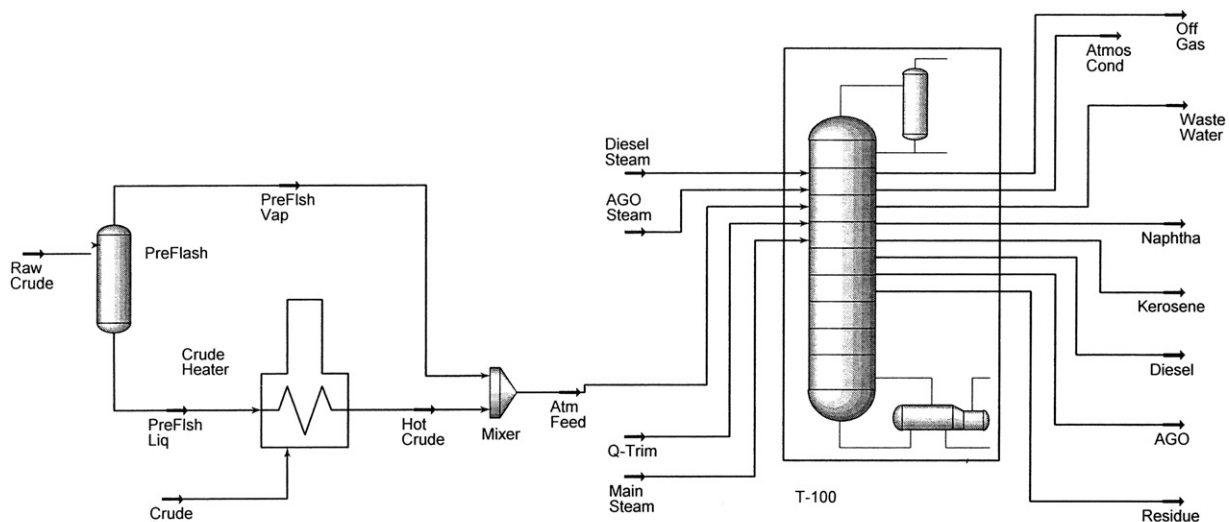


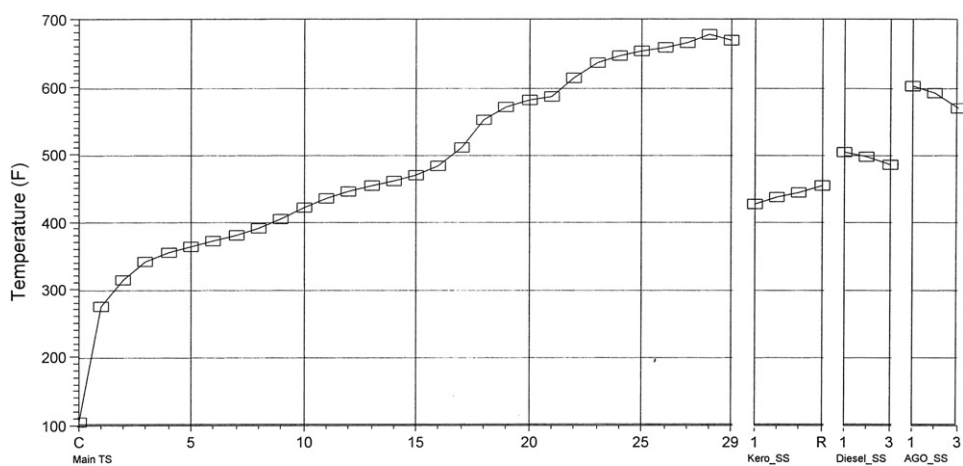
# Appendix L

Simulation Results Using Honeywell UniSim<sup>®</sup> Design Suites R360.1, R370 and R380.

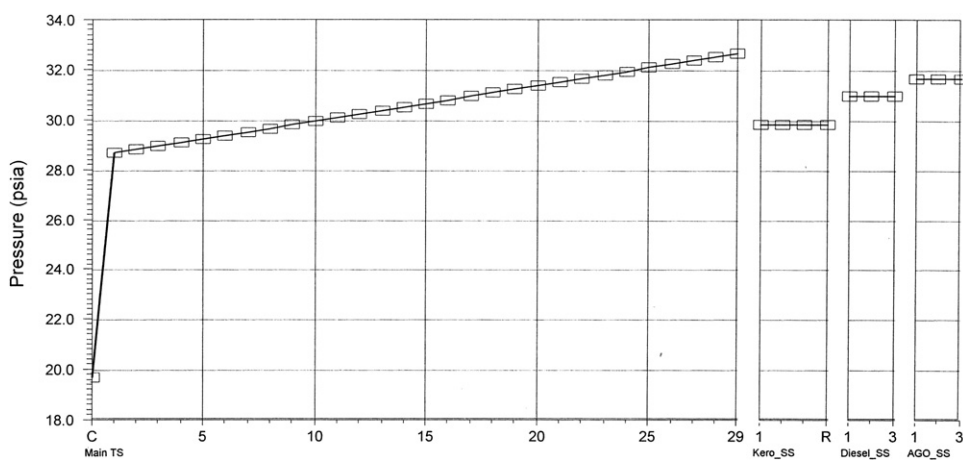
1. Simulation Results of Fractionation of Crude Distillation Unit (crude-distillation-unit.usc).
2. Simulation Results of Gas Processing (gas-processing.usc).
3. Simulation Results of Reactive Distillation of Methyl Acetate Production (reactive-distillation.usc).
4. Simulation Results of Absorption of Hydrocarbons with Lean Oil (Example 11-4.usc).
5. Simulation Results of Sour Water Stripping unit (Sour-Water-Unit.usc).



**Figure L-1** Process flow diagram of a crude distillation unit



**Figure L-2** Temperature vs. Tray Position from Top



**Figure L-3** Pressure vs. Tray Position from Top



1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc							
2			Unit Set: NewUser							
3			Date/Time: Saturday Jul 4 2009, 10:28:34							
4										
5										
6	<b>Column Sub-Flowsheet: T-100 @Main</b>									
7										
8										
9	<b>CONNECTIONS</b>									
10	Inlet Stream									
11										
12	STREAM NAME	Stage	FROM UNIT OPERATION							
13	Main Steam	29_Main TS								
14	Q-Trim	28_Main TS								
15	Atm Feed	28_Main TS	Mixer							
16	Kero_SS_Energy	Kero_SS_Reb								
17	Diesel Steam	3_Diesel_SS								
18	AGO Steam	3_AGO_SS								
19	Outlet Stream									
20	STREAM NAME	Stage	TO UNIT OPERATION							
21	Residue	29_Main TS								
22	Atmos Cond	Condenser								
23	Off Gas	Condenser								
24	Waste Water	Condenser								
25	Naphtha	Condenser								
26	Kerosene	Kero_SS_Reb								
27	Diesel	3_Diesel_SS								
28	AGO	3_AGO_SS								
29	PA_1_Q	PA_1								
30	PA_2_Q	PA_2								
31	PA_3_Q	PA_3								
32										
33	<b>MONITOR</b>									
34	Specifications Summary									
35		Specified Value	Current Value	Wt. Error	Wt. Tol.	Abs. Tol.	Active	Estimate	Used	
36	Kero_SS Prod Flow	9300 barrel/day *	9300 barrel/day	6.311e-006	1.000e-002 *	151.0 barrel/day *	On	On	On	
37	Diesel_SS Prod Flow	1.925e+004 barrel/day *	1.925e+004 barrel/day	4.570e-006	1.000e-002 *	151.0 barrel/day *	On	On	On	
38	AGO_SS Prod Flow	4500 barrel/day *	4500 barrel/day	6.846e-006	1.000e-002 *	151.0 barrel/day *	On	On	On	
39	PA_1_Rate(Pa)	5.000e+004 barrel/day *	5.000e+004 barrel/day	5.225e-006	1.000e-002 *	151.0 barrel/day *	On	On	On	
40	PA_1_Duty(Pa)	-5.500e+007 Btu/hr *	-5.500e+007 Btu/hr	-0.0000	1.000e-002 *	0.9478 Btu/hr *	On	On	On	
41	PA_2_Rate(Pa)	3.000e+004 barrel/day *	3.000e+004 barrel/day	5.503e-006	1.000e-002 *	151.0 barrel/day *	On	On	On	
42	PA_2_Duty(Pa)	-3.500e+007 Btu/hr *	-3.500e+007 Btu/hr	-0.0000	1.000e-002 *	0.9478 Btu/hr *	On	On	On	
43	PA_3_Rate(Pa)	3.000e+004 barrel/day *	3.000e+004 barrel/day	6.861e-006	1.000e-002 *	151.0 barrel/day *	On	On	On	
44	PA_3_Duty(Pa)	-3.500e+007 Btu/hr *	-3.500e+007 Btu/hr	-0.0000	1.000e-002 *	0.9478 Btu/hr *	On	On	On	
45	Naphtha Prod Rate	2.300e+004 barrel/day *	2.300e+004 barrel/day	9.978e-007	1.000e-002 *	151.0 barrel/day *	On	On	On	
46	Liquid Flow	3500 barrel/day *	3500 barrel/day	3.129e-006	1.000e-002 *	151.0 barrel/day *	On	On	On	
47	Kero Reb Duty	7.500e+006 Btu/hr *	7.500e+006 Btu/hr	5.160e-002	1.000e-002 *	9.478 Btu/hr *	On	On	On	
48	Vap Prod Flow	0.0000 lbmole/hr *	3.799e-019 lbmole/hr	-2.465e-007	1.000e-002 *	2.205 lbmole/hr *	On	On	On	
49	Reflux Ratio	1.000 *	0.7065	-0.2935	1.000e-002 *	1.000e-002 *	Off	On	Off	
50										
51	<b>SPECS</b>									
52	Column Specification Parameters									
53										
54	<b>Kero_SS Prod Flow</b>									
55	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---		
56	Stream:	Kerosene	Flow Basis:	Std Ideal Vol						
57										
58	<b>Diesel_SS Prod Flow</b>									
59	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---		
60	Stream:	Diesel	Flow Basis:	Std Ideal Vol						
61										
62	<b>AGO_SS Prod Flow</b>									
63	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---		
64	Stream:	AGO	Flow Basis:	Std Ideal Vol						
65										
66	<b>PA_1_Rate(Pa)</b>									
67	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---		
68	Spec Type:	Flow Rate	Pumparound:	PA_1	Flow Basis:	Std Ideal Vol				
69										
70										

1			Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc	
2	Company Name Not Available		Unit Set: NewUser	
3	Calgary, Alberta		Date/Time: Saturday Jul 4 2009, 10:28:34	
4	CANADA			
5				
6				
7	<b>Column Sub-Flowsheet: T-100 @Main (continued)</b>			
8				
9	Column Specification Parameters			
10	PA_1_Duty(Pa)			
11				
12	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary Lower Bound: --- Upper Bound: ---
13	Spec Type:	Duty	Pumparound:	PA_1
14	PA_2_Rate(Pa)			
15				
16	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary Lower Bound: --- Upper Bound: ---
17	Spec Type:	Flow Rate	Pumparound:	PA_2 Flow Basis: Std Ideal Vol
18	PA_2_Duty(Pa)			
19				
20	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary Lower Bound: --- Upper Bound: ---
21	Spec Type:	Duty	Pumparound:	PA_2
22	PA_3_Rate(Pa)			
23				
24	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary Lower Bound: --- Upper Bound: ---
25	Spec Type:	Flow Rate	Pumparound:	PA_3 Flow Basis: Std Ideal Vol
26	PA_3_Duty(Pa)			
27				
28	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary Lower Bound: --- Upper Bound: ---
29	Spec Type:	Duty	Pumparound:	PA_3
30	Naphtha Prod Rate			
31				
32	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary Lower Bound: --- Upper Bound: ---
33	Stream:	Naphtha	Flow Basis:	Std Ideal Vol
34	Liquid Flow			
35				
36	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary Lower Bound: --- Upper Bound: ---
37	Stage:	27__Main TS	Flow Basis:	Std Ideal Vol Liquid Specification: Light
38	Kero Reb Duty			
39				
40	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary Lower Bound: --- Upper Bound: ---
41	Energy Stream:	Kero_SS_Energy		
42	Vap Prod Flow			
43				
44	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary Lower Bound: --- Upper Bound: ---
45	Stage:	Condenser	Flow Basis:	Molar
46	Reflux Ratio			
47				
48	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary Lower Bound: --- Upper Bound: ---
49	Stage:	Condenser	Flow Basis:	Molar Liquid Specification: Light
50	SUBCOOLING			
51				
52			Condenser	
53	Degrees of Subcooling			---
54	Subcool to			---
55	User Variables			
56				
57	PROFILES			
58				
59	General Parameters			
60	Sub-Flow Sheet:	T-100 (COL1)	Number of Stages:	29 *
61	Profile Estimates			
62		Temperature	Net Liquid	Net Vapour
63		(F)	(barrel/day)	(barrel/day)
64	Condenser	100.0 *	1.625e+004	4.761e-003 *
65	1__Main TS	250.0 *	9.299e+004	4.011e+004
66	2__Main TS	315.7	5.124e+004	6.685e+004
67	3__Main TS	342.0	5.307e+004	7.510e+004
68	4__Main TS	355.4	5.342e+004	7.694e+004
69	5__Main TS	364.8	5.318e+004	7.729e+004
70	6__Main TS	373.0	5.249e+004	7.704e+004



1	Company Name Not Available Calgary, Alberta CANADA			Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc				
2				Unit Set: NewUser				
3				Date/Time: Saturday Jul 4 2009, 10:28:34				
4								
5								
6								
7	<b>Column Sub-Flowsheet: T-100 @Main (continued)</b>							
8								
9	<b>Profile Estimates</b>							
10				Temperature	Net Liquid		Net Vapour	
11				(F)	(barrel/day)		(barrel/day)	
12	7__Main TS			381.8	5.131e+004		7.636e+004	
13	8__Main TS			392.6	4.964e+004		7.518e+004	
14	9__Main TS			405.8	3.600e+004		7.106e+004	
15	10__Main TS			422.9	3.495e+004		6.917e+004	
16	11__Main TS			436.7	3.434e+004		6.811e+004	
17	12__Main TS			447.0	3.377e+004		6.750e+004	
18	13__Main TS			455.0	3.300e+004		6.693e+004	
19	14__Main TS			462.4	3.174e+004		6.616e+004	
20	15__Main TS			470.9	2.929e+004		6.490e+004	
21	16__Main TS			484.2	7.171e+004		6.245e+004	
22	17__Main TS			512.1	1.668e+004		7.162e+004	
23	18__Main TS			553.1	1.378e+004		6.889e+004	
24	19__Main TS			572.9	1.214e+004		6.599e+004	
25	20__Main TS			582.4	1.078e+004		6.435e+004	
26	21__Main TS			588.3	5.101e+004		6.299e+004	
27	22__Main TS			615.5	1.553e+004		7.177e+004	
28	23__Main TS			637.5	1.354e+004		7.207e+004	
29	24__Main TS			647.8	1.176e+004		7.007e+004	
30	25__Main TS			654.4	1.015e+004		6.830e+004	
31	26__Main TS			659.7	7984		6.669e+004	
32	27__Main TS			666.2	3500		6.452e+004	
33	28__Main TS			679.4	4.665e+004		6.004e+004	
34	29__Main TS			600.0	4.398e+004		3190	
35	1__Kero_SS			428.8	1.303e+004		2455	
36	2__Kero_SS			438.5	1.356e+004		3727	
37	3__Kero_SS			446.0	1.388e+004		4261	
38	Kero_SS_Reb			456.5	9300		4582	
39	1__Diesel_SS			504.6	2.130e+004		3254	
40	2__Diesel_SS			498.5	2.059e+004		2252	
41	3__Diesel_SS			486.1	1.925e+004		1543	
42	1__AGO_SS			602.8	5286		1445	
43	2__AGO_SS			592.1	4964		957.7	
44	3__AGO_SS			571.0	4500		635.4	
45								
46	<b>EFFICIENCIES</b>							
47	<b>Stage Efficiencies</b>							
48	Stages	Overall Efficiency	Methane	Ethane	Propane	i-Butane	n-Butane	
49	Condenser	1.000	1.000	1.000	1.000	1.000	1.000	
50	1__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
51	2__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
52	3__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
53	4__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
54	5__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
55	6__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
56	7__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
57	8__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
58	9__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
59	10__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
60	11__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
61	12__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
62	13__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
63	14__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
64	15__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
65	16__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
66	17__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
67	18__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
68	19__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
69	20__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
70	21__Main TS	1.000	1.000	1.000	1.000	1.000	1.000	

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Company Name Not Available

Calgary, Alberta

CANADA

Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc

Unit Set: NewUser

Date/Time: Saturday Jul 4 2009, 10:28:34

Column Sub-Flowsheet: T-100 @Main (continued)

Stage Efficiencies						
Stages	Overall Efficiency	Methane	Ethane	Propane	i-Butane	n-Butane
22_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
23_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
24_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
25_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
26_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
27_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
28_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
29_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
1_Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
2_Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
3_Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
Kero_SS_Reb	1.000	1.000	1.000	1.000	1.000	1.000
1_Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
2_Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
3_Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
1_AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
2_AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
3_AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
Stages	Overall Efficiency	H2O	NBP[0]49*	NBP[0]79*	NBP[0]111*	NBP[0]144*
Condenser	1.000	1.000	1.000	1.000	1.000	1.000
1_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
2_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
3_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
4_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
5_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
6_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
7_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
8_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
9_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
10_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
11_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
12_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
13_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
14_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
15_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
16_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
17_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
18_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
19_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
20_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
21_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
22_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
23_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
24_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
25_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
26_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
27_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
28_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
29_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
1_Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
2_Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
3_Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
Kero_SS_Reb	1.000	1.000	1.000	1.000	1.000	1.000
1_Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
2_Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
3_Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
1_AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
2_AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
3_AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000



1	Company Name Not Available Calgary, Alberta CANADA			Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc			
2				Unit Set: NewUser			
3							
4				Date/Time: Saturday Jul 4 2009, 10:28:34			
5							
6	Column Sub-Flowsheet: T-100 @Main (continued)						
7							
8							
9	Stage Efficiencies						
10	Stages	Overall Efficiency	NBP[0]176*	NBP[0]208*	NBP[0]240*	NBP[0]272*	NBP[0]304*
11	Condenser	1.000	1.000	1.000	1.000	1.000	1.000
12	1_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
13	2_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
14	3_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
15	4_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
16	5_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
17	6_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
18	7_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
19	8_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
20	9_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
21	10_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
22	11_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
23	12_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
24	13_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
25	14_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
26	15_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
27	16_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
28	17_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
29	18_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
30	19_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
31	20_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
32	21_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
33	22_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
34	23_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
35	24_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
36	25_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
37	26_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
38	27_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
39	28_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
40	29_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
41	1_Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
42	2_Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
43	3_Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
44	Kero_SS_Reb	1.000	1.000	1.000	1.000	1.000	1.000
45	1_Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
46	2_Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
47	3_Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
48	1_AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
49	2_AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
50	3_AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
51	Stages	Overall Efficiency	NBP[0]336*	NBP[0]368*	NBP[0]400*	NBP[0]433*	NBP[0]464*
52	Condenser	1.000	1.000	1.000	1.000	1.000	1.000
53	1_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
54	2_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
55	3_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
56	4_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
57	5_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
58	6_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
59	7_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
60	8_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
61	9_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
62	10_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
63	11_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
64	12_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
65	13_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
66	14_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
67	15_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
68	16_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
69	17_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
70	18_Main TS	1.000	1.000	1.000	1.000	1.000	1.000

1	Company Name Not Available Calgary, Alberta CANADA			Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc			
2				Unit Set: NewUser			
3				Date/Time: Saturday Jul 4 2009, 10:28:34			
4							
5							
6							
7							
8							
9	Stage Efficiencies						
10	Stages	Overall Efficiency	NBP[0]336*	NBP[0]368*	NBP[0]400*	NBP[0]433*	NBP[0]464*
11	19__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
12	20__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
13	21__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
14	22__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
15	23__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
16	24__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
17	25__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
18	26__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
19	27__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
20	28__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
21	29__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
22	1__Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
23	2__Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
24	3__Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
25	Kero_SS_Reb	1.000	1.000	1.000	1.000	1.000	1.000
26	1__Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
27	2__Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
28	3__Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
29	1__AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
30	2__AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
31	3__AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
32	Stages	Overall Efficiency	NBP[0]496*	NBP[0]528*	NBP[0]560*	NBP[0]592*	NBP[0]624*
33	Condenser	1.000	1.000	1.000	1.000	1.000	1.000
34	1__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
35	2__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
36	3__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
37	4__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
38	5__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
39	6__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
40	7__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
41	8__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
42	9__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
43	10__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
44	11__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
45	12__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
46	13__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
47	14__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
48	15__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
49	16__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
50	17__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
51	18__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
52	19__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
53	20__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
54	21__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
55	22__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
56	23__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
57	24__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
58	25__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
59	26__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
60	27__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
61	28__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
62	29__Main TS	1.000	1.000	1.000	1.000	1.000	1.000
63	1__Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
64	2__Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
65	3__Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
66	Kero_SS_Reb	1.000	1.000	1.000	1.000	1.000	1.000
67	1__Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
68	2__Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
69	3__Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
70	1 AGO SS	1.000	1.000	1.000	1.000	1.000	1.000



1	Company Name Not Available Calgary, Alberta CANADA			Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc			
2				Unit Set: NewUser			
3							
4				Date/Time: Saturday Jul 4 2009, 10:28:34			
5							
6	Column Sub-Flowsheet: T-100 @Main (continued)						
7							
8							
9	Stage Efficiencies						
10	Stages	Overall Efficiency	NBP[0]496*	NBP[0]528*	NBP[0]560*	NBP[0]592*	NBP[0]624*
11	2_AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
12	3_AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
13	Stages	Overall Efficiency	NBP[0]656*	NBP[0]688*	NBP[0]720*	NBP[0]752*	NBP[0]784*
14	Condenser	1.000	1.000	1.000	1.000	1.000	1.000
15	1_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
16	2_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
17	3_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
18	4_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
19	5_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
20	6_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
21	7_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
22	8_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
23	9_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
24	10_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
25	11_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
26	12_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
27	13_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
28	14_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
29	15_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
30	16_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
31	17_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
32	18_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
33	19_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
34	20_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
35	21_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
36	22_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
37	23_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
38	24_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
39	25_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
40	26_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
41	27_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
42	28_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
43	29_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
44	1_Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
45	2_Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
46	3_Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
47	Kero_SS_Reb	1.000	1.000	1.000	1.000	1.000	1.000
48	1_Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
49	2_Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
50	3_Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
51	1_AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
52	2_AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
53	3_AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
54	Stages	Overall Efficiency	NBP[0]830*	NBP[0]888*	NBP[0]947*	NBP[0]1009*	NBP[0]1062*
55	Condenser	1.000	1.000	1.000	1.000	1.000	1.000
56	1_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
57	2_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
58	3_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
59	4_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
60	5_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
61	6_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
62	7_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
63	8_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
64	9_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
65	10_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
66	11_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
67	12_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
68	13_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
69	14_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
70	15_Main TS	1.000	1.000	1.000	1.000	1.000	1.000

1	Company Name Not Available Calgary, Alberta CANADA			Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc			
2				Unit Set: NewUser			
3							
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5				Date/Time: Saturday Jul 4 2009, 10:28:34			
6							
7							
8	<b>Column Sub-Flowsheet: T-100 @Main (continued)</b>						
9	<b>Stage Efficiencies</b>						
10	Stages	Overall Efficiency	NBP[0]830*	NBP[0]888*	NBP[0]947*	NBP[0]1009*	NBP[0]1062*
11	16_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
12	17_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
13	18_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
14	19_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
15	20_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
16	21_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
17	22_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
18	23_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
19	24_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
20	25_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
21	26_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
22	27_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
23	28_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
24	29_Main TS	1.000	1.000	1.000	1.000	1.000	1.000
25	1_Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
26	2_Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
27	3_Kero_SS	1.000	1.000	1.000	1.000	1.000	1.000
28	Kero_SS_Reb	1.000	1.000	1.000	1.000	1.000	1.000
29	1_Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
30	2_Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
31	3_Diesel_SS	1.000	1.000	1.000	1.000	1.000	1.000
32	1_AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
33	2_AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
34	3_AGO_SS	1.000	1.000	1.000	1.000	1.000	1.000
35	Stages	Overall Efficiency	NBP[0]1124*				
36	Condenser	1.000	1.000				
37	1_Main TS	1.000	1.000				
38	2_Main TS	1.000	1.000				
39	3_Main TS	1.000	1.000				
40	4_Main TS	1.000	1.000				
41	5_Main TS	1.000	1.000				
42	6_Main TS	1.000	1.000				
43	7_Main TS	1.000	1.000				
44	8_Main TS	1.000	1.000				
45	9_Main TS	1.000	1.000				
46	10_Main TS	1.000	1.000				
47	11_Main TS	1.000	1.000				
48	12_Main TS	1.000	1.000				
49	13_Main TS	1.000	1.000				
50	14_Main TS	1.000	1.000				
51	15_Main TS	1.000	1.000				
52	16_Main TS	1.000	1.000				
53	17_Main TS	1.000	1.000				
54	18_Main TS	1.000	1.000				
55	19_Main TS	1.000	1.000				
56	20_Main TS	1.000	1.000				
57	21_Main TS	1.000	1.000				
58	22_Main TS	1.000	1.000				
59	23_Main TS	1.000	1.000				
60	24_Main TS	1.000	1.000				
61	25_Main TS	1.000	1.000				
62	26_Main TS	1.000	1.000				
63	27_Main TS	1.000	1.000				
64	28_Main TS	1.000	1.000				
65	29_Main TS	1.000	1.000				
66	1_Kero_SS	1.000	1.000				
67	2_Kero_SS	1.000	1.000				
68	3_Kero_SS	1.000	1.000				
69	Kero_SS_Reb	1.000	1.000				
70	1_Diesel_SS	1.000	1.000				



1	Company Name Not Available Calgary, Alberta CANADA			Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc		
2				Unit Set: NewUser		
3				Date/Time: Saturday Jul 4 2009, 10:28:34		
4						
5						
6	<b>Column Sub-Flowsheet: T-100 @Main (continued)</b>					
7						
8						
9	<b>Stage Efficiencies</b>					
10	Stages	Overall Efficiency	NBP[0]1124*			
11	2__Diesel_SS	1.000	1.000			
12	3__Diesel_SS	1.000	1.000			
13	1__AGO_SS	1.000	1.000			
14	2__AGO_SS	1.000	1.000			
15	3__AGO_SS	1.000	1.000			
16	<b>SOLVER</b>					
17						
18	Column Solving Algorithm: Legacy Inside-Out					
19	<b>Solving Options</b>			<b>Acceleration Parameters</b>		
20	Maximum Iterations: 10000			Accelerate K Value & H Model Parameters: Off		
21	Equilibrium Error Tolerance: 1.000e-05					
22	Heat/Spec Error Tolerance: 5.000e-004					
23	Save Solutions as Initial Estimate: On					
24	Super Critical Handling Model: Simple K					
25	Trace Level: Low			<b>Damping Parameters</b>		
26	Init from Ideal K's: Off					
27	<b>Initial Estimate Generator Parameters</b>			Azeotrope Check: Off		
28	Iterative IEG (Good for Chemicals): Off			Fixed Damping Factor: 1		
29						
30						
31	<b>SIDE STRIPPERS</b>					
32						
33	<b>Side Stripper Summary</b>					
34		# Stages	Liquid Draw Stage	Vapour Return Stage	Product Flow (lbmole/hr)	Reboiler Duty (Btu/hr)
35						
36	Kero_SS	3 *	9__Main TS	8__Main TS	722.0	7.500e+006
37	Diesel_SS	3 *	17__Main TS	16__Main TS	1139	
38	AGO_SS	3 *	22__Main TS	21__Main TS	202.2	
39						
40	<b>SIDE RECTIFIERS</b>					
41						
42	<b>PUMP AROUNDS</b>					
43	<b>Pump Around Summary</b>					
44		Draw Stage	Return Stage	Product Flow (lbmole/hr)	Condenser Duty (Btu/hr)	
45						
46	PA_1	2__Main TS	1__Main TS	4812	-5.500e+007	
47	PA_2	17__Main TS	16__Main TS	1830	-3.500e+007	
48	PA_3	22__Main TS	21__Main TS	1430	-3.500e+007	
49						
50	<b>VAP BYPASSES</b>					
51						
52	<b>RATING</b>					
53						
54	<b>Tray Sections</b>					
55	Tray Section	Main TS	Kero_SS	Diesel_SS	AGO_SS	
56	Tray Diameter (ft)	4.921 *	4.921 *	4.921 *	4.921 *	
57	Weir Height (ft)	0.1640 *	0.1640 *	0.1640 *	0.1640 *	
58	Weir Length (ft)	3.937 *	3.937 *	3.937 *	3.937 *	
59	Tray Space (ft)	1.640 *	1.640 *	1.640 *	1.640 *	
60	Tray Volume (ft3)	31.20	31.20	31.20	31.20	
61	Disable Heat Loss Calculations	No	No	No	No	
62	Heat Model	None	None	None	None	
63	Rating Calculations	No	No	No	No	
64	Tray Hold Up (ft3)	3.120	3.120	3.120	3.120	
65						
66	<b>Vessels</b>					
67	Vessel	Condenser	Kero_SS_Reb			
68	Diameter (ft)	3.914	3.914			
69	Length (ft)	5.871	5.871			
70	Volume (ft3)	70.63 *	70.63 *			

1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc					
2			Unit Set: NewUser					
3			Date/Time: Saturday Jul 4 2009, 10:28:34					
4								
5								
6	<b>Column Sub-Flowsheet: T-100 @Main (continued)</b>							
7								
8								
9	Orientation	Horizontal	Horizontal					
10	Vessel has a Boot	No	No					
11	Boot Diameter (ft)	---	---					
12	Boot Length (ft)	---	---					
13	Hold Up (ft3)	35.31	35.31					
14	<b>Other Equipment In Column Flowsheet</b>							
15								
16	PA_1_Cooler	PA_2_Cooler	PA_3_Cooler					
17								
18	<b>Pressure Profile</b>							
19		Pressure (psia)		Pressure Drop (psi)				
20	Condenser	19.70 psia		9.000 psi				
21	1_Main TS	28.70 psia		0.1429 psi				
22	2_Main TS	28.84 psia		0.1429 psi				
23	3_Main TS	28.99 psia		0.1429 psi				
24	4_Main TS	29.13 psia		0.1429 psi				
25	5_Main TS	29.27 psia		0.1429 psi				
26	6_Main TS	29.41 psia		0.1429 psi				
27	7_Main TS	29.56 psia		0.1429 psi				
28	8_Main TS	29.70 psia		0.1429 psi				
29	9_Main TS	29.84 psia		0.1429 psi				
30	10_Main TS	29.99 psia		0.1429 psi				
31	11_Main TS	30.13 psia		0.1429 psi				
32	12_Main TS	30.27 psia		0.1429 psi				
33	13_Main TS	30.41 psia		0.1429 psi				
34	14_Main TS	30.56 psia		0.1429 psi				
35	15_Main TS	30.70 psia		0.1429 psi				
36	16_Main TS	30.84 psia		0.1429 psi				
37	17_Main TS	30.99 psia		0.1429 psi				
38	18_Main TS	31.13 psia		0.1429 psi				
39	19_Main TS	31.27 psia		0.1429 psi				
40	20_Main TS	31.41 psia		0.1429 psi				
41	21_Main TS	31.56 psia		0.1429 psi				
42	22_Main TS	31.70 psia		0.1429 psi				
43	23_Main TS	31.84 psia		0.1429 psi				
44	24_Main TS	31.99 psia		0.1429 psi				
45	25_Main TS	32.13 psia		0.1429 psi				
46	26_Main TS	32.27 psia		0.1429 psi				
47	27_Main TS	32.41 psia		0.1429 psi				
48	28_Main TS	32.56 psia		0.1429 psi				
49	29_Main TS	32.70 psia		---				
50	1_Kero_SS	29.84 psia		0.0000 psi				
51	2_Kero_SS	29.84 psia		0.0000 psi				
52	3_Kero_SS	29.84 psia		0.0000 psi				
53	Kero_SS_Reb	29.84 psia		0.0000 psi				
54	1_Diesel_SS	30.99 psia		0.0000 psi				
55	2_Diesel_SS	30.99 psia		0.0000 psi				
56	3_Diesel_SS	30.99 psia		0.0000 psi				
57	1_AGO_SS	31.70 psia		0.0000 psi				
58	2_AGO_SS	31.70 psia		0.0000 psi				
59	3_AGO_SS	31.70 psia		0.0000 psi				
60	<b>Pressure Solving Options</b>							
61								
62	Pressure Tolerance	1.000e-004 *	Pressure Drop Tolerance	1.000e-004 *	Damping Factor	1.000 *	Max Press Iterations	100 *
63								
64	<b>CONDITIONS</b>							
65	Name	Main Steam @Main	Atm Feed @Main	Diesel Steam @Main	AGO Steam @Main	Residue @Main		
66	Vapour	1.0000	0.6053	1.0000	1.0000	0.0000		
67	Temperature (F)	375.0000 *	623.5643	300.0000 *	300.0000 *	670.2670		
68	Pressure (psia)	150.0000 *	65.0000	50.0000 *	50.0000 *	32.7000		
69	Molar Flow (lbmole/hr)	416.3174	6231.0675	166.5270	138.7725	1419.7843		
70	Mass Flow (lb/hr)	7500.0000 *	1284956.4375	3000.0000 *	2500.0000 *	619556.1846		



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4						
5						
6						
7	Column Sub-Flowsheet: T-100 @Main (continued)					
8						
9						
10	CONDITIONS					
11	Std Ideal Liq Vol Flow (barrel/day)	514.5826	100000.0000	205.8330	171.5275	43976.1325
12	Molar Enthalpy (Btu/lbmole)	-1.014e+005	-1.201e+005	-1.019e+005	-1.019e+005	-2.546e+005
13	Molar Entropy (Btu/lbmole-F)	40.29	161.8	41.80	41.80	352.8
14	Heat Flow (Btu/hr)	-4.2220e+07	-7.4846e+08	-1.6967e+07	-1.4139e+07	-3.6144e+08
15	Name	Off Gas @Main	Naphtha @Main	Waste Water @Main	Kerosene @Main	Diesel @Main
16	Vapour	1.0000	0.0000	0.0000	0.0000	0.0000
17	Temperature (F)	106.6557	106.6557	106.6557	456.5015	486.0726
18	Pressure (psia)	19.7000	19.7000	19.7000	29.8429	30.9857
19	Molar Flow (lbmole/hr)	0.0000	2769.1927	700.9743	721.9749	1139.2301
20	Mass Flow (lb/hr)	0.0000	245765.2528	12628.1218	113873.5417	246158.3828
21	Std Ideal Liq Vol Flow (barrel/day)	0.0000	23000.0230	866.4282	9300.0587	19250.0880
22	Molar Enthalpy (Btu/lbmole)	-5.147e+004	-8.349e+004	-1.222e+005	-1.159e+005	-1.545e+005
23	Molar Entropy (Btu/lbmole-F)	47.02	29.10	13.83	83.02	130.7
24	Heat Flow (Btu/hr)	0.0000e-01	-2.3121e+08	-8.5626e+07	-8.3691e+07	-1.7602e+08
25	Name	AGO @Main	Q-Trim @Main	Kero_SS_Energy	Atmos Cond @Main	
26	Vapour	0.0000	---	---	---	---
27	Temperature (F)	571.0402	---	---	---	---
28	Pressure (psia)	31.7000	---	---	---	---
29	Molar Flow (lbmole/hr)	202.1898	---	---	---	---
30	Mass Flow (lb/hr)	59986.8757	---	---	---	---
31	Std Ideal Liq Vol Flow (barrel/day)	4500.0308	---	---	---	---
32	Molar Enthalpy (Btu/lbmole)	-1.947e+005	---	---	---	---
33	Molar Entropy (Btu/lbmole-F)	207.8	---	---	---	---
34	Heat Flow (Btu/hr)	-3.9375e+07	7.0950e+07	7.5002e+06	1.0895e+08	
35	PROPERTIES					
36						
37	Name	Main Steam @Main	Atm Feed @Main	Diesel Steam @Main	AGO Steam @Main	Residue @Main
38	Molecular Weight	18.02	206.2	18.02	18.02	436.4
39	Molar Density (lbmole/ft3)	1.764e-002	9.577e-003	6.267e-003	6.267e-003	0.1023
40	Mass Density (lb/ft3)	0.3177	1.975	0.1129	0.1129	44.66
41	Act. Volume Flow (barrel/day)	1.009e+005	2.781e+006	1.136e+005	9.466e+004	5.930e+004
42	Mass Enthalpy (Btu/lb)	-5629	-582.5	-5656	-5656	-583.4
43	Mass Entropy (Btu/lb-F)	2.236	0.7847	2.320	2.320	0.8085
44	Heat Capacity (Btu/lbmole-F)	8.800	139.4	8.417	8.417	311.5
45	Mass Heat Capacity (Btu/lb-F)	0.4885	0.6762	0.4672	0.4672	0.7139
46	Lower Heating Value (Btu/lbmole)	0.0000	---	0.0000	0.0000	---
47	Mass Lower Heating Value (Btu/lb)	---	---	---	---	---
48	Phase Fraction [Vol. Basis]	---	0.9705	---	---	---
49	Phase Fraction [Mass Basis]	4.941e-324	0.3541	4.941e-324	4.941e-324	2.122e-314
50	Partial Pressure of CO2 (psia)	0.0000	0.0000	0.0000	0.0000	0.0000
51	Cost Based on Flow (Cost/s)	0.0000	0.0000	0.0000	0.0000	0.0000
52	Act. Gas Flow (ACFM)	393.4	---	442.9	369.1	---
53	Avg. Liq. Density (lbmole/ft3)	3.458	0.2664	3.458	3.458	0.1380
54	Specific Heat (Btu/lbmole-F)	8.800	139.4	8.417	8.417	311.5
55	Std. Gas Flow (MMSCFD)	3.792	56.75	1.517	1.264	12.93
56	Std. Ideal Liq. Mass Density (lb/ft3)	62.30	54.93	62.30	62.30	60.22
57	Act. Liq. Flow (USGPM)	---	2394	---	---	1730
58	Z Factor	0.9495	---	0.9787	0.9787	2.635e-002
59	Watson K	---	11.29	---	---	11.53
60	User Property	---	---	---	---	---
61	Cp/(Cp - R)	1.291	1.014	1.309	1.309	1.006
62	Cp/Cv	1.372	1.012	1.340	1.340	3.671
63	Heat of Vap. (Btu/lbmole)	1.575e+004	1.136e+005	1.681e+004	1.681e+004	1.663e+005
64	Kinematic Viscosity (cSt)	3.029	---	7.698	7.698	0.3857
65	Liq. Mass Density (Std. Cond) (lb/ft3)	63.33	54.70	63.33	63.33	60.13
66	Liq. Vol. Flow (Std. Cond) (barrel/day)	506.1	1.004e+005	202.4	168.7	4.402e+004
67	Liquid Fraction	0.0000	0.3947	0.0000	0.0000	1.000
68	Molar Volume (ft3/lbmole)	56.70	104.4	159.6	159.6	9.770
69	Mass Heat of Vap. (Btu/lb)	874.4	551.0	933.2	933.2	381.0
70	Phase Fraction [Molar Basis]	1.0000	0.6053	1.0000	1.0000	0.0000

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6							
7	<b>Column Sub-Flowsheet: T-100 @Main (continued)</b>						
8							
9							
10	<b>PROPERTIES</b>						
11	Name	Main Steam @Main	Atm Feed @Main	Diesel Steam @Main	AGO Steam @Main	Residue @Main	
12	Surface Tension (dyne/cm)	---	10.91	---	---	12.78	
13	Thermal Conductivity (Btu/hr-ft-F)	2.006e-002	---	1.695e-002	1.695e-002	6.594e-002	
14	Viscosity (cP)	1.542e-002	---	1.392e-002	1.392e-002	0.2759	
15	Partial Pressure of H2S (psia)	0.0000	0.0000	0.0000	0.0000	0.0000	
16	Cv (Semi-Ideal) (Btu/lbmole-F)	6.814	137.5	6.432	6.432	309.5	
17	Mass Cv (Semi-Ideal) (Btu/lb-F)	0.3782	0.6665	0.3570	0.3570	0.7093	
18	Cv (Btu/lbmole-F)	6.414	137.8	6.280	6.280	84.86	
19	Mass Cv (Btu/lb-F)	0.3560	0.6680	0.3486	0.3486	0.1945	
20	Cv (Ent. Method) (Btu/lbmole-F)	6.322	156.5	6.247	6.247	---	
21	Mass Cv (Ent. Method) (Btu/lb-F)	0.3509	0.7588	0.3468	0.3468	---	
22	Cp/Cv (Ent. Method)	1.392	0.8911	1.347	1.347	---	
23	Reid VP at 37.8 C (psia)	---	6.668	---	---	---	
24	True VP at 37.8 C (psia)	0.9380	8.978	0.9380	0.9380	0.9599	
25	Liq. Vol. Flow - Sum(Std. Cond) (barrel/day)	506.3	1.001e+005	202.5	168.8	4.404e+004	
26	Name	Off Gas @Main	Naphtha @Main	Waste Water @Main	Kerosene @Main	Diesel @Main	
27	Molecular Weight	51.73	88.75	18.02	157.7	216.1	
28	Molar Density (lbmole/ft3)	3.331e-003	0.5038	3.447	0.2584	0.1994	
29	Mass Density (lb/ft3)	0.1723	44.71	62.11	40.75	43.09	
30	Act. Volume Flow (barrel/day)	0.0000	2.350e+004	869.2	1.194e+004	2.442e+004	
31	Mass Enthalpy (Btu/lb)	-995.0	-940.8	-6781	-734.9	-715.0	
32	Mass Entropy (Btu/lb-F)	0.9091	0.3279	0.7674	0.5264	0.6050	
33	Heat Capacity (Btu/lbmole-F)	21.93	43.65	18.57	102.4	140.0	
34	Mass Heat Capacity (Btu/lb-F)	0.4239	0.4919	1.031	0.6491	0.6478	
35	Lower Heating Value (Btu/lbmole)	---	---	7.316e-004	---	---	
36	Mass Lower Heating Value (Btu/lb)	---	---	4.061e-005	---	---	
37	Phase Fraction [Vol. Basis]	---	3.045e-004	---	---	---	
38	Phase Fraction [Mass Basis]	2.122e-314	1.173e-006	0.0000	2.122e-314	2.122e-314	
39	Partial Pressure of CO2 (psia)	0.0000	0.0000	0.0000	0.0000	0.0000	
40	Cost Based on Flow (Cost/s)	0.0000	0.0000	0.0000	0.0000	0.0000	
41	Act. Gas Flow (ACFM)	---	---	---	---	---	
42	Avg. Liq. Density (lbmole/ft3)	---	0.5147	3.458	0.3318	0.2530	
43	Specific Heat (Btu/lbmole-F)	21.93	43.65	18.57	102.4	140.0	
44	Std. Gas Flow (MMSCFD)	0.0000	25.22	6.384	6.575	10.38	
45	Std. Ideal Liq. Mass Density (lb/ft3)	36.48	45.68	62.30	52.34	54.66	
46	Act. Liq. Flow (USGPM)	---	685.1	25.35	348.4	712.2	
47	Z Factor	---	---	9.403e-004	1.175e-002	1.531e-002	
48	Watson K	13.36	11.76	19.51	11.37	11.43	
49	User Property	---	---	---	---	---	
50	Cp/(Cp - R)	1.100	1.048	1.120	1.020	1.014	
51	Cp/Cv	1.110	1.092	1.156	1.020	1.123	
52	Heat of Vap. (Btu/lbmole)	1.639e+004	1.953e+004	1.746e+004	1.998e+004	4.333e+004	
53	Kinematic Viscosity (cSt)	2.974	---	0.6368	0.2767	0.3146	
54	Liq. Mass Density (Std. Cond) (lb/ft3)	37.19	46.25	63.33	52.57	54.74	
55	Liq. Vol. Flow (Std. Cond) (barrel/day)	0.0000	2.270e+004	852.1	9255	1.921e+004	
56	Liquid Fraction	0.0000	1.000	1.000	1.000	1.000	
57	Molar Volume (ft3/lbmole)	300.2	1.985	0.2901	3.870	5.014	
58	Mass Heat of Vap. (Btu/lb)	316.8	220.1	969.2	126.6	200.5	
59	Phase Fraction [Molar Basis]	1.0000	0.0000	0.0000	0.0000	0.0000	
60	Surface Tension (dyne/cm)	---	18.29	69.23	10.52	12.93	
61	Thermal Conductivity (Btu/hr-ft-F)	1.060e-002	6.629e-002	0.3659	5.698e-002	6.338e-002	
62	Viscosity (cP)	8.209e-003	0.3635	0.6335	0.1806	0.2171	
63	Partial Pressure of H2S (psia)	0.0000	0.0000	0.0000	0.0000	0.0000	
64	Cv (Semi-Ideal) (Btu/lbmole-F)	19.94	41.67	16.59	100.4	138.0	
65	Mass Cv (Semi-Ideal) (Btu/lb-F)	0.3855	0.4695	0.9207	0.6365	0.6387	
66	Cv (Btu/lbmole-F)	19.75	39.99	16.06	100.4	124.6	
67	Mass Cv (Btu/lb-F)	0.3818	0.4505	0.8915	0.6365	0.5768	
68	Cv (Ent. Method) (Btu/lbmole-F)	---	---	---	99.91	137.4	
69	Mass Cv (Ent. Method) (Btu/lb-F)	---	---	---	0.6335	0.6357	
70	Cp/Cv (Ent. Method)	---	---	---	1.025	1.019	



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4							
5							
6							
7	Column Sub-Flowsheet: T-100 @Main (continued)						
8							
9							
10	PROPERTIES						
11	Name	Off Gas @Main	Naphtha @Main	Waste Water @Main	Kerosene @Main	Diesel @Main	
12	Reid VP at 37.8 C (psia)	174.5	13.98	---	---	---	
13	True VP at 37.8 C (psia)	420.0	17.97	26.53	2.894e-002	0.9447	
14	Liq. Vol. Flow - Sum(Std. Cond) (barrel/day)	0.0000	2.272e+004	852.4	9259	1.922e+004	
15	Name	AGO @Main					
16	Molecular Weight	296.7					
17	Molar Density (lbmole/ft3)	0.1468					
18	Mass Density (lb/ft3)	43.56					
19	Act. Volume Flow (barrel/day)	5887					
20	Mass Enthalpy (Btu/lb)	-656.4					
21	Mass Entropy (Btu/lb-F)	0.7005					
22	Heat Capacity (Btu/lbmole-F)	201.7					
23	Mass Heat Capacity (Btu/lb-F)	0.6798					
24	Lower Heating Value (Btu/lbmole)	---					
25	Mass Lower Heating Value (Btu/lb)	---					
26	Phase Fraction [Vol. Basis]	---					
27	Phase Fraction [Mass Basis]	2.122e-314					
28	Partial Pressure of CO2 (psia)	0.0000					
29	Cost Based on Flow (Cost/s)	0.0000					
30	Act. Gas Flow (ACFM)	---					
31	Avg. Liq. Density (lbmole/ft3)	0.1921					
32	Specific Heat (Btu/lbmole-F)	201.7					
33	Std. Gas Flow (MMSCFD)	1.841					
34	Std. Ideal Liq. Mass Density (lb/ft3)	56.98					
35	Act. Liq. Flow (USGPM)	171.7					
36	Z Factor	1.952e-002					
37	Watson K	11.49					
38	User Property	---					
39	Cp/(Cp - R)	1.010					
40	Cp/Cv	1.150					
41	Heat of Vap. (Btu/lbmole)	7.216e+004					
42	Kinematic Viscosity (cSt)	0.1824					
43	Liq. Mass Density (Std. Cond) (lb/ft3)	56.89					
44	Liq. Vol. Flow (Std. Cond) (barrel/day)	4506					
45	Liquid Fraction	1.000					
46	Molar Volume (ft3/lbmole)	6.812					
47	Mass Heat of Vap. (Btu/lb)	243.2					
48	Phase Fraction [Molar Basis]	0.0000					
49	Surface Tension (dyne/cm)	13.07					
50	Thermal Conductivity (Btu/hr-ft-F)	6.525e-002					
51	Viscosity (cP)	0.1273					
52	Partial Pressure of H2S (psia)	0.0000					
53	Cv (Semi-Ideal) (Btu/lbmole-F)	199.7					
54	Mass Cv (Semi-Ideal) (Btu/lb-F)	0.6731					
55	Cv (Btu/lbmole-F)	175.4					
56	Mass Cv (Btu/lb-F)	0.5911					
57	Cv (Ent. Method) (Btu/lbmole-F)	---					
58	Mass Cv (Ent. Method) (Btu/lb-F)	---					
59	Cp/Cv (Ent. Method)	---					
60	Reid VP at 37.8 C (psia)	---					
61	True VP at 37.8 C (psia)	0.9387					
62	Liq. Vol. Flow - Sum(Std. Cond) (barrel/day)	4508					
63	SUMMARY						
64							
65	Flow Basis:	Molar	The composition option is selected				
66	Feed Composition						
67		Atm Feed	Main Steam	Diesel Steam	AGO Steam		
68	Flow Rate (lbmole/hr)	6.231068e+03	416.3174	166.5270	138.7725		
69		---	---	---	---		
70	Methane	0.0003	0.0000	0.0000	0.0000		

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7	Column Sub-Flowsheet: T-100 @Main (continued)				
8					
9					
10	SUMMARY				
11		Atm Feed	Main Steam	Diesel Steam	AGO Steam
12	Ethane	0.0006	0.0000	0.0000	0.0000
13	Propane	0.0086	0.0000	0.0000	0.0000
14	i-Butane	0.0054	0.0000	0.0000	0.0000
15	n-Butane	0.0193	0.0000	0.0000	0.0000
16	H2O	0.0000	1.0000	1.0000	1.0000
17	NBP[0]49*	0.0364	0.0000	0.0000	0.0000
18	NBP[0]79*	0.0436	0.0000	0.0000	0.0000
19	NBP[0]111*	0.0427	0.0000	0.0000	0.0000
20	NBP[0]144*	0.0416	0.0000	0.0000	0.0000
21	NBP[0]176*	0.0438	0.0000	0.0000	0.0000
22	NBP[0]208*	0.0451	0.0000	0.0000	0.0000
23	NBP[0]240*	0.0437	0.0000	0.0000	0.0000
24	NBP[0]272*	0.0418	0.0000	0.0000	0.0000
25	NBP[0]304*	0.0391	0.0000	0.0000	0.0000
26	NBP[0]336*	0.0362	0.0000	0.0000	0.0000
27	NBP[0]368*	0.0342	0.0000	0.0000	0.0000
28	NBP[0]400*	0.0334	0.0000	0.0000	0.0000
29	NBP[0]433*	0.0356	0.0000	0.0000	0.0000
30	NBP[0]464*	0.0394	0.0000	0.0000	0.0000
31	NBP[0]496*	0.0393	0.0000	0.0000	0.0000
32	NBP[0]528*	0.0356	0.0000	0.0000	0.0000
33	NBP[0]560*	0.0314	0.0000	0.0000	0.0000
34	NBP[0]592*	0.0279	0.0000	0.0000	0.0000
35	NBP[0]624*	0.0242	0.0000	0.0000	0.0000
36	NBP[0]656*	0.0213	0.0000	0.0000	0.0000
37	NBP[0]688*	0.0192	0.0000	0.0000	0.0000
38	NBP[0]720*	0.0172	0.0000	0.0000	0.0000
39	NBP[0]752*	0.0153	0.0000	0.0000	0.0000
40	NBP[0]784*	0.0138	0.0000	0.0000	0.0000
41	NBP[0]830*	0.0229	0.0000	0.0000	0.0000
42	NBP[0]888*	0.0212	0.0000	0.0000	0.0000
43	NBP[0]947*	0.0209	0.0000	0.0000	0.0000
44	NBP[0]1009*	0.0267	0.0000	0.0000	0.0000
45	NBP[0]1062*	0.0365	0.0000	0.0000	0.0000
46	NBP[0]1124*	0.0358	0.0000	0.0000	0.0000
47	Flow Basis:	Molar		The composition option is selected	
48	Feed Flows				
49		Atm Feed	Main Steam	Diesel Steam	AGO Steam
50	Flow Rate (lbmole/hr)	6.231068e+03	416.3174	166.5270	138.7725
51		---	---	---	---
52	Methane (lbmole/hr)	1.7716	0.0000	0.0000	0.0000
53	Ethane (lbmole/hr)	3.8868	0.0000	0.0000	0.0000
54	Propane (lbmole/hr)	53.6976	0.0000	0.0000	0.0000
55	i-Butane (lbmole/hr)	33.8881	0.0000	0.0000	0.0000
56	n-Butane (lbmole/hr)	120.1641	0.0000	0.0000	0.0000
57	H2O (lbmole/hr)	0.0000	416.3174	166.5270	138.7725
58	NBP[0]49* (lbmole/hr)	226.6945	0.0000	0.0000	0.0000
59	NBP[0]79* (lbmole/hr)	271.5884	0.0000	0.0000	0.0000
60	NBP[0]111* (lbmole/hr)	266.1674	0.0000	0.0000	0.0000
61	NBP[0]144* (lbmole/hr)	259.3055	0.0000	0.0000	0.0000
62	NBP[0]176* (lbmole/hr)	273.0245	0.0000	0.0000	0.0000
63	NBP[0]208* (lbmole/hr)	280.7126	0.0000	0.0000	0.0000
64	NBP[0]240* (lbmole/hr)	272.5889	0.0000	0.0000	0.0000
65	NBP[0]272* (lbmole/hr)	260.4708	0.0000	0.0000	0.0000
66	NBP[0]304* (lbmole/hr)	243.5950	0.0000	0.0000	0.0000
67	NBP[0]336* (lbmole/hr)	225.5670	0.0000	0.0000	0.0000
68	NBP[0]368* (lbmole/hr)	213.0273	0.0000	0.0000	0.0000
69	NBP[0]400* (lbmole/hr)	208.0502	0.0000	0.0000	0.0000
70	NBP[0]433* (lbmole/hr)	222.1205	0.0000	0.0000	0.0000



1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc			
2			Unit Set: NewUser			
3						
4			Date/Time: Saturday Jul 4 2009, 10:28:34			
5						
6						
7	Column Sub-Flowsheet: T-100 @Main (continued)					
8						
9						
10	SUMMARY					
11		Atm Feed	Main Steam	Diesel Steam	AGO Steam	
12	NBP[0]464* (lbmole/hr)	245.5858	0.0000	0.0000	0.0000	
13	NBP[0]496* (lbmole/hr)	244.7608	0.0000	0.0000	0.0000	
14	NBP[0]528* (lbmole/hr)	221.9567	0.0000	0.0000	0.0000	
15	NBP[0]560* (lbmole/hr)	195.5585	0.0000	0.0000	0.0000	
16	NBP[0]592* (lbmole/hr)	173.7073	0.0000	0.0000	0.0000	
17	NBP[0]624* (lbmole/hr)	150.9991	0.0000	0.0000	0.0000	
18	NBP[0]656* (lbmole/hr)	132.5479	0.0000	0.0000	0.0000	
19	NBP[0]688* (lbmole/hr)	119.3653	0.0000	0.0000	0.0000	
20	NBP[0]720* (lbmole/hr)	107.2018	0.0000	0.0000	0.0000	
21	NBP[0]752* (lbmole/hr)	95.1769	0.0000	0.0000	0.0000	
22	NBP[0]784* (lbmole/hr)	86.1208	0.0000	0.0000	0.0000	
23	NBP[0]830* (lbmole/hr)	142.9814	0.0000	0.0000	0.0000	
24	NBP[0]888* (lbmole/hr)	131.8420	0.0000	0.0000	0.0000	
25	NBP[0]947* (lbmole/hr)	130.3502	0.0000	0.0000	0.0000	
26	NBP[0]1009* (lbmole/hr)	166.3452	0.0000	0.0000	0.0000	
27	NBP[0]1062* (lbmole/hr)	227.1241	0.0000	0.0000	0.0000	
28	NBP[0]1124* (lbmole/hr)	223.1228	0.0000	0.0000	0.0000	
29	Products					
30	Flow Basis:	Molar	The composition option is selected			
31	Product Compositions					
32		Off Gas	Naphtha	Waste Water	Residue	Kerosene
33	Flow Rate (lbmole/hr)	0.0000	2.769193e+03	700.9743	1.419784e+03	721.9749
34		---	---	---	---	---
35	Methane	0.1082	0.0006	0.0000	0.0000	0.0000
36	Ethane	0.0452	0.0014	0.0000	0.0000	0.0000
37	Propane	0.1853	0.0194	0.0000	0.0000	0.0000
38	i-Butane	0.0493	0.0122	0.0000	0.0000	0.0000
39	n-Butane	0.1243	0.0434	0.0000	0.0000	0.0000
40	H2O	0.0578	0.0010	1.0000	0.0070	0.0000
41	NBP[0]49*	0.1636	0.0818	0.0000	0.0001	0.0000
42	NBP[0]79*	0.1218	0.0980	0.0000	0.0001	0.0000
43	NBP[0]111*	0.0670	0.0960	0.0000	0.0001	0.0000
44	NBP[0]144*	0.0359	0.0935	0.0000	0.0002	0.0000
45	NBP[0]176*	0.0205	0.0984	0.0000	0.0002	0.0001
46	NBP[0]208*	0.0112	0.1009	0.0000	0.0004	0.0005
47	NBP[0]240*	0.0055	0.0974	0.0000	0.0005	0.0019
48	NBP[0]272*	0.0026	0.0916	0.0000	0.0007	0.0058
49	NBP[0]304*	0.0011	0.0822	0.0000	0.0009	0.0158
50	NBP[0]336*	0.0004	0.0647	0.0000	0.0012	0.0534
51	NBP[0]368*	0.0001	0.0167	0.0000	0.0017	0.2124
52	NBP[0]400*	0.0000	0.0006	0.0000	0.0024	0.2531
53	NBP[0]433*	0.0000	0.0000	0.0000	0.0038	0.2411
54	NBP[0]464*	0.0000	0.0000	0.0000	0.0061	0.1779
55	NBP[0]496*	0.0000	0.0000	0.0000	0.0089	0.0361
56	NBP[0]528*	0.0000	0.0000	0.0000	0.0117	0.0019
57	NBP[0]560*	0.0000	0.0000	0.0000	0.0149	0.0001
58	NBP[0]592*	0.0000	0.0000	0.0000	0.0187	0.0000
59	NBP[0]624*	0.0000	0.0000	0.0000	0.0225	0.0000
60	NBP[0]656*	0.0000	0.0000	0.0000	0.0269	0.0000
61	NBP[0]688*	0.0000	0.0000	0.0000	0.0319	0.0000
62	NBP[0]720*	0.0000	0.0000	0.0000	0.0367	0.0000
63	NBP[0]752*	0.0000	0.0000	0.0000	0.0409	0.0000
64	NBP[0]784*	0.0000	0.0000	0.0000	0.0460	0.0000
65	NBP[0]830*	0.0000	0.0000	0.0000	0.0966	0.0000
66	NBP[0]888*	0.0000	0.0000	0.0000	0.0928	0.0000
67	NBP[0]947*	0.0000	0.0000	0.0000	0.0918	0.0000
68	NBP[0]1009*	0.0000	0.0000	0.0000	0.1172	0.0000
69	NBP[0]1062*	0.0000	0.0000	0.0000	0.1600	0.0000
70	NBP[0]1124*	0.0000	0.0000	0.0000	0.1572	0.0000

1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc		
2			Unit Set: NewUser		
3			Date/Time: Saturday Jul 4 2009, 10:28:34		
4					
5					
6					
7	Column Sub-Flowsheet: T-100 @Main (continued)				
8					
9					
10	SUMMARY				
11		Diesel	AGO		
12	Flow Rate (lbmole/hr)	1.139230e+03	202.1898		
13		---	---		
14	Methane	0.0000	0.0000		
15	Ethane	0.0000	0.0000		
16	Propane	0.0000	0.0000		
17	i-Butane	0.0000	0.0000		
18	n-Butane	0.0000	0.0000		
19	H2O	0.0062	0.0079		
20	NBP[0]49*	0.0000	0.0000		
21	NBP[0]79*	0.0000	0.0000		
22	NBP[0]111*	0.0000	0.0000		
23	NBP[0]144*	0.0001	0.0000		
24	NBP[0]176*	0.0001	0.0000		
25	NBP[0]208*	0.0003	0.0000		
26	NBP[0]240*	0.0007	0.0000		
27	NBP[0]272*	0.0014	0.0000		
28	NBP[0]304*	0.0028	0.0000		
29	NBP[0]336*	0.0053	0.0001		
30	NBP[0]368*	0.0097	0.0002		
31	NBP[0]400*	0.0177	0.0005		
32	NBP[0]433*	0.0372	0.0013		
33	NBP[0]464*	0.0946	0.0036		
34	NBP[0]496*	0.1794	0.0082		
35	NBP[0]528*	0.1762	0.0158		
36	NBP[0]560*	0.1482	0.0278		
37	NBP[0]592*	0.1210	0.0460		
38	NBP[0]624*	0.0916	0.0723		
39	NBP[0]656*	0.0625	0.1149		
40	NBP[0]688*	0.0332	0.1793		
41	NBP[0]720*	0.0100	0.2161		
42	NBP[0]752*	0.0015	0.1751		
43	NBP[0]784*	0.0001	0.1020		
44	NBP[0]830*	0.0000	0.0285		
45	NBP[0]888*	0.0000	0.0004		
46	NBP[0]947*	0.0000	0.0000		
47	NBP[0]1009*	0.0000	0.0000		
48	NBP[0]1062*	0.0000	0.0000		
49	NBP[0]1124*	0.0000	0.0000		
50	Flow Basis:	Molar		The composition option is selected	
51	Product Flows				
52		Off Gas	Naphtha	Waste Water	Residue
53	Flow Rate (lbmole/hr)	0.0000	2.769193e+03	700.9743	1.419784e+03
54		---	---	---	---
55	Methane (lbmole/hr)	0.0000	1.7715	0.0000	0.0001
56	Ethane (lbmole/hr)	0.0000	3.8865	0.0000	0.0003
57	Propane (lbmole/hr)	0.0000	53.6888	0.0000	0.0087
58	i-Butane (lbmole/hr)	0.0000	33.8787	0.0000	0.0092
59	n-Butane (lbmole/hr)	0.0000	120.1252	0.0000	0.0377
60	H2O (lbmole/hr)	0.0000	2.6936	700.9743	9.9429
61	NBP[0]49* (lbmole/hr)	0.0000	226.5771	0.0000	0.1101
62	NBP[0]79* (lbmole/hr)	0.0000	271.4085	0.0000	0.1630
63	NBP[0]111* (lbmole/hr)	0.0000	265.9248	0.0000	0.2047
64	NBP[0]144* (lbmole/hr)	0.0000	258.9506	0.0000	0.2630
65	NBP[0]176* (lbmole/hr)	0.0000	272.4376	0.0000	0.3529
66	NBP[0]208* (lbmole/hr)	0.0000	279.4958	0.0000	0.5064
67	NBP[0]240* (lbmole/hr)	0.0000	269.8077	0.0000	0.6949
68	NBP[0]272* (lbmole/hr)	0.0000	253.7392	0.0000	0.9472
69	NBP[0]304* (lbmole/hr)	0.0000	227.6800	0.0000	1.2739
70	NBP[0]336* (lbmole/hr)	0.0000	179.2151	0.0000	1.7128
					38.5288



1	Company Name Not Available Calgary, Alberta CANADA			Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc		
2				Unit Set: NewUser		
3						
4						
5	Date/Time: Saturday Jul 4 2009, 10:28:34					
6	Column Sub-Flowsheet: T-100 @Main (continued)					
7						
8						
9						
10	SUMMARY					
11		Off Gas	Naphtha	Waste Water	Residue	Kerosene
12	NBP[0]368* (lbmole/hr)	0.0000	46.2345	0.0000	2.3633	153.3164
13	NBP[0]400* (lbmole/hr)	0.0000	1.6436	0.0000	3.3925	182.7217
14	NBP[0]433* (lbmole/hr)	0.0000	0.0334	0.0000	5.3705	174.0735
15	NBP[0]464* (lbmole/hr)	0.0000	0.0005	0.0000	8.7073	128.4266
16	NBP[0]496* (lbmole/hr)	0.0000	0.0000	0.0000	12.6528	26.0635
17	NBP[0]528* (lbmole/hr)	0.0000	0.0000	0.0000	16.6330	1.3515
18	NBP[0]560* (lbmole/hr)	0.0000	0.0000	0.0000	21.1106	0.0446
19	NBP[0]592* (lbmole/hr)	0.0000	0.0000	0.0000	26.5369	0.0013
20	NBP[0]624* (lbmole/hr)	0.0000	0.0000	0.0000	32.0125	0.0000
21	NBP[0]656* (lbmole/hr)	0.0000	0.0000	0.0000	38.1224	0.0000
22	NBP[0]688* (lbmole/hr)	0.0000	0.0000	0.0000	45.2790	0.0000
23	NBP[0]720* (lbmole/hr)	0.0000	0.0000	0.0000	52.1042	0.0000
24	NBP[0]752* (lbmole/hr)	0.0000	0.0000	0.0000	58.0137	0.0000
25	NBP[0]784* (lbmole/hr)	0.0000	0.0000	0.0000	65.3338	0.0000
26	NBP[0]830* (lbmole/hr)	0.0000	0.0000	0.0000	137.2172	0.0000
27	NBP[0]888* (lbmole/hr)	0.0000	0.0000	0.0000	131.7652	0.0000
28	NBP[0]947* (lbmole/hr)	0.0000	0.0000	0.0000	130.3496	0.0000
29	NBP[0]1009* (lbmole/hr)	0.0000	0.0000	0.0000	166.3452	0.0000
30	NBP[0]1062* (lbmole/hr)	0.0000	0.0000	0.0000	227.1241	0.0000
31	NBP[0]1124* (lbmole/hr)	0.0000	0.0000	0.0000	223.1228	0.0000
32		Diesel	AGO			
33	Flow Rate (lbmole/hr)	1.139230e+03	202.1898			
34		---	---			
35	Methane (lbmole/hr)	0.0000	0.0000			
36	Ethane (lbmole/hr)	0.0000	0.0000			
37	Propane (lbmole/hr)	0.0001	0.0000			
38	i-Butane (lbmole/hr)	0.0002	0.0000			
39	n-Butane (lbmole/hr)	0.0011	0.0000			
40	H2O (lbmole/hr)	7.0656	1.6023			
41	NBP[0]49* (lbmole/hr)	0.0062	0.0000			
42	NBP[0]79* (lbmole/hr)	0.0138	0.0000			
43	NBP[0]111* (lbmole/hr)	0.0284	0.0001			
44	NBP[0]144* (lbmole/hr)	0.0611	0.0001			
45	NBP[0]176* (lbmole/hr)	0.1329	0.0002			
46	NBP[0]208* (lbmole/hr)	0.3251	0.0006			
47	NBP[0]240* (lbmole/hr)	0.7418	0.0013			
48	NBP[0]272* (lbmole/hr)	1.6074	0.0030			
49	NBP[0]304* (lbmole/hr)	3.2345	0.0069			
50	NBP[0]336* (lbmole/hr)	6.0941	0.0162			
51	NBP[0]368* (lbmole/hr)	11.0739	0.0392			
52	NBP[0]400* (lbmole/hr)	20.1940	0.0984			
53	NBP[0]433* (lbmole/hr)	42.3710	0.2720			
54	NBP[0]464* (lbmole/hr)	107.7213	0.7301			
55	NBP[0]496* (lbmole/hr)	204.3843	1.6602			
56	NBP[0]528* (lbmole/hr)	200.7705	3.2017			
57	NBP[0]560* (lbmole/hr)	168.7906	5.6127			
58	NBP[0]592* (lbmole/hr)	137.8735	9.2956			
59	NBP[0]624* (lbmole/hr)	104.3708	14.6158			
60	NBP[0]656* (lbmole/hr)	71.1891	23.2364			
61	NBP[0]688* (lbmole/hr)	37.8334	36.2529			
62	NBP[0]720* (lbmole/hr)	11.4127	43.6849			
63	NBP[0]752* (lbmole/hr)	1.7591	35.4041			
64	NBP[0]784* (lbmole/hr)	0.1704	20.6167			
65	NBP[0]830* (lbmole/hr)	0.0033	5.7610			
66	NBP[0]888* (lbmole/hr)	0.0000	0.0768			
67	NBP[0]947* (lbmole/hr)	0.0000	0.0006			
68	NBP[0]1009* (lbmole/hr)	0.0000	0.0000			
69	NBP[0]1062* (lbmole/hr)	0.0000	0.0000			
70	NBP[0]1124* (lbmole/hr)	0.0000	0.0000			

1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc			
2			Unit Set: NewUser			
3						
4						
5						Date/Time: Saturday Jul 4 2009, 10:28:34
6	Column Sub-Flowsheet: T-100 @Main (continued)					
7						
8						
9	SUMMARY					
10						
11	Flow Basis:		Molar	The composition option is selected		
12	Product Recoveries					
13		Off Gas	Naphtha	Waste Water	Residue	Kerosene
14	Flow Rate (lbmole/hr)	0.0000	2.769193e+03	700.9743	1.419784e+03	721.9749
15		---	---	---	---	---
16	Methane (%)	0.0000	99.9962	0.0001	0.0037	0.0000
17	Ethane (%)	0.0000	99.9915	0.0000	0.0085	0.0000
18	Propane (%)	0.0000	99.9836	0.0000	0.0163	0.0000
19	i-Butane (%)	0.0000	99.9723	0.0000	0.0270	0.0001
20	n-Butane (%)	0.0000	99.9676	0.0000	0.0313	0.0001
21	H2O (%)	0.0000	0.3733	97.1394	1.3779	0.0000
22	NBP[0]49* (%)	0.0000	99.9482	0.0000	0.0486	0.0004
23	NBP[0]79* (%)	0.0000	99.9338	0.0000	0.0600	0.0011
24	NBP[0]111* (%)	0.0000	99.9089	0.0000	0.0769	0.0036
25	NBP[0]144* (%)	0.0000	99.8631	0.0000	0.1014	0.0118
26	NBP[0]176* (%)	0.0000	99.7850	0.0000	0.1293	0.0369
27	NBP[0]208* (%)	0.0000	99.5665	0.0000	0.1804	0.1371
28	NBP[0]240* (%)	0.0000	98.9797	0.0000	0.2549	0.4928
29	NBP[0]272* (%)	0.0000	97.4156	0.0000	0.3636	1.6025
30	NBP[0]304* (%)	0.0000	93.4666	0.0000	0.5229	4.6798
31	NBP[0]336* (%)	0.0000	79.4509	0.0000	0.7593	17.0809
32	NBP[0]368* (%)	0.0000	21.7036	0.0000	1.1094	71.9703
33	NBP[0]400* (%)	0.0000	0.7900	0.0000	1.6306	87.8258
34	NBP[0]433* (%)	0.0000	0.0150	0.0000	2.4179	78.3690
35	NBP[0]464* (%)	0.0000	0.0002	0.0000	3.5455	52.2940
36	NBP[0]496* (%)	0.0000	0.0000	0.0000	5.1695	10.6485
37	NBP[0]528* (%)	0.0000	0.0000	0.0000	7.4938	0.6089
38	NBP[0]560* (%)	0.0000	0.0000	0.0000	10.7950	0.0228
39	NBP[0]592* (%)	0.0000	0.0000	0.0000	15.2768	0.0007
40	NBP[0]624* (%)	0.0000	0.0000	0.0000	21.2005	0.0000
41	NBP[0]656* (%)	0.0000	0.0000	0.0000	28.7613	0.0000
42	NBP[0]688* (%)	0.0000	0.0000	0.0000	37.9331	0.0000
43	NBP[0]720* (%)	0.0000	0.0000	0.0000	48.6039	0.0000
44	NBP[0]752* (%)	0.0000	0.0000	0.0000	60.9535	0.0000
45	NBP[0]784* (%)	0.0000	0.0000	0.0000	75.8629	0.0000
46	NBP[0]830* (%)	0.0000	0.0000	0.0000	95.9685	0.0000
47	NBP[0]888* (%)	0.0000	0.0000	0.0000	99.9417	0.0000
48	NBP[0]947* (%)	0.0000	0.0000	0.0000	99.9995	0.0000
49	NBP[0]1009* (%)	0.0000	0.0000	0.0000	100.0000	0.0000
50	NBP[0]1062* (%)	0.0000	0.0000	0.0000	100.0000	0.0000
51	NBP[0]1124* (%)	0.0000	0.0000	0.0000	100.0000	0.0000
52		Diesel	AGO			
53	Flow Rate (lbmole/hr)	1.139230e+03	202.1898			
54		---	---			
55	Methane (%)	0.0000	0.0000			
56	Ethane (%)	0.0000	0.0000			
57	Propane (%)	0.0001	0.0000			
58	i-Butane (%)	0.0006	0.0000			
59	n-Butane (%)	0.0009	0.0000			
60	H2O (%)	0.9791	0.2220			
61	NBP[0]49* (%)	0.0027	0.0000			
62	NBP[0]79* (%)	0.0051	0.0000			
63	NBP[0]111* (%)	0.0107	0.0000			
64	NBP[0]144* (%)	0.0236	0.0000			
65	NBP[0]176* (%)	0.0487	0.0001			
66	NBP[0]208* (%)	0.1158	0.0002			
67	NBP[0]240* (%)	0.2721	0.0005			
68	NBP[0]272* (%)	0.6171	0.0012			
69	NBP[0]304* (%)	1.3278	0.0028			
70	NBP[0]336* (%)	2.7017	0.0072			



1	Company Name Not Available Calgary, Alberta CANADA			Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc		
2				Unit Set: NewUser		
3						
4						
5				Date/Time: Saturday Jul 4 2009, 10:28:34		
6	Column Sub-Flowsheet: T-100 @Main (continued)					
7						
8						
9	SUMMARY					
10						
11		Diesel	AGO			
12	NBP[0]368* (%)	5.1983	0.0184			
13	NBP[0]400* (%)	9.7063	0.0473			
14	NBP[0]433* (%)	19.0757	0.1225			
15	NBP[0]464* (%)	43.8630	0.2973			
16	NBP[0]496* (%)	83.5037	0.6783			
17	NBP[0]528* (%)	90.4548	1.4425			
18	NBP[0]560* (%)	86.3121	2.8701			
19	NBP[0]592* (%)	79.3712	5.3513			
20	NBP[0]624* (%)	69.1201	9.6794			
21	NBP[0]656* (%)	53.7082	17.5306			
22	NBP[0]688* (%)	31.6954	30.3714			
23	NBP[0]720* (%)	10.6460	40.7502			
24	NBP[0]752* (%)	1.8482	37.1982			
25	NBP[0]784* (%)	0.1978	23.9392			
26	NBP[0]830* (%)	0.0023	4.0292			
27	NBP[0]888* (%)	0.0000	0.0583			
28	NBP[0]947* (%)	0.0000	0.0005			
29	NBP[0]1009* (%)	0.0000	0.0000			
30	NBP[0]1062* (%)	0.0000	0.0000			
31	NBP[0]1124* (%)	0.0000	0.0000			
32	COLUMN PROFILES					
33						
34	Reflux Ratio:	0.7065	Reboil Ratio:	0.4048	The Flows Option is Selected	Flow Basis: Molar
35	Column Profiles Flows					
36		Temperature (F)	Pressure (psia)	Net Liq (lbmole/hr)	Net Vap (lbmole/hr)	Net Feed (lbmole/hr)
37	*Condenser	106.7	19.70	1956	---	3470
38	1_Main TS	275.2	28.70	9295	5426	4812
39	2_Main TS	315.7	28.84	4932	7952	4812
40	3_Main TS	342.0	28.99	4925	8401	---
41	4_Main TS	355.4	29.13	4844	8394	---
42	5_Main TS	364.8	29.27	4733	8314	---
43	6_Main TS	373.0	29.41	4587	8203	---
44	7_Main TS	381.8	29.56	4386	8056	---
45	8_Main TS	392.6	29.70	4123	7856	218.6
46	9_Main TS	405.8	29.84	2881	7373	940.6
47	10_Main TS	422.9	29.99	2679	7072	---
48	11_Main TS	436.7	30.13	2550	6871	---
49	12_Main TS	447.0	30.27	2449	6741	---
50	13_Main TS	455.0	30.41	2346	6640	---
51	14_Main TS	462.4	30.56	2209	6537	---
52	15_Main TS	470.9	30.70	1980	6401	---
53	16_Main TS	484.2	30.84	4595	6172	2218
54	17_Main TS	512.1	30.99	1018	6569	3190
55	18_Main TS	553.1	31.13	751.4	6182	---
56	19_Main TS	572.9	31.27	627.9	5916	---
57	20_Main TS	582.4	31.41	541.3	5792	---
58	21_Main TS	588.3	31.56	2500	5705	1642
59	22_Main TS	615.5	31.70	740.3	6022	1706
60	23_Main TS	637.5	31.84	614.4	5968	---
61	24_Main TS	647.8	31.99	515.9	5842	---
62	25_Main TS	654.4	32.13	433.1	5744	---
63	26_Main TS	659.7	32.27	331.3	5661	---
64	27_Main TS	666.2	32.41	137.8	5559	---
65	28_Main TS	679.4	32.56	1578	5365	6231
66	29_Main TS	670.3	32.70	---	574.7	416.3
67	1_Kero_SS	428.8	29.84	1041	---	940.6
68	2_Kero_SS	438.5	29.84	1078	318.8	---
69	3_Kero_SS	446.0	29.84	1095	356.1	---
70	Kero SS Reb	456.5	29.84	---	373.4	722.0

1	Company Name Not Available Calgary, Alberta CANADA			Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc			
2				Unit Set: NewUser			
3				Date/Time: Saturday Jul 4 2009, 10:28:34			
4							
5							
6							
7	Column Sub-Flowsheet: T-100 @Main (continued)						
8							
9							
10	COLUMN PROFILES						
11		Temperature (F)	Pressure (psia)	Net Liq (lbmole/hr)	Net Vap (lbmole/hr)	Net Feed (lbmole/hr)	Net Draws (lbmole/hr)
12	1_Diesel_SS	504.6	30.99	1281	---	1360	387.5
13	2_Diesel_SS	498.5	30.99	1230	308.8	---	---
14	3_Diesel_SS	486.1	30.99	---	257.0	166.5	1139
15	1_AGO_SS	602.8	31.70	244.0	---	275.3	211.8
16	2_AGO_SS	592.1	31.70	225.9	180.5	---	---
17	3_AGO_SS	571.0	31.70	---	162.5	138.8	202.2
18	Column Profiles Energy						
19		Temperature (F)	Liquid Enthalpy (Btu/lbmole)	Vapour Enthalpy (Btu/lbmole)	Heat Loss (Btu/hr)		
20	*Condenser	106.7	-8.349e+004	-5.147e+004	---		
21	1_Main TS	275.2	-9.797e+004	-6.841e+004	---		
22	2_Main TS	315.7	-1.000e+005	-7.320e+004	---		
23	3_Main TS	342.0	-1.028e+005	-7.691e+004	---		
24	4_Main TS	355.4	-1.047e+005	-7.849e+004	---		
25	5_Main TS	364.8	-1.063e+005	-7.936e+004	---		
26	6_Main TS	373.0	-1.080e+005	-7.996e+004	---		
27	7_Main TS	381.8	-1.101e+005	-8.045e+004	---		
28	8_Main TS	392.6	-1.130e+005	-8.093e+004	---		
29	9_Main TS	405.8	-1.168e+005	-8.136e+004	---		
30	10_Main TS	422.9	-1.210e+005	-8.207e+004	---		
31	11_Main TS	436.7	-1.241e+005	-8.271e+004	---		
32	12_Main TS	447.0	-1.264e+005	-8.314e+004	---		
33	13_Main TS	455.0	-1.285e+005	-8.337e+004	---		
34	14_Main TS	462.4	-1.307e+005	-8.342e+004	---		
35	15_Main TS	470.9	-1.341e+005	-8.324e+004	---		
36	16_Main TS	484.2	-1.409e+005	-8.256e+004	---		
37	17_Main TS	512.1	-1.451e+005	-8.409e+004	---		
38	18_Main TS	553.1	-1.583e+005	-8.343e+004	---		
39	19_Main TS	572.9	-1.649e+005	-8.233e+004	---		
40	20_Main TS	582.4	-1.689e+005	-8.141e+004	---		
41	21_Main TS	588.3	-1.726e+005	-8.053e+004	---		
42	22_Main TS	615.5	-1.729e+005	-8.220e+004	---		
43	23_Main TS	637.5	-1.784e+005	-8.148e+004	---		
44	24_Main TS	647.8	-1.834e+005	-8.010e+004	---		
45	25_Main TS	654.4	-1.878e+005	-7.885e+004	---		
46	26_Main TS	659.7	-1.927e+005	-7.766e+004	---		
47	27_Main TS	666.2	-2.032e+005	-7.594e+004	---		
48	28_Main TS	679.4	-2.384e+005	-7.199e+004	---		
49	29_Main TS	670.3	-2.546e+005	-9.916e+004	---		
50	1_Kero_SS	428.8	-1.147e+005	-8.527e+004	---		
51	2_Kero_SS	438.5	-1.145e+005	-8.852e+004	---		
52	3_Kero_SS	446.0	-1.148e+005	-9.052e+004	---		
53	Kero_SS_Reb	456.5	-1.159e+005	-9.246e+004	---		
54	1_Diesel_SS	504.6	-1.488e+005	-9.897e+004	---		
55	2_Diesel_SS	498.5	-1.510e+005	-1.026e+005	---		
56	3_Diesel_SS	486.1	-1.545e+005	-1.039e+005	---		
57	1_AGO_SS	602.8	-1.825e+005	-1.055e+005	---		
58	2_AGO_SS	592.1	-1.876e+005	-1.068e+005	---		
59	3_AGO_SS	571.0	-1.947e+005	-1.056e+005	---		
60							
61	FEEDS / PRODUCTS						
62	Flow Basis:			Molar			
63		Stream	Type	Duty (Btu/hr)	State	Flows (lbmole/hr)	Enthalpy (Btu/lbmol) Temp (F)
64	*Condenser	Atmos Cond	Energy	1.089e+008	*	---	---
65		Off Gas	Draw	---	Vapour	3.799e-019	* -3213 * 106.7 *
66		Naphtha	Draw	---	Liquid	2769	* -5212 * 106.7 *
67		Waste Water	Draw	---	Water	701.0	* -7626 * 106.7 *
68	1_Main TS	<PA_1>	Energy	-5.500e+007	*	---	---
69		PA_1_Return	Feed	---	Liquid	4812	* -4.792e+004 * 138.0 *
70	2_Main TS	PA_1_Draw	Draw	---	Liquid	4812	* -6244 * 315.7 *

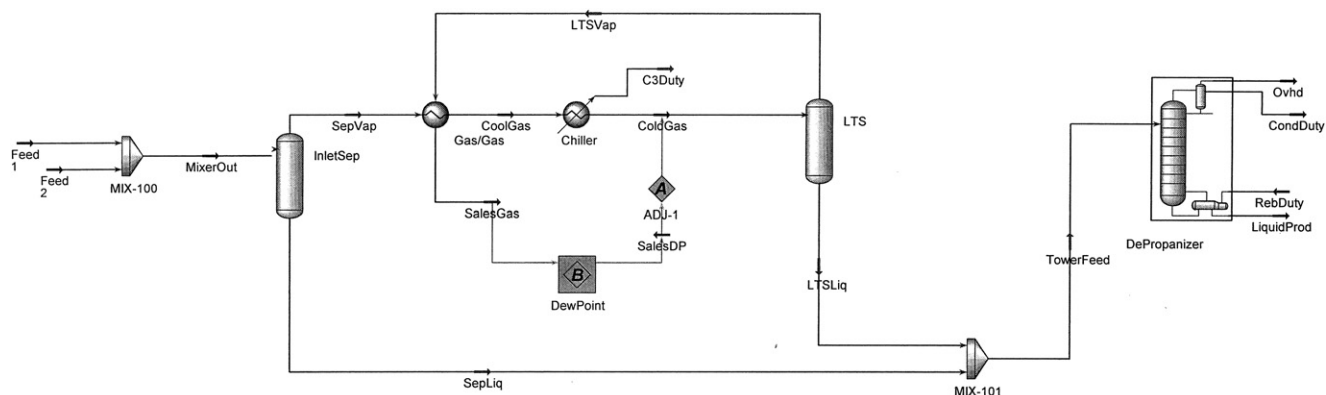


1	Company Name Not Available Calgary, Alberta CANADA				Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc							
2												
3									Unit Set: NewUser			
4									Date/Time: Saturday Jul 4 2009, 10:28:34			
5												
6												
7	Column Sub-Flowsheet: T-100 @Main (continued)											
8												
9												
10	FEEDS / PRODUCTS											
11	3_Main TS											
12	4_Main TS											
13	5_Main TS											
14	6_Main TS											
15	7_Main TS											
16	8_Main TS	Kero_SS_Return	Feed	---	Vapour	218.6	* -3.666e+004	* 428.8 *				
17	9_Main TS	Kero_SS_Draw	Draw	---	Liquid	940.6	* -7290	* 405.8 *				
18	10_Main TS											
19	11_Main TS											
20	12_Main TS											
21	13_Main TS											
22	14_Main TS											
23	15_Main TS											
24	16_Main TS	Diesel_SS_Return	Feed	---	Vapour	387.5	* -4.255e+004	* 504.6 *				
25		<PA_2>	Energy	-3.500e+007	---	---	---	---				
26		PA_2_Return	Feed	---	Liquid	1830	* -7.061e+004	* 365.2 *				
27	17_Main TS	Diesel_SS_Draw	Draw	---	Liquid	1360	* -9060	* 512.1 *				
28		PA_2_Draw	Draw	---	Liquid	1830	* -9060	* 512.1 *				
29	18_Main TS											
30	19_Main TS											
31	20_Main TS											
32	21_Main TS	AGO_SS_Return	Feed	---	Vapour	211.8	* -4.537e+004	* 602.8 *				
33		<PA_3>	Energy	-3.500e+007	---	---	---	---				
34		PA_3_Return	Feed	---	Liquid	1430	* -8.485e+004	* 484.2 *				
35	22_Main TS	AGO_SS_Draw	Draw	---	Liquid	275.3	* -1.079e+004	* 615.5 *				
36		PA_3_Draw	Draw	---	Liquid	1430	* -1.079e+004	* 615.5 *				
37	23_Main TS											
38	24_Main TS											
39	25_Main TS											
40	26_Main TS											
41	27_Main TS											
42	28_Main TS	Q-Trim	Energy	7.095e+007	---	---	---	---				
43		Atm Feed	Feed	---	Mixed	6231	* -5.164e+004	* 623.6 *				
44	29_Main TS	Main Steam	Feed	---	Vapour	416.3	* -4.360e+004	* 375.0 *				
45		Residue	Draw	---	Liquid	1420	* -1.589e+004	* 670.3 *				
46	1_Kero_SS	Kero_SS_Draw	Feed	---	Liquid	940.6	* -5.020e+004	* 405.8 *				
47		Kero_SS_Return	Draw	---	Vapour	218.6	* -5323	* 428.8 *				
48	2_Kero_SS											
49	3_Kero_SS											
50	Kero_SS_Reb	Kero_SS_Energy	Energy	7.500e+006	---	---	---	---				
51		Kerosene	Draw	---	Liquid	722.0	* -7237	* 456.5 *				
52	1_Diesel_SS	Diesel_SS_Draw	Feed	---	Liquid	1360	* -6.239e+004	* 512.1 *				
53		Diesel_SS_Return	Draw	---	Vapour	387.5	* -6178	* 504.6 *				
54	2_Diesel_SS											
55	3_Diesel_SS	Diesel Steam	Feed	---	Vapour	166.5	* -4.380e+004	* 300.0 *				
56		Diesel	Draw	---	Liquid	1139	* -9645	* 486.1 *				
57	1_AGO_SS	AGO_SS_Draw	Feed	---	Liquid	275.3	* -7.433e+004	* 615.5 *				
58		AGO_SS_Return	Draw	---	Vapour	211.8	* -6588	* 602.8 *				
59	2_AGO_SS											
60	3_AGO_SS	AGO Steam	Feed	---	Vapour	138.8	* -4.380e+004	* 300.0 *				
61		AGO	Draw	---	Liquid	202.2	* -1.216e+004	* 571.0 *				
62	SETUP											
63												
64	Column Flowsheet Topology											
65	Total Theor. Stages:	40 *	Total Tray-Sections:	4 *	Condenser + Reboiler:	2 *	Pump Arouds:	3 *				
66	Side Strippers:	3 *	Side Rectifiers:	0 *	Vapour Bypasses:	0 *						
67	Sub-Flowsheet											
68	Feed Streams				Product Streams							
69	Internal Stream	External Stream	Transfer Basis	Internal Stream	External Stream	Transfer Basis						
70	Main Steam	Main Steam @Main	T-P Flash	Residue	Residue @Main	T-P Flash						

1	Company Name Not Available Calgary, Alberta CANADA			Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc		
2				Unit Set: NewUser		
3				Date/Time: Saturday Jul 4 2009, 10:28:34		
4						
5						
6	<b>Column Sub-Flowsheet: T-100 @Main (continued)</b>					
7						
8						
9	Sub-Flowsheet					
10	<b>Feed Streams</b>			<b>Product Streams</b>		
11	Q-Trim	Q-Trim @Main	None Req'd	Atmos Cond	Atmos Cond @Main	None Req'd
12	Atm Feed	Atm Feed @Main	T-P Flash	Off Gas	Off Gas @Main	T-P Flash
13	Kero_SS_Energy		None Req'd	Waste Water	Waste Water @Main	T-P Flash
14	Diesel Steam	Diesel Steam @Main	T-P Flash	Naphtha	Naphtha @Main	T-P Flash
15	AGO Steam	AGO Steam @Main	T-P Flash	Kerosene	Kerosene @Main	T-P Flash
16				Diesel	Diesel @Main	T-P Flash
17				AGO	AGO @Main	T-P Flash
18				PA_1_Q		None Req'd
19				PA_2_Q		None Req'd
20				PA_3_Q		None Req'd
21						
22	<b>VARIABLES</b>					
23						
24	<b>Column Flowsheet Vars Available as Parameters</b>					
25	Data Source	Variable	Component	Description		
26						
27	<b>COMPONENT MAPS</b>					
28						
29	<b>Feed Streams</b>					
30	Feed Name	In to SubFlowSheet	Out of SubFlowSheet			
31	Main Steam					
32	Q-Trim					
33	Atm Feed					
34	Kero_SS_Energy					
35	Diesel Steam					
36	AGO Steam					
37	<b>Product Stream</b>					
38	Product Name	In to SubFlowSheet	Out of SubFlowSheet			
39	Residue					
40	Atmos Cond					
41	Off Gas					
42	Waste Water					
43	Naphtha					
44	Kerosene					
45	Diesel					
46	AGO					
47	PA_1_Q					
48	PA_2_Q					
49	PA_3_Q					
50	<b>DYNAMICS</b>					
51						
52	<b>Vessel Dynamic Specifications</b>					
53						
54	Vessel	Condenser	Kero_SS_Reb			
55	Diameter (ft)	3.914	3.914			
56	Height.0 (ft)	5.871	5.871			
57	Volume.0 (ft3)	70.63 *	70.63 *			
58	Liquid Volume Percent (%)	50.00 *	50.00 *			
59	Level Calculator	Horizontal cylinder	Horizontal cylinder			
60	Fraction Calculator	Use levels and nozzles	Use levels and nozzles			
61	Vessel Delta P (psi)	9.000 *	0.0000 *			
62	Fixed Vessel P Spec (psia)	19.70	29.84			
63	Fixed P Spec Active	Not Active	Not Active			
64	<b>Other Equipment in Column Flowsheet</b>					
65						
66	PA_1_Cooler @COL1					
67	PA_2_Cooler @COL1					
68	PA_3_Cooler @COL1					
69						
70	<b>Holdup Details</b>					

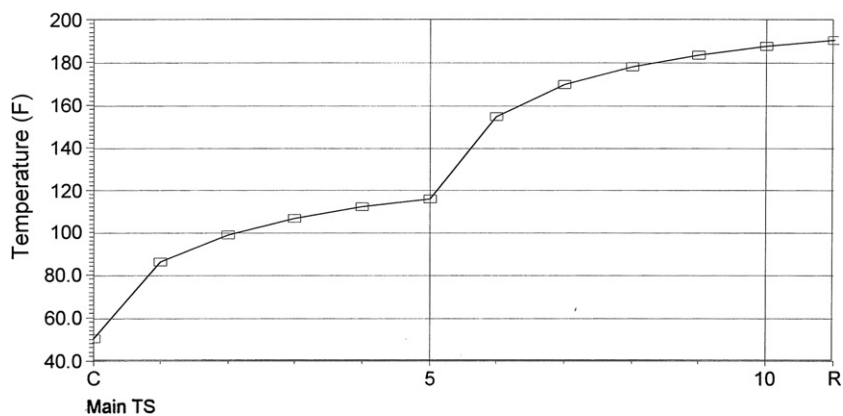


1	Company Name Not Available Calgary, Alberta CANADA	Case Name: D:\Applied-Process-Design-vol-2\programs\crude-distillation-unit.usc		
2		Unit Set: NewUser		
3		Date/Time: Saturday Jul 4 2009, 10:28:34		
4				
5				
6				
7	<b>Column Sub-Flowsheet: T-100 @Main (continued)</b>			
8				
9		Pressure	Volume	Bulk Liquid Volume
10		(psia)	(ft3)	(ft3)
11	*Condenser	0.0000	0.0000 *	0.0000
12	1_Main TS	0.0000	0.0000 *	0.0000
13	2_Main TS	0.0000	0.0000 *	0.0000
14	3_Main TS	0.0000	0.0000 *	0.0000
15	4_Main TS	0.0000	0.0000 *	0.0000
16	5_Main TS	0.0000	0.0000 *	0.0000
17	6_Main TS	0.0000	0.0000 *	0.0000
18	7_Main TS	0.0000	0.0000 *	0.0000
19	8_Main TS	0.0000	0.0000 *	0.0000
20	9_Main TS	0.0000	0.0000 *	0.0000
21	10_Main TS	0.0000	0.0000 *	0.0000
22	11_Main TS	0.0000	0.0000 *	0.0000
23	12_Main TS	0.0000	0.0000 *	0.0000
24	13_Main TS	0.0000	0.0000 *	0.0000
25	14_Main TS	0.0000	0.0000 *	0.0000
26	15_Main TS	0.0000	0.0000 *	0.0000
27	16_Main TS	0.0000	0.0000 *	0.0000
28	17_Main TS	0.0000	0.0000 *	0.0000
29	18_Main TS	0.0000	0.0000 *	0.0000
30	19_Main TS	0.0000	0.0000 *	0.0000
31	20_Main TS	0.0000	0.0000 *	0.0000
32	21_Main TS	0.0000	0.0000 *	0.0000
33	22_Main TS	0.0000	0.0000 *	0.0000
34	23_Main TS	0.0000	0.0000 *	0.0000
35	24_Main TS	0.0000	0.0000 *	0.0000
36	25_Main TS	0.0000	0.0000 *	0.0000
37	26_Main TS	0.0000	0.0000 *	0.0000
38	27_Main TS	0.0000	0.0000 *	0.0000
39	28_Main TS	0.0000	0.0000 *	0.0000
40	29_Main TS	0.0000	0.0000 *	0.0000
41	1_Kero_SS	0.0000	0.0000 *	0.0000
42	2_Kero_SS	0.0000	0.0000 *	0.0000
43	3_Kero_SS	0.0000	0.0000 *	0.0000
44	Kero_SS_Reb	0.0000	0.0000 *	0.0000
45	1_Diesel_SS	0.0000	0.0000 *	0.0000
46	2_Diesel_SS	0.0000	0.0000 *	0.0000
47	3_Diesel_SS	0.0000	0.0000 *	0.0000
48	1_AGO_SS	0.0000	0.0000 *	0.0000
49	2_AGO_SS	0.0000	0.0000 *	0.0000
50	3_AGO_SS	0.0000	0.0000 *	0.0000
51				
52	<b>NOTES</b>			
53				
54				
55				
56				
57				
58				
59				
60				
61				
62				
63				
64				
65				
66				
67				
68				
69				
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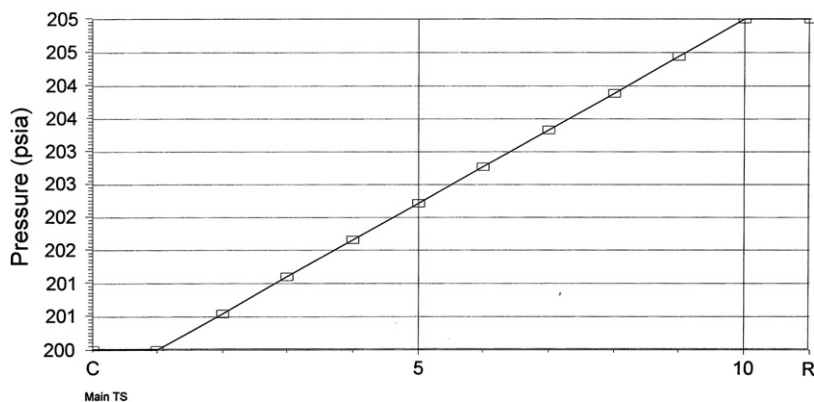
**Figure L-4** Process flow diagram of a gas processing unit

Temperature vs. Tray Position from Top



**Figure L-5** Temperature vs. Tray Position from Top

Pressure vs. Tray Position from Top



**Figure L-6** Pressure vs. Tray Position from Top



1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\gas-processing.usc						
2			Unit Set: NewUser						
3			Date/Time: Saturday Jul 4 2009, 10:41:08						
4									
5									
6	<b>Distillation: DePropanizer @Main</b>								
7									
8	<b>CONNECTIONS</b>								
9									
10	Inlet Stream								
11	STREAM NAME		Stage		FROM UNIT OPERATION				
12	RebDuty		Reboiler						
13	TowerFeed		5 Main TS		Mixer		MIX-101		
14	Outlet Stream								
15	STREAM NAME		Stage		TO UNIT OPERATION				
16	CondDuty		Condenser						
17	Ovhd		Condenser						
18	LiquidProd		Reboiler						
19									
20	<b>MONITOR</b>								
21									
22	Specifications Summary								
23		Specified Value	Current Value	Wt. Error	Wt. Tol.	Abs. Tol.	Active	Estimate	Used
24	Reflux Ratio	1.000 *	1.000	1.784e-006	1.000e-002 *	1.000e-002 *	On	On	On
25	Propane Fraction	2.000e-002 *	2.000e-002	-2.574e-005	1.000e-002 *	1.000e-003 *	On	On	On
26	Ovhd Vap Rate	219.6 lbmole/hr *	242.9 lbmole/hr	0.1062	1.000e-002 *	2.205 lbmole/hr *	Off	On	Off
27	Reflux Rate	---	242.9 lbmole/hr	---	1.000e-002 *	2.205 lbmole/hr *	Off	On	Off
28	Btms Prod Rate	---	67.67 lbmole/hr	---	1.000e-002 *	2.205 lbmole/hr *	Off	On	Off
29									
30	<b>SPECS</b>								
31									
32	Column Specification Parameters								
33									
34	<b>Reflux Ratio</b>								
35	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
36	Stage:	Condenser	Flow Basis:	Molar	Liquid Specification:	---			
37									
38	<b>Propane Fraction</b>								
39	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
40	Stage:	Reboiler	Flow Basis:	Mole Fraction	Phase:	Liquid			
41	Components:	Propane							
42									
43	<b>Ovhd Vap Rate</b>								
44	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
45	Stream:	Ovhd	Flow Basis:	Molar					
46									
47	<b>Reflux Rate</b>								
48	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
49	Stage:	Condenser	Flow Basis:	Molar	Liquid Specification:	---			
50									
51	<b>Btms Prod Rate</b>								
52	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
53	Stream:	LiquidProd	Flow Basis:	Molar					
54									
55	<b>SUBCOOLING</b>								
56			Condenser						
57	Degrees of Subcooling				---				
58	Subcool to				---				
59									
60	<b>User Variables</b>								
61									
62	<b>PROFILES</b>								
63	General Parameters								
64	Sub-Flow Sheet:	DePropanizer (COL1)				Number of Stages:		10	
65	<b>Profile Estimates</b>								
66		Temperature (F)		Net Liquid (lbmole/hr)		Net Vapour (lbmole/hr)			
67	Condenser	40.00 *		242.9		242.9			
68	1_Main TS	86.34		247.4		485.9			
69	2_Main TS	99.14		242.6		490.3			
70	3_Main TS	106.9		238.3		485.5			

1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\gas-processing.usc					
2			Unit Set: NewUser					
3			Date/Time: Saturday Jul 4 2009, 10:41:08					
4								
5								
6	<b>Distillation: DePropanizer @Main (continued)</b>							
7								
8	<b>Profile Estimates</b>							
9		Temperature (F)	Net Liquid (lbmole/hr)	Net Vapour (lbmole/hr)				
10	4_Main TS	112.4	235.3	481.3				
11	5_Main TS	116.2	501.4	478.3				
12	6_Main TS	155.0	552.5	433.7				
13	7_Main TS	169.9	568.1	484.8				
14	8_Main TS	178.4	575.1	500.4				
15	9_Main TS	183.9	579.0	507.5				
16	10_Main TS	187.9	581.3	511.3				
17	Reboiler	200.0 *	67.67	513.7				
18								
19	<b>EFFICIENCIES</b>							
20								
21	<b>Stage Efficiencies</b>							
22	Stages	Overall Efficiency	Nitrogen	CO2	Methane	Ethane	Propane	
23	Condenser	1.000	1.000	1.000	1.000	1.000	1.000	
24	1_Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
25	2_Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
26	3_Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
27	4_Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
28	5_Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
29	6_Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
30	7_Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
31	8_Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
32	9_Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
33	10_Main TS	1.000	1.000	1.000	1.000	1.000	1.000	
34	Reboiler	1.000	1.000	1.000	1.000	1.000	1.000	
35	Stages	Overall Efficiency	i-Butane	n-Butane				
36	Condenser	1.000	1.000	1.000				
37	1_Main TS	1.000	1.000	1.000				
38	2_Main TS	1.000	1.000	1.000				
39	3_Main TS	1.000	1.000	1.000				
40	4_Main TS	1.000	1.000	1.000				
41	5_Main TS	1.000	1.000	1.000				
42	6_Main TS	1.000	1.000	1.000				
43	7_Main TS	1.000	1.000	1.000				
44	8_Main TS	1.000	1.000	1.000				
45	9_Main TS	1.000	1.000	1.000				
46	10_Main TS	1.000	1.000	1.000				
47	Reboiler	1.000	1.000	1.000				
48								
49	<b>SOLVER</b>							
50								
51	Column Solving Algorithm: Legacy Inside-Out							
52	<b>Solving Options</b>			<b>Acceleration Parameters</b>				
53	Maximum Iterations:	10000	Accelerate K Value & H Model Parameters:				Off	
54	Equilibrium Error Tolerance:	1.000e-05						
55	Heat/Spec Error Tolerance:	5.000e-004						
56	Save Solutions as Initial Estimate:	On						
57	Super Critical Handling Model:	Simple K						
58	Trace Level:	Low						
59	Init from Ideal K's:	Off	<b>Damping Parameters</b>					
60	<b>Initial Estimate Generator Parameters</b>			Azeotrope Check:				Off
61	Iterative IEG (Good for Chemicals):	Off	Fixed Damping Factor:				1	
62								
63								
64	<b>SIDE STRIPPERS</b>							
65								
66	<b>SIDE RECTIFIERS</b>							
67								
68	<b>PUMP AROUNDS</b>							
69								
70	<b>VAP BYPASSES</b>							



1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\gas-processing.usc			
2			Unit Set: NewUser			
3			Date/Time: Saturday Jul 4 2009, 10:41:08			
4						
5						
6	<b>Distillation: DePropanizer @Main (continued)</b>					
7						
8	<b>VAP BYPASSES</b>					
9						
10	<b>RATING</b>					
11						
12	<b>Tray Sections</b>					
13						
14	Tray Section	Main TS				
15	Tray Diameter (ft)	4.921	*			
16	Weir Height (ft)	0.1640	*			
17	Weir Length (ft)	3.937	*			
18	Tray Space (ft)	1.640	*			
19	Tray Volume (ft3)	31.20				
20	Disable Heat Loss Calculations	No				
21	Heat Model	None				
22	Rating Calculations	No				
23	Tray Hold Up (ft3)	3.120				
24	<b>Vessels</b>					
25						
26	Vessel	Condenser	Reboiler			
27	Diameter (ft)	3.914	3.914			
28	Length (ft)	5.871	5.871			
29	Volume (ft3)	70.63	70.63	*		
30	Orientation	Horizontal	Horizontal			
31	Vessel has a Boot	No	No			
32	Boot Diameter (ft)	---	---			
33	Boot Length (ft)	---	---			
34	Hold Up (ft3)	35.31	35.31			
35	<b>Other Equipment In Column Flowsheet</b>					
36						
37						
38	<b>Pressure Profile</b>					
39						
40		Pressure (psia)		Pressure Drop (psi)		
41	Condenser	200.0 psia	*	0.0000 psi		
42	1__Main TS	200.0 psia		0.5556 psi		
43	2__Main TS	200.6 psia		0.5556 psi		
44	3__Main TS	201.1 psia		0.5556 psi		
45	4__Main TS	201.7 psia		0.5556 psi		
46	5__Main TS	202.2 psia		0.5556 psi		
47	6__Main TS	202.8 psia		0.5556 psi		
48	7__Main TS	203.3 psia		0.5556 psi		
49	8__Main TS	203.9 psia		0.5556 psi		
50	9__Main TS	204.4 psia		0.5556 psi		
51	10__Main TS	205.0 psia		---		
52	Reboiler	205.0 psia	*	0.0000 psi		
53	<b>Pressure Solving Options</b>					
54						
55	Pressure Tolerance	1.000e-004 *	Pressure Drop Tolerance	1.000e-004 *		
56	Damping Factor	1.000 *	Max Press Iterations	100 *		
57	<b>CONDITIONS</b>					
58	Name	TowerFeed @Main	LiquidProd @Main	Ovhd @Main	RebDuty @Main	CondDuty @Main
59	Vapour	0.0168	0.0000	1.0000	---	---
60	Temperature (F)	24.7167	190.6985	50.9511	---	---
61	Pressure (psia)	580.0000	205.0000	200.0000	---	---
62	Molar Flow (lbmole/hr)	310.5934	67.6652	242.9282	---	---
63	Mass Flow (lb/hr)	11619.0607	3913.8955	7705.1652	---	---
64	Std Ideal Liq Vol Flow (barrel/day)	1741.8603	468.3456	1273.5147	---	---
65	Molar Enthalpy (Btu/lbmole)	-4.963e+004	-6.029e+004	-4.020e+004	---	---
66	Molar Entropy (Btu/lbmole-F)	25.76	24.35	38.91	---	---
67	Heat Flow (Btu/hr)	-1.5416e+07	-4.0793e+06	-9.7649e+06	3.3651e+06	1.7935e+06
68						
69						
70						

1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\gas-processing.usc		
2			Unit Set: NewUser		
3			Date/Time: Saturday Jul 4 2009, 10:41:08		
4					
5					
6					
7	Distillation: DePropanizer @Main (continued)				
8					
9					
10	PROPERTIES				
11	Name	TowerFeed @Main	LiquidProd @Main	Ovhd @Main	
12	Molecular Weight	37.41	57.84	31.72	
13	Molar Density (lbmole/ft3)	0.7321	0.5086	4.286e-002	
14	Mass Density (lb/ft3)	27.39	29.42	1.360	
15	Act. Volume Flow (barrel/day)	1814	568.7	2.423e+004	
16	Mass Enthalpy (Btu/lb)	-1327	-1042	-1267	
17	Mass Entropy (Btu/lb-F)	0.6886	0.4209	1.227	
18	Heat Capacity (Btu/lbmole-F)	24.79	44.19	14.77	
19	Mass Heat Capacity (Btu/lb-F)	0.6627	0.7640	0.4655	
20	Lower Heating Value (Btu/lbmole)	---	1.137e+006	---	
21	Mass Lower Heating Value (Btu/lb)	---	1.965e+004	---	
22	Phase Fraction [Vol. Basis]	8.621e-002	---	---	
23	Phase Fraction [Mass Basis]	9.666e-003	2.122e-314	4.941e-324	
24	Partial Pressure of CO2 (psia)	3.901	0.0000	1.149	
25	Cost Based on Flow (Cost/s)	0.0000	0.0000	0.0000	
26	Act. Gas Flow (ACFM)	---	---	94.46	
27	Avg. Liq. Density (lbmole/ft3)	0.7622	0.6176	0.8154	
28	Specific Heat (Btu/lbmole-F)	24.79	44.19	14.77	
29	Std. Gas Flow (MMSCFD)	2.829	0.6163	2.212	
30	Std. Ideal Liq. Mass Density (lb/ft3)	28.51	35.72	25.86	
31	Act. Liq. Flow (USGPM)	48.34	16.59	---	
32	Z Factor	---	5.775e-002	0.8515	
33	Watson K	15.62	13.66	16.66	
34	User Property	---	---	---	
35	Cp/(Cp - R)	1.087	1.047	1.155	
36	Cp/Cv	1.149	1.047	1.309	
37	Heat of Vap. (Btu/lbmole)	6972	6548	7751	
38	Kinematic Viscosity (cSt)	---	0.1977	0.4482	
39	Liq. Mass Density (Std. Cond) (lb/ft3)	27.07	35.78	21.36	
40	Liq. Vol. Flow (Std. Cond) (barrel/day)	1830	467.1	1531	
41	Liquid Fraction	0.9832	1.000	0.0000	
42	Molar Volume (ft3/lbmole)	1.366	1.966	23.33	
43	Mass Heat of Vap. (Btu/lb)	186.4	113.2	244.4	
44	Phase Fraction [Molar Basis]	0.0168	0.0000	1.0000	
45	Surface Tension (dyne/cm)	7.301	4.326	---	
46	Thermal Conductivity (Btu/hr-ft-F)	---	3.763e-002	1.305e-002	
47	Viscosity (cP)	---	9.317e-002	9.761e-003	
48	Cv (Semi-Ideal) (Btu/lbmole-F)	22.81	42.20	12.78	
49	Mass Cv (Semi-Ideal) (Btu/lb-F)	0.6096	0.7297	0.4029	
50	Cv (Btu/lbmole-F)	21.58	42.20	11.28	
51	Mass Cv (Btu/lb-F)	0.5770	0.7297	0.3556	
52	Cv (Ent. Method) (Btu/lbmole-F)	---	---	11.47	
53	Mass Cv (Ent. Method) (Btu/lb-F)	---	---	0.3616	
54	Cp/Cv (Ent. Method)	---	---	1.287	
55	Reid VP at 37.8 C (psia)	502.4	62.78	---	
56	True VP at 37.8 C (psia)	870.2	63.18	1035	
57	Liq. Vol. Flow - Sum(Std. Cond) (barrel/day)	1802	467.6	1542	
58	Partial Pressure of H2S (psia)	0.0000	0.0000	0.0000	
59	SUMMARY				
60					
61	Flow Basis:	Molar	The composition option is selected		
62	Feed Composition				
63		TowerFeed			
64	Flow Rate (lbmole/hr)	310.5934			
65		---			
66	Nitrogen	0.0019			
67	CO2	0.0045			
68	Methane	0.2344			
69	Ethane	0.2528			
70	Propane	0.2592			



1	Company Name Not Available Calgary, Alberta CANADA			Case Name:	D:\Applied-Process-Design-vol-2\programs\gas-processing.usc		
2				Unit Set:	NewUser		
3				Date/Time: Saturday Jul 4 2009, 10:41:08			
4							
5							
6	Distillation: DePropanizer @Main (continued)						
7							
8							
9	SUMMARY						
10							
11		TowerFeed					
12	i-Butane	0.1259					
13	n-Butane	0.1212					
14	Flow Basis:		Molar	The composition option is selected			
15	Feed Flows						
16		TowerFeed					
17	Flow Rate (lbmole/hr)	310.5934					
18		---					
19	Nitrogen (lbmole/hr)	0.6046					
20	CO2 (lbmole/hr)	1.3960					
21	Methane (lbmole/hr)	72.8109					
22	Ethane (lbmole/hr)	78.5185					
23	Propane (lbmole/hr)	80.5041					
24	i-Butane (lbmole/hr)	39.1108					
25	n-Butane (lbmole/hr)	37.6485					
26	Products						
27	Flow Basis:		Molar	The composition option is selected			
28	Product Compositions						
29		Ovhd	LiquidProd				
30	Flow Rate (lbmole/hr)	242.9282	67.6652				
31		---	---				
32	Nitrogen	0.0025	0.0000				
33	CO2	0.0057	0.0000				
34	Methane	0.2997	0.0000				
35	Ethane	0.3232	0.0000				
36	Propane	0.3258	0.0200				
37	i-Butane	0.0371	0.4450				
38	n-Butane	0.0060	0.5350				
39	Flow Basis:		Molar	The composition option is selected			
40	Product Flows						
41		Ovhd	LiquidProd				
42	Flow Rate (lbmole/hr)	242.9282	67.6652				
43		---	---				
44	Nitrogen (lbmole/hr)	0.6046	0.0000				
45	CO2 (lbmole/hr)	1.3960	0.0000				
46	Methane (lbmole/hr)	72.8109	0.0000				
47	Ethane (lbmole/hr)	78.5152	0.0033				
48	Propane (lbmole/hr)	79.1509	1.3532				
49	i-Butane (lbmole/hr)	9.0014	30.1094				
50	n-Butane (lbmole/hr)	1.4492	36.1992				
51	Flow Basis:		Molar	The composition option is selected			
52	Product Recoveries						
53		Ovhd	LiquidProd				
54	Flow Rate (lbmole/hr)	242.9282	67.6652				
55		---	---				
56	Nitrogen (%)	100.0000	0.0000				
57	CO2 (%)	100.0000	0.0000				
58	Methane (%)	100.0000	0.0000				
59	Ethane (%)	99.9958	0.0042				
60	Propane (%)	98.3190	1.6810				
61	i-Butane (%)	23.0152	76.9848				
62	n-Butane (%)	3.8494	96.1506				
63	COLUMN PROFILES						
64							
65	Reflux Ratio:	1.000	Reboil Ratio:	7.591	The Flows Option is Selected	Flow Basis:	Molar
66	Column Profiles Flows						
67		Temperature (F)	Pressure (psia)	Net Liq (lbmole/hr)	Net Vap (lbmole/hr)	Net Feed (lbmole/hr)	Net Draws (lbmole/hr)
68	Condenser	50.95	200.0	242.9	---	---	242.9
69	1 Main TS	86.34	200.0	247.4	485.9	---	---
70	2 Main TS	99.14	200.6	242.6	490.3	---	---

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Company Name Not Available  
Calgary, Alberta  
CANADA

Case Name: D:\Applied-Process-Design-vol-2\programs\gas-processing.usc

Unit Set: NewUser

Date/Time: Saturday Jul 4 2009, 10:41:08

Distillation: DePropanizer @Main (continued)

COLUMN PROFILES

	Temperature (F)	Pressure (psia)	Net Liq (lbmole/hr)	Net Vap (lbmole/hr)	Net Feed (lbmole/hr)	Net Draws (lbmole/hr)
3_Main TS	106.9	201.1	238.3	485.5	---	---
4_Main TS	112.4	201.7	235.3	481.3	---	---
5_Main TS	116.2	202.2	501.4	478.3	310.6	---
6_Main TS	155.0	202.8	552.5	433.7	---	---
7_Main TS	169.9	203.3	568.1	484.8	---	---
8_Main TS	178.4	203.9	575.1	500.4	---	---
9_Main TS	183.9	204.4	579.0	507.5	---	---
10_Main TS	187.9	205.0	581.3	511.3	---	---
Reboiler	190.7	205.0	---	513.7	---	67.67

Column Profiles Energy

	Temperature (F)	Liquid Enthalpy (Btu/lbmole)	Vapour Enthalpy (Btu/lbmole)	Heat Loss (Btu/hr)
Condenser	50.95	-5.284e+004	-4.020e+004	---
1_Main TS	86.34	-5.465e+004	-4.283e+004	---
2_Main TS	99.14	-5.604e+004	-4.383e+004	---
3_Main TS	106.9	-5.700e+004	-4.442e+004	---
4_Main TS	112.4	-5.758e+004	-4.479e+004	---
5_Main TS	116.2	-5.791e+004	-4.500e+004	---
6_Main TS	155.0	-5.888e+004	-4.978e+004	---
7_Main TS	169.9	-5.961e+004	-5.174e+004	---
8_Main TS	178.4	-6.004e+004	-5.279e+004	---
9_Main TS	183.9	-6.025e+004	-5.338e+004	---
10_Main TS	187.9	-6.032e+004	-5.367e+004	---
Reboiler	190.7	-6.029e+004	-5.377e+004	---

FEEDS / PRODUCTS

Flow Basis:		Molar					
	Stream	Type	Duty (Btu/hr)	State	Flows (lbmole/hr)	Enthalpy (Btu/lbmol)	Temp (F)
Condenser	CondDuty	Energy	1.794e+006 *		---	---	---
	Ovhd	Draw	---	Vapour	242.9 *	-2509 *	50.95 *
1_Main TS							
2_Main TS							
3_Main TS							
4_Main TS							
5_Main TS	TowerFeed	Feed	---	Mixed	310.6 *	-2.134e+004 *	24.72 *
6_Main TS							
7_Main TS							
8_Main TS							
9_Main TS							
10_Main TS							
Reboiler	RebDuty	Energy	3.365e+006 *		---	---	---
	LiquidProd	Draw	---	Liquid	67.67 *	-3764 *	190.7 *

SETUP

Sub-Flowsheet

Feed Streams			Product Streams		
Internal Stream	External Stream	Transfer Basis	Internal Stream	External Stream	Transfer Basis
RebDuty	RebDuty @Main	None Req'd	CondDuty	CondDuty @Main	None Req'd
TowerFeed	TowerFeed @Main	T-P Flash	Ovhd	Ovhd @Main	T-P Flash
			LiquidProd	LiquidProd @Main	T-P Flash

VARIABLES

Column Flowsheet Vars Available as Parameters

Data Source	Variable	Component	Description

COMPONENT MAPS

Feed Streams



1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\gas-processing.usc	
2			Unit Set: NewUser	
3			Date/Time: Saturday Jul 4 2009, 10:41:08	
4				
5				
6	<b>Distillation: DePropanizer @Main (continued)</b>			
7				
8				
9	<b>COMPONENT MAPS</b>			
10				
11	Feed Name	In to SubFlowSheet	Out of SubFlowSheet	
12	RebDuty			
13	TowerFeed			
14	<b>Product Stream</b>			
15	Product Name	In to SubFlowSheet	Out of SubFlowSheet	
16	CondDuty			
17	Ovhd			
18	LiquidProd			
19	<b>DYNAMICS</b>			
20				
21	<b>Vessel Dynamic Specifications</b>			
22				
23	Vessel	Condenser	Reboiler	
24	Diameter (ft)	3.914	3.914	
25	Height.0 (ft)	5.871	5.871	
26	Volume.0 (ft3)	70.63 *	70.63 *	
27	Liquid Volume Percent (%)	50.00 *	50.00 *	
28	Level Calculator	Horizontal cylinder	Horizontal cylinder	
29	Fraction Calculator	Use levels and nozzles	Use levels and nozzles	
30	Vessel Delta P (psi)	0.0000 *	0.0000 *	
31	Fixed Vessel P Spec (psia)	200.0	205.0	
32	Fixed P Spec Active	Not Active	Not Active	
33	<b>Other Equipment in Column Flowsheet</b>			
34				
35				
36	<b>Holdup Details</b>			
37				
38		Pressure (psia)	Volume (ft3)	Bulk Liquid Volume (ft3)
39	Condenser	0.0000	0.0000 *	0.0000
40	1__Main TS	0.0000	0.0000 *	0.0000
41	2__Main TS	0.0000	0.0000 *	0.0000
42	3__Main TS	0.0000	0.0000 *	0.0000
43	4__Main TS	0.0000	0.0000 *	0.0000
44	5__Main TS	0.0000	0.0000 *	0.0000
45	6__Main TS	0.0000	0.0000 *	0.0000
46	7__Main TS	0.0000	0.0000 *	0.0000
47	8__Main TS	0.0000	0.0000 *	0.0000
48	9__Main TS	0.0000	0.0000 *	0.0000
49	10__Main TS	0.0000	0.0000 *	0.0000
50	Reboiler	0.0000	0.0000 *	0.0000
51				
52	<b>NOTES</b>			
53				
54				
55				
56				
57				
58				
59				
60				
61				
62				
63				
64				
65				
66				
67				
68				
69				
70				

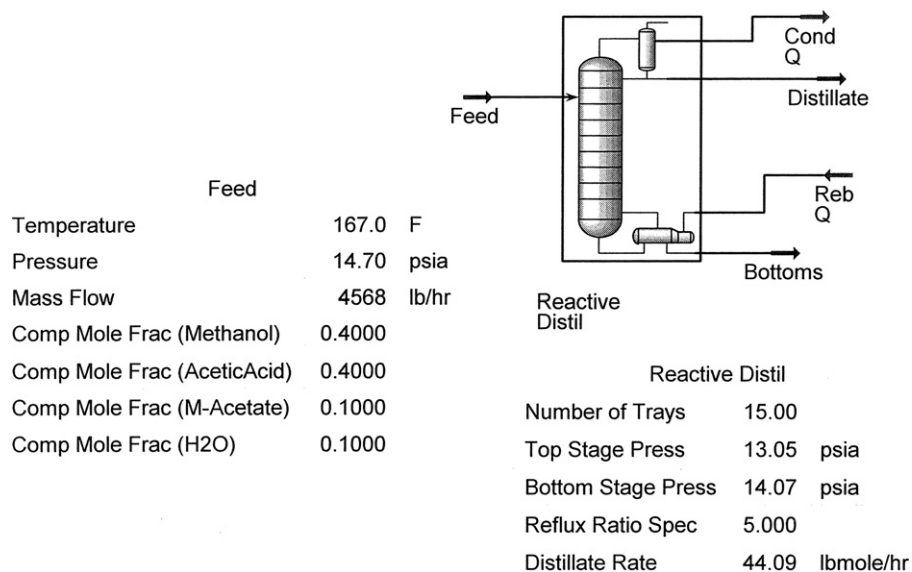


Figure L-7 Process flow diagram of a reactive distillation unit

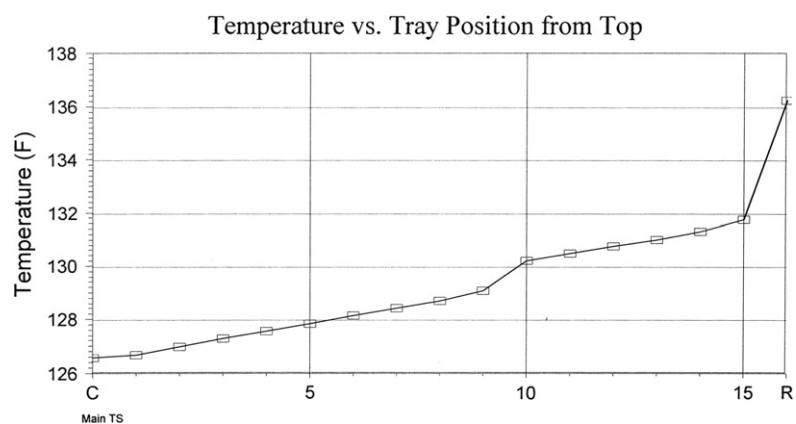


Figure L-8 Temperature vs. Tray Position from Top

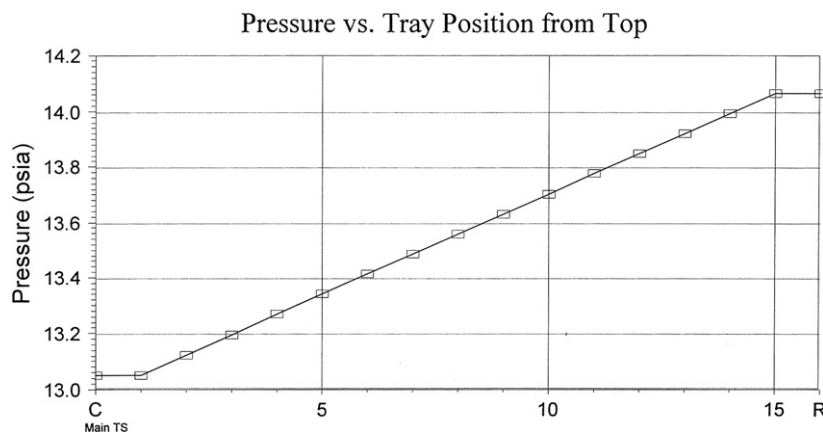


Figure L-9 Pressure vs. Tray Position from Top



1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\reactive-distillation.usc						
2			Unit Set: NewUser						
3			Date/Time: Saturday Jul 4 2009, 10:50:36						
4									
5									
6	<b>Distillation: Reactive Distil @Main</b>								
7									
8									
9	<b>CONNECTIONS</b>								
10									
11	Inlet Stream								
12	STREAM NAME	Stage	FROM UNIT OPERATION						
13	Reb Q	Reboiler							
14	Feed	10 Main TS							
15	Outlet Stream								
16	STREAM NAME	Stage	TO UNIT OPERATION						
17	Cond Q	Condenser							
18	Distillate	Condenser							
19	Bottoms	Reboiler							
20									
21	<b>MONITOR</b>								
22									
23	Specifications Summary								
24		Specified Value	Current Value	Wt. Error	Wt. Tol.	Abs. Tol.	Active	Estimate	Used
25	Reflux Ratio	5.000 *	5.000	0.0000	1.000e-002 *	1.000e-002 *	On	On	On
26	Distillate Rate	44.09 lbmole/hr *	44.09 lbmole/hr	0.0000	1.000e-002 *	2.205 lbmole/hr *	On	On	On
27	Reflux Rate	---	220.5 lbmole/hr	---	1.000e-002 *	2.205 lbmole/hr *	Off	On	Off
28	Btms Prod Rate	---	55.12 lbmole/hr	---	1.000e-002 *	2.205 lbmole/hr *	Off	On	Off
29									
30	<b>SPECS</b>								
31									
32	Column Specification Parameters								
33	<b>Reflux Ratio</b>								
34	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
35	Stage:	Condenser	Flow Basis:	Molar	Liquid Specification:	---			
36	<b>Distillate Rate</b>								
37	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
38	Stream:	Distillate	Flow Basis:	Molar					
39	<b>Reflux Rate</b>								
40	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
41	Stage:	Condenser	Flow Basis:	Molar	Liquid Specification:	---			
42	<b>Btms Prod Rate</b>								
43	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
44	Stream:	Bottoms	Flow Basis:	Molar					
45	<b>SUBCOOLING</b>								
46									
47									
48									
49									
50	Degrees of Subcooling	Condenser							
51	Subcool to								
52									
53	<b>User Variables</b>								
54									
55	<b>PROFILES</b>								
56									
57	General Parameters								
58	Sub-Flow Sheet:	Reactive Distil (COL1)	Number of Stages:	15 *					
59	<b>Profile Estimates</b>								
60		Temperature (F)	Net Liquid (lbmole/hr)	Net Vapour (lbmole/hr)					
61	Condenser	122.0 *	220.5	0.0000					
62	1__Main TS	126.7	220.4	264.6					
63	2__Main TS	127.0	220.4	264.5					
64	3__Main TS	127.3	220.4	264.5					
65	4__Main TS	127.6	220.3	264.5					
66	5__Main TS	127.9	220.2	264.4					
67	6__Main TS	128.2	219.9	264.3					
68	7__Main TS	128.4	219.4	264.0					
69	8__Main TS	128.7	218.4	263.5					
70	9__Main TS	129.1	215.7	262.5					

1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\reactive-distillation.usc			
2			Unit Set: NewUser			
3			Date/Time: Saturday Jul 4 2009, 10:50:36			
4						
5						
6	<b>Distillation: Reactive Distil @Main (continued)</b>					
7						
8						
9	<b>Profile Estimates</b>					
10		Temperature	Net Liquid	Net Vapour		
11		(F)	(lbmole/hr)	(lbmole/hr)		
12	10_Main TS	130.2	270.3	259.8		
13	11_Main TS	130.5	270.4	215.2		
14	12_Main TS	130.8	270.5	215.3		
15	13_Main TS	131.0	270.5	215.3		
16	14_Main TS	131.3	270.3	215.4		
17	15_Main TS	131.8	266.8	215.1		
18	Reboiler	212.0 *	55.12	211.7		
19						
20	<b>EFFICIENCIES</b>					
21	<b>Stage Efficiencies</b>					
22	Stages	Overall Efficiency	Methanol	Acetic Acid	M-Acetate	H2O
23	Condenser	1.000	1.000	1.000	1.000	1.000
24	1_Main TS	1.000	1.000	1.000	1.000	1.000
25	2_Main TS	1.000	1.000	1.000	1.000	1.000
26	3_Main TS	1.000	1.000	1.000	1.000	1.000
27	4_Main TS	1.000	1.000	1.000	1.000	1.000
28	5_Main TS	1.000	1.000	1.000	1.000	1.000
29	6_Main TS	1.000	1.000	1.000	1.000	1.000
30	7_Main TS	1.000	1.000	1.000	1.000	1.000
31	8_Main TS	1.000	1.000	1.000	1.000	1.000
32	9_Main TS	1.000	1.000	1.000	1.000	1.000
33	10_Main TS	1.000	1.000	1.000	1.000	1.000
34	11_Main TS	1.000	1.000	1.000	1.000	1.000
35	12_Main TS	1.000	1.000	1.000	1.000	1.000
36	13_Main TS	1.000	1.000	1.000	1.000	1.000
37	14_Main TS	1.000	1.000	1.000	1.000	1.000
38	15_Main TS	1.000	1.000	1.000	1.000	1.000
39	Reboiler	1.000	1.000	1.000	1.000	1.000
40	<b>SOLVER</b>					
41						
42	Column Solving Algorithm: Sparse Continuation Solver					
43	<b>Solving Options</b>			<b>Acceleration Parameters</b>		
44	Maximum Iterations:	10000	Accelerate K Value & H Model Parameters: Off			
45	Equilibrium Error Tolerance:	1.000e-05				
46	Heat/Spec Error Tolerance:	5.000e-004				
47	Save Solutions as Initial Estimate:	On				
48	Super Critical Handling Model:	Simple K				
49	Trace Level:	Low	<b>Damping Parameters</b>			
50	Init from Ideal K's:	Off				
51	<b>Initial Estimate Generator Parameters</b>			Azeotrope Check: Off		
52	Iterative IEG (Good for Chemicals):	Off	Fixed Damping Factor: 1 *			
53						
54						
55	<b>SIDE STRIPPERS</b>					
56						
57	<b>SIDE RECTIFIERS</b>					
58						
59	<b>PUMP AROUNDS</b>					
60						
61	<b>VAP BYPASSES</b>					
62						
63	<b>RATING</b>					
64						
65	<b>Tray Sections</b>					
66						
67	Tray Section	Main TS				
68	Tray Diameter	(ft)	4.921	*		
69	Weir Height	(ft)	0.1640	*		
70	Weir Length	(ft)	3.937	*		



1	Company Name Not Available Calgary, Alberta CANADA		Case Name:	D:\Applied-Process-Design-vol-2\programs\reactive-distillation.usc		
2			Unit Set:	NewUser		
3			Date/Time:	Saturday Jul 4 2009, 10:50:36		
4						
5						
6	<b>Distillation: Reactive Distil @Main (continued)</b>					
7						
8						
9	Tray Space	(ft)	1.804	*		
10	Tray Volume	(ft3)	34.32			
11	Disable Heat Loss Calculations		No			
12	Heat Model		None			
13	Rating Calculations		No			
14	Tray Hold Up	(ft3)	3.120			
15	<b>Vessels</b>					
16						
17	Vessel		Reboiler		Condenser	
18	Diameter	(ft)	3.914		3.914	
19	Length	(ft)	5.871		5.871	
20	Volume	(ft3)	70.63	*	70.63	*
21	Orientation		Horizontal		Horizontal	
22	Vessel has a Boot		No		No	
23	Boot Diameter	(ft)	---		---	
24	Boot Length	(ft)	---		---	
25	Hold Up	(ft3)	35.31		35.31	
26	<b>Other Equipment In Column Flowsheet</b>					
27						
28						
29	<b>Pressure Profile</b>					
30						
31			Pressure (psia)		Pressure Drop (psi)	
32	Condenser		13.05 psia	*	0.0000 psi	
33	1__Main TS		13.05 psia		7.252e-002 psi	
34	2__Main TS		13.13 psia		7.252e-002 psi	
35	3__Main TS		13.20 psia		7.252e-002 psi	
36	4__Main TS		13.27 psia		7.252e-002 psi	
37	5__Main TS		13.34 psia		7.252e-002 psi	
38	6__Main TS		13.42 psia		7.252e-002 psi	
39	7__Main TS		13.49 psia		7.252e-002 psi	
40	8__Main TS		13.56 psia		7.252e-002 psi	
41	9__Main TS		13.63 psia		7.252e-002 psi	
42	10__Main TS		13.71 psia		7.252e-002 psi	
43	11__Main TS		13.78 psia		7.252e-002 psi	
44	12__Main TS		13.85 psia		7.252e-002 psi	
45	13__Main TS		13.92 psia		7.252e-002 psi	
46	14__Main TS		14.00 psia		7.252e-002 psi	
47	15__Main TS		14.07 psia		---	
48	Reboiler		14.07 psia	*	0.0000 psi	
49	<b>Pressure Solving Options</b>					
50						
51	Pressure Tolerance	1.000e-004 *	Pressure Drop Tolerance	1.000e-004 *	Damping Factor	1.000 *
52					Max Press Iterations	100 *
53	<b>CONDITIONS</b>					
54	Name		Feed @Main	Bottoms @Main	Distillate @Main	Reb Q @Main
55	Vapour		0.0633	0.0000	0.0000	---
56	Temperature	(F)	167.0000 *	136.2575	126.6085	---
57	Pressure	(psia)	14.6959 *	14.0687	13.0534	---
58	Molar Flow	(lbmole/hr)	99.2070 *	55.1150	44.0920	---
59	Mass Flow	(lb/hr)	4568.1798	1552.2308	3016.0076	---
60	Std Ideal Liq Vol Flow	(barrel/day)	330.4306	109.4397	219.7548	---
61	Molar Enthalpy	(Btu/lbmole)	-1.484e+005	-1.337e+005	-1.810e+005	---
62	Molar Entropy	(Btu/lbmole-F)	25.31	10.38	32.63	---
63	Heat Flow	(Btu/hr)	-1.4725e+07	-7.3664e+06	-7.9822e+06	2.9723e+06
64	<b>PROPERTIES</b>					
65						
66	Name		Feed @Main	Bottoms @Main	Distillate @Main	
67	Molecular Weight		46.05	28.16	68.40	
68	Molar Density	(lbmole/ft3)	3.362e-002	2.127	0.8113	
69	Mass Density	(lb/ft3)	1.548	59.91	55.50	
70	Act. Volume Flow	(barrel/day)	1.261e+004	110.8	232.3	

1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\reactive-distillation.usc			
2			Unit Set: NewUser			
3			Date/Time: Saturday Jul 4 2009, 10:50:36			
4						
5						
6						
7	Distillation: Reactive Distil @Main (continued)					
8						
9						
10	PROPERTIES					
11	Name	Feed @Main	Bottoms @Main	Distillate @Main		
12	Mass Enthalpy (Btu/lb)	-3223	-4746	-2647		
13	Mass Entropy (Btu/lb-F)	0.5496	0.3684	0.4770		
14	Heat Capacity (Btu/lbmole-F)	25.31	20.91	32.11		
15	Mass Heat Capacity (Btu/lb-F)	0.5497	0.7426	0.4694		
16	Lower Heating Value (Btu/lbmole)	3.073e+005	1.116e+005	5.616e+005		
17	Mass Lower Heating Value (Btu/lb)	6674	3963	8211		
18	Phase Fraction [Vol. Basis]	0.9738	---	---		
19	Phase Fraction [Mass Basis]	6.029e-002	0.0000	2.122e-314		
20	Partial Pressure of CO2 (psia)	0.0000	0.0000	0.0000		
21	Cost Based on Flow (Cost/s)	0.0000	0.0000	0.0000		
22	Act. Gas Flow (ACFM)	---	---	---		
23	Avg. Liq. Density (lbmole/ft3)	1.283	2.153	0.8577		
24	Specific Heat (Btu/lbmole-F)	25.31	20.91	32.11		
25	Std. Gas Flow (MMSCFD)	0.9035	0.5020	0.4016		
26	Std. Ideal Liq. Mass Density (lb/ft3)	59.10	60.63	58.67		
27	Act. Liq. Flow (USGPM)	9.633	3.230	6.776		
28	Z Factor	---	1.034e-003	2.557e-003		
29	Watson K	9.153	8.924	8.944		
30	User Property	---	---	---		
31	Partial Pressure of H2S (psia)	0.0000	0.0000	0.0000		
32	Cp/(Cp - R)	1.085	1.105	1.066		
33	Cp/Cv	1.005	1.185	1.285		
34	Heat of Vap. (Btu/lbmole)	1.384e+004	1.792e+004	1.359e+004		
35	Kinematic Viscosity (cSt)	---	0.4279	0.3197		
36	Liq. Mass Density (Std. Cond) (lb/ft3)	59.59	62.48	58.52		
37	Liq. Vol. Flow (Std. Cond) (barrel/day)	327.7	106.2	220.3		
38	Liquid Fraction	0.9367	1.000	1.000		
39	Molar Volume (ft3/lbmole)	29.74	0.4701	1.233		
40	Mass Heat of Vap. (Btu/lb)	300.5	636.3	198.7		
41	Phase Fraction [Molar Basis]	0.0633	0.0000	0.0000		
42	Surface Tension (dyne/cm)	27.88	59.13	32.15		
43	Thermal Conductivity (Btu/hr-ft-F)	---	0.3012	0.1039		
44	Viscosity (cP)	---	0.4106	0.2842		
45	Cv (Semi-Ideal) (Btu/lbmole-F)	23.33	18.93	30.12		
46	Mass Cv (Semi-Ideal) (Btu/lb-F)	0.5066	0.6721	0.4403		
47	Cv (Btu/lbmole-F)	25.18	17.65	24.98		
48	Mass Cv (Btu/lb-F)	0.5469	0.6266	0.3652		
49	Cv (Ent. Method) (Btu/lbmole-F)	---	---	---		
50	Mass Cv (Ent. Method) (Btu/lb-F)	---	---	---		
51	Cp/Cv (Ent. Method)	---	---	---		
52	Reid VP at 37.8 C (psia)	3.446	6.871	---		
53	True VP at 37.8 C (psia)	3.356	6.597	7.387		
54	Liq. Vol. Flow - Sum(Std. Cond) (barrel/day)	327.7	106.2	220.3		
55						
56	SUMMARY					
57	Flow Basis:	Molar	The composition option is selected			
58	Feed Composition					
59		Feed				
60	Flow Rate (lbmole/hr)	99.2070				
61		---				
62	Methanol	0.4000				
63	Acetic Acid	0.4000				
64	M-Acetate	0.1000				
65	H2O	0.1000				
66	Flow Basis:	Molar	The composition option is selected			
67	Feed Flows					
68		Feed				
69	Flow Rate (lbmole/hr)	99.2070				
70		---				



1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\reactive-distillation.usc							
2										
3							Unit Set: NewUser			
4							Date/Time: Saturday Jul 4 2009, 10:50:36			
5										
6	<b>Distillation: Reactive Distil @Main (continued)</b>									
7										
8										
9	<b>SUMMARY</b>									
10										
11										
12	Methanol (lbmole/hr)	39.6828								
13	AceticAcid (lbmole/hr)	39.6828								
14	M-Acetate (lbmole/hr)	9.9207								
15	H2O (lbmole/hr)	9.9207								
16	<b>Products</b>									
17	Flow Basis:	Molar	The composition option is selected							
18	<b>Product Compositions</b>									
19		Distillate	Bottoms							
20	Flow Rate (lbmole/hr)	44.0920	55.1150							
21		---	---							
22	Methanol	0.0117	0.0023							
23	AceticAcid	0.0000	0.0116							
24	M-Acetate	0.8958	0.1717							
25	H2O	0.0925	0.8144							
26	Flow Basis:	Molar	The composition option is selected							
27	<b>Product Flows</b>									
28		Distillate	Bottoms							
29	Flow Rate (lbmole/hr)	44.0920	55.1150							
30		---	---							
31	Methanol (lbmole/hr)	0.5152	0.1261							
32	AceticAcid (lbmole/hr)	0.0000	0.6413							
33	M-Acetate (lbmole/hr)	39.4981	9.4641							
34	H2O (lbmole/hr)	4.0787	44.8836							
35	Flow Basis:	Molar	The composition option is selected							
36	<b>Product Recoveries</b>									
37		Distillate	Bottoms							
38	Flow Rate (lbmole/hr)	44.0920	55.1150							
39		---	---							
40	Methanol (%)	1.2983	0.3177							
41	AceticAcid (%)	0.0000	1.6160							
42	M-Acetate (%)	398.1386	95.3974							
43	H2O (%)	41.1126	452.4234							
44	<b>COLUMN PROFILES</b>									
45										
46	Reflux Ratio:	5.000	Reboil Ratio:	3.841	The Flows Option is Selected	Flow Basis: Molar				
47	<b>Column Profiles Flows</b>									
48		Temperature (F)	Pressure (psia)	Net Liq (lbmole/hr)	Net Vap (lbmole/hr)	Net Feed (lbmole/hr)				
49	Condenser	126.6	13.05	220.5	---	44.09				
50	1_Main TS	126.7	13.05	220.4	264.6	---				
51	2_Main TS	127.0	13.13	220.4	264.5	---				
52	3_Main TS	127.3	13.20	220.4	264.5	---				
53	4_Main TS	127.6	13.27	220.3	264.5	---				
54	5_Main TS	127.9	13.34	220.2	264.4	---				
55	6_Main TS	128.2	13.42	219.9	264.3	---				
56	7_Main TS	128.4	13.49	219.4	264.0	---				
57	8_Main TS	128.7	13.56	218.4	263.5	---				
58	9_Main TS	129.1	13.63	215.7	262.5	---				
59	10_Main TS	130.2	13.71	270.3	259.8	99.21				
60	11_Main TS	130.5	13.78	270.4	215.2	---				
61	12_Main TS	130.8	13.85	270.5	215.3	---				
62	13_Main TS	131.0	13.92	270.5	215.3	---				
63	14_Main TS	131.3	14.00	270.3	215.4	---				
64	15_Main TS	131.8	14.07	266.8	215.1	---				
65	Reboiler	136.3	14.07	---	211.7	55.12				
66	<b>Column Profiles Energy</b>									
67		Temperature (F)	Liquid Enthalpy (Btu/lbmole)	Vapour Enthalpy (Btu/lbmole)	Heat Loss (Btu/hr)					
68	Condenser	126.6	-1.810e+005	-1.671e+005	---					
69	1_Main TS	126.7	-1.812e+005	-1.674e+005	---					
70	2_Main TS	127.0	-1.813e+005	-1.676e+005	---					

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Company Name Not Available  
Calgary, Alberta  
CANADA

Case Name: D:\Applied-Process-Design-vol-2\programs\reactive-distillation.usc

Unit Set: NewUser

Date/Time: Saturday Jul 4 2009, 10:50:36

Distillation: Reactive Distil @Main (continued)

COLUMN PROFILES

	Temperature (F)	Liquid Enthalpy (Btu/lbmole)	Vapour Enthalpy (Btu/lbmole)	Heat Loss (Btu/hr)
3_Main TS	127.3	-1.813e+005	-1.677e+005	---
4_Main TS	127.6	-1.813e+005	-1.677e+005	---
5_Main TS	127.9	-1.812e+005	-1.677e+005	---
6_Main TS	128.2	-1.810e+005	-1.676e+005	---
7_Main TS	128.4	-1.806e+005	-1.674e+005	---
8_Main TS	128.7	-1.798e+005	-1.670e+005	---
9_Main TS	129.1	-1.778e+005	-1.663e+005	---
10_Main TS	130.2	-1.692e+005	-1.645e+005	---
11_Main TS	130.5	-1.693e+005	-1.645e+005	---
12_Main TS	130.8	-1.693e+005	-1.645e+005	---
13_Main TS	131.0	-1.692e+005	-1.646e+005	---
14_Main TS	131.3	-1.691e+005	-1.645e+005	---
15_Main TS	131.8	-1.673e+005	-1.643e+005	---
Reboiler	136.3	-1.337e+005	-1.620e+005	---

FEEDS / PRODUCTS

Flow Basis:	Molar						
	Stream	Type	Duty (Btu/hr)	State	Flows (lbmole/hr)	Enthalpy (Btu/lbmol)	Temp (F)
Condenser	Cond Q	Energy	3.595e+006 *		---	---	---
	Distillate	Draw	---	Liquid	44.09 *	-1.130e+004 *	126.6 *
1_Main TS							
2_Main TS							
3_Main TS							
4_Main TS							
5_Main TS							
6_Main TS							
7_Main TS							
8_Main TS							
9_Main TS							
10_Main TS	Feed	Feed	---	Mixed	99.21 *	-6.381e+004 *	167.0 *
11_Main TS							
12_Main TS							
13_Main TS							
14_Main TS							
15_Main TS							
Reboiler	Reb Q	Energy	2.972e+006 *		---	---	---
	Bottoms	Draw	---	Liquid	55.12 *	-8344 *	136.3 *

SETUP

Sub-Flowsheet					
Feed Streams			Product Streams		
Internal Stream	External Stream	Transfer Basis	Internal Stream	External Stream	Transfer Basis
Reb Q	Reb Q @Main	None Req'd	Cond Q	Cond Q @Main	None Req'd
Feed	Feed @Main	P-H Flash	Distillate	Distillate @Main	P-H Flash
			Bottoms	Bottoms @Main	P-H Flash

VARIABLES

Column Flowsheet Vars Available as Parameters			
Data Source	Variable	Component	Description

COMPONENT MAPS

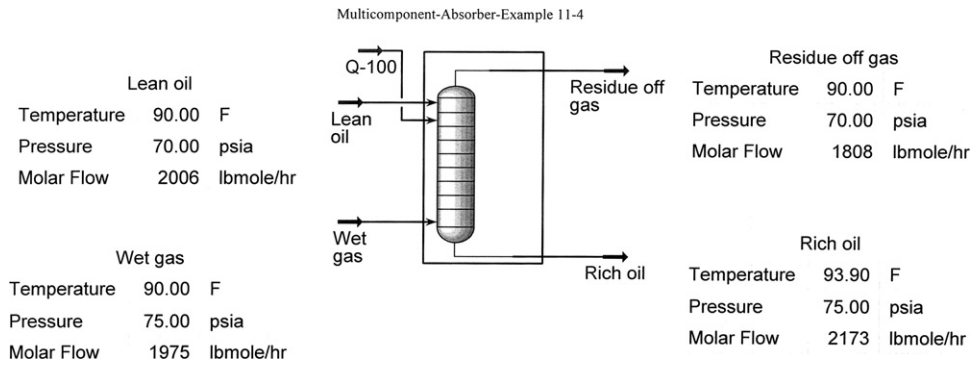
Feed Streams		
Feed Name	In to SubFlowSheet	Out of SubFlowSheet
Reb Q		
Feed		

Product Stream

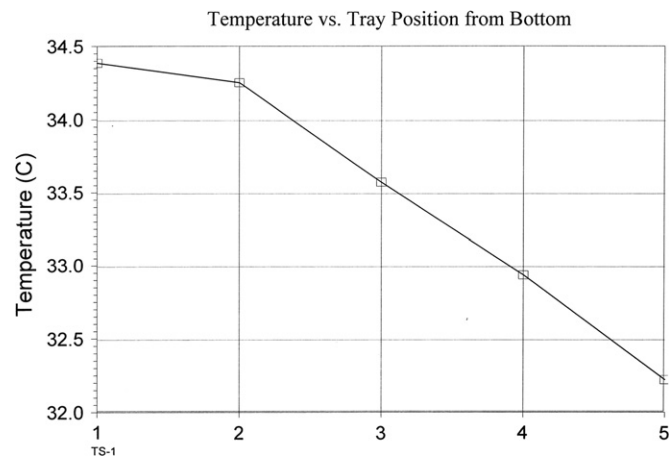
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1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\reactive-distillation.usc	
2			Unit Set: NewUser	
3			Date/Time: Saturday Jul 4 2009, 10:50:36	
4				
5				
6	<b>Distillation: Reactive Distil @Main (continued)</b>			
7				
8				
9	<b>COMPONENT MAPS</b>			
10				
11	Product Name	In to SubFlowSheet	Out of SubFlowSheet	
12	Cond Q			
13	Distillate			
14	Bottoms			
15	<b>DYNAMICS</b>			
16				
17	<b>Vessel Dynamic Specifications</b>			
18				
19	Vessel	Reboiler	Condenser	
20	Diameter (ft)	3.914	3.914	
21	Height.0 (ft)	5.871	5.871	
22	Volume.0 (ft3)	70.63 *	70.63 *	
23	Liquid Volume Percent (%)	50.00 *	50.00 *	
24	Level Calculator	Horizontal cylinder	Horizontal cylinder	
25	Fraction Calculator	Use levels and nozzles	Use levels and nozzles	
26	Vessel Delta P (psi)	0.0000 *	0.0000 *	
27	Fixed Vessel P Spec (psia)	14.07	13.05	
28	Fixed P Spec Active	Not Active	Not Active	
29	<b>Other Equipment in Column Flowsheet</b>			
30				
31				
32	<b>Holdup Details</b>			
33				
34		Pressure (psia)	Volume (ft3)	Bulk Liquid Volume (ft3)
35				
36	Condenser	13.05	49.30 *	48.33
37	1_Main TS	13.05	34.32 *	6.094e-002
38	2_Main TS	13.13	34.32 *	5.730e-002
39	3_Main TS	13.20	34.32 *	6.110e-002
40	4_Main TS	13.27	34.32 *	6.131e-002
41	5_Main TS	13.34	34.32 *	6.145e-002
42	6_Main TS	13.42	34.32 *	6.149e-002
43	7_Main TS	13.49	34.32 *	6.134e-002
44	8_Main TS	13.56	34.32 *	6.078e-002
45	9_Main TS	13.63	34.32 *	5.905e-002
46	10_Main TS	13.71	34.32 *	6.713e-002
47	11_Main TS	13.78	34.32 *	7.805e-002
48	12_Main TS	13.85	34.32 *	7.672e-002
49	13_Main TS	13.92	34.32 *	7.644e-002
50	14_Main TS	14.00	34.32 *	7.558e-002
51	15_Main TS	14.07	34.32 *	5.927e-002
52	Reboiler	14.07	2.784e+004 *	0.8609
53	<b>NOTES</b>			
54				
55	A distillation column with 12 theoretical stages.			
56				
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**Figure L-10** Process flow diagram of a multicomponent absorption unit



**Figure L-11** Temperature vs. Tray Position from Bottom



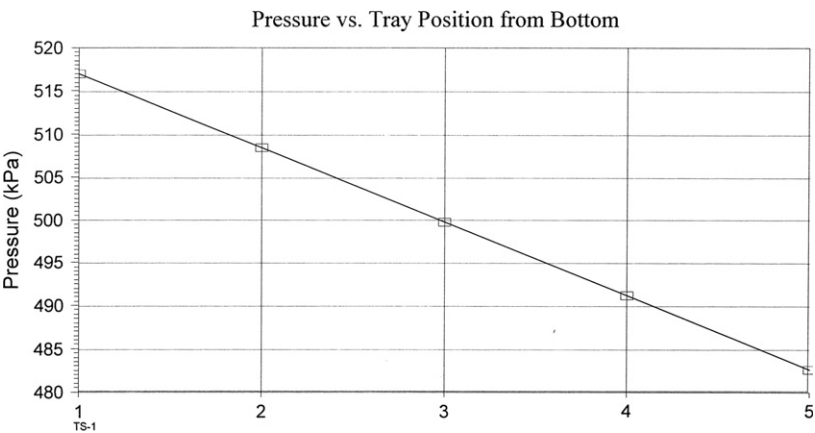


Figure L-12 Pressure vs. Tray Position from Bottom

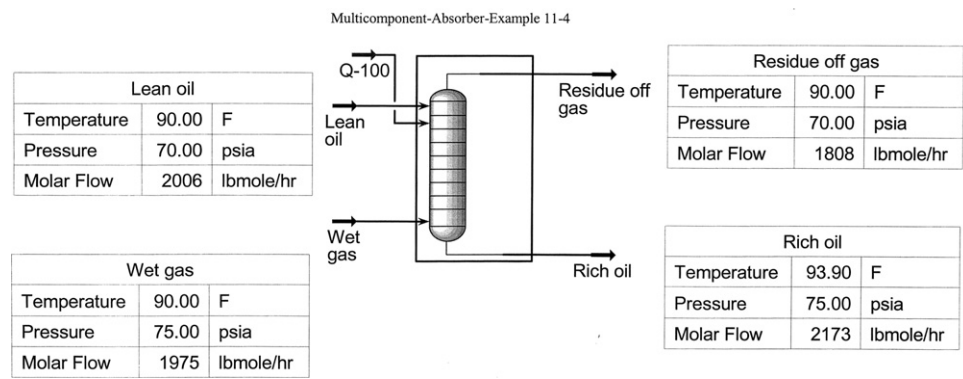


Figure L-10 Process flow diagram of a multicomponent absorption unit

1	<b>Honeywell</b> Company Name Not Available Calgary, Alberta CANADA		Case Name: C:\Example-11-4.usc						
2			Unit Set: Field						
3			Date/Time: Saturday Mar 6 2010, 19:46:41						
4									
5									
6	<b>Absorber: Multicomponent-Absorber-Example 11-4 @</b>								
7									
8									
9	<b>CONNECTIONS</b>								
10									
11	Inlet Stream								
12	STREAM NAME	Stage	FROM UNIT OPERATION						
13	Lean oil	5 TS-1							
14	Wet gas	1 TS-1							
15	Q-100	5 TS-1							
16	Outlet Stream								
17	STREAM NAME	Stage	TO UNIT OPERATION						
18	Residue off gas	5 TS-1							
19	Rich oil	1 TS-1							
20									
21	<b>MONITOR</b>								
22	Specifications Summary								
23		Specified Value	Current Value	Wt. Error	Wt. Tol.	Abs. Tol.	Active	Estimate	Used
24	Residue off gas Rate	---	1808 lbmole/hr	---	1.000e-002 *	2.205 lbmole/hr *	Off	On	Off
25	Rich oil Rate	---	2173 lbmole/hr	---	1.000e-002 *	2.205 lbmole/hr *	Off	On	Off
26	Temperature	90.00 F *	90.00 F	-5.342e-007	1.000e-002 *	1.800 F *	On	On	On
27									
28	<b>SPECS</b>								
29	Column Specification Parameters								
30									
31	<b>Residue off gas Rate</b>								
32	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
33	Stream:	Residue off gas	Flow Basis:	Molar					
34									
35	<b>Rich oil Rate</b>								
36	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
37	Stream:	Rich oil	Flow Basis:	Molar					
38									
39	<b>Temperature</b>								
40	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
41	Stage:	5 TS-1							
42									
43	<b>SUBCOOLING</b>								
44									
45	Degrees of Subcooling								
46	Subcool to								
47									
48	<b>User Variables</b>								
49									
50	<b>PROFILES</b>								
51	General Parameters								
52	Sub-Flow Sheet:	nponent-Absorber-Example 11-4 (COL1)				Number of Stages:	5 *		
53	<b>Profile Estimates</b>								
54		Temperature (F)	Net Liquid (lbmole/hr)	Net Vapour (lbmole/hr)					
55									
56	5 TS-1	90.00	2099	1808					
57	4 TS-1	91.30	2118	1902					
58	3 TS-1	92.43	2132	1920					
59	2 TS-1	93.65	2150	1935					
60	1 TS-1	93.90	2173	1952					
61									
62	<b>EFFICIENCIES</b>								
63	<b>Stage Efficiencies</b>								
64	Stages	Overall Efficiency	Methane	Ethane	Propane	i-Butane	n-Butane		
65	5 TS-1	1.000	1.000	1.000	1.000	1.000	1.000		
66	4 TS-1	1.000	1.000	1.000	1.000	1.000	1.000		
67	3 TS-1	1.000	1.000	1.000	1.000	1.000	1.000		
68	2 TS-1	1.000	1.000	1.000	1.000	1.000	1.000		
69	1 TS-1	1.000	1.000	1.000	1.000	1.000	1.000		



1	<b>Honeywell</b> Company Name Not Available Calgary, Alberta CANADA		Case Name: C:\Example-11-4.usc			
2			Unit Set: Field			
3			Date/Time: Saturday Mar 6 2010, 19:46:41			
4						
5						
6	<b>Absorber: Multicomponent-Absorber-Example 11-4 @</b>					
7						
8						
9	<b>Stage Efficiencies</b>					
10	Stages	Overall Efficiency	i-Pentane	n-Pentane	n-Octane	
11	5_TS-1	1.000	1.000	1.000	1.000	
12	4_TS-1	1.000	1.000	1.000	1.000	
13	3_TS-1	1.000	1.000	1.000	1.000	
14	2_TS-1	1.000	1.000	1.000	1.000	
15	1_TS-1	1.000	1.000	1.000	1.000	
16	<b>SOLVER</b>					
17						
18	Column Solving Algorithm: Legacy Inside-Out					
19	<b>Solving Options</b>			<b>Acceleration Parameters</b>		
20	Maximum Iterations: 10000			Accelerate K Value & H Model Parameters: Off		
21	Equilibrium Error Tolerance: 1.000e-05					
22	Heat/Spec Error Tolerance: 5.000e-004					
23	Save Solutions as Initial Estimate: On					
24	Super Critical Handling Model: Simple K					
25	Trace Level: Low			<b>Damping Parameters</b>		
26	Init from Ideal K's: Off					
27	<b>Initial Estimate Generator Parameters</b>			Azeotrope Check: Off		
28	Iterative IEG (Good for Chemicals): Off			Fixed Damping Factor: 1		
29						
30						
31	<b>SIDE STRIPPERS</b>					
32						
33	<b>SIDE RECTIFIERS</b>					
34						
35	<b>PUMP AROUNDS</b>					
36						
37	<b>VAP BYPASSES</b>					
38						
39	<b>RATING</b>					
40						
41	<b>Tray Sections</b>					
42						
43	Tray Section		TS-1			
44	Tray Diameter	(ft)	4.921	*		
45	Weir Height	(ft)	0.1640	*		
46	Weir Length	(ft)	3.937	*		
47	Tray Space	(ft)	1.640	*		
48	Tray Volume	(ft3)	31.20			
49	Disable Heat Loss Calculations		No			
50	Heat Model		None			
51	Rating Calculations		No			
52	Tray Hold Up	(ft3)	3.120			
53	<b>Vessels</b>					
54						
55	Vessel					
56	Diameter					
57	Length					
58	Volume					
59	Orientation					
60	Vessel has a Boot					
61	Boot Diameter					
62	Boot Length					
63	Hold Up					
64	<b>Other Equipment In Column Flowsheet</b>					
65						
66						
67	<b>Pressure Profile</b>					
68						
69				Pressure (psia)	Pressure Drop (psi)	

1	<div>Honeywell</div> <div>Company Name Not Available Calgary, Alberta CANADA</div>		Case Name: C:\Example-11-4.usc				
2			Unit Set: Field				
3			Date/Time: Saturday Mar 6 2010, 19:46:41				
4							
5							
6							
7							
8	Absorber: Multicomponent-Absorber-Example 11-4 @						
9	4_TS-1		71.25 psia		1.250 psi		
10	3_TS-1		72.50 psia		1.250 psi		
11	2_TS-1		73.75 psia		1.250 psi		
12	1_TS-1		75.00 psia		---		
13							
14	Pressure Solving Options						
15	Pressure Tolerance	1.000e-004 *	Pressure Drop Tolerance	1.000e-004 *	Damping Factor	1.000 *	
16						Max Press Iterations	100 *
17	CONDITIONS						
18	Name	Lean oil @Main	Wet gas @Main	Rich oil @Main	esidue off gas @Main	Q-100 @Main	
19	Vapour	0.0000	1.0000	0.0000	1.0000	---	
20	Temperature (F)	90.0000 *	90.0000 *	93.9028	89.9995	---	
21	Pressure (psia)	70.0000 *	75.0000 *	75.0000	70.0000	---	
22	Molar Flow (lbmole/hr)	2005.7000 *	1975.0000 *	2172.5103	1808.1897	---	
23	Mass Flow (lb/hr)	227933.5008	40165.4690	234021.5531	34077.4167	---	
24	Std Ideal Liq Vol Flow (barrel/day)	22151.2517	8081.5912	23055.7764	7177.0664	---	
25	Molar Enthalpy (Btu/lbmole)	-1.060e+005	-3.407e+004	-1.013e+005	-3.334e+004	---	
26	Molar Entropy (Btu/lbmole-F)	11.37	41.73	13.52	41.82	---	
27	Heat Flow (Btu/hr)	-2.1256e+08	-6.7294e+07	-2.1997e+08	-6.0287e+07	-4.1082e+05	
28	PROPERTIES						
29	Name	Lean oil @Main	Wet gas @Main	Rich oil @Main	Residue off gas @Main		
31	Molecular Weight	113.6	20.34	107.7	18.85		
32	Molar Density (lbmole/ft3)	0.3695	1.293e-002	0.3853	1.203e-002		
33	Mass Density (lb/ft3)	41.99	0.2630	41.51	0.2267		
34	Act. Volume Flow (barrel/day)	2.321e+004	6.527e+005	2.410e+004	6.425e+005		
35	Mass Enthalpy (Btu/lb)	-932.5	-1675	-940.0	-1769		
36	Mass Entropy (Btu/lb-F)	0.1001	2.052	0.1256	2.219		
37	Heat Capacity (Btu/lbmole-F)	58.36	10.28	55.97	9.734		
38	Mass Heat Capacity (Btu/lb-F)	0.5135	0.5053	0.5196	0.5165		
39	Lower Heating Value (Btu/lbmole)	2.189e+006	4.268e+005	2.078e+006	3.985e+005		
40	Mass Lower Heating Value (Btu/lb)	1.927e+004	2.099e+004	1.929e+004	2.114e+004		
41	Phase Fraction [Vol. Basis]	---	---	---	---		
42	Phase Fraction [Mass Basis]	2.122e-314	4.941e-324	2.122e-314	4.941e-324		
43	Partial Pressure of CO2 (psia)	0.0000	0.0000	0.0000	0.0000		
44	Cost Based on Flow (Cost/s)	0.0000	0.0000	0.0000	0.0000		
45	Act. Gas Flow (ACFM)	---	2545	---	2505		
46	Avg. Liq. Density (lbmole/ft3)	0.3870	1.045	0.4028	1.077		
47	Specific Heat (Btu/lbmole-F)	58.36	10.28	55.97	9.734		
48	Std. Gas Flow (MMSCFD)	18.27	17.99	19.79	16.47		
49	Std. Ideal Liq. Mass Density (lb/ft3)	43.99	21.24	43.39	20.30		
50	Act. Liq. Flow (USGPM)	676.8	---	702.9	---		
51	Z Factor	3.212e-002	0.9830	3.276e-002	0.9864		
52	Watson K	12.67	18.18	12.71	18.70		
53	User Property	---	---	---	---		
54	Cp/(Cp - R)	1.035	1.240	1.037	1.256		
55	Cp/Cv	1.123	1.262	1.132	1.276		
56	Heat of Vap. (Btu/lbmole)	1.277e+004	5903	3.046e+004	6531		
57	Kinematic Viscosity (cSt)	0.6833	2.699	0.6240	3.165		
58	Liq. Mass Density (Std. Cond) (lb/ft3)	44.15	---	43.75	---		
59	Liq. Vol. Flow (Std. Cond) (barrel/day)	2.207e+004	---	2.286e+004	---		
60	Liquid Fraction	1.000	0.0000	1.000	0.0000		
61	Molar Volume (ft3/lbmole)	2.707	77.31	2.595	83.12		
62	Mass Heat of Vap. (Btu/lb)	112.4	290.3	282.7	346.6		
63	Phase Fraction [Molar Basis]	0.0000	1.0000	0.0000	1.0000		
64	Surface Tension (dyne/cm)	20.38	---	18.97	---		
65	Thermal Conductivity (Btu/hr-ft-F)	7.153e-002	1.838e-002	6.897e-002	1.900e-002		
66	Viscosity (cP)	0.4596	1.137e-002	0.4149	1.150e-002		
67	Cv (Semi-Ideal) (Btu/lbmole-F)	56.37	8.290	53.99	7.748		
68	Mass Cv (Semi-Ideal) (Btu/lb-F)	0.4960	0.4076	0.5012	0.4111		
69	Cv (Btu/lbmole-F)	51.98	8.141	49.43	7.626		



1	<b>Honeywell</b> Company Name Not Available Calgary, Alberta CANADA		Case Name: C:\Example-11-4.usc			
2			Unit Set: Field			
3			Date/Time: Saturday Mar 6 2010, 19:46:41			
4						
5						
6	<b>Absorber: Multicomponent-Absorber-Example 11-4 @</b>					
7						
8						
9	<b>PROPERTIES</b>					
10						
11	Name	Lean oil @Main	Wet gas @Main	Rich oil @Main	Residue off gas @Main	
12	Cv (Ent. Method) (Btu/lbmole-F)	---	8.139	54.23	7.628	
13	Mass Cv (Ent. Method) (Btu/lb-F)	---	0.4002	0.5035	0.4047	
14	Cp/Cv (Ent. Method)	---	1.263	1.032	1.276	
15	Liq. Vol. Flow - Sum(Std. Cond) (barrel/day)	2.207e+004	0.0000	2.286e+004	0.0000	
16	Partial Pressure of H2S (psia)	0.0000	0.0000	0.0000	0.0000	
17	Reid VP at 37.8 C (psia)	0.8703	---	18.45	---	
18	True VP at 37.8 C (psia)	0.8910	---	76.89	---	
19						
20	<b>SUMMARY</b>					
21	Flow Basis:		Molar	The composition option is selected		
22	<b>Feed Composition</b>					
23		Lean oil	Wet gas			
24	Flow Rate (lbmole/hr)	2.005700e+03	1.975000e+03			
25		---	---			
26	Methane	0.0000	0.8300			
27	Ethane	0.0000	0.0839			
28	Propane	0.0000	0.0481			
29	i-Butane	0.0010	0.0090			
30	n-Butane	0.0020	0.0170			
31	i-Pentane	0.0040	0.0040			
32	n-Pentane	0.0060	0.0080			
33	n-Octane	0.9870	0.0000			
34	Flow Basis:		Molar	The composition option is selected		
35	<b>Feed Flows</b>					
36		Lean oil	Wet gas			
37	Flow Rate (lbmole/hr)	2.005700e+03	1.975000e+03			
38		---	---			
39	Methane (lbmole/hr)	0.0000	1.639200e+03			
40	Ethane (lbmole/hr)	0.0000	165.8000			
41	Propane (lbmole/hr)	0.0000	94.9000			
42	i-Butane (lbmole/hr)	2.0057	17.8000			
43	n-Butane (lbmole/hr)	4.0114	33.6000			
44	i-Pentane (lbmole/hr)	8.0228	7.9000			
45	n-Pentane (lbmole/hr)	12.0342	15.8000			
46	n-Octane (lbmole/hr)	1.979626e+03	0.0000			
47	<b>Products</b>					
48	Flow Basis:		Molar	The composition option is selected		
49	<b>Product Compositions</b>					
50		Residue off gas	Rich oil			
51	Flow Rate (lbmole/hr)	1.808190e+03	2.172510e+03			
52		---	---			
53	Methane	0.8815	0.0209			
54	Ethane	0.0786	0.0109			
55	Propane	0.0273	0.0209			
56	i-Butane	0.0018	0.0076			
57	n-Butane	0.0019	0.0158			
58	i-Pentane	0.0010	0.0065			
59	n-Pentane	0.0012	0.0118			
60	n-Octane	0.0067	0.9057			
61	Flow Basis:		Molar	The composition option is selected		
62	<b>Product Flows</b>					
63		Residue off gas	Rich oil			
64	Flow Rate (lbmole/hr)	1.808190e+03	2.172510e+03			
65		---	---			
66	Methane (lbmole/hr)	1.593895e+03	45.3049			
67	Ethane (lbmole/hr)	142.1548	23.6452			
68	Propane (lbmole/hr)	49.3861	45.5139			
69	i-Butane (lbmole/hr)	3.2959	16.5098			
70	n-Butane (lbmole/hr)	3.3931	34.2183			

<div style="display: flex; align-items: center;"> <div style="text-align: center; width: 150px;"> </div> <div style="margin-left: 10px;">             Company Name Not Available              Calgary, Alberta              CANADA           </div> </div>	<div style="display: flex; flex-direction: column;"> <div style="border-bottom: 1px solid black; padding: 2px;">Case Name: C:\Example-11-4.usc</div> <div style="border-bottom: 1px solid black; padding: 2px;">Unit Set: Field</div> <div style="padding: 2px;">Date/Time: Saturday Mar 6 2010, 19:46:41</div> </div>
--	--

Absorber: Multicomponent-Absorber-Example 11-4 @

SUMMARY

	Residue off gas	Rich oil		
i-Pentane (lbmole/hr)	1.8907	14.0321		
n-Pentane (lbmole/hr)	2.1383	25.6959		
n-Octane (lbmole/hr)	12.0358	1.967590e+03		
Flow Basis:	Molar		The composition option is selected	

Product Recoveries

	Residue off gas	Rich oil		
Flow Rate (lbmole/hr)	1.808190e+03	2.172510e+03		
	---	---		
Methane (%)	97.2362	2.7638		
Ethane (%)	85.7387	14.2613		
Propane (%)	52.0401	47.9599		
i-Butane (%)	16.6410	83.3590		
n-Butane (%)	9.0214	90.9786		
i-Pentane (%)	11.8740	88.1260		
n-Pentane (%)	7.6824	92.3176		
n-Octane (%)	0.6080	99.3920		

COLUMN PROFILES

Reflux Ratio:	1.161	Reboil Ratio:	---	The Flows Option is Selected	Flow Basis:	Molar
---------------	-------	---------------	-----	------------------------------	-------------	-------

Column Profiles Flows

	Temperature (F)	Pressure (psia)	Net Liq (lbmole/hr)	Net Vap (lbmole/hr)	Net Feed (lbmole/hr)	Net Draws (lbmole/hr)
5_TS-1	90.00	70.00	2099	---	2006	1808
4_TS-1	91.30	71.25	2118	1902	---	---
3_TS-1	92.43	72.50	2132	1920	---	---
2_TS-1	93.65	73.75	2150	1935	---	---
1_TS-1	93.90	75.00	---	1952	1975	2173

Column Profiles Energy

	Temperature (F)	Liquid Enthalpy (Btu/lbmole)	Vapour Enthalpy (Btu/lbmole)	Heat Loss (Btu/hr)
5_TS-1	90.00	-1.031e+005	-3.334e+004	---
4_TS-1	91.30	-1.026e+005	-3.356e+004	---
3_TS-1	92.43	-1.023e+005	-3.368e+004	---
2_TS-1	93.65	-1.019e+005	-3.380e+004	---
1_TS-1	93.90	-1.013e+005	-3.398e+004	---

FEEDS / PRODUCTS

Flow Basis:	Molar						
	Stream	Type	Duty (Btu/hr)	State	Flows (lbmole/hr)	Enthalpy (Btu/lbmole)	Temp (F)
5_TS-1	Lean oil	Feed	---	Liquid	2006	-4.556e+004	90.00
	Q-100	Energy	-4.108e+005	---	---	---	---
	Residue off gas	Draw	---	Vapour	1808	-2081	90.00
4_TS-1							
3_TS-1							
2_TS-1							
1_TS-1	Wet gas	Feed	---	Vapour	1975	-1.465e+004	90.00
	Rich oil	Draw	---	Liquid	2173	-6321	93.90

SETUP

Sub-Flowsheet

Feed Streams			Product Streams		
Internal Stream	External Stream	Transfer Basis	Internal Stream	External Stream	Transfer Basis
Lean oil	Lean oil @Main	P-H Flash	Residue off gas	Residue off gas @Main	P-H Flash
Wet gas	Wet gas @Main	P-H Flash	Rich oil	Rich oil @Main	P-H Flash
Q-100	Q-100 @Main	None Req'd			

VARIABLES

Column Flowsheet Vars Available as Parameters

Data Source	Variable	Component	Description



1	<b>Honeywell</b> Company Name Not Available Calgary, Alberta CANADA		Case Name: C:\Example-11-4.usc	
2			Unit Set: Field	
3			Date/Time: Saturday Mar 6 2010, 19:46:41	
4				
5				
6	<b>Absorber: Multicomponent-Absorber-Example 11-4 @</b>			
7				
8	<b>COMPONENT MAPS</b>			
9				
10	<b>Feed Streams</b>			
11	Feed Name	In to SubFlowSheet	Out of SubFlowSheet	
12	Lean oil			
13	Wet gas			
14	Q-100			
15	<b>Product Stream</b>			
16	Product Name	In to SubFlowSheet	Out of SubFlowSheet	
17	Residue off gas			
18	Rich oil			
19				
20	<b>DYNAMICS</b>			
21				
22	<b>Vessel Dynamic Specifications</b>			
23	Vessel			
24	Diameter (ft)			
25	Height.0 (ft)			
26	Volume.0 (ft3)			
27	Liquid Volume Percent (%)			
28	Level Calculator			
29	Fraction Calculator			
30	Vessel Delta P (psi)			
31	Fixed Vessel P Spec (psia)			
32	Fixed P Spec Active			
33				
34	<b>Other Equipment in Column Flowsheet</b>			
35				
36				
37	<b>Holdup Details</b>			
38		Pressure (psia)	Volume (ft3)	Bulk Liquid Volume (ft3)
39	5__TS-1	0.0000	0.0000 *	0.0000
40	4__TS-1	0.0000	0.0000 *	0.0000
41	3__TS-1	0.0000	0.0000 *	0.0000
42	2__TS-1	0.0000	0.0000 *	0.0000
43	1__TS-1	0.0000	0.0000 *	0.0000
44				
45	<b>NOTES</b>			
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				
60				
61				
62				
63				
64				
65				
66				
67				
68				
69				

1	Company Name Not Available Calgary, Alberta CANADA		Case Name: C:\Sour-Water-Unit.usc						
2			Unit Set: NewUser						
3			Date/Time: Saturday Jul 4 2009, 11:00:17						
4									
5									
6	<b>Distillation: SW Stripper @Main</b>								
7									
8									
9	<b>CONNECTIONS</b>								
10									
11	Inlet Stream								
12	STREAM NAME	Stage	FROM UNIT OPERATION						
13	Reb Q	Reboiler							
14	Stripper Feed	3 Main TS	Heat Exchanger	Feed Bottoms					
15	Outlet Stream								
16	STREAM NAME	Stage	TO UNIT OPERATION						
17	Cond Q	Condenser							
18	Off Gas	Condenser							
19	Stripper Bottoms	Reboiler	Heat Exchanger	Feed Bottoms					
20									
21	<b>MONITOR</b>								
22	Specifications Summary								
23		Specified Value	Current Value	Wt. Error	Wt. Tol.	Abs. Tol.	Active	Estimate	Used
24	Reflux Ratio	10.00 *	9.999	-6.315e-005	1.000e-002 *	1.000e-002 *	On	On	On
25	NH3 Mass Frac (Reboiler)	1.000e-005 *	9.966e-006	-5.988e-004	1.000e-002 *	1.000e-003 *	On	On	On
26	Ovhd Vap Rate	---	643.7 lbmole/hr	---	1.000e-002 *	2.205 lbmole/hr *	Off	On	Off
27	Reflux Rate	---	6437 lbmole/hr	---	1.000e-002 *	2.205 lbmole/hr *	Off	On	Off
28	Btms Prod Rate	---	3.949e+004 lbmole/hr	---	1.000e-002 *	2.205 lbmole/hr *	Off	On	Off
29									
30	<b>SPECS</b>								
31	Column Specification Parameters								
32									
33	<b>Reflux Ratio</b>								
34	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
35	Stage:	Condenser	Flow Basis:	Molar	Liquid Specification:	---			
36									
37	<b>NH3 Mass Frac (Reboiler)</b>								
38	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
39	Stage:	Reboiler	Flow Basis:	Mole Fraction	Phase:	Liquid			
40	Components:	Ammonia							
41									
42	<b>Ovhd Vap Rate</b>								
43	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
44	Stream:	Off Gas	Flow Basis:	Molar					
45									
46	<b>Reflux Rate</b>								
47	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
48	Stage:	Condenser	Flow Basis:	Molar	Liquid Specification:	---			
49									
50	<b>Btms Prod Rate</b>								
51	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
52	Stream:	Stripper Bottoms	Flow Basis:	Molar					
53									
54	<b>SUBCOOLING</b>								
55			Condenser						
56	Degrees of Subcooling								
57	Subcool to								
58									
59	<b>User Variables</b>								
60									
61	<b>PROFILES</b>								
62	General Parameters								
63	Sub-Flow Sheet:	SW Stripper (COL1)			Number of Stages:	10 *			
64	<b>Profile Estimates</b>								
65			Temperature (F)	Net Liquid (lbmole/hr)		Net Vapour (lbmole/hr)			
66									
67	Condenser		208.4	6437		643.7			
68	1_Main TS		241.0	6438		7080			
69	2_Main TS		245.3	6448		7081			
70	3_Main TS		246.5	4,850e+004		7091			



1	Company Name Not Available Calgary, Alberta CANADA		Case Name: C:\Sour-Water-Unit.usc				
2			Unit Set: NewUser				
3			Date/Time: Saturday Jul 4 2009, 11:00:17				
4							
5							
6	<b>Distillation: SW Stripper @Main (continued)</b>						
7							
8							
9	<b>Profile Estimates</b>						
10		Temperature (F)		Net Liquid (lbmole/hr)		Net Vapour (lbmole/hr)	
11							
12	4__Main TS	249.0		4.857e+004		9012	
13	5__Main TS	250.5		4.863e+004		9086	
14	6__Main TS	251.7		4.868e+004		9140	
15	7__Main TS	252.7		4.872e+004		9188	
16	8__Main TS	253.6		4.876e+004		9233	
17	9__Main TS	254.4		4.881e+004		9276	
18	10__Main TS	255.2		4.885e+004		9318	
19	Reboiler	255.3		3.949e+004		9362	
20							
21	<b>EFFICIENCIES</b>						
22	<b>Stage Efficiencies</b>						
23	Stages	Overall Efficiency	H2S	Ammonia	H2O		
24	Condenser	1.000	1.000	1.000	1.000		
25	1__Main TS	1.000	1.000	1.000	1.000		
26	2__Main TS	1.000	1.000	1.000	1.000		
27	3__Main TS	1.000	1.000	1.000	1.000		
28	4__Main TS	1.000	1.000	1.000	1.000		
29	5__Main TS	1.000	1.000	1.000	1.000		
30	6__Main TS	1.000	1.000	1.000	1.000		
31	7__Main TS	1.000	1.000	1.000	1.000		
32	8__Main TS	1.000	1.000	1.000	1.000		
33	9__Main TS	1.000	1.000	1.000	1.000		
34	10__Main TS	1.000	1.000	1.000	1.000		
35	Reboiler	1.000	1.000	1.000	1.000		
36							
37	<b>SOLVER</b>						
38	Column Solving Algorithm: Legacy Inside-Out						
39	<b>Solving Options</b>			<b>Acceleration Parameters</b>			
40	Maximum Iterations:	10000	Accelerate K Value & H Model Parameters:			Off	
41	Equilibrium Error Tolerance:	1.000e-05					
42	Heat/Spec Error Tolerance:	5.000e-004					
43	Save Solutions as Initial Estimate:	On					
44	Super Critical Handling Model:	Simple K					
45	Trace Level:	Low	<b>Damping Parameters</b>				
46	Init from Ideal K's:	Off					
47	<b>Initial Estimate Generator Parameters</b>			Azeotrope Check:			Off
48	Iterative IEG (Good for Chemicals):	Off	Fixed Damping Factor:			0 *	
49							
50							
51	<b>SIDE STRIPPERS</b>						
52							
53	<b>SIDE RECTIFIERS</b>						
54							
55	<b>PUMP AROUNDS</b>						
56							
57	<b>VAP BYPASSES</b>						
58							
59	<b>RATING</b>						
60							
61	<b>Tray Sections</b>						
62							
63	Tray Section	Main TS					
64	Tray Diameter (ft)	4.921		*			
65	Weir Height (ft)	0.1640		*			
66	Weir Length (ft)	3.937		*			
67	Tray Space (ft)	1.640		*			
68	Tray Volume (ft3)	31.20					
69	Disable Heat Loss Calculations	No					
70	Heat Model	None					

1	Company Name Not Available Calgary, Alberta CANADA		Case Name: C:\Sour-Water-Unit.usc			
2			Unit Set: NewUser			
3			Date/Time: Saturday Jul 4 2009, 11:00:17			
4						
5						
6	<b>Distillation: SW Stripper @Main (continued)</b>					
7						
8						
9	Rating Calculations	No				
10	Tray Hold Up (ft3)	3.120				
11	<b>Vessels</b>					
12						
13	Vessel	Condenser	Reboiler			
14	Diameter (ft)	3.914	3.914			
15	Length (ft)	5.871	5.871			
16	Volume (ft3)	70.63 *	70.63 *			
17	Orientation	Horizontal	Horizontal			
18	Vessel has a Boot	No	No			
19	Boot Diameter (ft)	---	---			
20	Boot Length (ft)	---	---			
21	Hold Up (ft3)	35.31	35.31			
22	<b>Other Equipment In Column Flowsheet</b>					
23						
24						
25	<b>Pressure Profile</b>					
26						
27		Pressure (psia)		Pressure Drop (psi)		
28	Condenser	28.70 psia *		0.0000 psi		
29	1__Main TS	28.70 psia		0.4444 psi		
30	2__Main TS	29.14 psia		0.4444 psi		
31	3__Main TS	29.59 psia		0.4444 psi		
32	4__Main TS	30.03 psia		0.4444 psi		
33	5__Main TS	30.48 psia		0.4444 psi		
34	6__Main TS	30.92 psia		0.4444 psi		
35	7__Main TS	31.37 psia		0.4444 psi		
36	8__Main TS	31.81 psia		0.4444 psi		
37	9__Main TS	32.26 psia		0.4444 psi		
38	10__Main TS	32.70 psia		---		
39	Reboiler	32.70 psia *		0.0000 psi		
40	<b>Pressure Solving Options</b>					
41						
42	Pressure Tolerance	1.000e-004 *	Pressure Drop Tolerance	1.000e-004 *	Damping Factor	
43					1.000 *	
44	<b>CONDITIONS</b>					
45	Name	Stripper Feed @Main	Stripper Bottoms @Main	Off Gas @Main	Reb Q @Main	Cond Q @Main
46	Vapour	0.0000	0.0003	1.0000	---	---
47	Temperature (F)	200.0000 *	255.2556	208.3906	---	---
48	Pressure (psia)	30.0000	32.7000	28.7000	---	---
49	Molar Flow (lbmole/hr)	40131.1250	39487.4281	643.6969	---	---
50	Mass Flow (lb/hr)	725148.9890	711369.7315	13779.2575	---	---
51	Std Ideal Liq Vol Flow (barrel/day)	50000.0000	48808.0864	1191.9136	---	---
52	Molar Enthalpy (Btu/lbmole)	-1.195e+005	-1.194e+005	-5.288e+004	---	---
53	Molar Entropy (Btu/lbmole-F)	16.86	18.21	44.60	---	---
54	Heat Flow (Btu/hr)	-4.7963e+09	-4.7129e+09	-3.4036e+07	1.6034e+08	1.1117e+08
55	<b>PROPERTIES</b>					
56						
57	Name	Stripper Feed @Main	Stripper Bottoms @Main	Off Gas @Main		
58	Molecular Weight	18.07	18.02	21.41		
59	Molar Density (lbmole/ft3)	3.280	2.688	4.056e-003		
60	Mass Density (lb/ft3)	59.26	48.43	8.683e-002		
61	Act. Volume Flow (barrel/day)	5.231e+004	6.279e+004	6.784e+005		
62	Mass Enthalpy (Btu/lb)	-6614	-6625	-2470		
63	Mass Entropy (Btu/lb-F)	0.9330	1.011	2.083		
64	Heat Capacity (Btu/lbmole-F)	18.86	19.22	8.581		
65	Mass Heat Capacity (Btu/lb-F)	1.044	1.067	0.4008		
66	Lower Heating Value (Btu/lbmole)	---	---	---		
67	Mass Lower Heating Value (Btu/lb)	---	---	---		
68	Phase Fraction [Vol. Basis]	---	0.1636	---		
69	Phase Fraction [Mass Basis]	0.0000	2.638e-004	4.941e-324		
70	Partial Pressure of CO2 (psia)	0.0000	0.0000	0.0000		



1	Company Name Not Available Calgary, Alberta CANADA		Case Name: C:\Sour-Water-Unit.usc		
2					
3					
4					
5			Unit Set: NewUser		
6			Date/Time: Saturday Jul 4 2009, 11:00:17		
7					
8	<b>Distillation: SW Stripper @Main (continued)</b>				
9					
10	<b>PROPERTIES</b>				
11	Name	Stripper Feed @Main	Stripper Bottoms @Main	Off Gas @Main	
12	Cost Based on Flow (Cost/s)	0.0000	0.0000	0.0000	
13	Act. Gas Flow (ACFM)	---	---	2645	
14	Avg. Liq. Density (lbmole/ft3)	3.431	3.458	2.309	
15	Specific Heat (Btu/lbmole-F)	18.86	19.22	8.581	
16	Std. Gas Flow (MMSCFD)	365.5	359.6	5.862	
17	Std. Ideal Liq. Mass Density (lb/ft3)	61.99	62.30	49.42	
18	Act. Liq. Flow (USGPM)	1526	1532	---	
19	Z Factor	1.292e-003	---	0.9870	
20	Watson K	10.49	12.12	10.49	
21	User Property	---	---	---	
22	Cp/(Cp - R)	1.118	1.115	1.301	
23	Cp/Cv	1.176	1.000	1.320	
24	Heat of Vap. (Btu/lbmole)	1.750e+004	1.713e+004	1.727e+004	
25	Kinematic Viscosity (cSt)	0.3134	---	7.693	
26	Liq. Mass Density (Std. Cond) (lb/ft3)	63.09	63.33	51.62	
27	Liq. Vol. Flow (Std. Cond) (barrel/day)	4.911e+004	4.800e+004	1140	
28	Liquid Fraction	1.000	0.9997	0.0000	
29	Molar Volume (ft3/lbmole)	0.3049	0.3720	246.5	
30	Mass Heat of Vap. (Btu/lb)	968.2	950.7	806.8	
31	Phase Fraction [Molar Basis]	0.0000	0.0003	1.0000	
32	Surface Tension (dyne/cm)	59.38	53.95	---	
33	Thermal Conductivity (Btu/hr-ft-F)	0.3887	---	1.548e-002	
34	Viscosity (cP)	0.2975	---	1.070e-002	
35	Partial Pressure of H2S (psia)	0.0000	1.722e-004	6.641	
36	Cv (Semi-Ideal) (Btu/lbmole-F)	16.87	17.23	6.595	
37	Mass Cv (Semi-Ideal) (Btu/lb-F)	0.9337	0.9565	0.3081	
38	Cv (Btu/lbmole-F)	16.03	19.21	6.499	
39	Mass Cv (Btu/lb-F)	0.8872	1.066	0.3036	
40	Cv (Ent. Method) (Btu/lbmole-F)	---	---	---	
41	Mass Cv (Ent. Method) (Btu/lb-F)	---	---	---	
42	Cp/Cv (Ent. Method)	---	---	---	
43	Reid VP at 37.8 C (psia)	290.5	214.8	290.6	
44	True VP at 37.8 C (psia)	1.326	0.9513	206.2	
45	Liq. Vol. Flow - Sum(Std. Cond) (barrel/day)	4.913e+004	4.802e+004	1141	
46					
47	<b>SUMMARY</b>				
48	Flow Basis:	Molar	The composition option is selected		
49	<b>Feed Composition</b>				
50	Stripper Feed				
51	Flow Rate (lbmole/hr)	4.013113e+04			
52		---			
53	H2S	0.0037			
54	Ammonia	0.0053			
55	H2O	0.9910			
56	Flow Basis:	Molar	The composition option is selected		
57	<b>Feed Flows</b>				
58	Stripper Feed				
59	Flow Rate (lbmole/hr)	4.013113e+04			
60		---			
61	H2S (lbmole/hr)	148.9624			
62	Ammonia (lbmole/hr)	212.9034			
63	H2O (lbmole/hr)	3.976926e+04			
64					
65	<b>Products</b>				
66	Flow Basis:	Molar	The composition option is selected		
67	<b>Product Compositions</b>				
68	Off Gas		Stripper Bottoms		
69	Flow Rate (lbmole/hr)	643.6969	3.948743e+04		
70		---	---		
	H2S	0.2314	0.0000		

1	Company Name Not Available Calgary, Alberta CANADA			Case Name: C:\Sour-Water-Unit.usc				
2				Unit Set: NewUser				
3				Date/Time: Saturday Jul 4 2009, 11:00:17				
4								
5								
6								
7	Distillation: SW Stripper @Main (continued)							
8								
9								
10	SUMMARY							
11		Off Gas	Stripper Bottoms					
12	Ammonia	0.3301	0.0000					
13	H2O	0.4385	1.0000					
14	Flow Basis:			Molar	The composition option is selected			
15	Product Flows							
16		Off Gas	Stripper Bottoms					
17	Flow Rate (lbmole/hr)	643.6969	3.948743e+04					
18		---	---					
19	H2S (lbmole/hr)	148.9541	0.0084					
20	Ammonia (lbmole/hr)	212.5099	0.3935					
21	H2O (lbmole/hr)	282.2330	3.948703e+04					
22	Flow Basis:			Molar	The composition option is selected			
23	Product Recoveries							
24		Off Gas	Stripper Bottoms					
25	Flow Rate (lbmole/hr)	643.6969	3.948743e+04					
26		---	---					
27	H2S (%)	99.9944	0.0056					
28	Ammonia (%)	99.8152	0.1848					
29	H2O (%)	0.7097	99.2903					
30								
31	COLUMN PROFILES							
32	Reflux Ratio:	9.999	Reboil Ratio:	0.2371	The Flows Option is Selected		Flow Basis: Molar	
33	Column Profiles Flows							
34		Temperature (F)	Pressure (psia)	Net Liq (lbmole/hr)	Net Vap (lbmole/hr)	Net Feed (lbmole/hr)	Net Draws (lbmole/hr)	
35	Condenser	208.4	28.70	6437	---	---	643.7	
36	1_Main TS	241.0	28.70	6438	7080	---	---	
37	2_Main TS	245.3	29.14	6448	7081	---	---	
38	3_Main TS	246.5	29.59	4.850e+004	7091	4.013e+004	---	
39	4_Main TS	249.0	30.03	4.857e+004	9012	---	---	
40	5_Main TS	250.5	30.48	4.863e+004	9086	---	---	
41	6_Main TS	251.7	30.92	4.868e+004	9140	---	---	
42	7_Main TS	252.7	31.37	4.872e+004	9188	---	---	
43	8_Main TS	253.6	31.81	4.876e+004	9233	---	---	
44	9_Main TS	254.4	32.26	4.881e+004	9276	---	---	
45	10_Main TS	255.2	32.70	4.885e+004	9318	---	---	
46	Reboiler	255.3	32.70	---	9362	---	3.949e+004	
47	Column Profiles Energy							
48		Temperature (F)	Liquid Enthalpy (Btu/lbmole)	Vapour Enthalpy (Btu/lbmole)	Heat Loss (Btu/hr)			
49	Condenser	208.4	-1.126e+005	-5.288e+004	---			
50	1_Main TS	241.0	-1.185e+005	-9.147e+004	---			
51	2_Main TS	245.3	-1.191e+005	-9.687e+004	---			
52	3_Main TS	246.5	-1.191e+005	-9.737e+004	---			
53	4_Main TS	249.0	-1.193e+005	-1.001e+005	---			
54	5_Main TS	250.5	-1.193e+005	-1.012e+005	---			
55	6_Main TS	251.7	-1.194e+005	-1.017e+005	---			
56	7_Main TS	252.7	-1.194e+005	-1.020e+005	---			
57	8_Main TS	253.6	-1.194e+005	-1.021e+005	---			
58	9_Main TS	254.4	-1.194e+005	-1.022e+005	---			
59	10_Main TS	255.2	-1.194e+005	-1.022e+005	---			
60	Reboiler	255.3	-1.194e+005	-1.022e+005	---			
61								
62	FEEDS / PRODUCTS							
63	Flow Basis:			Molar				
64		Stream	Type	Duty (Btu/hr)	State	Flows (lbmole/hr)	Enthalpy (Btu/lbmol)	Temp (F)
65	Condenser	Cond Q	Energy	1.112e+008	---	---	---	---
66		Off Gas	Draw	---	Vapour	643.7	-3301	208.4
67	1_Main TS							
68	2_Main TS							
69	3_Main TS	Stripper Feed	Feed	---	Liquid	4.013e+004	-5.138e+004	200.0
70	4_Main TS							



1	Company Name Not Available Calgary, Alberta CANADA			Case Name: C:\Sour-Water-Unit.usc			
2				Unit Set: NewUser			
3				Date/Time: Saturday Jul 4 2009, 11:00:17			
4							
5							
6	<b>Distillation: SW Stripper @Main (continued)</b>						
7							
8							
9	<b>FEEDS / PRODUCTS</b>						
10							
11	5__Main TS						
12	6__Main TS						
13	7__Main TS						
14	8__Main TS						
15	9__Main TS						
16	10__Main TS						
17	Reboiler	Reb Q	Energy	1.603e+008	*	---	---
18		Stripper Bottoms	Draw	---		Liquid	3.949e+004 * -7451 * 255.3 *
19	<b>SETUP</b>						
20							
21	Sub-Flowsheet						
22	<b>Feed Streams</b>			<b>Product Streams</b>			
23	Internal Stream	External Stream	Transfer Basis	Internal Stream	External Stream	Transfer Basis	
24	Reb Q	Reb Q @Main	None Req'd	Cond Q	Cond Q @Main	None Req'd	
25	Stripper Feed	Stripper Feed @Main	T-P Flash	Off Gas	Off Gas @Main	T-P Flash	
26				Stripper Bottoms	Stripper Bottoms @Main	T-P Flash	
27							
28	<b>VARIABLES</b>						
29							
30	Column Flowsheet Vars Available as Parameters						
31	Data Source	Variable	Component	Description			
32							
33	<b>COMPONENT MAPS</b>						
34							
35	<b>Feed Streams</b>						
36	Feed Name	In to SubFlowSheet	Out of SubFlowSheet				
37	Reb Q						
38	Stripper Feed						
39	<b>Product Stream</b>						
40	Product Name	In to SubFlowSheet	Out of SubFlowSheet				
41	Cond Q						
42	Off Gas						
43	Stripper Bottoms						
44	<b>DYNAMICS</b>						
45							
46	Vessel Dynamic Specifications						
47	Vessel	Condenser	Reboiler				
48	Diameter	(ft)	3.914	3.914			
49	Height.0	(ft)	5.871	5.871			
50	Volume.0	(ft3)	70.63 *	70.63 *			
51	Liquid Volume Percent	(%)	50.00 *	50.00 *			
52	Level Calculator	Horizontal cylinder	Horizontal cylinder				
53	Fraction Calculator	Use levels and nozzles	Use levels and nozzles				
54	Vessel Delta P	(psi)	0.0000 *	0.0000 *			
55	Fixed Vessel P Spec	(psia)	28.70	32.70			
56	Fixed P Spec Active	Not Active	Not Active				
57							
58	Other Equipment in Column Flowsheet						
59							
60							
61	Holdup Details						
62							
63		Pressure	Volume	Bulk Liquid Volume			
64		(psia)	(ft3)	(ft3)			
65	Condenser	0.0000	0.0000 *	0.0000			
66	1__Main TS	0.0000	0.0000 *	0.0000			
67	2__Main TS	0.0000	0.0000 *	0.0000			
68	3__Main TS	0.0000	0.0000 *	0.0000			
69	4__Main TS	0.0000	0.0000 *	0.0000			
70	5__Main TS	0.0000	0.0000 *	0.0000			

1	Company Name Not Available Calgary, Alberta CANADA		Case Name: C:\Sour-Water-Unit.usc	
2			Unit Set: NewUser	
3			Date/Time: Saturday Jul 4 2009, 11:00:17	
4				
5				
6	<b>Distillation: SW Stripper @Main (continued)</b>			
7				
8				
9		Pressure (psia)	Volume (ft3)	Bulk Liquid Volume (ft3)
10				
11	6_Main TS	0.0000	0.0000 *	0.0000
12	7_Main TS	0.0000	0.0000 *	0.0000
13	8_Main TS	0.0000	0.0000 *	0.0000
14	9_Main TS	0.0000	0.0000 *	0.0000
15	10_Main TS	0.0000	0.0000 *	0.0000
16	Reboiler	0.0000	0.0000 *	0.0000
17	<b>NOTES</b>			
18				
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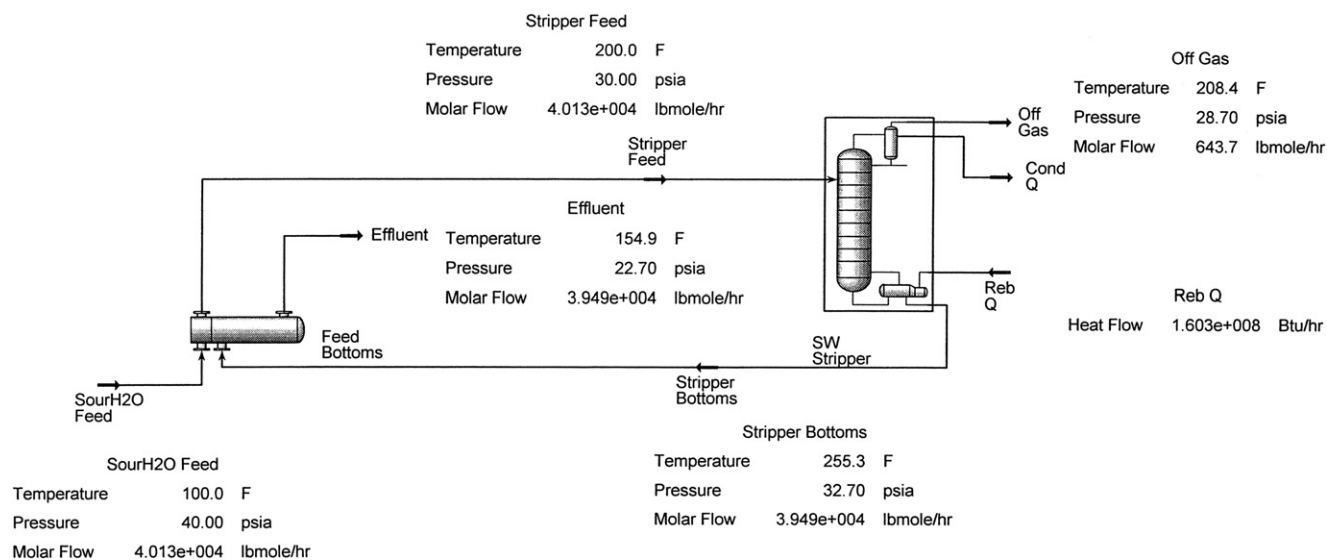


Figure L-14 Process flow diagram of a sour water stripping unit

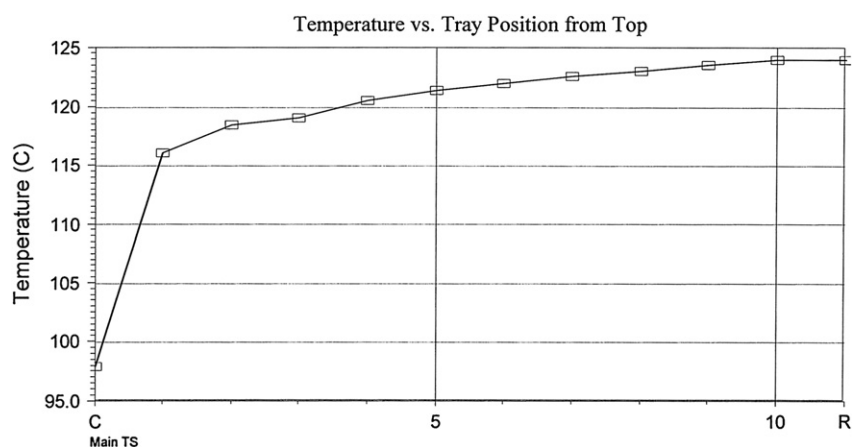


Figure L-15 Temperature vs. Tray Position from Top

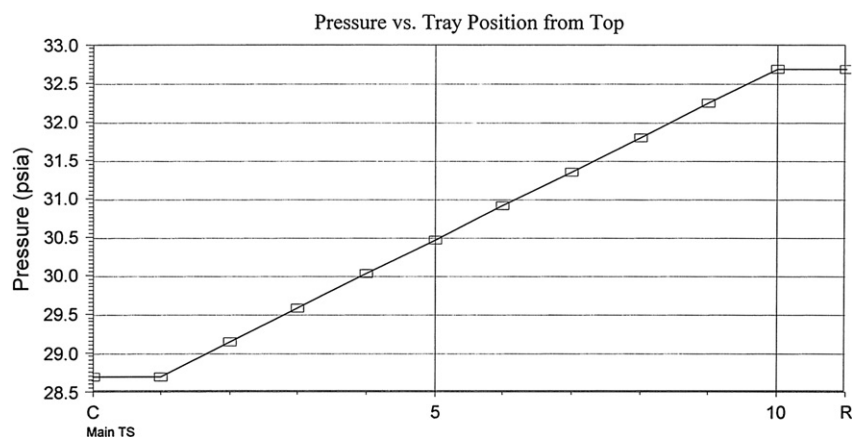


Figure L-16 Pressure vs. Tray Position from Top

1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\Sour-Water-Unit.usc						
2			Unit Set: NewUser						
3			Date/Time: Saturday Jul 4 2009, 11:06:54						
4									
5	<b>Distillation: SW Stripper @Main</b>								
6	<b>CONNECTIONS</b>								
7	Inlet Stream								
8	STREAM NAME	Stage	FROM UNIT OPERATION						
9	Reb Q	Reboiler							
10	Stripper Feed	3 Main TS	Heat Exchanger Feed Bottoms						
11	Outlet Stream								
12	STREAM NAME	Stage	TO UNIT OPERATION						
13	Cond Q	Condenser							
14	Off Gas	Condenser							
15	Stripper Bottoms	Reboiler	Heat Exchanger Feed Bottoms						
16	<b>MONITOR</b>								
17	Specifications Summary								
18		Specified Value	Current Value	Wt. Error	Wt. Tol.	Abs. Tol.	Active	Estimate	Used
19	Reflux Ratio	10.00 *	9.999	-6.315e-005	1.000e-002 *	1.000e-002 *	On	On	On
20	NH3 Mass Frac (Reboiler)	1.000e-005 *	9.966e-006	-5.988e-004	1.000e-002 *	1.000e-003 *	On	On	On
21	Ovhd Vap Rate	---	643.7 lbmole/hr	---	1.000e-002 *	2.205 lbmole/hr *	Off	On	Off
22	Reflux Rate	---	6437 lbmole/hr	---	1.000e-002 *	2.205 lbmole/hr *	Off	On	Off
23	Btms Prod Rate	---	3.949e+004 lbmole/hr	---	1.000e-002 *	2.205 lbmole/hr *	Off	On	Off
24	<b>SPECS</b>								
25	Column Specification Parameters								
26	<b>Reflux Ratio</b>								
27	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
28	Stage:	Condenser	Flow Basis:	Molar	Liquid Specification:	---			
29	<b>NH3 Mass Frac (Reboiler)</b>								
30	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
31	Stage:	Reboiler	Flow Basis:	Mole Fraction	Phase:	Liquid			
32	Components:	Ammonia							
33	<b>Ovhd Vap Rate</b>								
34	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
35	Stream:	Off Gas	Flow Basis:	Molar					
36	<b>Reflux Rate</b>								
37	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
38	Stage:	Condenser	Flow Basis:	Molar	Liquid Specification:	---			
39	<b>Btms Prod Rate</b>								
40	Fixed / Ranged:	Fixed	Primary / Alternate:	Primary	Lower Bound:	---	Upper Bound:	---	
41	Stream:	Stripper Bottoms	Flow Basis:	Molar					
42	<b>SUBCOOLING</b>								
43			Condenser						
44	Degrees of Subcooling							---	
45	Subcool to							---	
46	<b>User Variables</b>								
47	<b>PROFILES</b>								
48	General Parameters								
49	Sub-Flow Sheet:	SW Stripper (COL1)			Number of Stages:		10 *		
50	<b>Profile Estimates</b>								
51		Temperature (F)	Net Liquid (lbmole/hr)	Net Vapour (lbmole/hr)					
52	Condenser	208.4	6437	643.7					
53	1_Main TS	241.0	6438	7080					
54	2_Main TS	245.3	6448	7081					
55	3_Main TS	246.5	4.850e+004	7091					



1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\Sour-Water-Unit.usc			
2			Unit Set: NewUser			
3			Date/Time: Saturday Jul 4 2009, 11:06:54			
4						
5						
6	<b>Distillation: SW Stripper @Main (continued)</b>					
7						
8						
9	<b>Profile Estimates</b>					
10		Temperature		Net Liquid		Net Vapour
11		(F)		(lbmole/hr)		(lbmole/hr)
12	4__Main TS	249.0		4.857e+004		9012
13	5__Main TS	250.5		4.863e+004		9086
14	6__Main TS	251.7		4.868e+004		9140
15	7__Main TS	252.7		4.872e+004		9188
16	8__Main TS	253.6		4.876e+004		9233
17	9__Main TS	254.4		4.881e+004		9276
18	10__Main TS	255.2		4.885e+004		9318
19	Reboiler	255.3		3.949e+004		9362
20						
21	<b>EFFICIENCIES</b>					
22	<b>Stage Efficiencies</b>					
23	Stages	Overall Efficiency	H2S	Ammonia	H2O	
24	Condenser	1.000	1.000	1.000	1.000	
25	1__Main TS	1.000	1.000	1.000	1.000	
26	2__Main TS	1.000	1.000	1.000	1.000	
27	3__Main TS	1.000	1.000	1.000	1.000	
28	4__Main TS	1.000	1.000	1.000	1.000	
29	5__Main TS	1.000	1.000	1.000	1.000	
30	6__Main TS	1.000	1.000	1.000	1.000	
31	7__Main TS	1.000	1.000	1.000	1.000	
32	8__Main TS	1.000	1.000	1.000	1.000	
33	9__Main TS	1.000	1.000	1.000	1.000	
34	10__Main TS	1.000	1.000	1.000	1.000	
35	Reboiler	1.000	1.000	1.000	1.000	
36						
37	<b>SOLVER</b>					
38	Column Solving Algorithm: Legacy Inside-Out					
39	<b>Solving Options</b>			<b>Acceleration Parameters</b>		
40	Maximum Iterations:	10000	Accelerate K Value & H Model Parameters:			Off
41	Equilibrium Error Tolerance:	1.000e-05				
42	Heat/Spec Error Tolerance:	5.000e-004				
43	Save Solutions as Initial Estimate:	On				
44	Super Critical Handling Model:	Simple K				
45	Trace Level:	Low	<b>Damping Parameters</b>			
46	Init from Ideal K's:	Off				
47	<b>Initial Estimate Generator Parameters</b>			Azeotrope Check:		
48	Iterative IEG (Good for Chemicals):	Off	Fixed Damping Factor:			0 *
49						
50						
51	<b>SIDE STRIPPERS</b>					
52						
53	<b>SIDE RECTIFIERS</b>					
54						
55	<b>PUMP AROUNDS</b>					
56						
57	<b>VAP BYPASSES</b>					
58						
59	<b>RATING</b>					
60						
61	<b>Tray Sections</b>					
62						
63	Tray Section	Main TS				
64	Tray Diameter	(ft)	4.921	*		
65	Weir Height	(ft)	0.1640	*		
66	Weir Length	(ft)	3.937	*		
67	Tray Space	(ft)	1.640	*		
68	Tray Volume	(ft3)	31.20			
69	Disable Heat Loss Calculations	No				
70	Heat Model	None				

1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\Sour-Water-Unit.usc			
2			Unit Set: NewUser			
3			Date/Time: Saturday Jul 4 2009, 11:06:54			
4						
5						
6						
7	<b>Distillation: SW Stripper @Main (continued)</b>					
8						
9	Rating Calculations	No				
10	Tray Hold Up (ft3)	3.120				
11	<b>Vessels</b>					
12						
13	Vessel	Condenser	Reboiler			
14	Diameter (ft)	3.914	3.914			
15	Length (ft)	5.871	5.871			
16	Volume (ft3)	70.63 *	70.63 *			
17	Orientation	Horizontal	Horizontal			
18	Vessel has a Boot	No	No			
19	Boot Diameter (ft)	---	---			
20	Boot Length (ft)	---	---			
21	Hold Up (ft3)	35.31	35.31			
22	<b>Other Equipment In Column Flowsheet</b>					
23						
24						
25	<b>Pressure Profile</b>					
26						
27		Pressure (psia)		Pressure Drop (psi)		
28	Condenser	28.70 psia		0.0000 psi		
29	1__Main TS	28.70 psia		0.4444 psi		
30	2__Main TS	29.14 psia		0.4444 psi		
31	3__Main TS	29.59 psia		0.4444 psi		
32	4__Main TS	30.03 psia		0.4444 psi		
33	5__Main TS	30.48 psia		0.4444 psi		
34	6__Main TS	30.92 psia		0.4444 psi		
35	7__Main TS	31.37 psia		0.4444 psi		
36	8__Main TS	31.81 psia		0.4444 psi		
37	9__Main TS	32.26 psia		0.4444 psi		
38	10__Main TS	32.70 psia		---		
39	Reboiler	32.70 psia *		0.0000 psi		
40	<b>Pressure Solving Options</b>					
41						
42	Pressure Tolerance	1.000e-004 *	Pressure Drop Tolerance	1.000e-004 *	Damping Factor	
43					1.000 *	
44					Max Press Iterations	
45					100 *	
46	<b>CONDITIONS</b>					
47	Name	Stripper Feed @Main	Stripper Bottoms @Main	Off Gas @Main	Reb Q @Main	Cond Q @Main
48	Vapour	0.0000	0.0003	1.0000	---	---
49	Temperature (F)	200.0000 *	255.2556	208.3906	---	---
50	Pressure (psia)	30.0000	32.7000	28.7000	---	---
51	Molar Flow (lbmole/hr)	40131.1250	39487.4281	643.6969	---	---
52	Mass Flow (lb/hr)	725148.9890	711369.7315	13779.2575	---	---
53	Std Ideal Liq Vol Flow (barrel/day)	50000.0000	48808.0864	1191.9136	---	---
54	Molar Enthalpy (Btu/lbmole)	-1.195e+005	-1.194e+005	-5.288e+004	---	---
55	Molar Entropy (Btu/lbmole-F)	16.86	18.21	44.60	---	---
56	Heat Flow (Btu/hr)	-4.7963e+09	-4.7129e+09	-3.4036e+07	1.6034e+08	1.1117e+08
57	<b>PROPERTIES</b>					
58	Name	Stripper Feed @Main	Stripper Bottoms @Main	Off Gas @Main		
59	Molecular Weight	18.07	18.02	21.41		
60	Molar Density (lbmole/ft3)	3.280	2.688	4.056e-003		
61	Mass Density (lb/ft3)	59.26	48.43	8.683e-002		
62	Act. Volume Flow (barrel/day)	5.231e+004	6.279e+004	6.784e+005		
63	Mass Enthalpy (Btu/lb)	-6614	-6625	-2470		
64	Mass Entropy (Btu/lb-F)	0.9330	1.011	2.083		
65	Heat Capacity (Btu/lbmole-F)	18.86	19.22	8.581		
66	Mass Heat Capacity (Btu/lb-F)	1.044	1.067	0.4008		
67	Lower Heating Value (Btu/lbmole)	---	---	---		
68	Mass Lower Heating Value (Btu/lb)	---	---	---		
69	Phase Fraction [Vol. Basis]	---	0.1636	---		
70	Phase Fraction [Mass Basis]	0.0000	2.638e-004	4.941e-324		
71	Partial Pressure of CO2 (psia)	0.0000	0.0000	0.0000		



1	Company Name Not Available Calgary, Alberta CANADA		Case Name: D:\Applied-Process-Design-vol-2\programs\Sour-Water-Unit.usc			
2			Unit Set: NewUser			
3			Date/Time: Saturday Jul 4 2009, 11:06:54			
4						
5						
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8						
9						
10	PROPERTIES					
11	Name	Stripper Feed @Main	Stripper Bottoms @Main	Off Gas @Main		
12	Cost Based on Flow (Cost/s)	0.0000	0.0000	0.0000		
13	Act. Gas Flow (ACFM)	---	---	2645		
14	Avg. Liq. Density (lbmole/ft3)	3.431	3.458	2.309		
15	Specific Heat (Btu/lbmole-F)	18.86	19.22	8.581		
16	Std. Gas Flow (MMSCFD)	365.5	359.6	5.862		
17	Std. Ideal Liq. Mass Density (lb/ft3)	61.99	62.30	49.42		
18	Act. Liq. Flow (USGPM)	1526	1532	---		
19	Z Factor	1.292e-003	---	0.9870		
20	Watson K	10.49	12.12	10.49		
21	User Property	---	---	---		
22	Cp/(Cp - R)	1.118	1.115	1.301		
23	Cp/Cv	1.176	1.000	1.320		
24	Heat of Vap. (Btu/lbmole)	1.750e+004	1.713e+004	1.727e+004		
25	Kinematic Viscosity (cSt)	0.3134	---	7.693		
26	Liq. Mass Density (Std. Cond) (lb/ft3)	63.09	63.33	51.62		
27	Liq. Vol. Flow (Std. Cond) (barrel/day)	4.911e+004	4.800e+004	1140		
28	Liquid Fraction	1.000	0.9997	0.0000		
29	Molar Volume (ft3/lbmole)	0.3049	0.3720	246.5		
30	Mass Heat of Vap. (Btu/lb)	968.2	950.7	806.8		
31	Phase Fraction [Molar Basis]	0.0000	0.0003	1.0000		
32	Surface Tension (dyne/cm)	59.38	53.95	---		
33	Thermal Conductivity (Btu/hr-ft-F)	0.3887	---	1.548e-002		
34	Viscosity (cP)	0.2975	---	1.070e-002		
35	Partial Pressure of H2S (psia)	0.0000	1.722e-004	6.641		
36	Cv (Semi-Ideal) (Btu/lbmole-F)	16.87	17.23	6.595		
37	Mass Cv (Semi-Ideal) (Btu/lb-F)	0.9337	0.9565	0.3081		
38	Cv (Btu/lbmole-F)	16.03	19.21	6.499		
39	Mass Cv (Btu/lb-F)	0.8872	1.066	0.3036		
40	Cv (Ent. Method) (Btu/lbmole-F)	---	---	---		
41	Mass Cv (Ent. Method) (Btu/lb-F)	---	---	---		
42	Cp/Cv (Ent. Method)	---	---	---		
43	Reid VP at 37.8 C (psia)	290.5	214.8	290.6		
44	True VP at 37.8 C (psia)	1.326	0.9513	206.2		
45	Liq. Vol. Flow - Sum(Std. Cond) (barrel/day)	4.913e+004	4.802e+004	1141		
46						
47	SUMMARY					
48	Flow Basis:	Molar	The composition option is selected			
49	Feed Composition					
50	Stripper Feed					
51	Flow Rate (lbmole/hr)	4.013113e+04				
52	---					
53	H2S	0.0037				
54	Ammonia	0.0053				
55	H2O	0.9910				
56	Flow Basis:	Molar	The composition option is selected			
57	Feed Flows					
58	Stripper Feed					
59	Flow Rate (lbmole/hr)	4.013113e+04				
60	---					
61	H2S (lbmole/hr)	148.9624				
62	Ammonia (lbmole/hr)	212.9034				
63	H2O (lbmole/hr)	3.976926e+04				
64	Products					
65	Flow Basis:	Molar	The composition option is selected			
66	Product Compositions					
67	Off Gas	Stripper Bottoms				
68	Flow Rate (lbmole/hr)	643.6969	3.948743e+04			
69	---	---	---			
70	H2S	0.2314	0.0000			

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Company Name Not Available  
Calgary, Alberta  
CANADA

Case Name: D:\Applied-Process-Design-vol-2\programs\Sour-Water-Unit.usc

Unit Set: NewUser

Date/Time: Saturday Jul 4 2009, 11:06:54

Distillation: SW Stripper @Main (continued)

SUMMARY

	Off Gas	Stripper Bottoms		
Ammonia	0.3301	0.0000		
H2O	0.4385	1.0000		
Flow Basis:	Molar		The composition option is selected	

Product Flows

	Off Gas	Stripper Bottoms		
Flow Rate (lbmole/hr)	643.6969	3.948743e+04		
	---	---		
H2S (lbmole/hr)	148.9541	0.0084		
Ammonia (lbmole/hr)	212.5099	0.3935		
H2O (lbmole/hr)	282.2330	3.948703e+04		
Flow Basis:	Molar		The composition option is selected	

Product Recoveries

	Off Gas	Stripper Bottoms		
Flow Rate (lbmole/hr)	643.6969	3.948743e+04		
	---	---		
H2S (%)	99.9944	0.0056		
Ammonia (%)	99.8152	0.1848		
H2O (%)	0.7097	99.2903		

COLUMN PROFILES

Reflux Ratio:	9.999	Reboil Ratio:	0.2371	The Flows Option is Selected	Flow Basis:	Molar
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Column Profiles Flows

	Temperature (F)	Pressure (psia)	Net Liq (lbmole/hr)	Net Vap (lbmole/hr)	Net Feed (lbmole/hr)	Net Draws (lbmole/hr)
Condenser	208.4	28.70	6437	---	---	643.7
1_Main TS	241.0	28.70	6438	7080	---	---
2_Main TS	245.3	29.14	6448	7081	---	---
3_Main TS	246.5	29.59	4.850e+004	7091	4.013e+004	---
4_Main TS	249.0	30.03	4.857e+004	9012	---	---
5_Main TS	250.5	30.48	4.863e+004	9086	---	---
6_Main TS	251.7	30.92	4.868e+004	9140	---	---
7_Main TS	252.7	31.37	4.872e+004	9188	---	---
8_Main TS	253.6	31.81	4.876e+004	9233	---	---
9_Main TS	254.4	32.26	4.881e+004	9276	---	---
10_Main TS	255.2	32.70	4.885e+004	9318	---	---
Reboiler	255.3	32.70	---	9362	---	3.949e+004

Column Profiles Energy

	Temperature (F)	Liquid Enthalpy (Btu/lbmole)	Vapour Enthalpy (Btu/lbmole)	Heat Loss (Btu/hr)
Condenser	208.4	-1.126e+005	-5.288e+004	---
1_Main TS	241.0	-1.185e+005	-9.147e+004	---
2_Main TS	245.3	-1.191e+005	-9.687e+004	---
3_Main TS	246.5	-1.191e+005	-9.737e+004	---
4_Main TS	249.0	-1.193e+005	-1.001e+005	---
5_Main TS	250.5	-1.193e+005	-1.012e+005	---
6_Main TS	251.7	-1.194e+005	-1.017e+005	---
7_Main TS	252.7	-1.194e+005	-1.020e+005	---
8_Main TS	253.6	-1.194e+005	-1.021e+005	---
9_Main TS	254.4	-1.194e+005	-1.022e+005	---
10_Main TS	255.2	-1.194e+005	-1.022e+005	---
Reboiler	255.3	-1.194e+005	-1.022e+005	---

FEEDS / PRODUCTS

Flow Basis:	Molar						
	Stream	Type	Duty (Btu/hr)	State	Flows (lbmole/hr)	Enthalpy (Btu/lbmol)	Temp (F)
Condenser	Cond Q	Energy	1.112e+008	*	---	---	---
	Off Gas	Draw	---	Vapour	643.7	-3301	208.4
1_Main TS							
2_Main TS							
3_Main TS	Stripper Feed	Feed	---	Liquid	4.013e+004	-5.138e+004	200.0
4_Main TS							



1	Company Name Not Available Calgary, Alberta CANADA			Case Name: D:\Applied-Process-Design-vol-2\programs\Sour-Water-Unit.usc			
2				Unit Set: NewUser			
3				Date/Time: Saturday Jul 4 2009, 11:06:54			
4							
5							
6	<b>Distillation: SW Stripper @Main (continued)</b>						
7							
8							
9	<b>FEEDS / PRODUCTS</b>						
10							
11	5_Main TS						
12	6_Main TS						
13	7_Main TS						
14	8_Main TS						
15	9_Main TS						
16	10_Main TS						
17	Reboiler	Reb Q	Energy	1.603e+008	*	---	---
18		Stripper Bottoms	Draw	---		Liquid	3.949e+004 * -7451 * 255.3 *
19							
20	<b>SETUP</b>						
21	Sub-Flowsheet						
22	<b>Feed Streams</b>			<b>Product Streams</b>			
23	Internal Stream	External Stream	Transfer Basis	Internal Stream	External Stream	Transfer Basis	
24	Reb Q	Reb Q @Main	None Req'd	Cond Q	Cond Q @Main	None Req'd	
25	Stripper Feed	Stripper Feed @Main	T-P Flash	Off Gas	Off Gas @Main	T-P Flash	
26				Stripper Bottoms	Stripper Bottoms @Main	T-P Flash	
27							
28							
29	<b>VARIABLES</b>						
30	Column Flowsheet Vars Available as Parameters						
31	Data Source	Variable	Component	Description			
32							
33							
34	<b>COMPONENT MAPS</b>						
35	<b>Feed Streams</b>						
36	Feed Name	In to SubFlowSheet	Out of SubFlowSheet				
37	Reb Q						
38	Stripper Feed						
39	<b>Product Stream</b>						
40	Product Name	In to SubFlowSheet	Out of SubFlowSheet				
41	Cond Q						
42	Off Gas						
43	Stripper Bottoms						
44							
45	<b>DYNAMICS</b>						
46	Vessel Dynamic Specifications						
47							
48	Vessel	Condenser	Reboiler				
49	Diameter (ft)	3.914	3.914				
50	Height.0 (ft)	5.871	5.871				
51	Volume.0 (ft3)	70.63 *	70.63 *				
52	Liquid Volume Percent (%)	50.00 *	50.00 *				
53	Level Calculator	Horizontal cylinder	Horizontal cylinder				
54	Fraction Calculator	Use levels and nozzles	Use levels and nozzles				
55	Vessel Delta P (psi)	0.0000 *	0.0000 *				
56	Fixed Vessel P Spec (psia)	28.70	32.70				
57	Fixed P Spec Active	Not Active	Not Active				
58							
59	Other Equipment in Column Flowsheet						
60							
61							
62	<b>Holdup Details</b>						
63		Pressure (psia)	Volume (ft3)	Bulk Liquid Volume (ft3)			
64							
65	Condenser	0.0000	0.0000 *	0.0000			
66	1_Main TS	0.0000	0.0000 *	0.0000			
67	2_Main TS	0.0000	0.0000 *	0.0000			
68	3_Main TS	0.0000	0.0000 *	0.0000			
69	4_Main TS	0.0000	0.0000 *	0.0000			
70	5_Main TS	0.0000	0.0000 *	0.0000			

1	Company Name Not Available Calgary, Alberta CANADA		Case Name:	D:\Applied-Process-Design-vol-2\programs\Sour-Water-Unit.usc	
2			Unit Set:	NewUser	
3			Date/Time:	Saturday Jul 4 2009, 11:06:54	
4					
5					
6	<b>Distillation: SW Stripper @Main (continued)</b>				
7					
8					
9		Pressure	Volume	Bulk Liquid Volume	
10		(psia)	(ft3)	(ft3)	
11	6_Main TS	0.0000	0.0000	*	0.0000
12	7_Main TS	0.0000	0.0000	*	0.0000
13	8_Main TS	0.0000	0.0000	*	0.0000
14	9_Main TS	0.0000	0.0000	*	0.0000
15	10_Main TS	0.0000	0.0000	*	0.0000
16	Reboiler	0.0000	0.0000	*	0.0000
17	<b>NOTES</b>				
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