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**ANEXOS**

**ANEXO A**  
**CONTRATO DE SERVICIO DE AMPLIACIÓN DE LA PLANTA DE**  
**TRATAMIENTO DE YAPACANÍ**

**Exterran**

Carretera Al Norte Km. 9.5  
Santa Cruz Bolivia

Telefono: (591 3) 3443631  
Fax: (591 3) 31 344 3737

[www.exterran.com](http://www.exterran.com)

Martes, 23 de Noviembre de 2010

**Señores.**

EMPRESA PETROLERA YPFB ANDINA S.A.

Ate. Rodrigo Toro

Presente.-

**Ref.- SERVICIO DE AMPLIACION DE CAPACIDAD DE PROCESAMIENTO PLANTA DE TRATAMIENTO DE GAS DE YAPACANI ANDI-GIC-151/09**

Estimado Rodrigo,

Exterran Bolivia SRL., comunica que el monto a facturar por el EPC. "SERVICIO DE AMPLIACION DE CAPACIDAD DE PROCESAMIENTO PLANTA DE TRATAMIENTO DE GAS YAPACANI – ANDI-GIC-151/09", es de USD 11.842.028,23 – el mismo incluye impuestos de ley.

El item Engineering & Project Mgt. USD 1.693.777,29 debe ser pagado a EESLP cuenta corriente en USA, YPFB-ANDINA S.A. se deberá hacer cargo de los impuestos por remesas al exterior y/o cualquier otro impuesto de ley.

Agradeciendo desde ya vuestra gentileza, nos despedimos y quedamos en disposición para cualquier consulta o aclaración que crean conveniente.

Cualquier consulta y/o aclaración, estamos a su disposición.

Atentamente.



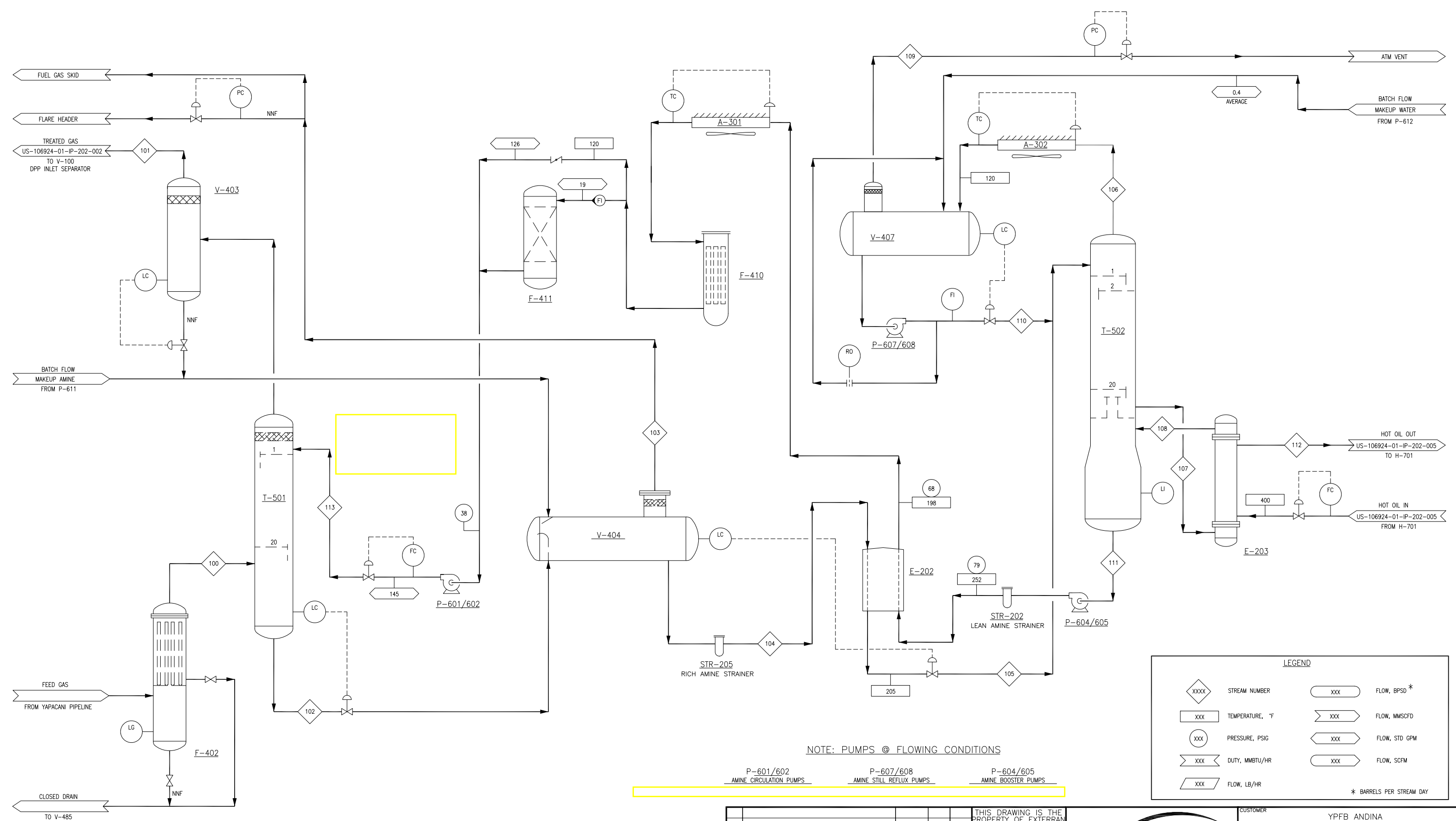
Raul Alvarez E.

Gerente General

Exterran Bolivia SRL.

**ANEXO B**

DIAGRAMA DE FLUJO DEL PROCESO UNIDAD DE AMINA – PLANTA  
DE YAPACANÍ



NOTE: PUMPS @ FLOWING CONDITIONS

P-601/602 AMINE CIRCULATION PUMPS    P-607/608 AMINE STILL REFLUX PUMPS    P-604/605 AMINE BOOSTER PUMPS

LEGEND			
◇ XXXX	STREAM NUMBER	○ XXX	FLOW, BPSD *
□ XXX	TEMPERATURE, °F	▸ XXX	FLOW, MMSCFD
⊙ XXX	PRESSURE, PSIG	▹ XXX	FLOW, STD GPM
▬ XXX	DUTY, MMBTU/HR	▸ XXX	FLOW, SCFM
▬ XXX	FLOW, LB/HR		

\* BARRELS PER STREAM DAY

REV.	DESCRIPTION	DATE	BY	CK
A	ISSUED FOR DESIGN	11/17/10	J.E.	WSC
REVISIONS				

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16666 Northchase Drive  
Houston, Texas 77060 281-836-7000

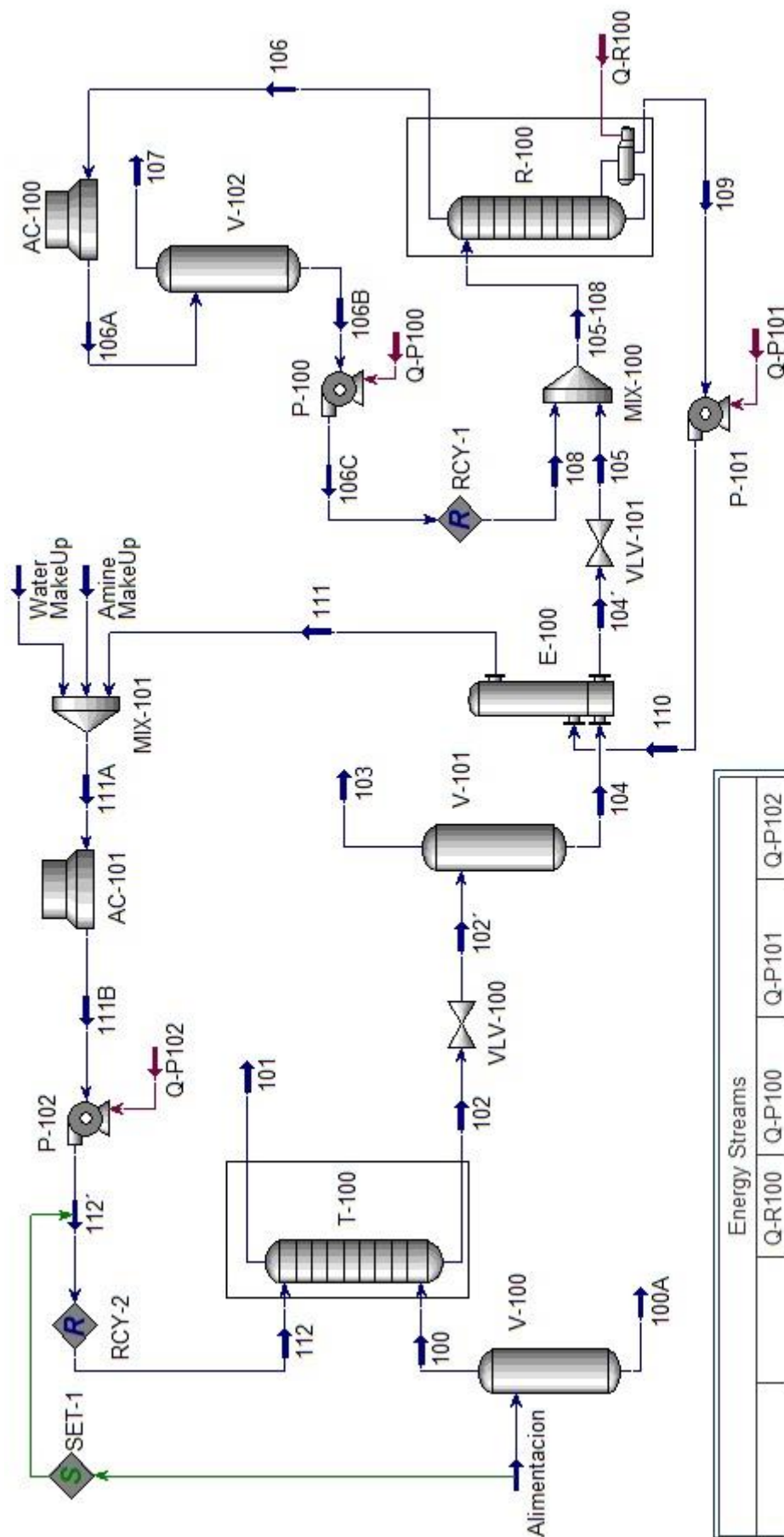
CUSTOMER		YFPB ANDINA YAPACANI	
TITLE			
PROCESS FLOW DIAGRAM AMINE UNIT			
DRAWN	DATE	APPROVED	SCALE
J.E.	11/10/10	WSC	NTS
DRAWING NO.		SHT. NO.	
US-106924-01-IP-202-001		1 OF 2	
REV.		REV.	
		A	

**ANEXO C**


PLANTA BASE - DFP Y REPORTE DE LA SIMULACIÓN EN HYSYS V8.8





**DFP: UNIDAD DE AMINA – PLANTA DE YAPACANI**



Energy Streams				
	Q-R100	Q-P100	Q-P101	Q-P102
Heat Flow	MMBtu/hr	1,496e-004	1,648e-002	0,2821
Power	hp	5,880e-002	6,478	110,9

1	 Universidad Mayor de San Andres Facultad de Ingenieria La Paz - Bolivia		Case Name: Planta Base_Unidad de Amina_Planta de Yapacani.hsc			
2			Unit Set: Energy Analysis1			
3			Date/Time: Fri Oct 01 10:53:45 2021			
4						
5						
6	<b>Workbook: Case (Main)</b>					
7						
8						
9	<b>Material Streams</b>					
10					Fluid Pkg:	All
11	Name	Alimentacion	100	100A	112	101
12	Vapour Fraction	0.9999	1.0000	0.0000	0.0000	1.0000
13	Temperature (F)	86.20	86.20	86.20	122.2	122.9
14	Pressure (psia)	1214	1214	1214	1212	1212
15	Molar Flow (MMSCFD)	16.0	16.0	2.36e-003	18.0	14.8
16	Mass Flow (lb/hr)	3.425e+004	3.424e+004	4.681	6.550e+004	2.825e+004
17	Heat Flow (MMBtu/hr)	8.494	8.497	-3.735e-003	-13.74	8.797
18	CO2 Composition(mole %)	7.905	7.906	0.2484	8.682e-003	0.1861
19	Comp Molar Flow (CO2) (lbmole/hr)	139.0000	138.9994	0.0006	0.1719	3.0177
20	Name	102	102'	103	104	104'
21	Vapour Fraction	0.0000	0.0012	1.0000	0.0000	0.0034
22	Temperature (F)	150.7	150.5	150.5	150.5	205.0
23	Pressure (psia)	1214	104.7	104.7	104.7	94.70
24	Molar Flow (MMSCFD)	19.3	19.3	2.26e-002	19.3	19.3
25	Mass Flow (lb/hr)	7.150e+004	7.150e+004	52.01	7.145e+004	7.145e+004
26	Heat Flow (MMBtu/hr)	-14.04	-14.04	1.449e-002	-14.05	-10.98
27	CO2 Composition(mole %)	6.434	6.434	15.49	6.423	6.423
28	Comp Molar Flow (CO2) (lbmole/hr)	136.1535	136.1535	0.3852	135.7683	135.7683
29	Name	105	108	105-108	106	109
30	Vapour Fraction	0.0214	0.0000	0.0177	1.0000	0.0000
31	Temperature (F)	193.8	112.9	192.3	209.6	263.1
32	Pressure (psia)	41.70	41.70	41.70	25.00	32.00
33	Molar Flow (MMSCFD)	19.3	1.10	20.3	2.41	17.9
34	Mass Flow (lb/hr)	7.145e+004	2177	7.362e+004	8296	6.533e+004
35	Heat Flow (MMBtu/hr)	-10.98	-1.686	-12.66	1.394	-5.719
36	CO2 Composition(mole %)	6.423	6.149e-002	6.080	51.29	8.688e-003
37	Comp Molar Flow (CO2) (lbmole/hr)	135.7683	0.0741	135.8424	135.6713	0.1711
38	Name	106A	107	106B	106C	110
39	Vapour Fraction	0.5446	1.0000	0.0000	0.0000	0.0000
40	Temperature (F)	112.8	112.8	112.8	112.9	263.4
41	Pressure (psia)	24.48	24.48	24.48	41.70	93.70
42	Molar Flow (MMSCFD)	2.41	1.31	1.10	1.10	17.9
43	Mass Flow (lb/hr)	8296	6119	2177	2177	6.533e+004
44	Heat Flow (MMBtu/hr)	-1.061	0.6250	-1.686	-1.686	-5.702
45	CO2 Composition(mole %)	51.29	94.14	6.150e-002	6.150e-002	8.688e-003
46	Comp Molar Flow (CO2) (lbmole/hr)	135.6713	135.5972	0.0741	0.0741	0.1711
47	Name	111	Water MakeUp	Amine MakeUp	111A	111B
48	Vapour Fraction	0.0000	0.0000	0.0000	0.0000	0.0000
49	Temperature (F)	210.4	208.4	208.4	210.4	116.9
50	Pressure (psia)	83.70	83.70	83.70	83.70	80.81
51	Molar Flow (MMSCFD)	17.9	9.11e-002	0.000	18.0	18.0
52	Mass Flow (lb/hr)	6.533e+004	180.2	0.0000	6.551e+004	6.551e+004
53	Heat Flow (MMBtu/hr)	-8.777	-0.1221	0.0000	-8.899	-14.02
54	CO2 Composition(mole %)	8.688e-003	0.0000	0.0000	8.644e-003	8.644e-003
55	Comp Molar Flow (CO2) (lbmole/hr)	0.1711	0.0000	0.0000	0.1711	0.1711
56						
57						
58						
59						
60	Aspen Technology Inc.		Aspen HYSYS Version 8.8 (34.0.0.8909)			Page 1 of 5

1	 Universidad Mayor de San Andres Facultad de Ingenieria La Paz - Bolivia		Case Name: Planta Base_Unidad de Amina_Planta de Yapacani.hsc			
2			Unit Set: Energy Analysis1			
3			Date/Time: Fri Oct 01 10:53:45 2021			
4						
5						
6	<b>Workbook: Case (Main) (continued)</b>					
7						
8						
9	<b>Material Streams (continued)</b>				Fluid Pkg:	All
10						
11	Name	112'				
12	Vapour Fraction	0.0000				
13	Temperature (F)	122.2				
14	Pressure (psia)	1212				
15	Molar Flow (MMSCFD)	18.0				
16	Mass Flow (lb/hr)	6.551e+004				
17	Heat Flow (MMBtu/hr)	-13.74				
18	CO2 Composition(mole %)	8.644e-003				
19	Comp Molar Flow (CO2) (lbmole/hr)	0.1711				
20	<b>Compositions</b>				Fluid Pkg:	All
21						
22	Name	Alimentacion	100	100A	112	101
23	Comp Mole Frac (Nitrogen)	0.0404	0.0404	0.0000	0.0000	0.0438
24	Comp Mole Frac (CO2)	0.0790	0.0791	0.0025	0.0001	0.0019
25	Comp Mole Frac (H2S)	0.0000	0.0000	0.0000	0.0000	0.0000
26	Comp Mole Frac (Methane)	0.8559	0.8560	0.0014	0.0000	0.9268
27	Comp Mole Frac (Ethane)	0.0106	0.0106	0.0000	0.0000	0.0115
28	Comp Mole Frac (Propane)	0.0054	0.0054	0.0000	0.0000	0.0059
29	Comp Mole Frac (i-Butane)	0.0009	0.0009	0.0000	0.0000	0.0009
30	Comp Mole Frac (n-Butane)	0.0024	0.0024	0.0000	0.0000	0.0026
31	Comp Mole Frac (i-Pentane)	0.0007	0.0007	0.0000	0.0000	0.0008
32	Comp Mole Frac (n-Pentane)	0.0011	0.0011	0.0000	0.0000	0.0012
33	Comp Mole Frac (n-Hexane)	0.0011	0.0011	0.0000	0.0000	0.0012
34	Comp Mole Frac (n-Heptane)	0.0014	0.0014	0.0000	0.0000	0.0016
35	Comp Mole Frac (H2O)	0.0011	0.0009	0.9961	0.8440	0.0019
36	Comp Mole Frac (DEAmine)	0.0000	0.0000	0.0000	0.0494	0.0000
37	Comp Mole Frac (MDEAmine)	0.0000	0.0000	0.0000	0.1064	0.0000
38	Master Comp Mass Frac (DEAmine)	0.0000	0.0000	0.0000	0.1571	0.0000
39	Master Comp Mass Frac (MDEAmine)	0.0000	0.0000	0.0000	0.3833	0.0000
40	Name	102	102'	103	104	104'
41	Comp Mole Frac (Nitrogen)	0.0000	0.0000	0.0222	0.0000	0.0000
42	Comp Mole Frac (CO2)	0.0643	0.0643	0.1549	0.0642	0.0642
43	Comp Mole Frac (H2S)	0.0000	0.0000	0.0000	0.0000	0.0000
44	Comp Mole Frac (Methane)	0.0010	0.0010	0.7815	0.0001	0.0001
45	Comp Mole Frac (Ethane)	0.0000	0.0000	0.0073	0.0000	0.0000
46	Comp Mole Frac (Propane)	0.0000	0.0000	0.0025	0.0000	0.0000
47	Comp Mole Frac (i-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000
48	Comp Mole Frac (n-Butane)	0.0000	0.0000	0.0001	0.0000	0.0000
49	Comp Mole Frac (i-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000
50	Comp Mole Frac (n-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000
51	Comp Mole Frac (n-Hexane)	0.0000	0.0000	0.0003	0.0000	0.0000
52	Comp Mole Frac (n-Heptane)	0.0000	0.0000	0.0001	0.0000	0.0000
53	Comp Mole Frac (H2O)	0.7888	0.7888	0.0309	0.7897	0.7897
54	Comp Mole Frac (DEAmine)	0.0462	0.0462	0.0000	0.0463	0.0463
55	Comp Mole Frac (MDEAmine)	0.0996	0.0996	0.0000	0.0997	0.0997
56	Master Comp Mass Frac (DEAmine)	0.1439	0.1439	0.0000	0.1440	0.1440
57	Master Comp Mass Frac (MDEAmine)	0.3512	0.3512	0.0000	0.3514	0.3514
58						
59						
60	Aspen Technology Inc.		Aspen HYSYS Version 8.8 (34.0.0.8909)			Page 2 of 5


1	 <p>Universidad Mayor de San Andres Facultad de Ingenieria La Paz - Bolivia</p>	Case Name: Planta Base_Unidad de Amina_Planta de Yapacani.hsc
2		Unit Set: Energy Analysis1
3		Date/Time: Fri Oct 01 10:53:45 2021
4		
5		


**Workbook: Case (Main) (continued)**

**Compositions (continued)** Fluid Pkg: All

11	Name	105	108	105-108	106	109
12	Comp Mole Frac (Nitrogen)	0.0000	0.0000	0.0000	0.0000	0.0000
13	Comp Mole Frac (CO2)	0.0642	0.0006	0.0608	0.5129	0.0001
14	Comp Mole Frac (H2S)	0.0000	0.0000	0.0000	0.0000	0.0000
15	Comp Mole Frac (Methane)	0.0001	0.0000	0.0001	0.0007	0.0000
16	Comp Mole Frac (Ethane)	0.0000	0.0000	0.0000	0.0000	0.0000
17	Comp Mole Frac (Propane)	0.0000	0.0000	0.0000	0.0000	0.0000
18	Comp Mole Frac (i-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000
19	Comp Mole Frac (n-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000
20	Comp Mole Frac (i-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000
21	Comp Mole Frac (n-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000
22	Comp Mole Frac (n-Hexane)	0.0000	0.0000	0.0000	0.0000	0.0000
23	Comp Mole Frac (n-Heptane)	0.0000	0.0000	0.0000	0.0000	0.0000
24	Comp Mole Frac (H2O)	0.7897	0.9990	0.8010	0.4862	0.8433
25	Comp Mole Frac (DEAmine)	0.0463	0.0000	0.0438	0.0000	0.0497
26	Comp Mole Frac (MDEAmine)	0.0997	0.0004	0.0943	0.0002	0.1070
27	Master Comp Mass Frac (DEAmine)	0.1440	0.0002	0.1398	0.0001	0.1575
28	Master Comp Mass Frac (MDEAmine)	0.3514	0.0024	0.3411	0.0006	0.3843
29	Name	106A	107	106B	106C	110
30	Comp Mole Frac (Nitrogen)	0.0000	0.0000	0.0000	0.0000	0.0000
31	Comp Mole Frac (CO2)	0.5129	0.9414	0.0006	0.0006	0.0001
32	Comp Mole Frac (H2S)	0.0000	0.0000	0.0000	0.0000	0.0000
33	Comp Mole Frac (Methane)	0.0007	0.0013	0.0000	0.0000	0.0000
34	Comp Mole Frac (Ethane)	0.0000	0.0000	0.0000	0.0000	0.0000
35	Comp Mole Frac (Propane)	0.0000	0.0000	0.0000	0.0000	0.0000
36	Comp Mole Frac (i-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000
37	Comp Mole Frac (n-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000
38	Comp Mole Frac (i-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000
39	Comp Mole Frac (n-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000
40	Comp Mole Frac (n-Hexane)	0.0000	0.0000	0.0000	0.0000	0.0000
41	Comp Mole Frac (n-Heptane)	0.0000	0.0000	0.0000	0.0000	0.0000
42	Comp Mole Frac (H2O)	0.4862	0.0573	0.9990	0.9990	0.8433
43	Comp Mole Frac (DEAmine)	0.0000	0.0000	0.0000	0.0000	0.0497
44	Comp Mole Frac (MDEAmine)	0.0002	0.0000	0.0004	0.0004	0.1070
45	Master Comp Mass Frac (DEAmine)	0.0001	0.0000	0.0002	0.0002	0.1575
46	Master Comp Mass Frac (MDEAmine)	0.0006	0.0000	0.0024	0.0024	0.3843

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1	 Universidad Mayor de San Andres Facultad de Ingenieria La Paz - Bolivia		Case Name: Planta Base_Unidad de Amina_Planta de Yapacani.hsc			
2			Unit Set: Energy Analysis1			
3			Date/Time: Fri Oct 01 10:53:45 2021			
4						
5						
6	<b>Workbook: Case (Main) (continued)</b>					
7						
8						
9	<b>Compositions (continued)</b>					Fluid Pkg: All
10						
11	Name	111	Water MakeUp	Amine MakeUp	111A	111B
12	Comp Mole Frac (Nitrogen)	0.0000	0.0000	0.0000	0.0000	0.0000
13	Comp Mole Frac (CO2)	0.0001	0.0000	0.0000	0.0001	0.0001
14	Comp Mole Frac (H2S)	0.0000	0.0000	0.0000	0.0000	0.0000
15	Comp Mole Frac (Methane)	0.0000	0.0000	0.0000	0.0000	0.0000
16	Comp Mole Frac (Ethane)	0.0000	0.0000	0.0000	0.0000	0.0000
17	Comp Mole Frac (Propane)	0.0000	0.0000	0.0000	0.0000	0.0000
18	Comp Mole Frac (i-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000
19	Comp Mole Frac (n-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000
20	Comp Mole Frac (i-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000
21	Comp Mole Frac (n-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000
22	Comp Mole Frac (n-Hexane)	0.0000	0.0000	0.0000	0.0000	0.0000
23	Comp Mole Frac (n-Heptane)	0.0000	0.0000	0.0000	0.0000	0.0000
24	Comp Mole Frac (H2O)	0.8433	1.0000	0.0000	0.8441	0.8441
25	Comp Mole Frac (DEAmine)	0.0497	0.0000	0.5000	0.0494	0.0494
26	Comp Mole Frac (MDEAmine)	0.1070	0.0000	0.5000	0.1064	0.1064
27	Master Comp Mass Frac (DEAmine)	0.1575	0.0000	0.4687	0.1571	0.1571
28	Master Comp Mass Frac (MDEAmine)	0.3843	0.0000	0.5313	0.3833	0.3833
29	Name	112'				
30	Comp Mole Frac (Nitrogen)	0.0000				
31	Comp Mole Frac (CO2)	0.0001				
32	Comp Mole Frac (H2S)	0.0000				
33	Comp Mole Frac (Methane)	0.0000				
34	Comp Mole Frac (Ethane)	0.0000				
35	Comp Mole Frac (Propane)	0.0000				
36	Comp Mole Frac (i-Butane)	0.0000				
37	Comp Mole Frac (n-Butane)	0.0000				
38	Comp Mole Frac (i-Pentane)	0.0000				
39	Comp Mole Frac (n-Pentane)	0.0000				
40	Comp Mole Frac (n-Hexane)	0.0000				
41	Comp Mole Frac (n-Heptane)	0.0000				
42	Comp Mole Frac (H2O)	0.8441				
43	Comp Mole Frac (DEAmine)	0.0494				
44	Comp Mole Frac (MDEAmine)	0.1064				
45	Master Comp Mass Frac (DEAmine)	0.1571				
46	Master Comp Mass Frac (MDEAmine)	0.3833				
47	<b>Energy Streams</b>					Fluid Pkg: All
48						
49	Name	Q-R100	Q-P100	Q-P101	Q-P102	
50	Heat Flow (MMBtu/hr)	8.339	1.496e-004	1.648e-002	0.2821	
51	Power (hp)	3277	5.880e-002	6.478	110.9	
52	<b>Unit Ops</b>					
53						
54	Operation Name	Operation Type	Feeds	Products	Ignored	Calc Level
55	V-100	Separator	Alimentacion	100A	No	500.0
56				100		
57	V-101	Separator	102'	104	No	500.0
58				103		
59	V-102	Separator	106A	106B	No	500.0
60	Aspen Technology Inc. Aspen HYSYS Version 8.8 (34.0.0.8909)					Page 4 of 5

1	 <p>Universidad Mayor de San Andres Facultad de Ingenieria La Paz - Bolivia</p>	Case Name: Planta Base_Unidad de Amina_Planta de Yapacani.hsc
2		Unit Set: Energy Analysis1
3		Date/Time: Fri Oct 01 10:53:45 2021
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**Workbook: Case (Main) (continued)**

**Unit Ops (continued)**

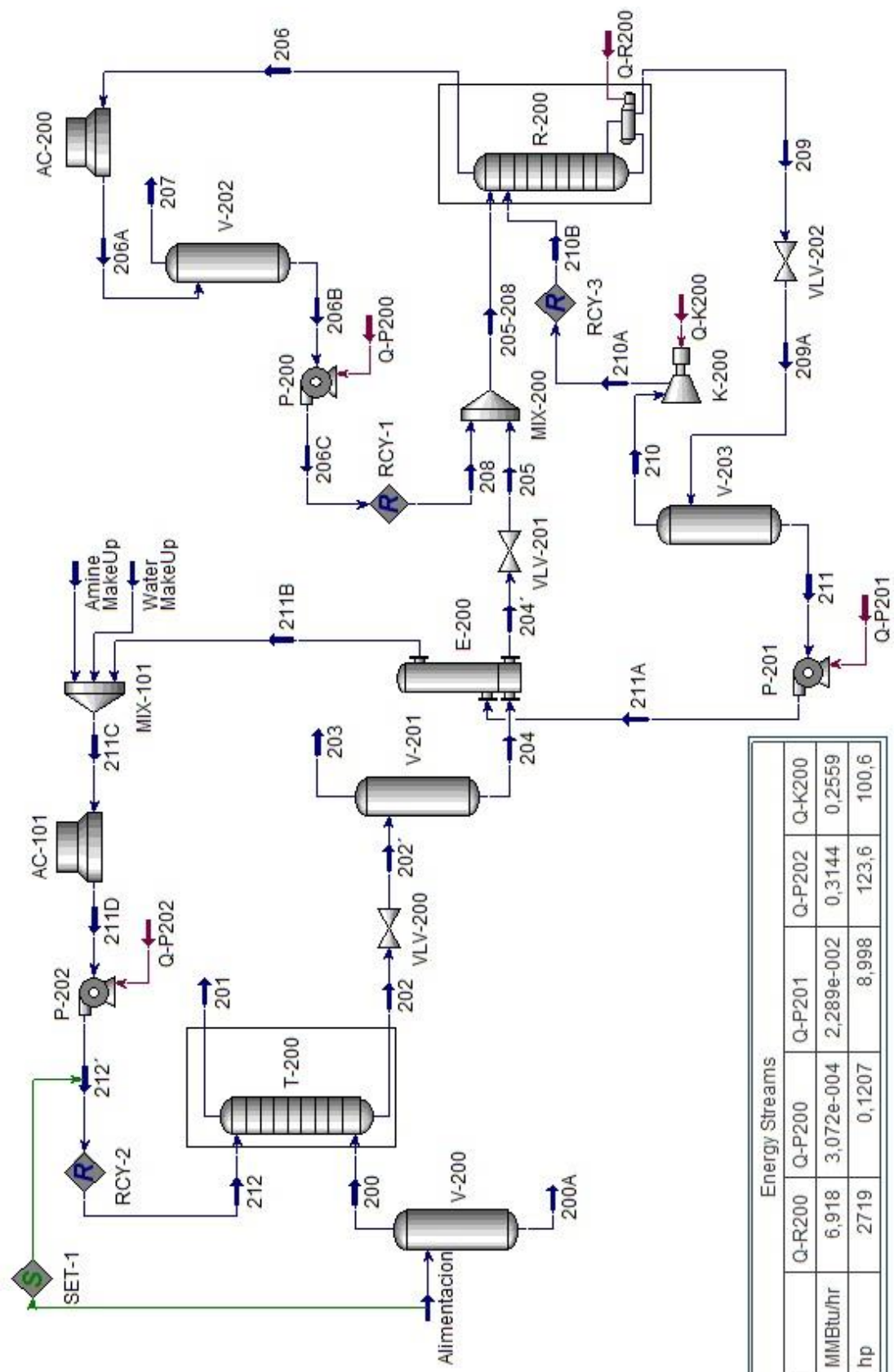
Operation Name	Operation Type	Feeds	Products	Ignored	Calc Level
V-102	Separator		107	No	500.0
T-100	Absorber	112	102	No	2500
		100	101		
VLV-100	Valve	102	102'	No	500.0
VLV-101	Valve	104'	105	No	500.0
E-100	Heat Exchanger	104	104'	No	500.0
		110	111		
MIX-100	Mixer	105	105-108	No	500.0
		108			
MIX-101	Mixer	111	111A	No	500.0
		Water MakeUp			
		Amine MakeUp			
R-100	Reboiled Absorber	105-108	109	No	2500
		Q-R100	106		
AC-100	Air cooler	106	106A	No	500.0
AC-101	Air cooler	111A	111B	No	500.0
P-100	Pump	106B	106C	No	500.0
		Q-P100			
P-101	Pump	109	110	No	500.0
		Q-P101			
P-102	Pump	111B	112'	No	500.0
		Q-P102			
RCY-1	Recycle	106C	108	No	3500
RCY-2	Recycle	112'	112	No	3500
SET-1	Set			No	500.0

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60	Aspen Technology Inc.	Aspen HYSYS Version 8.8 (34.0.0.8909)	Page 5 of 5

**ANEXO D**


TECNOLOGÍA 1 - DFP Y REPORTE DE LA SIMULACIÓN EN HYSYS V8.8


**DFP: INCORPORACIÓN DE VAPOR RE-COMPRESIVO**





Energy Streams					
	Q-R200	Q-P200	Q-P201	Q-P202	Q-K200
Heat Flow	MMBtu/hr	3,072e-004	2,289e-002	0,3144	0,2559
Power	hp	2719	8,998	123,6	100,6



1	 Universidad Mayor de San Andres Facultad de Ingenieria La Paz - Bolivia		Case Name: Tecnologia 1_Incorporación de Vapor Recompresado.hsc			
2			Unit Set: Energy Analysis1			
3			Date/Time: Fri Oct 01 11:18:13 2021			
4						
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6	<b>Workbook: Case (Main)</b>					
7						
8						
9	<b>Material Streams</b>					
10						Fluid Pkg: All
11	Name	Alimentacion	200	200A	212	201
12	Vapour Fraction	0.9999	1.0000	0.0000	0.0000	1.0000
13	Temperature (F)	86.20	86.20	86.20	124.6	125.0
14	Pressure (psia)	1214	1214	1214	1212	1212
15	Molar Flow (MMSCFD)	16.0	16.0	2.36e-003	21.6	14.8
16	Mass Flow (lb/hr)	3.425e+004	3.424e+004	4.681	7.270e+004	2.822e+004
17	Heat Flow (MMBtu/hr)	8.494	8.497	-3.735e-003	-18.87	8.834
18	CO2 Composition(mole %)	7.905	7.906	0.2484	7.682e-003	0.1495
19	Comp Molar Flow (CO2) (lbmole/hr)	139.0000	138.9993	0.0006	0.1819	2.4224
20	Name	202	202'	203	204	204'
21	Vapour Fraction	0.0000	0.0012	1.0000	0.0000	0.0001
22	Temperature (F)	149.0	148.8	148.8	148.8	185.0
23	Pressure (psia)	1214	104.7	104.7	104.7	94.70
24	Molar Flow (MMSCFD)	22.8	22.8	2.63e-002	22.8	22.8
25	Mass Flow (lb/hr)	7.872e+004	7.872e+004	58.54	7.866e+004	7.866e+004
26	Heat Flow (MMBtu/hr)	-19.21	-19.21	1.692e-002	-19.22	-17.00
27	CO2 Composition(mole %)	5.459	5.459	13.03	5.451	5.451
28	Comp Molar Flow (CO2) (lbmole/hr)	136.7589	136.7589	0.3770	136.3818	136.3818
29	Name	205	208	205-208	206	209
30	Vapour Fraction	0.0046	0.0000	0.0029	1.0000	0.0000
31	Temperature (F)	182.2	117.6	181.0	207.6	260.8
32	Pressure (psia)	41.50	59.70	41.50	25.00	32.00
33	Molar Flow (MMSCFD)	22.8	1.05	23.8	2.39	23.0
34	Mass Flow (lb/hr)	7.866e+004	2092	8.075e+004	8281	7.550e+004
35	Heat Flow (MMBtu/hr)	-17.00	-1.611	-18.61	1.380	-11.92
36	CO2 Composition(mole %)	5.451	5.459e-002	5.212	51.86	8.075e-003
37	Comp Molar Flow (CO2) (lbmole/hr)	136.3818	0.0632	136.4450	136.2933	0.2037
38	Name	206A	207	206B	206C	211A
39	Vapour Fraction	0.5580	1.0000	0.0000	0.0000	0.0000
40	Temperature (F)	117.5	117.5	117.5	117.7	219.1
41	Pressure (psia)	23.05	23.05	23.05	59.70	93.70
42	Molar Flow (MMSCFD)	2.39	1.34	1.06	1.06	21.4
43	Mass Flow (lb/hr)	8281	6183	2098	2098	7.247e+004
44	Heat Flow (MMBtu/hr)	-0.9729	0.6433	-1.616	-1.616	-12.80
45	CO2 Composition(mole %)	51.86	92.90	5.454e-002	5.454e-002	7.714e-003
46	Comp Molar Flow (CO2) (lbmole/hr)	136.2933	136.2300	0.0633	0.0633	0.1817
47	Name	211B	Water MakeUp	Amine MakeUp	211C	211D
48	Vapour Fraction	0.0000	0.0000	0.0000	0.0000	0.0000
49	Temperature (F)	184.4	208.4	208.4	184.5	119.2
50	Pressure (psia)	83.70	83.70	83.70	83.70	81.71
51	Molar Flow (MMSCFD)	21.4	0.114	0.000	21.6	21.6
52	Mass Flow (lb/hr)	7.247e+004	225.2	0.0000	7.270e+004	7.270e+004
53	Heat Flow (MMBtu/hr)	-15.02	-0.1527	0.0000	-15.17	-19.19
54	CO2 Composition(mole %)	7.714e-003	0.0000	0.0000	7.673e-003	7.673e-003
55	Comp Molar Flow (CO2) (lbmole/hr)	0.1817	0.0000	0.0000	0.1817	0.1817
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1	 Universidad Mayor de San Andres Facultad de Ingenieria La Paz - Bolivia		Case Name: Tecnologia 1_Incorporación de Vapor Recomprimido.hsc			
2			Unit Set: Energy Analysis1			
3			Date/Time: Fri Oct 01 11:18:13 2021			
4						
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6	<b>Workbook: Case (Main) (continued)</b>					
7						
8						
9	<b>Material Streams (continued)</b>					Fluid Pkg: All
10						
11	Name	212'	209A	210	211	210A
12	Vapour Fraction	0.0000	0.0664	1.0000	0.0000	1.0000
13	Temperature (F)	124.4	218.8	218.8	218.8	404.5
14	Pressure (psia)	1212	14.70	14.70	14.70	32.00
15	Molar Flow (MMSCFD)	21.6	23.0	1.53	21.4	1.53
16	Mass Flow (lb/hr)	7.270e+004	7.550e+004	3025	7.247e+004	3025
17	Heat Flow (MMBtu/hr)	-18.88	-11.92	0.9024	-12.82	1.158
18	CO2 Composition(mole %)	7.673e-003	8.075e-003	1.315e-002	7.714e-003	1.315e-002
19	Comp Molar Flow (CO2) (lbmole/hr)	0.1817	0.2037	0.0220	0.1817	0.0220
20	Name	210B				
21	Vapour Fraction	1.0000				
22	Temperature (F)	404.5				
23	Pressure (psia)	32.00				
24	Molar Flow (MMSCFD)	1.52				
25	Mass Flow (lb/hr)	3024				
26	Heat Flow (MMBtu/hr)	1.158				
27	CO2 Composition(mole %)	3.106e-002				
28	Comp Molar Flow (CO2) (lbmole/hr)	0.0520				
29	<b>Compositions</b>					Fluid Pkg: All
30						
31	Name	Alimentacion	200	200A	212	201
32	Comp Mole Frac (Nitrogen)	0.0404	0.0404	0.0000	0.0000	0.0438
33	Comp Mole Frac (CO2)	0.0790	0.0791	0.0025	0.0001	0.0015
34	Comp Mole Frac (H2S)	0.0000	0.0000	0.0000	0.0000	0.0000
35	Comp Mole Frac (Methane)	0.8559	0.8560	0.0014	0.0000	0.9270
36	Comp Mole Frac (Ethane)	0.0106	0.0106	0.0000	0.0000	0.0115
37	Comp Mole Frac (Propane)	0.0054	0.0054	0.0000	0.0000	0.0059
38	Comp Mole Frac (i-Butane)	0.0009	0.0009	0.0000	0.0000	0.0009
39	Comp Mole Frac (n-Butane)	0.0024	0.0024	0.0000	0.0000	0.0026
40	Comp Mole Frac (i-Pentane)	0.0007	0.0007	0.0000	0.0000	0.0008
41	Comp Mole Frac (n-Pentane)	0.0011	0.0011	0.0000	0.0000	0.0012
42	Comp Mole Frac (n-Hexane)	0.0011	0.0011	0.0000	0.0000	0.0012
43	Comp Mole Frac (n-Heptane)	0.0014	0.0014	0.0000	0.0000	0.0016
44	Comp Mole Frac (H2O)	0.0011	0.0009	0.9961	0.8687	0.0021
45	Comp Mole Frac (DEAmine)	0.0000	0.0000	0.0000	0.0415	0.0000
46	Comp Mole Frac (MDEAmine)	0.0000	0.0000	0.0000	0.0897	0.0000
47	Master Comp Mass Frac (DEAmine)	0.0000	0.0000	0.0000	0.1422	0.0000
48	Master Comp Mass Frac (MDEAmine)	0.0000	0.0000	0.0000	0.3480	0.0000
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60	Aspen Technology Inc.		Aspen HYSYS Version 8.8 (34.0.0.8909)		Page 2 of 6	

1	 Universidad Mayor de San Andres Facultad de Ingenieria La Paz - Bolivia		Case Name: Tecnologia 1_Incorporación de Vapor Recomprimido.hsc				
2			Unit Set: Energy Analysis1				
3			Date/Time: Fri Oct 01 11:18:13 2021				
4							
5							
6	<b>Workbook: Case (Main) (continued)</b>						
7							
8							
9	<b>Compositions (continued)</b>					Fluid Pkg:	All
10							
11	Name	202	202'	203	204	204'	
12	Comp Mole Frac (Nitrogen)	0.0000	0.0000	0.0229	0.0000	0.0000	
13	Comp Mole Frac (CO2)	0.0546	0.0546	0.1303	0.0545	0.0545	
14	Comp Mole Frac (H2S)	0.0000	0.0000	0.0000	0.0000	0.0000	
15	Comp Mole Frac (Methane)	0.0010	0.0010	0.8056	0.0001	0.0001	
16	Comp Mole Frac (Ethane)	0.0000	0.0000	0.0075	0.0000	0.0000	
17	Comp Mole Frac (Propane)	0.0000	0.0000	0.0026	0.0000	0.0000	
18	Comp Mole Frac (i-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000	
19	Comp Mole Frac (n-Butane)	0.0000	0.0000	0.0001	0.0000	0.0000	
20	Comp Mole Frac (i-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000	
21	Comp Mole Frac (n-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000	
22	Comp Mole Frac (n-Hexane)	0.0000	0.0000	0.0003	0.0000	0.0000	
23	Comp Mole Frac (n-Heptane)	0.0000	0.0000	0.0001	0.0000	0.0000	
24	Comp Mole Frac (H2O)	0.8203	0.8203	0.0305	0.8212	0.8212	
25	Comp Mole Frac (DEAmine)	0.0393	0.0393	0.0000	0.0393	0.0393	
26	Comp Mole Frac (MDEAmine)	0.0848	0.0848	0.0000	0.0849	0.0849	
27	Master Comp Mass Frac (DEAmine)	0.1313	0.1313	0.0000	0.1314	0.1314	
28	Master Comp Mass Frac (MDEAmine)	0.3214	0.3214	0.0000	0.3216	0.3216	
29	Name	205	208	205-208	206	209	
30	Comp Mole Frac (Nitrogen)	0.0000	0.0000	0.0000	0.0000	0.0000	
31	Comp Mole Frac (CO2)	0.0545	0.0005	0.0521	0.5186	0.0001	
32	Comp Mole Frac (H2S)	0.0000	0.0000	0.0000	0.0000	0.0000	
33	Comp Mole Frac (Methane)	0.0001	0.0000	0.0001	0.0009	0.0000	
34	Comp Mole Frac (Ethane)	0.0000	0.0000	0.0000	0.0000	0.0000	
35	Comp Mole Frac (Propane)	0.0000	0.0000	0.0000	0.0000	0.0000	
36	Comp Mole Frac (i-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000	
37	Comp Mole Frac (n-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000	
38	Comp Mole Frac (i-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000	
39	Comp Mole Frac (n-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000	
40	Comp Mole Frac (n-Hexane)	0.0000	0.0000	0.0000	0.0000	0.0000	
41	Comp Mole Frac (n-Heptane)	0.0000	0.0000	0.0000	0.0000	0.0000	
42	Comp Mole Frac (H2O)	0.8212	0.9991	0.8291	0.4803	0.8767	
43	Comp Mole Frac (DEAmine)	0.0393	0.0000	0.0376	0.0000	0.0390	
44	Comp Mole Frac (MDEAmine)	0.0849	0.0003	0.0811	0.0001	0.0842	
45	Master Comp Mass Frac (DEAmine)	0.1314	0.0002	0.1280	0.0000	0.1369	
46	Master Comp Mass Frac (MDEAmine)	0.3216	0.0020	0.3133	0.0005	0.3352	
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2		Unit Set: Energy Analysis1
3		Date/Time: Fri Oct 01 11:18:13 2021
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**Workbook: Case (Main) (continued)**

6	<b>Compositions (continued)</b>						Fluid Pkg: All
7							
8							
9							
10							

11	Name	206A	207	206B	206C	211A
12	Comp Mole Frac (Nitrogen)	0.0000	0.0000	0.0000	0.0000	0.0000
13	Comp Mole Frac (CO2)	0.5186	0.9290	0.0005	0.0005	0.0001
14	Comp Mole Frac (H2S)	0.0000	0.0000	0.0000	0.0000	0.0000
15	Comp Mole Frac (Methane)	0.0009	0.0016	0.0000	0.0000	0.0000
16	Comp Mole Frac (Ethane)	0.0000	0.0000	0.0000	0.0000	0.0000
17	Comp Mole Frac (Propane)	0.0000	0.0000	0.0000	0.0000	0.0000
18	Comp Mole Frac (i-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000
19	Comp Mole Frac (n-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000
20	Comp Mole Frac (i-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000
21	Comp Mole Frac (n-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000
22	Comp Mole Frac (n-Hexane)	0.0000	0.0000	0.0000	0.0000	0.0000
23	Comp Mole Frac (n-Heptane)	0.0000	0.0000	0.0000	0.0000	0.0000
24	Comp Mole Frac (H2O)	0.4803	0.0694	0.9991	0.9991	0.8680
25	Comp Mole Frac (DEAmine)	0.0000	0.0000	0.0000	0.0000	0.0418
26	Comp Mole Frac (MDEAmine)	0.0001	0.0000	0.0003	0.0003	0.0902
27	Master Comp Mass Frac (DEAmine)	0.0000	0.0000	0.0002	0.0002	0.1427
28	Master Comp Mass Frac (MDEAmine)	0.0005	0.0000	0.0020	0.0020	0.3491
29	Name	211B	Water MakeUp	Amine MakeUp	211C	211D
30	Comp Mole Frac (Nitrogen)	0.0000	0.0000	0.0000	0.0000	0.0000
31	Comp Mole Frac (CO2)	0.0001	0.0000	0.0000	0.0001	0.0001
32	Comp Mole Frac (H2S)	0.0000	0.0000	0.0000	0.0000	0.0000
33	Comp Mole Frac (Methane)	0.0000	0.0000	0.0000	0.0000	0.0000
34	Comp Mole Frac (Ethane)	0.0000	0.0000	0.0000	0.0000	0.0000
35	Comp Mole Frac (Propane)	0.0000	0.0000	0.0000	0.0000	0.0000
36	Comp Mole Frac (i-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000
37	Comp Mole Frac (n-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000
38	Comp Mole Frac (i-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000
39	Comp Mole Frac (n-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000
40	Comp Mole Frac (n-Hexane)	0.0000	0.0000	0.0000	0.0000	0.0000
41	Comp Mole Frac (n-Heptane)	0.0000	0.0000	0.0000	0.0000	0.0000
42	Comp Mole Frac (H2O)	0.8680	1.0000	0.0000	0.8687	0.8687
43	Comp Mole Frac (DEAmine)	0.0418	0.0000	0.5000	0.0415	0.0415
44	Comp Mole Frac (MDEAmine)	0.0902	0.0000	0.5000	0.0897	0.0897
45	Master Comp Mass Frac (DEAmine)	0.1427	0.0000	0.4687	0.1422	0.1422
46	Master Comp Mass Frac (MDEAmine)	0.3491	0.0000	0.5313	0.3480	0.3480

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60	Aspen Technology Inc. <span style="margin-left: 200px;">Aspen HYSYS Version 8.8 (34.0.0.8909)</span> <span style="float: right;">Page 4 of 6</span>

1	 Universidad Mayor de San Andres Facultad de Ingenieria La Paz - Bolivia		Case Name: Tecnologia 1_Incorporación de Vapor Recomprimido.hsc			
2			Unit Set: Energy Analysis1			
3			Date/Time: Fri Oct 01 11:18:13 2021			
4						
5						
6	<b>Workbook: Case (Main) (continued)</b>					
7						
8						
9	<b>Compositions (continued)</b>					Fluid Pkg: All
10						
11	Name	212'	209A	210	211	210A
12	Comp Mole Frac (Nitrogen)	0.0000	0.0000	0.0000	0.0000	0.0000
13	Comp Mole Frac (CO2)	0.0001	0.0001	0.0001	0.0001	0.0001
14	Comp Mole Frac (H2S)	0.0000	0.0000	0.0000	0.0000	0.0000
15	Comp Mole Frac (Methane)	0.0000	0.0000	0.0000	0.0000	0.0000
16	Comp Mole Frac (Ethane)	0.0000	0.0000	0.0000	0.0000	0.0000
17	Comp Mole Frac (Propane)	0.0000	0.0000	0.0000	0.0000	0.0000
18	Comp Mole Frac (i-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000
19	Comp Mole Frac (n-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000
20	Comp Mole Frac (i-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000
21	Comp Mole Frac (n-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000
22	Comp Mole Frac (n-Hexane)	0.0000	0.0000	0.0000	0.0000	0.0000
23	Comp Mole Frac (n-Heptane)	0.0000	0.0000	0.0000	0.0000	0.0000
24	Comp Mole Frac (H2O)	0.8687	0.8767	0.9995	0.8680	0.9995
25	Comp Mole Frac (DEAmine)	0.0415	0.0390	0.0000	0.0418	0.0000
26	Comp Mole Frac (MDEAmine)	0.0897	0.0842	0.0003	0.0902	0.0003
27	Master Comp Mass Frac (DEAmine)	0.1422	0.1369	0.0002	0.1427	0.0002
28	Master Comp Mass Frac (MDEAmine)	0.3480	0.3352	0.0023	0.3491	0.0023
29	Name	210B				
30	Comp Mole Frac (Nitrogen)	0.0000				
31	Comp Mole Frac (CO2)	0.0003				
32	Comp Mole Frac (H2S)	0.0000				
33	Comp Mole Frac (Methane)	0.0000				
34	Comp Mole Frac (Ethane)	0.0000				
35	Comp Mole Frac (Propane)	0.0000				
36	Comp Mole Frac (i-Butane)	0.0000				
37	Comp Mole Frac (n-Butane)	0.0000				
38	Comp Mole Frac (i-Pentane)	0.0000				
39	Comp Mole Frac (n-Pentane)	0.0000				
40	Comp Mole Frac (n-Hexane)	0.0000				
41	Comp Mole Frac (n-Heptane)	0.0000				
42	Comp Mole Frac (H2O)	0.9993				
43	Comp Mole Frac (DEAmine)	0.0000				
44	Comp Mole Frac (MDEAmine)	0.0003				
45	Master Comp Mass Frac (DEAmine)	0.0002				
46	Master Comp Mass Frac (MDEAmine)	0.0023				
47	<b>Energy Streams</b>					Fluid Pkg: All
48						
49	Name	Q-R200	Q-P200	Q-P201	Q-P202	Q-K200
50	Heat Flow (MMBtu/hr)	6.918	3.072e-004	2.289e-002	0.3144	0.2559
51	Power (hp)	2719	0.1207	8.998	123.6	100.6
52	<b>Unit Ops</b>					
53						
54	Operation Name	Operation Type	Feeds	Products	Ignored	Calc Level
55	V-200	Separator	Alimentacion	200A	No	500.0
56				200		
57	V-201	Separator	202'	204	No	500.0
58				203		
59	V-202	Separator	206A	206B	No	500.0
60	Aspen Technology Inc. Aspen HYSYS Version 8.8 (34.0.0.8909)					Page 5 of 6