Alfred L. Luaces

cc: Augusto Baron, Foster-Wheeler USA Corp.
TJM – Purvin & Gertz
DKF – Purvin & Gertz

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BUENOS AIRES CALGARY HOUSTON LONDON LOS ANGELES SINGAPORE

TABLE IV-3
PERU REFINED PRODUCT DEMAND
(Thousand Barrels per Day)

Product	Flow	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Crude	Production	121.8	120.0	118.2	115.6	105.9	99.2	95.8	92.8	90.2	87.8	85.8	83.9	82.3	80.8	79.5	78.3	77.3	78.4
Crude	Imports	47.4	55.7	79.1	93.7	57.6	61.8	75.8	74.8	81.8	78.8	76.5	78.7	100.4	102.5	104.5	106.4	112.5	118.6
Crude	Exports	26.9	37.0	45.1	42.5	28.8	13.6	19.0	14.3	9.5	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crude	Int'l Marine Bunkers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crude	Supply Adjustments	0.7	11.2	10.8	1.0	18.0	(3.6)	0.0	0.0	0.0	12.0	14.2	16.3	18.5	20.7	22.8	25.0	25.0	25.0
Crude	Consumption	141.0	150.0	163.0	167.8	152.7	143.9	152.6	153.4	162.5	173.9	176.4	179.0	201.2	204.0	206.8	209.7	214.8	220.0
Crude	Refinery Capacity	182.3	182.3	182.3	182.3	182.3	189.3	189.3	189.3	201.7	226.7	226.7	226.7	254.7	254.7	254.7	254.7	254.7	254.7
Crude	Refinery Utilization, %	77.4	82.3	89.5	92.1	83.8	76.0	80.6	81.0	80.6	76.7	77.8	79.0	79.0	80.1	81.2	82.3	84.3	86.4
Total LPG	Production	4.9	4.9	6.4	7.6	6.5	6.8	7.3	7.4	8.0	20.1	24.2	25.7	28.3	29.8	31.3	32.8	34.3	36.8
Total LPG	Imports	3.7	3.8	3.4	4.4	4.5	5.4	5.4	6.5	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total LPG	Exports	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	5.9	5.9	7.1	7.2	7.4	7.8	4.9	3.3
Total LPG	Int'l Marine Bunkers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total LPG	Supply Adjustments	(0.2)	(0.2)	(0.4)	(1.0)	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total LPG	Consumption	8.3	8.5	9.3	11.0	12.8	13.6	14.7	16.0	17.3	18.7	20.3	21.8	23.2	24.6	25.9	27.0	31.4	35.5
Naphtha	Production	4.5	3.9	3.3	5.4	5.7	7.0	8.9	6.0	8.0	17.0	18.6	20.3	21.9	23.5	25.1	26.8	26.8	26.8
Naphtha	Imports	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Naphtha	Exports	1.9	2.3	2.0	2.9	1.3	4.2	5.4	4.8	4.8	13.8	15.4	17.1	18.7	20.3	21.9	23.6	23.6	23.6
Naphtha	Int'l Marine Bunkers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Naphtha	Supply Adjustments	(2.6)	(1.5)	(1.3)	(2.5)	(4.3)	(2.8)	(3.5)	(3.2)	(3.2)	(3.2)	(3.2)	(3.2)	(3.2)	(3.2)	(3.2)	(3.2)	(3.2)	(3.2)
Naphtha	Consumption	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	Production	23.8	26.3	27.4	29.1	28.0	26.2	27.1	28.7	31.9	32.6	33.4	34.1	40.8	41.7	42.6	43.5	48.1	53.0
Gasoline	Imports	1.0	1.4	0.9	1.1	0.9	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Gasoline	Exports	0.0	0.5	1.7	0.6	0.1	1.5	3.2	4.5	7.6	8.3	9.0	9.6	15.9	16.4	16.7	16.8	15.9	13.5
Gasoline	Int'l Marine Bunkers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	Supply Adjustments	0.9	0.6	2.0	(1.8)	0.3	(0.4)	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	Consumption	25.6	27.9	28.6	27.8	29.1	25.5	25.5	25.5	25.5	25.5	25.6	25.8	26.1	26.6	27.2	27.9	33.5	40.7
Kero/Jet Fuel	Production	22.2	23.9	21.8	23.0	21.9	22.1	22.0	21.8	21.6	21.3	20.9	20.6	20.3	20.2	20.0	19.9	20.0	20.5
Kero/Jet Fuel	Imports	1.0	1.1	2.7	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kero/Jet Fuel	Exports	0.1	0.0	0.1	0.1	0.1	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kero/Jet Fuel	Int'l Marine Bunkers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kero/Jet Fuel	Supply Adjustments	0.0	0.0	0.1	0.8	0.6	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)
Kero/Jet Fuel	Consumption	23.1	25.0	24.4	23.7	22.4	21.2	21.1	20.9	20.7	20.4	20.0	19.7	19.4	19.3	19.1	19.0	19.1	19.6
Distillate	Production	31.7	32.0	41.3	41.2	37.5	33.9	36.8	37.4	40.5	43.6	44.7	45.8	52.9	54.1	55.4	56.6	60.7	65.0
Distillate	Imports	23.0	21.7	22.0	19.0	20.5	25.5	22.8	23.1	21.7	20.8	21.8	22.9	18.0	19.0	20.0	21.0	28.8	38.1
Distillate	Exports	0.0	0.0	0.0	0.0	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Distillate	Int'l Marine Bunkers	2.7	0.0	0.4	0.9	0.9	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3
Distillate	Supply Adjustments	4.6	5.3	0.4	(0.9)	2.5	(3.4)	(3.4)	(3.4)	(3.4)	(3.4)	(3.4)	(3.4)	(3.4)	(3.4)	(3.4)	(3.4)	(3.4)	(3.4)
Distillate	Consumption	56.6	59.0	63.3	58.3	58.8	55.0	55.1	56.0	57.8	59.9	62.0	64.2	66.4	68.6	70.9	73.1	85.0	98.5
Residual Fuel	Production	49.5	53.4	51.9	60.1	49.3	51.4	54.6	54.3	57.5	57.1	56.7	56.3	63.7	63.1	62.6	62.0	58.9	55.1
Residual Fuel	Imports	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Residual Fuel	Exports	18.5	15.3	18.4	26.8	16.3	19.7	23.0	23.2	27.1	27.8	28.6	29.3	37.5	37.8	38.0	38.0	36.9	34.8
Residual Fuel	Int'l Marine Bunkers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Residual Fuel	Supply Adjustments	1.3	0.0	1.0	0.6	0.3	(5.0)	(5.0)	(5.0)	(5.0)	(5.0)	(5.0)	(5.0)	(5.0)	(5.0)	(5.0)	(5.0)	(5.0)	(5.0)
Residual Fuel	Consumption	32.2	38.2	34.6	34.0	33.2	26.7	26.5	26.0	25.3	24.3	23.1	22.0	21.1	20.3	19.6	19.0	17.0	15.3

TABLE IV-4
PERU GASOLINE DEMAND BY GRADE
Thousand Barrels per Day

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
84 Octane	24.42	21.83	22.51	20.25	18.86	18.97	18.01	16.45	16.73	14.49	13.53	12.03	10.53	9.05	7.56	6.10	4.63	3.14	1.61	0.00
90/91 Octane	0.00	0.56	1.66	2.05	3.05	4.40	6.19	7.04	8.12	7.47	8.52	9.69	10.88	12.08	13.29	14.59	15.98	17.49	19.14	20.96
95 Octane	3.35	3.12	2.71	1.33	1.48	1.72	1.72	1.62	1.95	1.64	1.45	1.71	1.98	2.24	2.52	2.80	3.11	3.44	3.80	4.19
97/98 Octane	0.00	0.01	0.22	1.50	2.20	2.81	2.66	2.72	2.32	1.88	1.96	2.03	2.09	2.16	2.23	2.32	2.41	2.52	2.65	2.79

TABLE IV-5
PERU JET/KEROSENE DEMAND
Thousand Barrels per Day

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Jet Fuel Demand	5.69	5.71	5.76	6.13	6.65	8.65	9.75	9.32	9.04	8.43	7.35	7.37	7.46	7.65	7.86	8.08	8.30	8.52	8.74	8.96	9.18
Kerosene Demand	15.76	15.08	15.33	14.97	14.48	14.48	15.23	15.12	14.70	13.97	13.82	13.73	13.48	13.10	12.58	11.95	11.40	10.92	10.51	10.15	9.85

APPENDIX A.5 – LP MODEL REPORT FILE – CURRENT REFINERY CASE

This appendix contains the report file from the Haverly Systems GRTMPS LP model for the current refinery case.

APPENDIX A.6 – LP MODEL REPORT FILES - BASE CASE

This appendix contains the report files from the Haverly Systems GRTMPS LP models for the base case.

FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

DATE: 09 APR 02
TIME: 09:48 HRS

PetroPeru Current Refinery Operations (Rev 2)

PAGE 1
LCU 01010

ECONOMIC REPORT
ONE YEAR

ACCOUNTING CATEGORY		.M $	.. $/CD
SAX	Product Values - Sales	515812	1413184
BRX	Raw Material Costs	-367970	-1008136
UTP	Utilities Costs	-7069	-19368
TEL	Antiknock Costs	-175	-479
	TOTAL VARIABLE REVENUES	515812	1413184
	TOTAL VARIABLE COSTS	-375214	-1027982
	GROSS VARIABLE INCOME	140599	385201
	INCOME TAX	42180	115560
	NET PRESENT VALUE (I=15.00 PCT)	91393	250392

****SOLUTION STATUS: OPTIMAL AFTER 527 ITERATIONS
CASE 1a: 4 RECURSION PASSES

CASE 1a: THE MODEL CONVERGED ON BOTH DISTRIBUTIONS AND PROPERTIES

PetroPeru Refinery Upgrade Study
Talara Refinery Modifications Project
A Foster Wheeler USA Study
Current Refinery Configuration
Calibration Run (Sep-Dec 2001 Data)
(Incorporates PetroPeru 2/13/02 & 3/6/02
comments)
Uses Modified Visc Blend Function For RFO

****SYSTEM NAME : GRTMPS - III
****SYSTEM VERSION: VER 3.01.004
GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION

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PLANT INPUT/OUTPUT REPORT
Single Refinery ONE YEAR

		PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	STOCK LIMITS MIN B/CD	STOCK LIMITS MAX B/CD	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT	STOCK MIN - L/
	PLANT INPUT										
HFG	Purch Nat Gas		88	242	0.41			23389	64078	0.36	
NGA	Nat Gasoline		18	50	0.08		50	4424	12120	0.07	
HOB	High Octane BldSt		286	783	1.31		4530	76660	210027	1.16	
may	Mayna25		5134	14067	23.59	9340	17050	1616554	4428915	24.54	2940671
mes	Mesa30		4443	12173	20.41	4300	17570	1361766	3730866	20.67	1317881
ONO	MIXTURE		11797	32320	54.20	31300	32320	3505195	9603274	53.21	9300200
	TOTAL		21767	59635	100.00			6587988	18049281	100.00	
	PLANT OUTPUT										
SUL	Sulfur	10707	10	27	0.05			3908	10707	0.06	
B34	C3/C4 LPG		1851	5070	8.50	4770	5070	358303	981652	5.44	923566
1GP	FCC Naphtha		547	1500	2.52	1500	1600	143725	393766	2.18	393766
2GR	Virgin Naphtha		1391	3810	6.39	3810	7350	359450	984794	5.46	984794
3GS	Gasoline G-95 SP		358	980	1.64	440	980	94736	259551	1.44	116533
4GU	Gasoline 90 SP		1748	4790	8.03	2020	4790	459293	1258337	6.97	530656
5GM	Lead Gasoline GB4		3066	8400	14.09	4740	8400	789440	2162848	11.98	1220464
G3S	Gasoline 97 SP		182	500	0.84		500	48676	133359	0.74	
G4U	Solvent 3		153	420	0.70		420	42374	116093	0.64	
2KE	Kerosene		3650	10000	16.77	10000	15530	1060025	2904179	16.09	2904179
3JA	Turbo Jet A-1		110	300	0.50	300	1660	31651	86715	0.48	86715
5D2	No. 2 Diesel		4000	10960	18.38	10960	13500	1215650	3330548	18.45	3330548
[illegible]R4	MF80 Fuel Oil		128	350	0.59	100	350	42868	117446	0.65	33556
[illegible]5	PI6 Fuel Oil		1460	4000	6.71		4000	481156	1318236	7.30	
dR6	PI500 Fuel Oil		595	1630	2.73		1630	205352	562608	3.12	
9R7	P16 Export		2283	6255	10.49			792977	2172540	12.04	
BAP	Solid Asphalt		110	300	0.50		300	38584	105710	0.59	
CAP	Liquid Asphalt		91	250	0.42		250	30424	83353	0.46	
DAP	Res Asphalt		255	700	1.17		700	85122	233210	1.29	
	TOTAL		21988	60242	101.02			6283713	17215653	95.38	
	PROCESS FUEL USED										
HFA	Purch Nat Gas		88	242	0.41			23389	64078	0.36	
FEA	Plant Fuel Gas		397	1088	1.82			111318	304980	1.69	
4MA	Butylenes		138	377	0.63			28894	79163	0.44	
CKA	KCC Coke Burn	329	0	0	0.00			120179	329257	1.82	
	TOTAL		623	1707	2.86			283779	777478	4.31	

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PLANT INPUT/OUTPUT REPORT (CONT.)
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	STOCK LIMITS MIN ---- MAX B/CD	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT	STOCK MIN - L/
GRAND TOTAL		22612	61950	103.88		6567493	17993131	99.69	
PLANT GAIN		845	2314	3.88					
PLANT LOSS						20495	56150	0.31	

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Raw Material Purchases
ONE YEAR

STOCK	LOCATION	PER DAY ACTUAL UNITS	Volume .M Bbls	Volume B/CD	UNIT PRICE $/BBL	UNIT PRICE C/Gal	MARGINAL VALUE $/BBL	MARGINAL VALUE C/Gal	INCR INCE $/BBL
HFG Purch Nat Gas	1 Single Refinery		88	242	2.62	6.24	2.62	6.24	-0.00
NGA Nat Gasoline	1 Single Refinery		18	50	17.61	41.93	26.06	62.05	8.45
HOB High Octane BldStk	1 Single Refinery		286	783	30.11	71.69	30.11	71.69	-0.00
may Mayna25	1 Single Refinery		5134	14067	15.55	37.02	15.55	37.02	-0.00
mes Mesa30	1 Single Refinery		4443	12173	19.19	45.69	19.19	45.69	-0.00
ONO MIXTURE	1 Single Refinery		11797	32320	16.42	39.10	21.37	50.89	4.95
	**GRAND TOTAL		21767	59635					

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Product Sales
ONE YEAR

STOCK	LOCATION	PER DAY ACTUAL UNITS	Volume .M Bbls	Volume B/CD	UNIT PRICE $/BBL	UNIT PRICE C/Gal	MARGINAL VALUE $/BBL	MARGINAL VALUE C/Gal	INCR INCE $/BBL
@ SUL Sulfur	1 Single Refinery	10707	10	27					
B34 C3/C4 LPG	1 Single Refinery		1851	5070	19.18	45.67	1.86	4.43	17.32
1GP FCC Naphtha	1 Single Refinery		547	1500	20.66	49.19	26.23	62.45	-5.57
2GR Virgin Naphtha	1 Single Refinery		1391	3810	17.20	40.95	25.94	61.76	-8.74
3GS Gasoline G-95 SP	1 Single Refinery		358	980	30.98	73.76	27.85	66.30	3.13
4GU Gasoline 90 SP	1 Single Refinery		1748	4790	28.45	67.74	26.20	62.39	2.25
5GM Lead Gasoline G84	1 Single Refinery		3066	8400	26.40	62.86	26.13	62.21	0.27
G3S Gasoline 97 SP	1 Single Refinery		182	500	31.58	75.19	29.14	69.38	2.44
G4U Solvent 3	1 Single Refinery		153	420	48.37	115.17	37.54	89.38	10.83
2KE Kerosene	1 Single Refinery		3650	10000	27.67	65.88	34.80	82.86	-7.13
3JA Turbo Jet A-1	1 Single Refinery		110	300	28.14	67.00	34.88	83.06	-6.74
5D2 No. 2 Diesel	1 Single Refinery		4000	10960	26.00	61.90	29.63	70.56	-3.63
6R4 MF80 Fuel Oil	1 Single Refinery		128	350	20.56	48.95	18.16	43.23	2.40
R5 PI6 Fuel Oil	1 Single Refinery		1460	4000	18.65	44.40	13.54	32.24	5.11
8R6 PI500 Fuel Oil	1 Single Refinery		595	1630	18.05	42.98	12.63	30.06	5.42
9R7 PI6 Export	1 Single Refinery		2283	6255	13.54	32.24	13.54	32.24	0.00
BAP Solid Asphalt	1 Single Refinery		110	300	27.96	66.57	2.36	5.61	25.60
CAP Liquid Asphalt	1 Single Refinery		91	250	29.45	70.12	7.05	16.79	22.40
DAP Res Asphalt	1 Single Refinery		255	700	18.79	44.74	12.62	30.06	6.17
		**GRAND TOTAL	21988	60242					

@ ... REPORTED MONETARY VALUES PER ACTUAL STREAM UNITS

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PROCESS UTILIZATION REPORT
Single Refinery ONE YEAR

----PROCESS UNIT----	----PROCESS LIMIT----	OPERATING RATE .M Bbls	OPERATING RATE B/CD	UNUSED CAPACITY .M Bbls	UNUSED CAPACITY B/CD	PCT OF MAX CAPACITY	EXPANSION INCENTIVE $/BBL
CRD-DU Crude Tower #1	CRD Feed	21374	58560			100.0	3.650
VAC-VU Vacuum Tower #1	VAC Feed	8888	24350			100.0	0.343
WAC-WU Vacuum Tower #2	WAC Feed	76	208	742	2032	9.3	
SGP-SG Sats Gas Plant	SGP Feed	119	327				
UGP-UG Unsats Gas Plant	UGP Feed	1878	5145				
FCC-FC FCCU (Total)	FCC Total Feed	5918	16213	726	1989	89.1	
	KCC Feed (KC)	5918	16213				
	OKC CO Boiler (KC)	72552	198772				
SUL-SU Sulfur Plant	SUL Feed	3908	10707				
MRJ-MJ Merox (Jet)	MRJ Feed	3760	10300				
MRD-MD Merox (Diesel)	MRD Feed	2951	8085				
MRG-MG Merox (FCC Gasoline)	MRG Feed	3345	9164				
MRL-ML Merox (LPG)	MRL Feed	1997	5472				
FUL-90 Fuel System	PFO Fuel Oil						0.386
	FLR Flare						
TL-95 General Utilities	STM MP Steam (Mlbs)	275	753				
	STL LP Steam (Mlbs)						
	STH HP Steam (Mlbs)	309	846				
	SWT Sour Water (Mlbs)	67	184				
	VNT Steam Vent						
	KWH Power (kwh)	38566	105659				
	CWR Cooling H2O (MGal)	6367	17444				
	KWT Condensing Turbine						0.064
ADM-AM Amine (DEA) Unit	ADM Amine Unit (GPM)	11	30				

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MATERIAL BALANCE - Crude Tower #1 CRD-DU
Single Refinery ONE YEAR

		PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
	FEED STREAMS							
may	Mayna25		5134	14067	24.02	1616554	4428915	24.93
mes	Mesa30		4443	12173	20.79	1361766	3730866	21.00
ONO	MIXTURE		11797	32320	55.19	3505195	9603274	54.06
	TOTAL FEED		21374	58560	100.00	6483515	17763056	100.00
	PRODUCT STREAMS							
F3S	Propane (Lbs & FOEB)	747	1	3	0.00	273	747	0.00
S3S	Propane (Sat.)		14	38	0.06	2451	6714	0.04
S4I	Iso-butane (Sat.)		28	78	0.13	5573	15268	0.09
S4N	NC4 (Sat.)		77	212	0.36	15785	43247	0.24
55	55/ 292		3128	8569	14.63	795317	2178949	12.27
LN	292/ 316		534	1463	2.50	145527	398705	2.24
HN	316/ 321		107	294	0.50	29532	80908	0.46
NK	321/ 375		1095	3000	5.12	305894	838067	4.72
LK	375/ 463		1866	5111	8.73	538299	1474792	8.30
MK	463/ 557		2087	5717	9.76	619339	1696818	9.55
HK	557/ 566		205	562	0.96	61653	168914	0.95
LG	566/ 645		2076	5689	9.71	628252	1721239	9.69
AR	645+		10116	27715	47.33	3320182	9096390	51.21
	TOTAL PRODUCT		21335	58451	99.81	6468076	17720758	99.76
	LOSS (GAIN)		40	109	0.19	15439	42298	0.24

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	6910	6910
STM$	MP Steam, MLbs/D	218	218
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	32413	32413
BTU$	Fuel Fired, MBTU/D	4866336	4866336
SWT$	Sour Water, MLbs/Day	184	184
MUW$	Make-up Water, MGal/D	12	12

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MATERIAL BALANCE - Vacuum Tower #1 VAC-VU
Single Refinery ONE YEAR

			------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
	FEED STREAMS							
ARC	645+	(C)	2780	7618	31.28	916868	2511968	31.42
ARD	645+	(D)	2076	5687	23.36	695142	1904499	23.83
ARE	645+	(E)	4031	11045	45.36	1305667	3577169	44.75
	TOTAL FEED		8888	24350	100.00	2917677	7993636	100.00
	PRODUCT STREAMS							
LV	645/ 697		1140	3122	12.82	351858	963996	12.06
HV	697/1011		5166	14153	58.12	1654534	4532969	56.71
VB	1011+		2582	7075	29.05	912843	2500939	31.29
	TOTAL PRODUCT		8888	24350	100.00	2919235	7997903	100.05
	LOSS (GAIN)		0	0	0.00	-1558	-4267	-0.05

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	2922	2922
STM$	MP Steam, MLbs/D	249	249
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	16802	16802
BTU$	Fuel Fired, MBTU/D	2172020	2172020
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	23	23

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MATERIAL BALANCE - Vacuum Tower #2 WAC-WU
Single Refinery ONE YEAR

			------ VOLUME ------		PERCENT OF	------ WEIGHT ------		PERCENT OF
			.M Bbls	B/CD	INPUT	.M Lbs	L/CD	INPUT
	FEED STREAMS							
ARD	645+	(D)	76	208	100.00	25426	69660	100.00
	TOTAL FEED		76	208	100.00	25426	69660	100.00
	PRODUCT STREAMS							
LV	645/ 697		9	25	11.92	2826	7744	11.12
HV	697/1011		43	117	56.01	13807	37827	54.30
VB	1011+		24	67	32.07	8851	24248	34.81
	TOTAL PRODUCT		76	208	100.00	25484	69819	100.23
	LOSS (GAIN)		-0	-0	-0.00	-58	-158	-0.23

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	130	130
STM$	MP Steam, MLbs/D	14	14
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	33	33
BTU$	Fuel Fired, MBTU/D	32203	32203
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	0	0

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MATERIAL BALANCE - Sats Gas Plant SGP-SG
Single Refinery ONE YEAR

	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS						
S3S Propane (Sat.)	14	38	11.56	2451	6714	10.29
S4I Iso-butane (Sat.)	28	78	23.72	5573	15268	23.41
S4N NC4 (Sat.)	77	212	64.72	15785	43247	66.30
TOTAL FEED	119	327	100.00	23808	65229	100.00
PRODUCT STREAMS						
C3S Propane	14	38	11.56	2451	6714	10.29
C4I Iso-butane	28	78	23.72	5573	15268	23.41
C4N Normal Butane	77	212	64.72	15785	43247	66.30
TOTAL PRODUCT	119	327	100.00	23808	65229	100.00

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	4	4
CWR$	Cooling Water, MGal/D	138	138
STM$	MP Steam, MLbs/D	1	1
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	78	78
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	0	0

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MATERIAL BALANCE - Unsats Gas Plant UGP-UG
Single Refinery ONE YEAR

	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS						
U3S Propane (Unsat.)	197	540	10.50	35001	95894	9.58
U3M Propylene (Unsat.)	635	1741	33.83	115893	317515	31.73
U4I Iso-butane (Unsat.)	359	985	19.14	70751	193839	19.37
U4N NC4 (Unsat.)	94	256	4.98	19122	52389	5.24
U4J Iso C4= (Unsat.)	198	543	10.55	41573	113899	11.38
U4L 1/2 C4= (Unsat.)	394	1080	21.00	82873	227049	22.69
TOTAL FEED	1878	5145	100.00	365214	1000585	100.00
PRODUCT STREAMS						
C3S Propane	197	540	10.50	35001	95894	9.58
C3M Propylene	635	1741	33.83	115893	317515	31.73
C4I Iso-butane	359	985	19.14	70751	193839	19.37
C4N Normal Butane	94	256	4.98	19122	52389	5.24
C4M Mixed C4=	592	1623	31.55	124413	340857	34.07
TOTAL PRODUCT	1878	5145	100.00	365181	1000495	99.99
LOSS (GAIN)				33	90	0.01

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	64	64
CWR$	Cooling Water, MGal/D	2171	2171
STM$	MP Steam, MLbs/D	13	13
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	1227	1227
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	1	1

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MATERIAL BALANCE - FCCU (KC)
Single Refinery ONE YEAR

KCC-KC

			PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
	FEED STREAMS								
ARC	645+	(C)		655	1794	11.07	215984	591736	11.34
HVC	697/1011	(C)		998	2735	16.87	316925	868289	16.64
HVD	697/1011	(D)		1205	3302	20.37	391279	1071998	20.54
ARE	645+	(E)		497	1363	8.40	161096	441358	8.46
HVE	697/1011	(E)		2562	7020	43.30	819563	2245378	43.03
	TOTAL FEED			5918	16213	100.00	1904847	5218759	100.00
	PRODUCT STREAMS								
KTG	FCC Gasoline			3345	9164	56.52	878093	2405734	46.10
KLC	FCC LCO			379	1039	6.41	128578	352269	6.75
KHC	FCC HCO			804	2203	13.59	293370	803752	15.40
CKE	FCC Cat Coke		329257	0	0	0.00	120179	329257	6.31
KCK	Coke			0	0	0.00	0	0	0.00
H2S	H2S (Lbs)		11376	10	27	0.17	4152	11376	0.22
F1S	Methane (Lbs & FOEB)		102231	141	387	2.39	37314	102230	1.96
F2S	Ethane (Lbs & FOEB)		81537	105	289	1.78	29761	81537	1.56
F2M	Ethylene (Lbs & FOEB)		59638	75	205	1.26	21768	59638	1.14
F3S	Propane (Lbs & FOEB)		18826	24	65	0.40	6872	18826	0.36
F3M	Propylene (Lbs & FOEB)		41985	51	140	0.86	15324	41984	0.80
U3S	Propane (Unsat.)			197	540	3.33	35001	95894	1.84
U3M	Propylene (Unsat.)			635	1741	10.74	115893	317515	6.08
[illegible]	Iso-butane (Unsat.)			359	985	6.07	70751	193839	3.71
[illegible]	[illegible]C4 (Unsat.)			94	256	1.58	19122	52389	1.00
U4J	Iso C4= (Unsat.)			198	543	3.35	41573	113899	2.18
U4L	1/2 C4= (Unsat.)			394	1080	6.66	82873	227049	4.35
	TOTAL PRODUCT			6813	18666	115.12	1900624	5207188	99.78
	LOSS (GAIN)			-895	-2452	-15.12	4223	11571	0.22

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	1362	1362
CWR$	Cooling Water, MGal/D	5172	5172
STM$	MP Steam, MLbs/D	257	257
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	846	846
KWH$	Electricity, KWH/D	7043	7043

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BTU$	Fuel Fired, MBTU/D	598702	598702
MUW$	Make-up Water, MGal/D	41	41
KVV	FCC Conversion, Vol%	80.04	
KDE	FCC Feed Density	331.43	
KSL	FCC Feed Sulfur	0.4817	
KNI	FCC Feed Basic Nitrogen	0.1307	
KME	FCC Feed Metals	4.6000	
KRR	FCC Feed Concarbon	1.2000	

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MATERIAL BALANCE - Sulfur Plant
Single Refinery ONE YEAR

SUL-SU

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
HSS H2S fr Amine U (Lbs)	11376	10	27	100.00	4152	11376	100.00
TOTAL FEED		10	27	100.00	4152	11376	100.00
PRODUCT STREAMS							
SUL Sulfur	10707	10	27	100.00	3908	10707	94.12
TOTAL PRODUCT		10	27	100.00	3908	10707	94.12
LOSS (GAIN)		-0	-0	-0.00	244	669	5.88

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	0	
STM$	MP Steam, MLbs/D	0	
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	0	
BTU$	Fuel Fired, MBTU/D	0	
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	0	

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MATERIAL BALANCE - Fuel System
Single Refinery ONE YEAR

FUL-90

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
HFG Purch Nat Gas		88	242	14.16	23389	64078	8.24
CKE FCC Cat Coke	329257	0	0	0.02	120179	329257	42.35
FOE Fuel Gas		397	1088	63.74	111318	304980	39.23
C4M Mixed C4=		138	377	22.08	28894	79163	10.18
TOTAL FEED		623	1707	100.00	283779	777478	100.00
PRODUCT STREAMS							
TOTAL PRODUCT							
LOSS (GAIN)		623	1707	100.00	283779	777478	100.00

OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
BTU$ Fuel Fired, MBTU/D	-10055900	-10055900
BTU$ Fuel Fired, MBTU/D	0	

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MATERIAL BALANCE - Fuel Pool
Single Refinery ONE YEAR

FUP-91

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
F1S Methane (Lbs & FOEB)	102231	141	387	35.60	37314	102230	33.52
F2S Ethane (Lbs & FOEB)	81537	105	289	26.52	29761	81537	26.74
F2M Ethylene (Lbs & FOEB)	59638	75	205	18.80	21768	59638	19.56
F3S Propane (Lbs & FOEB)	19574	25	67	6.19	7144	19574	6.42
F3M Propylene (Lbs & FOEB)	41985	51	140	12.89	15324	41984	13.77
TOTAL FEED		397	1088	100.00	111311	304963	100.00
PRODUCT STREAMS							
FOE Fuel Gas		397	1088	100.00	111318	304980	100.01
TOTAL PRODUCT		397	1088	100.00	111318	304980	100.01
LOSS (GAIN)		-0	-0	-0.00	-6	-17	-0.01

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MATERIAL BALANCE - General Utilities UTL-95
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
TOTAL FEED							
PRODUCT STREAMS							
TOTAL PRODUCT							

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	18	18
CWR$	Cooling Water, MGal/D	-17444	-17444
CWR$	Cooling Water, MGal/D	17444	17444
STM$	MP Steam, MLbs/D	-753	-753
STM$	MP Steam, MLbs/D	753	753
STL$	LP Steam, MLbs/D	0	
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	-846	-846
STH$	HP Steam, MLbs/D	846	846
KWH$	Electricity, KWH/D	-62212	-62212
KWH$	Electricity, KWH/D	105659	105659
BTU$	Fuel Fired, MBTU/D	2386639	2386639
SWT$	Sour Water, MLbs/Day	-184	-184
SWT$	Sour Water, MLbs/Day	184	184
KWP$	Electricity	-26352	-26352
MUW$	Make-up Water, MGal/D	736	736
PWR$	Power	105659	105659
OXX$		0	

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MATERIAL BALANCE - Amine (DEA) Unit ADM-AM
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
H2S H2S (Lbs)	11376	10	27	100.00	4152	11376	100.00
TOTAL FEED		10	27	100.00	4152	11376	100.00
PRODUCT STREAMS							
HSS H2S fr Amine U (Lbs)	11376	10	27	100.00	4152	11376	100.00
TOTAL PRODUCT		10	27	100.00	4152	11376	100.00

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	0	
STM$	MP Steam, MLbs/D	0	
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	0	
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	0	

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UTILITIES CONSUMPTION REPORT - .M Units
Single Refinery ONE YEAR

PROCESS UNIT	Fuel Mixed MBTU	Steam High psi M Lbs	Steam Med psi M Lbs	Steam Low psi M Lbs	Power KWH	Water Cooling M Gal	Water Make-Up M Gal	Sour Water M Lbs	Cat & Chem $
CRD-DU Crude Tower #1	1776213		80		11831	2522	4	67	
VAC-VU Vacuum Tower #1	792787		91		6133	1067	8		
WAC-WU Vacuum Tower #2	11754		5		12	48	0		
SGP-SG Sats Gas Plant			0		28	50	0		1
UGP-UG Unsats Gas Plant			5		448	793	1		23
KCC-KC FCCU (KC)	218526	309	94		2571	1888	15		497
MRJ-MJ Merox (Jet)					526				19
MRD-MD Merox (Diesel)					413				15
MRG-MG Merox (FCC Gasoline)					468				17
MRL-ML Merox (LPG)					279				10
FUL-90 Fuel System	-3670403								
UTL-95 General Utilities	871123	-309	-275		-22707	-6367	269	-67	7
PURCHASES									
Units/CD							813		1614
.M Units							297		589
PRICE, $/unit							13.469		2.300
MARGINAL VALUE	0.000	0.958	0.958	0.958	0.045	0.584	13.469		2.300

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UTILITIES CONSUMPTION REPORT - .M Units
Single Refinery ONE YEAR

PROCESS UNIT	Power Purch KWH	Power Generate KWH
UTL-95 General Utilities	38566	
PURCHASES		
Units/CD	105659	
.M Units	38566	
PRICE, $/unit	0.045	
MARGINAL VALUE	0.045	0.030

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MATERIAL BALANCE - Sol Asp
Single Refinery ONE YEAR

BAP-AP

RECIPE OR COMPONENT	Volume .M Bbls	Volume B/CD	MARGINAL PENALTY $/BBL
A1A			2.305
A2A			35.019
B1A			0.650
B2A			35.019
C1A	110	300	
C2A			35.019
D1A			3.384
D2A			35.019
E1A			2.845
E2A			35.019
F1A			0.015
F2A			35.019
TOTAL	110	300	

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MATERIAL BALANCE - Sol Asp
Single Refinery ONE YEAR

BAP-AP

			Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
	COMPONENTS					
VBC	1011+	(C)	111	303	100.00	2.3321
	TOTAL COMPONENTS		111	303	100.00	
	BLENDED PRODUCTS					
BAP	Sol Asp		110	300	99.01	2.3555
	TOTAL PRODUCT		110	300	99.01	

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MATERIAL BALANCE - Liq Asp
Single Refinery ONE YEAR

CAP-BP

RECIPE OR COMPONENT	Volume .M Bbls	Volume B/CD	MARGINAL PENALTY $/BBL
A1A			1.826
A2A			27.738
B1A			0.528
B2A			27.751
C1A	91	250	
C2A			27.738
D1A			2.681
D2A			27.738
E1A			2.259
E2A			27.744
F1A			0.012
F2A			27.738
TOTAL	91	250	

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MATERIAL BALANCE - Liq Asp
Single Refinery ONE YEAR

CAP-BP

			Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
COMPONENTS						
VBC	1011+	(C)	73	200	80.00	2.3321
55C	55/ 292	(C)	9	25	10.00	25.9419
LNC	292/ 316	(C)	9	25	10.00	25.9280
	TOTAL COMPONENTS		91	250	100.00	
BLENDED PRODUCTS						
CAP	Liq Asp		91	250	100.00	7.0527
	TOTAL PRODUCT		91	250	100.00	

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MATERIAL BALANCE - Res Asp
Single Refinery ONE YEAR

DAP-CP

RECIPE OR COMPONENT	Volume .M Bbls	Volume B/CD	MARGINAL PENALTY $/BBL
A1A			6.190
A2A			28.863
B1A			
B2A			23.820
C1A	255	700	
C2A			24.271
D1A			2.047
D2A			23.972
E1A			1.428
E2A			23.727
F1A			
F2A			24.260
TOTAL	255	700	

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MATERIAL BALANCE - Res Asp
Single Refinery ONE YEAR

DAP-CP

			Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
COMPONENTS						
VBC	1011+	(C)	179	490	70.00	2.3321
NKC	321/ 375	(C)	26	70	10.00	38.8339
LKC	375/ 463	(C)	26	70	10.00	36.9013
MKC	463/ 557	(C)	26	70	10.00	34.1756
	TOTAL COMPONENTS		255	700	100.00	
BLENDED PRODUCTS						
DAP	Res Asp		255	700	100.00	12.6236
	TOTAL PRODUCT		255	700	100.00	

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MATERIAL BALANCE - C3/C4 LPG
Single Refinery ONE YEAR

B34-34

	RECIPE OR COMPONENT	Volume .M Bbls	Volume B/CD	MARGINAL PENALTY $/BBL
3SA	Propane	210	575	
3MA	Propylene	632	1732	
4NA	Normal Butane	170	466	
4IA	Iso-butane	386	1057	
4MA	Butylenes	453	1240	
	TOTAL	1851	5070	

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MATERIAL BALANCE - C3/C4 LPG
Single Refinery ONE YEAR

B34-34

	COMPONENTS	Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
C3S	Propane	211	578	11.34	1.8502
C3M	Propylene	635	1741	34.16	1.8502
C4N	Normal Butane	171	468	9.19	1.8502
C4I	Iso-butane	388	1062	20.85	1.8502
C4M	Mixed C4=	455	1246	24.46	1.8502
	TOTAL COMPONENTS	1860	5095	100.00	
	BLENDED PRODUCTS				
B34	Mixed C3/C4	1851	5070	99.50	1.8594
	TOTAL PRODUCT	1851	5070	99.50	

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PRODUCT BLENDING - FCC Naphtha 1GP
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha	547	1500	100.00	143725	393766	100.00	26.2113
TOTAL	547	1500	100.00	143725	393766	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.050		0.150		
158 % Off at 158 F	VL	24.000	10.000			
250 % Off at 250 F	VL	61.000	50.000			
374 % Off at 374 F	VL	94.000	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	262.511		280.000		
ARO Aromatics Content	VL	33.000		35.000		
PFF Paraffins Content	VL	31.000		100.000		
NAP Naphthenes Content	VL	20.000		22.000		
RVI Reid Vapor Pressure Index	VL	130.540		139.460		
OLE Olefin Content, Vol%	VL	16.000		100.000		
BEN Benzene Content	VL	0.900		1.500		
PERFORMANCE CONTROLS						
R Research O.N.	VL	92.500	92.500			-0.2836

COMPONENT QUALITIES

	DNX	SUL	RVI	ARO	OLE	PFF	NAP	158	250
kN# FCC Cat Naphtha	262.511	0.05001	130.540	33.0000	16.0000	31.0000	20.0000	24.0000	61.000
	430	BEN	R00	M00	F00	R05	R10	R20	R30
kN# FCC Cat Naphtha	100.000	0.90000	92.5000	81.1000	86.8000	.	.	.	.
	M10	M20	M30	F05	F10	F20	F30		

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PRODUCT BLENDING - Virgin Naphtha 2GR
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
55C	55/ 292	(C)	342	936	24.58	84569	231695	23.53	25.9419
LNC	292/ 316	(C)	55	152	3.98	14810	40576	4.12	25.9280
55D	55/ 292	(D)	626	1714	44.98	159582	437210	44.40	25.9426
LND	292/ 316	(D)	97	265	6.96	26316	72099	7.32	25.9280
LNE	292/ 316	(E)	271	743	19.50	74173	203214	20.64	25.9280
BLENDING LOSS									
TOTAL			1391	3810	100.00	359450	984794	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS							
SUL	Sulfur, Wt%	WT	0.002		0.050		
140	% Off at 140 F	VL	4.198		10.000		
248	% Off at 248 F	VL	50.000	50.000			-0.0002
320	% Off at 320 F	VL	100.000	90.000			
338	% Off at 338 F	VL	100.000	99.900			
DNX	Density, Lb/bbl	VL	258.476	244.400	262.600		
ARO	Aromatics Content	VL	9.927	0.000			
PFF	Paraffins Content	VL	56.743	0.000			
NAP	Naphthenes Content	VL	33.134	0.000			
NAR	Naphthenes + Aromatics	VL	43.061	42.000			
RVI	Reid Vapor Pressure Index	VL	48.101		157.520		
OLE	Olefin Content, Vol%	VL	0.000		1.000		

COMPONENT QUALITIES

			DNX	SUL	NAP	ARO	PFF	OLE	RVI	140	248
55C	55/ 292	(C)	247.413	.	23.7400	3.18900	72.8900	.	71.1820	5.02000	69.595
LNC	292/ 316	(C)	267.760	3.10E-3	37.2200	3.24700	58.9900	.	1.86100	.	.
55D	55/ 292	(D)	255.102	2.10E-3	27.2400	13.5300	59.2300	.	64.3730	6.59000	73.125
LND	292/ 316	(D)	271.936	0.01140	27.9400	23.1800	48.8800	.	17.4550	.	.
LNE	292/ 316	(E)	273.507	2.40E-3	59.5900	6.74200	33.0000	.	1.84200	.	.

			338	NAR	R00	M00	F00	R05	R10	R20	R30
55C	55/ 292	(C)	100.000	26.9290	63.5670	64.7370	64.1520	.	.	.	.
LNC	292/ 316	(C)	100.000	40.4670	53.1590	64.8480	59.0035	.	.	.	.
55D	55/ 292	(D)	100.000	40.7700	64.5520	62.7650	63.6585	.	.	.	.
LND	292/ 316	(D)	100.000	51.1200	56.6440	58.7790	57.7115	.	.	.	.
LNE	292/ 316	(E)	100.000	66.3320	64.2710	66.7530	65.5120	.	.	.	.

M10	M20	M30	F05	F10	F20	F30

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PRODUCT BLENDING - Gasoline G-95 SP 3GS
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha	209	572	58.33	54775	150069	57.82	26.2113
HOB High Octane BldStk	149	408	41.67	39961	109482	42.18	30.1100
BLENDING LOSS							
TOTAL	358	980	100.00	94736	259551	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.031		0.100		
158 % Off at 158 F	VL	18.583	10.000			
171 % Off at 171 F	VL	27.583		50.000		
244 % Off at 244 F	VL	65.833	50.000			
374 % Off at 374 F	VL	96.500	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	264.848		300.000		
ARO Aromatics Content	VL	41.333		100.000		
PPF Paraffins Content	VL	31.417		100.000		
RVI Reid Vapor Pressure Index	VL	112.515		155.703		
OLE Olefin Content, Vol%	VL	9.542		100.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	95.000	95.000			-0.6468

COMPONENT QUALITIES

	DNX	RVI	158	171	244	374	430	SUL	ARO
kN# FCC Cat Naphtha	262.511	130.540	24.0000	33.0000	60.0000	94.0000	100.000	0.05001	33.000
HOB High Octane BldStk	268.120	87.2800	11.0000	20.0000	74.0000	100.000	100.000	4.00E-3	53.000
	PPF	R00	M00	F00	R05	R10	R20	R30	M05
kN# FCC Cat Naphtha	31.0000	92.5000	81.1000	86.8000	.	.	.	.	.
HOB High Octane BldStk	32.0000	98.5000	96.0000	97.2500	.	.	.	.	.
	M20	M30	F05	F10	F20	F30			

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PRODUCT BLENDING - Gasoline 90 SP 4GU
Single Refinery ONE YEAR

COMPONENT		VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha		1572	4306	89.90	412598	1130405	89.83	26.2113
NGA Nat Gasoline		18	50	1.04	4424	12120	0.96	26.0626
55E 55/ 292	(E)	57	156	3.25	14487	39690	3.15	26.0001
LNE 292/ 316	(E)	102	278	5.81	27784	76122	6.05	25.9280
BLENDING LOSS								
TOTAL		1748	4790	100.00	459293	1258337	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.045		0.100		
158 % Off at 158 F	VL	23.066	10.000			
171 % Off at 171 F	VL	31.333		50.000		
244 % Off at 244 F	VL	57.027	50.000			
374 % Off at 374 F	VL	94.606	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	262.701		300.000		
ARO Aromatics Content	VL	30.170		100.000		
PFF Paraffins Content	VL	32.159		100.000		
RVI Reid Vapor Pressure Index	VL	121.921		155.703		
OLE Olefin Content, Vol%	VL	14.384		100.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	90.000	90.000			-0.0107

COMPONENT QUALITIES

		DNX	RVI	158	171	244	374	430	SUL	ARO
kN# FCC Cat Naphtha		262.511	130.540	24.0000	33.0000	60.0000	94.0000	100.000	0.05001	33.000
NGA Nat Gasoline		242.400	198.230	75.0000	79.0000	96.0000	100.000	100.000	.	2.0000
55E 55/ 292	(E)	255.151	73.6580	21.7910	25.9110	64.2380	100.000	100.000	8.00E-4	2.7970
LNE 292/ 316	(E)	273.507	1.84200	.	.	.	100.000	100.000	2.40E-3	6.7420
		PFF	R00	M00	F00	R05	R10	R20	R30	M05
kN# FCC Cat Naphtha		31.0000	92.5000	81.1000	86.8000	.	.	.	.	.
NGA Nat Gasoline		80.0000	76.9000	75.9000	76.4000	.	.	.	.	.
55E 55/ 292	(E)	47.3600	71.0390	68.5630	69.8010	.	.	.	.	.
LNE 292/ 316	(E)	33.0000	64.2710	66.7530	65.5120	.	.	.	.	.
		M20	M30	F05	F10	F20	F30			

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PRODUCT BLENDING - Lead Gasoline G84 5GM
Single Refinery *ONE YEAR*

COMPONENT		VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha		971	2662	31.68	255018	698680	32.30	26.2113
55D 55/ 292	(D)	64	177	2.10	16446	45057	2.08	25.9426
55E 55/ 292	(E)	2030	5562	66.21	517976	1419112	65.61	26.0001
BLENDING LOSS								
TOTAL		3066	8400	100.00	789440	2162848	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS							
SUL	Sulfur, Wt%	WT	0.017		0.150		
158	% Off at 158 F	VL	22.261	10.000			
171	% Off at 171 F	VL	27.977		50.000		
244	% Off at 244 F	VL	63.029	50.000			
374	% Off at 374 F	VL	98.099	90.000			
430	% Off at 430 F	VL	100.000	99.900			
DNX	Density, Lb/bbl	VL	257.482		300.000		
ARO	Aromatics Content	VL	12.592		100.000		
PFF	Paraffins Content	VL	42.426		100.000		
RVI	Reid Vapor Pressure Index	VL	91.486		155.703		
OLE	Olefin Content, Vol%	VL	5.070		100.000		
PERFORMANCE CONTROLS							
R	Research O.N.	VL	84.000	84.000			-0.0111
FINAL BLEND ANTIKNOCK CONC,	G Pb/Gal		1.3567		3.1800		
ANTIKNOCK COST, C/GM			0.1000				

COMPONENT QUALITIES

		DNX	RVI	158	171	244	374	430	SUL	PBL
kN# FCC Cat Naphtha		262.511	130.540	24.0000	33.0000	60.0000	94.0000	100.000	0.05001	.
55D 55/ 292	(D)	255.102	64.3730	10.8480	17.3320	70.6250	100.000	100.000	2.10E-3	.
55E 55/ 292	(E)	255.151	73.6580	21.7910	25.9110	64.2380	100.000	100.000	8.00E-4	.
		OLE	PFF	R00	M00	F00	R05	R10	R20	R30
kN# FCC Cat Naphtha		16.0000	31.0000	92.5000	81.1000	86.8000	95.0000	96.0000	97.0000	98.000
55D 55/ 292	(D)	.	59.2300	64.5520	62.7650	63.6585	69.0920	73.3270	77.7580	83.495
55E 55/ 292	(E)	.	47.3600	71.0390	68.5630	69.8010	74.2930	78.0120	81.9190	87.300
		M10	M20	M30	F05	F10	F20	F30		

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PRODUCT BLENDING - Gasoline 97 SP G3S
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha	46	125	25.00	11977	32814	24.61	26.2113
HOB High Octane BldStk	137	375	75.00	36699	100545	75.39	30.1100
BLENDING LOSS							
TOTAL	182	500	100.00	48676	133359	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.015		0.100		
158 % Off at 158 F	VL	14.250	10.000			
171 % Off at 171 F	VL	23.250		50.000		
244 % Off at 244 F	VL	70.500	50.000			
374 % Off at 374 F	VL	98.500	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	266.718		300.000		
ARO Aromatics Content	VL	48.000		100.000		
PFP Paraffins Content	VL	31.750		100.000		
RVI Reid Vapor Pressure Index	VL	98.095		155.703		
OLE Olefin Content, Vol%	VL	4.375		100.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	97.000	97.000			-0.6468

COMPONENT QUALITIES

	DNX	RVI	158	171	244	374	430	SUL	ARO
kN# FCC Cat Naphtha	262.511	130.540	24.0000	33.0000	60.0000	94.0000	100.000	0.05001	33.000
HOB High Octane BldStk	268.120	87.2800	11.0000	20.0000	74.0000	100.000	100.000	4.00E-3	53.000
	PFF	R00	M00	P00	R05	R10	R20	R30	M05
kN# FCC Cat Naphtha	31.0000	92.5000	81.1000	86.8000	.	.	.	.	.
HOB High Octane BldStk	32.0000	98.5000	96.0000	97.2500	.	.	.	.	.
	M20	M30	F05	P10	F20	F30			

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PRODUCT BLENDING - Solvent 3 G4U
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
HNC	316/ 321	(C)	14	40	9.41	3905	10699	9.22	37.5388
HND	316/ 321	(D)	20	56	13.22	5549	15203	13.10	37.5388
HNE	316/ 321	(E)	73	199	47.48	20077	55006	47.38	37.5388
NKE	321/ 375	(E)	46	126	29.89	12842	35185	30.31	37.5388
	TOTAL		153	420	100.00	42374	116093	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS							
SUL	Sulfur, Wt%	WT	0.004		0.100		
350	% Off at 350 F	VL	86.425	50.000			
374	% Off at 374 F	VL	99.466	90.000			
DNX	Density, Lb/bbl	VL	276.411		300.000		
OLE	Olefin Content, Vol%	VL	0.000		4.000		
FLI	Flash point index	VL	528.198		753.800		

COMPONENT QUALITIES

			DNX	SUL	350	374	FLI	OLE	R00	M00	F00
HNC	316/ 321	(C)	270.674	4.80E-3	100.000	100.000	611.000	.	51.9030	63.7620	57.832
HND	316/ 321	(D)	273.874	0.01520	100.000	100.000	611.000	.	55.5350	58.9500	57.242
HNE	316/ 321	(E)	275.840	2.60E-3	100.000	100.000	611.000	.	62.9430	64.6840	63.813
KE	321/ 375	(E)	280.247	2.50E-3	54.5870	98.2140	334.000	.	61.8080	64.2000	63.004
			R10	R20	R30	M05	M10	M20	M30	F05	F10
			F30								

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PRODUCT BLENDING - Kerosene 2KE
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
NKC	321/ 375	(C)	116	319	3.19	32264	88395	3.04	38.8339
LKC	375/ 463	(C)	242	662	6.62	69934	191601	6.60	36.9013
MKC	463/ 557	(C)	268	734	7.34	79980	219122	7.55	34.1756
HKC	557/ 566	(C)	31	85	0.85	9270	25398	0.87	32.1450
NKD	321/ 375	(D)	222	608	6.08	61712	169073	5.82	38.0724
LKD	375/ 463	(D)	375	1028	10.28	107835	295439	10.17	36.3389
MKD	463/ 557	(D)	437	1196	11.96	129655	355219	12.23	32.5171
NKE	321/ 375	(E)	174	477	4.77	48779	133640	4.60	37.5388
LKE	375/ 463	(E)	1151	3152	31.52	332126	909933	31.33	35.2774
MKE	463/ 557	(E)	541	1483	14.83	160418	439500	15.13	31.6575
HKE	557/ 566	(E)	93	256	2.56	28053	76858	2.65	30.3336
TOTAL			3650	10000	100.00	1060025	2904179	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
400	% Off at 400 F	VL	27.032	10.000			
DNX	Density, Lb/bbl	VL	290.418		310.000		
SUL	Sulfur, Wt%	WT	0.087		0.250		
FLI	Flash Point Index	VL	86.784		508.400		
SMI	Smoke Pt Index	VL	56.000		56.000		0.2884

COMPONENT QUALITIES

			DNX	SUL	400	SMI	FLI
KC	321/ 375	(C)	277.022	9.70E-3	100.000	41.9600	342.000
LKC	375/ 463	(C)	289.471	0.03690	23.1430	48.6600	66.8900
MKC	463/ 557	(C)	298.506	0.08930	.	58.1100	15.9100
HKC	557/ 566	(C)	300.419	0.12600	.	65.1500	6.47000
NKD	321/ 375	(D)	278.114	0.02210	100.000	44.6000	328.730
LKD	375/ 463	(D)	287.421	0.08670	27.8770	50.6100	72.2700
MKD	463/ 557	(D)	296.883	0.51670	.	63.8600	15.1700
NKE	321/ 375	(E)	280.247	2.50E-3	100.000	46.4500	333.970
LKE	375/ 463	(E)	288.666	2.90E-3	27.2680	54.2900	71.7800
MKE	463/ 557	(E)	296.379	0.01120	.	66.8400	15.3400
HKE	557/ 566	(E)	300.087	0.01980	.	71.4300	6.48000

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PRODUCT BLENDING - Turbo Jet A-1 3JA
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
NKE	321/ 375	(E)	15	41	13.66	4190	11481	13.24	37.5388
LKE	375/ 463	(E)	73	199	66.46	21008	57555	66.37	35.2774
MKE	463/ 557	(E)	22	60	19.88	6453	17679	20.39	31.6575
BLENDING LOSS									
TOTAL			110	300	100.00	31651	86715	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
400	% Off at 400 F	VL	31.778	10.000			
DNX	Density, Lb/bbl	VL	289.050	271.620	289.050		0.2440
SUL	Sulfur, Wt%	WT	0.005		0.300		
FLI	Flash Point Index	VL	96.360		636.900		
ARO	Aromatics Content	VL	10.453		22.000		
SMI	Smoke Pt Index	VL	55.715		56.000		
OLE	Olefin content	VL	0.000		5.000		
FZI	Freeze Point Index	VL	1.547		1.547		0.3837

COMPONENT QUALITIES

			DNX	SUL	ARO	OLE	400	SMI	FLI	FZI
NKE	321/ 375	(E)	280.247	2.50E-3	8.13000	.	100.000	46.4500	333.970	0.18000
LKE	375/ 463	(E)	288.666	2.90E-3	9.80000	.	27.2680	54.2900	71.7800	0.72000
MKE	463/ 557	(E)	296.379	0.01120	14.2300	.	.	66.8400	15.3400	5.25000

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PRODUCT BLENDING - No. 2 Diesel SD2
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
K1# FCC LCO Pool			157	431	3.93	53278	145966	4.38	31.2744
SD# SR Distllate			1596	4373	39.90	482597	1322183	39.70	29.3554
LGC	566/ 645	(C)	519	1421	12.96	157074	430340	12.92	29.5924
LVC	645/ 697	(C)	287	785	7.16	88316	241961	7.26	28.1980
HKD	557/ 566	(D)	43	117	1.07	12911	35374	1.06	30.2680
MKE	463/ 557	(E)	794	2174	19.84	235207	644402	19.35	31.6575
LVE	645/ 697	(E)	606	1659	15.14	186268	510323	15.32	27.8799
BLENDING LOSS									
TOTAL			4000	10960	100.00	1215650	3330548	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES						
DNX Density, Lb/bbl	VL	303.882		340.000		
SUL Sulfur, Wt%	WT	0.185		0.700		
PPX Pour Point Index (Hu)	VL	578.369		1002.200		
V00 Vis. Index at 100 F	VL	43.680	43.680	59.220		-0.2594
FLI Flash Point Index	VL	7.128		266.200		
CTI Cetane Index	VL	48.134	45.000			
K1# FCC LCO Pool	%	3.93		10.00		

COMPONENT QUALITIES

			DNX	PPX	SUL	CTI	FLI	V00	K1#
1# FCC LCO Pool			338.885	360.350	0.61396	26.0000	25.0000	50.0000	100.000
D# SR Distllate			302.386	600.708	0.24340	50.8690	4.74009	42.6715	.
LGC	566/ 645	(C)	302.895	358.673	0.16380	48.3700	4.34000	43.5850	.
LVC	645/ 697	(C)	308.170	738.317	0.27990	46.6500	2.61000	38.1420	.
HKD	557/ 566	(D)	301.755	389.444	0.77570	50.0700	6.48000	46.1890	.
MKE	463/ 557	(E)	296.379	229.995	0.01120	46.4800	15.3400	51.5450	.
LVE	645/ 697	(E)	307.537	1158.33	0.06040	49.2000	2.59000	36.9160	.

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PRODUCT BLENDING - MF80 Fuel Oil 6R4
Single Refinery ONE YEAR

COMPONENT		VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
Kh# FCC HCO Pool		48	130	37.27	17368	47583	40.51	12.2386
VBC 1011+	(C)	12	32	9.23	4154	11380	9.69	2.3321
LVD 645/ 697	(D)	68	187	53.51	21346	58483	49.80	25.0101
BLENDING LOSS								
TOTAL		128	350	100.00	42868	117446	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES						
DNX Density, Lb/bbl	VL	335.559		360.000		
SUL Sulfur, Wt%	WT	1.249		3.500		
PPX Pour Point Index (Hu)	VL	2394.500		2394.500		
VBF RFO Vis. Index @122F	VL	0.388		0.388		48.5609
FLI Flash Point Index	VL	1.632		154.900		
MET Metals Content,PPM	VL	30.493		230.000		
CRC W % Conradson Carbon	VL	3.716		14.000		

COMPONENT QUALITIES

		DNX	SUL	VBF	PPX	FLI	CRC	MET
Kh# FCC HCO Pool		364.812	1.51051	0.51000	2681.00	0.50000	6.00000	60.0000
VBC 1011+	(C)	352.368	0.79800	0.71400	6474.08	0.76000	15.4600	88.1500
LVD 645/ 697	(D)	312.287	1.12400	0.24700	1491.46	2.57000	0.10000	.

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PRODUCT BLENDING - PI6 Fuel Oil 7R5
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
VBC	1011+	(C)	679	1860	46.49	239181	655289	49.71	2.3321
NKE	321/ 375	(E)	437	1198	29.95	122543	335734	25.47	37.5388
VBE	1011+	(E)	344	942	23.56	119433	327214	24.82	5.1487
BLENDING LOSS									
TOTAL			1460	4000	100.00	481156	1318236	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
DNX	Density, Lb/bbl	VL	329.559		360.000		
SUL	Sulfur, Wt%	WT	0.496		3.000		
VBF	RFO Vis. Index @122F	VL	0.483	0.396	0.483		48.5609
FLI	Flash Point Index	VL	100.556		154.900		
MET	Metals Content,PPM	VL	46.359		400.000		
CRC	W % Conradson Carbon	VL	10.344		25.000		

COMPONENT QUALITIES

			DNX	SUL	VBF	FLI	CRC	MET
VBC	1011+	(C)	352.368	0.79800	0.71400	0.76000	15.4600	88.1500
NKE	321/ 375	(E)	280.247	2.50E-3	-0.01100	333.970	.	.
VBE	1011+	(E)	347.237	0.39660	0.65600	0.76000	13.4000	22.8200

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PRODUCT BLENDING - PI500 Fuel Oil 8R6
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
LVD	645/ 697	(D)	117	320	19.63	36475	99932	17.76	25.0101
VBD	1011+	(D)	419	1149	70.48	152390	417508	74.21	5.6828
NKE	321/ 375	(E)	59	161	9.89	16487	45169	8.03	37.5388
BLENDING LOSS									
TOTAL			595	1630	100.00	205352	562608	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
DNX	Density, Lb/bbl	VL	345.158		360.000		
SUL	Sulfur, Wt%	WT	1.704		3.000		
VBF	RFO Vis. Index @122F	VL	0.502	0.494	0.502		48.5609
FLI	Flash Point Index	VL	34.063		108.500		
MET	Metals Content,PPM	VL	191.368		400.000		
CRC	W % Conradson Carbon	VL	17.929		25.000		

COMPONENT QUALITIES

			DNX	SUL	VBF	FLI	CRC	MET
LVD	645/ 697	(D)	312.287	1.12400	0.24700	2.57000	0.10000	.
VBD	1011+	(D)	363.421	2.02700	0.64500	0.76000	25.4100	271.520
NKE	321/ 375	(E)	280.247	2.50E-3	-0.01100	333.970	.	.

FOSTER WHEELER USA CORPORATION
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PetroPeru Current Refinery Operations (Rev 2)

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PRODUCT BLENDING - PI6 Export 9R7
Single Refinery ONE YEAR

COMPONENT		VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
Kl# FCC LCO Pool		222	609	9.73	75301	206303	9.50	31.2744
Kh# FCC HCO Pool		757	2073	33.14	276002	756169	34.81	12.2386
HVC 697/1011	(C)	443	1213	19.39	140573	385130	17.73	19.6684
LVD 645/ 697	(D)	71	195	3.12	22280	61041	2.81	25.0101
VBD 1011+	(D)	271	742	11.86	98436	269686	12.41	5.6828
VBE 1011+	(E)	519	1423	22.75	180387	494210	22.75	5.1487
BLENDING LOSS								
TOTAL		2283	6255	100.00	792977	2172540	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES						
DNX Density, Lb/bbl	VL	347.315		360.000		
SUL Sulfur, Wt%	WT	1.029		3.000		
VBF RFO Vis. Index @122F	VL	0.483	0.396	0.483		48.5609
FLI Flash Point Index	VL	3.210		154.900		
MET Metals Content,PPM	VL	57.525		400.000		
CRC W % Conradson Carbon	VL	8.111		25.000		

COMPONENT QUALITIES

		DNX	SUL	VBF	FLI	CRC	MET
Kl# FCC LCO Pool		338.885	0.61396	0.11800	25.0000	.	2.00000
Kh# FCC HCO Pool		364.812	1.51051	0.51000	0.50000	6.00000	60.0000
VC 697/1011	(C)	317.530	0.40230	0.35700	1.38000	0.29000	0.23000
VD 645/ 697	(D)	312.287	1.12400	0.24700	2.57000	0.10000	.
VBD 1011+	(D)	363.421	2.02700	0.64500	0.76000	25.4100	271.520
VBE 1011+	(E)	347.237	0.39660	0.65600	0.76000	13.4000	22.8200

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PetroPeru Current Refinery Operations (Rev 2)

I N D E X

REPORT	DESCRIPTION	PAGE	LOC'N	PERIOD
01010	ECONOMIC REPORT	1	.	A
01250	PLANT INPUT/OUTPUT REPORT	2	1	A
01080	PURCHASES/SALES REPORT	4	.	A
BR	Raw Material Purchases	4	.	A
SA	Product Sales	5	.	A
01100	PROCESS UTILIZATION REPORT	6	1	A
01310	MATERIAL BALANCE	7	1	A
DU	Crude Tower #1	7	1	A
VU	Vacuum Tower #1	8	1	A
WU	Vacuum Tower #2	9	1	A
SG	Sats Gas Plant	10	1	A
UG	Unsats Gas Plant	11	1	A
KC	FCCU (KC)	12	1	A
SU	Sulfur Plant	14	1	A
90	Fuel System	15	1	A
91	Fuel Pool	16	1	A
95	General Utilities	17	1	A
AM	Amine (DEA) Unit	18	1	A
01030	UTILITIES CONSUMPTION REPORT	19	1	A
01150	RECIPE-MATERIAL BALANCE	21	1	A
.AP	Sol Asp	21	1	A
.BP	Liq Asp	23	1	A
.CP	Res Asp	25	1	A
.34	C3/C4 LPG	27	1	A
01320	PRODUCT BLENDING	29	1	A
1GP	FCC Naphtha	29	1	A
2GR	Virgin Naphtha	30	1	A
3GS	Gasoline G-95 SP	31	1	A
4GU	Gasoline 90 SP	32	1	A
5GM	Lead Gasoline G84	33	1	A
G3S	Gasoline 97 SP	34	1	A
G4U	Solvent 3	35	1	A
01340	PRODUCT BLENDING	36	1	A
2KE	Keroaene	36	1	A
3JA	Turbo Jet A-1	37	1	A
5D2	No. 2 Diesel	38	1	A
6R4	MF80 Fuel Oil	39	1	A
7R5	PI6 Fuel Oil	40	1	A
8R6	PI500 Fuel Oil	41	1	A
9R7	PI6 Export	42	1	A

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PetroPeru Base Case Refinery Upgrade

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ECONOMIC REPORT
ONE YEAR

	ACCOUNTING CATEGORY	.M $	.. $/CD
SAX	Product Values - Sales	771860	2114684
BRX	Raw Material Costs	-664767	-1821279
UTP	Utilities Costs	-9100	-24931
	TOTAL VARIABLE REVENUES	771860	2114684
	TOTAL VARIABLE COSTS	-673867	-1846210
	GROSS VARIABLE INCOME	97993	268474
	INCOME TAX	29398	80542
IVS	Investment less credits	-80021	-219235
DPR	Depreciation tax credits	1200	3289
	NET PRESENT VALUE (I=15.00 PCT)	52029	142544

****SOLUTION STATUS: OPTIMAL AFTER 10052 ITERATIONS
CASE 1a: 15 RECURSION PASSES

CASE 1a: THE MODEL CONVERGED ON PROPERTIES ONLY

PetroPeru Refinery Upgrade Study
Talara Refinery Modifications Project
A Foster Wheeler USA Study
Base Case Refinery Configuration
Includes Catalytic Reforming, NHT
Alkylation, Diesel HDS, SRU and ARU
Assumed CDU revamp to 90,000 BPSD
Potential to revamp VDU and FCC included
Year 2007 Basis
3 Grades of Gasoline (No Unleaded)
Atm Resid Allowed into Fuel Oil Pools
All Fuel Oil at 1.5% S
Capital Costs Included

****SYSTEM NAME : GRTMPS - III
****SYSTEM VERSION: VER 3.02.006

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PetroPeru Base Case Refinery Upgrade

PROCESS-UNIT INVESTMENT REPORT
ONE YEAR

--PROCESS INVESTMENT--		(NO)	------LOCATION------	PURCHASED CAPACITY B/SD	TOTAL INVESTMENT (INCL. OFFSITES) .M $	$/BBL	ADDED LABOR MEN/SHIFT
NHT	Naphtha Hydrotreater	1	Single Refinery	3103	9765	3147	
CRU	CCR	1	Single Refinery	3103	18372	5920	
DHT	Kero + Diesel HDS	1	Single Refinery	7755	20589	2655	
SUL	Sulfur + TGT + ARU	1	Single Refinery	40435	14498	359	
SAA	H2SO4 Alkylation	1	Single Refinery	2999	16797	5600	
			*** GRAND TOTAL		80021		

PROCESS UNIT INVESTMENT PARAMETER DETAILS AT Single Refinery

BASIS OF PROCESS UNIT PER CAPACITY UNIT COST CALCULATION

PROCESS INVESTMENT		BASE UNIT SIZE (SIZE)	BASE INVESTMENT UNIT COST (UCOST)	OFFSITES COST FACTOR (OSBL)	LOCATION FACTOR (*LOCI)	CURRENT COST FACTOR (XCSTI)	INFLATION FACTOR (*IFLI)	CALCULATED INVESTMENT UNIT COST (UCOST)	CALCULATED INCREMENTAL UNIT COST (ICOST)
DHT	Kero + Diesel HDS	4000	3529.00	1.0000	1.0000	1.0000	1.0000	3529.00	1724.00
NHT	Naphtha Hydrotreat	3000	3200.00	1.0000	1.0000	1.0000	1.0000	3200.00	1600.00
CRU	CCR	3000	6000.00	1.0000	1.0000	1.0000	1.0000	6000.00	3600.00
SAA	H2SO4 Alkylation	1000	8400.00	1.0000	1.0000	1.0000	1.0000	8400.00	4200.00
SUL	Sulfur + TGT + ARU	22400	582.40	1.0000	1.0000	1.0000	1.0000	582.40	80.50

CAPITAL RECOVERY FACTOR USED (XCAPF) = 0.1598

BASIS OF TOTAL PROCESS UNIT COST CALCULATION

PROCESS UNIT INVESTMENT DATA BREAKOUT		UNIT SIZE Bbls	INVESTMENT UNIT COST $/BBL	VARIABLE COST .M $	FIXED COST .M $	TOTAL COST .M $	INVESTMENT CREDIT RATE %	NET COST AFTER CREDIT .M $	ADDED LABOR MEN/SHIFT
DHT	Kero + Diesel HDS	7755	1724.00	6473	14116	20589			
NHT	Naphtha Hydrotreat	3103	1600.00	165	9600	9765			
CRU	CCR	3103	3600.00	372	18000	18372			
SAA	H2SO4 Alkylation	2999	4200.00	8397	8400	16797			
SUL	Sulfur + TGT + ARU	40435	80.50	1452	13046	14498			
	TOTAL			16859	63162	80021			

BASIS OF OTHER INVESTMENT COST FACTORS

OTHER INVESTMENT COSTS	PROCESS UNIT COST OR NUMBER OF MEN	% OR ANNUAL RATE	COST .M $	INCOME TAX RATE %	AFTER TAX COST .M $

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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Foster Wheeler USA LP Model

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PROCESS-UNIT INVESTMENT REPORT (CONT.)
ONE YEAR

MAINTENANCE	80021			30.00	
TAXES & INSURANCE	80021			30.00	
LABOR		185.01		30.00	
TOTAL					
DEPRECIATION	80021	5.00	4001	30.00	1200

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PetroPeru Base Case Refinery Upgrade

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PLANT INPUT/OUTPUT REPORT
Single Refinery ONE YEAR

		PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	STOCK LIMITS MIN B/CD	STOCK LIMITS MAX B/CD	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT	STOCK L MIN L/CD
PLANT INPUT											
HFG	Purch Nat Gas		182	499	0.56		100000	48239	132163	0.48	26
NGA	Nat Gasoline		18	50	0.06		50	4424	12120	0.04	
cui	Cuisia39		4530	12412	14.04		50000	1312041	3594632	13.15	14
lor	Loreto19		6830	18712	21.17		25000	2247526	6157607	22.52	8
may	Mayna25		3863	10585	11.98		11000	1216393	3332584	12.19	3
ONO	MIXTURE		10147	27800	31.45		27800	3014988	8260242	30.21	8
ori	Orient23		6691	18332	20.74		50000	2135156	5849742	21.40	15
	TOTAL		32262	88389	100.00			9978767	27339089	100.00	
PLANT OUTPUT											
SUL	Sulfur	38413	35	97	0.11			14021	38413	0.14	
B34	C3/C4 LPG		1985	5438	6.15		5700	374376	1025688	3.75	1
1GP	FCC Naphtha		292	800	0.91	800	800	76654	210011	0.77	210011
2GR	Virgin Naphtha		3245	8891	10.06			833174	2282667	8.35	
3GS	Gasoline G-95 SP		768	2104	2.38		2104	201041	550797	2.01	
4GU	Gasoline 91 SP		3619	9916	11.22		9916	930775	2550070	9.33	2
G3S	Gasoline 97 SP		221	605	0.68		605	61560	168658	0.62	
G4U	Solvent 3		153	420	0.48		420	42962	117704	0.43	
6GA	Export FCC Naphth		2921	8003	9.05			766814	2100861	7.68	
2KE	Kerosene		2905	7960	9.01		7960	846692	2319705	8.48	2
3JA	Turbo Jet A-1		978	2678	3.03		2890	282580	774191	2.83	
5D2	No. 2 Diesel		5682	15566	17.61		33000	1730471	4741018	17.34	10
6R4	MF80 Fuel Oil		102	280	0.32	80	280	34573	94722	0.35	27063
7R5	PI6 Fuel Oil		1150	3150	3.56		3150	397438	1088871	3.98	1
8R6	PI500 Fuel Oil		876	2400	2.72		2400	298702	818361	2.99	
9R7	PI6 Export		6871	18825	21.30			2386626	6538701	23.92	
BAP	Solid Asphalt		110	300	0.34		300	40216	110181	0.40	
CAP	Liquid Asphalt		91	250	0.28		250	31373	85953	0.31	
DAP	Res Asphalt		255	700	0.79		700	87768	240461	0.88	
	TOTAL		32260	88384	100.00			9437817	25857033	94.58	
PROCESS FUEL USED											
HYA	H2 (MSCF)	2	38	104	0.12			3928	10761	0.04	
HLA	H2 (Unrec.)	1	14	39	0.04			1457	3992	0.01	
HFA	Purch Nat Gas		182	499	0.56			48239	132163	0.48	
FEA	Plant Fuel Gas		665	1821	2.06			186264	510312	1.87	
4MA	Butylenes		96	264	0.30			20216	55386	0.20	
CKA	KCC Coke Burn	551	0	1	0.00			201214	551271	2.02	

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PetroPeru Base Case Refinery Upgrade

PLANT INPUT/OUTPUT REPORT (CONT.)
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	STOCK LIMITS MIN	STOCK LIMITS MAX B/CD	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT	STOCK L MIN L/CD
TOTAL		995	2727	3.09			461318	1263885	4.62	
GRAND TOTAL		33256	91111	103.08			9899135	27120918	99.20	
PLANT GAIN		994	2723	3.08						
PLANT LOSS							79633	218171	0.80	

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Raw Material Purchases
ONE YEAR

STOCK		LOCATION	PER DAY ACTUAL UNITS	Volume .M Bbls	Volume B/CD	UNIT PRICE $/BBL	UNIT PRICE C/Gal	MARGINAL VALUE $/BBL	MARGINAL VALUE C/Gal	INCREA INCENT $/BBL
HFG	Purch Nat Gas	1 Single Refinery		182	499	3.85	9.17	3.85	9.17	-0.00
NGA	Nat Gasoline	1 Single Refinery		18	50	19.75	47.02	24.72	58.87	4.97
cui	Cuisia39	1 Single Refinery		4530	12412	24.53	58.40	24.53	58.40	-0.00
lor	Loreto19	1 Single Refinery		6830	18712	17.77	42.31	17.92	42.67	0.15
may	Mayna25	1 Single Refinery		3863	10585	20.47	48.74	20.20	48.10	-0.27
ONO	MIXTURE	1 Single Refinery		10147	27800	22.51	53.60	20.41	48.61	-2.10
ori	Orient23	1 Single Refinery		6691	18332	18.49	44.02	18.49	44.02	-0.00
		**GRAND TOTAL		32262	88389					

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Product Sales
ONE YEAR

STOCK	LOCATION	PER DAY ACTUAL UNITS	Volume .M Bbls	Volume B/CD	UNIT PRICE $/BBL	UNIT PRICE C/Gal	MARGINAL VALUE $/BBL	MARGINAL VALUE C/Gal	INCREA INCENT $/BBL
@ SUL Sulfur	1 Single Refinery	38413	35	97	0.02	0.05	0.02	0.05	
B34 C3/C4 LPG	1 Single Refine		1985	5438	17.82	42.43	17.82	42.43	0.00
1GP FCC Naphtha	1 Single Refinery		292	800	24.79	59.02	24.79	59.02	0.00
2GR Virgin Naphtha	1 Single Refinery		3245	8891	23.46	55.86	23.46	55.86	0.00
3GS Gasoline G-95 SP	1 Single Refinery		768	2104	30.61	72.88	27.48	65.43	3.13
4GU Gasoline 91 SP	1 Single Refinery		3619	9916	28.90	68.81	26.52	63.15	2.38
G3S Gasoline 97 SP	1 Single Refinery		221	605	31.46	74.90	29.43	70.08	2.03
G4U Solvent 3	1 Single Refinery		153	420	54.63	130.07	28.90	68.82	25.73
6GA Export FCC Naphtha	1 Single Refinery		2921	8003	24.79	59.02	24.79	59.02	0.00
2KE Kerosene	1 Single Refinery		2905	7960	28.77	68.50	28.77	68.50	0.00
3JA Turbo Jet A-1	1 Single Refinery		978	2678	28.77	68.50	28.77	68.50	0.00
5D2 No. 2 Diesel	1 Single Refinery		5682	15566	28.54	67.95	28.54	67.95	0.00
6R4 MF80 Fuel Oil	1 Single Refinery		102	280	20.10	47.86	18.93	45.07	1.17
7R5 PI6 Fuel Oil	1 Single Refinery		1150	3150	18.19	43.31	16.65	39.64	1.54
8R6 PI500 Fuel Oil	1 Single Refinery		876	2400	17.59	41.88	16.20	38.57	1.39
9R7 PI6 Export	1 Single Refinery		6871	18825	16.65	39.64	16.65	39.64	0.00
BAP Solid Asphalt	1 Single Refinery		110	300	27.50	65.48	9.34	22.24	18.16
CAP Liquid Asphalt	1 Single Refinery		91	250	28.99	69.02	12.09	28.79	16.90
DAP Res Asphalt	1 Single Refinery		255	700	18.33	43.64	15.09	35.92	3.24
	**GRAND TOTAL		32260	88384					

@ ... REPORTED MONETARY VALUES PER ACTUAL STREAM UNITS

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PetroPeru Base Case Refinery Upgrade

PROCESS UTILIZATION REPORT
Single Refinery ONE YEAR

----PROCESS UNIT----	----PROCESS LIMIT----	OPERATING RATE .M Bbls	OPERATING RATE B/CD	UNUSED CAPACITY .M Bbls	UNUSED CAPACITY B/CD	PCT OF MAX CAPACITY	EXPANSION INCENTIVE $/BBL
CRD-DU Crude Tower #1	CRD Feed	32062	87840			100.0	1.749
VAC-VU Vacuum Tower #1	VAC Feed	13938	38185	2852	7815	83.0	
WAC-WU Vacuum Tower #2	WAC Feed			818	2240		
SGP-SG Sats Gas Plant	SGP Feed	403	1103				
UGP-UG Unsats Gas Plant	UGP Feed	2962	8114				
FCC-FC FCCU (Total)	FCC Total Feed	9273	25406				
	KCC Feed (KC)	9273	25406				
	OKC CO Boiler (KC)	121473	332802				
CRU-CR CCR Reformer	CRU Feed	1076	2948				2.329
SRU-SR LP SR Reformer	SRU Feed						134.651
SAA-SA H2SO4 Alkylation	SAA Alkylate product	1040	2849				2.717
DHT-DH Distillate HDS	DHT Total Capacity	2689	7367				1.115
	DHD SR Diesel Feed	1161	3181				
	DHJ Jet/Kero Feed	1122	3074				
	DHC FCC Stk.	406	1111				
NHT-NH Naphtha HDS	NHT Total feed	1076	2948				1.035
	NHL Lt Vir Naphtha						
	NHC Hvy Vir Naphtha	1076	2948				
	NHZ Hvy Coker Naphtha						
	NHA Lt Coker Naphtha						
HYD-H2 Hydrogen Plant	HYD Total MSCF H2						0.582
	H2A via plant fuel						
	H2B via LPG						
	H2C via naphtha						
	H2D via purch gas						
SUL-SU Sulfur Plant	SUL Feed	14021	38413				0.052
MRJ-MJ Merox (Jet)	MRJ Feed	3883	10638			100.0	0.068
MRD-MD Merox (Diesel)	MRD Feed	2255	6179	1093	2996	67.3	
MRG-MG Merox (FCC Gasoline)	MRG Feed	5185	14206				
MRL-ML Merox (LPG)	MRL Feed	3364	9217				

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PROCESS UTILIZATION REPORT (CONT.)
Single Refinery ONE YEAR

----PROCESS UNIT----	----PROCESS LIMIT----	OPERATING RATE .M Bbls	OPERATING RATE B/CD	UNUSED CAPACITY .M Bbls	UNUSED CAPACITY B/CD	PCT OF MAX CAPACITY	EXPANSION INCENTIVE $/BBL
FUL-90 Fuel System	PFO Fuel Oil						
	FLR Flare						
UTL-95 General Utilities	STM MP Steam (Mlbs)						
	STL LP Steam (Mlbs)	1	4				
	STH HP Steam (Mlbs)	834	2286				
	SWT Sour Water (Mlbs)	101	277				
	VNT Steam Vent						
	KWH Power (kwh)	69119	189368				
	CWR Cooling H2O (MGal)	10195	27932				
	KWT Condensing Turbine						0.065
COG-CG COGEN Plant	COG Feed						25.613
ADM-AM Amine (DEA) Unit	ADM Amine Unit (GPM)	40	108				

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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MATERIAL BALANCE - Crude Tower #1 CRD-DU
Single Refinery ONE YEAR

		PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
	FEED STREAMS							
cui	Cuisia39		4530	12412	14.13	1312041	3594632	13.22
lor	Loreto19		6830	18712	21.30	2247526	6157607	22.64
may	Mayna25		3863	10585	12.05	1216393	3332584	12.25
ONO	MIXTURE		10147	27800	31.65	3014988	8260242	30.37
ori	Orient23		6691	18332	20.87	2135156	5849742	21.51
	TOTAL FEED		32062	87840	100.00	9926104	27194806	100.00
	PRODUCT STREAMS							
F2S	Ethane (Lbs & FOEB)	1135	1	4	0.00	414	1135	0.00
F3S	Propane (Lbs & FOEB)	3028	4	10	0.01	1105	3028	0.01
S3S	Propane (Sat.)		56	153	0.17	9927	27197	0.10
S4I	Iso-butane (Sat.)		70	192	0.22	13797	37801	0.14
S4N	NC4 (Sat.)		170	467	0.53	34805	95356	0.35
55	55/ 180		1314	3601	4.10	308025	843903	3.10
LN	292/ 316		761	2085	2.37	207504	568505	2.09
LA	180/ 292		2914	7984	9.09	762721	2089645	7.68
HN	316/ 321		152	417	0.48	41860	114684	0.42
NK	321/ 375		1496	4099	4.67	417882	1144882	4.21
LK	375/ 463		2586	7086	8.07	746833	2046118	7.52
MK	463/ 557		2919	7997	9.10	870579	2385148	8.77
HK	557/ 566		291	798	0.91	88072	241294	0.89
LG	566/ 645		2895	7933	9.03	883147	2419581	8.90
AR	645+		16257	44539	50.70	5477693	15007379	55.18
	TOTAL PRODUCT		31888	87365	99.46	9864365	27025657	99.38
	LOSS (GAIN)		173	475	0.54	61739	169149	0.62

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	10365	10365
STM$	MP Steam, MLbs/D	328	328
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	48619	48619
BTU$	Fuel Fired, MBTU/D	7299504	7299504
SWT$	Sour Water, MLbs/Day	277	277
MUW$	Make-up Water, MGal/D	18	18

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MATERIAL BALANCE - Vacuum Tower #1 VAC-VU
Single Refinery ONE YEAR

			------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS								
ARB	645+	(B)	4348	11914	31.20	1527554	4185079	32.32
ARC	645+	(C)	1695	4643	12.16	558783	1530911	11.82
ARE	645+	(E)	3895	10672	27.95	1261633	3456530	26.69
ARF	645+	(F)	3999	10957	28.69	1379095	3778341	29.17
TOTAL FEED			13938	38185	100.00	4727064	12950862	100.00
PRODUCT STREAMS								
LV	645/ 697		1442	3949	10.34	449179	1230628	9.50
HV	697/1011		6954	19052	49.89	2251559	6168654	47.63
VB	1011+		5542	15183	39.76	2026307	5551525	42.87
TOTAL PRODUCT			13937	38185	100.00	4727044	12950807	100.00

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	4773	4773
STM$	MP Steam, MLbs/D	391	391
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	26348	26348
BTU$	Fuel Fired, MBTU/D	3406139	3406139
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	36	36

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MATERIAL BALANCE - Sats Gas Plant SGP-SG
Single Refinery ONE YEAR

	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS						
S3S Propane (Sat.)	104	286	25.93	18534	50779	23.53
S4I Iso-butane (Sat.)	96	262	23.72	18802	51514	23.87
S4N NC4 (Sat.)	203	555	50.35	41427	113498	52.60
TOTAL FEED	403	1103	100.00	78763	215790	100.00
PRODUCT STREAMS						
C3S Propane	104	286	25.93	18534	50779	23.53
C4I Iso-butane	96	262	23.72	18802	51514	23.87
C4N Normal Butane	203	555	50.35	41427	113498	52.60
TOTAL PRODUCT	403	1103	100.00	78763	215790	100.00

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	14	14
CWR$	Cooling Water, MGal/D	466	466
STM$	MP Steam, MLbs/D	3	3
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	263	263
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	0	0

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MATERIAL BALANCE - Unsats Gas Plant UGP-UG
Single Refinery ONE YEAR

	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS						
U3S Propane (Unsat.)	299	820	10.11	53152	145623	8.52
U3M Propylene (Unsat.)	996	2728	33.62	181607	497554	29.10
U4I Iso-butane (Unsat.)	580	1589	19.58	152222	417046	24.39
U4N NC4 (Unsat.)	168	459	5.66	43994	120531	7.05
U4J Iso C4= (Unsat.)	308	843	10.38	64536	176811	10.34
U4L 1/2 C4= (Unsat.)	612	1676	20.65	128532	352142	20.60
TOTAL FEED	2962	8114	100.00	624043	1709706	100.00
PRODUCT STREAMS						
C3S Propane	299	820	10.11	53152	145623	8.52
C3M Propylene	996	2728	33.62	181607	497554	29.10
C4I Iso-butane	580	1589	19.58	114124	312668	18.29
C4N Normal Butane	168	459	5.66	34243	93816	5.49
C4M Mixed C4=	321	881	10.85	67500	184933	10.82
C4L 1/2 C4=	598	1638	20.18	125617	344155	20.13
TOTAL PRODUCT	2962	8114	100.00	576243	1578749	92.34
LDSS (GAIN)				47800	130958	7.66

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	101	101
CWR$	Cooling Water, MGal/D	3424	3424
STM$	MP Steam, MLbs/D	21	21
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	1935	1935
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	2	2

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MATERIAL BALANCE - FCCU (KC)
Single Refinery ONE YEAR

KCC-KC

			PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
	FEED STREAMS								
ARA	645+	(A)		1428	3914	15.40	456985	1252015	15.22
HVB	697/1011	(B)		1893	5187	20.42	626168	1715528	20.86
ARC	645+	(C)		890	2440	9.60	293644	804503	9.78
HVC	697/1011	(C)		878	2406	9.47	278821	763893	9.29
HVE	697/1011	(E)		2476	6783	26.70	791923	2169653	26.38
HVF	697/1011	(F)		1707	4677	18.41	554647	1519580	18.47
	TOTAL FEED			9273	25406	100.00	3002188	8225172	100.00
	PRODUCT STREAMS								
KTG	FCC Gasoline			5185	14206	55.92	1361184	3729271	45.34
KLC	FCC LCO			616	1686	6.64	207660	568930	6.92
KHC	FCC HCO			1239	3395	13.36	455690	1248466	15.18
CKE	FCC Cat Coke		551271	0	1	0.00	201214	551271	6.70
H2S	H2S (Lbs)		27625	24	66	0.26	10083	27625	0.34
F1S	Methane (Lbs & FOEB)		159863	221	606	2.38	58350	159863	1.94
F2S	Ethane (Lbs & FOEB)		127504	165	451	1.78	46538	127503	1.55
F2M	Ethylene (Lbs & FOEB)		93259	117	320	1.26	34039	93258	1.13
F3S	Propane (Lbs & FOEB)		29440	37	101	0.40	10745	29440	0.36
F3M	Propylene (Lbs & FOEB)		65653	80	219	0.86	23963	65653	0.80
U3S	Propane (Unsat.)			299	820	3.23	53152	145623	1.77
U3M	Propylene (Unsat.)			996	2728	10.74	181607	497554	6.05
U4I	Iso-butane (Unsat.)			580	1589	6.25	152222	417046	5.07
U4N	NC4 (Unsat.)			168	459	1.81	43994	120531	1.47
U4J	Iso C4= (Unsat.)			308	843	3.32	64536	176811	2.15
U4L	1/2 C4= (Unsat.)			612	1676	6.60	128532	352142	4.28
	TOTAL PRODUCT			10645	29165	114.80	3033510	8310986	101.04
	LOSS (GAIN)			-1372	-3760	-14.80	-31322	-85814	-1.04

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	2134	2134
CWR$	Cooling Water, MGal/D	8104	8104
STM$	MP Steam, MLbs/D	402	402
STL5	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	1117	1117
KWH$	Electricity, KWH/D	11036	11036

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BTU$	Fuel Fired, MBTU/D	1002401	1002401
MUW$	Make-up Water, MGal/D	64	64
KVV	FCC Conversion, Vol%	80.04	
KDE	FCC Feed Density	333.30	
KSL	FCC Feed Sulfur	0.7410	
KNI	FCC Feed Basic Nitrogen	0.0476	
KME	FCC Feed Metals	4.4130	
KRR	FCC Feed Concarbon	1.3000	

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MATERIAL BALANCE - CCR Reformer CRU-CR
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
ln# NHT LSR for Ref		1045	2862	97.08	280477	768431	97.03
hn# NHT HSR for Ref		31	86	2.92	8571	23482	2.97
TOTAL FEED		1076	2948	100.00	289048	791912	100.00
PRODUCT STREAMS							
L95 Lt. Ref 95 Sev.		179	491	16.66	50473	138281	17.46
L00 Lt. Ref 100 Sev.		691	1893	64.22	194538	532980	67.30
H00 Hvy Ref hn 100 Sev.		26	72	2.43	7544	20669	2.61
HYD H2 (MSCFD)	3341	63	172	5.83	6463	17706	2.24
HLS H2 (Unrec.)	753	14	39	1.31	1457	3992	0.50
F1S Methane (Lbs & FOEB)	11690	16	44	1.50	4267	11690	1.48
F2S Ethane (Lbs & FOEB)	14766	19	52	1.77	5389	14766	1.86
F3S Propane (Lbs & FOEB)	2458	3	8	0.29	897	2458	0.31
S3S Propane (Sat.)		45	123	4.18	7989	21889	2.76
S4I Iso-butane (Sat.)		23	63	2.13	4513	12365	1.56
S4N NC4 (Sat.)		30	82	2.79	6124	16779	2.12
TOTAL PRODUCT		1110	3040	103.11	289655	793575	100.21
LOSS (GAIN)		-34	-92	-3.11	-607	-1662	-0.21

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	112	112
CWR$	Cooling Water, MGal/D	315	315
STM$	MP Steam, MLbs/D	-201	-201
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	2417	2417
BTU$	Fuel Fired, MBTU/D	798939	798939
SWT$	Sour Water, MLbs/Day	0	
SVC	Average Reformate Severity	99.00	
cPF	Avg Paraffin Vol%	45.22	
cAR	Avg Aromatic Vol%	13.34	

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MATERIAL BALANCE - H2SO4 Alkylation SAA-SA
Single Refinery ONE YEAR

	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS						
C4I Iso-butane	675	1850	53.05	132926	364181	51.41
C4L 1/2 C4=	598	1638	46.95	125617	344155	48.59
TOTAL FEED	1273	3488	100.00	258543	708336	100.00
PRODUCT STREAMS						
AL7 C4 Alkylate	1040	2849	81.69	258542	708333	100.00
TOTAL PRODUCT	1040	2849	81.69	258542	708333	100.00
LOSS (GAIN)	233	639	18.31	1	3	0.00

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	1277	1277
CWR$	Cooling Water, MGal/D	20	20
STM$	MP Steam, MLbs/D	262	262
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	17292	17292
SWT$	Sour Water, MLbs/Day	0	

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MATERIAL BALANCE - Distillate HDS DHT-DH
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
HKA 557/ 566 (A)		50	137	1.84	15103	41378	1.82
LGA 566/ 645 (A)		93	255	3.44	28569	78272	3.43
LGB 566/ 645 (B)		568	1557	20.94	177518	486351	21.34
MKC 463/ 557 (C)		221	605	8.14	65920	180604	7.92
HKC 557/ 566 (C)		23	64	0.86	6976	19111	0.84
MKE 463/ 557 (E)		646	1770	23.81	191450	524521	23.02
HKE 557/ 566 (E)		113	310	4.17	33952	93018	4.08
MKF 463/ 557 (F)		14	39	0.53	4275	11714	0.51
HKF 557/ 566 (F)		55	150	2.02	16547	45335	1.99
LGF 566/ 645 (F)		500	1369	18.42	152160	416878	18.29
HYD H2 (MSCFD)	1278	24	66	0.88	2471	6771	0.30
K1# FCC LCO Pool		406	1111	14.95	136862	374965	16.45
TOTAL FEED		2713	7433	100.00	831805	2278917	100.00
PRODUCT STREAMS							
HNP Htr'd Naphtha		31	86	1.16	8169	22380	0.98
ddd DHT Product		1153	3158	42.48	352171	964852	42.34
jjj DHT Jet Product		1111	3045	40.97	330824	906367	39.77
111 DHT LCO product		403	1103	14.84	134372	368142	16.15
H2S H2S (Lbs)	13158	11	31	0.42	4803	13158	0.58
F1S Methane (Lbs & FOEB)	560	1	2	0.03	204	560	0.02
F2S Ethane (Lbs & FOEB)	456	1	2	0.02	167	456	0.02
S3S Propane (Sat.)		3	10	0.13	618	1693	0.07
S4I Iso-butane (Sat.)		2	7	0.09	492	1348	0.06
S4N NC4 (Sat.)		2	7	0.09	497	1362	0.06
TOTAL PRODUCT		2719	7450	100.23	832316	2280317	100.06
LOSS (GAIN)		-6	-17	-0.23	-511	-1400	-0.06

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	147	147
CWR$	Cooling Water, MGal/D	190	190
STM$	MP Steam, MLbs/D	30	30
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	5066	5066

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BTU$	Fuel Fired, MBTU/D	529846	529846
SWT$	Sour Water, MLbs/Day	0	
dsu	% Desulfurization	96.04	

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MATERIAL BALANCE - Naphtha HDS NHT-NH
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
HNP Htr'd Naphtha		31	86	2.92	8169	22380	2.83
LNA 292/ 316 (A)		147	402	13.62	40289	110380	13.96
LAA 180/ 292 (A)		441	1209	40.98	115379	316107	39.98
LNB 292/ 316 (B)		136	373	12.65	37006	101387	12.82
LNE 292/ 316 (E)		321	878	29.78	87699	240270	30.39
HYD H2 (MSCFD)	33	1	2	0.06	64	174	0.02
TOTAL FEED		1077	2950	100.00	288605	790699	100.00
PRODUCT STREAMS							
ncl NHT LSR for Ref		1045	2862	97.02	280477	768431	97.18
nch NHT HSR for Ref		31	86	2.92	8571	23482	2.97
H2S H2S (Lbs)	31	0	0	0.00	11	31	0.00
TOTAL PRODUCT		1076	2948	99.95	289059	791944	100.16
LOSS (GAIN)		1	2	0.05	-454	-1245	-0.16

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	59	59
CWR$	Cooling Water, MGal/D	76	76
STM$	MP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	2027	2027
BTU$	Fuel Fired, MBTU/D	212028	212028
SWT$	Sour Water, MLbs/Day	0	

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MATERIAL BALANCE - Sulfur Plant SUL-SU
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
HSS H2S fr Amine U (Lbs)	40814	35	97	100.00	14897	40814	100.00
TOTAL FEED		35	97	100.00	14897	40814	100.00
PRODUCT STREAMS							
SUL Sulfur	38413	35	97	100.00	14021	38413	94.12
TOTAL PRODUCT		35	97	100.00	14021	38413	94.12
LOSS (GAIN)		-0	-0	-0.00	876	2401	5.88

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	13	13
STM$	MP Steam, MLbs/D	-124	-124
STL$	LP Steam, MLbs/D	4	4
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	920	920
BTU$	Fuel Fired, MBTU/D	20993	20993
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	15	15

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MATERIAL BALANCE - Fuel System FUL-90
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
HFG Purch Nat Gas		182	499	18.29	48239	132163	10.46
CKE FCC Cat Coke	551271	0	1	0.02	201214	551271	43.62
HYD H2 (MSCFD)	2030	38	104	3.83	3928	10761	0.85
HLS H2 (Unrec.)	753	14	39	1.42	1457	3992	0.32
FOE Fuel Gas		665	1821	66.77	186264	510312	40.38
C4M Mixed C4=		96	264	9.67	20216	55386	4.38
TOTAL FEED		995	2727	100.00	461318	1263885	100.00
PRODUCT STREAMS							
TOTAL PRODUCT							
LOSS (GAIN)		995	2727	100.00	461318	1263885	100.00

OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
BTU$ Fuel Fired, MBTU/D	-16688610	-16688610
BTU$ Fuel Fired, MBTU/D	0	

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MATERIAL BALANCE - Fuel Pool
Single Refinery ONE YEAR

FUP-91

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
F1S Methane (Lbs & FOEB)	172113	238	652	35.82	62821	172113	33.76
F2S Ethane (Lbs & FOEB)	143861	186	509	27.97	52509	143860	28.22
F2M Ethylene (Lbs & FOEB)	93259	117	320	17.57	34039	93258	18.29
F3S Propane (Lbs & FOEB)	34925	44	120	6.60	12748	34925	6.85
F3M Propylene (Lbs & FOEB)	65653	80	219	12.04	23963	65653	12.88
TOTAL FEED		665	1821	100.00	186080	509809	100.00
PRODUCT STREAMS							
FOE Fuel Gas		665	1821	100.00	186264	510312	100.10
TOTAL PRODUCT		665	1821	100.00	186264	510312	100.10
LOSS (GAIN)		-0	-0	-0.00	-183	-503	-0.10

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MATERIAL BALANCE - General Utilities UTL-95
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
TOTAL FEED							
PRODUCT STREAMS							
TOTAL PRODUCT							

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	28	28
CWR$	Cooling Water, MGal/D	-27932	-27932
CWR$	Cooling Water, MGal/D	27932	27932
STM$	MP Steam, MLbs/D	0	
STM$	MP Steam, MLbs/D	0	
STL$	LP Steam, MLbs/D	-4	-4
STL$	LP Steam, MLbs/D	4	4
STH$	HP Steam, MLbs/D	-2286	-2286
STH$	HP Steam, MLbs/D	2286	2286
KWH$	Electricity, KWH/D	-122467	-122467
KWH$	Electricity, KWH/D	189368	189368
BTU$	Fuel Fired, MBTU/D	3418760	3418760
SWT$	Sour Water, MLbs/Day	-277	-277
SWT$	Sour Water, MLbs/Day	277	277
KWP$	Electricity	-39528	-39528
MUW$	Make-up Water, MGal/D	1172	1172
PWR$	Power	189368	189368
OXX$		0	

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MATERIAL BALANCE - COGEN Plant COG-CG
Single Refinery ONE YEAR

	------ VOLUME ------		PERCENT OF	------ WEIGHT ------		PERCENT OF
	.M Bbls	B/CD	INPUT	.M Lbs	L/CD	INPUT
FEED STREAMS						
TOTAL FEED						
PRODUCT STREAMS						
TOTAL PRODUCT						

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
STM$	MP Steam, MLbs/D	-1326	-1326
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	1169	1169
KWH$	Electricity, KWH/D	0	
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	19	19
PWK$		0	

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PetroPeru Base Case Refinery Upgrade

MATERIAL BALANCE - Amine (DEA) Unit ADM-AM
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
H2S H2S (Lbs)	40814	35	97	100.00	14897	40814	100.00
TOTAL FEED		35	97	100.00	14897	40814	100.00
PRODUCT STREAMS							
HSS H2S fr Amine U (Lbs)	40814	35	97	100.00	14897	40814	100.00
TOTAL PRODUCT		35	97	100.00	14897	40814	100.00

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	198	198
STM$	MP Steam, MLbs/D	214	214
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	916	916
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	94	94

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UTILITIES CONSUMPTION REPORT - .M Units
Single Refinery ONE YEAR

PROCESS UNIT	Fuel Mixed MBTU	Steam High psi M Lbs	Steam Med psi M Lbs	Steam Low psi M Lbs	Power ------ KWH	Water Cooling M Gal	Water Make-Up M Gal	Sour Water M Lbs	Cat & Chem $
CRD-DU Crude Tower #1	2664319		120		17746	3783	7	101	
VAC-VU Vacuum Tower #1	1243241		143		9617	1742	13		
SGP-SG Sats Gas Plant			1		96	170	0		5
UGP-UG Unsats Gas Plant			8		706	1250	1		37
KCC-KC FCCU (KC)	365876	408	147		4028	2958	23		779
CRU-CR CCR Reformer	291613		-73		882	115			41
SAA-SA H2SO4 Alkylation			96		6312	7			466
DHT-DH Distillate HDS	193394		11		1849	69			54
NHT-NH Naphtha HDS	77390				740	28			22
SUL-SU Sulfur Plant	7662		-45	1	336		5		5
MRJ-MJ Merox (Jet)					543				19
MRD-MD Merox (Diesel)					315				11
MRG-MG Merox (FCC Gasoline)					725				26
MRL-ML Merox (LPG)					470				17
FUL-90 Fuel System	-6091343								
UTL-95 General Utilities	1247847	-834		-1	-44700	-10195	428	-101	10
COG-CG COGEN Plant		427	-484				7		
ADM-AM Amine (DEA) Unit			78		334	72	34		
PURCHASES									
Units/CD							1420		4086
.M Units							518		1492
PRICE, $/unit							5.000		2.300
MARGINAL VALUE	0.001	1.046	0.993	1.046	0.045	0.245	5.000		2.300

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UTILITIES CONSUMPTION REPORT - .M Units
Single Refinery ONE YEAR

	Power Purch KWH	Power Generate KWH
PROCESS UNIT		
UTL-95 General Utilities	69119	
PURCHASES		
Units/CD	189368	
.M Units	69119	
PRICE, $/unit	0.045	
MARGINAL VALUE	0.045	0.045

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PetroPeru Base Case Refinery Upgrade

MATERIAL BALANCE - Sol Asp
Single Refinery ONE YEAR

BAP-AF

			Volume M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
	COMPONENTS					
VBF	1011+	(F)	111	303	100.00	9.2478
	TOTAL COMPONENTS		111	303	100.00	
	BLENDED PRODUCTS					
BAP	Sol Asp		110	300	99.01	9.3403
	TOTAL PRODUCT		110	300	99.01	

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MATERIAL BALANCE - Liq Asp
Single Refinery ONE YEAR

CAP-BP

			Volume .M, Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
COMPONENTS						
VBF	1011+	(F)	73	200	80.00	9.2478
55F	55/ 180	(F)	9	25	10.00	23.4600
LAF	180/ 292	(F)	5	13	5.00	23.4600
LNF	292/ 316	(F)	5	13	5.00	23.4600
	TOTAL COMPONENTS		91	250	100.00	
BLENDED PRODUCTS						
CAP	Liq Asp		91	250	100.00	12.0902
	TOTAL PRODUCT		91	250	100.00	

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MATERIAL BALANCE - Res Asp DAP-CP
Single Refinery ONE YEAR

			Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
COMPONENTS						
VBF	1011+	(F)	179	490	70.00	9.2478
NKF	321/ 375	(F)	26	70	10.00	29.0438
LKF	375/ 463	(F)	26	70	10.00	28.7506
MKF	463/ 557	(F)	26	70	10.00	28.3355
	TOTAL COMPONENTS		255	700	100.00	
BLENDED PRODUCTS						
DAP	Res Asp		255	700	100.00	15.0865
	TOTAL PRODUCT		255	700	100.00	

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LCU 01150A

MATERIAL BALANCE - C3/C4 LPG
Single Refinery ONE YEAR

B34-34

		Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
	COMPONENTS				
C3S	Propane	404	1106	20.24	24.1196
C3M	Propylene	996	2728	49.91	24.1196
C4N	Normal Butane	370	1015	18.56	2.7188
C4M	Mixed C4=	225	617	11.29	2.7188
	TOTAL COMPONENTS	1995	5465	100.00	
	BLENDED PRODUCTS				
B34	Mixed C3/C4	1985	5438	99.50	17.8200
	TOTAL PRODUCT	1985	5438	99.50	
	BLENDING PARAMETERS		LEVEL		
BBB	C4s in C3/C4 LPG		30.00		

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PRODUCT BLENDING - FCC Naphtha 1GP
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha	292	800	100.00	76654	210011	100.00	24.7723
TOTAL	292	800	100.00	76654	210011	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.089		0.150		
158 % Off at 158 F	VL	24.000	10.000			
250 % Off at 250 F	VL	61.000	50.000			
374 % Off at 374 F	VL	94.000	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	262.514		280.000		
ARO Aromatics Content	VL	33.000		35.000		
PFF Paraffins Content	VL	31.000		100.000		
NAP Naphthenes Content	VL	20.000		22.000		
RVI Reid Vapor Pressure Index	VL	130.540		139.460		
OLE Olefin Content, Vol%	VL	16.000		100.000		
BEN Benzene Content	VL	0.900		1.500		
PERFORMANCE CONTROLS						
R Research O.N.	VL	92.500	92.500			

COMPONENT QUALITIES

	DNX	SUL	RVI	ARO	OLE	PFF	NAP	158	250
kN# FCC Cat Naphtha	262.514	0.08891	130.540	33.0000	16.0000	31.0000	20.0000	24.0000	61.0000
	430	PBL	BEN	R00	M00	F00	R05	R10	R20
kN# FCC Cat Naphtha	100.000	.	0.90000	92.5000	81.1000	86.8000	95.0000	96.0000	97.0000
	M05	M10	M20	M30	F05	F10	F20	F30	
kN# FCC Cat Naphtha	83.6000	85.2000	86.0000	87.6000	89.3000	90.6000	91.5000	92.8000	

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PRODUCT BLENDING - Virgin Naphtha 2GR
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
55A	55/ 180	(A)	320	878	9.87	75423	206638	9.05	23.4600
LAA	180/ 292	(A)	251	687	7.72	65530	179533	7.87	23.4600
LAB	180/ 292	(B)	294	806	9.07	76873	210612	9.23	23.4600
55C	55/ 180	(C)	63	173	1.94	13957	38238	1.68	23.4600
LNC	292/ 316	(C)	48	133	1.49	12983	35569	1.56	23.4600
LAC	180/ 292	(C)	201	551	6.19	51376	140757	6.17	23.4600
LAE	180/ 292	(E)	1269	3478	39.11	334346	916016	40.13	
55F	55/ 180	(F)	240	659	7.41	56365	154424	6.77	23.4600
LNF	292/ 316	(F)	105	286	3.22	28294	77517	3.40	23.4600
LAF	180/ 292	(F)	453	1241	13.96	118028	323365	14.17	23.4600
BLENDING LOSS									
TOTAL			3245	8891	100.00	833174	2282667	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS							
SUL	Sulfur, Wt%	WT	0.001		0.050		
140	% Off at 140 F	VL	9.886		10.000		
248	% Off at 248 F	VL	60.300	50.000			
320	% Off at 320 F	VL	100.000	90.000			
338	% Off at 338 F	VL	100.000	99.900			
DNX	Density, Lb/bbl	VL	256.729	244.400	262.600		
ARO	Aromatics Content	VL	4.646	0.000			
PFF	Paraffins Content	VL	56.863	0.000			
NAP	Naphthenes Content	VL	38.119	0.000			
NAR	Naphthenes + Aromatics	VL	42.765	42.000			
RVI	Reid Vapor Pressure Index	VL	56.969		157.520		
OLE	Olefin Content, Vol%	VL	0.000		1.000		

COMPONENT QUALITIES

			DNX	SUL	NAP	ARO	PFF	OLE	RVI	140	248
55A	55/ 180	(A)	235.409	1.00E-3	16.9100	1.82900	81.2600	.	158.798	50.8650	100.000
LAA	180/ 292	(A)	261.506	10.00E-4	29.3900	15.3500	55.2600	.	18.8970	.	58.0770
LAB	180/ 292	(B)	261.153	.	40.6400	7.66200	50.9000	.	18.2970	.	43.8080
55C	55/ 180	(C)	221.222	.	14.4400	2.80200	82.7600	.	209.164	23.7480	100.000
LNC	292/ 316	(C)	267.760	3.10E-3	37.2200	3.24700	58.9900	.	1.86100	.	.
LAC	180/ 292	(C)	255.633	2.00E-4	26.6000	3.30800	69.8300	.	27.8700	.	59.8560
LAE	180/ 292	(E)	263.391	1.10E-3	56.3200	3.68800	39.5200	.	26.3340	.	53.1580
55F	55/ 180	(F)	234.402	.	15.6500	3.20700	80.7400	.	228.196	59.4210	100.000
LNF	292/ 316	(F)	270.576	9.60E-3	35.2100	3.67300	60.6400	.	3.97200	.	.
LAF	180/ 292	(F)	260.527	1.70E-3	26.4100	3.43100	69.8300	.	35.9410	.	58.1480

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- Virgin Naphtha 2GR
Single Refinery ONE YEAR

			338	NAR	R00	M00	F00	R05	R10	R20	R30
55A	55/ 180	(A)	100.000	18.7390	67.4170	65.9670	66.6920	71.3010	75.3060	79.5030	85.0820
LAA	180/ 292	(A)	100.000	44.7400	59.5150	60.2010	59.8580	62.0800	66.5070	71.1110	77.0660
LAB	180/ 292	(B)	100.000	48.3020	69.5760	66.7390	68.1575	71.5200	75.0720	78.7920	84.1340
55C	55/ 180	(C)	100.000	17.2420	70.4180	65.4480	67.9330	73.7670	77.5350	81.4920	86.9070
LNC	292/ 316	(C)	100.000	40.4670	53.1590	64.8480	59.0035	55.8660	60.9190	66.1570	72.5420
LAC	180/ 292	(C)	100.000	29.9080	61.7200	64.8220	63.2710	64.2150	68.4410	72.8420	78.6570
LAE	180/ 292	(E)	100.000	60.0080	69.0070	66.9370	67.9720	71.0100	74.6100	78.3780	83.7530
55F	55/ 180	(F)	100.000	18.8570	71.8410	73.9500	72.8955	74.9780	78.6330	82.4770	87.8140
LNF	292/ 316	(F)	100.000	38.8830	55.3800	67.5340	61.4570	58.0360	62.8610	67.8670	74.0970
LAF	180/ 292	(F)	100.000	29.8410	59.7590	68.7670	64.2630	62.3180	66.7220	71.3030	77.2420

			M10	M20	M30	F05	F10	F20	F30
55A	55/ 180	(A)	73.2140	77.1850	82.6900	70.3585	74.2600	78.3440	83.8860
LAA	180/ 292	(A)	66.0000	70.5300	76.4570	61.8605	66.2535	70.8205	76.7615
LAB	180/ 292	(B)	72.2700	75.8960	81.2450	70.1575	73.6710	77.3440	82.6895
55C	55/ 180	(C)	72.7390	76.7530	82.2900	71.3325	75.1370	79.1225	84.5985
LNC	292/ 316	(C)	70.6500	74.5190	80.0220	61.4025	65.7845	70.3380	76.2820
LAC	180/ 292	(C)	70.6270	74.4990	80.0040	65.5635	69.5340	73.6705	79.3305
LAE	180/ 292	(E)	72.4320	76.0340	81.3670	69.9960	73.5210	77.2060	82.5600
55F	55/ 180	(F)	80.4220	83.8490	88.9400	76.0735	79.5275	83.1630	88.3770
LNF	292/ 316	(F)	72.9140	76.4430	81.7300	63.7855	67.8875	72.1550	77.9135
LAF	180/ 292	(F)	73.8750	77.2580	82.4530	66.4780	70.2985	74.2805	79.8475

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PRODUCT BLENDING - Gasoline G-95 SP 3GS
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
sa# Alkyate Pool (SA)	256	703	33.39	63754	174669	31.71	29.3906
kN# FCC Cat Naphtha	345	944	44.87	90450	247809	44.99	24.7723
rf# Total Reformate	163	446	21.19	45851	125620	22.81	30.2777
55F 55/ 180 (F)	4	12	0.55	985	2700	0.49	23.4600
BLENDING LOSS							
TOTAL	768	2104	100.00	201041	550797	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.040		0.040		0.1630
158 % Off at 158 F	VL	17.913	10.000			
171 % Off at 171 F	VL	28.332		50.000		
244 % Off at 244 F	VL	67.683	50.000			
374 % Off at 374 F	VL	97.277	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	261.786		300.000		
ARO Aromatics Content	VL	22.986		45.000		
PFF Paraffins Content	VL	57.467		100.000		
RVI Reid Vapor Pressure Index	VL	100.473		155.703		
OLE Olefin Content, Vol%	VL	7.452		25.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	95.000	95.000			-0.2397

COMPONENT QUALITIES

	DNX	RVI	158	171	244	374	430	SUL	ARO
sa# Alkyate Pool (SA)	248.600	64.1960	4.90000	13.0000	60.0000	100.000	100.000	.	.
kN# FCC Cat Naphtha	262.514	130.540	24.0000	33.0000	60.0000	94.0000	100.000	0.08891	33.0000
rf# Total Reformate	281.729	90.6823	24.0464	41.0385	95.2227	99.8543	100.000	.	38.5149
55F 55/ 180 (F)	234.402	228.196	75.4450	89.0580	100.000	100.000	100.000	.	3.20700

	PFF	R00	M00	F00	R05	R10	R20	R30	M05
sa# Alkyate Pool (SA)	100.000	96.2000	92.7000	94.4500	98.2000	100.300	102.600	104.300	94.8000
kN# FCC Cat Naphtha	31.0000	92.5000	81.1000	86.8000	95.0000	96.0000	97.0000	98.0000	83.6000
rf# Total Reformate	45.8755	99.0000	88.8192	93.9096	101.268	102.428	103.865	104.793	92.1155
55F 55/ 180 (F)	80.7400	71.8410	73.9500	72.8955	74.9780	78.6330	82.4770	87.8140	77.1690

	M20	M30	F05	F10	F20	F30
sa# Alkyate Pool (SA)	92.0000	95.0000	96.5000	95.6500	97.3000	99.6500
kN# FCC Cat Naphtha	86.0000	87.6000	89.3000	90.6000	91.5000	92.8000
rf# Total Reformate	90.0000	92.0000	96.6919	95.7140	96.9323	98.3965
55F 55/ 180 (F)	83.8490	88.9400	76.0735	79.5275	83.1630	88.3770

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PRODUCT BLENDING - Gasoline 91 SP 4GU
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
sa# Alkyate Pool (SA)	784	2147	21.65	194788	533664	20.93	29.3906
kN# FCC Cat Naphtha	1594	4366	44.03	418347	1146155	44.95	24.7723
NGA Nat Gasoline	18	50	0.50	4424	12120	0.48	24.7246
rf# Total Reformate	547	1498	15.11	154062	422087	16.55	30.2777
55B 55/ 180 (B)	151	413	4.17	35348	96844	3.80	24.3890
55E 55/ 180 (E)	526	1442	14.54	123808	339199	13.30	24.2762
BLENDING LOSS							
TOTAL	3619	9916	100.00	930775	2550070	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.040		0.040		0.1630
158 % Off at 158 F	VL	29.374	10.000			
171 % Off at 171 F	VL	39.837		50.000		
244 % Off at 244 F	VL	72.986	50.000			
374 % Off at 374 F	VL	97.336	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	257.167		300.000		
ARO Aromatics Content	VL	20.591		45.000		
PFF Paraffins Content	VL	54.805		100.000		
RVI Reid Vapor Pressure Index	VL	122.100		155.703		
OLE Olefin Content, Vol%	VL	7.229		25.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	91.000	91.000			-0.2397

COMPONENT QUALITIES

	DNX	RVI	158	171	244	374	430	SUL	ARO
sa# Alkyate Pool (SA)	248.600	64.1960	4.90000	13.0000	60.0000	100.000	100.000	.	.
kN# FCC Cat Naphtha	262.514	130.540	24.0000	33.0000	60.0000	94.0000	100.000	0.08891	33.0000
NGA Nat Gasoline	242.400	198.230	75.0000	79.0000	96.0000	100.000	100.000	.	2.00000
rf# Total Reformate	281.729	90.6823	24.0464	41.0385	95.2227	99.8543	100.000	.	38.5149
55B 55/ 180 (B)	234.297	209.353	80.3450	91.6670	100.000	100.000	100.000	.	2.78300
55E 55/ 180 (E)	235.276	187.750	71.4290	83.0360	100.000	100.000	100.000	3.00E-4	0.79800
	PFF	R00	M00	F00	R05	R10	R20	R30	M05
sa# Alkyate Pool (SA)	100.000	96.2000	92.7000	94.4500	98.2000	100.300	102.600	104.300	94.8000
kN# FCC Cat Naphtha	31.0000	92.5000	81.1000	86.8000	95.0000	96.0000	97.0000	98.0000	83.6000
NGA Nat Gasoline	80.0000	76.9000	75.9000	76.4000	78.5000	82.6000	85.0000	86.0000	74.3000
rf# Total Reformate	45.8755	99.0000	88.8192	93.9096	101.268	102.428	103.865	104.793	92.1155
55B 55/ 180 (B)	62.3600	75.7200	71.8780	73.7990	78.3390	81.6840	85.2130	90.3310	75.1760
55E 55/ 180 (E)	65.8400	75.2710	73.3050	74.2880	77.9490	81.3300	84.8970	90.0410	76.5480

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- Gasoline 91 SP 4GU
Single Refinery ONE YEAR

			M20	M30	F05	F10	F20	F30
sa#	Alkyate Pool (SA)		92.0000	95.0000	96.5000	95.6500	97.3000	99.6500
kN#	FCC Cat Naphtha		86.0000	87.6000	89.3000	90.6000	91.5000	92.8000
NGA	Nat Gasoline		80.7000	83.5000	76.4000	79.6000	82.8500	84.7500
rf#	Total Reformate		90.0000	92.0000	96.6919	95.7140	96.9323	98.3965
55B	55/ 180	(B)	82.1250	87.3190	76.7575	80.1240	83.6690	86.8250
55E	55/ 180	(E)	83.3130	88.4370	77.2485	80.5870	84.1050	89.2390

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PRODUCT BLENDING - Gasoline 97 SP G3S
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha	34	93	15.38	8918	24434	14.49	24.7723
rf# Total Reformate	187	512	84.62	52642	144224	85.51	30.2777
BLENDING LOSS							
TOTAL	221	605	100.00	61560	168658	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.013		0.040		
158 % Off at 158 F	VL	24.039	10.000			
171 % Off at 171 F	VL	39.802		50.000		
244 % Off at 244 F	VL	89.804	50.000			
374 % Off at 374 F	VL	98.954	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	278.773		300.000		
ARO Aromatics Content	VL	37.666		45.000		
PFF Paraffins Content	VL	43.587		100.000		
RVI Reid Vapor Pressure Index	VL	96.814		155.703		
OLE Olefin Content, Vol%	VL	2.885		25.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	98.000	98.000			-0.8443

COMPONENT QUALITIES

	DNX	RVI	158	171	244	374	430	SUL	ARO
kN# FCC Cat Naphtha	262.514	130.540	24.0000	33.0000	60.0000	94.0000	100.000	0.08891	33.0000
rf# Total Reformate	281.729	90.6823	24.0464	41.0385	95.2227	99.8543	100.000	.	38.5149
	PFF	R00	M00	F00	R05	R10	R20	R30	M05
kN# FCC Cat Naphtha	31.0000	92.5000	81.1000	86.8000	95.0000	96.0000	97.0000	98.0000	83.6000
rf# Total Reformate	45.8755	99.0000	88.8192	93.9096	101.268	102.428	103.865	104.793	92.1155
	M20	M30	F05	F10	F20	F30			
kN# FCC Cat Naphtha	86.0000	87.6000	89.3000	90.6000	91.5000	92.8000			
rf# Total Reformate	90.0000	92.0000	96.6919	95.7140	96.9323	98.3965			

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PRODUCT BLENDING - Solvent 3 G4U
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
NKE	321/ 375	(E)	153	420	100.00	42962	117704	100.00	28.9027
.	TOTAL		153	420	100.00	42962	117704	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS							
SUL	Sulfur, Wt%	WT	0.002		0.100		
350	% Off at 350 F	VL	54.587	50.000			
374	% Off at 374 F	VL	98.214	90.000			
DNX	Density, Lb/bbl	VL	280.247		300.000		
OLE	Olefin Content, Vol%	VL	0.000		4.000		
FLI	Flash point index	VL	334.000		753.800		

COMPONENT QUALITIES

			DNX	SUL	350	374	FLI	OLE	R00	M00	F00
NKE	321/ 375	(E)	280.247	2.50E-3	54.5870	98.2140	334.000	.	61.8080	64.2000	63.0040
			R10	R20	R30	M05	M10	M20	M30	F05	F10
NKE	321/ 375	(E)	68.2630	72.0220	77.5160	68.5520	72.0840	75.7700	81.1530	66.5990	70.1735
			F30								
NKE	321/ 375	(E)	79.3345								

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PRODUCT BLENDING - Export FCC Naphtha 6GA
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha	2921	8003	100.00	766814	2100861	100.00	24.7723
TOTAL	2921	8003	100.00	766814	2100861	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.089		0.150		
158 % Off at 158 F	VL	24.000	10.000			
250 % Off at 250 F	VL	61.000	50.000			
374 % Off at 374 F	VL	94.000	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	262.514		280.000		
ARO Aromatics Content	VL	33.000		35.000		
PFF Paraffins Content	VL	31.000		100.000		
NAP Naphthenes Content	VL	20.000		22.000		
RVI Reid Vapor Pressure Index	VL	130.540		130.540		0.0453
OLE Olefin Content, Vol%	VL	16.000		100.000		
BEN Benzene Content	VL	0.900		1.500		
PERFORMANCE CONTROLS						
R Research O.N.	VL	92.500	91.500			

COMPONENT QUALITIES

	DNX	SUL	RVI	ARO	OLE	PFF	NAP	158	250
kN# FCC Cat Naphtha	262.514	0.08891	130.540	33.0000	16.0000	31.0000	20.0000	24.0000	61.0000
	430	PBL	BEN	R00	M00	F00	R05	R10	R20
kN# FCC Cat Naphtha	100.000	.	0.90000	92.5000	81.1000	86.8000	95.0000	96.0000	97.0000
	M05	M10	M20	M30	F05	F10	F20	F30	
kN# FCC Cat Naphtha	83.6000	85.2000	86.0000	87.6000	89.3000	90.6000	91.5000	92.8000	

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PRODUCT BLENDING - Kerosene 2KE
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
NKB	321/ 375	(B)	176	483	6.06	49367	135253	5.83	28.9280
LKB	375/ 463	(B)	410	1124	14.12	120106	329059	14.19	28.7791
MKB	463/ 557	(B)	496	1359	17.08	151112	414004	17.85	28.4181
HKB	557/ 566	(B)	50	138	1.73	15495	42452	1.83	28.1953
NKC	321/ 375	(C)	107	293	3.68	29603	81105	3.50	29.0058
LKC	375/ 463	(C)	201	551	6.92	58188	159419	6.87	28.8520
NKE	321/ 375	(E)	339	930	11.68	95087	260514	11.23	28.9027
LKE	375/ 463	(E)	371	1016	12.76	107040	293259	12.64	28.7228
LKF	375/ 463	(F)	433	1186	14.89	124661	341537	14.72	28.7506
MKF	463/ 557	(F)	322	882	11.09	96033	263103	11.34	28.3355
	TOTAL		2905	7960	100.00	846692	2319705	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
400	% Off at 400 F	VL	34.169	10.000			
DNX	*Density, Lb/bbl*	VL	291.420		310.000		
SUL	Sulfur, Wt%	WT	0.223		0.250		
FLI	Flash Point Index	VL	111.472		508.400		.
SMI	Smoke Pt Index	VL	56.000		56.000		0.0229

COMPONENT QUALITIES

			DNX	SUL	400	SMI	FLI
NKB	321/ 375	(B)	280.303	0.04310	100.000	45.3500	348.860
LKB	375/ 463	(B)	292.853	0.14980	23.3010	51.8400	67.1200
MKB	463/ 557	(B)	304.592	0.44990	.	67.5700	15.7300
HKB	557/ 566	(B)	308.254	0.59370	.	77.2800	6.47000
NKC	321/ 375	(C)	277.022	9.70E-3	100.000	41.9600	342.000
LKC	375/ 463	(C)	289.471	0.03690	23.1430	48.6600	66.8900
NKE	321/ 375	(E)	280.247	2.50E-3	100.000	46.4500	333.970
LKE	375/ 463	(E)	288.666	2.90E-3	27.2680	54.2900	71.7800
LKF	375/ 463	(F)	288.089	0.18390	29.4120	53.0800	73.9900
MKF	463/ 557	(F)	298.170	0.68550	.	71.1700	15.0000

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PetroPeru Base Case Refinery Upgrade

PRODUCT BLENDING - Turbo Jet A-1 3JA
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
NKE	321/ 375	(E)	136	373	13.92	38144	104505	13.50	28.9027
LKE	375/ 463	(E)	681	1867	69.70	196708	538925	69.61	28.7228
MKF	463/ 557	(F)	160	439	16.37	47728	130762	16.89	28.3355
BLENDING LOSS									
TOTAL			978	2678	100.00	282580	774191	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
400	% Off at 400 F	VL	32.929	10.000			
DNX	Density, Lb/bbl	VL	289.050	271.620	289.050		0.0190
SUL	Sulfur, Wt%	WT	0.118		0.300		
FLI	Flash Point Index	VL	98.987		636.900		
ARO	Aromatics Content	VL	11.850		22.000		
SMI	Smoke Pt Index	VL	55.962		56.000		
OLE	Olefin content	VL	0.000		5.000		
FZI	Freeze Point Index	VL	1.547		1.547		0.0376

COMPONENT QUALITIES

			DNX	SUL	ARO	OLE	400	SMI	FLI	FZI
NKE	321/ 375	(E)	280.247	2.50E-3	8.13000	.	100.000	46.4500	333.970	0.18000
LKE	375/ 463	(E)	288.666	2.90E-3	9.80000	.	27.2680	54.2900	71.7800	0.72000
MKF	463/ 557	(F)	298.170	0.68550	23.7400	.	.	71.1700	15.0000	6.23000

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PetroPeru Base Case Refinery Upgrade

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PRODUCT BLENDING - No. 2 Diesel 5D2
Single Refinery ONE YEAR

COMPONENT		VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
dD# DHT SR Product		1153	3158	20.29	352171	964852	20.35	28.9314
dJ# DHT Jet Product		1111	3045	19.56	330824	906367	19.12	29.1576
dF# DHT LCO product		403	1103	7.08	134372	368142	7.77	27.3371
LGA 566/ 645	(A)	326	894	5.74	100021	274031	5.78	27.1564
LGC 566/ 645	(C)	390	1069	6.87	118192	323814	6.83	27.4314
LVC 645/ 697	(C)	175	479	3.07	53824	147462	3.11	26.0580
MKE 463/ 557	(E)	521	1427	9.17	154396	423003	8.92	28.8814
LGE 566/ 645	(E)	1018	2788	17.91	306686	840236	17.72	28.9464
LVE 645/ 697	(E)	585	1603	10.30	179986	493112	10.40	28.5957
BLENDING LOSS								
TOTAL		5682	15566	100.00	1730471	4741018	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES						
DNX Density, Lb/bbl	VL	304.566		340.000		
SUL Sulfur, Wt%	WT	0.050		0.050		0.0347
PPX Pour Point Index (Hu)	VL	485.215		1002.200		
V00 Vis. Index at 100 F	VL	44.808	43.680	59.220		
FLI Flash Point Index	VL	8.525		266.200		
CTI Cetane Index	VL	47.000	47.000			-0.0757
K1# FCC LCO Pool	%	0.00		10.00		

COMPONENT QUALITIES

	DNX	PPX	SUL	CTI	FLI	V00	K1#
dD# DHT SR Product	305.540	404.937	0.01567	47.3680	4.63098	41.9772	.
dJ# DHT Jet Product	297.642	230.708	5.70E-3	49.1211	13.5458	50.1548	.
dF# DHT LCO product	333.821	360.362	0.03353	28.6001	25.0018	50.6415	.
LGA 566/ 645 (A)	306.488	763.343	0.17680	46.7500	4.72000	45.0270	.
LGC 566/ 645 (C)	302.895	358.673	0.16380	48.3700	4.34000	43.5850	.
LVC 645/ 697 (C)	308.170	738.317	0.27990	46.6500	2.61000	38.1420	.
MKE 463/ 557 (E)	296.379	229.995	0.01120	46.4800	15.3400	51.5450	.
LGE 566/ 645 (E)	301.339	562.922	0.03230	50.1600	4.70000	42.5020	.
LVE 645/ 697 (E)	307.537	1158.33	0.06040	49.2000	2.59000	36.9160	.

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PRODUCT BLENDING - MF80 Fuel Oil 6R4
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
Kh# FCC HCO Pool			41	113	40.44	15198	41639	43.96	15.9358
HNA	316/ 321	(A)	0	1	0.33	93	254	0.27	41.0373
VBE	1011+	(E)	8	21	7.37	2615	7164	7.56	12.8232
LVF	645/ 697	(F)	50	138	49.41	15744	43135	45.54	22.6256
VBF	1011+	(F)	3	7	2.46	923	2529	2.67	9.2478
BLENDING LOSS									
TOTAL			102	280	100.00	34573	94722	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
DNX	Density, Lb/bbl	VL	338.291		360.000		
SUL	Sulfur, Wt%	WT	1.500		1.500		0.0008
PPX	Pour Point Index (Hu)	VL	2394.500		2394.500		
VBF	RFO Vis. Index @122F	VL	0.388		0.388		23.9702
FLI	Flash Point Index	VL	3.564		154.900		
MET	Metals Content,PPM	VL	48.753		230.000		
CRC	W % Conradson Carbon	VL	4.073		14.000		

COMPONENT QUALITIES

			DNX	SUL	VBF	PPX	FLI	CRC	MET
Kh# FCC HCO Pool			367.759	1.73716	0.51000	2681.00	0.50000	6.00000	60.0000
HNA	316/ 321	(A)	275.952	1.00E-3	-0.52000	10.8680	611.000	.	.
VBE	1011+	(E)	347.237	0.39660	0.65600	5452.84	0.76000	13.4000	22.8200
LVF	645/ 697	(F)	311.811	1.39800	0.23500	1250.16	2.59000	0.01000	0.05000
VBF	1011+	(F)	367.269	2.61100	0.77800	11825.9	0.76000	26.6100	926.300

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PRODUCT BLENDING - PI6 Fuel Oil 7R5
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
Kh# FCC HCO Pool			206	566	17.96	75935	208041	19.11	15.9358
NKA	321/ 375	(A)	169	463	14.69	47020	128821	11.83	40.7286
NKB	321/ 375	(B)	57	157	4.97	16028	43913	4.03	28.9280
VBC	1011+	(C)	331	906	28.77	116558	319336	29.33	11.3212
VBF	1011+	(F)	386	1059	33.60	141898	388761	35.70	9.2478
BLENDING LOSS									
TOTAL			1150	3150	100.00	397438	1088871	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
DNX	Density, Lb/bbl	VL	345.673		360.000		
SUL	Sulfur, Wt%	WT	1.500		1.500		0.0008
VBF	RFO Vis. Index @122F	VL	0.483	0.396	0.483		23.9702
FLI	Flash Point Index	VL	68.770		154.900		
MET	Metals Content,PPM	VL	347.408		400.000		
CRC	W % Conradson Carbon	VL	14.467		25.000		

COMPONENT QUALITIES

			DNX	SUL	VBF	FLI	CRC	MET
Kh# FCC HCO Pool			367.759	1.73716	0.51000	0.50000	6.00000	60.0000
NKA	321/ 375	(A)	278.313	1.00E-3	-0.50700	346.100	.	.
NKB	321/ 375	(B)	280.303	0.04310	-0.01500	348.860	.	.
VBC	1011+	(C)	352.368	0.79800	0.71400	0.76000	15.4600	88.1500
VBF	1011+	(F)	367.269	2.61100	0.77800	0.76000	26.6100	926.300

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PRODUCT BLENDING - PI500 Fuel Oil BR6
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
sD# SR Distllate			367	1004	41.85	117143	320940	39.22	22.2920
HNA	316/ 321	(A)	28	77	3.23	7796	21359	2.61	41.0373
VBC	1011+	(C)	197	541	22.53	69538	190516	23.28	11.3212
VBF	1011+	(F)	284	777	32.40	104225	285547	34.89	9.2478
BLENDING LOSS									
TOTAL			876	2400	100.00	298702	818361	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
DNX	Density, Lb/bbl	VL	340.984		360.000		
SUL	Sulfur, Wt%	WT	1.500		1.500		0.0008
VBF	RFO Vis. Index @122F	VL	0.502	0.494	0.502		23.9702
FLI	Flash Point Index	VL	21.210		108.500		
MET	Metals Content,PPM	VL	319.936		400.000		
CRC	W % Conradson Carbon	VL	12.103		25.000		

COMPONENT QUALITIES

			DNX	SUL	VBF	FLI	CRC	MET
sD# SR Distllate			319.521	1.02800	0.25300	2.60000	.	.
HNA	316/ 321	(A)	275.952	1.00E-3	-0.52000	611.000	.	.
VBC	1011+	(C)	352.368	0.79800	0.71400	0.76000	15.4600	88.1500
VBF	1011+	(F)	367.269	2.61100	0.77800	0.76000	26.6100	926.300

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
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PRODUCT BLENDING - PI6 Export 9R7
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
Kl# FCC LCO Pool			210	575	3.05	70797	193965	2.97	25.8870
Kh# FCC HCO Pool			991	2716	14.43	364557	998786	15.27	15.9358
NKA	321/ 375	(A)	87	240	1.27	24333	66667	1.02	40.7286
LKA	375/ 463	(A)	465	1273	6.76	132770	363754	5.56	37.9320
MKA	463/ 557	(A)	513	1405	7.46	152046	416565	6.37	29.2082
HNB	316/ 321	(B)	27	74	0.40	7460	20439	0.31	29.5239
VBB	1011+	(B)	2089	5722	30.40	784295	2148753	32.86	9.4048
HNC	316/ 321	(C)	11	30	0.16	2939	8051	0.12	29.2606
VBC	1011+	(C)	114	311	1.65	40038	109694	1.68	11.3212
HNE	316/ 321	(E)	63	172	0.91	17270	47314	0.72	29.3873
VBE	1011+	(E)	827	2265	12.03	287093	786557	12.03	12.8232
HNF	316/ 321	(F)	23	63	0.34	6303	17268	0.26	29.5952
NKF	321/ 375	(F)	245	672	3.57	68233	186941	2.86	29.0438
LVF	645/ 697	(F)	265	725	3.85	82482	225978	3.46	22.6256
VBF	1011+	(F)	942	2581	13.71	346009	947970	14.50	9.2478
BLENDING LOSS									
TOTAL			6871	18825	100.00	2386626	6538701	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
DNX	Density, Lb/bbl	VL	347.345		360.000		
SUL	Sulfur, Wt%	WT	1.500		1.500		0.0008
VBF	RFO Vis. Index @122F	VL	0.483	0.396	0.483		23.9702
FLI	Flash Point Index	VL	34.147		154.900		
MET	Metals Content,PPM	VL	400.000		400.000		
CRC	W % Conradson Carbon	VL	16.702		25.000		

COMPONENT QUALITIES

			DNX	SUL	VBF	FLI	CRC	MET
Kl# FCC LCO Pool			337.381	1.10672	0.10240	25.0000	.	2.00000
Kh# FCC HCO Pool			367.759	1.73716	0.51000	0.50000	6.00000	60.0000
NKA	321/ 375	(A)	278.313	1.00E-3	-0.50700	346.100	.	.
LKA	375/ 463	(A)	285.637	5.60E-3	-0.39000	69.1700	.	.
MKA	463/ 557	(A)	296.477	0.05490	-0.02600	15.0400	.	.
HNB	316/ 321	(B)	274.448	0.02680	-0.04000	611.000	.	.
VBB	1011+	(B)	375.524	2.15600	0.77700	0.76000	33.9500	855.600
HNC	316/ 321	(C)	270.674	4.80E-3	-0.02900	611.000	.	.
VBC	1011+	(C)	352.368	0.79800	0.71400	0.76000	15.4600	88.1500
HNE	316/ 321	(E)	275.840	2.60E-3	-0.03400	611.000	.	.
VBE	1011+	(E)	347.237	0.39660	0.65600	0.76000	13.4000	22.8200
HNF	316/ 321	(F)	272.255	0.01750	-0.04300	611.000	.	.
NKF	321/ 375	(F)	278.009	0.04860	-0.02000	323.580	.	.

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FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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- PI6 Export 9R7
Single Refinery ONE YEAR

LVF	645/ 697	(F)	311.811	1.39800	0.23500	2.59000	0.01000	0.05000
VBF	1011+	(F)	367.269	2.61100	0.77800	0.76000	26.6100	926.300

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION

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PetroPeru Base Case Refinery Upgrade

I N D E X

REPORT	DESCRIPTION	PAGE	LOC'N	PERIOD
01010	ECONOMIC REPORT	1	.	A
01020	PROCESS-UNIT INVESTMENT REPORT	2	.	A
01250	PLANT INPUT/OUTPUT REPORT	4	1	A
01080	PURCHASES/SALES REPORT	6	.	A
BR	Raw Material Purchases	6	.	A
SA	Product Sales	7	.	A
01100	PROCESS UTILIZATION REPORT	8	1	A
01310	MATERIAL BALANCE	10	1	A
DU	Crude Tower #1	10	1	A
VU	Vacuum Tower #1	11	1	A
SG	Sats Gas Plant	12	1	A
UG	Unsats Gas Plant	13	1	A
KC	FCCU (KC)	14	1	A
CR	CCR Reformer	16	1	A
SA	H2SO4 Alkylation	17	1	A
DH	Distillate HDS	18	1	A
NH	Naphtha HDS	20	1	A
SU	Sulfur Plant	21	1	A
90	Fuel System	22	1	A
91	Fuel Pool	23	1	A
95	General Utilities	24	1	A
CG	COGEN Plant	25	1	A
AM	Amine (DEA) Unit	26	1	A
01030	UTILITIES CONSUMPTION REPORT	27	1	A
01150	RECIPE-MATERIAL BALANCE	29	1	A
.AP	Sol Asp	29	1	A
.BP	Liq Asp	30	1	A
.CP	Res Asp	31	1	A
.34	C3/C4 LPG	32	1	A
01320	PRODUCT BLENDING	33	1	A
1GP	FCC Naphtha	33	1	A
2GR	Virgin Naphtha	34	1	A
3GS	Gasoline G-95 SP	36	1	A
4GU	Gasoline 91 SP	37	1	A
G3S	Gasoline 97 SP	39	1	A
G4U	Solvent 3	40	1	A
6GA	Export FCC Naphtha	41	1	A
01340	PRODUCT BLENDING	42	1	A
2KE	Kerosene	42	1	A
3JA	Turbo Jet A-1	43	1	A
5D2	No. 2 Diesel	44	1	A
6R4	MF80 Fuel Oil	45	1	A
7R5	PI6 Fuel Oil	46	1	A
8R6	PI500 Fuel Oil	47	1	A
9R7	PI6 Export	48	1	A

APPENDIX A.7 – LP MODEL REPORT FILES – HYDROCRACKER AND HYDROGEN PLANT CASE

This appendix contains the report files from the Haverly Systems GRTMPS LP models for the hydrocracker and hydrogen plant case.

Hydrocracker TIC Includes capital investment costs

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

DATE: 12 AUG 02
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PetroPeru Coker Case Refinery Upgrade

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LCU 01010

ECONOMIC REPORT
ONE YEAR

	ACCOUNTING CATEGORY	.M $	.. $/CD
SAX	Product Values - Sales	814318	2231008
BRX	Raw Material Costs	-659793	-1807653
UTP	Utilities Costs	-13235	-36261
	TOTAL VARIABLE REVENUES	814318	2231008
	TOTAL VARIABLE COSTS	-673028	-1843913
	GROSS VARIABLE INCOME	141290	387095
	INCOME TAX	42387	116128
IVS	Investment less credits	-146558	-401528
DPR	Depreciation tax credits	2198	6023
	NET PRESENT VALUE (I=15.00 PCT)	70470	193067

****SOLUTION STATUS: OPTIMAL AFTER 3460 ITERATIONS
CASE 1a: 3 RECURSION PASSES

CASE 1a: THE MODEL CONVERGED ON BOTH DISTRIBUTIONS AND PROPERTIES

PetroPeru Refinery Upgrade Study
Talara Refinery Modifications Project
A Foster Wheeler USA Study
Upgraded Refinery With Visbreaker
Includes Catalytic Reforming, NHT
Hydrocracker, Alkylation, Diesel HDS,
SRU & ARU
Assumed CDU revamp to 90,000 BPSD
Potential to revamp VDU and FCC included
Year 2007 Basis
3 Grades of Gasoline (No Unleaded)
Incestment Costs Included

****SYSTEM NAME : GRTMPS - III
****SYSTEM VERSION: VER 3.02.006

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PetroPeru Coker Case Refinery Upgrade

PROCESS-UNIT INVESTMENT REPORT
ONE YEAR

--PROCESS INVESTMENT--		(NO)	------LOCATION------	PURCHASED CAPACITY B/SD	TOTAL INVESTMENT (INCL. OFFSITES) .M $	$/BBL	ADDED LABOR MEN/SHIFT
NHT	Naphtha Hydrotreater	1	Single Refinery	5293	13269	2507	
CRU	CCR	1	Single Refinery	5293	26254	4960	
HYD	Hydrogen Plant	1	Single Refinery	31085	17209	554	
SUL	Sulfur + TGT + ARU	1	Single Refinery	79478	17391	219	
SAA	H2SO4 Alkylation	1	Single Refinery	2269	13731	6051	
HYK	Hydrocracker	1	Single Refinery	18484	58704	3176	
	*** GRAND TOTAL				146558		

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PetroPeru Coker Case Refinery Upgrade

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PLANT INPUT/OUTPUT REPORT
Single Refinery ONE YEAR

		PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	STOCK LIMITS MIN	STOCK LIMITS MAX B/CD	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT	STOCK L MIN L/CD
	PLANT INPUT										
HFG	Purch Nat Gas		1226	3360	3.67		100000	325014	890448	3.14	26
NGA	Nat Gasoline		18	50	0.05		50	4424	12120	0.04	
HOB	High Octane BldSt		120	329	0.36		4530	32209	88245	0.31	1
cui	Cuisia39		2027	5554	6.06		50000	587095	1608480	5.67	14
lor	Loreto19		7098	19446	21.23		25000	2335694	6399162	22.55	8
may	Mayna25		4015	11000	12.01		11000	1264111	3463317	12.20	3
mes	Mesa30		444	1216	1.33		38000	136062	372773	1.31	11
ONO	MIXTURE		10147	27800	30.36		27800	3014988	8260242	29.11	8
ori	Orient23		8331	22824	24.92		50000	2658422	7283349	25.67	15
	TOTAL		33426	91579	100.00			10358020	28378137	100.00	
	PLANT OUTPUT										
SUL	Sulfur	75504	70	191	0.21			27559	75504	0.27	
B34	C3/C4 LPG		1395	3822	4.17		5700	260432	713512	2.51	1
1GP	FCC Naphtha		292	800	0.87	800	800	76488	209556	0.74	209556
2GR	Virgin Naphtha		3577	9801	10.70			918536	2516537	8.87	
3GS	Gasoline G-95 SP		768	2104	2.30		2104	207728	569118	2.01	
4GU	Gasoline 91 SP		3619	9916	10.83		9916	918009	2515094	8.86	2
G3S	Gasoline 97 SP		221	605	0.66		605	59077	161855	0.57	
G4U	Solvent 3		153	420	0.46		420	42915	117574	0.41	
G5M	Export Gasoline		1485	4069	4.44			402744	1103408	3.89	
2KE	Kerosene		2905	7960	8.69		7960	831399	2277806	8.03	2
3JA	Turbo Jet A-1		1055	2890	3.16		2890	301887	827087	2.91	
5D2	No. 2 Diesel		7896	21632	23.62		33000	2294803	6287131	22.15	9
6R4	MF80 Fuel Oil		29	80	0.09	80	280	9401	25756	0.09	25756
7R5	PI6 Fuel Oil		1150	3150	3.44		3150	389400	1066849	3.76	1
8R6	PI500 Fuel Oil		876	2400	2.62		2400	300989	824628	2.91	
9R7	PI6 Export		7754	21243	23.20			2619002	7175349	25.28	
BAP	Solid Asphalt		110	300	0.33		300	40216	110181	0.39	
CAP	Liquid Asphalt		91	250	0.27		250	31373	85953	0.30	
DAP	Res Asphalt		255	700	0.76		700	87768	240461	0.85	
	TOTAL		33702	92333	100.82			9819726	26903360	94.80	
	PROCESS FUEL USED										
HLA	H2 (Unrec.)	1	22	61	0.07			2298	6296	0.02	
HFA	Purch Nat Gas		782	2141	2.34			207134	567491	2.00	
FEA	Plant Fuel Gas		382	1048	1.14			107179	293640	1.03	
CKA	KCC Coke Burn	194	0	0	0.00			70786	193933	0.68	
COA	CO2 (H2 Plt)	166	0	0	0.00			60753	166446	0.59	

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FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PetroPeru Coker Case Refinery Upgrade

PLANT INPUT/OUTPUT REPORT (CONT.)
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	STOCK LIMITS MIN	STOCK LIMITS MAX B/CD	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT	STOCK MIN L/CD
TOTAL		1186	3251	3.55			448149	1227806	4.33	
GRAND TOTAL		34888	95584	104.37			10267875	28131166	99.13	
PLANT GAIN		1462	4005	4.37						
PLANT LOSS							90145	246971	0.87	

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PetroPeru Coker Case Refinery Upgrade

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LCU 01080

Raw Material Purchases
ONE YEAR

STOCK		LOCATION	PER DAY ACTUAL UNITS	Volume .M Bbls	Volume B/CD	UNIT PRICE $/BBL	UNIT PRICE C/Gal	MARGINAL VALUE $/BBL	MARGINAL VALUE C/Gal	INCREA INCENT $/BBL
HFG	Purch Nat Gas	1 Single Refinery		1226	3360	3.85	9.17	3.85	9.17	-0.00
NGA	Nat Gasoline	1 Single Refinery		18	50	19.75	47.02	22.54	53.67	2.79
HOB	High Octane BldStk	1 Single Refinery		120	329	33.50	79.76	33.50	79.76	-0.00
cui	Cuisia39	1 Single Refinery		2027	5554	24.53	58.40	24.53	58.40	-0.00
lor	Loreto19	1 Single Refinery		7098	19446	17.77	42.31	18.39	43.79	0.62
may	Mayna25	1 Single Refinery		4015	11000	20.47	48.74	22.73	54.12	2.26
mes	Mesa30	1 Single Refinery		444	1216	22.98	54.71	22.98	54.71	-0.00
ONO	MIXTURE	1 Single Refinery		10147	27800	22.51	53.60	24.19	57.61	1.68
ori	Orient23	1 Single Refinery		8331	22824	18.49	44.02	18.49	44.02	-0.00
		**GRAND TOTAL		33426	91579					

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

DATE: 12 AUG 02
TIME: 15:37 HRS

PetroPeru Coker Case Refinery Upgrade

Product Sales
ONE YEAR

STOCK	LOCATION	PER DAY ACTUAL UNITS	Volume .M Bbls	Volume B/CD	UNIT PRICE $/BBL	UNIT PRICE C/Gal	MARGINAL VALUE $/BBL	MARGINAL VALUE C/Gal	INCREM INCENT $/BBL
@ SUL Sulfur	1 Single Refinery	75504	70	191	0.02	0.05	0.02	0.05	
B34 C3/C4 LPG	1 Single Refinery		1395	3822	17.82	42.43	17.82	42.43	0.00
1GP FCC Naphtha	1 Single Refinery		292	800	24.79	59.02	26.42	62.91	-1.63
2GR Virgin Naphtha	1 Single Refinery		3577	9801	23.46	55.86	23.46	55.86	0.00
3GS Gasoline G-95 SP	1 Single Refinery		768	2104	30.61	72.88	27.05	64.39	3.56
4GU Gasoline 91 SP	1 Single Refinery		3619	9916	28.90	68.81	26.05	62.02	2.85
G3S Gasoline 97 SP	1 Single Refinery		221	605	31.46	74.90	30.83	73.40	0.63
G4U Solvent 3	1 Single Refinery		153	420	54.63	130.07	28.44	67.71	26.19
G5M Export Gasoline	1 Single Refinery		1485	4069	26.05	62.02	26.05	62.02	0.00
2KE Kerosene	1 Single Refinery		2905	7960	28.77	68.50	28.46	67.75	0.31
3JA Turbo Jet A-1	1 Single Refinery		1055	2890	28.77	68.50	28.46	67.75	0.31
5D2 No. 2 Diesel	1 Single Refinery		7896	21632	28.54	67.95	28.54	67.95	0.00
6R4 MF80 Fuel Oil	1 Single Refinery		29	80	20.10	47.86	22.61	53.84	-2.51
7R5 PI6 Fuel Oil	1 Single Refinery		1150	3150	18.19	43.31	16.65	39.64	1.54
8R6 PI500 Fuel Oil	1 Single Refinery		876	2400	17.59	41.88	16.34	38.91	1.25
9R7 PI6 Export	1 Single Refinery		7754	21243	16.65	39.64	16.65	39.64	0.00
BAP Solid Asphalt	1 Single Refinery		110	300	27.50	65.48	5.52	13.14	21.98
CAP Liquid Asphalt	1 Single Refinery		91	250	28.99	69.02	8.94	21.29	20.05
DAP Res Asphalt	1 Single Refinery		255	700	18.33	43.64	12.39	29.51	5.94
		**GRAND TOTAL	33702	92333					

@ ... REPORTED MONETARY VALUES PER ACTUAL STREAM UNITS

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PROCESS UTILIZATION REPORT
Single Refinery ONE YEAR

----PROCESS UNIT----	----PROCESS LIMIT----	OPERATING RATE .M Bbls	OPERATING RATE B/CD	UNUSED CAPACITY .M Bbls	UNUSED CAPACITY B/CD	PCT OF MAX CAPACITY	EXPANSION INCENTIVE $/BBL
CRD-DU Crude Tower #1	CRD Feed	32062	87840			100.0	2.154
VAC-VU Vacuum Tower #1	VAC Feed	14914	40860	1876	5140	88.8	
WAC-WU Vacuum Tower #2	WAC Feed	711	1948	107	292	87.0	-0.196
SGP-SG Sats Gas Plant	SGP Feed	1007	2760				
UGP-UG Unsats Gas Plant	UGP Feed	1358	3721				
FCC-FC FCCU (Total)	FCC Total Feed	4196	11496				-1.130
	KCC Feed (KC)	4196	11496				
	OKC CO Boiler (KC)	42733	117078				
HYK-HK Hydrocracker	HYK Total Feed	6409	17560				1.225
	HHK High Sev						
	MHK Med. Sev	5309	14545				
	LHK Low Sev	1100	3014				
TNS-TN Naphtha Splitter	TNS Feed						
CRU-CR CCR Reformer	CRU Feed	1835	5028				2.329
SRU-SR LP SR Reformer	SRU Feed						
SAA-SA H2SO4 Alkylation	SAA Alkylate product	787	2156				2.717
DHT-DH Distillate HDS	DHT Total Capacity						1.495
	DHD SR Diesel Feed						
	DHJ Jet/Kero Feed						
	DHC FCC Stk.						
	DHc Coker Stk.						
NHT-NH Naphtha HDS	NHT Total feed	1835	5028				1.035
	NHL Lt Vir Naphtha						
	NHC Hvy Vir Naphtha	1835	5028				
	NHZ Hvy Coker Naphtha						
	NHA Lt Coker Naphtha						
HYD-H2 Hydrogen Plant	HYD Total MSCF H2	10779	29530				0.252
	H2A via plant fuel						
	H2B via LPG						
	H2C via naphtha						
	H2D via purch gas	10779	29530				
SUL-SU Sulfur Plant	SUL Feed	27559	75504				0.039

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PROCESS UTILIZATION REPORT (CONT.)
Single Refinery ONE YEAR

----PROCESS UNIT----	----PROCESS LIMIT----	OPERATING RATE .M Bbls	OPERATING RATE B/CD	UNUSED CAPACITY .M Bbls	UNUSED CAPACITY B/CD	PCT OF MAX CAPACITY	EXPANSION INCENTIVE $/BBL
MRJ-MJ Merox (Jet)	MRJ Feed	2886	7907	997	2732	74.3	
MRD-MD Merox (Diesel)	MRD Feed	3057	8375	292	799	91.3	
MRG-MG Merox (FCC Gasoline)	MRG Feed	2412	6609				
MRL-ML Merox (LPG)	MRL Feed	2365	6481				
FUL-90 Fuel System	PFO Fuel Oil						
	FLR Flare						
UTL-95 General Utilities	STM MP Steam (Mlbs)	772	2114				
	STL LP Steam (Mlbs)	3	7				
	STH HP Steam (Mlbs)	69	189				
	SWT Sour Water (Mlbs)	101	277				
	VNT Steam Vent						
	KWH Power (kwh)	144846	396838				
	CWR Cooling H2O (MGal)	11421	31290				
	KWT Condensing Turbine						0.066
ADM-AM Amine (DEA) Unit	ADM Amine Unit (GPM)	78	213				

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MATERIAL BALANCE - Crude Tower #1 CRD-DU
Single Refinery ONE YEAR

		PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
	FEED STREAMS							
cui	Cuisia39		2027	5554	6.32	587095	1608480	5.87
lor	Loreto19		7098	19446	22.14	2335694	6399162	23.37
may	Mayna25		4015	11000	12.52	1264111	3463317	12.65
mes	Mesa30		444	1216	1.38	136062	372773	1.36
ONO	MIXTURE		10147	27800	31.65	3014988	8260242	30.16
ori	Orient23		8331	22824	25.98	2658422	7283349	26.59
	TOTAL FEED		32062	87840	100.00	9996373	27387323	100.00
	PRODUCT STREAMS							
F2S	Ethane (Lbs & FOEB)	508	1	2	0.00	185	508	0.00
F3S	Propane (Lbs & FOEB)	2355	3	8	0.01	859	2355	0.01
S3S	Propane (Sat.)		43	119	0.14	7721	21153	0.08
S4I	Iso-butane (Sat.)		54	148	0.17	10599	29038	0.11
S4N	NC4 (Sat.)		141	387	0.44	28872	79102	0.29
S5	55/ 180		1221	3346	3.81	286045	783685	2.86
LN	292/ 316		724	1983	2.26	197071	539919	1.97
LA	180/ 292		2719	7449	8.48	711417	1949089	7.12
HN	316/ 321		146	399	0.45	40008	109611	0.40
NK	321/ 375		1457	3990	4.54	406813	1114555	4.07
LK	375/ 463		2503	6859	7.81	723597	1982458	7.24
MK	463/ 557		2835	7767	8.84	846183	2318311	8.46
HK	557/ 566		284	779	0.89	85954	235491	0.86
LG	566/ 645		2861	7839	8.92	872440	2390247	8.73
AR	645+		16934	46396	52.82	5728531	15694606	57.31
	TOTAL PRODUCT		31927	87471	99.58	9946297	27250129	99.50
	LOSS (GAIN)		135	369	0.42	50076	137195	0.50

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	10365	10365
STM$	MP Steam, MLbs/D	328	328
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	48619	48619
BTU$	Fuel Fired, MBTU/D	7299504	7299504
SWT$	Sour Water, MLbs/Day	277	277

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MUW$	Make-up Water, MGal/D	18	18

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MATERIAL BALANCE - Vacuum Tower #1 VAC-VU
Single Refinery ONE YEAR

			------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS								
ARB	645+	(B)	3808	10433	25.53	1337708	3664954	26.45
ARC	645+	(C)	2686	7360	18.01	885866	2427030	17.52
ARD	645+	(D)	215	589	1.44	71996	197250	1.42
ARE	645+	(E)	3246	8892	21.76	1051151	2879866	20.79
ARF	645+	(F)	4959	13586	33.25	1709988	4684898	33.82
TOTAL FEED			14914	40860	100.00	5056709	13853997	100.00
PRODUCT STREAMS								
LV	645/ 697		1502	4114	10.07	467670	1281287	9.25
HV	697/1011		7350	20136	49.28	2377001	6512331	47.01
VB	1011+		6062	16608	40.65	2212163	6060721	43.75
TOTAL PRODUCT			14914	40859	100.00	5056834	13854339	100.00

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	4903	4903
STM$	MP Steam, MLbs/D	418	418
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	28193	28193
BTU$	Fuel Fired, MBTU/D	3644689	3644689
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	38	38

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MATERIAL BALANCE - Vacuum Tower #2 WAC-WU
Single Refinery ONE YEAR

			------ VOLUME ------		PERCENT OF	------ WEIGHT ------		PERCENT OF
			.M Bbls	B/CD	INPUT	.M Lbs	L/CD	INPUT
	FEED STREAMS							
ARB	645+	(B)	711	1948	100.00	249770	684301	100.00
	TOTAL FEED		711	1948	100.00	249770	684301	100.00
	PRODUCT STREAMS							
LV	645/ 697		60	164	8.43	19154	52477	7.67
HV	697/1011		310	848	43.54	102385	280506	40.99
VB	1011+		341	936	48.03	128240	351342	51.34
	TOTAL PRODUCT		711	1948	100.00	249778	684324	100.00

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	1221	1221
STM$	MP Steam, MLbs/D	132	132
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	307	307
BTU$	Fuel Fired, MBTU/D	301550	301550
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	0	0

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MATERIAL BALANCE - Sats Gas Plant SGP-SG
Single Refinery ONE YEAR

	------ VOLUME ------		PERCENT OF	------ WEIGHT ------		PERCENT OF
	.M Bbls	B/CD	INPUT	.M Lbs	L/CD	INPUT
FEED STREAMS						
S3S Propane (Sat.)	403	1103	39.99	71505	195905	37.11
S4I Iso-butane (Sat.)	314	859	31.14	61729	169120	32.04
S4N NC4 (Sat.)	291	797	28.88	59434	162832	30.85
TOTAL FEED	1007	2760	100.00	192668	527857	100.00
PRODUCT STREAMS						
C3S Propane	403	1103	39.99	71505	195905	37.11
C4I Iso-butane	314	859	31.14	61729	169120	32.04
C4N Normal Butane	291	797	28.88	59434	162832	30.85
TOTAL PRODUCT	1007	2760	100.00	192668	527857	100.00

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	34	34
CWR$	Cooling Water, MGal/D	1165	1165
STM$	MP Steam, MLbs/D	7	7
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	658	658
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	1	1

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MATERIAL BALANCE - Unsats Gas Plant UGP-UG
Single Refinery ONE YEAR

	------ VOLUME ------		PERCENT OF	------ WEIGHT ------		PERCENT OF
	.M Bbls	B/CD	INPUT	.M Lbs	L/CD	INPUT
FEED STREAMS						
U3S Propane (Unsat.)	134	366	9.85	23740	65041	8.32
U3M Propylene (Unsat.)	447	1225	32.92	81557	223443	28.57
U4I Iso-butane (Unsat.)	276	756	20.32	72304	198093	25.33
U4N NC4 (Unsat.)	49	134	3.61	12842	35184	4.50
U4J Iso C4= (Unsat.)	151	412	11.08	31584	86532	11.07
U4L 1/2 C4= (Unsat.)	302	827	22.21	63408	173721	22.21
TOTAL FEED	1358	3721	100.00	285435	782014	100.00
PRODUCT STREAMS						
C3S Propane	134	366	9.85	23740	65041	8.32
C3M Propylene	447	1225	32.92	81557	223443	28.57
C4I Iso-butane	276	756	20.32	54326	148837	19.03
C4N Normal Butane	49	134	3.61	10018	27445	3.51
C4M Mixed C4=	302	827	22.21	63357	173582	22.20
C4J Iso-butylene	151	412	11.08	31584	86532	11.07
TOTAL PRODUCT	1358	3721	100.00	264581	724881	92.69
LOSS (GAIN)				20854	57133	7.31

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	47	47
CWR$	Cooling Water, MGal/D	1570	1570
STM$	MP Steam, MLbs/D	10	10
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	887	887
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	1	1

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MATERIAL BALANCE - FCCU (KC) KCC-KC
Single Refinery ONE YEAR

			PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
	FEED STREAMS								
ARA	645+	(A)		639	1751	15.23	204486	560236	15.24
HVC	697/1011	(C)		1392	3814	33.18	442029	1211037	32.94
ARE	645+	(E)		650	1781	15.49	210482	576664	15.68
HVE	697/1011	(E)		1494	4094	35.61	477985	1309549	35.62
ARF	645+	(F)		21	56	0.49	7084	19409	0.53
	TOTAL FEED			4196	11496	100.00	1342066	3676895	100.00
	PRODUCT STREAMS								
KTG	FCC Gasoline			2389	6545	56.93	625745	1714370	46.63
KLC	FCC LCO			271	741	6.45	89554	245353	6.67
KHC	FCC HCO			569	1558	13.55	205754	563710	15.33
CKE	FCC Cat Coke		193933	0	0	0.00	70786	193933	5.27
KCK	Coke			0	0	0.00	0	0	0.00
H2S	H2S (Lbs)		4776	4	11	0.10	1743	4776	0.13
F1S	Methane (Lbs & FOEB)		69435	96	263	2.29	25344	69435	1.89
F2S	Ethane (Lbs & FOEB)		55380	72	196	1.71	20214	55380	1.51
F2M	Ethylene (Lbs & FOEB)		40506	51	139	1.21	14785	40506	1.10
F3S	Propane (Lbs & FOEB)		12787	16	44	0.38	4667	12787	0.35
F3M	Propylene (Lbs & FOEB)		28516	35	95	0.83	10408	28516	0.78
U3S	Propane (Unsat.)			134	366	3.19	23740	65041	1.77
U3M	Propylene (Unsat.)			447	1225	10.66	81557	223443	6.08
U4I	Iso-butane (Unsat.)			276	756	6.58	72304	198093	5.39
U4N	NC4 (Unsat.)			72	198	1.72	18956	51935	1.41
U4J	Iso C4= (Unsat.)			151	412	3.59	31584	86532	2.35
U4L	1/2 C4= (Unsat.)			302	827	7.19	63408	173721	4.72
	TOTAL PRODUCT			4883	13378	116.37	1360549	3727531	101.38
	LOSS (GAIN)			-687	-1882	-16.37	-18482	-50637	-1.38

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	966	966
CWR$	Cooling Water, MGal/D	3667	3667
STM$	MP Steam, MLbs/D	182	182
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	833	833
KWH$	Electricity, KWH/D	4994	4994

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BTUS	Fuel Fired, MBTU/D	352638	352638
MUWS	Make-up Water, MGal/D	29	29
KVV	FCC Conversion, Vol%	80.04	
KDE	FCC Feed Density	329.39	
KSL	FCC Feed Sulfur	0.2884	
KNI	FCC Feed Basic Nitrogen	0.0650	
KME	FCC Feed Metals	4.0000	
KRR	FCC Feed Concarbon	1.1000	

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MATERIAL BALANCE - Hydrocracker HYK-HK
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
LVB 645/ 697 (B)		381	1044	5.38	121738	333530	5.59
HVB 697/1011 (B)		1968	5390	27.77	650732	1782826	29.91
LVD 645/ 697 (D)		26	70	0.36	8003	21927	0.37
HVD 697/1011 (D)		120	330	1.70	39095	107110	1.80
HVE 697/1011 (E)		568	1557	8.02	181819	498134	8.36
LVF 645/ 697 (F)		391	1070	5.51	121794	333683	5.60
HVF 697/1011 (F)		2117	5799	29.87	687726	1884180	31.61
HYD H2 (MSCFD)	36038	677	1854	9.55	69716	191004	3.20
Kl# FCC LCO Pool		271	741	3.82	89554	245353	4.12
Kh# FCC HCO Pool		569	1558	8.02	205754	563710	9.46
TOTAL FEED		7086	19414	100.00	2175932	5961457	100.00
PRODUCT STREAMS							
YC5 C5/160 Hyk		557	1526	7.86	129023	353489	5.93
YLN 160/220 Hyk		387	1059	5.46	98224	269106	4.51
YLT 160/220 Hyk (Th)		50	137	0.71	12726	34865	0.58
YHN 220/285 Hyk		581	1592	8.20	152834	418723	7.02
YHT 220/285 Hyk (Th)		77	212	1.09	20305	55631	0.93
YNK 285/350 Hyk		1138	3119	16.07	305678	837474	14.05
YLK 350/400 Hyk		1074	2943	15.16	293055	802889	13.47
YMK 400/430 Hyk		665	1822	9.39	185613	508528	8.53
YHK 430/525 Hyk		2437	6678	34.40	686131	1879811	31.53
YLG 525/650 Hyk		285	780	4.02	81993	224639	3.77
H2S H2S (Lbs)	75218	65	179	0.92	27455	75218	1.26
F1S Methane (Lbs & FOEB)	7313	10	28	0.14	2669	7313	0.12
F2S Ethane (Lbs & FOEB)	22236	29	79	0.41	8116	22235	0.37
F3S Propane (Lbs & FOEB)	16854	21	58	0.30	6152	16854	0.28
S3S Propane (Sat.)		303	831	4.28	53881	147618	2.48
S4I Iso-butane (Sat.)		235	644	3.32	46257	126732	2.13
S4N NC4 (Sat.)		112	307	1.58	22875	62671	1.05
TOTAL PRODUCT		8028	21994	113.29	2132986	5843796	98.03
LOSS (GAIN)		-942	-2580	-13.29	42946	117661	1.97

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$ Cat/Chem, $/D	1492	1492

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CWR$	Cooling Water, MGal/D	7138	7138
STM$	MP Steam, MLbs/D	1194	1194
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	202559	202559
BTU$	Fuel Fired, MBTU/D	2997593	2997593
SWT$	Sour Water, MLbs/Day	0	

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MATERIAL BALANCE - CCR Reformer CRU-CR
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
ln# NHT LSR for Ref		38	105	2.10	9374	25681	1.89
hn# NHT HSR for Ref		1797	4923	97.90	486416	1332647	98.11
TOTAL FEED		1835	5028	100.00	495790	1358328	100.00
PRODUCT STREAMS							
L95 Lt. Ref 95 Sev.		31	85	1.70	7749	21230	1.56
H95 Hvy Ref hn 95 Sev.		282	772	15.36	80489	220518	16.23
H00 Hvy Ref hn 100 Sev.		1252	3431	68.23	357585	979685	72.12
HYD H2 (MSCFD)	6715	126	345	6.87	12990	35589	2.62
HLS H2 (Unrec.)	1188	22	61	1.22	2298	6296	0.46
F1S Methane (Lbs & FOEB)	15282	21	58	1.15	5578	15282	1.13
F2S Ethane (Lbs & FOEB)	19171	25	68	1.35	6997	19171	1.41
F3S Propane (Lbs & FOEB)	2995	4	10	0.20	1093	2995	0.22
S3S Propane (Sat.)		56	153	3.04	9904	27133	2.00
S4I Iso-butane (Sat.)		25	68	1.35	4873	13349	0.98
S4N NC4 (Sat.)		38	103	2.05	7686	21059	1.55
TOTAL PRODUCT		1882	5155	102.52	497242	1362307	100.29
LOSS (GAIN)		-46	-127	-2.52	-1452	-3979	-0.29

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	191	191
CWR$	Cooling Water, MGal/D	538	538
STM$	MP Steam, MLbs/D	-342	-342
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	4123	4123
BTU$	Fuel Fired, MBTU/D	1362637	1362637
SWT$	Sour Water, MLbs/Day	0	
SVC	Average Reformate Severity	99.00	
cPF	Avg Paraffin Vol%	42.60	
cAR	Avg Aromatic Vol%	10.12	

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MATERIAL BALANCE - H2SO4 Alkylation SAA-SA
Single Refinery ONE YEAR

	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS						
C4I Iso-butane	511	1400	53.05	100573	275544	51.44
C4M Mixed C4=	302	827	31.32	63357	173582	32.41
C4J Iso-butylene	151	412	15.63	31584	86532	16.15
TOTAL FEED	963	2639	100.00	195515	535658	100.00
PRODUCT STREAMS						
AL7 C4 Alkylate	787	2156	81.69	195616	535934	100.05
TOTAL PRODUCT	787	2156	81.69	195616	535934	100.05
LOSS (GAIN)	176	483	18.31	-101	-276	-0.05

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	966	966
CWR$	Cooling Water, MGal/D	15	15
STM$	MP Steam, MLbs/D	198	198
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	13084	13084
SWT$	Sour Water, MLbs/Day	0	

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MATERIAL BALANCE - Distillate HDS DHT-DH
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
TOTAL FEED							
PRODUCT STREAMS							
TOTAL PRODUCT							

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	0	
CWR$	Cooling Water, MGal/D	0	
STM$	MP Steam, MLbs/D	0	
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	0	
BTU$	Fuel Fired, MBTU/D	0	
SWT$	Sour Water, MLbs/Day	0	
dsu	% Desulfurization	0	

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MATERIAL BALANCE - Naphtha HDS NHT-NH
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
YLN 160/220 Hyk		38	105	2.09	9778	26789	2.00
YHN 220/285 Hyk		581	1592	31.60	152834	418723	31.25
YHT 220/285 Hyk (Th)		77	212	4.20	20305	55631	4.15
YNK 285/350 Hyk		1138	3119	61.90	305678	837474	62.51
HYD H2 (MSCFD)	207	4	11	0.21	400	1097	0.08
TOTAL FEED		1839	5039	100.00	488996	1339714	100.00
PRODUCT STREAMS							
ncl NHT LSR for Ref		38	105	2.09	9374	25681	1.92
nch NHT HSR for Ref		1797	4923	97.70	486416	1332647	99.47
H2S H2S (Lbs)	229	0	1	0.01	84	229	0.02
TOTAL PRODUCT		1835	5029	99.80	495873	1358557	101.41
LOSS (GAIN)		4	10	0.20	-6878	-18843	-1.41

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	101	101
CWR$	Cooling Water, MGal/D	130	130
STM$	MP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	3458	3458
BTU$	Fuel Fired, MBTU/D	361627	361627
SWT$	Sour Water, MLbs/Day	0	

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MATERIAL BALANCE - Hydrogen Plant HYD-H2
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
HFG Purch Nat Gas		445	1219	100.00	117879	322957	100.00
TOTAL FEED		445	1219	100.00	117879	322957	100.00
PRODUCT STREAMS							
CO2 CO2 (H2 Plt)	166446	0	0	0.01	60753	166446	51.54
HYD H2 (MSCFD)	29530	555	1519	124.67	57127	156512	48.46
TOTAL PRODUCT		555	1520	124.69	117879	322957	100.00
LOSS (GAIN)		-110	-301	-24.69	-0	-0	-0.00

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	118	118
CWR$	Cooling Water, MGal/D	188	188
STM$	MP Steam, MLbs/D	0	
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	-1022	-1022
KWH$	Electricity, KWH/D	12048	12048
BTU$	Fuel Fired, MBTU/D	947928	947928
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	221	221

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MATERIAL BALANCE - Sulfur Plant SUL-SU
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
HSS H2S fr Amine U (Lbs)	80223	70	191	100.00	29281	80223	100.00
TOTAL FEED		70	191	100.00	29281	80223	100.00
PRODUCT STREAMS							
SUL Sulfur	75504	70	191	100.00	27559	75504	94.12
TOTAL PRODUCT		70	191	100.00	27559	75504	94.12
LOSS (GAIN)		-0	-0	-0.00	1722	4719	5.88

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	25	25
STM$	MP Steam, MLbs/D	-245	-245
STL$	LP Steam, MLbs/D	7	7
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	1809	1809
BTU$	Fuel Fired, MBTU/D	41263	41263
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	29	29

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MATERIAL BALANCE - Fuel System FUL-90
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
HFG Purch Nat Gas		782	2141	65.88	207134	567491	46.22
CKE FCC Cat Coke	193933	0	0	0.01	70786	193933	15.80
CO2 CO2 (H2 Plt)	166446	0	0	0.01	60753	166446	13.56
HLS H2 (Unrec.)	1188	22	61	1.88	2298	6296	0.51
FOE Fuel Gas		382	1048	32.23	107179	293640	23.92
TOTAL FEED		1186	3251	100.00	448149	1227806	100.00
PRODUCT STREAMS							
TOTAL PRODUCT							
LOSS (GAIN)		1186	3251	100.00	448149	1227806	100.00

OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
BTU$ Fuel Fired, MBTU/D	-20476891	-20476891
BTU$ Fuel Fired, MBTU/D	0	

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MATERIAL BALANCE - Fuel Pool FUP-91
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
F1S Methane (Lbs & FOEB)	92030	127	349	33.29	33591	92030	31.37
F2S Ethane (Lbs & FOEB)	97294	126	344	32.87	35512	97294	33.17
F2M Ethylene (Lbs & FOEB)	40506	51	139	13.26	14785	40506	13.81
F3S Propane (Lbs & FOEB)	34991	44	120	11.49	12772	34991	11.93
F3M Propylene (Lbs & FOEB)	28516	35	95	9.09	10408	28516	9.72
TOTAL FEED		382	1048	100.00	107068	293336	100.00
PRODUCT STREAMS							
FOE Fuel Gas		382	1048	100.00	107179	293640	100.10
TOTAL PRODUCT		382	1048	100.00	107179	293640	100.10
LOSS (GAIN)		-0	-0	-0.00	-111	-304	-0.10

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MATERIAL BALANCE - General Utilities UTL-95
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
TOTAL FEED							
PRODUCT STREAMS							
TOTAL PRODUCT							

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	28	28
CWR$	Cooling Water, MGal/D	-31290	-31290
CWR$	Cooling Water, MGal/D	31290	31290
STM$	MP Steam, MLbs/D	-2303	-2303
STM$	MP Steam, MLbs/D	2114	2114
STL$	LP Steam, MLbs/D	-7	-7
STL$	LP Steam, MLbs/D	7	7
STH$	HP Steam, MLbs/D	189	189
STH$	HP Steam, MLbs/D	189	189
KWH$	Electricity, KWH/D	-326646	-326646
KWH$	Electricity, KWH/D	396838	396838
BTU$	Fuel Fired, MBTU/D	3167461	3167461
SWT$	Sour Water, MLbs/Day	-277	-277
SWT$	Sour Water, MLbs/Day	277	277
KWP$	Electricity	-39528	-39528
MUW$	Make-up Water, MGal/D	1303	1303
PWR$	Power	396838	396838
OXX$		0	

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MATERIAL BALANCE - Amine (DEA) Unit ADM-AM
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
H2S H2S (Lbs)	80223	70	191	100.00	29281	80223	100.00
TOTAL FEED		70	191	100.00	29281	80223	100.00
PRODUCT STREAMS							
HSS H2S fr Amine U (Lbs)	80223	70	191	100.00	29281	80223	100.00
TOTAL PRODUCT		70	191	100.00	29281	80223	100.00

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	389	389
STM$	MP Steam, MLbs/D	422	422
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	1800	1800
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	185	185

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UTILITIES CONSUMPTION REPORT - .M Units
Single Refinery ONE YEAR

	Fuel Mixed MBTU	Steam High psi M Lbs	Steam Med psi M Lbs	Steam Low psi M Lbs	Power ------ KWH	Water Cooling M Gal	Water Make-Up M Gal	Sour Water M Lbs	Cat & Chem $
PROCESS UNIT									
CRD-DU Crude Tower #1	2664319		120		17746	3783	7	101	
VAC-VU Vacuum Tower #1	1330312		153		10291	1790	14		
WAC-WU Vacuum Tower #2	110066		48		112	446	0		
SGP-SG Sats Gas Plant			3		240	425	0		13
UGP-UG Unsats Gas Plant			4		324	573	0		17
KCC-KC FCCU (KC)	128713	304	66		1823	1339	10		352
HYK-HK Hydrocracker	1094122		436		73934	2605			544
CRU-CR CCR Reformer	497362		-125		1505	196			70
SAA-SA H2SO4 Alkylation			72		4775	5			353
NHT-NH Naphtha HDS	131994				1262	47			37
HYD-H2 Hydrogen Plant	345994	-373			4398	69	81		43
SUL-SU Sulfur Plant	15061		-89	3	660		11		9
MRJ-MJ Merox (Jet)					403				14
MRD-MD Merox (Diesel)					427				15
MRG-MG Merox (FCC Gasoline)					337				12
MRL-ML Merox (LPG)					331				12
FUL-90 Fuel System	-7474065								
UTL-95 General Utilities	1156123	69	-841	-3	-119226	-11421	475	-101	10
ADM-AM Amine (DEA) Unit			154		657	142	68		
PURCHASES									
Units/CD							1826		4114
.M Units							666		1502
PRICE, $/unit							5.000		2.300
MARGINAL VALUE	0.001	1.046	1.046	1.046	0.045	0.245	5.000		2.300

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UTILITIES CONSUMPTION REPORT - .M Units
Single Refinery ONE YEAR

	Power Purch KWH	Power Generate KWH
PROCESS UNIT		
UTL-95 General Utilities	144846	
PURCHASES		
Units/CD	396838	
.M Units	144846	
PRICE, $/unit	0.045	
MARGINAL VALUE	0.045	0.030

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MATERIAL BALANCE - Sol Asp
Single Refinery ONE YEAR

BAP-AP

	COMPONENTS		Volume M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
VBF	1011+	(F)	111	303	100.00	5.4656
	TOTAL COMPONENTS		111	303	100.00	
	BLENDED PRODUCTS					
BAP	Sol Asp		110	300	99.01	5.5203
	TOTAL PRODUCT		110	300	99.01	

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MATERIAL BALANCE - Liq Asp
Single Refinery ONE YEAR

CAP-BP

	COMPONENTS		Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
VBF	1011+	(F)	73	200	80.00	5.4656
55F	55/ 180	(F)	9	25	10.00	21.9407
LAF	180/ 292	(F)	5	13	5.00	23.7674
LNF	292/ 316	(F)	5	13	5.00	23.7674
	TOTAL COMPONENTS		91	250	100.00	
	BLENDED PRODUCTS					
CAP	Liq Asp		91	250	100.00	8.9433
	TOTAL PRODUCT		91	250	100.00	

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MATERIAL BALANCE - Res Asp
Single Refinery ONE YEAR

DAP-CP

			Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
COMPONENTS						
VBF	1011+	(F)	179	490	70.00	5.4656
NKF	321/ 375	(F)	26	70	10.00	28.4375
LKF	375/ 463	(F)	26	70	10.00	28.7939
MKF	463/ 557	(F)	26	70	10.00	28.4375
	TOTAL COMPONENTS		255	700	100.00	
BLENDED PRODUCTS						
DAP	Res Asp		255	700	100.00	12.3928
	TOTAL PRODUCT		255	700	100.00	

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MATERIAL BALANCE - C3/C4 LPG
Single Refinery ONE YEAR

B34-34

	COMPONENTS	Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
C3S	Propane	536	1470	38.26	19.3323
C3M	Propylene	447	1225	31.89	19.3323
C4N	Normal Butane	340	931	24.24	13.9691
C4I	Iso-butane	79	216	5.61	13.9691
	TOTAL COMPONENTS	1402	3842	100.00	
	BLENDED PRODUCTS				
B34	Mixed C3/C4	1395	3822	99.50	17.8200
	TOTAL PRODUCT	1395	3822	99.50	

	BLENDING PARAMETERS	LEVEL
BBB	C4s in C3/C4 LPG	30.00

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PRODUCT BLENDING - FCC Naphtha 1GP
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha	292	800	100.00	76488	209556	100.00	26.4056
. TOTAL	292	800	100.00	76488	209556	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.039		0.150		
158 % Off at 158 F	VL	24.881	10.000			
250 % Off at 250 F	VL	61.377	50.000			
374 % Off at 374 F	VL	94.058	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	261.945		280.000		
ARO Aromatics Content	VL	32.681		35.000		
PFF Paraffins Content	VL	26.716		100.000		
NAP Naphthenes Content	VL	14.855		22.000		
RVI Reid Vapor Pressure Index	VL	139.460		139.460		0.1140
OLE Olefin Content, Vol%	VL	15.845		100.000		
BEN Benzene Content	VL	0.891		1.500		
PERFORMANCE CONTROLS						
R Research O.N.	VL	92.500	92.500			

COMPONENT QUALITIES

	DNX	SUL	RVI	ARO	OLE	PFF	NAP	158	250
kN# FCC Cat Naphtha	261.945	0.03928	139.460	32.6807	15.8452	26.7161	14.8548	24.8806	61.3774
	430	PBL	BEN	R00	M00	F00	R05	R10	R20
kN# FCC Cat Naphtha	100.000	.	0.89129	92.5000	81.1668	86.8334	95.0145	96.0242	97.0377
	M05	M10	M20	M30	F05	F10	F20	F30	
kN# FCC Cat Naphtha	83.6890	85.2000	86.0000	87.6000	89.3517	90.6121	91.5189	92.8218	

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PRODUCT BLENDING - Virgin Naphtha 2GR
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
55A	55/ 180	(A)	143	393	4.01	33749	92464	3.67	22.2038
LAA	180/ 292	(A)	310	848	8.65	80951	221783	8.81	23.7674
LNB	292/ 316	(B)	142	388	3.96	38458	105365	4.19	23.7674
LAB	180/ 292	(B)	306	838	8.55	79889	218874	8.70	23.7674
55C	55/ 180	(C)	66	180	1.83	14504	39738	1.58	23.0374
LAC	180/ 292	(C)	209	572	5.84	53392	146278	5.81	23.7674
55D	55/ 180	(D)	13	37	0.37	3181	8715	0.35	22.7906
LND	292/ 316	(D)	10	26	0.27	2629	7204	0.29	23.7674
LAD	180/ 292	(D)	56	152	1.55	14407	39471	1.57	23.7674
55E	55/ 180	(E)	156	426	4.35	36622	100335	3.99	22.1353
LAE	180/ 292	(E)	1269	3478	35.49	334346	916016	36.40	23.7674
55F	55/ 180	(F)	307	841	8.58	71929	197066	7.83	21.9407
LNF	292/ 316	(F)	27	73	0.75	7234	19819	0.79	23.7674
LAF	180/ 292	(F)	565	1548	15.80	147245	403410	16.03	23.7674
BLENDING LOSS									
TOTAL			3577	9801	100.00	918536	2516537	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS							
SUL	Sulfur, Wt%	WT	0.002		0.050		
140	% Off at 140 F	VL	10.000		10.000		0.0307
248	% Off at 248 F	VL	60.496	50.000			
320	% Off at 320 F	VL	100.000	90.000			
338	% Off at 338 F	VL	100.000	99.900			
DNX	Density, Lb/bbl	VL	256.774	244.400	262.600		
ARO	Aromatics Content	VL	5.304	0.000			
PFF	Paraffins Content	VL	56.315	0.000			
NAP	Naphthenes Content	VL	37.989	0.000			
NAR	Naphthenes + Aromatics	VL	43.293	42.000			
RVI	Reid Vapor Pressure Index	VL	59.360		157.520		
OLE	Olefin Content, Vol%	VL	0.000		1.000		

COMPONENT QUALITIES

			DNX	SUL	NAP	ARO	PFF	OLE	RVI	140	248
55A	55/ 180	(A)	235.409	1.00E-3	16.9100	1.82900	81.2600	.	158.798	50.8650	100.000
LAA	180/ 292	(A)	261.506	10.00E-4	29.3900	15.3500	55.2600	.	18.8970	.	58.0770
LNB	292/ 316	(B)	271.737	0.01730	42.2800	12.4100	44.3700	.	6.30500	.	.
LAB	180/ 292	(B)	261.153	.	40.6400	7.66200	50.9000	.	18.2970	.	43.8080
55C	55/ 180	(C)	221.222	.	14.4400	2.80200	82.7600	.	209.164	23.7480	100.000
LAC	180/ 292	(C)	255.633	2.00E-4	26.6000	3.30800	69.8300	.	27.8700	.	59.8560

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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- Virgin Naphtha 2GR
Single Refinery ONE YEAR

55D	55/ 180	(D)	238.046	2.90E-3	20.2300	4.75300	75.0100	.	151.837	31.7750	100.000
LND	292/ 316	(D)	271.936	0.01140	27.9400	23.1800	48.8800	.	17.4550	.	.
LAD	180/ 292	(D)	259.201	2.00E-3	28.9400	15.6500	55.4100	.	43.3460	.	66.6520
55E	55/ 180	(E)	235.276	3.00E-4	33.0500	0.79800	65.8400	.	187.750	53.0930	100.000
LAE	180/ 292	(E)	263.391	1.10E-3	56.3200	3.68800	39.5200	.	26.3340	.	53.1580
55F	55/ 180	(F)	234.402	.	15.6500	3.20700	80.7400	.	228.196	59.4210	100.000
LNF	292/ 316	(F)	270.576	9.60E-3	35.2100	3.67300	60.6400	.	3.97200	.	.
LAF	180/ 292	(F)	260.527	1.70E-3	26.4100	3.43100	69.8300	.	35.9410	.	58.1480
			338	NAR	R00	M00	F00	R05	R10	R20	R30
55A	55/ 180	(A)	100.000	18.7390	67.4170	65.9670	66.6920	71.3010	75.3060	79.5030	85.0820
LAA	180/ 292	(A)	100.000	44.7400	59.5150	60.2010	59.8580	62.0800	66.5070	71.1110	77.0660
LNB	292/ 316	(B)	100.000	54.6900	70.5440	66.8440	68.6940	72.3790	75.8500	79.4880	84.7730
LAB	180/ 292	(B)	100.000	48.3020	69.5760	66.7390	68.1575	71.5200	75.0720	78.7920	84.1340
55C	55/ 180	(C)	100.000	17.2420	70.4180	65.4480	67.9330	73.7670	77.5350	81.4920	86.9070
LAC	180/ 292	(C)	100.000	29.9080	61.7200	64.8220	63.2710	64.2150	68.4410	72.8420	78.6570
55D	55/ 180	(D)	100.000	24.9830	70.1400	68.4810	69.3105	73.5340	77.3230	81.3020	86.7320
LND	292/ 316	(D)	100.000	51.1200	56.6440	58.7790	57.7115	59.2750	63.9740	68.8540	74.9980
LAD	180/ 292	(D)	100.000	44.5900	63.2590	62.0220	62.6405	65.6860	69.7770	74.0400	79.7590
55E	55/ 180	(E)	100.000	33.8480	75.2710	73.3050	74.2880	77.9490	81.3300	84.8970	90.0410
LAE	180/ 292	(E)	100.000	60.0080	69.0070	66.9370	67.9720	71.0100	74.6100	78.3780	83.7530
55F	55/ 180	(F)	100.000	18.8570	71.8410	73.9500	72.8955	74.9780	78.6330	82.4770	87.8140
LNF	292/ 316	(F)	100.000	38.8830	55.3800	67.5340	61.4570	58.0360	62.8610	67.8670	74.0970
LAF	180/ 292	(F)	100.000	29.8410	59.7590	68.7670	64.2630	62.3180	66.7220	71.3030	77.2420
			M10	M20	M30	F05	F10	F20	F30		
55A	55/ 180	(A)	73.2140	77.1850	82.6900	70.3585	74.2600	78.3440	83.8860		
LAA	180/ 292	(A)	66.0000	70.5300	76.4570	61.8605	66.2535	70.8205	76.7615		
LNB	292/ 316	(B)	72.3570	75.9700	81.3100	70.6370	74.1035	77.7290	83.0415		
LAB	180/ 292	(B)	72.2700	75.8960	81.2450	70.1575	73.6710	77.3440	82.6895		
55C	55/ 180	(C)	72.7390	76.7530	82.2900	71.3325	75.1370	79.1225	84.5985		
LAC	180/ 292	(C)	70.6270	74.4990	80.0040	65.5635	69.5340	73.6705	79.3305		
55D	55/ 180	(D)	75.5020	79.2850	84.6510	72.7120	76.4125	80.2935	85.6915		
LND	292/ 316	(D)	64.3400	69.0860	75.1560	59.5215	64.1570	68.9700	75.0770		
LAD	180/ 292	(D)	67.9520	72.2130	77.9660	64.7715	68.8645	73.1265	78.8625		
55E	55/ 180	(E)	79.8440	83.3130	88.4370	77.2485	80.5870	84.1050	89.2390		
LAE	180/ 292	(E)	72.4320	76.0340	81.3670	69.9960	73.5210	77.2060	82.5600		
55F	55/ 180	(F)	80.4220	83.8490	88.9400	76.0735	79.5275	83.1630	88.3770		
LNF	292/ 316	(F)	72.9140	76.4430	81.7300	63.7855	67.8875	72.1550	77.9135		
LAF	180/ 292	(F)	73.8750	77.2580	82.4530	66.4780	70.2985	74.2805	79.8475		

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PRODUCT BLENDING - Gasoline G-95 SP 3GS
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
sa# Alkyate Pool (SA)	151	413	19.64	37501	102743	18.05	27.3442
rf# Total Reformate	505	1385	65.82	143957	394402	69.30	28.0411
55E 55/ 180 (E)	112	306	14.54	26270	71972	12.65	22.1353
BLENDING LOSS							
TOTAL	768	2104	100.00	207728	569118	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.000		0.040		
158 % Off at 158 F	VL	15.164	10.000			
171 % Off at 171 F	VL	20.627		50.000		
244 % Off at 244 F	VL	50.819	50.000			
374 % Off at 374 F	VL	96.893	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	270.493		300.000		
ARO Aromatics Content	VL	45.000		45.000		
PFF Paraffins Content	VL	49.685		100.000		
RVI Reid Vapor Pressure Index	VL	71.652		155.703		
OLE Olefin Content, Vol%	VL	0.427		25.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	95.000	95.000			-0.2489

COMPONENT QUALITIES

	DNX	RVI	158	171	244	374	430	SUL	ARO
sa# Alkyate Pool (SA)	248.600	64.1960	4.90000	13.0000	60.0000	100.000	100.000	.	.
rf# Total Reformate	284.806	48.2316	5.79856	9.11740	37.2156	95.2797	100.000	.	68.1942
55E 55/ 180 (E)	235.276	187.750	71.4290	83.0360	100.000	100.000	100.000	3.00E-4	0.79800
	PFF	R00	M00	F00	R05	R10	R20	R30	M05
sa# Alkyate Pool (SA)	100.000	96.2000	92.7000	94.4500	98.2000	100.300	102.600	104.300	94.8000
rf# Total Reformate	31.0996	99.0000	87.5959	93.2980	100.924	101.490	102.202	102.732	89.5739
55E 55/ 180 (E)	65.8400	75.2710	73.3050	74.2880	77.9490	81.3300	84.8970	90.0410	76.5480
	M20	M30	F05	F10	F20	F30			
sa# Alkyate Pool (SA)	92.0000	95.0000	96.5000	95.6500	97.3000	99.6500			
rf# Total Reformate	90.0000	92.0000	95.2489	95.2450	96.1010	97.3659			
55E 55/ 180 (E)	83.3130	88.4370	77.2485	80.5870	84.1050	89.2390			

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PRODUCT BLENDING - Gasoline 91 SP 4GU
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
sa# Alkyate Pool (SA)	591	1619	16.33	146945	402588	16.01	27.3442
kN# FCC Cat Naphtha	1771	4853	48.94	463978	1271172	50.54	26.4056
NGA Nat Gasoline	18	50	0.50	4424	12120	0.48	22.5407
YC5 C5/160 Hyk	553	1516	15.29	128222	351292	13.97	25.5273
rf# Total Reformate	270	739	7.45	76791	210386	8.36	28.0411
55B 55/ 180 (B)	157	430	4.33	36735	100643	4.00	22.2470
55E 55/ 180 (E)	259	709	7.15	60916	166893	6.64	22.1353
BLENDING LOSS							
TOTAL	3619	9916	100.00	918009	2515094	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.020		0.040		
158 % Off at 158 F	VL	38.431	10.000			
171 % Off at 171 F	VL	45.533		50.000		
244 % Off at 244 F	VL	69.384	50.000			
374 % Off at 374 F	VL	96.740	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	253.640		300.000		
ARO Aromatics Content	VL	21.415		45.000		
PFF Paraffins Content	VL	54.827		100.000		
RVI Reid Vapor Pressure Index	VL	135.563		155.703		
OLE Olefin Content, Vol%	VL	7.873		25.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	91.000	91.000			-0.2489

COMPONENT QUALITIES

	DNX	RVI	158	171	244	374	430	SUL	ARO
sa# Alkyate Pool (SA)	248.600	64.1960	4.90000	13.0000	60.0000	100.000	100.000	.	.
kN# FCC Cat Naphtha	261.945	139.460	24.8806	33.7548	60.3871	94.0581	100.000	0.03928	32.6807
NGA Nat Gasoline	242.400	198.230	75.0000	79.0000	96.0000	100.000	100.000	.	2.00000
YC5 C5/160 Hyk	231.700	194.480	105.000	104.000	100.000	100.000	100.000	.	1.00000
rf# Total Reformate	284.806	48.2316	5.79856	9.11740	37.2156	95.2797	100.000	.	68.1942
55B 55/ 180 (B)	234.297	209.353	80.3450	91.6670	100.000	100.000	100.000	.	2.78300
55E 55/ 180 (E)	235.276	187.750	71.4290	83.0360	100.000	100.000	100.000	3.00E-4	0.79800

	PFF	R00	M00	F00	R05	R10	R20	R30	M05
sa# Alkyate Pool (SA)	100.000	96.2000	92.7000	94.4500	98.2000	100.300	102.600	104.300	94.8000
kN# FCC Cat Naphtha	26.7161	92.5000	81.1668	86.8334	95.0145	96.0242	97.0377	98.0435	83.6890
NGA Nat Gasoline	80.0000	76.9000	75.9000	76.4000	78.5000	82.6000	85.0000	86.0000	74.3000
YC5 C5/160 Hyk	100.000	88.9000	85.5000	86.3000	91.6000	94.0000	96.7000	98.4000	89.8000

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FOSTER WHEELER USA CORPORATION
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- Gasoline 91 SP 4GU
Single Refinery ONE YEAR

rf#	Total Reformate		31.0996	99.0000	87.5959	93.2980	100.924	101.490	102.202	102.732	89.5739
55B	55/ 180	(B)	62.3600	75.7200	71.8780	73.7990	78.3390	81.6840	85.2130	90.3310	75.1760
55E	55/ 180	(E)	65.8400	75.2710	73.3050	74.2880	77.9490	81.3300	84.8970	90.0410	76.5480
			M20	M30	F05	F10	F20	F30			
sa#	Alkyate Pool (SA)		92.0000	95.0000	96.5000	95.6500	97.3000	99.6500			
kN#	FCC Cat Naphtha		86.0000	87.6000	89.3518	90.6121	91.5189	92.8218			
NGA	Nat Gasoline		80.7000	83.5000	76.4000	79.6000	82.8500	84.7500			
YC5	C5/160 Hyk		95.4000	97.7000	90.7000	93.1000	96.0500	98.0500			
rf#	Total Reformate		90.0000	92.0000	95.2489	95.2450	96.1010	97.3659			
55B	55/ 180	(B)	82.1250	87.3190	76.7575	80.1240	83.6690	88.8250			
55E	55/ 180	(E)	83.3130	88.4370	77.2485	80.5870	84.1050	89.2390			

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PRODUCT BLENDING - Gasoline 97 SP G3S
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
sa# Alkyate Pool (SA)	45	123	20.35	11170	30602	18.91	27.3442
HOB High Octane BldStk	120	329	54.40	32209	88245	54.52	33.5000
YC5 C5/160 Hyk	3	9	1.57	802	2197	1.36	25.5273
rf# Total Reformate	52	143	23.69	14896	40811	25.21	28.0411
BLENDING LOSS							
TOTAL	221	605	100.00	59077	161855	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.002		0.040		
158 % Off at 158 F	VL	10.000	10.000			-0.7875
171 % Off at 171 F	VL	17.315		50.000		
244 % Off at 244 F	VL	62.846	50.000			
374 % Off at 374 F	VL	98.882	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	267.530		300.000		
ARO Aromatics Content	VL	45.000		45.000		0.4512
PFF Paraffins Content	VL	46.688		100.000		
RVI Reid Vapor Pressure Index	VL	75.014		155.703		
OLE Olefin Content, Vol%	VL	0.492		25.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	98.000	98.000			-10.9849

COMPONENT QUALITIES

	DNX	RVI	158	171	244	374	430	SUL	ARO
sa# Alkyate Pool (SA)	248.600	64.1960	4.90000	13.0000	60.0000	100.000	100.000	.	.
HOB High Octane BldStk	268.120	87.2800	11.0000	20.0000	74.0000	100.000	100.000	4.00E-3	53.0000
YC5 C5/160 Hyk	231.700	194.480	105.000	104.000	100.000	100.000	100.000	.	1.00000
rf# Total Reformate	284.806	48.2316	5.79856	9.11740	37.2156	95.2797	100.000	.	68.1942
	PFF	R00	M00	F00	R05	R10	R20	R30	M05
sa# Alkyate Pool (SA)	100.000	96.2000	92.7000	94.4500	98.2000	100.300	102.600	104.300	94.8000
HOB High Octane BldStk	32.0000	98.5000	96.0000	97.2500	100.000	101.000	102.100	102.800	92.0000
YC5 C5/160 Hyk	100.000	88.9000	85.5000	86.3000	91.6000	94.0000	96.7000	98.4000	89.8000
rf# Total Reformate	31.0996	99.0000	87.5960	93.2980	100.924	101.490	102.202	102.732	89.5739
	M20	M30	F05	F10	F20	F30			
sa# Alkyate Pool (SA)	92.0000	95.0000	96.5000	95.6500	97.3000	99.6500			
HOB High Octane BldStk	95.0000	96.0000	96.0000	97.0000	98.5500	99.4000			
YC5 C5/160 Hyk	95.4000	97.7000	90.7000	93.1000	96.0500	98.0500			
rf# Total Reformate	90.0000	92.0000	95.2489	95.2450	96.1010	97.3659			

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PRODUCT BLENDING - Solvent 3 G4U
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
NKD	321/ 375	(D)	22	61	14.46	6166	16893	14.37	28.4375
NKE	321/ 375	(E)	131	359	85.54	36749	100681	85.63	28.4375
	TOTAL		153	420	100.00	42915	117574	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS							
SUL	Sulfur, Wt%	WT	0.005		0.100		
350	% Off at 350 F	VL	54.410	50.000			
374	% Off at 374 F	VL	98.204	90.000			
DNX	Density, Lb/bbl	VL	279.939		300.000		
OLE	Olefin Content, Vol%	VL	0.000		4.000		
FLI	Flash point index	VL	333.277		753.800		

COMPONENT QUALITIES

			DNX	SUL	350	374	FLI	OLE	R00	M00	F00
NKD	321/ 375	(D)	278.114	0.02210	53.3640	98.1480	329.000	.	53.5430	58.3040	55.9235
NKE	321/ 375	(E)	280.247	2.50E-3	54.5870	98.2140	334.000	.	61.8080	64.2000	63.0040
			R10	R20	R30	M05	M10	M20	M30	F05	F10
NKD	321/ 375	(D)	60.7960	65.2100	71.1800	58.7040	62.8890	67.2230	73.1110	57.6150	61.8425
NKE	321/ 375	(E)	68.2630	72.0220	77.5160	68.5520	72.0840	75.7700	81.1530	66.5990	70.1735
			F30								
NKD	321/ 375	(D)	72.1455								
NKE	321/ 375	(E)	79.3345								

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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Foster Wheeler USA LP Model

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PRODUCT BLENDING - Export Gasoline G5M
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha	349	956	23.49	91394	250393	22.69	26.4056
YLN 160/220 Hyk	348	954	23.45	88446	242318	21.96	21.9683
YLT 160/220 Hyk (Th)	50	137	3.37	12726	34865	3.16	22.4909
rf# Total Reformate	738	2022	49.69	210179	575833	52.19	28.0411
TOTAL	1485	4069	100.00	402744	1103408	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.009		0.040		
158 % Off at 158 F	VL	24.818	10.000			
171 % Off at 171 F	VL	30.697		50.000		
244 % Off at 244 F	VL	58.693	50.000			
374 % Off at 374 F	VL	96.259	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	271.174		300.000		
ARO Aromatics Content	VL	42.055		45.000		
PFF Paraffins Content	VL	34.624		100.000		
RVI Reid Vapor Pressure Index	VL	84.700		155.703		
OLE Olefin Content, Vol%	VL	3.971		25.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	91.000	91.000			-0.2489

COMPONENT QUALITIES

	DNX	RVI	158	171	244	374	430	SUL	ARO
kN# FCC Cat Naphtha	261.945	139.460	24.8806	33.7548	60.3871	94.0581	100.000	0.03928	32.6807
YLN 160/220 Hyk	254.000	104.299	60.0000	68.0000	97.0000	100.000	100.000	.	1.76000
YLT 160/220 Hyk (Th)	254.000	104.299	60.0000	68.0000	97.0000	100.000	100.000	.	2.37000
rf# Total Reformate	284.806	48.2316	5.79856	9.11740	37.2156	95.2797	100.000	.	68.1942
	PFF	R00	M00	F00	R05	R10	R20	R30	M05
kN# FCC Cat Naphtha	26.7161	92.5000	81.1668	86.8334	95.0145	96.0242	97.0377	98.0435	83.6890
YLN 160/220 Hyk	48.3200	74.6000	67.4000	71.0000	80.7000	83.9000	87.8000	90.1000	74.6000
YLT 160/220 Hyk (Th)	46.4300	76.7000	69.4000	73.0500	82.7000	85.9000	89.7000	92.0000	76.6000
rf# Total Reformate	31.0996	99.0000	87.5959	93.2980	100.924	101.490	102.202	102.732	89.5739
	M20	M30	F05	F10	F20	F30			
kN# FCC Cat Naphtha	86.0000	87.6000	89.3518	90.6121	91.5189	92.8218			
YLN 160/220 Hyk	82.7000	85.3000	77.6500	81.1500	85.2500	87.7000			
YLT 160/220 Hyk (Th)	84.6000	87.2000	79.6500	83.1000	87.1500	89.6000			
rf# Total Reformate	90.0000	92.0000	95.2489	95.2450	96.1010	97.3659			

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - Kerosene 2KE
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
YLK 350/400 Hyk			834	2286	28.72	227635	623657	27.38	28.4552
MKB	463/ 557	(B)	516	1413	17.75	157039	430245	18.89	28.4375
HKB	557/ 566	(B)	52	143	1.80	16103	44117	1.94	28.4375
NKC	321/ 375	(C)	111	304	3.82	30765	84287	3.70	28.4375
MKC	463/ 557	(C)	229	629	7.90	68506	187689	8.24	28.4375
HKC	557/ 566	(C)	11	29	0.37	3225	8836	0.39	28.4375
LKD	375/ 463	(D)	37	103	1.29	10774	29519	1.30	28.4375
NKE	321/ 375	(E)	498	1363	17.13	139445	382041	16.77	28.4375
NKF	321/ 375	(F)	312	854	10.73	86696	237524	10.43	28.4375
MKF	463/ 557	(F)	237	649	8.15	70608	193446	8.49	28.4375
HKF	557/ 566	(F)	68	187	2.35	20603	56446	2.48	28.4375
TOTAL			2905	7960	100.00	831399	2277806	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
400	% Off at 400 F	VL	60.762	10.000			
DNX	Density, Lb/bbl	VL	286.157		310.000		
SUL	Sulfur, Wt%	WT	0.192		0.250		
FLI	Flash Point Index	VL	189.614		508.400		
SMI	Smoke Pt Index	VL	52.606		56.000		

COMPONENT QUALITIES

			DNX	SUL	400	SMI	FLI
YLK 350/400 Hyk			272.800	.	100.000	40.0000	272.000
MKB	463/ 557	(B)	304.592	0.44990	.	67.5700	15.7300
HKB	557/ 566	(B)	308.254	0.59370	.	77.2800	6.47000
NKC	321/ 375	(C)	277.022	9.70E-3	100.000	41.9600	342.000
MKC	463/ 557	(C)	298.506	0.08930	.	58.1100	15.9100
HKC	557/ 566	(C)	300.419	0.12600	.	65.1500	6.47000
LKD	375/ 463	(D)	287.421	0.08670	27.8770	50.6100	72.2700
NKE	321/ 375	(E)	280.247	2.50E-3	100.000	46.4500	333.970
NKF	321/ 375	(F)	278.009	0.04860	100.000	45.5600	323.580
MKF	463/ 557	(F)	298.170	0.68550	.	71.1700	15.0000
HKF	557/ 566	(F)	302.332	0.91990	.	85.4700	6.48000

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - Turbo Jet A-1 3JA
Single Refinery ONE YEAR

COMPONENT		VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
YLK 350/400 Hyk		240	657	22.73	65420	179233	21.67	28.4552
NKA 321/ 375	(A)	115	314	10.88	31928	87474	10.58	28.4375
HKA 557/ 566	(A)	22	61	2.12	6758	18515	2.24	28.4375
NKB 321/ 375	(B)	242	664	22.98	67961	186195	22.51	28.4375
MKD 463/ 557	(D)	44	120	4.14	12955	35492	4.29	28.4375
HKD 557/ 566	(D)	4	12	0.41	1290	3534	0.43	28.4375
MKF 463/ 557	(F)	388	1062	36.75	115575	316644	38.28	28.4375
BLENDING LOSS								
TOTAL		1055	2890	100.00	301887	827087	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
400	% Off at 400 F	VL	56.594	10.000			
DNX	Density, Lb/bbl	VL	286.189	271.620	289.050		
SUL	Sulfur, Wt%	WT	0.300		0.300		
FLI	Flash Point Index	VL	185.964		636.900		
ARO	Aromatics Content	VL	20.296		22.000		
SMI	Smoke Pt Index	VL	54.812		56.000		
OLE	Olefin content	VL	0.000		5.000		
FZI	Freeze Point Index	VL	3.875		6.000		

COMPONENT QUALITIES

		DNX	SUL	ARO	OLE	400	SMI	FLI	FZI
YLK 350/400 Hyk		272.800	.	16.0000	.	100.000	40.0000	272.000	2.45000
NKA 321/ 375	(A)	278.313	1.00E-3	24.6500	.	100.000	44.3900	346.100	0.36000
HKA 557/ 566	(A)	302.511	0.10120	24.4200	.	.	64.7700	6.48000	14.0200
NKB 321/ 375	(B)	280.303	0.04310	15.5800	.	100.000	45.3500	348.860	0.22000
MKD 463/ 557	(D)	296.883	0.51670	25.0000	.	.	63.8600	15.1700	13.0000
HKD 557/ 566	(D)	301.755	0.77570	30.0000	.	.	74.4600	6.48000	25.8200
MKF 463/ 557	(F)	298.170	0.68550	23.7400	.	.	71.1700	15.0000	6.23000

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PetroPeru Coker Case Refinery Upgrade

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PRODUCT BLENDING - No. 2 Diesel SD2
Single Refinery ONE YEAR

COMPONENT		VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
YMK 400/430 Hyk		665	1822	8.42	185613	508528	8.09	28.5610
YHK 430/525 Hyk		2437	6678	30.87	686131	1879811	29.90	29.4947
YLG 525/650 Hyk		285	780	3.61	81993	224639	3.57	30.4301
LNA 292/ 316	(A)	66	180	0.83	18028	49391	0.79	23.7900
HNA 316/ 321	(A)	13	35	0.16	3530	9671	0.15	27.4277
LGA 566/ 645	(A)	188	514	2.38	57540	157644	2.51	28.1492
HNB 316/ 321	(B)	28	77	0.36	7753	21241	0.34	27.5565
LGB 566/ 645	(B)	115	315	1.46	35926	98427	1.57	26.2141
LNC 292/ 316	(C)	50	138	0.64	13492	36964	0.59	23.7819
HNC 316/ 321	(C)	11	31	0.14	3054	8367	0.13	27.7001
HKC 557/ 566	(C)	13	37	0.17	4024	11025	0.18	28.4375
LGC 566/ 645	(C)	406	1111	5.14	122828	336516	5.35	28.3563
LVC 645/ 697	(C)	277	759	3.51	85330	233779	3.72	27.8709
HND 316/ 321	(D)	2	6	0.03	554	1519	0.02	26.8584
LGD 566/ 645	(D)	37	103	0.47	11453	31379	0.50	26.7872
LNE 292/ 316	(E)	321	878	4.06	87699	240270	3.82	23.7860
HNE 316/ 321	(E)	63	172	0.79	17270	47314	0.75	26.5957
MKE 463/ 557	(E)	1167	3197	14.78	345846	947524	15.07	28.5711
HKE 557/ 566	(E)	113	310	1.43	33952	93018	1.48	28.8488
LGE 566/ 645	(E)	1018	2788	12.89	306686	840236	13.36	28.8973
LVE 645/ 697	(E)	488	1336	6.18	149958	410845	6.53	28.7394
LNF 292/ 316	(F)	105	287	1.32	28296	77524	1.23	23.7674
HNF 316/ 321	(F)	29	79	0.37	7848	21500	0.34	26.9196
BLENDING LOSS								
TOTAL		7896	21632	100.00	2294803	6287131	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
DNX	Density, Lb/bbl	VL	290.643		340.000		
SUL	Sulfur, Wt%	WT	0.050		0.050		0.0089
PPX	Pour Point Index (Hu)	VL	289.257		1002.200		
V00	Vis. Index at 100 F	VL	45.763	43.680	59.220		
FLI	Flash Point Index	VL	103.301		266.200		
CTI	Cetane Index	VL	47.000	47.000			-0.1036
Kl#	FCC LCO Pool	%	0.00		10.00		

COMPONENT QUALITIES

		DNX	PPX	SUL	CTI	FLI	V00	Kl#
YMK 400/430 Hyk		279.100	30.9110	.	46.0000	74.0000	61.0000	.
YHK 430/525 Hyk		281.500	66.7660	.	55.0000	36.0000	52.0000	.
YLG 525/650 Hyk		287.900	281.440	.	64.0000	6.30000	45.0000	.
LNA 292/ 316	(A)	274.812	.	1.00E-3	.	1036.00	.	.

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PetroPeru Coker Case Refinery Upgrade

- No. 2 Diesel 5D2

Single Refinery ONE YEAR

HNA	316/ 321	(A)	275.952	10.8680	1.00E-3	35.1000	611.000	74.9310	.
LGA	566/ 645	(A)	306.488	763.343	0.17680	46.7500	4.72000	48.0270	.
HNB	316/ 321	(B)	274.448	12.7640	0.02680	36.9600	611.000	74.3340	.
LGB	566/ 645	(B)	312.441	414.689	0.69660	42.1400	4.58000	41.5790	.
LNC	292/ 316	(C)	267.760	.	3.10E-3	.	1016.00	.	.
HNC	316/ 321	(C)	270.674	19.8280	4.80E-3	37.8400	611.000	72.8090	.
HKC	557/ 566	(C)	300.419	222.147	0.12600	48.1500	6.47000	48.0350	.
LGC	566/ 645	(C)	302.895	358.673	0.16380	48.3700	4.34000	43.5850	.
LVC	645/ 697	(C)	308.170	738.317	0.27990	46.6500	2.61000	38.1420	.
HND	316/ 321	(D)	273.874	43.3520	0.01520	29.9500	611.000	89.0430	.
LGD	566/ 645	(D)	305.925	744.407	0.92230	53.2600	4.69000	42.8210	.
LNE	292/ 316	(E)	273.507	.	2.40E-3	.	1037.00	.	.
HNE	316/ 321	(E)	275.840	4.68800	2.60E-3	27.1100	611.000	73.5000	.
MKE	463/ 557	(E)	296.379	229.995	0.01120	46.4800	15.3400	51.5450	.
HKE	557/ 566	(E)	300.087	360.650	0.01980	49.3700	6.48000	46.4420	.
LGE	566/ 645	(E)	301.339	562.922	0.03230	50.1600	4.70000	42.5020	.
LVE	645/ 697	(E)	307.537	1158.33	0.06040	49.2000	2.59000	36.9160	.
LNF	292/ 316	(F)	270.576	.	9.60E-3	.	1026.00	.	.
HNF	316/ 321	(F)	272.255	23.6530	0.01750	30.6000	611.000	74.9310	.

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PRODUCT BLENDING - MF80 Fuel Oil 6R4
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
LGB	566/ 645	(B)	24	66	82.65	7540	20659	80.21	26.2141
VBF	1011+	(F)	5	14	17.35	1861	5098	19.79	5.4656
BLENDING LOSS									
TOTAL			29	80	100.00	9401	25756	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
DNX	Density, Lb/bbl	VL	321.953		360.000		
SUL	Sulfur, Wt%	WT	1.075		1.500		
PPX	Pour Point Index (Hu)	VL	2394.500		2394.500		0.0018
VBF	RFO Visc Index (122F)	VL	0.295		0.388		
FLI	Flash Point Index	VL	3.917		154.900		
MET	Metals Content, PPM	VL	160.710		230.000		
CRC	W % Conradson Carbon	VL	4.617		14.000		

COMPONENT QUALITIES

			DNX	SUL	VBF	PPX	FLI	CRC	MET
LGB	566/ 645	(B)	312.441	0.69660	0.19400	414.689	4.58000	.	.
VBF	1011+	(F)	367.269	2.61100	0.77800	11825.9	0.76000	26.6100	926.300

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - PI6 Fuel Oil 7R5
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
LKA	375/ 463	(A)	36	98	3.12	10243	28062	2.63	35.7497
MKA	463/ 557	(A)	229	629	19.96	68036	186399	17.47	29.8062
VBE	1011+	(E)	259	709	22.52	89894	246286	23.09	18.3942
LGF	566/ 645	(F)	135	371	11.78	41223	112941	10.59	26.4426
VBF	1011+	(F)	490	1343	42.63	180004	493160	46.23	5.4656
BLENDING LOSS									
TOTAL			1150	3150	100.00	389400	1066849	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
DNX	Density, Lb/bbl	VL	338.682		360.000		
SUL	Sulfur, Wt%	WT	1.416		1.500		
VBF	RFO Visc Index (122F)	VL	0.483	0.396	0.483		16.3281
FLI	Flash Point Index	VL	6.204		154.900		
MET	Metals Content,PPM	VL	400.000		400.000		0.0121
CRC	W % Conradson Carbon	VL	14.360		25.000		

COMPONENT QUALITIES

			DNX	SUL	VBF	FLI	CRC	MET
LKA	375/ 463	(A)	285.637	5.60E-3	-0.39000	69.1700	.	.
MKA	463/ 557	(A)	296.477	0.05490	-0.02600	15.0400	.	.
VBE	1011+	(E)	347.237	0.39660	0.65600	0.76000	13.4000	22.8200
LGF	566/ 645	(F)	304.431	1.01700	0.18000	4.67000	.	.
VBF	1011+	(F)	367.269	2.61100	0.77800	0.76000	26.6100	926.300

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
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PRODUCT BLENDING - PI500 Fuel Oil 8R6
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
LKA	375/ 463	(A)	172	472	19.65	49167	134705	16.34	35.7497
VBE	1011+	(E)	334	915	38.11	115912	317567	38.51	18.3942
VBF	1011+	(F)	370	1014	42.24	135910	372356	45.15	5.4656
BLENDING LOSS									
TOTAL			876	2400	100.00	300989	824628	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
DNX	Density, Lb/bbl	VL	343.595		360.000		
SUL	Sulfur, Wt%	WT	1.333		1.500		
VBF	RFO Visc Index (122F)	VL	0.502	0.494	0.502		16.3281
FLI	Flash Point Index	VL	14.202		108.500		
MET	Metals Content, PPM	VL	400.000		400.000		0.0121
CRC	W % Conradson Carbon	VL	16.347		25.000		

COMPONENT QUALITIES

			DNX	SUL	VBF	FLI	CRC	MET
LKA	375/ 463	(A)	285.637	5.60E-3	-0.39000	69.1700	.	.
VBE	1011+	(E)	347.237	0.39660	0.65600	0.76000	13.4000	22.8200
VBF	1011+	(F)	367.269	2.61100	0.77800	0.76000	26.6100	926.300

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - PI6 Export 9R7
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
LKB	375/ 463	(B)	426	1168	5.50	124818	341967	4.77	28.7286
LGB	566/ 645	(B)	451	1237	5.82	141016	386344	5.38	26.2141
VBB	1011+	(B)	2170	5946	27.99	815062	2233046	31.12	6.3378
LKC	375/ 463	(C)	209	572	2.69	60471	165673	2.31	28.4673
VBC	1011+	(C)	1017	2787	13.12	358502	982197	13.69	16.6564
VBD	1011+	(D)	69	189	0.89	25062	68662	0.96	15.5633
LKE	375/ 463	(E)	1052	2883	13.57	303747	832184	11.60	28.6633
VBE	1011+	(E)	102	281	1.32	35569	97449	1.36	18.3942
LKF	375/ 463	(F)	545	1493	7.03	157016	430181	6.00	28.7939
LGF	566/ 645	(F)	487	1334	6.28	148227	406102	5.66	26.4426
VBF	1011+	(F)	1224	3353	15.78	449514	1231545	17.16	5.4656
BLENDING LOSS									
TOTAL			7754	21243	100.00	2619002	7175349	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
DNX	Density, Lb/bbl	VL	337.769		360.000		
SUL	Sulfur, Wt%	WT	1.368		1.500		
VBF	RFO Visc Index (122F)	VL	0.483	0.396	0.483		16.3281
FLI	Flash Point Index	VL	21.443		154.900		
MET	Metals Content,PPM	VL	400.000		400.000		0.0121
CRC	W % Conradson Carbon	VL	16.135		25.000		

COMPONENT QUALITIES

			DNX	SUL	VBF	FLI	CRC	MET
LKB	375/ 463	(B)	292.853	0.14980	0.04000	67.1200	.	.
LGB	566/ 645	(B)	312.441	0.69660	0.19400	4.58000	.	.
VBB	1011+	(B)	375.524	2.15600	0.77700	0.76000	33.9500	855.600
LKC	375/ 463	(C)	289.471	0.03690	0.05600	66.8900	.	.
VBC	1011+	(C)	352.368	0.79800	0.71400	0.76000	15.4600	88.1500
VBD	1011+	(D)	363.421	2.02700	0.64500	0.76000	25.4100	271.520
LKE	375/ 463	(E)	288.666	2.90E-3	0.04400	71.7800	.	.
VBE	1011+	(E)	347.237	0.39660	0.65600	0.76000	13.4000	22.8200
LKF	375/ 463	(F)	288.089	0.18390	0.03600	73.9900	.	.
LGF	566/ 645	(F)	304.431	1.01700	0.18000	4.67000	.	.
VBF	1011+	(F)	367.269	2.61100	0.77800	0.76000	26.6100	926.300

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FOSTER WHEELER USA CORPORATION

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PetroPeru Coker Case Refinery Upgrade

I N D E X

REPORT	DESCRIPTION	PAGE	LOC'N	PERIOD
01010	ECONOMIC REPORT	1	.	A
01020	PROCESS-UNIT INVESTMENT REPORT	2	.	A
01250	PLANT INPUT/OUTPUT REPORT	3	1	A
01080	PURCHASES/SALES REPORT	5	.	A
BR	Raw Material Purchases	5	.	A
SA	Product Sales	6	.	A
01100	PROCESS UTILIZATION REPORT	7	1	A
01310	MATERIAL BALANCE	9	1	A
DU	Crude Tower #1	9	1	A
VU	Vacuum Tower #1	11	1	A
WU	Vacuum Tower #2	12	1	A
SG	Sats Gas Plant	13	1	A
UG	Unsats Gas Plant	14	1	A
KC	FCCU (KC)	15	1	A
HK	Hydrocracker	17	1	A
CR	CCR Reformer	19	1	A
SA	H2SO4 Alkylation	20	1	A
DH	Distillate HDS	21	1	A
NH	Naphtha HDS	22	1	A
H2	Hydrogen Plant	23	1	A
SU	Sulfur Plant	24	1	A
90	Fuel System	25	1	A
91	Fuel Pool	26	1	A
95	General Utilities	27	1	A
AM	Amine (DEA) Unit	28	1	A
01030	UTILITIES CONSUMPTION REPORT	29	1	A
01150	RECIPE-MATERIAL BALANCE	31	1	A
.AP	Sol Asp	31	1	A
.BP	Liq Asp	32	1	A
.CP	Res Asp	33	1	A
.34	C3/C4 LPG	34	1	A
01320	PRODUCT BLENDING	35	1	A
1GP	FCC Naphtha	35	1	A
2GR	Virgin Naphtha	36	1	A
3GS	Gasoline G-95 SP	38	1	A
4GU	Gasoline 91 SP	39	1	A
G3S	Gasoline 97 SP	41	1	A
G4U	Solvent 3	42	1	A
G5M	Export Gasoline	43	1	A
01340	PRODUCT BLENDING	44	1	A
2KE	Kerosene	44	1	A
3JA	Turbo Jet A-1	45	1	A
5D2	No. 2 Diesel	46	1	A
6R4	MF80 Fuel Oil	48	1	A
7R5	PI6 Fuel Oil	49	1	A
8R6	PI500 Fuel Oil	50	1	A
9R7	PI6 Export	51	1	A

APPENDIX A.8 – LP MODEL REPORT FILES – DELAYED COKER & CFB CASE

This appendix contains the report files from the Haverly Systems GRTMPS LP models for the delayed coker & CFB case.

Coker TIC	Includes capital investment costs

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PetroPeru Coker Case Refinery Upgrade

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ECONOMIC REPORT
ONE YEAR

	ACCOUNTING CATEGORY	.M $	.. $/CD
SAX	Product Values - Sales	793598	2174242
BRX	Raw Material Costs	-635282	-1740498
UTP	Utilities Costs	-11676	-31988
	TOTAL VARIABLE REVENUES	793598	2174242
	TOTAL VARIABLE COSTS	-646957	-1772485
	GROSS VARIABLE INCOME	146641	401757
	INCOME TAX	43992	120527
IVS	Investment less credits	-200033	-548035
FOC	Added Fixed Costs	-5601	-15345
DPR	Depreciation tax credits	3000	8221
	NET PRESENT VALUE (I=15.00 PCT)	60949	166983

****SOLUTION STATUS: OPTIMAL AFTER 19701 ITERATIONS
CASE 1a: 15 RECURSION PASSES

CASE 1a: THE MODEL CONVERGED ON PROPERTIES ONLY

PetroPeru Refinery Upgrade Study
Talara Refinery Modifications Project
A Foster Wheeler USA Study
Upgraded Refinery With Coker
Includes Catalytic Reforming, NHT
Coker, Alkylation, Diesel HDS, SRU & ARU
Assumed CDU revamp to 90,000 BPSD
Potential to revamp VDU and FCC included
Year 2007 Basis
3 Grades of Gasoline (No Unleaded)
Investment Costs Included

****SYSTEM NAME : GRTMPS - III
****SYSTEM VERSION: VER 3.02.006

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PROCESS-UNIT INVESTMENT REPORT
ONE YEAR

--PROCESS INVESTMENT--		(NO)	------LOCATION------	PURCHASED CAPACITY B/SD	TOTAL INVESTMENT (INCL. OFFSITES) .M $	$/BBL	ADDED LABOR MEN/SHIFT
NHT	Naphtha Hydrotreater	1	Single Refinery	4477	11963	2672	
CRU	CCR	1	Single Refinery	4477	23317	5208	
COK	Delayed Coker	1	Single Refinery	14655	94220	6429	
DHT	Kero + Diesel HDS	1	Single Refinery	15651	32138	2053	
SUL	Sulfur + TGT + ARU	1	Single Refinery	134400	20698	154	
SAA	H2SO4 Alkylation	1	Single Refinery	3204	17697	5524	
			*** GRAND TOTAL		200033		

PROCESS UNIT INVESTMENT PARAMETER DETAILS AT Single Refinery

BASIS OF PROCESS UNIT PER CAPACITY UNIT COST CALCULATION

	PROCESS INVESTMENT	BASE UNIT SIZE (SIZE)	BASE INVESTMENT UNIT COST (UCOST)	OFFSITES COST FACTOR (OSBL)	LOCATION FACTOR (*LOCI)	CURRENT COST FACTOR (XCSTI)	INFLATION FACTOR (*IFLI)	CALCULATED INVESTMENT UNIT COST (UCOST)	CALCULATED INCREMENTAL UNIT COST (ICOST)
COK	Delayed Coker	10000	7560.00	1.0000	1.0000	1.0000	1.0000	7560.00	4000.00
DHT	Kero + Diesel HDS	15000	2080.00	1.0000	1.0000	1.0000	1.0000	2080.00	1440.00
NHT	Naphtha Hydrotreat	3000	3200.00	1.0000	1.0000	1.0000	1.0000	3200.00	1600.00
CRU	CCR	3000	6000.00	1.0000	1.0000	1.0000	1.0000	6000.00	3600.00
SAA	H2SO4 Alkylation	3000	5600.00	1.0000	1.0000	1.0000	1.0000	5600.00	4400.00
SUL	Sulfur + TGT + ARU	67200	247.80	1.0000	1.0000	1.0000	1.0000	247.80	60.20

CAPITAL RECOVERY FACTOR USED (XCAPF) = 0.1598

BASIS OF TOTAL PROCESS UNIT COST CALCULATION

	PROCESS UNIT INVESTMENT DATA BREAKOUT	UNIT SIZE Bbls	INVESTMENT UNIT COST $/BBL	VARIABLE COST .M $	FIXED COST .M $	TOTAL COST .M $	INVESTMENT CREDIT RATE %	NET COST AFTER CREDIT .M $	ADDED LABOR MEN/SHIFT
COK	Delayed Coker	14655	4000.00	18620	75600	94220			
DHT	Kero + Diesel HDS	15651	1440.00	938	31200	32138			
NHT	Naphtha Hydrotreat	4477	1600.00	2363	9600	11963			
CRU	CCR	4477	3600.00	5317	18000	23317			
SAA	H2SO4 Alkylation	3204	4400.00	897	16800	17697			
SUL	Sulfur + TGT + ARU	134400	60.20	4045	16652	20698			
	TOTAL			32181	167852	200033			

BASIS OF OTHER INVESTMENT COST FACTORS

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PROCESS-UNIT INVESTMENT REPORT (CONT.)
ONE YEAR

OTHER INVESTMENT COSTS	PROCESS UNIT COST OR NUMBER OF MEN	% OR ANNUAL RATE	COST .M $	INCOME TAX RATE %	AFTER TAX COST .M $
MAINTENANCE	200033	3.00	6001	30.00	4201
TAXES & INSURANCE	200033	1.00	2000	30.00	1400
LABOR		185.01		30.00	
TOTAL			8001		5601
DEPRECIATION	200033	5.00	10002	30.00	3000

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PLANT INPUT/OUTPUT REPORT
Single Refinery ONE YEAR

		PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	STOCK LIMITS MIN B/CD	STOCK LIMITS MAX B/CD	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT	STOCK L MIN L/CD
	PLANT INPUT										
HFG	Purch Nat Gas		37	102	0.12		100000	9850	26987	0.10	26
NGA	Nat Gasoline		3	8	0.01		50	734	2011	0.01	
lor	Loreto19		3673	10062	11.44		25000	1208591	3311209	12.03	8
may	Mayna25		2078	5692	6.47		11000	654107	1792073	6.51	3
ONO	MIXTURE		10147	27800	31.61		27800	3014988	8260242	30.01	8
ori	Orient23		16164	44286	50.35		50000	5158197	14132047	51.34	15
	TOTAL		32102	87950	100.00			10046468	27524569	100.00	
	PLANT OUTPUT										
CXK	Delayed Coke	1613653	1472	4034	4.59			588983	1613653	5.86	
SUL	Sulfur	127680	118	323	0.37			46603	127680	0.46	
B34	C3/C4 LPG		2080	5700	6.48		5700	385336	1055715	3.84	1
ELP	C3/C4 Export		434	1188	1.35			88612	242774	0.88	
1GP	FCC Naphtha		292	800	0.91	800	800	76655	210015	0.76	210015
2GR	Virgin Naphtha		3135	8590	9.77			809233	2217077	8.05	
3GS	Gasoline G-95 SP		768	2104	2.39		2104	208799	572053	2.08	
4GU	Gasoline 91 SP		3619	9916	11.27		9916	923823	2531022	9.20	2
G3S	Gasoline 97 SP		207	568	0.65		605	57110	156464	0.57	
G4U	Solvent 3		153	420	0.48		420	42962	117704	0.43	
6GA	Export FCC Naphth		4118	11283	12.83			1081087	2961881	10.76	
2KE	Kerosene		2828	7748	8.81		7960	808055	2213851	8.04	2
3JA	Turbo Jet A-1		1055	2890	3.29		2890	304904	835354	3.03	
5D2	No. 2 Diesel		8039	22026	25.04		33000	2427348	6650269	24.16	9
6R4	MF80 Fuel Oil		102	280	0.32	80	280	36792	100800	0.37	28800
7R5	PI6 Fuel Oil		1150	3150	3.58		3150	413910	1134000	4.12	1
8R6	PI500 Fuel Oil		876	2400	2.73		2400	315360	864000	3.14	
9R7	PI6 Export		1830	5015	5.70			630629	1727752	6.28	
BAP	Solid Asphalt		110	300	0.34		300	41120	112657	0.41	
CAP	Liquid Asphalt		91	250	0.28		250	31983	87623	0.32	
DAP	Res Asphalt		255	700	0.80		700	89589	245449	0.89	
	TOTAL		32735	89684	101.97			9408894	25777793	93.65	
	PROCESS FUEL USED										
HLA	H2 (Unrec.)	2	33	90	0.10			3398	9309	0.03	
HFA	Purch Nat Gas		37	102	0.12			9850	26987	0.10	
FEA	Plant Fuel Gas		1140	3123	3.55			319493	875323	3.18	
4MA	Butylenes		35	95	0.11			7269	19914	0.07	
CKA	KCC Coke Burn	712	0	1	0.00			260039	712436	2.59	

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Foster Wheeler USA LP Model

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PetroPeru Coker Case Refinery Upgrade

PLANT INPUT/OUTPUT REPORT (CONT.)
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	STOCK LIMITS MIN ---- MAX B/CD	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT	STOCK L MIN --- L/CD
TOTAL		1245	3411	3.88		600049	1643970	5.97	
GRAND TOTAL		33980	93095	105.85		10008943	27421762	99.63	
PLANT GAIN		1878	5145	5.85					
PLANT LOSS						37524	102807	0.37	

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Raw Material Purchases
ONE YEAR

STOCK		LOCATION	PER DAY ACTUAL UNITS	Volume .M Bbls	Volume B/CD	UNIT PRICE $/BBL	UNIT PRICE C/Gal	MARGINAL VALUE $/BBL	MARGINAL VALUE C/Gal	INCREA INCENT $/BBL
HFG Purch Nat Gas		1 Single Refinery		37	102	3.85	9.17	3.85	9.17	-0.00
NGA Nat Gasoline		1 Single Refinery		3	8	19.75	47.02	19.75	47.02	-0.00
lor	Loreto19	1 Single Refinery		3673	10062	17.77	42.31	17.54	41.76	-0.23
may	Mayna25	1 Single Refinery		2078	5692	20.47	48.74	20.88	49.71	0.41
ONO	MIXTURE	1 Single Refinery		10147	27800	22.51	53.60	23.04	54.86	0.53
ori	Orient23	1 Single Refinery		16164	44286	18.49	44.02	18.49	44.02	-0.00
		**GRAND TOTAL		32102	87950					

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Product Sales
ONE YEAR

STOCK	LOCATION	PER DAY ACTUAL UNITS	Volume .M Bbls	Volume B/CD	UNIT PRICE $/BBL	UNIT PRICE C/Gal	MARGINAL VALUE $/BBL	MARGINAL VALUE C/Gal	INCREA INCENT $/BBL
@ SUL Sulfur	1 Single Refiner	127680	118	323	0.02	0.05	0.02	0.05	
B34 C3/C4 LPG	1 Single Refinery		2080	5700	17.82	42.43	14.79	35.21	3.03
ELP C3/C4 Export	1 Single Refinery		434	1188	14.79	35.21	14.79	35.21	0.00
1GP FCC Naphtha	1 Single Refinery		292	800	24.79	59.02	24.79	59.02	0.00
2GR Virgin Naphtha	1 Single Refinery		3135	8590	23.46	55.86	23.46	55.86	0.00
3GS Gasoline G-95 SP	1 Single Refinery		768	2104	30.61	72.88	28.58	68.04	2.03
4GU Gasoline 91 SP	1 Single Refinery		3619	9916	28.90	68.81	26.32	62.68	2.58
G3S Gasoline 97 SP	1 Single Refinery		207	568	31.46	74.90	31.46	74.90	0.00
G4U Solvent 3	1 Single Refinery		153	420	54.63	130.07	27.19	64.75	27.44
6GA Export FCC Naphtha	1 Single Refinery		4118	11283	24.79	59.02	24.79	59.02	0.00
2KE Kerosene	1 Single Refinery		2828	7748	28.77	68.50	28.77	68.50	0.00
3JA Turbo Jet A-1	1 Single Refinery		1055	2890	28.77	68.50	28.77	68.50	0.00
5D2 No. 2 Diesel	1 Single Refinery		8039	22026	28.54	67.95	28.54	67.95	0.00
6R4 MF80 Fuel Oil	1 Single Refinery		102	280	20.10	47.86	17.68	42.08	2.42
7R5 PI6 Fuel Oil	1 Single Refinery		1150	3150	18.19	43.31	16.65	39.64	1.54
8R6 PI500 Fuel Oil	1 Single Refinery		876	2400	17.59	41.88	16.45	39.16	1.14
9R7 PI6 Export	1 Single Refinery		1830	5015	16.65	39.64	16.65	39.64	0.00
BAP Solid Asphalt	1 Single Refinery		110	300	27.50	65.48	11.93	28.40	15.57
CAP Liquid Asphalt	1 Single Refinery		91	250	28.99	69.02	13.89	33.07	15.10
DAP Res Asphalt	1 Single Refinery		255	700	18.33	43.64	16.43	39.11	1.90
@ CXK Delayed Coke	1 Single Refine	1613653	1472	4034	0.00	0.01	0.00	0.01	
	**GRAND TOTAL		32735	89684					

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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Product Sales
ONE YEAR

STOCK	LOCATION	PER DAY ACTUAL UNITS	Volume .M Bbls	Volume B/CD	UNIT PRICE $/BBL	UNIT PRICE C/Gal	MARGINAL VALUE $/BBL	MARGINAL VALUE C/Gal	INCREA INCENT $/BBL

@ ... REPORTED MONETARY VALUES PER ACTUAL STREAM UNITS

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
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PROCESS UTILIZATION REPORT
Single Refinery ONE YEAR

----PROCESS UNIT----	----PROCESS LIMIT----	OPERATING RATE .M Bbls	OPERATING RATE B/CD	UNUSED CAPACITY .M Bbls	UNUSED CAPACITY B/CD	PCT OF MAX CAPACITY	EXPANSION INCENTIVE $/BBL
CRD-DU Crude Tower #1	CRD Feed	32062	87840			100.0	1.923
VAC-VU Vacuum Tower #1	VAC Feed	15394	42175	1396	3825	91.7	
WAC-WU Vacuum Tower #2	WAC Feed	711	1948	107	292	87.0	-0.196
SGP-SG Sats Gas Plant	SGP Feed	384	1053				
UGP-UG Unsats Gas Plant	UGP Feed	3537	9690				
FCC-FC FCCU (Total)	FCC Total Feed	10234	28039				
	KCC Feed (KC)	10234	28039				
	OKC CO Boiler (KC)	156986	430098				
COK-XK Delayed Coker	COK Feed	5082	13922				3.049
TNS-TN Naphtha Splitter	TNS Feed	873	2393				
CRU-CR CCR Reformer	CRU Feed	1552	4253				2.744
SRU-SR LP SR Reformer	SRU Feed						109.822
SAA-SA H2SO4 Alkylation	SAA Alkylate product	1111	3044				3.354
DHT-DH Distillate HDS	DHT Total Capacity	5427	14869				1.098
	DHD SR Diesel Feed	1677	4595				
	DHJ Jet/Kero Feed	1690	4630				
	DHC FCC Stk.	687	1882				
	DHc Coker Stk.	1373	3761				
NHT-NH Naphtha HDS	NHT Total feed	1552	4253				1.220
	NHL Lt Vir Naphtha						
	NHC Hvy Vir Naphtha	928	2544				
	NHZ Hvy Coker Naphtha	624	1709				
	NHA Lt Coker Naphtha						
HYD-H2 Hydrogen Plant	HYD Total MSCF H2						0.849
	H2A via plant fuel						
	H2B via LPG						
	H2C via naphtha						
	H2D via purch gas						
SUL-SU Sulfur Plant	SUL Feed	46603	127680				0.309
MRJ-MJ Merox (Jet)	MRJ Feed	3883	10638			100.0	1.558

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PROCESS UTILIZATION REPORT (CONT.)
Single Refinery ONE YEAR

----PROCESS UNIT----	----PROCESS LIMIT----	OPERATING RATE .M Bbls	OPERATING RATE B/CD	UNUSED CAPACITY .M Bbls	UNUSED CAPACITY B/CD	PCT OF MAX CAPACITY	EXPANSION INCENTIVE $/BBL
MRD-MD Merox (Diesel)	MRD Feed	2313	6338	1035	2837	69.1	
MRG-MG Merox (FCC Gasoline)	MRG Feed	5904	16175				
MRL-ML Merox (LPG)	MRL Feed	3921	10743				
FUL-90 Fuel System	PFO Fuel Oil						
	FLR Flare						
UTL-95 General Utilities	STM MP Steam (Mlbs)	747	2047				
	STL LP Steam (Mlbs)	4	12				
	STH HP Steam (Mlbs)	226	619				
	SWT Sour Water (Mlbs)	314	861				
	VNT Steam Vent						
	KWH Power (kwh)	94208	258105				
	CWR Cooling H2O (MGal)	11794	32311				
	KWT Condensing Turbine						0.066
ADM-AM Amine (DEA) Unit	ADM Amine Unit (GPM)	132	360				

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MATERIAL BALANCE - Crude Tower #1 CRD-DU
Single Refinery ONE YEAR

		PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
	FEED STREAMS							
lor	Loreto19		3673	10062	11.45	1208591	3311209	12.04
may	Mayna25		2078	5692	6.48	654107	1792073	6.52
ONO	MIXTURE		10147	27800	31.65	3014988	8260242	30.04
ori	Orient23		16164	44286	50.42	5158197	14132047	51.40
	TOTAL FEED		32062	87840	100.00	10035883	27495571	100.00
	PRODUCT STREAMS							
F3S	Propane (Lbs & FOEB)	2405	3	8	0.01	878	2405	0.01
S3S	Propane (Sat.)		44	122	0.14	7886	21604	0.08
S4I	Iso-butane (Sat.)		46	126	0.14	9028	24735	0.09
S4N	NC4 (Sat.)		142	390	0.44	29110	79753	0.29
55	55/ 180		1254	3437	3.91	294037	805581	2.93
LN	292/ 316		684	1873	2.13	185915	509356	1.85
LA	180/ 292		2641	7236	8.24	691320	1894027	6.89
HN	316/ 321		139	381	0.43	38088	104351	0.38
NK	321/ 375		1466	4017	4.57	409280	1121314	4.08
LK	375/ 463		2488	6816	7.76	718567	1968677	7.16
MK	463/ 557		2814	7708	8.78	838590	2297507	8.36
HK	557/ 566		285	780	0.89	86011	235646	0.86
LG	566/ 645		2741	7508	8.55	833297	2283005	8.30
AR	645+		17285	47357	53.91	5873124	16090750	58.52
	TOTAL PRODUCT		32033	87761	99.91	10015130	27438713	99.79
	LOSS (GAIN)		29	79	0.09	20753	56858	0.21

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	10365	10365
STM$	MP Steam, MLbs/D	328	328
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	48619	48619
BTU$	Fuel Fired, MBTU/D	7299504	7299504
SWT$	Sour Water, MLbs/Day	277	277
MUW$	Make-up Water, MGal/D	18	18

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MATERIAL BALANCE - Vacuum Tower #1 VAC-VU
Single Refinery ONE YEAR

			------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS								
ARB	645+	(B)	2338	6406	15.19	821431	2250497	15.64
ARC	645+	(C)	210	575	1.36	69154	189464	1.32
ARE	645+	(E)	3184	8724	20.69	1031352	2825621	19.63
ARF	645+	(F)	9661	26470	62.76	3331673	9127872	63.42
TOTAL FEED			15394	42175	100.00	5253611	14393454	100.00
PRODUCT STREAMS								
LV	645/ 697		1458	3995	9.47	454087	1244073	8.64
HV	697/1011		7274	19930	47.25	2358538	6461749	44.89
VB	1011+		6661	18250	43.27	2440873	6687325	46.46
TOTAL PRODUCT			15394	42175	100.00	5253498	14393147	100.00

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	5061	5061
STM$	MP Steam, MLbs/D	432	432
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	29101	29101
BTU$	Fuel Fired, MBTU/D	3762034	3762034
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	39	39

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MATERIAL BALANCE - Vacuum Tower #2 WAC-WU
Single Refinery ONE YEAR

			------ VOLUME ------		PERCENT OF	------ WEIGHT ------		PERCENT OF
			.M Bbls	B/CD	INPUT	.M Lbs	L/CD	INPUT
	FEED STREAMS							
ARE	645+	(E)	711	1948	100.00	230282	630908	100.00
	TOTAL FEED		711	1948	100.00	230282	630908	100.00
	PRODUCT STREAMS							
LV	645/ 697		107	293	15.02	32852	90006	14.27
HV	697/1011		452	1238	63.56	144547	396019	62.77
VB	1011+		152	417	21.42	52879	144875	22.96
	TOTAL PRODUCT		711	1948	100.00	230279	630901	100.00

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	1221	1221
STM$	MP Steam, MLbs/D	132	132
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	307	307
BTU$	Fuel Fired, MBTU/D	301550	301550
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	0	0

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MATERIAL BALANCE - Sats Gas Plant SGP-SG
Single Refinery ONE YEAR

	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS						
S3S Propane (Sat.)	114	312	29.62	20214	55381	26.99
S4I Iso-butane (Sat.)	80	220	20.90	15812	43320	21.11
S4N NC4 (Sat.)	190	521	49.49	38872	106500	51.90
TOTAL FEED	384	1053	100.00	74898	205201	100.00
PRODUCT STREAMS						
C3S Propane	114	312	29.62	20214	55381	26.99
C4I Iso-butane	80	220	20.90	15812	43320	21.11
C4N Normal Butane	190	521	49.49	38872	106500	51.90
TOTAL PRODUCT	384	1053	100.00	74898	205201	100.00

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	13	13
CWR$	Cooling Water, MGal/D	444	444
STM$	MP Steam, MLbs/D	3	3
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	251	251
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	0	0

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MATERIAL BALANCE - Unsats Gas Plant UGP-UG
Single Refinery ONE YEAR

	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS						
U3S Propane (Unsat.)	484	1325	13.67	85865	235247	11.58
U3M Propylene (Unsat.)	1175	3219	33.22	214323	587186	28.91
U4I Iso-butane (Unsat.)	641	1757	18.13	168316	461138	22.71
U4N NC4 (Unsat.)	247	676	6.97	64742	177374	8.73
U4J Iso C4= (Unsat.)	334	916	9.45	70125	192123	9.46
U4L 1/2 C4= (Unsat.)	656	1798	18.56	137934	377900	18.61
TOTAL FEED	3537	9690	100.00	741304	2030969	100.00
PRODUCT STREAMS						
C3S Propane	484	1325	13.67	85865	235247	11.58
C3M Propylene	1175	3219	33.22	214323	587186	28.91
C4I Iso-butane	641	1757	18.13	126187	345719	17.02
C4N Normal Butane	247	676	6.97	50391	138059	6.80
C4M Mixed C4=	352	964	9.95	73921	202523	9.97
C4L 1/2 C4=	638	1749	18.05	134191	367646	18.10
TOTAL PRODUCT	3537	9690	100.00	684878	1876378	92.39
LOSS (GAIN)				56425	154590	7.61

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	121	121
CWR$	Cooling Water, MGal/D	4089	4089
STM$	MP Steam, MLbs/D	25	25
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	2311	2311
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	3	3

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MATERIAL BALANCE - FCCU (KC) KCC-KC
Single Refinery ONE YEAR

		PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS								
HVB 697/1011 (B)			1018	2789	9.95	336717	922513	10.08
ARC 645+ (C)			1180	3234	11.53	389232	1066389	11.65
HVC 697/1011 (C)			109	298	1.06	34507	94538	1.03
HVE 697/1011 (E)			2476	6783	24.19	791923	2169653	23.70
HVF 697/1011 (F)			4124	11298	40.29	1339938	3671064	40.10
cG# 650+ HCGO			1328	3637	12.97	449414	1231271	13.45
TOTAL FEED			10234	28039	100.00	3341731	9155428	100.00
PRODUCT STREAMS								
KTG FCC Gasoline			5655	15492	55.25	1484414	4066887	44.42
KLC FCC LCO			687	1882	6.71	234890	643535	7.03
KHC FCC HCO			1360	3726	13.29	505795	1385739	15.14
CKE FCC Cat Coke		712436	0	1	0.00	260039	712436	7.78
H2S H2S (Lbs)		45809	40	109	0.39	16720	45809	0.50
F1S Methane (Lbs & FOEB)		183038	253	694	2.47	66808	183037	2.00
F2S Ethane (Lbs & FOEB)		145987	189	517	1.84	53285	145986	1.59
F2M Ethylene (Lbs & FOEB)		106778	134	366	1.31	38974	106777	1.17
F3S Propane (Lbs & FOEB)		33707	42	116	0.41	12303	33707	0.37
F3M Propylene (Lbs & FOEB)		75171	92	251	0.90	27437	75170	0.82
U3S Propane (Unsat.)			339	928	3.31	60147	164788	1.80
U3M Propylene (Unsat.)			1106	3031	10.81	201808	552897	6.04
U4I Iso-butane (Unsat.)			602	1649	5.88	158011	432906	4.73
U4N NC4 (Unsat.)			183	501	1.79	47998	131502	1.44
U4J Iso C4= (Unsat.)			316	865	3.08	66218	181420	1.98
U4L 1/2 C4= (Unsat.)			622	1705	6.08	130819	358408	3.91
TOTAL PRODUCT			11619	31833	113.53	3365667	9221004	100.72
LOSS (GAIN)			-1385	-3793	-13.53	-23935	-65576	-0.72

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	2355	2355
CWR$	Cooling Water, MGal/D	8945	8945
STM$	MP Steam, MLbs/D	444	444
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	619	619
KWH$	Electricity, KWH/D	12180	12180

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BTU$	Fuel Fired, MBTU/D	1295454	1295454
MUW$	Make-up Water, MGal/D	70	70
KVV	FCC Conversion, Vol%	80.04	
KDE	FCC Feed Density	336.07	
KSL	FCC Feed Sulfur	1.0376	
KNI	FCC Feed Basic Nitrogen	0.0670	
KME	FCC Feed Metals	4.8000	
KRR	FCC Feed Concarbon	1.1024	

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MATERIAL BALANCE - Delayed Coker COK-XK
Single Refinery ONE YEAR

			PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
	FEED STREAMS								
VBC	1011+	(C)		79	218	1.56	27986	76674	1.50
VBE	1011+	(E)		226	618	4.44	78338	214626	4.21
VBF	1011+	(F)		4777	13087	94.00	1754310	4806328	94.29
	TOTAL FEED			5082	13922	100.00	1860634	5097628	100.00
	PRODUCT STREAMS								
TTN	Thermal Naphtha			873	2393	17.19	227239	622571	12.21
XLG	380/650 LCGO			1373	3761	27.02	419292	1148746	22.53
XHG	650+ HCGO			1328	3637	26.13	449414	1231271	24.15
CXK	Delayed Coke		1613653	1472	4034	28.98	588983	1613653	31.65
HLS	H2 (Unrec.)		731	14	38	0.27	1414	3873	0.08
H2S	H2S (Lbs)		39356	34	94	0.67	14365	39356	0.77
F1S	Methane (Lbs & FOEB)		112771	156	427	3.07	41161	112771	2.21
F2S	Ethane (Lbs & FOEB)		108683	140	385	2.76	39669	108682	2.13
F2M	Ethylene (Lbs & FOEB)		13096	16	45	0.32	4780	13096	0.26
F3S	Propane (Lbs & FOEB)		35280	44	121	0.87	12877	35280	0.69
F3M	Propylene (Lbs & FOEB)		10709	13	36	0.26	3909	10709	0.21
U3S	Propane (Unsat.)			145	397	2.85	25718	70460	1.38
U3M	Propylene (Unsat.)			69	188	1.35	12515	34288	0.67
U4I	Iso-butane (Unsat.)			39	108	0.77	10305	28233	0.55
U4N	NC4 (Unsat.)			64	175	1.26	16743	45872	0.90
U4J	Iso C4= (Unsat.)			19	51	0.37	3906	10702	0.21
U4L	1/2 C4= (Unsat.)			34	93	0.67	7115	19492	0.38
	TOTAL PRODUCT			5833	15982	114.79	1879406	5149058	101.01
	LOSS (GAIN)			-752	-2060	-14.79	-18772	-51430	-1.01

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	132	132
CWR$	Cooling Water, MGal/D	557	557
STM$	MP Steam, MLbs/D	334	334
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	46793	46793
BTU$	Fuel Fired, MBTU/D	2053548	2053548
SWT$	Sour Water, MLbs/Day	585	585

MUWS	Make-up Water, MGal/D	29	29
rcyS	Recycle BPD	0	
xkl	Feed Gravity (Lbs/Bbl)	366.15	
xkc	Feed Concarbon Wt%	25.85	
dSU	Feed Sulfur, Wt%	2.4844	

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MATERIAL BALANCE - Naphtha Splitter TNS-TN
Single Refinery ONE YEAR

	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS						
TTN Thermal Naphtha	873	2393	100.00	227239	622571	100.00
TOTAL FEED	873	2393	100.00	227239	622571	100.00
PRODUCT STREAMS						
TC5 C5/180 Th Naph.	249	683	28.55	58344	159846	25.68
THN 180/380 Th Naph.	624	1709	71.45	165830	454329	72.98
TOTAL PRODUCT	873	2393	100.00	224174	614174	98.65
LOSS (GAIN)				3065	8397	1.35

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	0	
KWH$	Electricity, KWH/D	0	
BTU$	Fuel Fired, MBTU/D	0	

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MATERIAL BALANCE - CCR Reformer CRU-CR
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
ln# NHT LSR for Ref		728	1996	46.93	193648	530541	46.56
hn# NHT HSR for Ref		824	2257	53.07	222250	608904	53.44
TOTAL FEED		1552	4253	100.00	415897	1139445	100.00
PRODUCT STREAMS							
L95 Lt. Ref 95 Sev.		258	707	16.61	71797	196705	17.26
L00 Lt. Ref 100 Sev.		319	875	20.57	88892	243539	21.37
H00 Hvy Ref hn 100 Sev.		712	1952	45.89	203210	556739	48.86
HYD H2 (MSCFD)	5209	98	268	6.30	10076	27606	2.42
HLS H2 (Unrec.)	1026	19	53	1.24	1984	5436	0.48
F1S Methane (Lbs & FOEB)	16609	23	63	1.48	6062	16609	1.46
F2S Ethane (Lbs & FOEB)	21112	27	75	1.76	7706	21112	1.85
F3S Propane (Lbs & FOEB)	3414	4	12	0.28	1246	3414	0.30
S3S Propane (Sat.)		63	173	4.07	11212	30718	2.70
S4I Iso-butane (Sat.)		30	82	1.93	5899	16161	1.42
S4N NC4 (Sat.)		43	119	2.80	8867	24293	2.13
TOTAL PRODUCT		1598	4377	102.92	416951	1142333	100.25
LOSS (GAIN)		-45	-124	-2.92	-1054	-2888	-0.25

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	162	162
CWR$	Cooling Water, MGal/D	455	455
STM$	MP Steam, MLbs/D	-290	-290
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	3487	3487
BTU$	Fuel Fired, MBTU/D	1152555	1152555
SWT$	Sour Water, MLbs/Day	0	
SVC	Average Reformate Severity	99.00	
cPF	Avg Paraffin Vol%	45.24	
cAR	Avg Aromatic Vol%	10.72	

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MATERIAL BALANCE - H2SO4 Alkylation SAA-SA
Single Refinery ONE YEAR

	------ VOLUME ------		PERCENT OF	------ WEIGHT ------		PERCENT OF
	.M Bbls	B/CD	INPUT	.M Lbs	L/CD	INPUT
FEED STREAMS						
C4I Iso-butane	721	1977	53.05	141999	389039	51.41
C4L 1/2 C4=	638	1749	46.95	134191	367646	48.59
TOTAL FEED	1360	3726	100.00	276190	756685	100.00
PRODUCT STREAMS						
AL7 C4 Alkylate	1111	3044	81.69	276189	756682	100.00
TOTAL PRODUCT	1111	3044	81.69	276189	756682	100.00
LOSS (GAIN)	249	682	18.31	1	3	0.00

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	1364	1364
CWR$	Cooling Water, MGal/D	21	21
STM$	MP Steam, MLbs/D	280	280
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	18473	18473
SWT$	Sour Water, MLbs/Day	0	

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MATERIAL BALANCE - Distillate HDS DHT-DH
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
LGB 566/ 645 (B)		306	837	5.55	95459	261532	5.68
LKC 375/ 463 (C)		52	143	0.95	15136	41469	0.90
MKC 463/ 557 (C)		119	325	2.16	35448	97118	2.11
HKC 557/ 566 (C)		12	34	0.23	3751	10277	0.22
LGC 566/ 645 (C)		164	449	2.98	49690	136137	2.96
HKE 557/ 566 (E)		113	310	2.05	33952	93018	2.02
MKF 463/ 557 (F)		1261	3455	22.89	376037	1030237	22.39
HKF 557/ 566 (F)		132	362	2.40	39976	109523	2.38
LGF 566/ 645 (F)		1207	3308	21.92	367595	1007110	21.88
HYD H2 (MSCFD)	4407	83	227	1.50	8525	23356	0.51
K1# FCC LCO Pool		687	1882	12.47	234890	643535	13.98
CD# 380/650 LCGO		1373	3761	24.92	419292	1148747	24.96
TOTAL FEED		5510	15095	100.00	1679751	4602058	100.00
PRODUCT STREAMS							
HNP Htr'd Naphtha		61	167	1.11	15839	43394	0.94
ddd DHT Product		1665	4561	30.21	503640	1379836	29.98
jjj DHT Jet Product		1674	4586	30.38	497096	1361906	29.59
lll DHT LCO product		682	1868	12.37	229310	628247	13.65
ccc DHT CGO product		1370	3753	24.86	413895	1133958	24.64
H2S H2S (Lbs)	47359	41	113	0.75	17286	47359	1.03
F1S Methane (Lbs & FOEB)	1260	2	5	0.03	460	1260	0.03
F2S Ethane (Lbs & FOEB)	819	1	3	0.02	299	819	0.02
S3S Propane (Sat.)		6	17	0.11	1116	3059	0.07
S4I Iso-butane (Sat.)		4	12	0.08	885	2424	0.05
S4N NC4 (Sat.)		4	12	0.08	896	2454	0.05
TOTAL PRODUCT		5510	15097	100.01	1680721	4604715	100.06
LOSS (GAIN)		-0	-1	-0.01	-970	-2657	-0.06

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	297	297
CWR$	Cooling Water, MGal/D	384	384
STM$	MP Steam, MLbs/D	60	60
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	

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KWH$	Electricity, KWH/D	10225	10225
BTU$	Fuel Fired, MBTU/D	1069352	1069352
SWT$	Sour Water, MLbs/Day	0	
dsu	% Desulfurization	96.54	

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MATERIAL BALANCE - Naphtha HDS NHT-NH
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
THN 180/380 Th Naph.		624	1709	39.81	165830	454329	39.97
HNP Htr'd Naphtha		61	167	3.89	15839	43394	3.82
LNB 292/ 316 (B)		69	188	4.38	18660	51124	4.50
HNB 316/ 321 (B)		15	40	0.93	4012	10991	0.97
LAB 180/ 292 (B)		154	421	9.81	40147	109991	9.68
HNC 316/ 321 (C)		6	16	0.37	1580	4329	0.38
LNE 292/ 316 (E)		225	616	14.35	61531	168577	14.83
HNE 316/ 321 (E)		63	172	3.99	17270	47314	4.16
HNF 316/ 321 (F)		56	153	3.57	15227	41718	3.67
LAF 180/ 292 (F)		281	770	17.94	73237	200651	17.65
HYD H2 (MSCFD)	802	15	41	0.96	1551	4250	0.37
TOTAL FEED		1567	4294	100.00	414883	1136665	100.00
PRODUCT STREAMS							
ncl NHT LSR for Ref		728	1996	46.48	193648	530541	46.68
nch NHT HSR for Ref		824	2257	52.56	222250	608904	53.57
H2S H2S (Lbs)	3135	3	7	0.17	1144	3135	0.28
TOTAL PRODUCT		1555	4260	99.21	417042	1142581	100.52
LOSS (GAIN)		12	34	0.79	-2159	-5915	-0.52

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	85	85
CWR$	Cooling Water, MGal/D	110	110
STM$	MP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	2925	2925
BTU$	Fuel Fired, MBTU/D	305874	305874
SWT$	Sour Water, MLbs/Day	0	

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MATERIAL BALANCE - Sulfur Plant SUL-SU
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
HSS H2S fr Amine U (Lbs)	135660	118	323	100.00	49516	135660	100.00
TOTAL FEED		118	323	100.00	49516	135660	100.00
PRODUCT STREAMS							
SUL Sulfur	127680	118	323	100.00	46603	127680	94.12
TOTAL PRODUCT		118	323	100.00	46603	127680	94.12
LOSS (GAIN)		-0	-0	-0.00	2913	7980	5.88

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	42	42
STM$	MP Steam, MLbs/D	-414	-414
STL$	LP Steam, MLbs/D	12	12
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	3059	3059
BTU$	Fuel Fired, MBTU/D	69777	69777
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	50	50

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MATERIAL BALANCE - Fuel System FUL-90
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
HFG Purch Nat Gas		37	102	2.99	9850	26987	1.64
CKE FCC Cat Coke	712436	0	1	0.02	260039	712436	43.34
HLS H2 (Unrec.)	1756	33	90	2.65	3398	9309	0.57
FOE Fuel Gas		1140	3123	91.56	319493	875323	53.24
C4M Mixed C4=		35	95	2.78	7269	19914	1.21
TOTAL FEED		1245	3411	100.00	600049	1643970	100.00
PRODUCT STREAMS							
TOTAL PRODUCT							
LOSS (GAIN)		1245	3411	100.00	600049	1643970	100.00

OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
BTU$ Fuel Fired, MBTU/D	-21308600	-21308600
BTU$ Fuel Fired, MBTU/D	0	

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MATERIAL BALANCE - Fuel Pool
Single Refinery ONE YEAR

FUP-91

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
F1S Methane (Lbs & FOEB)	313678	434	1189	38.06	114492	313677	36.02
F2S Ethane (Lbs & FOEB)	276601	357	979	31.35	100959	276599	31.76
F2M Ethylene (Lbs & FOEB)	119874	150	411	13.17	43754	119873	13.77
F3S Propane (Lbs & FOEB)	74806	94	257	8.24	27304	74806	8.59
F3M Propylene (Lbs & FOEB)	85879	105	287	9.18	31346	85879	9.86
TOTAL FEED		*1140*	*3123*	*100.00*	*317854*	*870834*	*100.00*
PRODUCT STREAMS							
FOE Fuel Gas		1140	3123	100.00	319493	875323	100.52
TOTAL PRODUCT		1140	3123	100.00	319493	875323	100.52
LOSS (GAIN)		-0	-0	-0.00	-1639	-4489	-0.52

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MATERIAL BALANCE - General Utilities UTL-95
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
TOTAL FEED							
PRODUCT STREAMS							
TOTAL PRODUCT							

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	32	32
CWR$	Cooling Water, MGal/D	-32311	-32311
CWR$	Cooling Water, MGal/D	32311	32311
STM$	MP Steam, MLbs/D	-2047	-2047
STM$	MP Steam, MLbs/D	2047	2047
STL$	LP Steam, MLbs/D	-12	-12
STL$	LP Steam, MLbs/D	12	12
STH$	HP Steam, MLbs/D	-619	-619
STH$	HP Steam, MLbs/D	619	619
KWH$	Electricity, KWH/D	-186912	-186912
KWH$	Electricity, KWH/D	258105	258105
BTU$	Fuel Fired, MBTU/D	3998952	3998952
SWT$	Sour Water, MLbs/Day	-861	-861
SWT$	Sour Water, MLbs/Day	861	861
KWP$	Electricity	-39528	-39528
MUW$	Make-up Water, MGal/D	1357	1357
PWR$	Power	258105	258105
OXX$		0	

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MATERIAL BALANCE - Amine (DEA) Unit ADM-AM
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
H2S H2S (Lbs)	135660	118	323	100.00	49516	135660	100.00
TOTAL FEED		118	323	100.00	49516	135660	100.00
PRODUCT STREAMS							
HSS H2S fr Amine U (Lbs)	135660	118	323	100.00	49516	135660	100.00
TOTAL PRODUCT		118	323	100.00	49516	135660	100.00

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	658	658
STM$	MP Steam, MLbs/D	713	713
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	3044	3044
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	314	314

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UTILITIES CONSUMPTION REPORT - .M Units
Single Refinery ONE YEAR

PROCESS UNIT	Fuel Mixed MBTU	Steam High psi M Lbs	Steam Med psi M Lbs	Steam Low psi M Lbs	Power ------ KWH	Water Cooling M Gal	Water Make-Up M Gal	Sour Water M Lbs	Cat & Chem $
CRD-DU Crude Tower #1	2664319		120		17746	3783	7	101	
VAC-VU Vacuum Tower #1	1373142		158		10622	1847	14		
WAC-WU Vacuum Tower #2	110066		48		112	446	0		
SGP-SG Sats Gas Plant			1		92	162	0		5
UGP-UG Unsats Gas Plant			9		844	1493	1		44
KCC-KC FCCU (KC)	472841	226	162		4446	3265	26		860
COK-XK Delayed Coker	749545		122		17079	203	11	213	48
CRU-CR CCR Reformer	420682		-106		1273	166			59
SAA-SA H2SO4 Alkylation			102		6742	8			498
DHT-DH Distillate HDS	390314		22		3732	140			109
NHT-NH Naphtha HDS	111644				1068	40			31
SUL-SU Sulfur Plant	25469		-151	4	1117		18		15
MRJ-MJ Merox (Jet)					543				19
MRD-MD Merox (Diesel)					323				12
MRG-MG Merox (FCC Gasoline)					825				30
MRL-ML Merox (LPG)					548				20
FUL-90 Fuel System	-7777639								
UTL-95 General Utilities	1459618	-226	-747	-4	-68223	-11794	495	-314	12
ADM-AM Amine (DEA) Unit			260		1111	240	114		
PURCHASES									
Units/CD							1880		4824
.M Units							686		1761
PRICE, $/unit							5.000		2.300
MARGINAL VALUE	0.001	1.046	1.046	1.046	0.045	0.245	5.000		2.300

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UTILITIES CONSUMPTION REPORT - .M Units
Single Refinery ONE YEAR

	Power Purch KWH	Power Generate KWH
PROCESS UNIT		
UTL-95 General Utilities	94208	
PURCHASES		
Units/CD	258105	
.M Units	94208	
PRICE, $/unit	0.045	
MARGINAL VALUE	0.045	0.030

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MATERIAL BALANCE - Sol Asp BAP-AP
Single Refinery ONE YEAR

		Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
	COMPONENTS				
VBB	1011+ (B)	111	303	100.00	11.8120
	TOTAL COMPONENTS	111	303	100.00	
	BLENDED PRODUCTS				
BAP	Sol Asp	110	300	99.01	11.9301
	TOTAL PRODUCT	110	300	99.01	

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LCU 01150A

MATERIAL BALANCE - Liq Asp
Single Refinery ONE YEAR

CAP-BP

	COMPONENTS		Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
VBB	1011+	(B)	73	200	80.00	11.8120
55B	55/ 180	(B)	9	25	10.00	19.0402
LAB	180/ 292	(B)	5	13	5.00	25.0379
LNB	292/ 316	(B)	5	13	5.00	25.7201
	TOTAL COMPONENTS		91	250	100.00	
	BLENDED PRODUCTS					
CAP	Liq Asp		91	250	100.00	13.8915
	TOTAL PRODUCT		91	250	100.00	

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LCU 01150A

MATERIAL BALANCE - Res Asp
Single Refinery ONE YEAR

DAP-CP

	COMPONENTS		Volume M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
VBB	1011+	(B)	179	490	70.00	11.8120
NKB	321/ 375	(B)	26	70	10.00	27.1944
LKB	375/ 463	(B)	26	70	10.00	27.1944
MKB	463/ 557	(B)	26	70	10.00	27.1944
	TOTAL COMPONENTS		255	700	100.00	
	BLENDED PRODUCTS					
DAP	Res Asp		255	700	100.00	16.4267
	TOTAL PRODUCT		255	700	100.00	

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MATERIAL BALANCE - C3/C4 Exp
Single Refinery ONE YEAR

ELP-LP

		Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
	COMPONENTS				
C4N	Normal Butane	436	1194	100.00	2.7188
	TOTAL COMPONENTS	436	1194	100.00	
	BLENDED PRODUCTS				
ELP	Mixed C3/C4	434	1188	99.50	14.7900
	TOTAL PRODUCT	434	1188	99.50	
	BLENDING PARAMETERS		LEVEL		
BBB	C4s in C3/C4 LPG		100.50		

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MATERIAL BALANCE - C3/C4 LPG
Single Refinery ONE YEAR

B34-34

	COMPONENTS	Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
C3S	Propane	598	1637	28.58	19.8218
C3M	Propylene	1175	3219	56.19	19.8218
C4N	Normal Butane	1	3	0.05	2.7188
C4M	Mixed C4=	317	870	15.18	2.7188
	TOTAL COMPONENTS	2091	5728	100.00	
	BLENDED PRODUCTS				
B34	Mixed C3/C4	2080	5700	99.50	14.7900
	TOTAL PRODUCT	2080	5700	99.50	

	BLENDING PARAMETERS	LEVEL
BBB	C4s in C3/C4 LPG	15.30

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PRODUCT BLENDING - FCC Naphtha 1GP
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha	292	800	100.00	76655	210015	100.00	24.7723
TOTAL	292	800	100.00	76655	210015	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.104		0.150		
158 % Off at 158 F	VL	24.000	10.000			
250 % Off at 250 F	VL	61.000	50.000			
374 % Off at 374 F	VL	94.000	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	262.519		280.000		
ARO Aromatics Content	VL	33.000		35.000		
PFF Paraffins Content	VL	26.000		100.000		
NAP Naphthenes Content	VL	15.000		22.000		
RVI Reid Vapor Pressure Index	VL	130.540		139.460		
OLE Olefin Content, Vol%	VL	16.000		100.000		
BEN Benzene Content	VL	0.900		1.500		
PERFORMANCE CONTROLS						
R Research O.N.	VL	92.500	92.500			

COMPONENT QUALITIES

	DNX	SUL	RVI	ARO	OLE	PFF	NAP	158	250
kN# FCC Cat Naphtha	262.519	0.10445	130.540	33.0000	16.0000	26.0000	15.0000	24.0000	61.0000
	430	PBL	BEN	R00	M00	F00	R05	R10	R20
kN# FCC Cat Naphtha	100.000	.	0.90000	92.5000	81.1000	86.8000	95.0000	96.0000	97.0000
	M05	M10	M20	M30	F05	F10	F20	F30	
kN# FCC Cat Naphtha	83.6000	85.2000	86.0000	87.6000	89.3000	90.6000	91.5000	92.8000	

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PRODUCT BLENDING - Virgin Naphtha 2GR
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
55C	55/ 180	(C)	34	93	1.08	7505	20562	0.93	20.4521
LNC	292/ 316	(C)	26	71	0.83	6981	19127	0.86	24.4101
LAC	180/ 292	(C)	108	296	3.45	27627	75691	3.41	23.7346
LNE	292/ 316	(E)	96	262	3.05	26168	71694	3.23	26.0296
LAE	180/ 292	(E)	1269	3478	40.49	334346	916016	41.32	25.6233
55F	55/ 180	(F)	514	1408	16.40	120499	330134	14.89	16.8574
LNF	292/ 316	(F)	264	722	8.41	71335	195439	8.82	24.3073
LAF	180/ 292	(F)	824	2259	26.29	214771	588414	26.54	23.7346
BLENDING LOSS									
TOTAL			3135	8590	100.00	809233	2217077	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS							
SUL	Sulfur, Wt%	WT	0.002		0.050		
140	% Off at 140 F	VL	10.000		10.000		0.1043
248	% Off at 248 F	VL	56.354	50.000			
320	% Off at 320 F	VL	100.000	90.000			
338	% Off at 338 F	VL	100.000	99.900			
DNX	Density, Lb/bbl	VL	258.110	244.400	262.600		
ARO	Aromatics Content	VL	3.607	0.000			
PFF	Paraffins Content	VL	57.500		57.500		0.0623
NAP	Naphthenes Content	VL	38.475	0.000			
NAR	Naphthenes + Aromatics	VL	42.082	42.000			
RVI	Reid Vapor Pressure Index	VL	61.159		157.520		
OLE	Olefin Content, Vol%	VL	0.000		1.000		

COMPONENT QUALITIES

			DNX	SUL	NAP	ARO	PFF	OLE	RVI	140	248
55C	55/ 180	(C)	221.222	.	14.4400	2.80200	82.7600	.	209.164	23.7480	100.000
LNC	292/ 316	(C)	267.760	3.10E-3	37.2200	3.24700	58.9900	.	1.86100	.	.
LAC	180/ 292	(C)	255.633	2.00E-4	26.6000	3.30800	69.8300	.	27.8700	.	59.8560
LNE	292/ 316	(E)	273.507	2.40E-3	59.5900	6.74200	33.0000	.	1.84200	.	.
LAE	180/ 292	(E)	263.391	1.10E-3	56.3200	3.68800	39.5200	.	26.3340	.	53.1580
55F	55/ 180	(F)	234.402	.	15.6500	3.20700	80.7400	.	228.196	59.4210	100.000
LNF	292/ 316	(F)	270.576	9.60E-3	35.2100	3.67300	60.6400	.	3.97200	.	.
LAF	180/ 292	(F)	260.527	1.70E-3	26.4100	3.43100	69.8300	.	35.9410	.	58.1480

			338	NAR	R00	M00	F00	R05	R10	R20	R30
55C	55/ 180	(C)	100.000	17.2420	70.4180	65.4480	67.9330	73.7670	77.5350	81.4920	86.9070
LNC	292/ 316	(C)	100.000	40.4670	53.1590	64.8480	59.0035	55.8660	60.9190	66.1570	72.5420
LAC	180/ 292	(C)	100.000	29.9080	61.7200	64.8220	63.2710	64.2150	68.4410	72.8420	78.6570

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
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PetroPeru Coker Case Refinery Upgrade

- Virgin Naphtha 2GR

Single Refinery ONE YEAR

LNE	292/ 316	(E)	100.000	66.3320	64.2710	66.7530	65.5120	66.6460	70.6480	74.8220	80.4790
LAE	180/ 292	(E)	100.000	60.0080	69.0070	66.9370	67.9720	71.0100	74.6100	78.3780	83.7530
55F	55/ 180	(F)	100.000	18.8570	71.8410	73.9500	72.8955	74.9780	78.6330	82.4770	87.8140
LNF	292/ 316	(F)	100.000	38.8830	55.3800	67.5340	61.4570	58.0360	62.8610	67.8670	74.0970
LAF	180/ 292	(F)	100.000	29.8410	59.7590	68.7670	64.2630	62.3180	66.7220	71.3030	77.2420
			M10	M20	M30	F05	F10	F20	F30		
55C	55/ 180	(C)	72.7390	76.7530	82.2900	71.3325	75.1370	79.1225	84.5985		
LNC	292/ 316	(C)	70.6500	74.5190	80.0220	61.4025	65.7845	70.3380	76.2820		
LAC	180/ 292	(C)	70.6270	74.4990	80.0040	65.5635	69.5340	73.6705	79.3305		
LNE	292/ 316	(E)	72.2820	75.9060	81.2530	67.7275	71.4650	75.3640	80.8660		
LAE	180/ 292	(E)	72.4320	76.0340	81.3670	69.9960	73.5210	77.2060	82.5600		
55F	55/ 180	(F)	80.4220	83.8490	88.9400	76.0735	79.5275	83.1630	88.3770		
LNF	292/ 316	(F)	72.9140	76.4430	81.7300	63.7855	67.8875	72.1550	77.9135		
LAF	180/ 292	(F)	73.8750	77.2580	82.4530	66.4780	70.2985	74.2805	79.8475		

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

DATE: 02 JUL 02
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PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - Gasoline G-95 SP 3GS
Single Refinery ONE YEAR

COMPONENT		VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha		305	835	39.66	79964	219079	38.30	24.7723
rf# Total Reformate		423	1159	55.10	119411	327154	57.19	32.4135
55F 55/ 180	(F)	40	110	5.24	9424	25819	4.51	16.8574
BLENDING LOSS								
TOTAL		768	2104	100.00	208799	572053	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.040		0.040		0.1406
158 % Off at 158 F	VL	21.241	10.000			
171 % Off at 171 F	VL	30.850		50.000		
244 % Off at 244 F	VL	63.915	50.000			
374 % Off at 374 F	VL	96.098	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	271.888		300.000		
ARO Aromatics Content	VL	43.532		45.000		
PFF Paraffins Content	VL	34.628		100.000		
RVI Reid Vapor Pressure Index	VL	100.520		155.703		
OLE Olefin Content, Vol%	VL	6.622		25.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	95.000	95.000			-0.5629

COMPONENT QUALITIES

	DNX	RVI	158	171	244	374	430	SUL	ARO
kN# FCC Cat Naphtha	262.519	130.540	24.0000	33.0000	60.0000	94.0000	100.000	0.10445	33.0000
rf# Total Reformate	282.194	66.7804	14.1047	23.7714	63.3047	97.2381	100.000	.	54.9448
55F 55/ 180 (F)	234.402	228.196	75.4450	89.0580	100.000	100.000	100.000	.	3.20700
	PFF	R00	M00	F00	R05	R10	R20	R30	M05
kN# FCC Cat Naphtha	26.0000	92.5000	81.1000	86.8000	95.0000	96.0000	97.0000	98.0000	83.6000
rf# Total Reformate	36.4571	99.0000	88.0867	93.5433	101.059	101.852	102.870	103.590	90.5981
55F 55/ 180 (F)	80.7400	71.8410	73.9500	72.8955	74.9780	78.6330	82.4770	87.8140	77.1690
	M20	M30	F05	F10	F20	F30			
kN# FCC Cat Naphtha	86.0000	87.6000	89.3000	90.6000	91.5000	92.8000			
rf# Total Reformate	90.0000	92.0000	95.8286	95.4262	96.4352	97.7948			
55F 55/ 180 (F)	83.8490	88.9400	76.0735	79.5275	83.1630	88.3770			

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
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PRODUCT BLENDING - Gasoline 91 SP 4GU
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
sa# Alkyate Pool (SA)	1081	2962	29.87	268749	736298	29.09	30.6485
kN# FCC Cat Naphtha	921	2523	25.44	241721	662250	26.17	24.7723
NGA Nat Gasoline	3	8	0.08	734	2011	0.08	19.7500
rf# Total Reformate	708	1940	19.56	199805	547410	21.63	32.4135
TC5 C5/180 Th Naph.	249	683	6.89	58344	159846	6.32	16.2598
55B 55/ 180 (B)	72	197	1.99	16870	46220	1.83	19.0402
55E 55/ 180 (E)	526	1442	14.54	123808	339199	13.40	18.7831
55F 55/ 180 (F)	59	161	1.63	13793	37788	1.49	16.8574
BLENDING LOSS							
TOTAL	3619	9916	100.00	923823	2531022	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.040		0.040		0.1406
158 % Off at 158 F	VL	29.940	10.000			
171 % Off at 171 F	VL	38.954		50.000		
244 % Off at 244 F	VL	71.108	50.000			
374 % Off at 374 F	VL	97.933	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	255.246		300.000		
ARO Aromatics Content	VL	19.448		45.000		
PFF Paraffins Content	VL	59.097		100.000		
RVI Reid Vapor Pressure Index	VL	111.639		155.703		
OLE Olefin Content, Vol%	VL	7.501		25.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	91.000	91.000			-0.5629

COMPONENT QUALITIES

	DNX	RVI	158	171	244	374	430	SUL	ARO
sa# Alkyate Pool (SA)	248.600	64.1960	4.90000	13.0000	60.0000	100.000	100.000	.	.
kN# FCC Cat Naphtha	262.519	130.540	24.0000	33.0000	60.0000	94.0000	100.000	0.10445	33.0000
NGA Nat Gasoline	242.400	198.230	75.0000	79.0000	96.0000	100.000	100.000	.	2.00000
rf# Total Reformate	282.194	66.7804	14.1047	23.7714	63.3047	97.2381	100.000	.	54.9448
TC5 C5/180 Th Naph.	233.957	157.500	92.0000	96.0000	106.000	100.000	100.000	0.20000	1.14000
55B 55/ 180 (B)	234.297	209.353	80.3450	91.6670	100.000	100.000	100.000	.	2.78300
55E 55/ 180 (E)	235.276	187.750	71.4290	83.0360	100.000	100.000	100.000	3.00E-4	0.79800
55F 55/ 180 (F)	234.402	228.196	75.4450	89.0580	100.000	100.000	100.000	.	3.20700

	PFF	R00	M00	F00	R05	R10	R20	R30	M05
sa# Alkyate Pool (SA)	100.000	96.2000	92.7000	94.4500	98.2000	100.300	102.600	104.300	94.8000
kN# FCC Cat Naphtha	26.0000	92.5000	81.1000	86.8000	95.0000	96.0000	97.0000	98.0000	83.6000

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PetroPeru Coker Case Refinery Upgrade

- Gasoline 91 SP 4GU
Single Refinery ONE YEAR

NGA	Nat Gasoline		80.0000	76.9000	75.9000	76.4000	78.5000	82.6000	85.0000	86.0000	74.3000
rf#	Total Reformate		36.4571	99.0000	88.0867	93.5433	101.059	101.852	102.870	103.590	90.5981
TC5	C5/180 Th Naph.		47.7400	82.5000	74.1000	78.3000	86.5000	87.9000	89.6000	92.3000	77.6000
55B	55/ 180	(B)	62.3600	75.7200	71.8780	73.7990	78.3390	81.6840	85.2130	90.3310	75.1760
55E	55/ 180	(E)	65.8400	75.2710	73.3050	74.2880	77.9490	81.3300	84.8970	90.0410	76.5480
55F	55/ 180	(F)	80.7400	71.8410	73.9500	72.8955	74.9780	78.6330	82.4770	87.8140	77.1690
			M20	M30	F05	F10	F20	F30			
sa#	Alkyate Pool (SA)		92.0000	95.0000	96.5000	95.6500	97.3000	99.6500			
kN#	FCC Cat Naphtha		86.0000	87.6000	89.3000	90.6000	91.5000	92.8000			
NGA	Nat Gasoline		80.7000	83.5000	76.4000	79.6000	82.8500	84.7500			
rf#	Total Reformate		90.0000	92.0000	95.8286	95.4262	96.4352	97.7948			
TC5	C5/180 Th Naph.		80.9000	83.0000	82.0500	83.4500	85.2500	87.6500			
55B	55/ 180	(B)	82.1250	87.3190	76.7575	80.1240	83.6690	88.8250			
55E	55/ 180	(E)	83.3130	88.4370	77.2485	80.5870	84.1050	89.2390			
55F	55/ 180	(F)	83.8490	88.9400	76.0735	79.5275	83.1630	88.3770			

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
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PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - Gasoline 97 SP G3S
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
sa# Alkyate Pool (SA)	30	82	14.44	7440	20383	13.03	30.6485
kN# FCC Cat Naphtha	19	52	9.16	4987	13662	8.73	24.7723
rf# Total Reformate	158	434	76.40	44683	122419	78.24	32.4135
BLENDING LOSS							
TOTAL	207	568	100.00	57110	156464	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.009		0.040		
158 % Off at 158 F	VL	13.683	10.000			
171 % Off at 171 F	VL	23.062		50.000		
244 % Off at 244 F	VL	62.525	50.000			
374 % Off at 374 F	VL	97.340	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	275.540		300.000		
ARO Aromatics Content	VL	45.000		45.000		0.0334
PFF Paraffins Content	VL	44.674		100.000		
RVI Reid Vapor Pressure Index	VL	72.251		155.703		
OLE Olefin Content, Vol%	VL	1.921		25.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	98.000	98.000			-1.2856

COMPONENT QUALITIES

	DNX	RVI	158	171	244	374	430	SUL	ARO
sa# Alkyate Pool (SA)	248.600	64.1960	4.90000	13.0000	60.0000	100.000	100.000	.	.
kN# FCC Cat Naphtha	262.519	130.540	24.0000	33.0000	60.0000	94.0000	100.000	0.10445	33.0000
rf# Total Reformate	282.194	66.7804	14.1047	23.7714	63.3047	97.2381	100.000	.	54.9448
	PFF	R00	M00	F00	R05	R10	R20	R30	M05
sa# Alkyate Pool (SA)	100.000	96.2000	92.7000	94.4500	98.2000	100.300	102.600	104.300	94.8000
kN# FCC Cat Naphtha	26.0000	92.5000	81.1000	86.8000	95.0000	96.0000	97.0000	98.0000	83.6000
rf# Total Reformate	36.4571	99.0000	88.0866	93.5433	101.059	101.852	102.870	103.590	90.5981
	M20	M30	F05	F10	F20	F30			
sa# Alkyate Pool (SA)	92.0000	95.0000	96.5000	95.6500	97.3000	99.6500			
kN# FCC Cat Naphtha	86.0000	87.6000	89.3000	90.6000	91.5000	92.8000			
rf# Total Reformate	90.0000	92.0000	95.8286	95.4262	96.4352	97.7948			

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - Solvent 3 G4U
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
NKE	321/ 375	(E)	153	420	100.00	42962	117704	100.00	27.1944
*	TOTAL		153	420	100.00	42962	117704	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS							
SUL	Sulfur, Wt%	WT	0.002		0.100		
350	% Off at 350 F	VL	54.587	50.000			
374	% Off at 374 F	VL	98.224	90.000			
DNX	Density, Lb/bbl	VL	280.247		300.000		
OLE	Olefin Content, Vol%	VL	0.000		4.000		
FLI	Flash point index	VL	334.000		753.800		

COMPONENT QUALITIES

			DNX	SUL	350	374	FLI	OLE	R00	M00	F00
NKE	321/ 375	(E)	280.247	2.50E-3	54.5870	98.2140	334.000	.	61.8080	64.2000	63.0040
			R10	R20	R30	M05	M10	M20	M30	F05	F10
NKE	321/ 375	(E)	68.2630	72.0220	77.5160	68.5520	72.0840	75.7700	81.1530	66.5990	70.1735
			F30								
NKE	321/ 375	(E)	79.3345								

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - Export FCC Naphtha 6GA
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha	4118	11283	100.00	1081087	2961881	100.00	24.7723
TOTAL	4118	11283	100.00	1081087	2961881	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.104		0.150		
158 % Off at 158 F	VL	24.000	10.000			
250 % Off at 250 F	VL	61.000	50.000			
374 % Off at 374 F	VL	94.000	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	262.519		280.000		
ARO Aromatics Content	VL	33.000		35.000		
PFF Paraffins Content	VL	26.000		100.000		
NAP Naphthenes Content	VL	15.000		22.000		
RVI Reid Vapor Pressure Index	VL	130.540		130.540		0.0342
OLE Olefin Content, Vol%	VL	16.000		100.000		
BEN Benzene Content	VL	0.900		1.500		
PERFORMANCE CONTROLS						
R Research O.N.	VL	92.500	91.500			

COMPONENT QUALITIES

	DNX	SUL	RVI	ARO	OLE	PFF	NAP	158	250
kN# FCC Cat Naphtha	262.519	0.10445	130.540	33.0000	16.0000	26.0000	15.0000	24.0000	61.0000
	430	PBL	BEN	R00	M00	F00	R05	R10	R20
kN# FCC Cat Naphtha	100.000	.	0.90000	92.5000	81.1000	86.8000	95.0000	96.0000	97.0000
	M05	M10	M20	M30	F05	F10	F20	F30	
kN# FCC Cat Naphtha	83.6000	85.2000	86.0000	87.6000	89.3000	90.6000	91.5000	92.8000	

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
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PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - Kerosene 2KE
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
NKB	321/ 375	(B)	100	274	3.53	28004	76724	3.47	27.1944
LKB	375/ 463	(B)	195	534	6.89	57104	156449	7.07	27.1944
MKB	463/ 557	(B)	141	387	5.00	43029	117888	5.33	27.1944
HKB	557/ 566	(B)	27	74	0.96	8332	22828	1.03	27.1944
NKE	321/ 375	(E)	475	1302	16.81	133232	365018	16.49	27.1944
LKE	375/ 463	(E)	1025	2809	36.25	295947	810813	36.62	27.1944
NKF	321/ 375	(F)	655	1794	23.15	182001	498633	22.52	27.1944
LKF	375/ 463	(F)	210	574	7.41	60406	165496	7.48	27.1944
TOTAL			2828	7748	100.00	808055	2213851	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
400	% Off at 400 F	VL	57.162	10.000			
DNX	Density, Lb/bbl	VL	285.717		310.000		
SUL	Sulfur, Wt%	WT	0.068		0.250		
FLI	Flash Point Index	VL	180.346		508.400		
SMI	Smoke Pt Index	VL	51.260		56.000		

COMPONENT QUALITIES

			DNX	SUL	400	SMI	FLI
NKB	321/ 375	(B)	280.303	0.04310	100.000	45.3500	348.860
LKB	375/ 463	(B)	292.853	0.14980	23.3010	51.8400	67.1200
MKB	463/ 557	(B)	304.592	0.44990	.	67.5700	15.7300
HKB	557/ 566	(B)	308.254	0.59370	.	77.2800	6.47000
NKE	321/ 375	(E)	280.247	2.50E-3	100.000	46.4500	333.970
LKE	375/ 463	(E)	288.666	2.90E-3	27.2680	54.2900	71.7800
NKF	321/ 375	(F)	278.009	0.04860	100.000	45.5600	323.580
LKF	375/ 463	(F)	288.089	0.18390	29.4120	53.0800	73.9900

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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TIME: 15:05 HRS

PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - Turbo Jet A-1 3JA
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
MKB	463/ 557	(B)	100	274	9.48	30448	83418	9.99	27.1944
NKC	321/ 375	(C)	57	157	5.45	15919	43614	5.22	27.1944
LKF	375/ 463	(F)	897	2459	85.08	258538	708323	84.79	27.1944
BLENDING LOSS									
TOTAL			1055	2890	100.00	304904	835354	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
400	% Off at 400 F	VL	30.470	10.000			
DNX	Density, Lb/bbl	VL	289.050	271.620	289.050		
SUL	Sulfur, Wt%	WT	0.201		0.300		
FLI	Flash Point Index	VL	83.069		636.900		
ARO	Aromatics Content	VL	13.296		22.000		
SMI	Smoke Pt Index	VL	53.847		56.000		
OLE	Olefin content	VL	0.000		5.000		
FZI	Freeze Point Index	VL	1.152		1.547		

COMPONENT QUALITIES

			DNX	SUL	ARO	OLE	400	SMI	FLI	FZI
MKB	463/ 557	(B)	304.592	0.44990	25.8700	.	.	67.5700	15.7300	4.80000
NKC	321/ 375	(C)	277.022	9.70E-3	5.89000	.	100.000	41.9600	342.000	0.62000
LKF	375/ 463	(F)	288.089	0.18390	12.3700	.	29.4120	53.0800	73.9900	0.78000

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

DATE: 02 JUL 02
TIME: 15:05 HRS

PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - No. 2 Diesel SD2
Single Refinery ONE YEAR

COMPONENT		VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
dD# DHT SR Product		1665	4561	20.71	503640	1379836	20.75	29.3865
dJ# DHT Jet Product		1674	4586	20.82	497096	1361906	20.48	29.1480
dF# DHT LCO product		264	723	3.28	88793	243269	3.66	24.0223
dC# DHT CGO product		1370	3753	17.04	413895	1133958	17.05	27.6608
LVB 645/ 697	(B)	147	402	1.83	46924	128559	1.93	20.1547
LKC 375/ 463	(C)	56	153	0.69	16154	44258	0.67	27.2042
LGC 566/ 645	(C)	46	125	0.57	13867	37991	0.57	27.9913
LVC 645/ 697	(C)	22	59	0.27	6661	18250	0.27	26.6773
LKE 375/ 463	(E)	27	74	0.34	7800	21370	0.32	27.1944
MKE 463/ 557	(E)	1167	3197	14.51	345846	947524	14.25	28.6841
LGE 566/ 645	(E)	1018	2788	12.66	306686	840236	12.63	29.4260
LVE 645/ 697	(E)	585	1603	7.28	179986	493112	7.41	28.9958
BLENDING LOSS								
TOTAL		8039	22026	100.00	2427348	6650269	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES						
DNX Density, Lb/bbl	VL	301.929		340.000		
SUL Sulfur, Wt%	WT	0.050		0.050		0.0251
PPX Pour Point Index (Hu)	VL	395.097		1002.200		
V00 Vis. Index at 100 F	VL	45.387	43.680	59.220		
FLI Flash Point Index	VL	13.170		266.200		
CTI Cetane Index	VL	47.000	47.000			-0.2436
K1# FCC LCO Pool	%	0.00		10.00		

COMPONENT QUALITIES

	DNX	PPX	SUL	CTI	FLI	V00	K1#
dD# DHT SR Product	302.547	346.080	0.01739	49.4588	4.62232	42.3371	.
dJ# DHT Jet Product	296.957	163.534	0.03980	49.1840	15.3706	51.0118	.
dF# DHT LCO product	336.373	360.362	0.05411	28.6001	25.0018	50.6415	.
dC# DHT CGO product	302.139	400.709	0.02506	42.6156	25.8015	42.0018	.
LVB 645/ 697 (B)	319.521	855.471	1.02800	44.7600	2.60000	35.8390	.
LKC 375/ 463 (C)	289.471	77.7390	0.03690	41.2000	66.8900	60.4170	.
LGC 566/ 645 (C)	302.895	358.673	0.16380	48.3700	4.34000	43.5850	.
LVC 645/ 697 (C)	308.170	738.317	0.27990	46.6500	2.61000	38.1420	.
LKE 375/ 463 (E)	288.666	33.5570	2.90E-3	40.1500	71.7800	61.0490	.
MKE 463/ 557 (E)	296.379	229.995	0.01120	46.4800	15.3400	51.5450	.
LGE 566/ 645 (E)	301.339	562.922	0.03230	50.1600	4.70000	42.5020	.
LVE 645/ 697 (E)	307.537	1158.33	0.06040	49.2000	2.59000	36.9160	.

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - MF80 Fuel Oil 6R4
Single Refinery ONE YEAR

COMPONENT		VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
Kh# FCC HCO Pool		70	191	68.23	25936	71058	70.49	14.9616
dF# DHT LCO product		29	79	28.36	9748	26707	26.49	24.0223
VBE 1011+	(E)	1	2	0.54	191	524	0.52	17.3827
LVF 645/ 697	(F)	3	8	2.88	917	2511	2.49	19.5424
BLENDING LOSS								
TOTAL		102	280	100.00	36792	100800	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES						
DNX Density, Lb/bbl	VL	360.000		360.000		
SUL Sulfur, Wt%	WT	1.500		1.500		0.0068
PPX Pour Point Index (Hu)	VL	1996.743		2394.500		
VBF RFO Visc Index (122F)	VL	0.388		0.388		10.7851
FLI Flash Point Index	VL	7.509		154.900		
MET Metals Content,PPM	VL	41.062		230.000		
CRC W % Conradson Carbon	VL	4.166		14.000		

COMPONENT QUALITIES

		DNX	SUL	VBF	PPX	FLI	CRC	MET
Kh# FCC HCO Pool		371.952	2.05518	0.51000	2681.00	0.50000	6.00000	60.0000
dF# DHT LCO product		336.373	0.05411	0.10523	360.362	25.0018	.	.
VBE 1011+	(E)	347.237	0.39660	0.65600	5452.84	0.76000	13.4000	22.8200
LVF 645/ 697	(F)	311.811	1.39800	0.23500	1250.16	2.59000	0.01000	0.05000

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

DATE: 02 JUL 02
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PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - PI6 Fuel Oil 7R5
Single Refinery ONE YEAR

COMPONENT		VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
Kh# FCC HCO Pool		733	2007	63.72	272489	746546	65.83	14.9616
dF# DHT LCO product		121	331	10.51	40633	111323	9.82	24.0223
VBE 1011+	(E)	237	648	20.57	82133	225023	19.84	17.3827
LVF 645/ 697	(F)	60	164	5.20	18654	51108	4.51	19.5424
BLENDING LOSS								
TOTAL		1150	3150	100.00	413910	1134000	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES						
DNX Density, Lb/bbl	VL	360.000		360.000		
SUL Sulfur, Wt%	WT	1.500		1.500		0.0068
VBF RFO Visc Index (122F)	VL	0.483	0.396	0.483		10.7851
FLI Flash Point Index	VL	3.236		154.900		
MET Metals Content,PPM	VL	42.928		400.000		
CRC W % Conradson Carbon	VL	6.580		25.000		

COMPONENT QUALITIES

	DNX	SUL	VBF	FLI	CRC	MET
Kh# FCC HCO Pool	371.952	2.05518	0.51000	0.50000	6.00000	60.0000
dF# DHT LCO product	336.373	0.05411	0.10523	25.0018	.	.
VBE 1011+ (E)	347.237	0.39660	0.65600	0.76000	13.4000	22.8200
LVF 645/ 697 (F)	311.811	1.39800	0.23500	2.59000	0.01000	0.05000

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - PI500 Fuel Oil 8R6
Single Refinery ONE YEAR

COMPONENT		VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
Kh# FCC HCO Pool		550	1508	62.83	204705	560836	64.91	14.9616
dF# DHT LCO product		61	167	6.98	20561	56331	6.52	24.0223
VBE 1011+	(E)	215	589	24.53	74625	204451	23.66	17.3827
LVF 645/ 697	(F)	50	136	5.66	15469	42382	4.91	19.5424
BLENDING LOSS								
TOTAL		876	2400	100.00	315360	864000	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES						
DNX Density, Lb/bbl	VL	360.000		360.000		
SUL Sulfur, Wt%	WT	1.500		1.500		0.0068
VBF RFO Visc Index (122F)	VL	0.502	0.494	0.502		10.7851
FLI Flash Point Index	VL	2.392		108.500		
MET Metals Content,PPM	VL	43.297		400.000		
CRC W % Conradson Carbon	VL	7.058		25.000		

COMPONENT QUALITIES

		DNX	SUL	VBF	FLI	CRC	MET
Kh# FCC HCO Pool		371.952	2.05518	0.51000	0.50000	6.00000	60.0000
dF# DHT LCO product		336.373	0.05411	0.10523	25.0018	.	.
VBE 1011+	(E)	347.237	0.39660	0.65600	0.76000	13.4000	22.8200
LVF 645/ 697	(F)	311.811	1.39800	0.23500	2.59000	0.01000	0.05000

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

DATE: 02 JUL 02
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PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - PI6 Export 9R7
Single Refinery ONE YEAR

COMPONENT		VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
Kh# FCC HCO Pool		7	20	0.39	2664	7299	0.42	14.9616
dF# DHT LCO product		207	567	11.30	69575	190617	11.03	24.0223
LVB 645/ 697	(B)	50	138	2.75	16069	44025	2.55	20.1547
VBB 1011+	(B)	761	2084	41.56	285642	782581	45.29	11.8120
VBE 1011+	(E)	157	429	8.56	54420	149097	8.63	17.3827
LVF 645/ 697	(F)	649	1777	35.44	202258	554133	32.07	19.5424
BLENDING LOSS								
TOTAL		1830	5015	100.00	630629	1727752	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES						
DNX Density, Lb/bbl	VL	344.545		360.000		
SUL Sulfur, Wt%	WT	1.500		1.500		0.0068
VBF RFO Visc Index (122F)	VL	0.483	0.396	0.483		10.7851
FLI Flash Point Index	VL	4.198		154.900		
MET Metals Content,PPM	VL	357.780		400.000		
CRC W % Conradson Carbon	VL	15.284		25.000		

COMPONENT QUALITIES

		DNX	SUL	VBF	FLI	CRC	MET
Kh# FCC HCO Pool		371.952	2.05518	0.51000	0.50000	6.00000	60.0000
dF# DHT LCO product		336.373	0.05411	0.10523	25.0018	-	-
LVB 645/ 697	(B)	319.521	1.02800	0.25300	2.60000	0.02000	0.06000
VBB 1011+	(B)	375.524	2.15600	0.77700	0.76000	33.9500	855.600
VBE 1011+	(E)	347.237	0.39660	0.65600	0.76000	13.4000	22.8200
LVF 645/ 697	(F)	311.811	1.39800	0.23500	2.59000	0.01000	0.05000

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION

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PetroPeru Coker Case Refinery Upgrade

I N D E X

REPORT	DESCRIPTION	PAGE	LOC'N	PERIOD
01010	ECONOMIC REPORT	1	.	A
01020	PROCESS-UNIT INVESTMENT REPORT	2	.	A
01250	PLANT INPUT/OUTPUT REPORT	4	1	A
01080	PURCHASES/SALES REPORT	6	.	A
BR	Raw Material Purchases	6	.	A
SA	Product Sales	7	.	A
01100	PROCESS UTILIZATION REPORT	9	1	A
01310	MATERIAL BALANCE	11	1	A
DU	Crude Tower #1	11	1	A
VU	Vacuum Tower #1	12	1	A
WU	Vacuum Tower #2	13	1	A
SG	Sats Gas Plant	14	1	A
UG	Unsats Gas Plant	15	1	A
KC	FCCU (KC)	16	1	A
XK	Delayed Coker	18	1	A
TN	Naphtha Splitter	20	1	A
CR	CCR Reformer	21	1	A
SA	H2SO4 Alkylation	22	1	A
DH	Distillate HDS	23	1	A
NH	Naphtha HDS	25	1	A
SU	Sulfur Plant	26	1	A
90	Fuel System	27	1	A
91	Fuel Pool	28	1	A
95	General Utilities	29	1	A
AM	Amine (DEA) Unit	30	1	A
01030	UTILITIES CONSUMPTION REPORT	31	1	A
01150	RECIPE-MATERIAL BALANCE	33	1	A
.AP	Sol Asp	33	1	A
.BP	Liq Asp	34	1	A
.CP	Res Asp	35	1	A
.LP	C3/C4 Exp	36	1	A
.34	C3/C4 LPG	37	1	A
01320	PRODUCT BLENDING	38	1	A
1GP	FCC Naphtha	38	1	A
2GR	Virgin Naphtha	39	1	A
3GS	Gasoline G-95 SP	41	1	A
4GU	Gasoline 91 SP	42	1	A
G3S	Gasoline 97 SP	44	1	A
G4U	Solvent 3	45	1	A
6GA	Export FCC Naphtha	46	1	A
01340	PRODUCT BLENDING	47	1	A
2KE	Kerosene	47	1	A
3JA	Turbo Jet A-1	48	1	A
5D2	No. 2 Diesel	49	1	A
6R4	MF80 Fuel Oil	50	1	A
7R5	PI6 Fuel Oil	51	1	A
8R6	PI500 Fuel Oil	52	1	A
9R7	PI6 Export	53	1	A

APPENDIX A.9 – LP MODEL REPORT FILES – VISBREAKER CASE

This appendix contains the report files from the Haverly Systems GRTMPS LP models for the visbreaker case.

Visbreaker TIC Includes capital investment costs

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

DATE: 01 JUL 02
TIME: 16:02 HRS

PetroPeru Coker Case Refinery Upgrade

PAGE 1
LCU 01010

ECONOMIC REPORT
ONE YEAR

	ACCOUNTING CATEGORY	.M $	.. $/CD
SAX	Product Values - Sales	755582	2070087
BRX	Raw Material Costs	-639114	-1750999
UTP	Utilities Costs	-8476	-23223
	TOTAL VARIABLE REVENUES	755582	2070087
	TOTAL VARIABLE COSTS	-647591	-1774222
	GROSS VARIABLE INCOME	107991	295866
	INCOME TAX	32397	88760
IVS	Investment less credits	-112690	-308739
DPR	Depreciation tax credits	1690	4631
	NET PRESENT VALUE (I=15.00 PCT)	53764	147297

****SOLUTION STATUS: OPTIMAL AFTER 35155 ITERATIONS
CASE 1a: 15 RECURSION PASSES

CASE 1a: THE MODEL CONVERGED ON PROPERTIES ONLY

PetroPeru Refinery Upgrade Study
Talara Refinery Modifications Project
A Foster Wheeler USA Study
Upgraded Refinery With Visbreaker
Includes Catalytic Reforming, NHT
Visbreaker, Alkylation, Diesel HDS,
SRU & ARU
Assumed CDU revamp to 90,000 BPSD
Potential to revamp VDU and FCC included
Year 2007 Basis
3 Grades of Gasoline (No Unleaded)
Includes Investment Costs

****SYSTEM NAME : GRTMPS - III
****SYSTEM VERSION: VER 3.02.006

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

DATE: 01 JUL 02
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PetroPeru Coker Case Refinery Upgrade

PROCESS-UNIT INVESTMENT REPORT
ONE YEAR

--PROCESS INVESTMENT--		(NO)	------LOCATION------	PURCHASED CAPACITY B/SD	TOTAL INVESTMENT (INCL. OFFSITES) .M $	$/BBL	ADDED LABOR MEN/SHIFT
NHT	Naphtha Hydrotreater	1	Single Refinery	4821	12513	2596	
CRU	CCR	1	Single Refinery	4727	24216	5123	
VIS	Visbreaker	1	Single Refinery	14316	21453	1499	
DHT	Kero + Diesel HDS	1	Single Refinery	9341	23325	2497	
SUL	Sulfur + TGT + ARU	1	Single Refinery	90801	18073	199	
SAA	H2SO4 Alkylation	1	Single Refinery	2121	13109	6180	
			*** GRAND TOTAL		112690		

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

DATE: 01 JUL 02 PAGE 3
TIME: 16:02 HRS PetroPeru Coker Case Refinery Upgrade LCU 01250

PLANT INPUT/OUTPUT REPORT
Single Refinery ONE YEAR

		PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	STOCK LIMITS MIN B/CD	STOCK LIMITS MAX B/CD	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT	STOCK L MIN L/CI
	PLANT INPUT										
HFG	Purch Nat Gas		348	954	1.07		100000	92254	252752	0.91	26
cui	Cuisia39		299	820	0.92		50000	86638	237365	0.85	14
lor	Loreto19		5894	16147	18.19		25000	1939522	5313760	19.13	8
may	Mayna25		3334	9134	10.29		11000	1049697	2875882	10.36	3
ONO	MIXTURE		10147	27800	31.31		27800	3014988	8260242	29.75	8
ori	Orient23		12388	33939	38.22		50000	3953007	10830158	39.00	15
	TOTAL		32410	88794	100.00			10136108	27770158	100.00	
	PLANT OUTPUT										
SUL	Sulfur	86261	80	218	0.25			31485	86261	0.31	
B34	C3/C4 LPG		1525	4177	4.70		5700	287040	786411	2.83	1
1GP	FCC Naphtha		292	800	0.90	800	800	76655	210014	0.76	210014
2GR	Virgin Naphtha		2456	6729	7.58			629946	1725879	6.21	
3GS	Gasoline G-95 SP		768	2104	2.37		2104	208302	570692	2.06	
4GU	Gasoline 91 SP		3619	9916	11.17		9916	934271	2559645	9.22	2
G4U	Solvent 3		153	420	0.47		420	42962	117704	0.42	
6GA	Export FCC Naphth		1816	4976	5.60			476811	1306333	4.70	
2KE	Kerosene		2905	7960	8.96		7960	843845	2311904	8.33	2
3JA	Turbo Jet A-1		1055	2890	3.25		2890	304904	835354	3.01	
5D2	No. 2 Diesel		5961	16333	18.39		33000	1785031	4890496	17.61	9
6R4	MF80 Fuel Oil		102	280	0.32	80	280	35081	96113	0.35	27461
7R5	PI6 Fuel Oil		1150	3150	3.55		3150	405040	1109699	4.00	1
8R6	PI500 Fuel Oil		876	2400	2.70		2400	304024	832941	3.00	
9R7	PI6 Export		8926	24455	27.54			3124288	8559694	30.82	
BAP	Solid Asphalt		110	300	0.34		300	41120	112657	0.41	
CAP	Liquid Asphalt		91	250	0.28		250	31983	87623	0.32	
DAP	Res Asphalt		255	700	0.79		700	89589	245449	0.88	
	TOTAL		32142	88059	99.17			9652378	26444871	95.23	
	PROCESS FUEL USED										
HYA	H2 (MSCF)	3	61	166	0.19			6244	17106	0.06	
HLA	H2 (Unrec.)	1	22	59	0.07			2226	6099	0.02	
HFA	Purch Nat Gas		348	954	1.07			92254	252752	0.91	
FEA	Plant Fuel Gas		566	1551	1.75			158639	434628	1.57	
4MA	Butylenes		66	181	0.20			13854	37956	0.14	
CKA	KCC Coke Burn	429	0	0	0.00			156759	429477	1.55	
	TOTAL		1063	2911	3.28			429976	1178018	4.24	

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

DATE: 01 JUL 02
TIME: 16:02 HRS

PetroPeru Coker Case Refinery Upgrade

PLANT INPUT/OUTPUT REPORT (CONT.)
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	STOCK LIMITS MIN B/CD	STOCK LIMITS MAX B/CD	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT	STOCK L MIN L/CD
GRAND TOTAL		33204	90970	102.45			10082354	27622889	99.47	
PLANT GAIN		794	2176	2.45						
PLANT LOSS							53753	147270	0.53	

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Raw Material Purchases
ONE YEAR

STOCK		LOCATION	PER DAY ACTUAL UNITS	Volume .M Bbls	Volume B/CD	UNIT PRICE $/BBL	UNIT PRICE C/Gal	MARGINAL VALUE $/BBL	MARGINAL VALUE C/Gal	INCREM INCENT $/BBL
HFG	Purch Nat Gas	1 Single Refinery		348	954	3.85	9.17	3.85	9.17	-0.00
cui	Cuisia39	1 Single Refinery		299	820	24.53	58.40	24.53	58.40	-0.00
lor	Loreto19	1 Single Refinery		5894	16147	17.77	42.31	17.09	40.68	-0.68
may	Mayna25	1 Single Refinery		3334	9134	20.47	48.74	21.68	51.61	1.21
ONO	MIXTURE	1 Single Refinery		10147	27800	22.51	53.60	24.17	57.54	1.66
ori	Orient23	1 Single Refinery		12388	33939	18.49	44.02	18.49	44.02	-0.00
		**GRAND TOTAL		32410	88794					

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Product Sales
ONE YEAR

STOCK	LOCATION	PER DAY ACTUAL UNITS	Volume .M Bbls	Volume B/CD	UNIT PRICE $/BBL	UNIT PRICE C/Gal	MARGINAL VALUE $/BBL	MARGINAL VALUE C/Gal	INCREA INCENT $/BBL
@ SUL Sulfur	1 Single Refinery	86261	80	218	0.02	0.05	0.02	0.05	
B34 C3/C4 LPG	1 Single Refinery		1525	4177	17.82	42.43			17.82
1GP FCC Naphtha	1 Single Refinery		292	800	24.79	59.02	24.79	59.02	0.00
2GR Virgin Naphtha	1 Single Refinery		2456	6729	23.46	55.86	23.46	55.86	0.00
3GS Gasoline G-95 SP	1 Single Refinery		768	2104	30.61	72.88	28.82	68.63	1.79
4GU Gasoline 91 SP	1 Single Refinery		3619	9916	28.90	68.81	26.19	62.36	2.71
G4U Solvent 3	1 Single Refinery		153	420	54.63	130.07	28.76	68.48	25.87
6GA Export FCC Naphtha	1 Single Refinery		1816	4976	24.79	59.02	24.79	59.02	0.00
2KE Kerosene	1 Single Refinery		2905	7960	28.77	68.50	28.69	68.32	0.08
3JA Turbo Jet A-1	1 Single Refinery		1055	2890	28.77	68.50	28.70	68.34	0.07
5D2 No. 2 Diesel	1 Single Refinery		5961	16333	28.54	67.95	28.54	67.95	0.00
6R4 MF80 Fuel Oil	1 Single Refinery		102	280	20.10	47.86	18.66	44.43	1.44
7R5 PI6 Fuel Oil	1 Single Refinery		1150	3150	18.19	43.31	16.65	39.64	1.54
8R6 PI500 Fuel Oil	1 Single Refinery		876	2400	17.59	41.88	14.62	34.80	2.97
9R7 PI6 Export	1 Single Refinery		8926	24455	16.65	39.64	16.65	39.64	0.00
BAP Solid Asphalt	1 Single Refinery		110	300	27.50	65.48	5.51	13.12	21.99
CAP Liquid Asphalt	1 Single Refinery		91	250	28.99	69.02	8.70	20.71	20.29
DAP Res Asphalt	1 Single Refinery		255	700	18.33	43.64	12.41	29.55	5.92
	**GRAND TOTAL		32142	88059					

@ ... REPORTED MONETARY VALUES PER ACTUAL STREAM UNITS

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PROCESS UTILIZATION REPORT
Single Refinery ONE YEAR

----PROCESS UNIT----	----PROCESS LIMIT----	OPERATING RATE .M Bbls	OPERATING RATE B/CD	UNUSED CAPACITY .M Bbls	UNUSED CAPACITY B/CD	PCT OF MAX CAPACITY	EXPANSION INCENTIVE $/BBL
CRD-DU Crude Tower #1	CRD Feed	* 32062	87840			100.0	1.574
VAC-VU Vacuum Tower #1	VAC Feed	15803	43295	987	2705	94.1	
WAC-WU Vacuum Tower #2	WAC Feed	711	1948	107	292	87.0	-0.196
SGP-SG Sats Gas Plant	SGP Feed	401	1098				
UGP-UG Unsats Gas Plant	UGP Feed	2098	5748				
FCC-FC FCCU (Total)	FCC Total Feed	6415	17575				
	KCC Feed (KC)	6415	17575				
	OKC CO Boiler (KC)	94635	259275				
VIS-VB Visbreaker	VIS Feed	4703	12885				0.546
TNS-TN Naphtha Splitter	TNS Feed	470	1289				
CRU-CR CCR Reformer	CRU Feed	1639	4490				2.329
SRU-SR LP SR Reformer	SRU Feed						
SAA-SA H2SO4 Alkylation	SAA Alkylate product	736	2015				2.717
DHT-DH Distillate HDS	DHT Total Capacity	3239	8874				1.115
	DHD SR Diesel Feed	1416	3879				
	DHJ Jet/Kero Feed	1393	3817				
	DHC FCC Stk.	430	1179				
	DHc Coker Stk.						
NHT-NH Naphtha HDS	NHT Total feed	1672	4580				1.035
	NHL Lt Vir Naphtha						-2.357
	NHC Hvy Vir Naphtha	1303	3570				
	NHZ Hvy Coker Naphtha	336	921				
	NHA Lt Coker Naphtha	33	89				
HYD-H2 Hydrogen Plant	HYD Total MSCF H2						0.582
	H2A via plant fuel						
	H2B via LPG						
	H2C via naphtha						
	H2D via purch gas						
SUL-SU Sulfur Plant	SUL Feed	31485	86261				0.039
MRJ-MJ Merox (Jet)	MRJ Feed	3883	10638			100.0	0.041

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PROCESS UTILIZATION REPORT (CONT.)
Single Refinery ONE YEAR

----PROCESS UNIT----	----PROCESS LIMIT----	OPERATING RATE .M Bbls	OPERATING RATE B/CD	UNUSED CAPACITY .M Bbls	UNUSED CAPACITY B/CD	PCT OF MAX CAPACITY	EXPANSION INCENTIVE $/BBL
MRD-MD Merox (Diesel)	MRD Feed	2735	7493	614	1681	81.7	
MRG-MG Merox (FCC Gasoline)	MRG Feed	3653	10008				
MRL-ML Merox (LPG)	MRL Feed	2499	6846				
FUL-90 Fuel System	PFO Fuel Oil						
	FLR Flare						
UTL-95 General Utilities	STM MP Steam (Mlbs)	264	724				
	STL LP Steam (Mlbs)	3	8				
	STH HP Steam (Mlbs)	178	489				
	SWT Sour Water (Mlbs)	101	277				
	VNT Steam Vent						
	KWH Power (kwh)	72151	197675				
	CWR Cooling H2O (MGal)	9724	26641				
	KWT Condensing Turbine						0.066
ADM-AM Amine (DEA) Unit	ADM Amine Unit (GPM)	89	244				

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MATERIAL BALANCE - Crude Tower #1 CRD-DU
Single Refinery ONE YEAR

		PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
	FEED STREAMS							
cui	Cuisia39		299	820	0.93	86638	237365	0.86
lor	Loreto19		5894	16147	18.38	1939522	5313760	19.31
may	Mayna25		3334	9134	10.40	1049697	2875882	10.45
ONO	MIXTURE		10147	27800	31.65	3014988	8260242	30.02
ori	Orient23		12388	33939	38.64	3953007	10830158	39.36
	TOTAL FEED		32062	87840	100.00	10043853	27517406	100.00
	PRODUCT STREAMS							
F3S	Propane (Lbs & FOEB)	2150	3	7	0.01	785	2150	0.01
S3S	Propane (Sat.)		40	109	0.12	7048	19310	0.07
S4I	Iso-butane (Sat.)		45	122	0.14	8780	24054	0.09
S4N	NC4 (Sat.)		131	358	0.41	26672	73075	0.27
55	55/ 180		1202	3293	3.75	281474	771160	2.80
LN	292/ 316		692	1895	2.16	188166	515522	1.87
LA	180/ 292		2590	7095	8.08	677683	1856664	6.75
HN	316/ 321		140	384	0.44	38433	105297	0.38
NK	321/ 375		1441	3948	4.49	402363	1102364	4.01
LK	375/ 463		2459	6736	7.67	710799	1947394	7.08
MK	463/ 557		2786	7633	8.69	831353	2277680	8.28
HK	557/ 566		281	770	0.88	84976	232810	0.85
LG	566/ 645		2798	7665	8.73	852071	2334441	8.48
AR	645+		17377	47609	54.20	5898877	16161306	58.73
	TOTAL PRODUCT		31983	87625	99.75	10009505	27423302	99.66
	LOSS (GAIN)		79	215	0.25	34348	94105	0.34

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	10365	10365
STM$	MP Steam, MLbs/D	328	328
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	48619	48619
BTU$	Fuel Fired, MBTU/D	7299504	7299504
SWT$	Sour Water, MLbs/Day	277	277
MUW$	Make-up Water, MGal/D	18	18

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MATERIAL BALANCE - Vacuum Tower #1 VAC-VU
Single Refinery ONE YEAR

			------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS								
ARB	645+	(B)	3753	10281	23.75	1318216	3611550	24.48
ARC	645+	(C)	1462	4005	9.25	482003	1320556	8.95
ARE	645+	(E)	3184	8724	20.15	1031352	2825621	19.15
ARF	645+	(F)	7404	20285	46.85	2553243	6995186	47.42
TOTAL FEED			15803	43295	100.00	5384813	14752913	100.00
PRODUCT STREAMS								
LV	645/ 697		1529	4188	9.67	476507	1305498	8.85
HV	697/1011		7575	20754	47.94	2455110	6726330	45.59
VB	1011+		6699	18352	42.39	2453128	6720899	45.56
TOTAL PRODUCT			15803	43295	100.00	5384745	14752726	100.00

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	5195	5195
STM$	MP Steam, MLbs/D	443	443
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	29874	29874
BTU$	Fuel Fired, MBTU/D	3861943	3861943
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	40	40

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MATERIAL BALANCE - Vacuum Tower #2 WAC-WU
Single Refinery ONE YEAR

			------ VOLUME ------		PERCENT OF	------ WEIGHT ------		PERCENT OF
			.M Bbls	B/CD	INPUT	.M Lbs	L/CD	INPUT
	FEED STREAMS							
ARE	645+	(E)	711	1948	100.00	230282	630908	100.00
	TOTAL FEED		711	1948	100.00	230282	630908	100.00
	PRODUCT STREAMS							
LV	645/ 697		107	293	15.02	32852	90006	14.27
HV	697/1011		452	1238	63.56	144547	396019	62.77
VE	1011+		152	417	21.42	52879	144875	22.96
	TOTAL PRODUCT		711	1948	100.00	230279	630901	100.00

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	1221	1221
STM$	MP Steam, MLbs/D	132	132
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	307	307
BTU$	Fuel Fired, MBTU/D	301550	301550
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	0	0

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MATERIAL BALANCE - Sats Gas Plant SGP-SG
Single Refinery ONE YEAR

	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS						
S3S Propane (Sat.)	125	342	31.19	22181	60770	28.49
S4I Iso-butane (Sat.)	86	237	21.55	16994	46560	21.83
S4N NC4 (Sat.)	189	519	47.26	38688	105995	49.69
TOTAL FEED	401	1098	100.00	77863	213325	100.00
PRODUCT STREAMS						
C3S Propane	125	342	31.19	22181	60770	28.49
C4I Iso-butane	86	237	21.55	16994	46560	21.83
C4N Normal Butane	189	519	47.26	38688	105995	49.69
TOTAL PRODUCT	401	1098	100.00	77863	213325	100.00

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	14	14
CWR$	Cooling Water, MGal/D	463	463
STM$	MP Steam, MLbs/D	3	3
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	262	262
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	0	0

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MATERIAL BALANCE - Unsats Gas Plant UGP-UG
Single Refinery ONE YEAR

	------ VOLUME ------		PERCENT OF	------ WEIGHT ------		PERCENT OF
	.M Bbls	B/CD	INPUT	.M Lbs	L/CD	INPUT
FEED STREAMS						
U3S Propane (Unsat.)	245	670	11.65	43408	118927	9.84
U3M Propylene (Unsat.)	706	1933	33.63	128688	352571	29.17
U4I Iso-butane (Unsat.)	391	1072	18.65	102731	281454	23.29
U4N NC4 (Unsat.)	139	381	6.63	36530	100083	8.28
U4J Iso C4= (Unsat.)	207	567	9.86	43400	118904	9.84
U4L 1/2 C4= (Unsat.)	411	1125	19.58	86336	236536	19.57
TOTAL FEED	2098	5748	100.00	441094	1208475	100.00
PRODUCT STREAMS						
C3S Propane	245	670	11.65	43408	118927	9.84
C3M Propylene	706	1933	33.63	128688	352571	29.17
C4I Iso-butane	391	1072	18.65	77018	211009	17.46
C4N Normal Butane	139	381	6.63	28433	77900	6.45
C4M Mixed C4=	411	1125	19.58	86267	236347	19.56
C4J Iso-butylene	207	567	9.86	43400	118904	9.84
TOTAL PRODUCT	2098	5748	100.00	407215	1115657	92.32
LOSS (GAIN)				33879	92818	7.68

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	72	72
CWR$	Cooling Water, MGal/D	2426	2426
STM$	MP Steam, MLbs/D	15	15
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	1371	1371
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	2	2

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MATERIAL BALANCE - FCCU (KC) KCC-KC
Single Refinery ONE YEAR

			PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
	FEED STREAMS								
ARA	645+*	(A)		94	258	1.47	30176	82675	1.44
HVB	697/1011	(B)		1634	4476	25.47	540357	1480430	25.84
ARC	645+	(C)		769	2107	11.99	253606	694810	12.13
HVC	697/1011	(C)		757	2075	11.81	240509	658930	11.50
HVF	697/1011	(F)		3160	8658	49.26	1026868	2813336	49.10
	TOTAL FEED			6415	17575	100.00	2091516	5730181	100.00
	PRODUCT STREAMS								
KTG	FCC Gasoline			3551	9729	55.36	932237	2554073	44.57
KLC	FCC LCO			430	1179	6.71	146795	402177	7.02
KHC	FCC HCO			853	2336	13.29	316516	867168	15.13
CKE	FCC Cat Coke		429477	0	0	0.00	156759	429477	7.49
KCK	Coke			0	0	0.00	0	0	0.00
H2S	H2S (Lbs)		31833	28	76	0.43	11619	31833	0.56
F1S	Methane (Lbs & FOEB)		113856	157	431	2.45	41557	113855	1.99
F2S	Ethane (Lbs & FOEB)		90809	117	321	1.83	33145	90808	1.58
F2M	Ethylene (Lbs & FOEB)		66420	83	228	1.30	24243	66419	1.16
F3S	Propane (Lbs & FOEB)		20967	26	72	0.41	7653	20967	0.37
F3M	Propylene (Lbs & FOEB)		46759	57	156	0.89	17067	46758	0.82
U3S	Propane (Unsat.)			211	578	3.29	37447	102594	1.79
U3M	Propylene (Unsat.)			692	1897	10.80	126314	346066	6.04
U4I	Iso-butane (Unsat.)			383	1049	5.97	100497	275334	4.80
U4N	NC4 (Unsat.)			116	317	1.80	30352	83157	1.45
U4J	Iso C4= (Unsat.)			201	550	3.13	42137	115443	2.01
U4L	1/2 C4= (Unsat.)			397	1087	6.19	83389	228462	3.99
	TOTAL PRODUCT			7303	20008	113.84	2107726	5774592	100.78
	LOSS (GAIN)			-888	-2433	-13.84	-16210	-44412	-0.78

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	1476	1476
CWR$	Cooling Water, MGal/D	5606	5606
STM$	MP Steam, MLbs/D	278	278
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	489	489
KWH$	Electricity, KWH/D	7635	7635

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BTU$	Fuel Fired, MBTU/D	780936	780936
MUW$	Make-up Water, MGal/D	44	44
KVV	FCC Conversion, Vol%	80.04	
KDE	FCC Feed Density	335.59	
KSL	FCC Feed Sulfur	1.2336	
KNI	FCC Feed Basic Nitrogen	0.0587	
KME	FCC Feed Metals	4.8000	
KRR	FCC Feed Concarbon	1.2836	

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MATERIAL BALANCE - Visbreaker VIS-VB
Single Refinery ONE YEAR

		PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
	FEED STREAMS							
VBC	1011+ (C)		208	570	4.42	73276	200755	4.29
VBE	1011+ (E)		834	2286	17.74	289708	793721	16.97
VBF	1011+ (F)		3661	10029	77.84	1344423	3683351	78.74
	TOTAL FEED		4703	12885	100.00	1707407	4677827	100.00
	PRODUCT STREAMS							
TTN	Thermal Naphtha		470	1289	10.00	122373	335269	7.17
VHK	400/650 Visbrk		554	1519	11.79	186716	511551	10.94
VHG	650/1000 Visbrk		1339	3668	28.47	475544	1302861	27.85
VVB	1000+ Visbrk		2255	6178	47.95	874444	2395736	51.21
H2S	H2S (Lbs)	36332	32	87	0.67	13261	36332	0.78
F1S	Methane (Lbs & FOEB)	14183	20	54	0.42	5177	14183	0.30
F2S	Ethane (Lbs & FOEB)	20025	26	71	0.55	7309	20025	0.43
F2M	Ethylene (Lbs & FOEB)	1361	2	5	0.04	497	1361	0.03
F3S	Propane (Lbs & FOEB)	2637	3	9	0.07	963	2637	0.06
F3M	Propylene (Lbs & FOEB)	905	1	3	0.02	330	905	0.02
U3S	Propane (Unsat.)		34	92	0.71	5962	16333	0.35
U3M	Propylene (Unsat.)		13	36	0.28	2375	6506	0.14
U4I	Iso-butane (Unsat.)		9	23	0.18	2234	6120	0.13
U4N	NC4 (Unsat.)		24	64	0.50	6178	16926	0.36
U4J	Iso C4= (Unsat.)		6	16	0.13	1263	3461	0.07
U4L	1/2 C4= (Unsat.)		14	38	0.30	2947	8074	0.17
	TOTAL PRODUCT		4800	13151	102.07	1707572	4678279	100.01
	LOSS (GAIN)		-97	-267	-2.07	-165	-452	-0.01

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	77	77
STM$	MP Steam, MLbs/D	-593	-593
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	9792	9792
BTU$	Fuel Fired, MBTU/D	1703341	1703341
SWT$	Sour Water, MLbs/Day	0	
vbl	Feed Gravity (Lbs/Bbl)	363.06	
vbc	Feed Concarbon Wt%	23.77	

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vbs	Feed Sulfur, Wt%	2.1381
vbv	Feed Vis Index @122F	21.79
vbm	Feed Ni+V, wppm	728.95
vbi	Feed Asphaltenes, Wt%	1.5317

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MATERIAL BALANCE - Naphtha Splitter TNS-TN
Single Refinery ONE YEAR

	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS						
TTN Thermal Naphtha	470	1289	100.00	122373	335269	100.00
TOTAL FEED	470	1289	100.00	122373	335269	100.00
PRODUCT STREAMS						
TC5 C5/180 Th Naph.	134	368	28.55	31419	86080	25.68
THN 180/380 Th Naph.	336	921	71.45	89303	244666	72.98
TOTAL PRODUCT	470	1289	100.00	120723	330747	98.65
LOSS (GAIN)				1651	4522	1.35

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	0	
KWH$	Electricity, KWH/D	0	
BTU$	Fuel Fired, MBTU/D	0	

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MATERIAL BALANCE - CCR Reformer CRU-CR
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
ln# NHT LSR for Ref		1265	3466	77.19	338169	926491	77.08
hn# NHT HSR for Ref		374	1024	22.81	100532	275429	22.92
TOTAL FEED		1639	4490	100.00	438701	1201920	100.00
PRODUCT STREAMS							
L95 Lt. Ref 95 Sev.		266	729	16.24	74715	204699	17.03
L00 Lt. Ref 100 Sev.		739	2026	45.11	207523	568556	47.30
H00 Hvy Ref hn 100 Sev.		325	892	19.85	92527	253499	21.09
HYD H2 (MSCFD)	5359	101	276	6.14	10367	28403	2.36
HLS H2 (Unrec.)	1151	22	59	1.32	2226	6099	0.51
F1S Methane (Lbs & FOEB)	20792	29	79	1.75	7589	20792	1.73
F2S Ethane (Lbs & FOEB)	26622	34	94	2.10	9717	26622	2.21
F3S Propane (Lbs & FOEB)	4401	6	15	0.34	1606	4401	0.37
S3S Propane (Sat.)		81	222	4.94	14383	39405	3.28
S4I Iso-butane (Sat.)		39	106	2.36	7617	20870	1.74
S4N NC4 (Sat.)		56	153	3.41	11412	31266	2.60
TOTAL PRODUCT		1697	4651	103.57	439683	1204611	100.22
LOSS (GAIN)		-58	-160	-3.57	-982	-2691	-0.22

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	171	171
CWR$	Cooling Water, MGal/D	480	480
STM$	MP Steam, MLbs/D	-306	-306
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	3682	3682
BTU$	Fuel Fired, MBTU/D	1216909	1216909
SWT$	Sour Water, MLbs/Day	0	
SVC	Average Reformate Severity	99.00	
cPF	Avg Paraffin Vol%	46.70	
cAR	Avg Aromatic Vol%	8.7820	

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MATERIAL BALANCE - H2SO4 Alkylation SAA-SA
Single Refinery ONE YEAR

	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS						
C4I Iso-butane	478	1309	53.05	94012	257568	51.44
C4M Mixed C4=	216	591	23.98	45337	124211	24.81
C4J Iso-butylene	207	567	22.97	43400	118904	23.75
TOTAL FEED	900	2467	100.00	182749	500683	100.00
PRODUCT STREAMS						
AL7 C4 Alkylate	736	2015	81.69	182855	500971	100.06
TOTAL PRODUCT	736	2015	81.69	182855	500971	100.06
LOSS (GAIN)	165	452	18.31	-105	-288	-0.06

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	903	903
CWR$	Cooling Water, MGal/D	14	14
STM$	MP Steam, MLbs/D	185	185
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	12230	12230
SWT$	Sour Water, MLbs/Day	0	

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MATERIAL BALANCE - Distillate HDS DHT-DH
Single Refinery ONE YEAR

		PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS								
HKA 557/ 566 (A)			3	9	0.10	997	2732	0.10
LGB 566/ 645 (B)			490	1343	14.99	153191	419701	15.33
MKC 463/ 557 (C)			50	138	1.54	15070	41289	1.51
HKC 557/ 566 (C)			20	55	0.61	6020	16492	0.60
MKE 463/ 557 (E)			866	2373	26.48	256662	703183	25.68
HKE 557/ 566 (E)			113	310	3.46	33952	93018	3.40
MKF 463/ 557 (F)			239	654	7.30	71220	195124	7.13
HKF 557/ 566 (F)			101	278	3.10	30636	83933	3.07
LGF 566/ 645 (F)			925	2535	28.30	281708	771803	28.19
HYD H2 (MSCFD)		1633	31	84	0.94	3159	8656	0.32
K1# FCC LCO Pool			430	1179	13.16	146795	402177	14.69
TOTAL FEED			3270	8958	100.00	999409	2738108	100.00
PRODUCT STREAMS								
HNP Htr'd Naphtha			38	104	1.16	9829	26930	0.98
ddd DHT Product			1405	3850	42.97	427091	1170113	42.73
jjj DHT Jet Product			1380	3781	42.20	409957	1123170	41.02
lll DHT LCO product			427	1170	13.06	143018	391831	14.31
H2S H2S (Lbs)		21774	19	52	0.58	7947	21774	0.80
F1S Methane (Lbs & FOEB)		668	1	3	0.03	244	668	0.02
F2S Ethane (Lbs & FOEB)		555	1	2	0.02	203	555	0.02
S3S Propane (Sat.)			4	12	0.13	750	2055	0.08
S4I Iso-butane (Sat.)			3	8	0.09	597	1636	0.06
S4N NC4 (Sat.)			3	8	0.09	604	1654	0.06
TOTAL PRODUCT			3281	8988	100.33	1000241	2740386	100.08
LOSS (GAIN)			-11	-30	-0.33	-832	-2279	-0.08

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	177	177
CWR$	Cooling Water, MGal/D	229	229
STM$	MP Steam, MLbs/D	36	36
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	6103	6103
BTU$	Fuel Fired, MBTU/D	638249	638249

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SWT$	Sour Water, MLbs/Day	0
dsu	% Desulfurization	95.98

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MATERIAL BALANCE - Naphtha HDS NHT-NH
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
TC5 C5/180 Th Naph.		33	89	1.94	7630	20905	1.71
THN 180/380 Th Naph.		336	921	19.99	89303	244666	20.03
HNP Htr'd Naphtha		38	104	2.25	9829	26930	2.21
LNA 292/ 316 (A)		10	27	0.58	2660	7289	0.60
LAA 180/ 292 (A)		46	125	2.72	11946	32729	2.68
LNB 292/ 316 (B)		113	309	6.72	30695	84097	6.89
LAB 180/ 292 (B)		249	683	14.84	65147	178485	14.61
LNC 292/ 316 (C)		42	115	2.49	11204	30695	2.51
LNE 292/ 316 (E)		321	878	19.07	87699	240270	19.67
LAE 180/ 292 (E)		113	310	6.74	29833	81734	6.69
LNF 292/ 316 (F)		202	554	12.02	54668	149775	12.26
LAF 180/ 292 (F)		170	465	10.09	44191	121071	9.91
HYD H2 (MSCFD)	498	9	26	0.56	964	2641	0.22
TOTAL FEED		1681	4605	100.00	445770	1221287	100.00
PRODUCT STREAMS							
ncl NHT LSR for Ref		1265	3466	75.27	338169	926491	75.86
nch NHT HSR for Ref		374	1024	22.24	100532	275429	22.55
tc5 Htd C5/180 Th Naph.		33	89	1.94	7630	20905	1.71
H2S H2S (Lbs)	1714	1	4	0.09	626	1714	0.14
TOTAL PRODUCT		1673	4584	99.53	446957	1224539	100.27
LOSS (GAIN)		8	22	0.47	-1187	-3252	-0.27

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	92	92
CWR$	Cooling Water, MGal/D	118	118
STM$	MP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	3150	3150
BTU$	Fuel Fired, MBTU/D	329379	329379
SWT$	Sour Water, MLbs/Day	0	

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MATERIAL BALANCE - Sulfur Plant SUL-SU
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
HSS H2S fr Amine U (Lbs)	91652	80	218	100.00	33453	91652	100.00
TOTAL FEED		80	218	100.00	33453	91652	100.00
PRODUCT STREAMS							
SUL Sulfur	86261	80	218	100.00	31485	86261	94.12
TOTAL PRODUCT		80	218	100.00	31485	86261	94.12
LOSS (GAIN)		-0	-0	-0.00	1968	5391	5.88

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	28	28
STM$	MP Steam, MLbs/D	-279	-279
STL$	LP Steam, MLbs/D	8	8
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	2067	2067
BTU$	Fuel Fired, MBTU/D	47142	47142
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	34	34

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MATERIAL BALANCE - Fuel System FUL-90
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
HFG Purch Nat Gas		348	954	32.76	92254	252752	21.46
CKE FCC Cat Coke	429477	0	0	0.01	156759	429477	36.46
HYD H2 (MSCFD)	3228	61	166	5.70	6244	17106	1.45
HLS H2 (Unrec.)	1151	22	59	2.03	2226	6099	0.52
FOE Fuel Gas		566	1551	53.27	158639	434628	36.89
C4M Mixed C4=		66	181	6.21	13854	37956	3.22
TOTAL FEED		1063	2911	100.00	429976	1178018	100.00
PRODUCT STREAMS							
TOTAL PRODUCT							
LOSS (GAIN)		1063	2911	100.00	429976	1178018	100.00

OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
BTUS Fuel Fired, MBTU/D	-18001867	-18001867
BTUS Fuel Fired, MBTU/D	0	

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MATERIAL BALANCE - Fuel Pool FUP-91
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
F1S Methane (Lbs & FOEB)	149499	207	566	36.53	54567	149499	34.51
F2S Ethane (Lbs & FOEB)	138085	178	489	31.52	50401	138085	31.88
F2M Ethylene (Lbs & FOEB)	67781	85	233	14.99	24740	67780	15.65
F3S Propane (Lbs & FOEB)	30154	38	104	6.69	11006	30154	6.96
F3M Propylene (Lbs & FOEB)	47664	58	159	10.27	17397	47663	11.00
TOTAL FEED		566	1551	100.00	158111	433181	100.00
PRODUCT STREAMS							
FOE Fuel Gas		566	1551	100.00	158639	434628	100.33
TOTAL PRODUCT		566	1551	100.00	158639	434628	100.33
LOSS (GAIN)		-0	-0	-0.00	-528	-1447	-0.33

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MATERIAL BALANCE - General Utilities UTL-95
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
TOTAL FEED							
PRODUCT STREAMS							
TOTAL PRODUCT							

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	21	21
CWR$	Cooling Water, MGal/D	-26641	-26641
CWR$	Cooling Water, MGal/D	26641	26641
STM$	MP Steam, MLbs/D	-724	-724
STM$	MP Steam, MLbs/D	724	724
STL$	LP Steam, MLbs/D	-8	-8
STL$	LP Steam, MLbs/D	8	8
STH$	HP Steam, MLbs/D	-489	-489
STH$	HP Steam, MLbs/D	489	489
KWH$	Electricity, KWH/D	-132038	-132038
KWH$	Electricity, KWH/D	197675	197675
BTU$	Fuel Fired, MBTU/D	1822913	1822913
SWT$	Sour Water, MLbs/Day	-277	-277
SWT$	Sour Water, MLbs/Day	277	277
KWP$	Electricity	-39528	-39528
MUW$	Make-up Water, MGal/D	1095	1095
PWR$	Power	197675	197675
OXX$		0	

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MATERIAL BALANCE - Amine (DEA) Unit ADM-AM
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
H2S H2S (Lbs)	91652	80	218	100.00	33453	91652	100.00
TOTAL FEED		80	218	100.00	33453	91652	100.00
PRODUCT STREAMS							
HSS H2S fr Amine U (Lbs)	91652	80	218	100.00	33453	91652	100.00
TOTAL PRODUCT		80	218	100.00	33453	91652	100.00

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	445	445
STM$	MP Steam, MLbs/D	482	482
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	2056	2056
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	212	212

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UTILITIES CONSUMPTION REPORT - .M Units
Single Refinery ONE YEAR

PROCESS UNIT	Fuel Mixed MBTU	Steam High psi M Lbs	Steam Med psi M Lbs	Steam Low psi M Lbs	Power KWH	Water Cooling M Gal	Water Make-Up M Gal	Sour Water M Lbs	Cat & Chem $
CRD-DU Crude Tower #1	2664319		120		17746	3783	7	101	
VAC-VU Vacuum Tower #1	1409609		162		10904	1896	15		
WAC-WU Vacuum Tower #2	110066		48		112	446	0		
SGP-SG Sats Gas Plant			1		96	169	0		5
UGP-UG Unsats Gas Plant			5		500	885	1		26
KCC-KC FCCU (KC)	285042	178	102		2787	2046	16		539
VIS-VB Visbreaker	621720		-216		3574	28			
CRU-CR CCR Reformer	444172		-112		1344	175			62
SAA-SA H2SO4 Alkylation			68		4464	5			330
DHT-DH Distillate HDS	232961		13		2228	84			65
NHT-NH Naphtha HDS	120223				1150	43			33
SUL-SU Sulfur Plant	17207		-102	3	754		12		10
MRJ-MJ Merox (Jet)					543				19
MRD-MD Merox (Diesel)					382				14
MRG-MG Merox (FCC Gasoline)					511				18
MRL-ML Merox (LPG)					349				12
FUL-90 Fuel System	*-6570681*								
UTL-95 General Utilities	665363	-178	-264	-3	-48194	-9724	400	-101	8
ADM-AM Amine (DEA) Unit			176		751	162	77		
PURCHASES									
Units/CD							1445		3129
.M Units							527		1142
PRICE, $/unit							*5.000*		*2.300*
MARGINAL VALUE	0.001	1.046	1.046	1.046	0.045	0.245	5.000		2.300

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UTILITIES CONSUMPTION REPORT - .M Units
Single Refinery ONE YEAR

	Power Purch KWH	Power Generate KWH
PROCESS UNIT		
UTL-95 General Utilities	72151	
PURCHASES		
Units/CD	197675	
.M Units	72151	
PRICE, $/unit	0.045	
MARGINAL VALUE	0.045	0.030

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MATERIAL BALANCE - Sol Asp BAP-AP
Single Refinery ONE YEAR

		Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
	COMPONENTS				
VBB	1011+ (B)	111	303	100.00	5.4546
	TOTAL COMPONENTS	111	303	100.00	
	BLENDED PRODUCTS				
BAP	Sol Asp	110	300	99.01	5.5091
	TOTAL PRODUCT	110	300	99.01	

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MATERIAL BALANCE - Liq Asp CAP-BF
Single Refinery ONE YEAR

			Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
COMPONENTS						
VBB	1011+	(B)	73	200	80.00	5.4546
SSB	55/ 180	(B)	9	25	10.00	17.5111
LAB	180/ 292	(B)	5	13	5.00	25.5211
LNB	292/ 316	(B)	5	13	5.00	26.1621
	TOTAL COMPONENTS		91	250	100.00	
BLENDED PRODUCTS						
CAP	Liq Asp		91	250	100.00	8.6990
	TOTAL PRODUCT		91	250	100.00	

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PetroPeru Coker Case Refinery Upgrade

MATERIAL BALANCE - Res Asp
Single Refinery ONE YEAR

DAP-CP

	COMPONENTS		Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
VBB	1011+	(B)	179	490	70.00	5.4546
NKB	321/ 375	(B)	26	70	10.00	28.7772
LKB	375/ 463	(B)	26	70	10.00	28.6899
MKB	463/ 557	(B)	26	70	10.00	28.4782
	TOTAL COMPONENTS		255	700	100.00	
	BLENDED PRODUCTS					
DAP	Res Asp		255	700	100.00	12.4128
	TOTAL PRODUCT		255	700	100.00	

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LCU 01150A

MATERIAL BALANCE - C3/C4 LPG
Single Refinery ONE YEAR

B34-34

		Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
	COMPONENTS				
C3S	Propane	369	1012	24.11	24.1196
C3M	Propylene	706	1933	46.04	24.1196
C4N	Normal Butane	328	900	21.44	2.7188
C4M	Mixed C4=	129	353	8.41	2.7188
	TOTAL COMPONENTS	1532	4198	100.00	
	BLENDED PRODUCTS				
B34	Mixed C3/C4	1525	4177	99.50	
	TOTAL PRODUCT	1525	4177	99.50	
	BLENDING PARAMETERS		LEVEL		
BBB	C4s in C3/C4 LPG		30.00		

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PRODUCT BLENDING - FCC Naphtha 1GP
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha	292	800	100.00	76655	210014	100.00	24.7723
TOTAL	292	800	100.00	76655	210014	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS							
SUL	Sulfur, Wt%	WT	0.102		0.150		
158	% Off at 158 F	VL	24.000	10.000			
250	% Off at 250 F	VL	61.000	50.000			
374	% Off at 374 F	VL	94.000	90.000			
430	% Off at 430 F	VL	100.000	99.900			
DNX	Density, Lb/bbl	VL	262.518		280.000		
ARO	Aromatics Content	VL	33.000		35.000		
PFF	Paraffins Content	VL	26.000		100.000		
NAP	Naphthenes Content	VL	15.000		22.000		
RVI	Reid Vapor Pressure Index	VL	130.540		139.460		
OLE	Olefin Content, Vol%	VL	16.000		100.000		
BEN	Benzene Content	VL	0.900		1.500		
PERFORMANCE CONTROLS							
R	Research O.N.	VL	92.500	92.500			

COMPONENT QUALITIES

	DNX	SUL	RVI	ARO	OLE	PFF	NAP	158	250
kN# FCC Cat Naphtha	262.518	0.10171	130.540	33.0000	16.0000	26.0000	15.0000	24.0000	61.0000
	430	PBL	BEN	R00	M00	F00	R05	R10	R20
kN# FCC Cat Naphtha	100.000	.	0.90000	92.5000	81.1000	86.8000	95.0000	96.0000	97.0000
	M05	M10	M20	M30	F05	F10	F20	F30	
kN# FCC Cat Naphtha	83.6000	85.2000	86.0000	87.6000	89.3000	90.6000	91.5000	92.8000	

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PRODUCT BLENDING - Virgin Naphtha 2GR
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
55A	55/ 180	(A)	21	58	0.86	4980	13645	0.79	16.2490
55C	55/ 180	(C)	54	149	2.22	12044	32998	1.91	20.2931
LAC	180/ 292	(C)	173	475	7.06	44335	121467	7.04	24.4463
LAE	180/ 292	(E)	1156	3167	47.07	304513	834282	48.34	25.7635
55F	55/ 180	(F)	373	1023	15.21	87547	239854	13.90	14.9575
LAF	180/ 292	(F)	678	1856	27.59	176526	483633	28.02	24.4434
BLENDING LOSS									
TOTAL			2456	6729	100.00	629946	1725879	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS							
SUL	Sulfur, Wt%	WT	0.001		0.050		
140	% Off at 140 F	VL	10.000		10.000		0.1515
248	% Off at 248 F	VL	63.572	50.000			
320	% Off at 320 F	VL	100.000	90.000			
338	% Off at 338 F	VL	100.000	99.900			
DNX	Density, Lb/bbl	VL	256.469	244.400	262.600		
ARO	Aromatics Content	VL	3.481	0.000			
PFF	Paraffins Content	VL	57.607	0.000			
NAP	Naphthenes Content	VL	38.519	0.000			
NAR	Naphthenes + Aromatics	VL	42.000	42.000			-0.0438
RVI	Reid Vapor Pressure Index	VL	64.981		157.520		
OLE	Olefin Content, Vol%	VL	0.000		1.000		

COMPONENT QUALITIES

			DNX	SUL	NAP	ARO	PFF	OLE	RVI	140	248
55A	55/ 180	(A)	235.409	1.00E-3	16.9100	1.82900	81.2600	.	158.798	50.8650	100.000
55C	55/ 180	(C)	221.222	.	14.4400	2.80200	82.7600	.	209.164	23.7480	100.000
LAC	180/ 292	(C)	255.633	2.00E-4	26.6000	3.30800	69.8300	.	27.8700	.	59.8560
LAE	180/ 292	(E)	263.391	1.10E-3	56.3200	3.68800	39.5200	.	26.3340	.	53.1580
55F	55/ 180	(F)	234.402	.	15.6500	3.20700	80.7400	.	228.196	59.4210	100.000
LAF	180/ 292	(F)	260.527	1.70E-3	26.4100	3.43100	69.8300	.	35.9410	.	58.1480
			338	NAR	R00	M00	F00	R05	R10	R20	R30
55A	55/ 180	(A)	100.000	18.7390	67.4170	65.9670	66.6920	71.3010	75.3060	79.5030	85.0820
55C	55/ 180	(C)	100.000	17.2420	70.4180	65.4480	67.9330	73.7670	77.5350	81.4920	86.9070
LAC	180/ 292	(C)	100.000	29.9080	61.7200	64.8220	63.2710	64.2150	68.4410	72.8420	78.6570
LAE	180/ 292	(E)	100.000	60.0080	69.0070	66.9370	67.9720	71.0100	74.6100	78.3780	83.7530
55F	55/ 180	(F)	100.000	18.8570	71.8410	73.9500	72.8955	74.9780	78.6330	82.4770	87.8140
LAF	180/ 292	(F)	100.000	29.8410	59.7590	68.7670	64.2630	62.3180	66.7220	71.3030	77.2420
			M10	M20	M30	F05	F10	F20	F30		

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- Virgin Naphtha 2GR
Single Refinery ONE YEAR

55A	55/ 180	(A)	73.2140	77.1850	82.6900	70.3585	74.2600	78.3440	83.8860
55C	55/ 180	(C)	72.7390	76.7530	82.2900	71.3325	75.1370	79.1225	84.5985
LAC	180/ 292	(C)	70.6270	74.4990	80.0040	65.5635	69.5340	73.6705	79.3305
LAE	180/ 292	(E)	72.4320	76.0340	81.3670	69.9960	73.5210	77.2060	82.5600
55F	55/ 180	(F)	80.4220	83.8490	88.9400	76.0735	79.5275	83.1630	88.3770
LAF	180/ 292	(F)	73.8750	77.2580	82.4530	66.4780	70.2985	74.2805	79.8475

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PRODUCT BLENDING - Gasoline G-95 SP 3GS
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha	45	123	5.83	11753	32201	5.64	24.7723
rf# Total Reformate	574	1573	74.76	161658	442899	77.61	33.1192
TC5 C5/180 Th Naph.	102	279	13.24	23789	65175	11.42	11.6074
55B 55/ 180 (B)	47	130	6.17	11102	30416	5.33	17.5111
BLENDING LOSS							
TOTAL	768	2104	100.00	208302	570692	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.040		0.040		0.1474
158 % Off at 158 F	VL	33.456	10.000			
171 % Off at 171 F	VL	45.658		50.000		
244 % Off at 244 F	VL	85.070	50.000			
374 % Off at 374 F	VL	98.736	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	271.241		300.000		
ARO Aromatics Content	VL	36.096		45.000		
PFF Paraffins Content	VL	43.083		100.000		
RVI Reid Vapor Pressure Index	VL	101.820		155.703		
OLE Olefin Content, Vol%	VL	7.424		25.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	95.000	95.000			-0.6585

COMPONENT QUALITIES

	DNX	RVI	158	171	244	374	430	SUL	ARO
kN# FCC Cat Naphtha	262.518	130.540	24.0000	33.0000	60.0000	94.0000	100.000	0.10171	33.0000
rf# Total Reformate	281.574	80.8446	19.9546	33.9316	82.0858	98.7775	100.000	.	45.2772
TC5 C5/180 Th Naph.	233.957	157.500	92.0000	96.0000	106.000	100.000	100.000	0.30000	1.14000
55B 55/ 180 (B)	234.297	209.353	80.3450	91.6670	100.000	100.000	100.000	.	2.78300
	PFF	R00	M00	F00	R05	R10	R20	R30	M05
kN# FCC Cat Naphtha	26.0000	92.5000	81.1000	86.8000	95.0000	96.0000	97.0000	98.0000	83.6000
rf# Total Reformate	41.9991	99.0000	88.5177	93.7589	101.182	102.191	103.455	104.298	91.4910
TC5 C5/180 Th Naph.	47.7400	82.5000	74.1000	78.3000	86.5000	87.9000	89.6000	92.3000	77.6000
55B 55/ 180 (B)	62.3600	75.7200	71.8780	73.7990	78.3390	81.6840	85.2130	90.3310	75.1760
	M20	M30	F05	F10	F20	F30			
kN# FCC Cat Naphtha	86.0000	87.6000	89.3000	90.6000	91.5000	92.8000			
rf# Total Reformate	90.0000	92.0000	96.3366	95.5955	96.7277	98.1488			
TC5 C5/180 Th Naph.	80.9000	83.0000	82.0500	83.4500	85.2500	87.6500			
55B 55/ 180 (B)	82.1250	87.3190	76.7575	80.1240	83.6690	88.8250			

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PRODUCT BLENDING - Gasoline 91 SP 4GU
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
sa# Alkyate Pool (SA)	736	2015	20.32	182855	500971	19.57	31.0810
kN# FCC Cat Naphtha	1398	3830	38.63	367017	1005525	39.28	24.7723
rf# Total Reformate	757	2074	20.91	213107	583854	22.81	33.1192
tc5 Htd C5/180 Th Naph.	33	89	0.90	7630	20905	0.82	12.8659
55B 55/ 180 (B)	74	202	2.04	17264	47299	1.85	17.5111
55E 55/ 180 (E)	526	1442	14.54	123808	339199	13.25	17.2108
55F 55/ 180 (F)	96	264	2.66	22590	61891	2.42	14.9575
BLENDING LOSS							
TOTAL	3619	9916	100.00	934271	2559645	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.040		0.040	.	0.1474
158 % Off at 158 F	VL	29.298	10.000			
171 % Off at 171 F	VL	39.660		50.000		
244 % Off at 244 F	VL	72.728	50.000			
374 % Off at 374 F	VL	97.427	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	258.133		300.000		
ARO Aromatics Content	VL	22.483		45.000		
PFF Paraffins Content	VL	52.924		100.000		
RVI Reid Vapor Pressure Index	VL	118.012		155.703		
OLE Olefin Content, Vol%	VL	6.387		25.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	91.000	91.000			-0.6585

COMPONENT QUALITIES

	DNX	RVI	158	171	244	374	430	SUL	ARO
sa# Alkyate Pool (SA)	248.600	64.1960	4.90000	13.0000	60.0000	100.000	100.000	.	.
kN# FCC Cat Naphtha	262.518	130.540	24.0000	33.0000	60.0000	94.0000	100.000	0.10171	33.0000
rf# Total Reformate	281.574	80.8446	19.9546	33.9316	82.0858	98.7775	100.000	.	45.2772
tc5 Htd C5/180 Th Naph.	233.957	.	92.0000	96.0000	106.000	100.000	100.000	6.00E-4	1.14000
55B 55/ 180 (B)	234.297	209.353	80.3450	91.6670	100.000	100.000	100.000	.	2.78300
55E 55/ 180 (E)	235.276	187.750	71.4290	83.0360	100.000	100.000	100.000	3.00E-4	0.79800
55F 55/ 180 (F)	234.402	228.196	75.4450	89.0580	100.000	100.000	100.000	.	3.20700

	PFF	R00	M00	F00	R05	R10	R20	R30	M05
sa# Alkyate Pool (SA)	100.000	96.2000	92.7000	94.4500	98.2000	100.300	102.600	104.300	94.8000
kN# FCC Cat Naphtha	26.0000	92.5000	81.1000	86.8000	95.0000	96.0000	97.0000	98.0000	83.6000
rf# Total Reformate	41.9991	99.0000	88.5177	93.7589	101.182	102.191	103.455	104.298	91.4910
tc5 Htd C5/180 Th Naph.	87.0100	68.7000	62.1000	65.4000	74.5000	75.9000	77.6000	78.7000	65.6000

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- Gasoline 91 SP 4GU
Single Refinery ONE YEAR

55B	55/ 180	(B)	62.3600	75.7200	71.8780	73.7990	78.3390	81.6840	85.2130	90.3310	75.1760
55E	55/ 180	(E)	65.8400	75.2710	73.3050	74.2880	77.9490	81.3300	84.8970	90.0410	76.5480
55F	55/ 180	(F)	80.7400	71.8410	73.9500	72.8955	74.9780	78.6330	82.4770	87.8140	77.1690
			M20	M30	F05	F10	F20	F30			
sa# Alkyate Pool (SA)			92.0000	95.0000	96.5000	95.6500	97.3000	99.6500			
kN# FCC Cat Naphtha			86.0000	87.6000	89.3000	90.6000	91.5000	92.8000			
rf# Total Reformate			90.0000	92.0000	96.3366	95.5955	96.7277	98.1488			
tc5 Htd C5/180 Th Naph.			69.9000	71.3000	70.0500	71.9500	73.7500	75.0000			
55B	55/ 180	(B)	82.1250	87.3190	76.7575	80.1240	83.6690	88.8250			
55E	55/ 180	(E)	83.3130	88.4370	77.2485	80.5870	84.1050	89.2390			
55F	55/ 180	(F)	83.8490	88.9400	76.0735	79.5275	83.1630	88.3770			

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PRODUCT BLENDING - Solvent 3 G4U
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
NKE	321/ 375	(E)	153	420	100.00	42962	117704	100.00	28.7624
	TOTAL		153	420	100.00	42962	117704	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS							
SUL	Sulfur, Wt%	WT	0.002		0.100		
350	% Off at 350 F	VL	54.587	50.000			
374	% Off at 374 F	VL	98.214	90.000			
DNX	Density, Lb/bbl	VL	280.247		300.000		
OLE	Olefin Content, Vol%	VL	0.000		4.000		
FLI	Flash point index	VL	334.000		753.800		

COMPONENT QUALITIES

			DNX	SUL	350	374	FLI	OLE	R00	M00	F00
NKE	321/ 375	(E)	280.247	2.50E-3	54.5870	98.2140	334.000	.	61.8080	64.2000	63.0040
			R10	R20	R30	M05	M10	M20	M30	F05	F10
NKE	321/ 375	(E)	68.2630	72.0220	77.5160	68.5520	72.0840	75.7700	81.1530	66.5990	70.1735
			F30								
NKE	321/ 375	(E)	79.3345								

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PRODUCT BLENDING - Export FCC Naphtha 6GA
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha	1816	4976	100.00	476811	1306333	100.00	24.7723
TOTAL	1816	4976	100.00	476811	1306333	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS							
SUL	Sulfur, Wt%	WT	0.102		0.150		
158	% Off at 158 F	VL	24.000	10.000			
250	% Off at 250 F	VL	61.000	50.000			
374	% Off at 374 F	VL	94.000	90.000			
430	% Off at 430 F	VL	100.000	99.900			
DNX	Density, Lb/bbl	VL	262.518		280.000		
ARO	Aromatics Content	VL	33.000		35.000		
PFF	Paraffins Content	VL	26.000		100.000		
NAP	Naphthenes Content	VL	15.000		22.000		
RVI	Reid Vapor Pressure Index	VL	130.540		130.540		0.0502
OLE	Olefin Content, Vol%	VL	16.000		100.000		
BEN	Benzene Content	VL	0.900		1.500		
PERFORMANCE CONTROLS							
R	Research O.N.	VL	92.500	91.500			

COMPONENT QUALITIES

	DNX	SUL	RVI	ARO	OLE	PFF	NAP	158	250
kN# FCC Cat Naphtha	262.5I8	0.10171	130.540	33.0000	16.0000	26.0000	15.0000	24.0000	61.0000
	430	PBL	BEN	R00	M00	F00	R05	R10	R20
kN# FCC Cat Naphtha	100.000	.	0.90000	92.5000	81.1000	86.8000	95.0000	96.0000	97.0000
	M05	M10	M20	M30	F05	F10	F20	F30	
kN# FCC Cat Naphtha	83.6000	85.2000	86.0000	87.6000	89.3000	90.6000	91.5000	92.8000	

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - Kerosene 2KE
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
dJ# DHT Jet Product			77	212	2.66	22946	62865	2.72	28.6596
NKB	321/ 375	(B)	176	482	6.05	49272	134992	5.84	28.7772
LKB	375/ 463	(B)	328	900	11.30	96164	263464	11.40	28.6899
MKB	463/ 557	(B)	403	1103	13.86	122621	335947	14.53	28.4782
HKB	557/ 566	(B)	43	119	1.49	13371	36634	1.58	28.3476
NKC	321/ 375	(C)	92	253	3.17	25546	69990	3.03	28.8229
LKC	375/ 463	(C)	173	475	5.97	50214	137572	5.95	28.7327
MKC	463/ 557	(C)	140	384	4.82	41816	114565	4.96	28.6055
NKE	321/ 375	(E)	449	1230	15.45	125838	344763	14.91	28.7624
NKF	321/ 375	(F)	449	1230	15.45	124808	341939	14.79	28.7744
MKF	463/ 557	(F)	574	1574	19.77	171248	469173	20.29	28.4298
TOTAL			2905	7960	100.00	843845	2311904	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
400	% Off at 400 F	VL	44.412	10.000			
DNX	Density, Lb/bbl	VL	290.440		310.000		
SUL	Sulfur, Wt%	WT	0.248		0.250		
FLI	Flash Point Index	VL	151.530		508.400		
SMI	Smoke Pt Index	VL	56.000		56.000		0.0135

COMPONENT QUALITIES

			DNX	SUL	400	SMI	FLI
dJ# DHT Jet Product			297.094	0.01323	10.0000	58.4875	13.7910
NKB	321/ 375	(B)	280.303	0.04310	100.000	45.3500	348.860
LKB	375/ 463	(B)	292.853	0.14980	23.3010	51.8400	67.1200
MKB	463/ 557	(B)	304.592	0.44990	.	67.5700	15.7300
HKB	557/ 566	(B)	308.254	0.59370	.	77.2800	6.47000
NKC	321/ 375	(C)	277.022	9.70E-3	100.000	41.9600	342.000
LKC	375/ 463	(C)	289.471	0.03690	23.1430	48.6600	66.8900
MKC	463/ 557	(C)	298.506	0.08930	.	58.1100	15.9100
NKE	321/ 375	(E)	280.247	2.50E-3	100.000	46.4500	333.970
NKF	321/ 375	(F)	278.009	0.04860	100.000	45.5600	323.580
MKF	463/ 557	(F)	298.170	0.68550	.	71.1700	15.0000

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PRODUCT BLENDING - Turbo Jet A-1 3JA
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
LKE	375/ 463	(E)	0	1	0.03	102	279	0.03	28.6711
NKF	321/ 375	(F)	53	145	5.00	14670	40191	4.81	28.7744
LKF	375/ 463	(F)	848	2324	80.43	244424	669655	80.16	28.6742
MKF	463/ 557	(F)	153	420	14.53	45709	125230	14.99	28.4298
BLENDING LOSS									
TOTAL			1055	2890	100.00	304904	835354	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
400	% Off at 400 F	VL	28.668	10.000			
DNX	Density, Lb/bbl	VL	289.050	271.620	289.050		0.0085
SUL	Sulfur, Wt%	WT	0.253		0.300		
FLI	Flash Point Index	VL	77.902		636.900		
ARO	Aromatics Content	VL	13.635		22.000		
SMI	Smoke Pt Index	VL	55.333		56.000		
OLE	Olefin content	VL	0.000		5.000		
FZI	Freeze Point Index	VL	1.547		1.547		0.0291

COMPONENT QUALITIES

			DNX	SUL	ARO	OLE	400	SMI	FLI	FZI
LKE	375/ 463	(E)	288.666	2.90E-3	9.80000	.	27.2680	54.2900	71.7800	0.72000
NKF	321/ 375	(F)	278.009	0.04860	4.64000	.	100.000	45.5600	323.580	0.28000
LKF	375/ 463	(F)	288.089	0.18390	12.3700	.	29.4120	53.0800	73.9900	0.78000
MKF	463/ 557	(F)	298.170	0.68550	23.7400	.	.	71.1700	15.0000	6.23000

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PRODUCT BLENDING - No. 2 Diesel 5D2
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
dD# DHT SR Product			1405	3850	23.57	427091	1170113	23.93	28.6465
dJ# DHT Jet Product			1303	3569	21.85	387011	1060305	21.68	28.6596
LGA	566/ 645	(A)	28	76	0.46	8491	23264	0.48	28.0969
LVB	645/ 697	(B)	119	326	1.99	37970	104028	2.13	25.1197
LGC	566/ 645	(C)	337	923	5.65	101995	279438	5.71	28.1450
LKE	375/ 463	(E)	1052	2882	17.64	303645	831905	17.01	28.6711
MKE	463/ 557	(E)	301	824	5.05	89185	244341	5.00	28.6481
LGE	566/ 645	(E)	1018	2788	17.07	306686	840236	17.18	28.5806
LVE	645/ 697	(E)	400	1095	6.71	122956	336867	6.89	28.5050
BLENDING LOSS									
TOTAL			5961	16333	100.00	1785031	4890496	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
DNX	Density, Lb/bbl	VL	299.427		340.000		
SUL	Sulfur, Wt%	WT	0.050		0.050		0.0109
PPX	Pour Point Index (Hu)	VL	364.687		1002.200		
V00	Vis. Index at 100 F	VL	47.397	43.680	59.220		
FLI	Flash Point Index	VL	18.842		266.200		
CTI	Cetane Index	VL	47.312	47.000			
K1#	FCC LCO Pool	%	0.00		10.00		

COMPONENT QUALITIES

			DNX	PPX	SUL	CTI	FLI	V00	K1#
dD# DHT SR Product			303.936	357.377	0.01798	48.3975	4.63983	42.0427	.
dJ# DHT Jet Product			297.094	220.917	0.01323	49.2852	13.7910	50.3241	.
LGA	566/ 645	(A)	306.488	763.343	0.17680	46.7500	4.72000	45.0270	.
LVB	645/ 697	(B)	319.521	855.471	1.02800	44.7600	2.60000	35.8390	.
LGC	566/ 645	(C)	302.895	358.673	0.16380	48.3700	4.34000	43.5850	.
LKE	375/ 463	(E)	288.666	33.5570	2.90E-3	40.1500	71.7800	61.0490	.
MKE	463/ 557	(E)	296.379	229.995	0.01120	46.4800	15.3400	51.5450	.
LGE	566/ 645	(E)	301.339	562.922	0.03230	50.1600	4.70000	42.5020	.
LVE	645/ 697	(E)	307.537	1158.33	0.06040	49.2000	2.59000	36.9160	.

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PRODUCT BLENDING - MF80 Fuel Oil 6R4
Single Refinery ONE YEAR

COMPONENT		VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
Kh# FCC HCO Pool		61	167	59.66	22635	62015	64.52	14.5933
VBC 1011+	(C)	13	34	12.25	4410	12083	12.57	15.2871
HNE 316/ 321	(E)	2	6	2.28	642	1760	1.83	28.8690
NKE 321/ 375	(E)	26	72	25.81	7393	20256	21.07	28.7624
BLENDING LOSS								
TOTAL		102	280	100.00	35081	96113	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES						
DNX Density, Lb/bbl	VL	343.262		360.000		
SUL Sulfur, Wt%	WT	1.500		1.500		0.0115
PPX Pour Point Index (Hu)	VL	2394.500		2394.500		0.0009
VBF RFO Vis. Index @122F	VL	0.388		0.388		7.8294
FLI Flash Point Index	VL	100.522		154.900		
MET Metals Content,PPM	VL	46.592		230.000		
CRC W % Conradson Carbon	VL	5.473		14.000		

COMPONENT QUALITIES

		DNX	SUL	VBF	PPX	FLI	CRC	MET
Kh# FCC HCO Pool		371.233	2.16840	0.51000	2681.00	0.50000	6.00000	60.0000
VBC 1011+	(C)	352.368	0.79800	0.71400	6474.08	0.76000	15.4600	88.1500
HNE 316/ 321	(E)	275.840	2.60E-3	-0.03400	4.68800	611.000	.	.
NKE 321/ 375	(E)	280.247	2.50E-3	-0.01100	7.77000	333.970	.	.

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PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - PI6 Fuel Oil 7R5
Single Refinery ONE YEAR

COMPONENT		VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
Kh# FCC HCO Pool		282	774	24.57	104856	287276	25.89	14.5933
dF# DHT LCO product		107	293	9.31	35848	98213	8.85	32.1641
vR# 1000+ Visbrk		322	883	28.03	124977	342403	30.86	1.4973
LVC 645/ 697	(C)	151	413	13.10	46428	127200	11.46	28.2270
VBC 1011+	(C)	102	279	8.86	35902	98362	8.86	15.2871
LVE 645/ 697	(E)	185	508	16.13	57029	156245	14.08	28.5050
BLENDING LOSS								
TOTAL		1150	3150	100.00	405040	1109699	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES						
DNX Density, Lb/bbl	VL	352.285		360.000		
SUL Sulfur, Wt%	WT	1.500		1.500		0.0111
VBF RFO Vis. Index @122F	VL	0.483	0.396	0.483		22.9129
FLI Flash Point Index	VL	3.280		154.900		
MET Metals Content, PPM	VL	400.000		400.000		0.0038
CRC W % Conradson Carbon	VL	10.702		25.000		

COMPONENT QUALITIES

		DNX	SUL	VBF	FLI	CRC	MET
Kh# FCC HCO Pool		371.233	2.16840	0.51000	0.50000	6.00000	60.0000
dF# DHT LCO product		334.910	0.06123	0.10523	25.0018	.	.
vR# 1000+ Visbrk		387.795	2.66374	0.76900	0.01000	28.0300	1346.38
LVC 645/ 697	(C)	308.170	0.27990	0.22600	2.61000	.	0.02000
VBC 1011+	(C)	352.368	0.79800	0.71400	0.76000	15.4600	88.1500
LVE 645/ 697	(E)	307.537	0.06040	0.24600	2.59000	0.01000	0.34000

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PRODUCT BLENDING - PI500 Fuel Oil 8R6
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
Kh# FCC HCO Pool			127	348	14.49	47114	129080	15.50	14.5933
HNA	316/ 321	(A)	2	5	0.22	521	1427	0.17	36.4589
NKA	321/ 375	(A)	17	46	1.93	4712	12909	1.55	36.2849
LKA	375/ 463	(A)	31	84	3.50	8767	24020	2.88	34.5380
MKA	463/ 557	(A)	34	93	3.87	10040	27507	3.30	28.8701
HNB	316/ 321	(B)	23	64	2.68	6438	17638	2.12	28.8913
VBB	1011+	(B)	386	1057	44.04	144880	396932	47.65	5.4546
HNC	316/ 321	(C)	9	26	1.07	2536	6947	0.83	28.7228
VBC	1011+	(C)	144	394	16.43	50719	138957	16.68	15.2871
HNE	316/ 321	(E)	60	165	6.88	16627	45554	5.47	28.8690
HNF	316/ 321	(F)	43	117	4.89	11669	31970	3.84	28.9324
BLENDING LOSS									
TOTAL			876	2400	100.00	304024	832941	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
DNX	Density, Lb/bbl	VL	347.059		360.000		
SUL	Sulfur, Wt%	WT	1.500		1.500		0.0082
VBF	RFO Vis. Index @122F	VL	0.502	0.494	0.502		15.6067
FLI	Flash Point Index	VL	106.377		108.500		
MET	Metals Content,PPM	VL	400.000		400.000		0.0063
CRC	W % Conradson Carbon	VL	18.362		25.000		

COMPONENT QUALITIES

			DNX	SUL	VBF	FLI	CRC	MET
Kh# FCC HCO Pool			371.233	2.16840	0.51000	0.50000	6.00000	60.0000
HNA	316/ 321	(A)	275.952	1.00E-3	-0.52000	611.000	.	.
NKA	321/ 375	(A)	278.313	1.00E-3	-0.50700	346.100	.	.
LKA	375/ 463	(A)	285.637	5.60E-3	-0.39000	69.1700	.	.
MKA	463/ 557	(A)	296.477	0.05490	-0.02600	15.0400	.	.
HNB	316/ 321	(B)	274.448	0.02680	-0.04000	611.000	.	.
VBB	1011+	(B)	375.524	2.15600	0.77700	0.76000	33.9500	855.600
HNC	316/ 321	(C)	270.674	4.80E-3	-0.02900	611.000	.	.
VBC	1011+	(C)	352.368	0.79800	0.71400	0.76000	15.4600	88.1500
HNE	316/ 321	(E)	275.840	2.60E-3	-0.03400	611.000	.	.
HNF	316/ 321	(F)	272.255	0.01750	-0.04300	611.000	.	.

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PetroPeru Coker Case Refinery Upgrade

PRODUCT BLENDING - PI6 Export 9R7
Single Refinery ONE YEAR

COMPONENT		VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
Kh# FCC HCO Pool		382	1047	4.28	141911	388797	4.54	14.5933
dF# DHT LCO product		320	877	3.59	107171	293619	3.43	32.1641
vD# 400/650 Visbrk		554	1519	6.21	186716	511551	5.98	28.3532
vG# 650/1000 Visbrk		1339	3668	15.00	475544	1302861	15.22	18.6624
vR# 1000+ Visbrk		1933	5295	21.65	749467	2053333	23.99	1.4973
LVB 645/ 697	(B)	198	541	2.21	63120	172930	2.02	25.1197
VBB 1011+	(B)	1054	2888	11.81	395827	1084458	12.67	5.4546
VBC 1011+	(C)	87	239	0.98	30754	84259	0.98	15.2871
HVE 697/1011	(E)	2476	6783	27.74	791923	2169653	25.35	25.4376
LVF 645/ 697	(F)	583	1598	6.53	181855	498233	5.82	24.2170
BLENDING LOSS								
TOTAL		8926	24455	100.00	3124288	8559694	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES						
DNX Density, Lb/bbl	VL	350.020		360.000		
SUL Sulfur, Wt%	WT	1.500		1.500		0.0111
VBF RFO Vis. Index @122F	VL	0.483	0.396	0.483		22.9129
FLI Flash Point Index	VL	3.272		154.900		
MET Metals Content, PPM	VL	400.000		400.000		0.0038
CRC W % Conradson Carbon	VL	10.551		25.000		

COMPONENT QUALITIES

	DNX	SUL	VBF	FLI	CRC	MET
Kh# FCC HCO Pool	371.233	2.16840	0.51000	0.50000	6.00000	60.0000
dF# DHT LCO product	334.910	0.06123	0.10523	25.0018	.	.
vD# 400/650 Visbrk	336.754	1.06172	0.11000	25.0000	.	2.00000
vG# 650/1000 Visbrk	355.217	1.83811	0.40000	0.60000	.	24.9728
vR# 1000+ Visbrk	387.795	2.66374	0.76900	0.01000	28.0300	1346.38
LVB 645/ 697 (B)	319.521	1.02800	0.25300	2.60000	0.02000	0.06000
VBB 1011+ (B)	375.524	2.15600	0.77700	0.76000	33.9500	855.600
VBC 1011+ (C)	352.368	0.79800	0.71400	0.76000	15.4600	88.1500
HVE 697/1011 (E)	319.863	0.13430	0.37700	1.39000	0.23000	0.52000
LVF 645/ 697 (F)	311.811	1.39800	0.23500	2.59000	0.01000	0.05000

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PetroPeru Coker Case Refinery Upgrade

I N D E X

REPORT	DESCRIPTION	PAGE	LOC'N	PERIOD
01010	ECONOMIC REPORT	1	.	A
01020	PROCESS-UNIT INVESTMENT REPORT	2	.	A
01250	PLANT INPUT/OUTPUT REPORT	3	1	A
01080	PURCHASES/SALES REPORT	5	.	A
BR	Raw Material Purchases	5	.	A
SA	Product Sales	6	.	A
01100	PROCESS UTILIZATION REPORT	7	1	A
01310	MATERIAL BALANCE	9	1	A
DU	Crude Tower #1	9	1	A
VU	Vacuum Tower #1	10	1	A
WU	Vacuum Tower #2	11	1	A
SG	Sats Gas Plant	12	1	A
UG	Unsats Gas Plant	13	1	A
KC	FCCU (KC)	14	1	A
VB	Visbreaker	16	1	A
TN	Naphtha Splitter	18	1	A
CR	CCR Reformer	19	1	A
SA	H2SO4 Alkylation	20	1	A
DH	Distillate HDS	21	1	A
NH	Naphtha HDS	23	1	A
SU	Sulfur Plant	24	1	A
90	Fuel System	25	1	A
91	Fuel Pool	26	1	A
95	General Utilities	27	1	A
AM	Amine (DEA) Unit	28	1	A
01030	UTILITIES CONSUMPTION REPORT	29	1	A
01150	RECIPE-MATERIAL BALANCE	31	1	A
.AP	Sol Asp	31	1	A
.BP	Liq Asp	32	1	A
.CP	Res Asp	33	1	A
.34	C3/C4 LPG	34	1	A
01320	PRODUCT BLENDING	35	1	A
1GP	FCC Naphtha	35	1	A
2GR	Virgin Naphtha	36	1	A
3GS	Gasoline G-95 SP	38	1	A
4GU	Gasoline 91 SP	39	1	A
G4U	Solvent 3	41	1	A
6GA	Export FCC Naphtha	42	1	A
01340	PRODUCT BLENDING	43	1	A
2KE	Kerosene	43	1	A
3JA	Turbo Jet A-1	44	1	A
5D2	No. 2 Diesel	45	1	A
6R4	MF80 Fuel Oil	46	1	A
7R5	PI6 Fuel Oil	47	1	A
8R6	PI500 Fuel Oil	48	1	A
9R7	PI6 Export	49	1	A

APPENDIX A.10 – LP MODEL REPORT FILE - CURRENT REFINERY IN FUTURE

This appendix contains the report file from the Haverly Systems GRTMPS LP model for the current refinery in the future case.

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

DATE: 16 AUG 02
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PetroPeru - No Refinery Upgrade Case -

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ECONOMIC REPORT
ONE YEAR

ACCOUNTING CATEGORY		.M $	.. $/CD
SAX	Product Values - Sales	568098	1556433
BRX	Raw Material Costs	-524984	-1438311
UTP	Utilities Costs	-4637	-12705
	TOTAL VARIABLE REVENUES	568098	1556433
	TOTAL VARIABLE COSTS	-529621	-1451016
	GROSS VARIABLE INCOME	38477	105417
	INCOME TAX	11543	31625
	NET PRESENT VALUE (I=15.00 PCT)	25011	68524

****SOLUTION STATUS: OPTIMAL AFTER 2128 ITERATIONS
CASE 1a: 8 RECURSION PASSES

CASE 1a: THE MODEL CONVERGED ON BOTH DISTRIBUTIONS AND PROPERTIES

PetroPeru Refinery Upgrade Study
Talara Refinery Modifications Project
A Foster Wheeler USA Study
Future Refinery Configuration
Without New Process Units
Assumed CDU revamp to 90,000 BPSD
Potential to revamp VDU and FCC included
Year 2007 Basis
3 Grades of Gasoline (No Unleaded)
Atm Resid Allowed into Fuel Oil Pools
All Fuel Oil at 1.5% S

****SYSTEM NAME : GRTMPS - III
****SYSTEM VERSION: VER 3.02.006

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PLANT INPUT/OUTPUT REPORT
Single Refinery ONE YEAR

		PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	STOCK LIMITS MIN B/CD	STOCK LIMITS MAX B/CD	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT	STOCK L MIN L/CD
	PLANT INPUT										
NGA	Nat Gasoline		18	50	0.08		50	4424	12120	0.06	
HOB	High Octane BldSt		2459	6738	10.31			659376	1806509	9.03	
lor	Loreto19		6663	18255	27.94		25000	2192727	6007471	30.03	8
may	Mayna25		3769	10327	15.80		11000	1186735	3251328	16.25	3
mes	Mesa30		795	2178	3.33		38000	243641	667509	3.34	11
ONO	MIXTURE		10147	27800	42.54		27800	3014988	8260242	41.29	8
	TOTAL		23852	65348	100.00			7301890	20005178	100.00	
	PLANT OUTPUT										
SUL	Sulfur	12466	12	32	0.05			4550	12466	0.06	
B34	C3/C4 LPG		1218	3337	5.11		5700	226378	620214	3.10	1
1GP	FCC Naphtha		292	800	1.22	800	800	76490	209561	1.05	209561
2GR	Virgin Naphtha		2161	5922	9.06			559469	1532792	7.66	
3GS	Gasoline G-95 SP		768	2104	3.22		2104	203434	557355	2.79	
4GU	Gasoline 91 SP		3619	9916	15.17		9916	950141	2603127	13.01	2
G4U	Solvent 3		153	420	0.64		420	42962	117704	0.59	
G5M	Export Gasoline		2209	6052	9.26			580935	1591603	7.96	
2KE	Kerosene		2055	5630	8.62		7960	602960	1651946	8.26	2
5D2	No. 2 Diesel		3983	10911	16.70		33000	1191072	3263211	16.31	9
6R4	MF80 Fuel Oil		102	280	0.43	80	280	33354	91380	0.46	26109
7R5	PI6 Fuel Oil		1150	3150	4.82		3150	401930	1101177	5.50	1
8R6	PI500 Fuel Oil		876	2400	3.67		2400	301410	825780	4.13	
9R7	PI6 Export		4375	11986	18.34			1499597	4108484	20.54	
BAP	Solid Asphalt		110	300	0.46		300	41120	112657	0.56	
CAP	Liquid Asphalt		91	250	0.38		250	32193	88199	0.44	
DAP	Res Asphalt		255	700	1.07		700	89589	245449	1.23	
	TOTAL		23429	64188	98.23			6837584	18733107	93.64	
	PROCESS FUEL USED										
FEA	Plant Fuel Gas		408	1119	1.71			114448	313555	1.57	
C4A	Normal Butane		134	368	0.56			27416	75113	0.38	
CIA	Iso-butane		29	80	0.12			5737	15718	0.08	
4MA	Butylenes		587	1609	2.46			123316	337853	1.69	
CKA	KCC Coke Burn	378	0	0	0.00			138051	378223	1.89	
	TOTAL		1159	3175	4.86			408969	1120462	5.60	
	GRAND TOTAL		24588	67364	103.08			7246552	19853568	99.24	

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PLANT INPUT/OUTPUT REPORT (CONT.)
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	STOCK LIMITS MIN B/CD	STOCK LIMITS MAX B/CD	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT	STOCK L MIN L/CD
PLANT GAIN		736	2016	3.08						
PLANT LOSS							55338	151610	0.76	

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PetroPeru - No Refinery Upgrade Case -

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Raw Material Purchases
ONE YEAR

STOCK		LOCATION	PER DAY ACTUAL UNITS	Volume .M Bbls	Volume B/CD	UNIT PRICE $/BBL	UNIT PRICE C/Gal	MARGINAL VALUE $/BBL	MARGINAL VALUE C/Gal	INCREA INCENT $/BBL
NGA	Nat Gasoline	1 Single Refinery		18	50	19.75	47.02	21.47	51.12	1.72
HOB	High Octane BldStk	1 Single Refinery		2459	6738	33.50	79.76	33.50	79.76	-0.00
lor	Loreto19	1 Single Refinery		6663	18255	17.77	42.31	17.61	41.93	-0.16
may	Mayna25	1 Single Refinery		3769	10327	20.47	48.74	20.75	49.41	0.28
mes	Mesa30	1 Single Refinery		795	2178	22.98	54.71	22.98	54.71	-0.00
ONO	MIXTURE	1 Single Refinery		10147	27800	22.51	53.60	23.17	55.17	0.66
		**GRAND TOTAL		23852	65348					

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PetroPeru - No Refinery Upgrade Case -

Product Sales
ONE YEAR

STOCK	LOCATION	PER DAY ACTUAL UNITS	Volume .M Bbls	Volume B/CD	UNIT PRICE $/BBL	UNIT PRICE C/Gal	MARGINAL VALUE $/BBL	MARGINAL VALUE C/Gal	INCREA INCENT $/BBL
@ SUL Sulfur	1 Single Refinery	12466	12	32	0.02	0.05	0.02	0.05	
B34 C3/C4 LPG	1 Single Refinery		1218	3337	17.82	42.43	17.82	42.43	0.00
1GP FCC Naphtha	1 Single Refinery		292	800	24.79	59.02	23.18	55.20	1.61
2GR Virgin Naphtha	1 Single Refinery		2161	5922	23.46	55.86	23.46	55.86	0.00
3GS Gasoline G-95 SP	1 Single Refinery		768	2104	30.61	72.88	28.28	67.33	2.33
4GU Gasoline 91 SP	1 Single Refinery		3619	9916	28.90	68.81	26.05	62.02	2.85
G4U Solvent 3	1 Single Refinery		153	420	54.63	130.07	30.33	72.20	24.30
G5M Export Gasoline	1 Single Refinery		2209	6052	26.05	62.02	26.05	62.02	0.00
2KE Kerosene	1 Single Refinery		2055	5630	28.77	68.50	28.77	68.50	0.00
5D2 No. 2 Diesel	1 Single Refinery		3983	10911	28.54	67.95	28.54	67.95	0.00
6R4 MFBO Fuel Oil	1 Single Refinery		102	280	20.10	47.86	19.28	45.91	0.82
7R5 PI6 Fuel Oil	1 Single Refinery		1150	3150	18.19	43.31	16.65	39.64	1.54
8R6 PI500 Fuel Oil	1 Single Refinery		876	2400	17.59	41.88	16.13	38.40	1.46
9R7 PI6 Export	1 Single Refinery		4375	11986	16.65	39.64	16.65	39.64	0.00
BAP Solid Asphalt	1 Single Refinery		110	300	27.50	65.48	8.60	20.49	18.90
CAP Liquid Asphalt	1 Single Refinery		91	250	28.99	69.02	11.57	27.55	17.42
DAP Res Asphalt	1 Single Refinery		255	700	18.33	43.64	14.64	34.86	3.69
		**GRAND TOTAL	23429	64188					

@ ... REPORTED MONETARY VALUES PER ACTUAL STREAM UNITS

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PROCESS UTILIZATION REPORT
Single Refinery ONE YEAR

----PROCESS UNIT----	----PROCESS LIMIT----	OPERATING RATE .M Bbls	OPERATING RATE B/CD	UNUSED CAPACITY .M Bbls	UNUSED CAPACITY B/CD	PCT OF MAX CAPACITY	EXPANSION INCENTIVE $/BBL
CRD-DU Crude Tower #1	CRD Feed	21374	58560			100.0	0.319
VAC-VU Vacuum Tower #1	VAC Feed	8888	24350			100.0	0.103
WAC-WU Vacuum Tower #2	WAC Feed	508	1393	309	847	62.2	
SGP-SG Sats Gas Plant	SGP Feed	97	266				
UGP-UG Unsats Gas Plant	UGP Feed	1878	5144				
FCC-FC FCCU (Total)	FCC Total Feed	6037	16540	607	1662	90.9	
	KCC Feed (KC)	6037	16540				
	OKC CO Boiler (KC)	83342	228333				
CRU-CR CCR Reformer	CRU Feed						270.602
SRU-SR LP SR Reformer	SRU Feed						177.872
SAA-SA H2SO4 Alkylation	SAA Alkylate product						31.001
DHT-DH Distillate HDS	DHT Total Capacity						
	DHD SR Diesel Feed						
	DHJ Jet/Kero Feed						
	DHC FCC Stk.						
NHT-NH Naphtha HDS	NHT Total feed						
	NHL Lt Vir Naphtha						
	NHC Hvy Vir Naphtha						
	NHZ Hvy Coker Naphtha						
	NHA Lt Coker Naphtha						
HYD-H2 Hydrogen Plant	HYD Total MSCF H2						182.088
	H2A via plant fuel						
	H2B via LPG						
	H2C via naphtha						
	H2D via purch gas						
SUL-SU Sulfur Plant	SUL Feed	4550	12466				
MRJ-MJ Merox (Jet)	MRJ Feed	2055	5630	1828	5009	52.9	
MRD-MD Merox (Diesel)	MRD Feed	3245	8889	104	285	96.9	
MRG-MG Merox (FCC Gasoline)	MRG Feed	3403	9323				
MRL-ML Merox (LPG)	MRL Feed	1975	5410				

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PROCESS UTILIZATION REPORT (CONT.)
Single Refinery ONE YEAR

----PROCESS UNIT----	----PROCESS LIMIT----	OPERATING RATE .M Bbls	OPERATING RATE B/CD	UNUSED CAPACITY .M Bbls	UNUSED CAPACITY B/CD	PCT OF MAX CAPACITY	EXPANSION INCENTIVE $/BBL
FUL-90 Fuel System	PFO Fuel Oil						
	FLR Flare	349	957				
UTL-95 General Utilities	STM MP Steam (Mlbs)	306	838				
	STL LP Steam (Mlbs)						
	STH HP Steam (Mlbs)	224	613				
	SWT Sour Water (Mlbs)	67	184				
	VNT Steam Vent						
	KWH Power (kwh)	38825	106369				
	CWR Cooling H2O (MGal)	6711	18386				
	KWT Condensing Turbine						0.047
CDG-CG COGEN Plant	COG Feed						25.613
ADM-AM Amine (DEA) Unit	ADM Amine Unit (GPM)	13	35				

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PetroPeru - No Refinery Upgrade Case -

MATERIAL BALANCE - Crude Tower #1 CRD-DU
Single Refinery ONE YEAR

		PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
	FEED STREAMS							
lor	Loreto19		6663	18255	31.17	2192727	6007471	33.03
may	Mayna25		3769	10327	17.63	1186735	3251328	17.88
mes	Mesa30		795	2178	3.72	243641	667509	3.67
ONO	MIXTURE		10147	27800	47.47	3014988	8260242	45.42
	TOTAL FEED		21374	58560	100.00	6638091	18186550	100.00
	PRODUCT STREAMS							
F3S	Propane (Lbs & FOEB)	660	1	2	0.00	241	660	0.00
S3S	Propane (Sat.)		12	33	0.06	2163	5927	0.03
S4I	Iso-butane (Sat.)		25	67	0.11	4826	13221	0.07
S4N	NC4 (Sat.)		60	165	0.28	12312	33733	0.19
S5	55/ 292		2610	7152	12.21	662716	1815660	9.98
LN	292/ 316		518	1420	2.42	141177	386787	2.13
HN	316/ 321		103	283	0.48	28407	77829	0.43
NK	321/ 375		1000	2740	4.68	279917	766897	4.22
LK	375/ 463		1716	4700	8.03	496988	1361610	7.49
MK	463/ 557		1945	5327	9.10	580784	1591188	8.75
HK	557/ 566		192	527	0.90	58184	159409	0.88
LG	566/ 645		2020	5534	9.45	615695	1686835	9.28
AR	645+		11045	30260	51.67	3712505	10171247	55.93
	TOTAL PRODUCT		21247	58212	99.41	6595915	18071001	99.36
	LOSS (GAIN)		127	348	0.59	42175	115548	0.64

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	6910	6910
STM$	MP Steam, MLbs/D	218	218
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	32413	32413
BTU$	Fuel Fired, MBTU/D	4866336	4866336
SWT$	Sour Water, MLbs/Day	184	184
MUW$	Make-up Water, MGal/D	12	12

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MATERIAL BALANCE - Vacuum Tower #1 VAC-VU
Single Refinery ONE YEAR

			------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
	FEED STREAMS							
ARB	645+	(B)	4242	11623	47.73	1490309	4083038	49.65
ARC	645+	(C)	1210	3314	13.61	398928	1092955	13.29
ARE	645+	(E)	3436	9412	38.65	1112678	3048432	37.07
	TOTAL FEED		8888	24350	100.00	3001915	8224425	100.00
	PRODUCT STREAMS							
LV	645/ 697		999	2736	11.23	311449	853284	10.38
HV	697/1011		4657	12760	52.40	1508382	4132553	50.25
VB	1011+		3232	8854	36.36	1182118	3238680	39.38
	TOTAL PRODUCT		8888	24350	100.00	3001949	8224518	100.00

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	3044	3044
STM$	MP Steam, MLbs/D	249	249
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	16802	16802
BTU$	Fuel Fired, MBTU/D	2172020	2172020
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	23	23

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
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PetroPeru - No Refinery Upgrade Case -

MATERIAL BALANCE - Vacuum Tower #2 WAC-WU
Single Refinery ONE YEAR

			------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
	FEED STREAMS							
ARC	645+	(C)	508	1393	100.00	167663	459351	100.00
	TOTAL FEED		508	1393	100.00	167663	459351	100.00
	PRODUCT STREAMS							
LV	645/ 697		52	144	10.31	16150	44246	9.63
HV	697/1011		263	722	51.82	83660	229206	49.90
VB	1011+		193	528	37.87	67852	185895	40.47
	TOTAL PRODUCT		508	1393	100.00	167662	459348	100.00

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	873	873
STM$	MP Steam, MLbs/D	94	94
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	220	220
BTU$	Fuel Fired, MBTU/D	215637	215637
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	0	0

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MATERIAL BALANCE - Sats Gas Plant SGP-SG
Single Refinery ONE YEAR

	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS						
S3S Propane (Sat.)	12	33	12.57	2163	5927	11.21
S4I Iso-butane (Sat.)	25	67	25.29	4826	13221	25.00
S4N NC4 (Sat.)	60	165	62.15	12312	33733	63.79
TOTAL FEED	97	266	100.00	19301	52881	100.00
PRODUCT STREAMS						
C3S Propane	12	33	12.57	2163	5927	11.21
C4I Iso-butane	25	67	25.29	4826	13221	25.00
C4N Normal Butane	60	165	62.15	12312	33733	63.79
TOTAL PRODUCT	97	266	100.00	19301	52881	100.00

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	3	3
CWR$	Cooling Water, MGal/D	112	112
STM$	MP Steam, MLbs/D	1	1
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	63	63
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	0	0

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MATERIAL BALANCE - Unsats Gas Plant UGP-UG
Single Refinery ONE YEAR

	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS						
U3S Propane (Unsat.)	197	540	10.50	34992	95867	8.90
U3M Propylene (Unsat.)	649	1779	34.58	118445	324506	30.13
U4I Iso-butane (Unsat.)	370	1014	19.71	96923	265543	24.66
U4N NC4 (Unsat.)	74	203	3.94	19363	53049	4.93
U4J Iso C4= (Unsat.)	197	539	10.48	41284	113106	10.50
U4L 1/2 C4= (Unsat.)	390	1070	20.80	82065	224837	20.88
TOTAL FEED	1878	5144	100.00	393072	1076909	100.00
PRODUCT STREAMS						
C3S Propane	197	540	10.50	34992	95867	8.90
C3M Propylene	649	1779	34.58	118445	324506	30.13
C4I Iso-butane	370	1014	19.71	72821	199511	18.53
C4N Normal Butane	74	203	3.94	15104	41380	3.84
C4M Mixed C4=	587	1609	31.28	123316	337853	31.37
TOTAL PRODUCT	1878	5144	100.00	364678	999117	92.78
LOSS (GAIN)				28394	77791	7.22

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	64	64
CWR$	Cooling Water, MGal/D	2171	2171
STM$	MP Steam, MLbs/D	13	13
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	1227	1227
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	1	1

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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MATERIAL BALANCE - FCCU (KC) KCC-KC
Single Refinery ONE YEAR

			PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS									
HVB	697/1011	(B)		1847	5061	30.60	610901	1673700	31.21
ARC	645+	(C)		656	1797	10.87	216336	592700	11.05
HVC	697/1011	(C)		890	2439	14.75	282717	774568	14.44
ARE	645+	(E)		460	1260	7.62	148956	408098	7.61
HVE	697/1011	(E)		2184	5982	36.17	698424	1913492	35.68
TOTAL FEED				6037	16540	100.00	1957333	5362557	100.00
PRODUCT STREAMS									
KTG	FCC Gasoline			3370	9233	55.82	882805	2418643	45.10
KLC	FCC LCO			400	1096	6.63	135284	370642	6.91
KHC	FCC HCO			807	2212	13.37	297480	815014	15.20
CKE	FCC Cat Coke		378223	0	0	0.00	138051	378223	7.05
H2S	H2S (Lbs)		13245	12	32	0.19	4834	13245	0.25
F1S	Methane (Lbs & FOEB)		105141	145	398	2.41	38376	105140	1.96
F2S	Ethane (Lbs & FOEB)		83858	108	297	1.79	30608	83857	1.56
F2M	Ethylene (Lbs & FOEB)		61336	77	210	1.27	22387	61335	1.14
F3S	Propane (Lbs & FOEB)		19362	24	67	0.40	7067	19362	0.36
F3M	Propylene (Lbs & FOEB)		43180	53	144	0.87	15760	43179	0.81
U3S	Propane (Unsat.)			197	540	3.26	34992	95867	1.79
U3M	Propylene (Unsat.)			649	1779	10.76	118445	324506	6.05
U4I	Iso-butane (Unsat.)			370	1014	6.13	96923	265543	4.95
U4N	NC4 (Unsat.)			107	293	1.77	27989	76682	1.43
U4J	Iso C4= (Unsat.)			197	539	3.26	41284	113106	2.11
U4L	1/2 C4= (Unsat.)			390	1070	6.47	82065	224837	4.19
TOTAL PRODUCT				6907	18924	114.42	1974352	5409183	100.87
LOSS (GAIN)				-870	-2384	-14.42	-17018	-46625	-0.87

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	1389	1389
CWR$	Cooling Water, MGal/D	5276	5276
STM$	MP Steam, MLbs/D	262	262
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	613	613
KWH$	Electricity, KWH/D	7185	7185
BTU$	Fuel Fired, MBTU/D	687740	687740

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MUWS	Make-up Water, MGal/D	41	41
KVV	FCC Conversion, Vol%	80.04	
KDE	FCC Feed Density	333.78	
KSL	FCC Feed Sulfur	0.5425	
KNI	FCC Feed Basic Nitrogen	0.0645	
KME	FCC Feed Metals	4.6000	
KRR	FCC Feed Concarbon	1.2000	

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PetroPeru - No Refinery Upgrade Case -

MATERIAL BALANCE - Sulfur Plant SUL-SU
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
HSS H2S fr Amine U (Lbs)	13245	12	32	100.00	4834	13245	100.00
TOTAL FEED		12	32	100.00	4834	13245	100.00
PRODUCT STREAMS							
SUL Sulfur	12466	12	32	100.00	4550	12466	94.12
TOTAL PRODUCT		12	32	100.00	4550	12466	94.12
LOSS (GAIN)		-0	-0	-0.00	284	779	5.88

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

OPERATING PARAMETERS		LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	0	
STM$	MP Steam, MLbs/D	0	
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	0	
BTU$	Fuel Fired, MBTU/D	0	
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	0	

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PetroPeru - No Refinery Upgrade Case -

MATERIAL BALANCE - Fuel System FUL-90
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	VOLUME .M Bbls	VOLUME B/CD	PERCENT OF INPUT	WEIGHT .M Lbs	WEIGHT L/CD	PERCENT OF INPUT
FEED STREAMS							
CKE FCC Cat Coke	378223	0	0	0.01	138051	378223	33.76
FOE Fuel Gas		408	1119	35.23	114448	313555	27.98
C4I Iso-butane		29	80	2.51	5737	15718	1.40
C4N Normal Butane		134	368	11.58	27416	75113	6.70
C4M Mixed C4=		587	1609	50.66	123316	337853	30.15
TOTAL FEED		1159	3175	100.00	408969	1120462	100.00
PRODUCT STREAMS							
TOTAL PRODUCT							
LOSS (GAIN)		1159	3175	100.00	408969	1120462	100.00

OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
BTU$ Fuel Fired, MBTU/D	-10108301	-10108301
BTU$ Fuel Fired, MBTU/D	0	

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PetroPeru - No Refinery Upgrade Case -

MATERIAL BALANCE - Fuel Pool
Single Refinery ONE YEAR

FUP-91

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
F1S Methane (Lbs & FOEB)	105141	145	398	35.61	38376	105140	33.53
F2S Ethane (Lbs & FOEB)	83858	108	297	26.53	30608	83857	26.75
F2M Ethylene (Lbs & FOEB)	61336	77	210	18.81	22387	61335	19.56
F3S Propane (Lbs & FOEB)	20022	25	69	6.16	7308	20022	6.39
F3M Propylene (Lbs & FOEB)	43180	53	144	12.89	15760	43179	13.77
TOTAL FEED		408	1119	100.00	114440	313534	100.00
PRODUCT STREAMS							
FOE Fuel Gas		408	1119	100.00	114448	313555	100.01
TOTAL PRODUCT		408	1119	100.00	114448	313555	100.01
LOSS (GAIN)		-0	-0	-0.00	-8	-21	-0.01

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MATERIAL BALANCE - General Utilities UTL-95
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
TOTAL FEED							
PRODUCT STREAMS							
TOTAL PRODUCT							

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CCU$	Cat/Chem, $/D	18	18
CWR$	Cooling Water, MGal/D	-18386	-18386
CWR$	Cooling Water, MGal/D	18386	18386
STM$	MP Steam, MLbs/D	-838	-838
STM$	MP Steam, MLbs/D	838	838
STL$	LP Steam, MLbs/D	0	
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	-613	-613
STH$	HP Steam, MLbs/D	613	613
KWH$	Electricity, KWH/D	-61998	-61998
KWH$	Electricity, KWH/D	106369	106369
BTU$	Fuel Fired, MBTU/D	2166567	2166567
SWT$	Sour Water, MLbs/Day	-184	-184
SWT$	Sour Water, MLbs/Day	184	184
KWP$	Electricity	-26352	-26352
MUW$	Make-up Water, MGal/D	770	770
PWR$	Power	106369	106369
OXX$		0	

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MATERIAL BALANCE - Amine (DEA) Unit ADM-AM
Single Refinery ONE YEAR

	PER DAY ACTUAL UNITS	------ VOLUME ------ .M Bbls	B/CD	PERCENT OF INPUT	------ WEIGHT ------ .M Lbs	L/CD	PERCENT OF INPUT
FEED STREAMS							
H2S H2S (Lbs)	13245	12	32	100.00	4834	13245	100.00
TOTAL FEED		12	32	100.00	4834	13245	100.00
PRODUCT STREAMS							
HSS H2S fr Amine U (Lbs)	13245	12	32	100.00	4834	13245	100.00
TOTAL PRODUCT		12	32	100.00	4834	13245	100.00

NOTE: REPORTED MONETARY VALUES ON NON-STANDARD BASE STREAMS ARE PER ACTUAL STREAM UNITS.

	OPERATING PARAMETERS	LEVEL(DAY)	LEVEL(PERIOD)
CWR$	Cooling Water, MGal/D	0	
STM$	MP Steam, MLbs/D	0	
STL$	LP Steam, MLbs/D	0	
STH$	HP Steam, MLbs/D	0	
KWH$	Electricity, KWH/D	0	
SWT$	Sour Water, MLbs/Day	0	
MUW$	Make-up Water, MGal/D	0	

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UTILITIES CONSUMPTION REPORT - .M Units
Single Refinery ONE YEAR

PROCESS UNIT	Fuel Mixed MBTU	Steam High psi M Lbs	Steam Med psi M Lbs	Steam Low psi M Lbs	Power ------ KWH	Water Cooling M Gal	Water Make-Up M Gal	Sour Water M Lbs	Cat & Chem $
CRD-DU Crude Tower #1	1776213		80		11831	2522	4	67	
VAC-VU Vacuum Tower #1	792787		91		6133	1111	8		
WAC-WU Vacuum Tower #2	78708		34		80	319	0		
SGP-SG Sats Gas Plant			0		23	41	0		1
UGP-UG Unsats Gas Plant			5		448	792	1		23
KCC-KC FCCU (KC)	251025	224	96		2622	1926	15		507
MRJ-MJ Merox (Jet)					287				10
MRD-MD Merox (Diesel)					454				16
MRG-MG Merox (FCC Gasoline)					476				17
MRL-ML Merox (LPG)					276				10
FUL-90 Fuel System	-3689530								
UTL-95 General Utilities	790797	-224	-306		-22629	-6711	281	-67	7
PURCHASES									
Units/CD							848		1621
.M Units							310		592
PRICE, $/unit							5.000		2.300
MARGINAL VALUE		0.134	0.134	0.134	0.045	0.245	5.000		2.300

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UTILITIES CONSUMPTION REPORT - .M Units
Single Refinery ONE YEAR

	Power Purch KWH	Power Generate KWH
PROCESS UNIT		
UTL-95 General Utilities	38825	
PURCHASES		
Units/CD	106369	
.M Units	38825	
PRICE, $/unit	0.045	
MARGINAL VALUE	0.045	0.045

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PetroPeru - No Refinery Upgrade Case -

MATERIAL BALANCE - Sol Asp
Single Refinery ONE YEAR

BAP-AP

			Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
	COMPONENTS					
VBB	1011+	(B)	111	303	100.00	8.5196
	TOTAL COMPONENTS		111	303	100.00	
	BLENDED PRODUCTS					
BAP	Sol Asp		110	300	99.01	8.6048
	TOTAL PRODUCT		110	300	99.01	

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MATERIAL BALANCE - Liq Asp CAP-BP
Single Refinery ONE YEAR

			Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
COMPONENTS						
VBB	1011+	(B)	73	200	80.00	8.5196
55B	55/ 292	(B)	9	25	10.00	18.7657
LNB	292/ 316	(B)	9	25	10.00	28.7909
	TOTAL COMPONENTS		91	250	100.00	
BLENDED PRODUCTS						
CAP	Liq Asp		91	250	100.00	11.5714
	TOTAL PRODUCT		91	250	100.00	

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PetroPeru - No Refinery Upgrade Case -

MATERIAL BALANCE - Res Asp
Single Refinery ONE YEAR

DAP-CP

			Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
COMPONENTS						
VBB	1011+	(B)	179	490	70.00	8.5196
NKB	321/ 375	(B)	26	70	10.00	30.4367
LKB	375/ 463	(B)	26	70	10.00	29.4102
MKB	463/ 557	(B)	26	70	10.00	26.9223
	TOTAL COMPONENTS		255	700	100.00	
BLENDED PRODUCTS						
DAP	Res Asp		255	700	100.00	14.6407
	TOTAL PRODUCT		255	700	100.00	

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PetroPeru - No Refinery Upgrade Case -

MATERIAL BALANCE - C3/C4 LPG
Single Refinery ONE YEAR

B34-34

		Volume .M Bbls	Volume B/CD	PERCENT OF BLENDS	MARGINAL VALUE
	COMPONENTS				
C3S	Propane	209	573	17.10	25.2766
C3M	Propylene	649	1779	53.05	25.2766
C4I	Iso-butane	365	1001	29.85	
	TOTAL COMPONENTS	1224	3353	100.00	
	BLENDED PRODUCTS				
B34	Mixed C3/C4	1218	3337	99.50	17.8200
	TOTAL PRODUCT	1218	3337	99.50	
	BLENDING PARAMETERS		LEVEL		
BBB	C4s in C3/C4 LPG		30.00		

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PRODUCT BLENDING - FCC Naphtha 1GP
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha	292	800	100.00	76490	209561	100.00	23.1665
TOTAL	292	800	100.00	76490	209561	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS							
SUL	Sulfur, Wt%	WT	0.082		0.150		
158	% Off at 158 F	VL	24.881	10.000			
250	% Off at 250 F	VL	61.377	50.000			
374	% Off at 374 F	VL	94.058	90.000			
430	% Off at 430 F	VL	100.000	99.900			
DNX	Density, Lb/bbl	VL	261.952		280.000		
ARO	Aromatics Content	VL	32.681		35.000		
PFF	Paraffins Content	VL	31.668		100.000		
NAP	Naphthenes Content	VL	19.806		22.000		
RVI	Reid Vapor Pressure Index	VL	139.460		139.460		0.3732
OLE	Olefin Content, Vol%	VL	15.845		100.000		
BEN	Benzene Content	VL	0.891		1.500		
PERFORMANCE CONTROLS							
R	Research O.N.	VL	92.500	92.500			

COMPONENT QUALITIES

	DNX	SUL	RVI	ARO	OLE	PFF	NAP	158	250
kN# FCC Cat Naphtha	261.952	0.08175	139.459	32.6807	15.8452	31.6676	19.8065	24.8804	61.3773
	430	PBL	BEN	R00	M00	F00	R05	R10	R20
kN# FCC Cat Naphtha	100.000	.	0.89130	92.5000	81.1669	86.8334	95.0146	96.0242	97.0378
	M05	M10	M20	M30	F05	F10	F20	F30	
kN# FCC Cat Naphtha	83.6892	85.2000	86.0000	87.6000	89.3519	90.6121	91.5189	92.8218	

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PetroPeru - No Refinery Upgrade Case -

PRODUCT BLENDING - Virgin Naphtha 2GR
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
LNB	292/ 316	(B)	124	339	5.73	33625	92122	6.01	28.7909
HNB	316/ 321	(B)	27	73	1.23	7278	19940	1.30	28.7909
55C	55/ 292	(C)	258	706	11.92	63740	174631	11.39	32.3930
LNC	292/ 316	(C)	47	130	2.19	12666	34702	2.26	28.7909
55D	55/ 292	(D)	123	338	5.71	31494	86285	5.63	30.9465
LND	292/ 316	(D)	17	47	0.80	4708	12900	0.84	28.7909
HND	316/ 321	(D)	4	10	0.17	993	2720	0.18	28.7909
55E	55/ 292	(E)	1213	3322	56.11	309410	847700	55.30	18.3047
LNE	292/ 316	(E)	321	878	14.84	87699	240270	15.68	28.7909
HNE	316/ 321	(E)	28	78	1.32	7855	21522	1.40	28.7909
BLENDING LOSS									
TOTAL			2161	5922	100.00	559469	1532792	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS							
SUL	Sulfur, Wt%	WT	0.003		0.050		
140	% Off at 140 F	VL	10.000		10.000		1.2386
248	% Off at 248 F	VL	50.000	50.000			-0.1411
320	% Off at 320 F	VL	99.458	90.000			
338	% Off at 338 F	VL	100.000	99.900			
DNX	Density, Lb/bbl	VL	258.850	244.400	262.600		
ARO	Aromatics Content	VL	4.998	0.000			
PFF	Paraffins Content	VL	48.801	0.000			
NAP	Naphthenes Content	VL	45.744	0.000			
NAR	Naphthenes + Aromatics	VL	50.742	42.000			
RVI	Reid Vapor Pressure Index	VL	54.380		157.520		
OLE	Olefin Content, Vol%	VL	0.000		1.000		

COMPONENT QUALITIES

			DNX	SUL	NAP	ARO	PFF	OLE	RVI	140	248
LNB	292/ 316	(B)	271.737	0.01730	42.2800	12.4100	44.3700	.	6.30500	.	.
HNB	316/ 321	(B)	274.448	0.02680	43.1900	13.8100	41.9700	.	2.82100	.	.
55C	55/ 292	(C)	247.413	.	23.7400	3.18900	72.8900	.	71.1820	5.02000	69.5950
LNC	292/ 316	(C)	267.760	3.10E-3	37.2200	3.24700	58.9900	.	1.86100	.	.
55D	55/ 292	(D)	255.102	2.10E-3	27.2400	13.5300	59.2300	.	64.3730	6.59000	73.1250
LND	292/ 316	(D)	271.936	0.01140	27.9400	23.1800	48.8800	.	17.4550	.	.
HND	316/ 321	(D)	273.874	0.01520	26.1300	25.4000	48.4700	.	15.3220	.	.
55E	55/ 292	(E)	255.151	8.00E-4	49.4000	2.79700	47.3600	.	73.6580	16.0860	66.8870
LNE	292/ 316	(E)	273.507	2.40E-3	59.5900	6.74200	33.0000	.	1.84200	.	.
HNE	316/ 321	(E)	275.840	2.60E-3	58.3400	7.32800	33.6000	.	1.25100	.	.

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PetroPeru - No Refinery Upgrade Case -

- Virgin Naphtha 2GR
Single Refinery ONE YEAR

			338	NAR	R00	M00	F00	R05	R10	R20	R30
LNB	292/ 316	(B)	100.000	54.6900	70.5440	66.8440	68.6940	72.3790	75.8500	79.4880	84.7730
HNB	316/ 321	(B)	100.000	57.0000	69.3670	64.7180	67.0425	72.4480	75.4480	78.5880	83.6290
55C	55/ 292	(C)	100.000	26.9290	63.5670	64.7370	64.1520	68.3690	72.6860	77.2000	82.9910
LNC	292/ 316	(C)	100.000	40.4670	53.1590	64.8480	59.0035	55.8660	60.9190	66.1570	72.5420
55D	55/ 292	(D)	100.000	40.7700	64.5520	62.7650	63.6585	69.0920	73.3270	77.7580	83.4950
LND	292/ 316	(D)	100.000	51.1200	56.6440	58.7790	57.7115	59.2750	63.9740	68.8540	74.9980
HND	316/ 321	(D)	100.000	51.5300	55.5350	58.9500	57.2425	58.4900	62.6010	66.8560	72.7100
55E	55/ 292	(E)	100.000	52.1970	71.0390	68.5630	69.8010	74.2930	78.0120	81.9190	87.3000
LNE	292/ 316	(E)	100.000	66.3320	64.2710	66.7530	65.5120	66.6460	70.6480	74.8220	80.4790
HNE	316/ 321	(E)	100.000	65.6680	62.9430	64.6840	63.8135	65.7740	69.3020	72.9710	78.3990

			M10	M20	M30	F05	F10	F20	F30
LNB	292/ 316	(B)	72.3570	75.9700	81.3100	70.6370	74.1035	77.7290	83.0415
HNB	316/ 321	(B)	73.4130	77.0280	82.3490	71.2005	74.4305	77.8080	82.9890
55C	55/ 292	(C)	72.0860	76.1630	81.7430	68.2760	72.3860	76.6815	82.3670
LNC	292/ 316	(C)	70.6500	74.5190	80.0220	61.4025	65.7845	70.3380	76.2820
55D	55/ 292	(D)	70.2610	74.5360	80.2520	67.6265	71.7940	76.1470	81.8735
LND	292/ 316	(D)	64.3400	69.0860	75.1560	59.5215	64.1570	68.9700	75.0770
HND	316/ 321	(D)	63.7210	67.9850	73.8210	59.0480	63.1610	67.4205	73.2655
55E	55/ 292	(E)	75.5760	79.3540	84.7160	73.1315	76.7940	80.6365	86.0080
LNE	292/ 316	(E)	72.2820	75.9060	81.2530	67.7275	71.4650	75.3640	80.8660
HNE	316/ 321	(E)	73.3170	76.9370	82.2630	67.8130	71.3095	74.9540	80.3310

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

DATE: 16 AUG 02
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PetroPeru - No Refinery Upgrade Case -

PRODUCT BLENDING - Gasoline G-95 SP 3GS
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha	360	987	46.92	94392	258608	46.40	23.1665
HOB High Octane BldStk	388	1064	50.58	104157	285362	51.20	33.5000
55E 55/ 292 (E)	19	52	2.49	4886	13385	2.40	18.3047
BLENDING LOSS							
TOTAL	768	2104	100.00	203434	557355	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.040		0.040		0.3385
158 % Off at 158 F	VL	17.782	10.000			
171 % Off at 171 F	VL	26.601		50.000		
244 % Off at 244 F	VL	67.369	50.000			
374 % Off at 374 F	VL	97.212	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	264.902		300.000		
ARO Aromatics Content	VL	42.214		45.000		
PFF Paraffins Content	VL	32.227		100.000		
RVI Reid Vapor Pressure Index	VL	111.424		155.703		
OLE Olefin Content, Vol%	VL	7.688		25.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	95.000	95.000			-0.5577

COMPONENT QUALITIES

	DNX	RVI	158	171	244	374	430	SUL	ARO
kN# FCC Cat Naphtha	261.952	139.459	24.8804	33.7547	60.3870	94.0580	100.000	0.08175	32.6807
HOB High Octane BldStk	268.120	87.2800	11.0000	20.0000	74.0000	100.000	100.000	4.00E-3	53.0000
55E 55/ 292 (E)	255.151	73.6580	21.7910	25.9110	64.2380	100.000	100.000	8.00E-4	2.79700
	PFF	R00	M00	F00	R05	R10	R20	R30	M05
kN# FCC Cat Naphtha	31.6676	92.5000	81.1668	86.8334	95.0145	96.0242	97.0378	98.0436	83.6891
HOB High Octane BldStk	32.0000	98.5000	96.0000	97.2500	100.000	101.000	102.100	102.800	92.0000
55E 55/ 292 (E)	47.3600	71.0390	68.5630	69.8010	74.2930	78.0120	81.9190	87.3000	71.9700
	M20	M30	F05	F10	F20	F30			
kN# FCC Cat Naphtha	86.0000	87.6000	89.3518	90.6121	91.5189	92.8218			
HOB High Octane BldStk	95.0000	96.0000	96.0000	97.0000	98.5500	99.4000			
55E 55/ 292 (E)	79.3540	84.7160	73.1315	76.7940	80.6365	86.0080			

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

DATE: 16 AUG 02 PAGE 30
TIME: 17:16 HRS PetroPeru - No Refinery Upgrade Case - LCU 01320

PRODUCT BLENDING - Gasoline 91 SP 4GU
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha	1709	4682	47.21	447630	1226383	47.11	23.1665
NGA Nat Gasoline	18	50	0.50	4424	12120	0.47	21.4695
HOB High Octane BldStk	1279	3505	35.35	343044	939846	36.10	33.5000
55B 55/ 292 (B)	425	1165	11.75	107184	293656	11.28	18.7657
55E 55/ 292 (E)	188	514	5.18	47860	131123	5.04	18.3047
BLENDING LOSS							
TOTAL	3619	9916	100.00	950141	2603127	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.040		0.040		0.3385
158 % Off at 158 F	VL	20.361	10.000			
171 % Off at 171 F	VL	28.420		50.000		
244 % Off at 244 F	VL	65.681	50.000			
374 % Off at 374 F	VL	97.195	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	262.518		300.000		
ARO Aromatics Content	VL	35.009		45.000		
PFF Paraffins Content	VL	35.598		100.000		
RVI Reid Vapor Pressure Index	VL	111.275		155.703		
OLE Olefin Content, Vol%	VL	7.658		25.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	91.000	91.000			-0.5577

COMPONENT QUALITIES

	DNX	RVI	158	171	244	374	430	SUL	ARO
kN# FCC Cat Naphtha	261.952	139.459	24.8804	33.7547	60.3870	94.0580	100.000	0.08175	32.6807
NGA Nat Gasoline	242.400	198.230	75.0000	79.0000	96.0000	100.000	100.000	.	2.00000
HOB High Octane BldStk	268.120	87.2800	11.0000	20.0000	74.0000	100.000	100.000	4.00E-3	53.0000
55B 55/ 292 (B)	252.051	83.0700	27.3920	31.2520	61.2570	100.000	100.000	.	5.86300
55E 55/ 292 (E)	255.151	73.6580	21.7910	25.9110	64.2380	100.000	100.000	8.00E-4	2.79700

	PFF	R00	M00	F00	R05	R10	R20	R30	M05
kN# FCC Cat Naphtha	31.6676	92.5000	81.1668	86.8334	95.0145	96.0242	97.0377	98.0435	83.6890
NGA Nat Gasoline	80.0000	76.9000	75.9000	76.4000	78.5000	82.6000	85.0000	86.0000	74.3000
HOB High Octane BldStk	32.0000	98.5000	96.0000	97.2500	100.000	101.000	102.100	102.800	92.0000
55B 55/ 292 (B)	55.1200	71.8170	68.2660	70.0415	74.9570	78.6140	82.4600	87.7980	71.6810
55E 55/ 292 (E)	47.3600	71.0390	68.5630	69.8010	74.2930	78.0120	81.9190	87.3000	71.9700

	M20	M30	F05	F10	F20	F30
kN# FCC Cat Naphtha	86.0000	87.6000	89.3518	90.6121	91.5189	92.8218
NGA Nat Gasoline	80.7000	83.5000	76.4000	79.6000	82.8500	84.7500

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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- Gasoline 91 SP 4GU
Single Refinery ONE YEAR

HOB	High Octane BldStk		95.0000	96.0000	96.0000	97.0000	98.5500	99.4000
55B	55/ 292	(B)	79.1050	84.4830	73.3190	76.9605	80.7825	86.1405
55E	55/ 292	(E)	79.3540	84.7160	73.1315	76.7940	80.6365	86.0080

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PetroPeru - No Refinery Upgrade Case -

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LCU 01320

PRODUCT BLENDING - Solvent 3 G4U
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
NKE	321/ 375	(E)	153	420	100.00	42962	117704	100.00	30.3261
	TOTAL		153	420	100.00	42962	117704	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS							
SUL	Sulfur, Wt%	WT	0.002		0.100		
350	% Off at 350 F	VL	54.587	50.000			
374	% Off at 374 F	VL	98.214	90.000			
DNX	Density, Lb/bbl	VL	280.247		300.000		
OLE	Olefin Content, Vol%	VL	0.000		4.000		
FLI	Flash point index	VL	334.000		753.800		

COMPONENT QUALITIES

			DNX	SUL	350	374	FLI	OLE	R00	M00	F00
NKE	321/ 375	(E)	280.247	2.50E-3	54.5870	98.2140	334.000	.	61.8080	64.2000	63.0040
			R10	R20	R30	M05	M10	M20	M30	F05	F10
NKE	321/ 375	(E)	68.2630	72.0220	77.5160	68.5520	72.0840	75.7700	81.1530	66.5990	70.1735
			F30								
NKE	321/ 375	(E)	79.3345								

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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TIME: 17:16 HRS PetroPeru - No Refinery Upgrade Case - LCU 01320

PRODUCT BLENDING - Export Gasoline G5M
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
kN# FCC Cat Naphtha	1042	2854	47.17	272919	747724	46.98	23.1665
HOB High Octane BldStk	791	2168	35.83	212175	581301	36.52	33.5000
55E 55/ 292 (E)	376	1029	17.01	95841	262579	16.50	18.3047
TOTAL	2209	6052	100.00	580935	1591603	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
VOLATILITY & MISC. CONTROLS						
SUL Sulfur, Wt%	WT	0.040		0.040		0.3385
158 % Off at 158 F	VL	19.382	10.000			
171 % Off at 171 F	VL	27.493		50.000		
244 % Off at 244 F	VL	65.919	50.000			
374 % Off at 374 F	VL	97.197	90.000			
430 % Off at 430 F	VL	100.000	99.900			
DNX Density, Lb/bbl	VL	263.005		300.000		
ARO Aromatics Content	VL	34.878		45.000		
PFF Paraffins Content	VL	34.455		100.000		
RVI Reid Vapor Pressure Index	VL	109.576		155.703		
OLE Olefin Content, Vol%	VL	7.653		25.000		
PERFORMANCE CONTROLS						
R Research O.N.	VL	91.000	91.000			-0.5577

COMPONENT QUALITIES

	DNX	RVI	158	171	244	374	430	SUL	ARO
kN# FCC Cat Naphtha	261.952	139.459	24.8804	33.7547	60.3870	94.0580	100.000	0.08175	32.6807
HOB High Octane BldStk	268.120	87.2800	11.0000	20.0000	74.0000	100.000	100.000	4.00E-3	53.0000
55E 55/ 292 (E)	255.151	73.6580	21.7910	25.9110	64.2380	100.000	100.000	8.00E-4	2.79700
	PFF	R00	M00	F00	R05	R10	R20	R30	M05
kN# FCC Cat Naphtha	31.6676	92.5000	81.1668	86.8334	95.0145	96.0242	97.0377	98.0435	83.6890
HOB High Octane BldStk	32.0000	98.5000	96.0000	97.2500	100.000	101.000	102.100	102.800	92.0000
55E 55/ 292 (E)	47.3600	71.0390	68.5630	69.8010	74.2930	78.0120	81.9190	87.3000	71.9700
	M20	M30	F05	F10	F20	F30			
kN# FCC Cat Naphtha	86.0000	87.6000	89.3518	90.6121	91.5189	92.8218			
HOB High Octane BldStk	95.0000	96.0000	96.0000	97.0000	98.5500	99.4000			
55E 55/ 292 (E)	79.3540	84.7160	73.1315	76.7940	80.6365	86.0080			

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

DATE: 16 AUG 02
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PetroPeru - No Refinery Upgrade Case -

PRODUCT BLENDING - Kerosene 2KE
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
NKB	321/ 375	(B)	19	52	0.92	5325	14590	0.88	30.4367
LKB	375/ 463	(B)	375	1026	18.23	109696	300536	18.19	29.4102
MKB	463/ 557	(B)	444	1217	21.61	135267	370594	22.43	26.9223
NKC	321/ 375	(C)	104	286	5.07	28882	79128	4.79	30.9729
LKC	375/ 463	(C)	196	537	9.54	56769	155532	9.42	29.9132
MKC	463/ 557	(C)	215	590	10.48	64313	176200	10.67	28.4185
NKD	321/ 375	(D)	40	109	1.93	11041	30250	1.83	30.5554
LKD	375/ 463	(D)	67	184	3.27	19293	52859	3.20	29.6048
MKD	463/ 557	(D)	78	214	3.80	23197	63554	3.85	27.5091
HKD	557/ 566	(D)	8	21	0.37	2310	6329	0.38	25.8325
LKE	375/ 463	(E)	509	1394	24.76	146867	402376	24.36	29.0227
TOTAL			2055	5630	100.00	602960	1651946	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
400	% Off at 400 F	VL	22.048	10.000			
DNX	Density, Lb/bbl	VL	293.428		310.000		
SUL	Sulfur, Wt%	WT	0.169		0.250		
FLI	Flash Point Index	VL	71.349		508.400		
SMI	Smoke Pt Index	VL	56.000		56.000		0.1582

COMPONENT QUALITIES

			DNX	SUL	400	SMI	FLI
NKB	321/ 375	(B)	280.303	0.04310	100.000	45.3500	348.860
LKB	375/ 463	(B)	292.853	0.14980	23.3010	51.8400	67.1200
MKB	463/ 557	(B)	304.592	0.44990	.	67.5700	15.7300
NKC	321/ 375	(C)	277.022	9.70E-3	100.000	41.9600	342.000
LKC	375/ 463	(C)	289.471	0.03690	23.1430	48.6600	66.8900
MKC	463/ 557	(C)	298.506	0.08930	.	58.1100	15.9100
NKD	321/ 375	(D)	278.114	0.02210	100.000	44.6000	328.730
LKD	375/ 463	(D)	287.421	0.08670	27.8770	50.6100	72.2700
MKD	463/ 557	(D)	296.883	0.51670	.	63.8600	15.1700
HKD	557/ 566	(D)	301.755	0.77570	.	74.4600	6.48000
LKE	375/ 463	(E)	288.666	2.90E-3	27.2680	54.2900	71.7800

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

DATE: 16 AUG 02
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PetroPeru - No Refinery Upgrade Case -

PRODUCT BLENDING - No. 2 Diesel 5D2
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
HNC	316/ 321	(C)	11	29	0.27	2867	7854	0.24	28.9384
HKC	557/ 566	(C)	23	62	0.57	6805	18645	0.57	27.5026
LGC	566/ 645	(C)	381	1043	9.56	115310	315918	9.68	26.9765
LVC	645/ 697	(C)	177	485	4.45	54576	149523	4.58	25.3079
HNE	316/ 321	(E)	34	94	0.86	9414	25792	0.79	28.7909
LKE	375/ 463	(E)	543	1489	13.65	156880	429808	13.17	29.0227
MKE	463/ 557	(E)	1167	3197	29.30	345846	947524	29.04	29.0369
HKE	557/ 566	(E)	113	310	2.84	33952	93018	2.85	28.9760
LGE	566/ 645	(E)	1018	2788	25.55	306686	840236	25.75	28.8198
LVE	645/ 697	(E)	516	1414	12.96	158736	434893	13.33	28.4324
BLENDING LOSS									
TOTAL			3983	10911	100.00	1191072	3263211	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
DNX	Density, Lb/bbl	VL	299.071		340.000		
SUL	Sulfur, Wt%	WT	0.050		0.050		0.0455
PPX	Pour Point Index (Hu)	VL	444.664		1002.200		
V00	Vis. Index at 100 F	VL	46.534	43.680	59.220		
FLI	Flash Point Index	VL	23.439		266.200		
CTI	Cetane Index	VL	47.000	47.000			-0.0173
K1#	FCC LCO Pool	%	0.00		10.00		

COMPONENT QUALITIES

			DNX	PPX	SUL	CTI	FLI	V00	K1#
HNC	316/ 321	(C)	270.674	19.8280	4.80E-3	37.8400	611.000	.	.
HKC	557/ 566	(C)	300.419	222.147	0.12600	48.1500	6.47000	48.0350	.
LGC	566/ 645	(C)	302.895	358.673	0.16380	48.3700	4.34000	43.5850	.
LVC	645/ 697	(C)	308.170	738.317	0.27990	46.6500	2.61000	38.1420	.
HNE	316/ 321	(E)	275.840	4.68800	2.60E-3	27.1100	611.000	.	.
LKE	375/ 463	(E)	288.666	33.5570	2.90E-3	40.1500	71.7800	61.0490	.
MKE	463/ 557	(E)	296.379	229.995	0.01120	46.4800	15.3400	51.5450	.
HKE	557/ 566	(E)	300.087	360.650	0.01980	49.3700	6.48000	46.4420	.
LGE	566/ 645	(E)	301.339	562.922	0.03230	50.1600	4.70000	42.5020	.
LVE	645/ 697	(E)	307.537	1158.33	0.06040	49.2000	2.59000	36.9160	.

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

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PRODUCT BLENDING - MF80 Fuel Oil 6R4
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
HKB	557/ 566	(B)	48	131	46.87	14765	40452	44.27	25.7046
VBC	1011+	(C)	29	79	28.27	10179	27888	30.52	10.2630
ARC	645+	(C)	20	54	19.23	6480	17754	19.43	17.2643
ARD	645+	(D)	6	16	5.64	1929	5285	5.78	17.9838
BLENDING LOSS									
TOTAL			102	280	100.00	33354	91380	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
DNX	Density, Lb/bbl	VL	326.358		360.000		
SUL	Sulfur, Wt%	WT	0.704		1.500		
PPX	Pour Point Index (Hu)	VL	2394.500		2394.500		
VBF	RFO Vis. Index @122F	VL	0.388		0.388		27.6731
FLI	Flash Point Index	VL	3.650		154.900		
MET	Metals Content,PPM	VL	37.612		230.000		
CRC	W % Conradson Carbon	VL	6.120		14.000		

COMPONENT QUALITIES

			DNX	SUL	VBF	PPX	FLI	CRC	MET
HKB	557/ 566	(B)	308.254	0.59370	0.15600	251.060	6.47000	.	.
VBC	1011+	(C)	352.368	0.79800	0.71400	6474.08	0.76000	15.4600	88.1500
ARC	645+	(C)	329.755	0.55070	0.46100	2059.06	1.61000	6.26000	35.5900
ARD	645+	(D)	334.862	1.56300	0.43500	903.332	1.66000	9.69000	103.810

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION
Foster Wheeler USA LP Model

DATE: 16 AUG 02
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PetroPeru - No Refinery Upgrade Case -

PRODUCT BLENDING - PI6 Fuel Oil 7R5
Single Refinery ONE YEAR

COMPONENT	VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
Kl# FCC LCO Pool	387	1060	33.64	130829	358436	32.55	27.1879
Kh# FCC HCO Pool	141	387	12.27	51985	142426	12.93	15.9083
VBC 1011+ (C)	622	1704	54.08	219115	600315	54.52	10.2630
BLENDING LOSS							
TOTAL	1150	3150	100.00	401930	1101177	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES						
DNX Density, Lb/bbl	VL	349.580		360.000		
SUL Sulfur, Wt%	WT	0.876		1.500		
VBF RFO Vis. Index @122F	VL	0.483	0.396	0.483		27.6731
FLI Flash Point Index	VL	8.883		154.900		
MET Metals Content,PPM	VL	55.711		400.000		
CRC W % Conradson Carbon	VL	9.098		25.000		

COMPONENT QUALITIES

	DNX	SUL	VBF	FLI	CRC	MET
Kl# FCC LCO Pool	338.215	0.73474	0.10240	25.0000	.	2.00000
Kh# FCC HCO Pool	368.443	1.55676	0.51000	0.50000	6.00000	60.0000
VBC 1011+ (C)	352.368	0.79800	0.71400	0.76000	15.4600	88.1500

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PRODUCT BLENDING - PI500 Fuel Oil 8R6
Single Refinery ONE YEAR

COMPONENT			VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
HKB	557/ 566	(B)	1	3	0.13	352	964	0.12	25.7046
LGB	566/ 645	(B)	343	939	39.11	107033	293240	35.51	24.6531
VBB	1011+	(B)	404	1107	46.14	151790	415864	50.36	8.5196
ARC	645+	(C)	128	351	14.62	42235	115712	14.01	17.2643
BLENDING LOSS									
TOTAL			876	2400	100.00	301410	825780	100.00	

BLEND PROPERTIES		BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES							
DNX	Density, Lb/bbl	VL	344.075		360.000		
SUL	Sulfur, Wt%	WT	1.411		1.500		
VBF	RFO Vis. Index @122F	VL	0.502	0.494	0.502		27.6731
FLI	Flash Point Index	VL	2.386		108.500		
MET	Metals Content,PPM	VL	400.000		400.000		
CRC	W % Conradson Carbon	VL	16.581		25.000		

COMPONENT QUALITIES

			DNX	SUL	VBF	FLI	CRC	MET
HKB	557/ 566	(B)	308.254	0.59370	0.15600	6.47000	.	.
LGB	566/ 645	(B)	312.441	0.69660	0.19400	4.58000	.	.
VBB	1011+	(B)	375.524	2.15600	0.77700	0.76000	33.9500	855.600
ARC	645+	(C)	329.755	0.55070	0.46100	1.61000	6.26000	35.5900

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
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PRODUCT BLENDING - PI6 Export 9R7
Single Refinery ONE YEAR

COMPONENT		VOLUME .M Bbls	VOLUME B/CD	VOLUME PERCENT	WEIGHT .M Lbs	WEIGHT L/CD	WEIGHT PERCENT	MARGINAL VALUE
Kl# FCC LCO Pool		13	36	0.30	4455	12206	0.30	27.1879
Kh# FCC HCO Pool		666	1825	15.23	245495	672588	16.37	15.9083
sD# SR Distllate		937	2568	21.42	271212	743046	18.09	28.6767
MKB 463/ 557	(B)	14	39	0.33	4378	11995	0.29	26.9223
LVB 645/ 697	(B)	358	980	8.18	114287	313115	7.62	23.0203
VBB 1011+	(B)	1271	3482	29.05	477275	1307603	31.83	8.5196
ARD 645+	(D)	379	1039	8.67	126992	347922	8.47	17.9838
VBE 1011+	(E)	736	2016	16.82	255504	700010	17.04	11.8681
BLENDING LOSS								
TOTAL		4375	11986	100.00	1499597	4108484	100.00	

BLEND PROPERTIES	BLENDING BASIS	LP BLEND	SPECIFICATIONS MIN	MAX	FIX	INCENTIVE $/unit
CONTROLLED PROPERTIES						
DNX Density, Lb/bbl	VL	342.781		360.000		
SUL Sulfur, Wt%	WT	1.268		1.500		
VBF RFO Vis. Index @122F	VL	0.483	0.396	0.483		27.6731
FLI Flash Point Index	VL	52.093		154.900		
MET Metals Content,PPM	VL	270.554		400.000		
CRC W % Conradson Carbon	VL	13.872		25.000		

COMPONENT QUALITIES

	DNX	SUL	VBF	FLI	CRC	MET
Kl# FCC LCO Pool	338.215	0.73474	0.10240	25.0000	.	2.00000
Kh# FCC HCO Pool	368.443	1.55676	0.51000	0.50000	6.00000	60.0000
sD# SR Distllate	289.383	0.24940	0.04860	238.734	.	.
MKB 463/ 557 (B)	304.592	0.44990	0.11200	15.7300	.	.
LVB 645/ 697 (B)	319.521	1.02800	0.25300	2.60000	0.02000	0.06000
VBB 1011+ (B)	375.524	2.15600	0.77700	0.76000	33.9500	855.600
ARD 645+ (D)	334.862	1.56300	0.43500	1.66000	9.69000	103.810
VBE 1011+ (E)	347.237	0.39660	0.65600	0.76000	13.4000	22.8200

GENERALIZED REFINING-TRANSPORTATION-MARKETING PLANNING SYSTEM - SECOND EDITION
FOSTER WHEELER USA CORPORATION

DATE: 16 AUG 02
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PetroPeru - No Refinery Upgrade Case -

I N D E X

REPORT	DESCRIPTION	PAGE	LOC'N	PERIOD
01010	ECONOMIC REPORT	1	.	A
01250	PLANT INPUT/OUTPUT REPORT	2	1	A
01080	PURCHASES/SALES REPORT	4	.	A
BR	Raw Material Purchases	4	.	A
SA	Product Sales	5	.	A
01100	PROCESS UTILIZATION REPORT	6	1	A
01310	MATERIAL BALANCE	8	1	A
DU	Crude Tower #1	8	1	A
VU	Vacuum Tower #1	9	1	A
WU	Vacuum Tower #2	10	1	A
SG	Sats Gas Plant	11	1	A
UG	Unsats Gas Plant	12	1	A
KC	FCCU (KC)	13	1	A
SU	Sulfur Plant	15	1	A
90	Fuel System	16	1	A
91	Fuel Pool	17	1	A
95	General Utilities	18	1	A
AM	Amine (DEA) Unit	19	1	A
01030	UTILITIES CONSUMPTION REPORT	20	1	A
01150	RECIPE-MATERIAL BALANCE	22	1	A
.AP	Sol Asp	22	1	A
.BP	Liq Asp	23	1	A
.CP	Res Asp	24	1	A
.34	C3/C4 LPG	25	1	A
01320	PRODUCT BLENDING	26	1	A
1GP	FCC Naphtha	26	1	A
2GR	Virgin Naphtha	27	1	A
3GS	Gasoline G-95 SP	29	1	A
4GU	Gasoline 91 SP	30	1	A
G4U	Solvent 3	32	1	A
G5M	Export Gasoline	33	1	A
01340	PRODUCT BLENDING	34	1	A
2KE	Kerosene	34	1	A
5D2	No. 2 Diesel	35	1	A
6R4	MF80 Fuel Oil	36	1	A
7R5	PI6 Fuel Oil	37	1	A
8R6	PI500 Fuel Oil	38	1	A
9R7	PI6 Export	39	1	A

APPENDIX A.11 – SUPPORTING DATA FROM ESTIMATING

This appendix contains the cost data supplied by the Foster Wheeler Estimating Department for the study.

FOSTER WHEELER USA CORP.

Customer: PetroPeru Talara Refinery
Location: Talara, Peru
Study: Feasibility Study
Description: Hydrocracker Case

Job No.: 13-103078-02
Date: 09/18/02
Prep. By: JNP
Revision: 0

Process Unit Summary
USGC TIC Estimate

	$ Million
FCC Unit Revamp	5.00
Naphtha Hydrotreater	16.50
Alkylation Unit	14.00
Acid Regeneration Plant	5.60
CCR	26.20
Hydrocracker Unit	60.00
Hydrogen Plant	30.00
Amine Unit	2.50
Sulfur Recovery Unit	9.00
Sour Water Stripper	2.50
Total	171.30

FOSTER WHEELER USA CORP.

Customer: PetroPeru Talara Refinery
Location: Talara, Peru
Study: Feasibility Study
Description: Hydrocracker Case

Job No.: 13-103078-02
Date: 09/18/02
Prep. By: JNP
Revision: 0

Utilities Summary
USGC TIC Estimate

	$ Million
Raw Water	0.50
Steam, Condensate & BFW	6.00
General Purpose Water	1.00
Fuel Gas	0.50
Cooling Water	2.00
Instrument & Plant Air	1.10
Inert Gas	2.50
Power Distribution	2.00
Total	15.60

FOSTER WHEELER USA CORP.

Customer: PetroPeru Talara Refinery
Location: Talara, Peru
Study: Feasibility Study
Description: Hydrocracker Case

Job No.: 13-103078-02
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Prep. By: JNP
Revision: 0

Offsites Summary
USGC TIC Estimate

	$ Million
Site Preparation	0.50
Control Room & DCS	9.50
Firewater System	4.00
Waste Water Treatment	2.50
Flare System	2.00
Interconnecting Piping	6.10
Sulfur Handling	1.30
Tankage	4.10
Total	30.00