

CRC Crude & Vacuum Units																			
Detailed Material Balance																			
Case: 100% WTI																			
Rev B																			
12/20/2019																			
	Units	1	2	3	4	5	6	7	8	9	10	11	12L	12V	13	14	15	16	17
Description		Crude	G-4001A/B	EX-4001	EX-4002	Crude	EX-4004	EX-4005	EX-4006	EX-21001	EX-21002	Downstream	Liquid	Vapor	T-4001	AC-4001	EX-4007	Off Gas	Sour
		Feed from	Discharge	Tube Side	Tube Side	from	Tube Side	Shell Side	Tube Side	Tube Side	Shell Side	H-4001	Part of	Part of	Gross	Effluent	Effluent	from	Water
		BL		Effluent	Effluent	Desalter	Effluent	Effluent	Effluent	Effluent	Effluent	Letdown CV	Stream 12	Stream 12	Overhead			D-4001	to OSBL
		Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Mixed	Liquid Phase	Vapor Phase	Vapor Phase	Liquid Phase	Liquid Phase	Vapor Phase	Liquid Phase
Temperature	F	60.00	62.86	239.55	260.00	260.00	293.15	314.11	439.86	500.32	521.05	488.80	700.00	700.00	287.52	130.00	100.00	100.00	100.00
Pressure	psia	46.80	435.70	409.70	403.70	375.00	380.70	366.70	357.70	348.70	336.70	96.70	44.70	44.70	32.70	27.60	24.70	19.70	64.70
Molar Vapor Fraction		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.00	1.00	1.00	0.00	0.00		0.00
Molar Liquid Fraction		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.56	1.00	0.00	0.00	1.00	1.00		1.00
Molar Solid Fraction		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
Mass Vapor Fraction		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	1.00	1.00	0.00	0.00		0.00
Mass Liquid Fraction		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.00	0.00	1.00	1.00		1.00
Mass Solid Fraction		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
Molar Enthalpy	Btu/lbmol	-33007.63	-32606.22	-16559.19	-14502.19	-14502.19	-11092.20	-8885.73	5155.42	12376.58	14924.05	14924.05	119860.61	38219.95	-23133.01	-43802.78	-45182.90		-123830.21
Mass Enthalpy	Btu/lb	-182.30	-180.08	-91.46	-80.10	-80.10	-61.26	-49.08	28.47	68.36	82.43	82.43	245.30	267.88	-274.85	-520.44	-536.84		-6873.35
Molar Entropy	Btu/lbmol-R	-26.28	-26.29	-4.69	-2.37	-2.37	1.31	3.59	16.18	22.80	25.49	28.81	174.79	46.05	-3.86	-33.32	-35.27		-59.26
Molar Entropy	Btu/lb-R	-0.15	-0.15	-0.03	-0.01	-0.01	0.01	0.02	0.09	0.13	0.14	0.16	0.36	0.32	-0.05	-0.40	-0.42		-3.29
Mass Entropy	lbmol/cuft	0.28	0.28	0.26	0.25	0.25	0.24	0.24	0.20	0.20	0.19	0.02	0.09	0.00	0.00	0.51	0.52		3.40
Mass Density	lb/cuft	51.58	51.58	46.32	45.57	45.57	44.17	43.06	36.94	35.39	34.94	3.97	44.54	0.53	0.36	42.97	43.98		61.27
Enthalpy Flow	MMBtu/hr	-16.46	-16.26	-8.26	-7.23	-7.23	-5.53	-4.43	2.57	6.17									

	Units	1	2	3	4	5	6	7	8	9	10	11	12L	12V	13	14	15	16	17
PC738F	lb/hr	1794.05	1794.05	1794.05	1794.05	1794.05	1794.05	1794.05	1794.05	1794.05	1794.05	1794.05	601.65	1192.40	0.00	0.00	0.00		0.00
PC762F	lb/hr	1794.66	1794.66	1794.66	1794.66	1794.66	1794.66	1794.66	1794.66	1794.66	1794.66	1794.66	716.96	1077.70	0.00	0.00	0.00		0.00
PC788F	lb/hr	1678.99	1678.99	1678.99	1678.99	1678.99	1678.99	1678.99	1678.99	1678.99	1678.99	1678.99	817.80	861.18	0.00	0.00	0.00		0.00
PC825F	lb/hr	3290.97	3290.97	3290.97	3290.97	3290.97	3290.97	3290.97	3290.97	3290.97	3290.97	3290.97	1962.35	1328.62	0.00	0.00	0.00		0.00
PC875F	lb/hr	2964.61	2964.61	2964.61	2964.61	2964.61	2964.61	2964.61	2964.61	2964.61	2964.61	2964.61	2167.88	796.72	0.00	0.00	0.00		0.00
PC925F	lb/hr	2646.62	2646.62	2646.62	2646.62	2646.62	2646.62	2646.62	2646.62	2646.62	2646.62	2646.62	2215.69	430.94	0.00	0.00	0.00		0.00
PC973F	lb/hr	2373.61	2373.61	2373.61	2373.61	2373.61	2373.61	2373.61	2373.61	2373.61	2373.61	2373.61	2152.87	220.74	0.00	0.00	0.00		0.00
PC1020F	lb/hr	2134.14	2134.14	2134.14	2134.14	2134.14	2134.14	2134.14	2134.14	2134.14	2134.14	2134.14	2023.88	110.26	0.00	0.00	0.00		0.00
PC1075F	lb/hr	1883.57	1883.57	1883.57	1883.57	1883.57	1883.57	1883.57	1883.57	1883.57	1883.57	1883.57	1837.01	46.55	0.00	0.00	0.00		0.00
PC1125F	lb/hr	1521.60	1521.60	1521.60	1521.60	1521.60	1521.60	1521.60	1521.60	1521.60	1521.60	1521.60	1503.07	18.53	0.00	0.00	0.00		0.00
PC1170F	lb/hr	1249.98	1249.98	1249.98	1249.98	1249.98	1249.98	1249.98	1249.98	1249.98	1249.98	1249.98	1242.01	7.97	0.00	0.00	0.00		0.00
PC1247F	lb/hr	1635.90	1635.90	1635.90	1635.90	1635.90	1635.90	1635.90	1635.90	1635.90	1635.90	1635.90	1632.63	3.27	0.00	0.00	0.00		0.00
PC1345F	lb/hr	1171.59	1171.59	1171.59	1171.59	1171.59	1171.59	1171.59	1171.59	1171.59	1171.59	1171.59	1171.08	0.51	0.00	0.00	0.00		0.00
PC1453F	lb/hr	856.85	856.85	856.85	856.85	856.85	856.85	856.85	856.85	856.85	856.85	856.85	856.76	0.09	0.00	0.00	0.00		0.00
PC1738F	lb/hr	2809.65	2809.65	2809.65	2809.65	2809.65	2809.65	2809.65	2809.65	2809.65	2809.65	2809.65	2809.44	0.21	0.00	0.00	0.00		0.00
Volume Flow	bbl/day	7480.83	7480.14	8330.22	8466.28	8466.28	8735.00	8960.91	10445.02	10902.56	11042.36	97198.56	2594.16	506665.59	3246.25	3410.98	3332.31		98.46
Vapor Phase																			
Heat capacity, mixture	Btu/lbmol-R											63.961		97.316	42.797				
Viscosity, mixture	cP											0.011		0.012	0.010				
Thermal conductivity, mixture	Btu-ft/hr-sqft-R											0.019		0.023	0.013				
Liquid Phase																			
Standard liquid volume flow	bbl/day	7500.000	7500.000	7500.000	7500.000	7500.000	7500.000	7500.000	7500.000	7500.000	7500.000	5337.745	1949.983			3149.841	3149.173		96.825
Heat capacity, mixture	Btu/lbmol-R	80.067	80.369	99.763	101.618	101.618	104.557	106.378	116.924	122.037	123.870	158.375	346.532			53.410	51.722		22.897
Viscosity, mixture	cP	1.472	1.432	0.419	0.377	0.377	0.318	0.286	0.166	0.135	0.128	0.250	0.367			0.382	0.467		0.700
Thermal conductivity, mixture	Btu-ft/hr-sqft-R	0.065	0.065	0.056	0.054	0.054	0.052	0.051	0.041	0.034	0.032	0.040	0.036			0.067	0.070		0.360
Surface tension, mixture	dyne/cm	31.55	31.41	22.91	21.97	21.97	20.44	19.49	13.97	11.45	10.61	15.25	11.83			18.17	19.85		32.04
ASTM D86 0%, liquid volume percent, for a petroleum mixture	F	-288.92	-288.92	-288.92	-288.92	-288.92	-288.92	-288.92	-288.92	-288.92	-288.92	-245.66				-97.97	-97.97		-354.13
ASTM D86 5%, liquid volume percent, for a petroleum mixture	F	161.22	161.22	161.22	161.22	161.22	161.22	161.22	161.22	161.22	161.22	244.02	582.86			116.28	116.28		13.41
ASTM D86 10%, liquid volume percent, for a petroleum mixture	F	192.05	192.05	192.05	192.05	192.05	192.05	192.05	192.05	192.05	192.05	271.51	684.77			135.85	135.85		41.33
ASTM D86 30%, liquid volume percent, for a petroleum mixture	F	284.86	284.86	284.86	284.86	284.86	284.86	284.86	284.86	284.86	284.86	457.98	834.81			181.34	181.34		117.95
ASTM D86 50%, liquid volume percent, for a petroleum mixture	F	461.48	461.48	461.48	461.48	461.48	461.48	461.48	461.48	461.48	461.48	616.30	933.90			215.79	215.79		187.74
ASTM D86 70%, liquid volume percent, for a petroleum mixture	F	711.26	711.26	711.26	711.26	711.26	711.26	711.26	711.26	711.26	711.26	814.50	1070.52			247.37	247.37		207.86
ASTM D86 90%, liquid volume percent, for a petroleum mixture	F	1232.93	1232.93	1232.93	1232.93	1232.93	1232.93	1232.93	1232.93	1232.93	1232.93	1268.85	1624.60			305.06	305.06		234.50
ASTM D86 95%, liquid volume percent, for a petroleum mixture	F	1318.09	1318.09	1318.09	1318.09	1318.09	1318.09	1318.09	1318.09	1318.09	1318.09	1359.89	1723.79			329.15	329.15		255.56
ASTM D86 100%, liquid volume percent, for a petroleum mixture	F	1523.76	1523.76	1523.76	1523.76	1523.76	1523.76	1523.76	1523.76	1523.76	1523.76	1555.77	1861.71			367.07	367.07		303.63
Flash point, Pennsky-Martens method	F	-79.73	-79.73	-79.73	-79.73	-79.73	-79.73	-79.73	-79.73	-79.73	-79.73	-14.23	70.82			-97.98	-97.88		-93.93

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Rev B																			
12/20/2019																			
	Units	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Description																			
		Reflux to	Draw to Kerosene	Vapor from	Kerosene Product to	EX-4002 Shell Side	AC4002B Effluent	EX-4008 Shell Side	Kerosene Product to	Diesel Draw from	Diesel to	Vapor from	Diesel from	Diesel from	Diesel from	Diesel Product	Diesel PA to	Diesel PA from	Naphtha PA to
		T-4001	Stripper	T-4002	EX-4002	Effluent		Effluent	DDS	T-4001	T-4003	T-4003	G-4007A/B	EX-4004	EX-4009	to DDS	G-4006A/B	EX-4006	G-4004A/B
		Liquid	Liquid Phase	Vapor Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Vapor Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase
Temperature	F	100.00	429.69	420.73	398.81	284.38	130.00	100.00	100.00	552.45	552.45	545.12	524.09	300.00	100.00	100.00	552.44	385.38	322.38
Pressure	psia	24.70	33.39	33.40	92.70	90.70	85.70	84.70	64.70	34.00	34.00	34.00	114.70	101.70	84.70	64.70	34.00	114.70	32.77
Molar Vapor Fraction		0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Molar Liquid Fraction		1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Molar Solid Fraction		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Vapor Fraction		0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Liquid Fraction		1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mass Solid Fraction		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Molar Enthalpy	Btu/lbmol	-45182.90	8283.05	-23706.03	3334.39	-8572.44	-25348.18	-25343.42	-25343.42	31186.04	31186.04	-27064.39	25375.87	-8511.47	-30230.93	-30230.93	31194.54	5849.64	-2770.20
Mass Enthalpy	Btu/lb	-536.84	48.89	-240.18	19.26	-49.51	-146.41	-146.38	-146.38	132.52	132.52	-254.03	104.11	-34.92	-124.02	-124.02	132.55	24.86	-21.47
Molar Entropy	Btu/lbmol-R	-35.27	21.27	19.04	19.00	7.53	-12.68	-12.69	-12.69	54.01	54.01	27.93	52.42	21.51	-4.35	-4.35	54.01	32.55	3.14
Mass Entropy	Btu/lb-R	-0.42	0.13	0.19	0.11	0.04	-0.07	-0.07	-0.07	0.23	0.23	0.26	0.22	0.09	-0.02	-0.02	0.23	0.14	0.02
Molar Density	lbmol/cuft	0.52	0.23	0.00	0.24	0.26	0.29	0.29	0.29	0.17	0.17	0.00	0.17	0.20	0.21	0.21	0.17	0.19	0.31
Mass Density	lb/cuft	43.98	39.63	0.36	41.54	44.99	49.98	49.98	49.98	39.93	39.93	0.35	41.72	47.80	51.92	51.92	39.93	44.91	39.53
Enthalpy Flow	MMBtu/hr	-1.64	0.86	-0.78	0.28	-0.72	-2.13	-2.13	-2.13	1.97	1.97	-0.72	1.28	-0.43	-1.52	-1.52	8.62	1.62	-1.82
Average MW		84.16	169.41	98.70	173.14	173.14	173.14	173.14	173.14	470.68	235.33	106.54	243.75	243.75	243.75	243.75	235.35	235.35	129.03
Mole Flows	lbmol/hr	30.67	103.61	32.94	83.99	83.99	83.99	83.99	83.99	339.40	63.21	26.71	50.38	50.38	50.38	50.38	276.19	276.19	658.77
Mass Flows	lb/hr	3061.45	17552.50	3251.63	14540.88	14540.88	14540.88	14540.88	14540.88	79876.48	14876.48	2845.58	12280.92	12280.92	12280.92	12280.92	65000.00	65000.00	85000.00
H2	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N2	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
O2	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H2S	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO2	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	lb/hr	3.84	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.32	0.06	0.06	0.00	0.00	0.00	0.00	0.26	0.26	0.72
C3	lb/hr	24.61	1.03	1.03	0.00	0.00	0.00	0.00	0.00	2.86	0.53	0.53	0.00	0.00	0.00	0.00	2.32	2.32	8.63
IC4	lb/hr	18.81	1.21	1.21	0.00	0.00	0.00	0.00	0.00	3.13	0.58	0.58	0.00	0.00	0.00	0.00	2.55	2.55	11.49
NC4	lb/hr	90.07	7.19	7.15	0.04	0.04	0.04	0.04	0.04	17.63	3.28	3.28	0.00	0.00	0.00	0.00	14.35	14.35	73.60
IC5	lb/hr	109.03	12.47	12.31	0.16	0.16	0.16	0.16	0.16	29.02	5.40	5.40	0.01	0.01	0.01	0.01	23.62	23.62	152.54
NC5	lb/hr	166.53	22.03	21.60	0.43	0.43	0.43	0.43	0.43	49.81	9.28	9.25	0.02	0.02	0.02	0.02	40.54	40.54	293.44
H2O	lb/hr	127.08	6.84	214.91	31.93	31.93	31.93	31.93	31.93	14.38	2.74	231.91	20.83	20.83	20.83	20.83	11.64	11.64	49.60
PC107F	lb/hr	43.37	6.09	5.95	0.14	0.14	0.14	0.14	0.14	13.41	2.50	2.49	0.01	0.01	0.01	0.01	10.91	10.91	88.72
PC138F	lb/hr	197.08	34.86	33.46	1.40	1.40	1.40	1.40	1.40	74.14	13.81	13.74	0.06	0.06	0.06	0.06	60.33	60.33	604.71
PC163F	lb/hr	223.42	50.91	47.26	3.65	3.65	3.65	3.65	3.65	101.73	18.95	18.80	0.15	0.15	0.15	0.15	82.79	82.79	1051.18
PC188F	lb/hr	274.88	81.28	71.47	9.82	9.82	9.82	9.82	9.82	150.32	28.00	27.65	0.35	0.35	0.35	0.35	122.33	122.33	1999.33
PC213F	lb/hr	357.45	136.75	111.32	25.43	25.43	25.43	25.43	25.43	232.61	43.32	42.49	0.83	0.83	0.83	0.83	189.29	189.29	3980.10
PC237F	lb/hr	360.26	178.55	131.50	47.05	47.05	47.05	47.05	47.05	279.38	52.03	50.52	1.51	1.51	1.51	1.51	227.35	227.35	6092.48
PC262F	lb/hr	314.45	208.60	134.10	74.50	74.50	74.50	74.50	74.50	297.58	55.42	52.94	2.48	2.48	2.48	2.48	242.16	242.16	8215.44
PC287F	lb/hr	242.88	224.19	121.58	102.61	102.61	102.61	102.61	102.61	286.81	53.42	49.74	3.67	3.67	3.67	3.67	233.39	233.39	9838.14
PC312F	lb/hr	186.73	259.92	114.94	144.98	144.98	144.98	144.98	144.98	284.82	53.05	47.49	5.55	5.55	5.55	5.55	231.77	231.77	11799.66
PC337F	lb/hr	185.53	499.06	175.15	323.92	323.92	323.92	323.92	323.92	392.42	73.09	61.73	11.36	11.36	11.36	11.36	319.33	319.33	18271.24
PC362F	lb/hr	114.99	1346.21	367.43	978.79	978.79	978.79	978.79	978.79	495.33	92.25	71.78	20.47	20.47	20.47	20.47	403.08	403.08	17515.53
PC388F	lb/hr	19.33	2696.63	562.15	2134.48	2134.48	2134.48	2134.48	2134.48	716.03	133.36	92.91	40.44	40.44	40.44	40.44	582.67	582.67	4539.59
PC413F	lb/hr	1.06	2634.87	413.30	2221.57	2221.57	2221.57	2221.57	2221.57	941.35	175.32	106.08	69.24	69.24	69.24	69.24	766.03	766.03	384.07
PC437F	lb/hr	0.05	2492.14	290.95	2201.19	2201.19	2201.19	2201.19	2201.19	1321.02	246.03	125.69	120.34	120.34	120.34	120.34	1074.99	1074.99	27.89
PC462F	lb/hr	0.00	2303.49	197.53	2105.96	2105.96	2105.96	2105.96	2105.96	1905.41	354.87	148.94	205.93	205.93	205.93	205.93	1550.54	1550.54	1.79
PC487F	lb/hr	0.00	1936.83	120.36	1816.47	1816.47	1816.47	1816.47	1816.47	2765.99	515.14	173.39	341.75	341.75	341.75	341.75	2250.85	2250.85	0.09
PC512F	lb/hr	0.00	1551.72	69.21	1482.51	1482.51	1482.51	1482.51	1482.51	4897.53	912.11	241.71	670.40	670.40	670.40	670.40	3985.42	3985.42	0.00
PC537F	lb/hr	0.00	709.49	22.44	687.05	687.05	687.05	687.05	687.05	8429.51	1569.89	322.01	1247.88	1247.88	1247.88	1247.88	6859.62	6859.62	0.00
PC562F	lb/hr	0.00	134.74	2.99	131.76	131.76	131.76	131.76	131.76	11010.38	2050.60	320.64	1729.96	1729.96	1729.96	1729.96	8959.79	8959.79	0.00
PC587F	lb/hr	0.00	14.03	0.22	13.82	13.82	13.82	13.82	13.82	11046.83	2057.39	242.02	1815.38	1815.38	1815.38	1815.38	8989.44	8989.44	0.00
PC612F	lb/hr	0.00	1.16	0.01	1.15	1.15	1.15	1.15	1.15	10216.45	1902.71	166.27	1736.45	1736.45	1736.45	1736.45	8313.73	8313.73	0.00
PC638F	lb/hr	0.00	0.08	0.00	0.08	0.08	0.08	0.08	0.08	9179.47	1709.56	109.53	1600.04	1600.04	1600.04	1600.04	7469.91	7469.91	0.00
PC664F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7681.47	1430.60	65.47	1365.12	1365.12	1365.12	1365.12	6250.88	6250.88	0.00
PC686F	lb/hr	0.00	0.00	0															

	Units	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
PC738F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	273.88	51.03	0.84	50.18	50.18	50.18	50.18	222.85	222.85	0.00
PC762F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.35	7.33	0.08	7.25	7.25	7.25	7.25	32.02	32.02	0.00
PC788F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.55	0.47	0.00	0.47	0.47	0.47	0.47	2.07	2.07	0.00
PC825F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.04	0.00	0.04	0.04	0.04	0.04	0.16	0.16	0.00
PC875F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PC925F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PC973F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PC1020F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PC1075F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PC1125F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PC1170F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PC1247F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PC1345F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PC1453F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PC1738F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Volume Flow	bbl/day	297.54	1893.47	38263.05	1496.17	1381.43	1243.59	1243.53	1243.53	8551.44	1592.66	35097.72	1258.14	1098.19	1011.16	1011.16	6958.78	6186.42	9190.36
Vapor Phase																			
Heat capacity, mixture	Btu/lbmol-R			54.559								63.328							
Viscosity, mixture	cP			0.011								0.012							
Thermal conductivity, mixture	Btu-ft/hr-sqft-R			0.015								0.017							
Liquid Phase																			
Standard liquid volume flow	bbl/day	281.192	1485.000		1221.873	1221.873	1221.873	1221.873	1221.873		1200.000		983.472	983.472	983.472	983.472	5243.176	5243.176	7573.310
Heat capacity, mixture	Btu/lbmol-R	51.722	108.964		108.617	99.515	82.103	82.097	82.097	159.970	159.970		162.512	139.229	116.307	116.307	159.970	177.200	79.244
Viscosity, mixture	cP	0.467	0.225		0.266	0.432	1.094	1.400	1.400	0.242	0.242		0.279	0.739	4.247	4.247	0.242	0.141	0.202
Thermal conductivity, mixture	Btu-ft/hr-sqft-R	0.070	0.047		0.050	0.058	0.067	0.068	0.068	0.041	0.041		0.044	0.056	0.065	0.065	0.041	0.029	0.054
Surface tension, mixture	dyne/cm	19.85	11.72		13.42	18.52	25.82	27.29	27.29	10.80	10.80		12.27	21.28	30.00	30.00	10.80	4.84	12.43
ASTM D86 0%, liquid volume percent, for a petroleum mixture	F	-97.97	-198.58		149.84	149.84	149.84	149.84	149.84	-377.02	-377.02		-314.38	-314.38	-314.38	-314.38	-377.02	-377.02	
ASTM D86 5%, liquid volume percent, for a petroleum mixture	F	116.28	337.95		385.73	385.73	385.73	385.73	385.73	461.83	461.83		524.53	524.53	524.53	524.53	461.83	461.83	253.46
ASTM D86 10%, liquid volume percent, for a petroleum mixture	F	135.85	373.81		391.82	391.82	391.82	391.82	391.82	501.13	501.13		535.13	535.13	535.13	535.13	501.13	501.13	259.24
ASTM D86 30%, liquid volume percent, for a petroleum mixture	F	181.34	399.53		409.56	409.56	409.56	409.56	409.56	546.87	546.87		560.06	560.06	560.06	560.06	546.87	546.87	290.23
ASTM D86 50%, liquid volume percent, for a petroleum mixture	F	215.79	419.18		428.76	428.76	428.76	428.76	428.76	569.78	569.78		580.79	580.79	580.79	580.79	569.78	569.78	314.48
ASTM D86 70%, liquid volume percent, for a petroleum mixture	F	247.37	444.97		452.83	452.83	452.83	452.83	452.83	597.34	597.34		606.11	606.11	606.11	606.11	597.34	597.34	332.43
ASTM D86 90%, liquid volume percent, for a petroleum mixture	F	305.06	481.50		485.63	485.63	485.63	485.63	485.63	636.54	636.54		640.31	640.31	640.31	640.31	636.54	636.54	349.58
ASTM D86 95%, liquid volume percent, for a petroleum mixture	F	329.15	501.34		504.67	504.67	504.67	504.67	504.67	655.49	655.49		658.74	658.74	658.74	658.74	655.49	655.49	364.39
ASTM D86 100%, liquid volume percent, for a petroleum mixture	F	367.07	543.91		547.36	547.36	547.36	547.36	547.36	702.35	702.35		705.62	705.62	705.62	705.62	702.35	702.35	404.79
Flash point, Pennsky-Martens method	F	-97.88	56.84		120.50	120.50	120.49	120.49	120.49	83.73	83.73		225.10	225.10	225.10	225.10	83.73	83.73	15.63

CRC Crude & Vacuum Units																			
Detailed Material Balance																			
Case: 100% WTI																			
Rev B																			
12/20/2019																			
	Units	36	37	38	39	40	41	42	43	44	45	46	47	48L	48V	49	50	51	52
Description																			
		Naphtha	AGO	AGO	AGO	AGO	AGO	Atm Resid	Superheated	Saturated	Saturated	Superheated	Naphtha	Liquid	Vapor	T-21000	LVGO	LVGO	LVGO PA
		PA from	Wash to	from	from	from	Product	to	Steam	Steam	Steam	Steam	Product	Part of	Part of	Overhead	drawoff	from	Return to
		EX-4001	T-4001	G-4008A/B	EX-4005	AC-4003	to HCU	H-21001	to T-4001	to T-4002	to H-21001	to T-21000	to NDS	Stream 48	Stream 48	to Vac System	from T-21001	AC-21001	T-21001
		Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Mixed Phase	Vapor Phase	Vapor Phase	Vapor Phase	Vapor Phase	Liquid Phase	Liquid Phase	Vapor Phase	Vapor Phase	Liquid Phase	Liquid Phase	Liquid Phase
Temperature	F	157.18	644.85	644.85	300.00	130.00	130.00	672.71	677.00	340.00	340.00	677.00	100.00	775.00	775.00	130.00	361.13	130.00	130.00
Pressure	psia	114.70	115.00	115.00	109.70	104.70	64.70	5.00	64.70	64.70	64.70	64.70	64.70	3.00	3.00	0.70	0.72	104.70	0.72
Molar Vapor Fraction		0.00	0.00	0.00	0.00	0.00	0.00	0.04	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Molar Liquid Fraction		1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00
Molar Solid Fraction		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Vapor Fraction		0.00	0.00	0.00	0.00	0.00	0.00	0.02	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Mass Liquid Fraction		1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00
Mass Solid Fraction		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Molar Enthalpy	Btu/lbmol	-14913.96	66307.33	66307.33	-8994.69	-38908.61	-38908.61	115643.08	-99001.32	-102021.85	-102021.85	-99001.32	-26772.49	237998.80	64818.82	-97753.81	4424.42	-37650.35	-37650.35
Mass Enthalpy	Btu/lb	-115.59	192.62	192.62	-26.13	-113.03	-113.03	223.77	-5495.41	-5663.07	-5663.07	-5495.41	-267.92	304.22	237.00	-4700.14	12.85	-109.35	-109.35
Molar Entropy	Btu/lbmol-R	-10.04	105.77	105.77	39.89	3.54	3.54	178.92	-7.37	-10.52	-10.52	-7.37	-34.58	321.15	119.70	-5.64	52.54	3.67	3.67
Mass Entropy	Btu/lb-R	-0.08	0.31	0.31	0.12	0.01	0.01	0.35	-0.41	-0.58	-0.58	-0.41	-0.35	0.41	0.44	-0.27	0.15	0.01	0.01
Molar Density	lbmol/cuft	0.35	0.12	0.12	0.15	0.16	0.16	0.01	0.01	0.01	0.01	0.01	0.43	0.06	0.00	0.00	0.14	0.16	0.16
Mass Density	lb/cuft	45.25	42.21	42.21	50.95	54.71	54.71	4.97	0.10	0.14	0.14	0.10	43.44	47.76	0.06	0.00	49.38	54.58	54.58
Enthalpy Flow	MMBtu/hr	-9.82	1.62	0.98	-0.13	-0.58	-0.58	6.40	-5.11	-1.36	-1.98	-1.43	-7.99	3.98	3.76	-3.65	0.17	-1.43	-1.43
Average MW		129.03	344.24	344.24	344.24	344.24	344.24	516.80	18.02	18.02	18.02	18.02	99.93	782.33	273.50	20.80	344.30	344.30	344.30
Mole Flows	lbmol/hr	658.77	22.64	14.82	14.82	14.82	14.82	55.36	51.62	13.32	19.43	14.43	298.36	16.71	58.07	37.38	38.03	54.53	38.03
Mass Flows	lb/hr	85000.00	7793.71	5100.64	5100.64	5100.64	5100.64	28607.69	930.00	240.00	350.00	260.00	29814.09	13075.98	15881.71	777.36	18774.29	18774.29	13092.99
H2	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N2	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.00	0.01	0.01	0.00
O2	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H2S	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO2	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	lb/hr	0.72	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.96	0.00	0.00	0.00	0.00	0.00	0.00
C3	lb/hr	8.63	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	249.91	0.00	0.00	5.38	0.01	0.01	0.00
IC4	lb/hr	11.49	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	191.02	0.00	0.00	31.92	0.05	0.05	0.04
NC4	lb/hr	73.60	1.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	914.81	0.00	0.00	12.76	0.02	0.02	0.02
IC5	lb/hr	152.54	1.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1107.43	0.00	0.00	13.37	0.04	0.04	0.03
NC5	lb/hr	293.44	3.09	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	1691.43	0.00	0.01	22.51	0.08	0.08	0.05
H2O	lb/hr	49.60	0.58	3.49	3.49	3.49	3.49	12.46	930.00	240.00	350.00	260.00	10.01	0.08	362.38	622.12	0.53	0.53	0.37
PC107F	lb/hr	88.72	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	440.51	0.00	0.00	0.00	0.00	0.00	0.00
PC138F	lb/hr	604.71	4.40	0.01	0.01	0.01	0.01	0.02	0.00	0.00	0.00	0.00	2001.69	0.00	0.02	0.02	0.00	0.00	0.00
PC163F	lb/hr	1051.18	5.83	0.02	0.02	0.02	0.02	0.03	0.00	0.00	0.00	0.00	2269.23	0.00	0.03	0.03	0.00	0.00	0.00
PC188F	lb/hr	1999.33	8.31	0.04	0.04	0.04	0.04	0.06	0.00	0.00	0.00	0.00	2791.84	0.00	0.06	0.06	0.00	0.00	0.00
PC213F	lb/hr	3980.10	12.45	0.09	0.09	0.09	0.09	0.12	0.00	0.00	0.00	0.00	3630.55	0.00	0.12	0.12	0.00	0.00	0.00
PC237F	lb/hr	6092.48	14.46	0.14	0.14	0.14	0.14	0.19	0.00	0.00	0.00	0.00	3659.02	0.00	0.19	0.19	0.00	0.00	0.00
PC262F	lb/hr	8215.44	14.61	0.21	0.21	0.21	0.21	0.26	0.00	0.00	0.00	0.00	3193.79	0.00	0.26	0.25	0.01	0.01	0.00
PC287F	lb/hr	9838.14	13.14	0.26	0.26	0.26	0.26	0.30	0.00	0.00	0.00	0.00	2466.92	0.00	0.30	0.30	0.01	0.01	0.01
PC312F	lb/hr	11799.66	11.98	0.33	0.33	0.33	0.33	0.35	0.00	0.00	0.00	0.00	1896.55	0.00	0.35	0.35	0.02	0.02	0.01
PC337F	lb/hr	18271.24	14.98	0.59	0.59	0.59	0.59	0.57	0.00	0.00	0.00	0.00	1884.42	0.00	0.57	0.56	0.04	0.04	0.02
PC362F	lb/hr	17515.53	17.07	0.95	0.95	0.95	0.95	0.83	0.00	0.00	0.00	0.00	1168.21	0.00	0.83	0.81	0.09	0.09	0.06
PC388F	lb/hr	4539.59	22.03	1.73	1.73	1.73	1.73	1.41	0.00	0.00	0.00	0.00	196.44	0.00	1.41	1.34	0.24	0.24	0.16
PC413F	lb/hr	384.07	25.51	2.80	2.80	2.80	2.80	2.19	0.00	0.00	0.00	0.00	10.81	0.01	2.18	2.00	0.65	0.65	0.42
PC437F	lb/hr	27.89	31.01	4.64	4.64	4.64	4.64	3.58	0.00	0.00	0.00	0.00	0.51	0.02	3.57	3.03	1.93	1.93	1.23
PC462F	lb/hr	1.79	37.66	7.49	7.49	7.49	7.49	5.91	0.00	0.00	0.00	0.00	0.02	0.03	5.89	4.28	5.73	5.73	3.69
PC487F	lb/hr	0.09	43.48	11.13	11.13	11.13	11.13	9.30	0.00	0.00	0.00	0.00	0.00	0.05	9.25	4.97	14.98	14.98	9.83
PC512F	lb/hr	0.00	54.37	17.26	17.26	17.26	17.26	15.79	0.00	0.00	0.00	0.00	0.00	0.10	15.69	5.06	36.24	36.24	24.38
PC537F	lb/hr	0.00	62.35	23.69	23.69	23.69	23.69	24.33	0.00	0.00	0.00	0.00	0.00	0.18	24.15	3.77	68.06	68.06	46.65
PC562F	lb/hr	0.00	78.38	34.49	34.49	34.49	34.49	40.29	0.00	0.00	0.00	0.00	0.00	0.36	39.93	2.57	123.19	123.19	85.31
PC587F	lb/hr	0.00	103.98	51.43	51.43	51.43	51.43	67.91	0.00	0.00	0.00	0.00	0.00	0.72	67.19	1.61	214.12	214.12	148.95
PC612F	lb/hr	0.00	141.47	76.75	76.75	76.75	76.75	110.83	0.00	0.00	0.00	0.00	0.00	1.41	109.43	0.92	350.67	350.67	244.38
PC638F	lb/hr	0.00	210.94	123.04	123.04	123.04	123.04	180.92	0.00	0.00	0.00	0.00	0.00	2.77	178.15	0.51	565.90	565.90	394.67
PC664F	lb/hr	0.00	388.82	240.52	240.52	240.52	240.52	322.37	0.00	0.00	0.00	0.00	0.00	6.09	316.28	0.28	982.83	982.83	685.70
PC686F	lb/hr	0.00	716.07	460.67	460.67	460.67	460.67	559.22	0.00	0.00	0.00	0.00	0.00	12.79	546.44	0.17	1644.59	1644.59	1147.65
PC713F	lb/hr	0.00	1013.54	675.88	675.88	675.88	675.88	861.17	0.00	0.00	0.00	0.00	0.00	24.92	836.25	0.07	2367.35	2367.35	1652.38

	Units	36	37	38	39	40	41	42	43	44	45	46	47	48L	48V	49	50	51	52
PC738F	lb/hr	0.00	1001.10	684.82	684.82	684.82	684.82	1058.75	0.00	0.00	0.00	0.00	0.00	38.61	1020.14	0.02	2636.86	2636.86	1840.78
PC762F	lb/hr	0.00	870.33	606.68	606.68	606.68	606.68	1180.46	0.00	0.00	0.00	0.00	0.00	54.39	1126.07	0.01	2552.83	2552.83	1782.17
PC788F	lb/hr	0.00	655.44	464.91	464.91	464.91	464.91	1213.38	0.00	0.00	0.00	0.00	0.00	74.24	1139.14	0.00	2004.42	2004.42	1398.85
PC825F	lb/hr	0.00	971.08	698.16	698.16	698.16	698.16	2592.39	0.00	0.00	0.00	0.00	0.00	228.28	2364.11	0.00	2846.71	2846.71	1985.26
PC875F	lb/hr	0.00	579.42	421.04	421.04	421.04	421.04	2543.34	0.00	0.00	0.00	0.00	0.00	363.92	2179.41	0.00	1415.82	1415.82	986.13
PC925F	lb/hr	0.00	325.11	237.66	237.66	237.66	237.66	2408.91	0.00	0.00	0.00	0.00	0.00	551.16	1857.75	0.00	611.96	611.96	425.71
PC973F	lb/hr	0.00	176.00	129.40	129.40	129.40	129.40	2244.56	0.00	0.00	0.00	0.00	0.00	781.60	1462.96	0.00	235.87	235.87	163.86
PC1020F	lb/hr	0.00	92.39	68.79	68.79	68.79	68.79	2066.30	0.00	0.00	0.00	0.00	0.00	1019.45	1046.85	0.00	75.69	75.69	52.54
PC1075F	lb/hr	0.00	40.68	30.72	30.72	30.72	30.72	1853.67	0.00	0.00	0.00	0.00	0.00	1236.64	617.03	0.00	14.31	14.31	9.95
PC1125F	lb/hr	0.00	16.56	12.58	12.58	12.58	12.58	1509.43	0.00	0.00	0.00	0.00	0.00	1201.89	307.54	0.00	2.13	2.13	1.48
PC1170F	lb/hr	0.00	7.16	5.50	5.50	5.50	5.50	1244.71	0.00	0.00	0.00	0.00	0.00	1093.83	150.88	0.00	0.32	0.32	0.22
PC1247F	lb/hr	0.00	2.94	2.29	2.29	2.29	2.29	1633.74	0.00	0.00	0.00	0.00	0.00	1562.23	71.51	0.00	0.02	0.02	0.01
PC1345F	lb/hr	0.00	0.46	0.35	0.35	0.35	0.35	1171.25	0.00	0.00	0.00	0.00	0.00	1158.18	13.07	0.00	0.00	0.00	0.00
PC1453F	lb/hr	0.00	0.08	0.06	0.06	0.06	0.06	856.79	0.00	0.00	0.00	0.00	0.00	853.83	2.96	0.00	0.00	0.00	0.00
PC1738F	lb/hr	0.00	0.14	0.04	0.04	0.04	0.04	2809.55	0.00	0.00	0.00	0.00	0.00	2808.20	1.34	0.00	0.00	0.00	0.00
Volume Flow	bbl/day	8029.66	815.01	516.57	427.91	398.52	398.52	24587.11	41295.50	7312.55	10664.14	11544.98	2933.68	1170.40	1089590.69	1451671.37	1470.17	1470.17	1025.36
Vapor Phase																			
Heat capacity, mixture	Btu/lbmol-R							142.431	8.935	9.383	9.383	8.935			190.514	9.029			
Viscosity, mixture	cP							0.010	0.023	0.015	0.015	0.023			0.010	0.011			
Thermal conductivity, mixture	Btu-ft/hr-sqft-R							0.016	0.029	0.019	0.019	0.029			0.017	0.012			
Liquid Phase																			
Standard liquid volume flow	bbl/day	7573.310	598.294	388.846	388.846	388.846	388.846	2018.063					2856.737	893.850			1434.158	1434.158	1000.158
Heat capacity, mixture	Btu/lbmol-R	89.183	241.397	241.397	192.509	158.308	158.308	369.337					53.687	559.405			202.728	158.534	158.534
Viscosity, mixture	cP	0.118	0.283	0.283	1.478	12.069	12.069	0.498					0.370	3.035			0.978	11.269	11.269
Thermal conductivity, mixture	Btu-ft/hr-sqft-R	0.040	0.039	0.039	0.054	0.060	0.060	0.039					0.067	0.035			0.052	0.060	0.060
Surface tension, mixture	dyne/cm	6.43	11.07	11.07	23.95	30.89	30.89	12.82					17.89	9.90			21.42	30.80	30.80
ASTM D86 0%, liquid volume percent, for a petroleum mixture	F												-97.97	385.24			147.56	147.56	147.56
ASTM D86 5%, liquid volume percent, for a petroleum mixture	F	253.46	663.36	663.36	663.36	663.36	663.36	743.24					116.28	897.01			664.81	664.81	664.81
ASTM D86 10%, liquid volume percent, for a petroleum mixture	F	259.24	679.45	679.45	679.45	679.45	679.45	758.51					135.85	932.92			677.29	677.29	677.29
ASTM D86 30%, liquid volume percent, for a petroleum mixture	F	290.23	706.25	706.25	706.25	706.25	706.25	836.63					181.34	1034.73			705.84	705.84	705.84
ASTM D86 50%, liquid volume percent, for a petroleum mixture	F	314.48	729.07	729.07	729.07	729.07	729.07	926.84					215.79	1116.62			727.80	727.80	727.80
ASTM D86 70%, liquid volume percent, for a petroleum mixture	F	332.43	767.05	767.05	767.05	767.05	767.05	1062.35					247.37	1285.49			757.96	757.96	757.96
ASTM D86 90%, liquid volume percent, for a petroleum mixture	F	349.58	859.93	859.93	859.93	859.93	859.93	1603.54					305.06	1912.76			824.02	824.02	824.02
ASTM D86 95%, liquid volume percent, for a petroleum mixture	F	364.39	898.60	898.60	898.60	898.60	898.60	1704.29					329.15	1980.84			856.00	856.00	856.00
ASTM D86 100%, liquid volume percent, for a petroleum mixture	F	404.79	1025.87	1025.87	1025.87	1025.87	1025.87	1842.34					367.07	2115.90			936.61	936.61	936.61
Flash point, Pennsky-Martens method	F	15.63	316.93	316.93	316.92	316.92	316.92	390.22					-98.01	503.70			337.88	337.87	337.87
								2055 B/D											
								@ 100% liq											

CRC Crude & Vacuum Units																			
Detailed Material Balance																			
Case: 100% WTI																			
Rev B																			
12/20/2019																			
	Units	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
Description																			
		LVGO	HVGO	HVGO Wash	HVGO	HVGO	HVGO	HVGO	HVGO	Vac Resid	Vac Resid	Vac Resid	Recycle to	Vac Resid	Vac Resid	Vac Resid	Saturated	AGO	T-4004
		Product	Drawoff	to	from	PA Return	to	from	Product to	from	to	from	T-21001	to	from	Product	Steam to	from	Ovhd to
		to HCU	from T-21001	T-21001	EX-21001	to T-21001	AC-21002	AC-21002	HCU	T-21001	EX-21002	EX-21002	Bottoms	AC-21003	AC-21003	to OSBL	T-4003	T-4004	T-4001
		Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Liquid Phase	Vapor Phase	Liquid Phase	Vapor Phase
Temperature	F	130.00	591.74	591.74	526.00	526.00	526.00	130.00	130.00	572.74	572.74	540.00	540.00	540.00	180.00	180.00	340.00	644.85	657.39
Pressure	psia	64.70	0.91	0.91	109.70	109.70	109.70	104.70	64.70	0.95	89.70	84.70	83.70	83.70	74.70	64.70	64.70	34.64	34.50
Molar Vapor Fraction		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Molar Liquid Fraction		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00
Molar Solid Fraction		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Vapor Fraction		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Mass Liquid Fraction		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00
Mass Solid Fraction		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Molar Enthalpy	Btu/lbmol	-37567.90	74082.99	74082.99	53786.54	53786.54	53786.54	-47229.62	-47229.62	151781.97	151781.97	132870.45	132868.44	132870.45	-45423.29	-45423.29	-102021.85	66307.33	-28519.34
Mass Enthalpy	Btu/lb	-109.15	161.95	161.95	117.67	117.67	117.67	-103.32	-103.32	167.66	167.66	146.77	146.77	146.77	-50.18	-50.18	-5663.07	192.62	-267.02
Molar Entropy	Btu/lbmol-R	3.58	135.49	135.49	118.66	118.66	118.66	11.55	11.55	275.51	275.51	258.82	258.82	258.82	65.01	65.01	-10.52	105.77	33.57
Mass Entropy	Btu/lb-R	0.01	0.30	0.30	0.26	0.26	0.26	0.03	0.03	0.30	0.30	0.29	0.29	0.29	0.07	0.07	-0.58	0.31	0.31
Molar Density	lbmol/cuft	0.16	0.10	0.10	0.11	0.11	0.11	0.12	0.12	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.01	0.12	0.00
Mass Density	lb/cuft	54.60	46.34	46.34	48.05	48.05	48.05	56.71	56.71	53.62	53.62	54.34	54.34	54.34	61.27	61.27	0.14	42.21	0.31
Enthalpy Flow	MMBtu/hr	-0.62	11.04	1.42	9.62	8.24	1.39	-1.22	-1.22	10.25	10.25	8.97	7.34	1.63	-0.56	-0.56	-1.42	2.60	-0.19
Average MW		344.19	457.45	457.45	457.11	457.11	457.11	457.11	457.11	905.29	905.29	905.29	905.28	905.29	905.29	905.29	18.02	344.24	106.81
Mole Flows	lbmol/hr	16.51	197.99	19.10	178.89	153.12	25.77	25.77	25.77	67.50	67.50	67.50	55.23	12.27	12.27	12.27	13.88	37.46	6.57
Mass Flows	lb/hr	5681.30	90517.70	8739.43	81778.27	70000.00	11778.27	11778.27	11778.27	61106.70	61106.70	61106.70	49997.85	11106.70	11106.70	11106.70	250.00	12894.35	701.23
H2	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N2	lb/hr	0.00	0.02	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
O2	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H2S	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO2	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.02
C3	lb/hr	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.16
IC4	lb/hr	0.01	0.05	0.01	0.05	0.04	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.16
NC4	lb/hr	0.01	0.02	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.18	0.87
IC5	lb/hr	0.01	0.03	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.85	1.36
NC5	lb/hr	0.02	0.06	0.01	0.05	0.05	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.10	2.27
H2O	lb/hr	0.16	0.84	0.08	0.75	0.65	0.11	0.11	0.11	0.35	0.35	0.35	0.29	0.06	0.06	0.06	250.00	4.07	66.94
PC107F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82	0.60
PC138F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.41	3.23
PC163F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.85	4.27
PC188F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.35	6.07
PC213F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.54	9.07
PC237F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.60	10.49
PC262F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.81	10.53
PC287F	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.40	9.40
PC312F	lb/hr	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.31	8.47
PC337F	lb/hr	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.58	10.43
PC362F	lb/hr	0.03	0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.02	11.60
PC388F	lb/hr	0.09	0.03	0.00	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.76	14.47
PC413F	lb/hr	0.23	0.06	0.01	0.05	0.05	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.31	15.96
PC437F	lb/hr	0.70	0.12	0.01	0.11	0.10	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.65	18.16
PC462F	lb/hr	2.04	0.26	0.02	0.24	0.20	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.15	20.20
PC487F	lb/hr	5.14	0.53	0.05	0.48	0.41	0.07	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.61	20.84
PC512F	lb/hr	11.86	1.20	0.11	1.09	0.93	0.16	0.16	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	71.63	22.71
PC537F	lb/hr	21.41	2.48	0.23	2.25	1.92	0.32	0.32	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	86.04	22.15
PC562F	lb/hr	37.88	5.61	0.53	5.09	4.35	0.73	0.73	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	112.86	23.13
PC587F	lb/hr	65.17	13.16	1.24	11.93	10.21	1.72	1.72	1.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	155.42	25.01
PC612F	lb/hr	106.29	30.45	2.87	27.58	23.61	3.98	3.98	3.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	218.22	27.25
PC638F	lb/hr	171.23	71.94	6.79	65.15	55.75	9.39	9.39	9.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	333.98	32.00
PC664F	lb/hr	297.13	192.31	18.20	174.10	149.00	25.10	25.10	25.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	629.34	45.24
PC686F	lb/hr	496.94	477.09	45.29	431.80	369.55	62.24	62.24	62.24	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	1176.74	65.61
PC713F	lb/hr	714.97	1121.79	106.89	1014.89	868.61	146.28	146.28	146.28	0.04	0.04	0.04	0.03	0.01	0.01	0.01	0.00	1689.42	69.13

	Units	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
PC738F	lb/hr	796.09	2016.51	192.85	1823.65	1560.81	262.84	262.84	262.84	0.11	0.11	0.11	0.09	0.02	0.02	0.02	0.00	1685.92	51.09
PC762F	lb/hr	770.66	3147.22	302.02	2845.20	2435.16	410.04	410.04	410.04	0.28	0.28	0.28	0.23	0.05	0.05	0.05	0.00	1477.00	33.10
PC788F	lb/hr	605.57	4669.19	449.78	4219.40	3611.39	608.02	608.02	608.02	0.81	0.81	0.81	0.67	0.15	0.15	0.15	0.00	1120.35	16.89
PC825F	lb/hr	861.45	13293.58	1283.34	12010.24	10279.80	1730.44	1730.44	1730.44	6.78	6.78	6.78	5.55	1.23	1.23	1.23	0.00	1669.24	15.60
PC875F	lb/hr	429.69	16182.93	1563.56	14619.37	12513.36	2106.01	2106.01	2106.01	44.70	44.70	44.70	36.58	8.13	8.13	8.13	0.00	1000.46	4.85
PC925F	lb/hr	186.25	16682.31	1611.36	15070.95	12900.19	2170.76	2170.76	2170.76	286.68	286.68	286.68	234.58	52.11	52.11	52.11	0.00	562.76	1.38
PC973F	lb/hr	72.00	14777.80	1425.53	13352.28	11429.60	1922.68	1922.68	1922.68	1373.52	1373.52	1373.52	1123.90	249.65	249.65	249.65	0.00	305.39	0.38
PC1020F	lb/hr	23.15	10410.44	1003.97	9406.47	8052.62	1353.85	1353.85	1353.85	3787.87	3787.87	3787.87	3099.48	688.48	688.48	688.48	0.00	161.18	0.11
PC1075F	lb/hr	4.36	4972.61	482.94	4489.66	3843.60	646.06	646.06	646.06	6613.17	6613.17	6613.17	5410.73	1202.00	1202.00	1202.00	0.00	71.39	0.02
PC1125F	lb/hr	0.64	1762.02	173.27	1588.75	1360.12	228.63	228.63	228.63	7038.36	7038.36	7038.36	5758.61	1279.29	1279.29	1279.29	0.00	29.14	0.00
PC1170F	lb/hr	0.10	573.17	57.10	516.07	441.80	74.27	74.27	74.27	6438.55	6438.55	6438.55	5268.44	1170.26	1170.26	1170.26	0.00	12.67	0.00
PC1247F	lb/hr	0.00	106.84	10.84	96.00	82.18	13.82	13.82	13.82	8912.92	8912.92	8912.92	7293.13	1620.00	1620.00	1620.00	0.00	5.23	0.00
PC1345F	lb/hr	0.00	4.66	0.48	4.18	3.58	0.60	0.60	0.60	6438.27	6438.27	6438.27	5267.63	1170.21	1170.21	1170.21	0.00	0.81	0.00
PC1453F	lb/hr	0.00	0.28	0.03	0.25	0.21	0.04	0.04	0.04	4712.02	4712.02	4712.02	3855.25	856.45	856.45	856.45	0.00	0.14	0.00
PC1738F	lb/hr	0.00	0.04	0.00	0.03	0.03	0.00	0.00	0.00	15452.26	15452.26	15452.26	12642.66	2808.59	2808.59	2808.59	0.00	0.18	0.00
Volume Flow	bbl/day	444.81	8080.81	806.19	7274.62	6226.88	1047.74	887.75	887.75	4871.58	4871.58	4806.89	3933.03	873.70	774.88	774.88	7617.24	1331.57	9537.24
Vapor Phase																			
Heat capacity, mixture	Btu/lbmol-R																9.383		67.298
Viscosity, mixture	cP																0.015		0.014
Thermal conductivity, mixture	Btu-ft/hr-sqft-R																0.019		0.019
Liquid Phase																			
Standard liquid volume flow	bbl/day	434.000	6669.996	643.996	6026.000	5158.000	868.000	868.000	868.000	4125.146	4125.146	4125.146	3375.252	749.783	749.783	749.783		987.140	
Heat capacity, mixture	Btu/lbmol-R	158.343	310.202	310.202	298.203	298.203	298.203	204.552	204.552	585.940	585.940	573.598	573.598	573.598	406.403	406.403		241.397	
Viscosity, mixture	cP	11.268	0.517	0.517	0.692	0.692	0.692	69.186	69.186	11.658	11.658	14.232	14.232	14.232			0.000	0.283	
Thermal conductivity, mixture	Btu-ft/hr-sqft-R	0.060	0.042	0.042	0.045	0.045	0.045	0.057	0.057	0.040	0.040	0.041	0.041	0.041	0.048	0.048		0.039	
Surface tension, mixture	dyne/cm	30.80	14.58	14.58	16.93	16.93	16.93	32.01	32.01	16.37	16.37	17.54	17.54	17.54	31.18	31.18		11.07	
ASTM D86 0%, liquid volume percent, for a petroleum mixture	F	147.33	543.34	543.34	545.07	545.07	545.07	545.07	545.07	817.62	817.62	817.62	817.62	817.62	817.62	817.62			
ASTM D86 5%, liquid volume percent, for a petroleum mixture	F	664.14	786.55	786.55	786.10	786.10	786.10	786.10	786.10	1029.69	1029.69	1029.69	1029.69	1029.69	1029.69	1029.69		663.36	
ASTM D86 10%, liquid volume percent, for a petroleum mixture	F	676.93	797.44	797.44	797.00	797.00	797.00	797.00	797.00	1043.26	1043.26	1043.26	1043.26	1043.26	1043.26	1043.26		679.45	
ASTM D86 30%, liquid volume percent, for a petroleum mixture	F	705.75	837.99	837.99	837.68	837.68	837.68	837.68	837.68	1101.35	1101.35	1101.35	1101.35	1101.35	1101.35	1101.35		706.25	
ASTM D86 50%, liquid volume percent, for a petroleum mixture	F	727.82	876.21	876.21	875.96	875.96	875.96	875.96	875.96	1182.32	1182.32	1182.32	1182.32	1182.32	1182.32	1182.32		729.07	
ASTM D86 70%, liquid volume percent, for a petroleum mixture	F	758.12	919.29	919.29	919.02	919.02	919.02	919.02	919.02	1360.32	1360.32	1360.32	1360.32	1360.32	1360.32	1360.32		767.05	
ASTM D86 90%, liquid volume percent, for a petroleum mixture	F	824.42	987.68	987.68	987.01	987.01	987.01	987.01	987.01	1897.04	1897.04	1897.04	1897.04	1897.04	1897.04	1897.04		859.93	
ASTM D86 95%, liquid volume percent, for a petroleum mixture	F	856.45	1020.26	1020.26	1019.49	1019.49	1019.49	1019.49	1019.49	1958.91	1958.91	1958.91	1958.91	1958.91	1958.91	1958.91		898.60	
ASTM D86 100%, liquid volume percent, for a petroleum mixture	F	936.85	1109.97	1109.97	1108.86	1108.86	1108.86	1108.86	1108.86	2094.50	2094.50	2094.50	2094.50	2094.50	2094.50	2094.50		1025.87	
Flash point, Pennsky-Martens method	F	337.08	444.29	444.29	444.20	444.20	444.20	444.19	444.19	626.47	626.47	626.46	626.46	626.46	626.47	626.47		316.93	

CRC Crude & Vacuum Units				
Detailed Material Balance				
Case: 100% WTI				
Rev B				
12/20/2019				
	Units	71	72	73
Description				
		Saturated	AGO	Diesel
		Steam to	Draw from	from
		T-4004	T-4001	AC-4002A
		Vapor Phase	Liquid Phase	Liquid Phase
Temperature	F	340.00	660.78	130.00
Pressure	psia	64.70	34.47	94.70
Molar Vapor Fraction		1.00	0.00	0.00
Molar Liquid Fraction		0.00	1.00	1.00
Molar Solid Fraction		0.00	0.00	0.00
Mass Vapor Fraction		1.00	0.00	0.00
Mass Liquid Fraction		0.00	1.00	1.00
Mass Solid Fraction		0.00	0.00	0.00
Molar Enthalpy	Btu/lbmol	-102021.85	68090.45	-30234.44
Mass Enthalpy	Btu/lb	-5663.07	207.89	-124.04
Molar Entropy	Btu/lbmol-R	-10.52	102.86	-4.35
Mass Entropy	Btu/lb-R	-0.58	0.31	-0.02
Molar Density	lbmol/cuft	0.01	0.12	0.21
Mass Density	lb/cuft	0.14	40.88	51.92
Enthalpy Flow	MMBtu/hr	-0.40	2.81	-1.52
Average MW		18.02	327.53	243.75
Mole Flows	lbmol/hr	3.89	23.80	50.38
Mass Flows	lb/hr	70.00	13525.58	12280.92
H2	lb/hr	0.00	0.00	0.00
N2	lb/hr	0.00	0.00	0.00
O2	lb/hr	0.00	0.00	0.00
H2S	lb/hr	0.00	0.00	0.00
CO2	lb/hr	0.00	0.00	0.00
C1	lb/hr	0.00	0.00	0.00
C2	lb/hr	0.00	0.05	0.00
C3	lb/hr	0.00	0.37	0.00
IC4	lb/hr	0.00	0.38	0.00
NC4	lb/hr	0.00	2.04	0.00
IC5	lb/hr	0.00	3.21	0.01
NC5	lb/hr	0.00	5.37	0.02
H2O	lb/hr	70.00	1.01	20.83
PC107F	lb/hr	0.00	1.42	0.01
PC138F	lb/hr	0.00	7.64	0.06
PC163F	lb/hr	0.00	10.12	0.15
PC188F	lb/hr	0.00	14.42	0.35
PC213F	lb/hr	0.00	21.61	0.83
PC237F	lb/hr	0.00	25.09	1.51
PC262F	lb/hr	0.00	25.35	2.48
PC287F	lb/hr	0.00	22.80	3.67
PC312F	lb/hr	0.00	20.78	5.55
PC337F	lb/hr	0.00	26.00	11.36
PC362F	lb/hr	0.00	29.62	20.47
PC388F	lb/hr	0.00	38.23	40.44
PC413F	lb/hr	0.00	44.27	69.24
PC437F	lb/hr	0.00	53.82	120.34
PC462F	lb/hr	0.00	65.36	205.93
PC487F	lb/hr	0.00	75.45	341.75
PC512F	lb/hr	0.00	94.34	670.40
PC537F	lb/hr	0.00	108.19	1247.88
PC562F	lb/hr	0.00	135.99	1729.96
PC587F	lb/hr	0.00	180.43	1815.38
PC612F	lb/hr	0.00	245.46	1736.45
PC638F	lb/hr	0.00	365.98	1600.04
PC664F	lb/hr	0.00	674.59	1365.12
PC686F	lb/hr	0.00	1242.34	932.96
PC713F	lb/hr	0.00	1758.56	279.78

	Units	71	72	73
PC738F	lb/hr	0.00	1737.01	50.18
PC762F	lb/hr	0.00	1510.11	7.25
PC788F	lb/hr	0.00	1137.24	0.47
PC825F	lb/hr	0.00	1684.84	0.04
PC875F	lb/hr	0.00	1005.31	0.00
PC925F	lb/hr	0.00	564.14	0.00
PC973F	lb/hr	0.00	305.78	0.00
PC1020F	lb/hr	0.00	161.29	0.00
PC1075F	lb/hr	0.00	71.42	0.00
PC1125F	lb/hr	0.00	29.14	0.00
PC1170F	lb/hr	0.00	12.67	0.00
PC1247F	lb/hr	0.00	5.23	0.00
PC1345F	lb/hr	0.00	0.81	0.00
PC1453F	lb/hr	0.00	0.14	0.00
PC1738F	lb/hr	0.00	0.18	0.00
Volume Flow	bbl/day	2132.83	1414.38	1011.16
Vapor Phase				
Heat capacity, mixture	Btu/lbmol-R	9.383		
Viscosity, mixture	cP	0.015		
Thermal conductivity, mixture	Btu-ft/hr-sqft-R	0.019		
Liquid Phase				
Standard liquid volume flow	bbl/day		1038.294	983.472
Heat capacity, mixture	Btu/lbmol-R		232.066	116.313
Viscosity, mixture	cP		0.254	2.886
Thermal conductivity, mixture	Btu-ft/hr-sqft-R		0.037	0.063
Surface tension, mixture	dyne/cm		10.23	28.66
ASTM D86 0%, liquid volume percent, for a petroleum mixture	F			-314.38
ASTM D86 5%, liquid volume percent, for a petroleum mixture	F		576.21	524.52
ASTM D86 10%, liquid volume percent, for a petroleum mixture	F		644.74	535.13
ASTM D86 30%, liquid volume percent, for a petroleum mixture	F		695.40	560.06
ASTM D86 50%, liquid volume percent, for a petroleum mixture	F		720.18	580.79
ASTM D86 70%, liquid volume percent, for a petroleum mixture	F		756.91	606.11
ASTM D86 90%, liquid volume percent, for a petroleum mixture	F		851.22	640.31
ASTM D86 95%, liquid volume percent, for a petroleum mixture	F		890.22	658.74
ASTM D86 100%, liquid volume percent, for a petroleum mixture	F		1047.50	705.62
Flash point, Pennsky-Martens method	F			225.10