

U.S. Patent No. 8,505,332
Claim 5
Weyburn CO2Flex® Plant
(Saskatchewan, Canada)

Claim 5	Weyburn Processing Plant (Saskatchewan, Canada) Ex. 2062, Weyburn NGL Recovery Plant, Process Flow Diagram and Material Balance (April 23, 2012 – Approved)
Claim 5 [5.1] The method of claim 1, wherein the sweet NGL rich stream comprises from 20 molar percent to 40 molar percent of the C3+ hydrocarbons from the carbon dioxide recycle stream, and	The composition for the Stream No. 603 “Dehydrated Gas to NGL Frac Tower” and Stream No. 604 “Hydrocarbons to NGL Frac Tower” are shown in EX2062 (“Weyburn NGL Recovery Plant, Process Flow Diagram and Material Balance”) at Page 12. The composition for the Stream No. 617 “Sweet NGL Rich Stream” is shown in EX2062 at Page 13. The calculations on the attached spreadsheet confirm that the Stream No. 617 “Sweet NGL Rich Stream” has 88.1 molar percent of the C3+ hydrocarbons from the Stream No. 603 “Dehydrated Gas to NGL Frac Tower” and Stream No. 604 “Hydrocarbons to NGL Frac Tower,” above the limit of the 20-40 molar percent range specified in this Claim 5. (See L8, which is the sum of J8:J15 divided by the sum of B8:B15 and C8:C15.)

Claim 5	Weyburn Processing Plant (Saskatchewan, Canada) Ex. 2062, Weyburn NGL Recovery Plant, Process Flow Diagram and Material Balance (April 23, 2012 – Approved)
[5.2] wherein the purified carbon dioxide recycle stream comprises at least 94 molar percent of the carbon dioxide,	The composition for the Stream No. 611 “Purified Carbon Dioxide Recycle Stream” is shown in EX2062 at Page 13. The calculations on the attached spreadsheet confirm that the Stream No. No. 611 “Purified Carbon Dioxide Recycle Stream” has 98.6 molar percent of the carbon dioxide from the Stream No. 603 “Dehydrated Gas to NGL Frac Tower” and Stream No. 604 “Hydrocarbons to NGL Frac Tower,” which is within the at least 94 molar percent specified in this Claim 5. (See E5, which is D5 divided by the sum of B5 and C5.)
[5.3] at least 94 molar percent of the methane, and	The calculations on the attached spreadsheet confirm that the Stream No. No. 611 “Purified Carbon Dioxide Recycle Stream” has 100 molar percent of the methane from the Stream No. 603 “Dehydrated Gas to NGL Frac Tower” and Stream No. 604 “Hydrocarbons to NGL Frac Tower,” which is within the at least 94 molar percent specified in this Claim 5. (See E6, which is D6 divided by the sum of B6 and C6.)

Claim 5	Weyburn Processing Plant (Saskatchewan, Canada) Ex. 2062, Weyburn NGL Recovery Plant, Process Flow Diagram and Material Balance (April 23, 2012 – Approved)
[5.4] at least 93 molar percent of the ethane from the carbon dioxide recycle stream.	The calculations on the attached spreadsheet confirm that the Stream No. No. 611 “Purified Carbon Dioxide Recycle Stream” has 93 molar percent of the ethane from the Stream No. 603 “Dehydrated Gas to NGL Frac Tower” and Stream No. 604 “Hydrocarbons to NGL Frac Tower,” which is within the at least 93 molar percent specified in this Claim 5. (See E7, which is D7 divided by the sum of B7 and C7.)

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	A	B	C	D	E	F
1	EX2062	Dehydrated Gas to NGL Frac Tower Stream 603	Hydrocarbons to NGL Frac Tower Stream 604	Purified CO2 Recycle Stream 611		
2						C3-C8
3		kgmole/h	kgmole/h	kgmole/h		Disregarded
4	N	2.25	0.01	2.25	99.6%	
5	CO2	489.72	10.53	493.22	98.6%	
6	C1	11.30	0.09	11.39	100.0%	
7	C2	12.55	0.55	12.18	93.0%	
8	C3	22.60	2.99	7.68	30.0%	11.8%
9	i-C4	4.33	1.33	0.11	1.9%	
10	n-C4	10.82	4.53	0.04	0.3%	
11	i-C5	2.53	2.47	0.00	0.0%	
12	n-C5	2.33	2.79	0.00	0.0%	
13	n-C6	0.86	3.40	0.00	0.0%	
14	n-C7	0.24	2.56	0.00	0.0%	
15	n-C8	0.07	2.30	0.00	0.0%	
16	H2O	0.00	0.02	0.00	0.0%	
17	H2S	15.28	0.80	12.36	76.9%	
18	COS	0.04	0.01	0.00	0.0%	
19	M-Mercaptan	0.08	0.02	0.00	0.0%	
20	E-Mercaptan	0.00	0.00	0.00	0.0%	

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	A	G	H	I	J	K	L	M	N
1	EX2062	Sour NGL Rich Stream 615			Sweet NGL Rich Stream 617			Acid Gas Stream 626	
2							C3-C8		
3		kgmole/h		C3-C8	kgmole/h		Recovered	kgmole/h	
4	N	0.0000	0.0%		0	0.0%		0.0000	0.0%
5	CO2	7.0200	1.4%		0.09	0.0%		6.3800	1.3%
6	C1	0.0000	0.0%		0	0.0%		0.0000	0.0%
7	C2	0.9200	7.0%		0.92	7.0%		0.0000	0.0%
8	C3	17.9100	70.0%	88.1%	17.91	70.0%	88.1%	0.0000	0.0%
9	i-C4	5.5500	98.1%		5.55	98.1%		0.0000	0.0%
10	n-C4	15.3100	99.7%		15.31	99.7%		0.0000	0.0%
11	i-C5	4.9900	99.8%		4.99	99.8%		0.0000	0.0%
12	n-C5	5.1200	100.0%		5.12	100.0%		0.0000	0.0%
13	n-C6	4.2600	100.0%		4.26	100.0%		0.0000	0.0%
14	n-C7	2.8000	100.0%		2.8	100.0%		0.0000	0.0%
15	n-C8	2.3700	100.0%		2.37	100.0%		0.0000	0.0%
16	H2O	0.0200	100.0%		0.05	250.0%		0.6400	3200.0%
17	H2S	3.7200	23.1%		0	0.0%		3.8100	23.7%
18	COS	0.0500	100.0%		0	0.0%		0.0000	0.0%
19	M-Mercaptan	0.1100	110.0%		0	0.0%		0.0000	0.0%
20	E-Mercaptan	0.0100	0.0%		0.0%	0.0%		0.0000	0.0%