Sulphur Recovery and Sulphur Emissions at Alberta Sour Gas Plants

Annual Report for 2003

August 2004



ALBERTA ENERGY AND UTILITIES BOARD

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1 Introduction

In *Interim Directive (ID) 2001-3: Sulphur Recovery Guidelines for the Province of Alberta*, the Alberta Energy and Utilities Board (EUB) committed to monitoring the sulphur recovery of grandfathered¹ sour gas plants and publishing an annual summary report on industry performance. This report covers both grandfathered sour gas plants (sulphur recovery and larger acid gas flaring sour gas plants) and nongrandfathered² gas plants (sulphur recovery and all acid gas injection sour gas plants). This is the second annual summary report following the implementation of *ID 2001-3*. A complete list of the grandfathered and nongrandfathered plants is in Appendix 1.

While *ID 2001-3* did not change the recovery levels expected for new gas plants, it set out clear expectations on when older grandfathered plants are required to meet the same requirements as new plants. The ID incorporates a phased approach to the more stringent requirements and encourages operators of sulphur recovery plants to take early action to improve performance.

Grandfathered sulphur recovery plants that perform better than the minimum requirements specified in *ID 2001-3* have the option to file sulphur emission performance credit report forms and may use the credits to meet a portion of the sulphur recovery requirements at a future date (i.e., operate for a longer time or at a higher inlet rate before having to degrandfather the plant). Most grandfathered sulphur recovery plants are now taking advantage of the emission credit program, and credits are continuing to grow every year.

Acid gas flaring plants have no ability to earn credits and are subject to more stringent requirements over time.

In the last four years a number of plants have degrandfathered:³ 8 plants have made upgrades to their plant, 3 plants have relicensed to meet the requirements for new plants, and 4 plants have been shut down. In addition, sulphur emissions have decreased substantially for both grandfathered acid gas flaring plants (emissions down 30 per cent) and grandfathered sulphur recovery plants (emissions down 25 per cent).

Nongrandfathered plants are those with an approved sulphur inlet greater than 1 t/d meeting the requirements for new plants, as listed in *ID 2001-3*. This includes some sulphur recovery plants and all acid gas injection plants.

Grandfathered plants are those that do not meet the sulphur recovery requirements for new plants listed in *ID 2001-3*. This includes some sulphur recovery plants and larger (sulphur inlet greater than 1 tonne per day [t/d]) acid gas flaring plants.

Degrandfathered plants are those that did not previously meet the requirements of *ID 2001-3* for new plants but have now relicensed to meet the requirements for new plants as set out in the ID.

2 Summary of Performance for Grandfathered Plants, 2000-2003

2.1 Grandfathered Plants That Have Been Degrandfathered

In the last four years, 8 plants have made modifications to improve or install sulphur recovery at their plants to meet the more stringent sulphur recovery requirements for new plants. In addition, 3 other plants have been relicensed to meet these more stringent sulphur recovery requirements, and 4 grandfathered plants have shut down.

Plants making modifications to meet the requirements for new plants

Plant name	Operator
1. Brazeau River	KeySpan
2. Garrington (Olds)	Esprit
3. Homeglen (Rimbey)	KeySpan
4. Bantry	AltaGas
5. Vulcan (Long Coulee)	Conoco Phillips
6. Wilson Creek	Petro-Canada
7. Rainbow	Husky
8. Edson	Talisman

The 8 operators listed above made significant physical modifications to their plants to achieve higher sulphur recoveries.

Plants relicensing to meet the requirements for new plants

Plant name	Operator
1. Okotoks (Mazeppa)	Mazeppa Processing
Crossfield East	PrimeWest
3. Sylvan Lake	NAL Resources

Of the 3 plants listed above, 2 were relicensed to a higher sulphur recovery efficiency with existing equipment and 1 was relicensed to a lower throughput.

Grandfathered plants that have shut down

Plant name	Operator
1. North Rosevear	Suncor
2. Bittern Lake	CNRL
3. North Caroline	BP Canada
4. South Caroline	BP Canada

A detailed list of plants that have been degrandfathered in the last four years is in Appendix 2, along with the process used for improving the sulphur recovery.

As of July 2004, there are 22 grandfathered sulphur recovery plants and 22 grandfathered acid gas flaring plants remaining (see Appendix 1).

2.2 Sulphur Emission Performance Credits (Emission Credits)

Emission credits can be earned by grandfathered sour gas plants with sulphur recovery that achieve recovery efficiencies higher than their required blended sulphur recovery efficiency. Credits cannot be transferred between facilities and do not apply to acid gas flaring plants.

Credit reports can help an operator

- operate at higher sulphur inlets,
- meet the required blended sulphur recovery efficiency, and
- defer upgrading for a longer period of time.

In order to earn credits, a credit report must be filed on time at the end of each quarter. The filing of credit reports is optional, but once an initial credit report is filed, the operator must continue to file them. Reports may not be filed retroactively.

Each sulphur emission credit represents 1 tonne (t) of sulphur emissions that would have been emitted if the plant exactly met its minimum requirement. Credits must be earned before they can be used.

Most plants that are able to file credit reports are doing so, and the emission credits are growing, as one would expect in this initial period. As of the end of the fourth quarter of 2003, over 30 000 t of sulphur emission credits had been earned (see Figure 1). The total sulphur emissions from grandfathered sulphur recovery plants in 2003 was only 43 000 t, i.e., emission credits earned in the last 2 years equate to about 8 months of emissions from the grandfathered sulphur recovery plants.

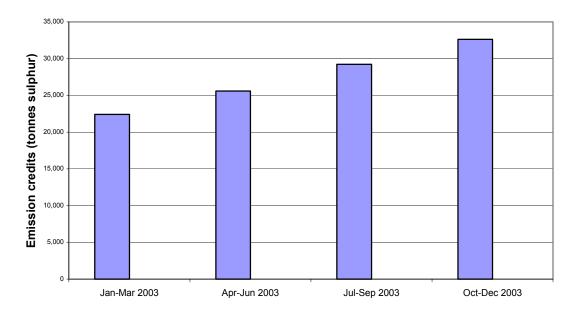


Figure 1. Net sulphur emission credits over time

Appendix 3 lists cumulative credits for each of the grandfathered sulphur recovery plants in 2003.

2.3 Sulphur Emissions and Inlets at Grandfathered Plants, 2000-2003

An analysis of the sulphur emissions and sulphur inlet for the specific plants that were listed in *ID 2001-3* as grandfathered follows in Sections 2.3.1 and 2.3.2. For the purpose of this analysis, plants that have degrandfathered since the ID was issued are included with the grandfathered plants.

2.3.1 Sulphur Emission Reduction

There have been substantial reductions in sulphur emissions from the grandfathered plants between 2000 and 2003, as shown in Figure 2.

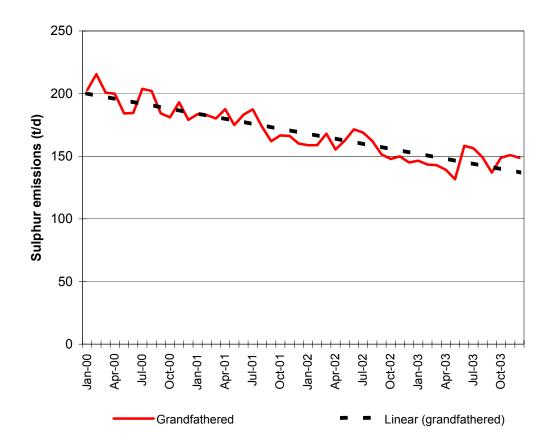


Figure 2. Sulphur emissions from grandfathered plants

The drop in emissions from grandfathered plants shown in Figure 2 is due to a decrease of about 30 per cent in emissions from the grandfathered acid gas flaring plants and a decrease of about 25 per cent from the grandfathered sulphur recovery plants between 2000 and 2003.

Of the 30 per cent decrease in emissions from grandfathered acid gas flaring plants from 2000 to 2003, about 20 per cent is due to declining sulphur inlet. The other 10 per cent is due in large part to the acid gas injection facility installed at ConocoPhillips Vulcan and the installation of sulphur recovery at PetroCanada Wilson Creek. Between 2000 and 2003, 23 of the 28 grandfathered acid gas flaring plants showed emission reductions.

Similarly, of the 25 per cent decrease in emissions from grandfathered sulphur recovery facilities from 2000 to 2003, about 20 per cent is due to declining sulphur inlet. The other 5 per cent decrease in emissions is due in large part to improved operations at BP Windfall, Husky Ram River, and Shell Jumping Pound and the installation of acid gas injection at KeySpan Brazeau. Between 2000 and 2003, 25 of the 28 grandfathered sulphur recovery plants reduced emissions, as shown in Appendix 4.

Appendix 4 lists sulphur production and emissions for each of the sulphur recovery plants for the years 2000 and 2003.

2.3.2 Decline in Sulphur Inlet

While improvements in operation have played a role in emission reductions at the grandfathered plants, as noted in the previous section, the reduction is also due to the declining sulphur inlets of these plants.

Figure 3 shows the decline in sulphur inlets for grandfathered gas plants.

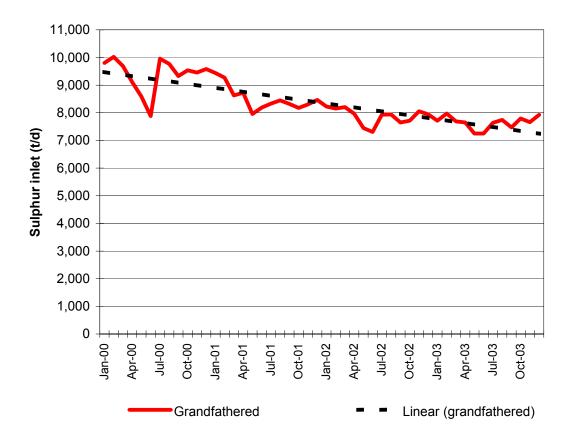


Figure 3. Sulphur inlet for grandfathered plants

3 Summary of Performance for Nongrandfathered Plants, 2000-2003

The sulphur emissions and sulphur inlet for the specific sour gas plants (having a sulphur inlet greater than 1 t/d) that met the requirements for new plants when *ID 2001-3* was issued were also examined.

The drop in sulphur emissions from these plants was about 20 per cent between 2000 and 2003. A smaller reduction in sulphur inlet, about 2 per cent, occurred over the same period. Details on these reductions on an individual plant basis for plants with sulphur recovery are given in Appendix 4.

'M'	endix 1.1. Grandfathered and Nongrand		a cour ous riuri	Contandial	oroa oui	pilai itooo	Tory Cao i lanto
				Guideline			
			Current Approved	Recovery for	Daily	Baseline	
			Sulphur Recovery	Approved	Approved	Capacity	Change in
		Plant	Efficiency	Sulphur Inlet	S Inlet	1999 S Inlet	Status
		Code	(%)	(%)	(t/d)	(t/d)	(from ID 2001-3)
		1100	00.4	00.40/	100.0	07.0	D
	Brazeau R KeySpan**	1108	98.4	98.4%	400.0	67.3	Degrandfathered in 2003 became AGI
	Brazeau R. (Nordegg) - KeySpan	1121	93.5	95.9%	49.8	38.2	
	Burnt Timber - Shell	1131	96.5	98.4%	560.0	412.4	
	Caroline (North) 1-11 - BP Canada	1374	69.7	69.7%	5.0	5.0	Plant shut down in 2003
	Caroline (South) 4-20 - BP Canada	1104	85.0	89.7%	9.8	6.8	Plant shut down in 2003
	Carstairs - Bonavista	1020	90.0	98.2%	72.2*	9.5	
	Crossfield (Balzac) - Nexen	1050	98.0	98.5%	1,730.1	414.6	
	Edson - Talisman	1084	98.4	98.4%	350.0	220.9	Degrandfathered in 2003; upgraded SR
	Gold Creek - CNRL	1129	97.0	98.3%	100.0	64.1	
)	Jumping Pound - Shell	1037	96.2	98.4%	619.0	472.1	
1	Kaybob S. 1 & 2 - BP Canada	1107	98.4	98.5%	1,107.7	540.6	
2	Kaybob S. 3 - Chevron	1144	98.1	99.5%	3,629.7	1,009.6	
3	Lone Pine Ck ExxonMobil	1139	98.0	98.3%	165.4	129.5	
1	Minnehik B. L Penn West	1047	95.6	95.9%	49.2	22.0	
5	Okotoks (Mazeppa) - Mazeppa Processing	1530	98.4	98.4%	586.6	263.4	Degrandfathered in 2002
3	Redwater - Imperial	1028	Fluctuating	95.9%	12.2*	3.1	
7	Rosevear (North) - Suncor	1206					Plant shut down in 2001
3	Rosevear (South) - Suncor	1268	95.6	98.3%	171.0	76.0	Plant consolidation 1206
9	Simonette - Suncor	1113	96.5	98.3%	120.0	92.3	
)	Strachan (Ram River) - Husky	1141	98.1	99.5%	4,660.5*	2,301.8	
1	Strachan - KeySpan	1133	98.1	98.4%	971.1	264.9	
2	Sturgeon Lk Chariot	1112	94.0	98.3%	104.2	40.6	
3	Teepee -Talisman	1296	92.0	95.9%	25.0	17.5	
1	Waterton - Shell	1056	98.7	99.5%	3,148.0	2,099.6	
5	Wildcat Hills - Petro-Canada	1054	97.5	98.3%	287.5	181.3	
3	Wimborne - Devon	1081	95.5	98.3%	235.0	182.1	
7	Windfall (West Whitecourt) - BP Canada	1034	98.3	98.5%	1,356.1	777.6	
8	Zama - Apache	1219	92.0	98.2%	80.3	38.6	Baseline revision 2001
	* Annual average sulphur inlet. ** KeySpan Brazeau River became an AGI fa						

			Guideline				
			Recovery for			Baseline	
			Approved	2003	Approved	Capacity	Changed
		Plant	Sulphur Inlet	S Emissions	S Inlet	1999 S Inlet	Status
		Code	(%)	(t/d)	(t/d)	(t/d)	(from ID 2001-3)
	Ansell (Galloway) - CNRL	1417	69.7	0.40	1.40	1.3	
	Bantry - AltaGas	1114	69.7	0.40	2.00	1.0	Degrandfathered in 2002; became SF
	Bantry - AltaGas Bellshill Lake - Viking Energy	1280	89.7	2.42	5.77	3.8	Degrandiamered in 2002, became Sh
	Big Bend - CNRL	1293	69.7	0.16	1.46	1.0	
	Bigoray - PennWest	1138	69.7	0.10	2.96	1.8	
	Bittern Lake - CNRL	1124	69.7	0.00	2.48	1.0	Plant shut down in 2000
	Boundary Lake S - PennWest	1202	69.7	1.09	2.20	1.1	i lant shut down in 2000
	Boundary Lake S - Talisman	1024	69.7	0.76	1.90	1.0	
	Carson Creek - ExxonMobil	1062	69.7	0.27	1.00	1.0	
)	Enchant - Taylor Management	1039	69.7	0.14	1.25	1.0	
, 	Forestburg - Signalta	1365	69.7	1.20	4.50	4.0	
2	Greencourt - CNRL	1127	89.7	1.04	5.08	1.3	
3	Harmattan-Elkton - Bonavista	1083	69.7	0.25	1.60	1.0	
	Judy Creek - Pengrowth	1069	69.7	2.20	3.60	2.7	
5	Kaybob - Paramount	1058	89.7	1.21	5.15	1.0	
3	Killam (Sedgewick) - AltaGas	1510	69.7	1.40	4.75	2.2	
7	Leduc - Woodbend - Imperial	1023	69.7	0.02	1.01	1.0	
3	Little Bow (Travers) - ConocoPhillips	1150	69.7	0.79	1.60	1.2	
)	Retlaw (Turin) - Taylor Management	1191	69.7	1.69	2.40	1.7	
)	Spirit River - Bonavista	1560	69.7	0.63	2.60	1.0	
	Strome - CNRL	1179	69.7	0.60	3.40	1.6	
2	Sylvan Lake - NAL Resources	1070	0	0.33	0.75	1.0	Degrandfathered in 2002
3	Virginia Hills (Hope Creek) - Apache	1135	89.7	6.02	9.80	5.2	
ļ	Vulcan - (Long Coulee) ConocoPhillips*	1100	69.7	0.03	4.90	2.7	Degrandfathered in 2002; became A0
5	West Drumheller - Acclaim	1109	69.7	0.32	2.99	1.1	
;	Whitecourt - Shining Bank	1115	89.7	3.16	7.50	3.5	
,	Wilson Creek - Imperial	1399	69.7	0.18	1.68	1.0	
3	Wilson Creek - Petro-Canada	1096	69.7	0.12	4.70	2.3	Degrandfathered in 2001; became SI

Appendix 1.3. Grandfath	nered and Nongrandfathered Sour	Gas Plants	 Nongrandfathered Sulph 	nur Recovery Plants
			Current Approved	
			Sulphur Recovery	Approved
		Plant	Efficiency	S Inlet
		Code	(%)	(t/d)
				· · ·
Basing (Hanlan Rob	ob) - Petro-Canada	1360	98.5	1,270.0
2 Bonnie Glen - Impe		1045	95.9	35.6
Brazeau R Petro-0	Canada	1482	98.4	455.0
Brazeau R. (West Po	embina) - Atco Midstream	1458	98.4	526.8
Campbell-Namao (C	Carbondale) - Atco Midstream	1638	69.7	1.15
Caroline - Shell	,	1662	99.5	5,450.0
Crossfield E Prim	ewest	1079	98.4	863.8
Garrington (Olds) -	Esprit	1021	98.4	404.9
Harmattan - Solex	•	1060	98.6	82.7
10 Hays - Anadarko		1585	90.0	9.9
11 Homeglen Rimbey -	- KevSpan	1004	98.3	150.0
12 Nevis - Duke Energy		1002	98.4	300.0
13 Progress - Anadark		1506	96.5	49.
14 Progress - Suncor	~	1629	69.7	2.5
5 Quirk Ck Imperial		1134	98.3	306.4
16 Rainbow - Husky**		1105	98.3	213.9
17 Rainbow - Gibson		1658	95.9	23.18
18 Saddle Hills (LaGlad	ce) - EnCana	1892	98.4	483.1
19 Savanna Ck. (Colen		1051	98.6	800.0
20 Sinclair (Hythe Brai		1147	98.3	132.2
21 Swalwell - Viking Er		1654	70.0	4.6
* Annual average s	ulphur inlet			
	ecame an AGI facility in Jan/02. Inje-	cted volumes	were 103 1 t/d for 2003	
Tracky rambow be	realite arriver identity in earliez. Inje	oted volunies	Were 100.1 tha 101 2000.	

	endix 1.4. Grandfathered and Nongrandfather		gra			
			Sulphur Recovery			2003
			Equivalent	Approved	2003	Sulphur
		Plant	Required	S Inlet	S Emissions	Injected
Non	grandfathered Acid Gas Injection Plants	Code	(%)	(t/d)	(t/d)	(t/d)
1	Acheson - EnerPro Midstream	1628	69.7	4.65	0.01	0.90
2	Bistcho Lk - Paramount	1975	95.9	25.00	0.01	14.1
3	Bigoray - EnerPro Midstream	1357	95.9	64.00	0.09	14.1
3 4	Boundary Lk S (Clear Hills) - CNRL	1880	95.9	15.35	0.02	7.4
† 5	Dizzy (Steen River) Penn West	1738	95.9	34.40	0.02	5.9
3 3	Dunvegan - Devon	1169	89.7	9.90	0.02	0.6
, 7	Eaglesham - (West Culp) Devon	1775	95.9	17.20	0.01	1.6
3	Galahad - Husky	1690	89.7	7.54	0.02	2.8
9	Golden Spike - Atco Midstream	1547	95.9	26.46	0.01	3.7
10	Gordondale - Duke	1668	98.2	54.30	0.07	21.2
11	Kelsey (Rosalind) - Thunder	1244	69.7	2.50	0.01	1.3
12	Leduc-Woodbend (Calmar) - Midcoast Canada	1676	95.9	15.54	0.01	2.5
13	Marlowe (Dizzy) - Bearspaw	1765	95.9	19.70	0.00	1.1
14	Mulligan (Fourth Creek) - Duke	1895	89.7	10.00	0.01	7.2
15	Normandville - Devon	1990	69.7	1.90	0.00	0.0
16	O'Chiese - Burlington	1970	95.9	14.53	0.00	0.4
17	Paddle River - KeySpan	1089	69.7	1.50	0.01	0.8
18	Pembina - EnerPro Midstream	1402	95.9	29.70*	0.05	4.6
19	Pembina - Imperial	1625	69.7	4.20	0.03	1.9
20	Pouce Coupe - Duke	1746	95.9	26.20	0.09	9.2
21	Provost (Hansman Lk) - Husky	1698	89.7	10.00	0.08	4.3
22	Provost (Thompson Lk) - Husky	1695	95.9	12.00	0.12	5.6
23	Puskwaskau - Devon	1964	89.7	5.15	0.04	0.3
<u>-0</u> 24	Rainbow - ExxonMobil	1155	95.9	20.10*	0.33	11.0
<u>- ·</u> 25	Rainbow - Husky	1105	98.3	213.49	0.29	103.0
26	Rycroft - Devon	1793	95.9	21.00	0.02	6.6
<u> </u>	Watelet (Glen Park) - Atco	1672	69.7	3.30	0.01	0.6
28	Wayne-Rosedale - EnCana	1888	89.7	5.90*	0.04	1.8
29	Wembley - ConocoPhillips	1520	98.3	124.00	0.09	49.2
30	Zama - Apache	1878&1978	98.3	247.00	0.05	34.4

P • · ·	idix 2. Plants That I	10.10 2 0 9.1			
				Approved	
				S Inlet	
				max daily	Modification
Sev	en plants modified	Plant Code	Plant Name	(t/d)	Process
1	Plant Mods	1108	Brazeau R KeySpan	400.00	(agi)
2	Plant Mods	1021	Garrington (Olds) - Esprit	404.90	(SuperClaus)
3	Plant Mods	1004	Homeglen Rimbey - KeySpan	150.00	(SuperClaus)
4	Plant Mods	1114	Bantry - AltaGas	2.00	(Xergy)
5	Plant Mods	1100	Vulcan (Long Coulee) - ConocoPhillips	4.90	(agi)
6	Plant Mods	1096	Wilson Creek - Petro-Canada	4.70	(Claus)
7	Plant Mods	1105	Rainbow - Husky	213.50	(agi)
8	Plant Mods	1084	Edson - Talisman	350.00	(Superclaus)
Thre	e plants relicensed to	higher S rec	covery efficiency or lower sulphur inlets		
9	Relicensed	1530	Okotoks (Mazeppa) - Mazeppa Processing	586.60	
10	Relicensed	1079	Crossfield E Primewest	863.80	
11	Relicensed	1070	Sylvan Lake - NAL Resources	0.75	
Othe	⊥ er - Sulphur recovery n	ot required,	given the low approved sulphur inlet		
	Plant Mods	1739	Bantry - EnCana	0.92	(Shell Paques/New Paradig

Apı	pendix 3.	Sulphur Credits Earned									
-1-1											
					Credits		<u></u>	ummulativ	o Crodite		
			Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	
Gra	ndfathered	d Sulphur Recovery Gas Plants	2003	2003	2003	2003	2003	2003	2003	2003	
	Plant Code										
	1108	Brazeau R KeySpan	-	-	-	-	-	-	-	-	Degrandfathered
	1121	Brazeau R. (Nordegg) - KeySpan	0.0	65.5	51.1	6.0	262.4	327.9	379.0	385.0	
	1131	Burnt Timber - Shell	59.2	58.9	209.5	53.0	593.1	652.0	861.5	914.5	
	1374	Caroline (North) 1-11 - BP Canada	-	-	-	-	-	-	-	-	Plant shut down
	1104	Caroline (South) 4-20 - BP Canada	-		-		-		-	-	Plant shut down
;	1020	Carstairs - Bonavista	14.6	11.9	14.5	12.8	101.5	113.4	127.9	140.7	
•	1050	Crossfield (Balzac) - Nexen	202.9	172.8	72.3	77.7	878.6	1,051.4	1,123.7	1,201.4	
	1084	Edson - Talisman	14.8	-	-	-	122.2	122.2	122.2	122.2	Degrandfathered
)	1129	Gold Creek - CNRL	-	-	-	-	-	-	-	-	
0	1037	Jumping Pound - Shell	242.1	25.0	173.6	282.0	1,119.6	1,144.6	1,318.2	1,600.2	
1	1107	Kaybob S. 1 & 2 - BP Canada	210.1	77.0	148.9	117.4	1,316.8	1,393.8	1,542.7	1,660.1	
2	1144	Kaybob S. 3 - Chevron	336.9	0.0	263.8	-181.9	1,056.1	1,056.1	1,319.9	1,138.0	
3	1139	Lone Pine Ck ExxonMobil	26.6	9.9	6.2	11.1	67.8	77.7	83.9	95.1	
4	1047	Minnehik B. L Penn West	13.4	9.7	3.3	3.0	22.8	32.6	35.9	38.9	
5	1530	Okotoks - Mazeppa Processing	-	-	-	-	-	-	-	-	Degrandfathered
6	1028	Redwater - Imperial	-	-	-	-	-	-	-	-	Variable inlet rat
7	1206	Rosevear (North) - Suncor*	-	-	-	-	-	-	-	-	Plant shut down
8	1268	Rosevear (South) - Suncor*	114.2	111.1	122.4	99.7	601.0	712.1	834.5	934.2	
9	1113	Simonette - Suncor	96.0	83.4	79.3	55.1	259.2	342.6	421.9	477.0	
0	1141	Strachan (Ram River) - Husky	1,698.8	1,468.2	1,605.6	1,860.7	8,150.1	9,618.3	11,223.9	13,084.6	
1	1133	Strachan - KeySpan	64.2	68.7	45.0	102.1	485.8	554.6	599.5	701.6	
2	1112	Sturgeon Lk Chariot	61.4	69.1	53.2	73.5	229.9	299.0	352.2	425.7	
3	1296	Teepee - Talisman	44.2	51.1	45.9	49.1	157.4	208.4	254.3	303.4	
4	1056	Waterton - Shell	281.8	414.8	300.2	295.5	3,013.4	3,428.2	3,728.4	4,023.9	
5	1054	Wildcat Hills - Petro-Canada	112.4	96.2	97.8	97.7	699.5	795.7	893.5	991.2	
6	1081	Wimborne - Devon	81.5	10.1	85.8	100.5	765.4	775.5	861.3	961.7	
7	1034	Windfall (West Whitecourt) - BP Canada	245.1	264.1	190.5	254.4	1,983.1	2,247.2	2,437.7	2,692.1	
8	1219	Zama - Apache	109.5	114.9	66.8	43.5	517.0	631.9	698.7	742.2	
		Totals	4,029.49	3,182.30	3,635.68	3,412.86	22,402.8	25,585.1	29,220.8	32,633.6	

	Plant		Change in Production and Emissions	Year 2003 minus Year 2000
	Code	Field-Operator	2003-2000	2003-200
Gran		d Plants	S Production (t/y)	S Emission (t S/
1	1034	Windfall (West Whitecourt) - BP Canada	(132,424.0)	(2,857
2	1141	Strachan (Ram River) - Husky	(132,927.1)	(2,081
3	1108 1037	Brazeau R KeySpan Jumping Pound - Shell	(35,158.5) (47,116.7)	(1,901 (1,882
5	1144	Kaybob S. 3 - Chevron	(50,745.7)	(95)
6	1107	Kaybob S. 1 & 2 - BP Canada	(101,956.4)	(86
7	1084	Edson - Talisman	(30,446.4)	(51)
8	1206	Rosevear (North) - Suncor	(12,290.7)	(49
9	1113 1133	Simonette - Suncor	(13,660.6)	(48
11	1081	Strachan - KeySpan Wimborne - Devon	(38,319.0) (15,009.4)	(31
12	1112	Sturgeon Lk Chariot	(5,845.4)	(20
13	1104	Caroline (South) 4-20 - BP Canada	(712.6)	(12)
14	1047	Minnehik B. L Penn West	(2,748.3)	(11
15	1020	Carstairs - Bonavista	(867.1)	(10
16 17	1050 1056	Crossfield (Balzac) - Nexen Waterton - Shell	(1,829.2)	(10
18	1131	Burnt Timber - Shell	(107,275.6) (7,923.5)	<u>(6</u>
19	1374	Caroline (North) 1-11 - BP Canada	(736.3)	(4
20	1129	Gold Creek - CNRL	(5,308.4)	(4
21	1121	Brazeau R. (Nordegg) - KeySpan	(908.1)	(3
22	1219	Zama - Apache	(3,698.3)	(2
23 24	1296 1530	Teepee - Talisman Okotoks (Mazeppa) - Mazeppa Processing	1,661.0 (9,452.6)	(2
25	1028	Redwater - Imperial	(9,452.0)	(
26	1054	Wildcat Hills - Petro-Canada	2,636.1	11
27	1268	Rosevear (South) - Suncor	4,680.7	14
28	1139	Lone Pine Ck ExxonMobil	2,588.4	15
	Totals		(745,955.4)	(13,21
Grar	ndfathere	d Plants That Were Previously Acid Gas Flaring	and Are Now Sulphur Recovery	
Oran	latatilete	Triants that were reviously Acid Gas Flaring	and Are Now Sulphur Recovery	
1	1114	Bantry - Altagas	170.3	(9-
2	1096	Wilson Creek - Petro-Canada	590.4	(99
Nong	grandfatl	nered Plants (Plants Meeting the Requirements for	or New Plants)	
1	1079	Crossfield E Primewest	(45,589.8)	(1,38
2	1105	Rainbow - Husky	(22,351.5)	(1,01
3	1004	Homeglen Rimbey - KeySpan	(6,346.0)	(79
4	1021	Garrington (Olds) - Esprit	10,465.0	(75
5	1360	Basing (Hanlan Robb) - Petro-Canada	(40,923.8)	(66
6 7	1662 1002	Caroline - Shell Nevis - Duke Energy	(91,466.0) 803.2	(28
8	1060	Harmattan - Solex	(5,002.2)	(8
9	1506	Progress - Anadarko	1,467.9	(2
10	1585	Hays - Anadarko	60.7	(2
11	1638	Campbell-Namao (Carbondale) - Atco Midstream	(109.6)	(
12	1629	Progress - Suncor	333.0	
13	1658	Rainbow - Gibson	1,486.9	
14	1045	Bonnie Glen - Imperial	1,460.8	2
15 16	1654 1458	Swalwell - Viking Brazeau R. (West Pembina) - Atco Midstream	(109.6) 18,772.1	
17	1147	Sinclair (Hythe Brainard) - EnCana	9,566.8	
18	1051	Savanna Ck. (Coleman) - Northstar	8,408.8	20
19	1134	Quirk Ck Imperial	10,146.9	23
20	1892	Saddle Hills - EnCana	11,541.2	41
21	1482	Brazeau R Petro-Canada	39,025.2	51
+				
	Totals		(98,359.8)	(3,539
		Totals	(844,315.2)	(3,539

Plant	Appendix	4.2. Gas Plants with Sulphur Recovery	, Year 2000				
Plant					Actual		
Code Field-Operator (by) (t.8y) (t/s) (t/s			Total	Total Annual	Sulphur		Total Annual
	Plant		Inlet	Emissions	Recovery Effic.	Recovery Effic.	Production
1034 Windfall (West Whitecourt) - BP Canada 286.311.3 4.616.6 98.45 98.3 29	Code	Field-Operator	(t/v)	(t S/v)	(%)	(%)	(t/v)
1141 Strachan (Ram River) - Husky			(=3/	(= =:)	(70)	(74)	(-7)
1141 Strachan (Ram River) - Husky							
100 Brazeau R KaySpan 36,697.0 2,152.6 94.2% 92.1 33 300	1034	Windfall (West Whitecourt) - BP Canada	286,311.3	4,616.6	98.4%	98.3	292,237.0
1037 Jumping Pound's Shell 161,7441 5,5007 96,6% 96,2 15 1144 Kaybobs 3.3 - Chevron 380,5858 6,646.1 98,276 98,276 98,1 38 1170 Kaybobs 3.4 2 BP Canada 234,3418 2,759.9 98,9% 98,4 25 1096 Edon - Talisman 73,009.3 1,421.2 98,1% 97.9 77 77 77 77 79 77 77		, ,					781,009.3
1141			,				35,158.5
1107 Kaybob S. 1 & 2 - BP Canada 234,341.8 2,756.9 98.9% 98.4 25 1084 Edon - Talisman 73,009.3 1,421.2 98.1% 97.9 7 7 7 7 7 7 7 7 7	1037						158,522.1
1094 Edson-Tallsman							369,708.4
1206 Rosevaer (North) - Suncor 10.771.6 499.6 96.1% 94.6 1 1113 Simontes - Suncor 32.358.2 793.8 97.5% 96.5 3 3 3 3 3 3 3 3 3							250,134.3 73,337.4
1113 Simonette - Suncor							12,290.7
1133 Strachan - KeySpan 97,799.5 1,199.6 98.8% 98.1 9		, ,					31,239.2
1 1081 Wimborne - Devon							97,129.6
3 1104	1 1081	Wimborne - Devon	57,618.0	1,833.9	96.7%	95.5	54,008.0
1	2 1112	Sturgeon Lk Chariot	18,698.9	729.2	96.2%	94.0	18,456.1
5 1020 Carstairs - Bonavista 3,815.5 324.6 91.2% 90.0 6 1050 Crossfield (Balze) - Nxern 144.323.2 2,408.8 98.3% 99.0 14 7 1056 Waterton - Shell 671.377.4 6,233.1 99.1% 96.5 15 9 1374 Caroline (North) 1-11 - PD Canada 1,039.2 88.8 91.2% 89.7 9 1374 Caroline (North) 1-11 - PD Canada 1,039.2 88.8 91.2% 89.7 10 1129 Gold Creek - CMRL 20.071.4 51.49 97.9% 97.0 2 21 11 121 Brazeau R. (Nordegg) - KeySpan 12.991.3 727.9 94.6% 93.5 1 31 206 Teepee - Talisman 5,424.7 372.2 93.2% 92.0 45 1028 Redwater - Imperial 1,184.9 88.3 92.7% 98.3 9 47 128 Rosevear (South) - Suncor 16.104.4 457.5 97.9% 95.6 1 48 1392 Crossfield E. Petro-Canada 71.413.7 12.20.0 <		Caroline (South) 4-20 - BP Canada	2,483.7	349.5	86.2%	85.0	2,186.0
1			·				6,748.4
7							3,370.0
8		, ,		,			141,245.3
9 374 Caroline (North) 1-11 - BP Canada 1,039 2 88.8 91.2% 89.7							679,224.2
1199 Gold Creek - CNRL 20,071.4 51.49 97.6% 97.0 2 21.29 28 27.9 94.6% 93.5 1 1121 Brazeau R. (Nordseg). * keySpan 12,991.3 727.9 94.6% 93.5 1 21.219 28 28 28 28 29 20 1 3 226 7 29 28 28 29 20 1 3 226 7 29 28 28 29 20 1 3 226 7 29 28 28 29 20 1 3 226 7 29 28 28 29 20 1 3 226 7 29 28 28 29 20 1 28 28 29 20 20 20 20 20 20 20							152,115.5 903.7
1 121 Brazeau R, (Nordegg) - KeySpan 12,991.3 727.9 94.6% 93.5 1 1 121 Brazeau R, (Nordegg) - KeySpan 12,91.5 15,117.5 583.9 96.1% 92.0 1 1 12,00 1 1 12,00 1 1 1 1 1 1 1 1 1			·				20,883.0
2 1219 Zama - Apache 15.117.5 583.9 96.1% 92.0 1 1 1 1 1 1 1 1 1							12,842.1
3 1296 Teopoe - Talisman 5,424.7 372.2 93.2% 92.0							14,405.1
150							5,070.9
1.184 88.3 92.7% Fluctuating 6 1054 Willocat Hills - Petro-Canada 71.413.7 1.220 98.2% 97.5 6 6 71.288 Rosevear (South) - Suncor 16.104.4 457.5 97.6% 95.6 1 1.39 Lone Pine Ck ExxonMobil 36.380.2 599.7 98.4% 98.0 3 3.433							95,760.9
6 1054 Wildcat Hills - Petro-Canada 71,4137 1,220 98.2% 97.5 6 7 1268 Rosevear (South) - Suncor 16,104.4 457.5 97.6% 95.6 1 139 Lone Pine Ck ExxonMobil 38,390.2 599.7 98.4% 98.0 3 3 7 7 138							1,118.
1199 Lone Pine Ck ExxonMobil 33,390.2 599.7 98.4% 98.0 3,431							66,931.
Totals 3,423,774.2 56,349.2 98.4% 3,431	7 1268	Rosevear (South) - Suncor	16,104.4	457.5	97.6%	95.6	18,426.7
Strandfathered Plants That Were Previously Acid Gas Flaring and Are Now Sulphur Recovery	8 1139	Lone Pine Ck ExxonMobil	38,390.2	599.7	98.4%	98.0	37,232.3
1114 Bantry - Altagas 310.6 310.7 0.0% -	Totals		3,423,774.2	56,349.2	98.4%		3,431,693.7
1114 Bantry - Altagas 310.6 310.7 0.0% -	Suon dfoth o	and Dianta That Ware Braviously Asid Cas Fla	winer and Are No.	Culmbum Daa			
1096 Wilson Creek - Petro-Canada 908.0 1,036.4 0.0%	<u>sranoratne</u>	red Plants That Were Previously Acid Gas Fla	iring and Are No	w Sulphur Rec	overy		
1096 Wilson Creek - Petro-Canada 908.0 1,036.4 0.0%	1114	Pantny Altagas	310.6	210.7	0.0%		_
Nongrandfathered Plants (Plants Meeting the Requirements for New Plants)						-	
1079 Crossfield E Primewest 170,668.1 3,028.6 98.2% 98.0 16	1000	Which crock I die danaa	000.0	1,000.1	0.070		
1079 Crossfield E Primewest 170,668.1 3,028.6 98.2% 98.0 16							
1105 Rainbow - Husky 25,910.0 1,123.5 95.2% 95.0 2 1004 Homeglen Rimbey - KeySpan 19,957.4 1,003.0 94.8% 92.0 1 1021 Garrington (Olds) - Esprit 103,220.0 2,152.2 97.9% 97.1 10 1360 Basing (Hanlan Robb) - Petro-Canada 299,824.2 3,434.8 98.8% 98.5 28 1662 Caroline - Shell 1,833,270.9 2,458.5 99.9% 99.8 1,84 1002 Nevis - Duke Energy 37,590.7 467.5 98.8% 98.4 3 1060 Harmattan - Solex 11,515.1 164.6 98.6% 98.6 6 1 1506 Progress - Anadarko 9,215.7 237.8 97.4% 96.5 1585 Hays - Anadarko 2,390.2 129.0 94.5% 90.0 1 1638 Campbell-Namao (Carbondale) - Atco Midstream 364.6 0.2 100.0% 69.7 2 1629 Progress - Suncor 389.1 - 100.0% 69.7 2 1629 Progress - Gibson 1,882.0 127.9 92.6% 70.0 4 1045 Bonnie Glen - Imperial 3,281.6 125.8 96.1% 95.9 5 1554 Swalwell - Viking Keywest 517.6 138.9 79.3% 70.0 6 1458 Brazeau R. (West Pembina) - Atco Midstream 107,983.1 1,624.1 98.6% 98.4 11 1147 Sinclair (Hythe Brainard) - EnCana 28,431.8 296.2 99.0% 98.3 2 1134 Quirk Ck Imperial 86,771.0 1,369.9 99.0% 98.6 13 134 Quirk Ck Imperial 86,771.0 1,002.1 98.9% 98.4 12 1482 Brazeau R Petro-Canada 97,601.0 917.1 99.1% 98.4 99 Totals Totals Totals 3,103,888.0 21,094.0 99.3% 3,102	longrandfa	thered Plants (Plants Meeting the Requireme	nts for New Plan	ts)			
1105 Rainbow - Husky 25,910.0 1,123.5 95.2% 95.0 2 1004 Homeglen Rimbey - KeySpan 19,957.4 1,003.0 94.8% 92.0 1 1021 Garrington (Olds) - Esprit 103,220.0 2,152.2 97.9% 97.1 10 1360 Basing (Hanlan Robb) - Petro-Canada 299,824.2 3,434.8 98.8% 98.5 28 1662 Caroline - Shell 1,833,270.9 2,458.5 99.9% 99.8 1,84 1002 Nevis - Duke Energy 37,590.7 467.5 98.8% 98.4 3 1060 Harmattan - Solex 11,515.1 164.6 98.6% 98.6 6 1 1506 Progress - Anadarko 9,215.7 237.8 97.4% 96.5 1585 Hays - Anadarko 2,390.2 129.0 94.5% 90.0 1 1638 Campbell-Namao (Carbondale) - Atco Midstream 364.6 0.2 100.0% 69.7 2 1629 Progress - Suncor 389.1 - 100.0% 69.7 2 1629 Progress - Gibson 1,882.0 127.9 92.6% 70.0 4 1045 Bonnie Glen - Imperial 3,281.6 125.8 96.1% 95.9 5 1554 Swalwell - Viking Keywest 517.6 138.9 79.3% 70.0 6 1458 Brazeau R. (West Pembina) - Atco Midstream 107,983.1 1,624.1 98.6% 98.4 11 1147 Sinclair (Hythe Brainard) - EnCana 28,431.8 296.2 99.0% 98.3 2 1134 Quirk Ck Imperial 86,771.0 1,369.9 99.0% 98.6 13 134 Quirk Ck Imperial 86,771.0 1,002.1 98.9% 98.4 12 1482 Brazeau R Petro-Canada 97,601.0 917.1 99.1% 98.4 99 Totals Totals Totals 3,103,888.0 21,094.0 99.3% 3,102							
1004 Homeglen Rimbey - KeySpan 19,957.4 1,003.0 94.8% 92.0 1 1021 Garrington (Olds) - Esprit 103.220.0 2,152.2 97.9% 97.1 10 103.200.0 2,152.2 97.9% 97.1 10 103.200.0 2,152.2 97.9% 97.1 10 103.200.0 2,152.2 97.9% 97.1 10 103.200.0 2,152.2 97.9% 97.1 10 10 103.200.0 2,152.2 97.9% 97.1 10 10 103.200.0 2,152.2 97.9% 97.1 10 10 10 10 10 10 10			,				169,921.2
1021 Garrington (Olds) - Esprit 103,220.0 2,152.2 97.9% 97.1 10 1360 Basing (Hanlan Robb) - Petro-Canada 299,824.2 3,434.8 98.8% 98.5 28 1662 Caroline - Shell 1,833,270.9 2,458.5 99.9% 99.8 1,84 1002 Nevis - Duke Energy 37,590.7 467.5 98.8% 98.4 3 3 1060 Harmattan - Solex 11,515.1 164.6 96.6% 96.6 1 1506 Progress - Anadarko 9,215.7 237.8 97.4% 96.5 1506 Progress - Anadarko 2,390.2 129.0 94.5% 90.0 1 1638 Campbell-Namao (Carbondale) - Atco Midstream 364.6 0.2 100.0% 69.7 1 160.9 Progress - Suncor 389.1 - 100.0% 69.7 1 1658 Rainbow - Gibson 1,882.0 127.9 92.6% 70.0 1 1654 Swalwell - Viking Keywest 517.6 138.9 79.3% 70.0 1 1458 Brazeau R. (West Pembina) - Atco Midstream 107,983.1 1,624.1 98.6% 98.4 11 147 Sinclair (Hythe Brainard) - EnCana 28,431.8 296.2 99.0% 98.3 2 134 Quirk Ck Imperial 86,771.0 1,369.9 99.0% 98.6 13 1482 Brazeau R Petro-Canada 97,601.0 917.1 99.1% 98.4 98.7 Totals 3,103,888.0 21,094.0 99.3% 3,102			,				22,351.5
1360 Basing (Hanlan Robb) - Petro-Canada 299,824.2 3,434.8 98.8% 98.5 28 1662 Caroline - Shell 1,833,270.9 2,458.5 99.9% 99.8 1,84 1002 Nevis - Duke Energy 37,590.7 467.5 98.8% 98.4 3 3,434.8 3,434.8 98.8% 98.4 3 3,434.8 1002 Nevis - Duke Energy 37,590.7 467.5 98.8% 98.4 3 3,434.8 3,434.8 98.8% 98.4 3 3,434.8 98.8% 98.5 28 3,434.8 98.8% 98.6 1,844 3,455.5 99.9% 99.8 1,844 3,455.5 1002 100		, , , ,					18,208.7
1662 Caroline - Shell		U , , ,					101,783.0
1002 Nevis - Duke Energy 37,590.7 467.5 98.8% 98.4 3 1060 Harmattan - Solex 11,515.1 164.6 98.6% 98.6 1 1506 Progress - Anadarko 9,215.7 237.8 97.4% 96.5		,					288,911.9
1060 Harmattan - Solex 11,515.1 164.6 98.6% 98.6 1 1506 Progress - Anadarko 9,215.7 237.8 97.4% 96.5 1585 Hays - Anadarko 2,390.2 129.0 94.5% 90.0 1 1638 Campbell-Namao (Carbondale) - Atco Midstream 364.6 0.2 100.0% 69.7 100.0% 1							1,844,827.3 37,091.8
1506 Progress - Anadarko 9,215.7 237.8 97.4% 96.5 1585 Hays - Anadarko 2,390.2 129.0 94.5% 90.0 1 1638 Campbell-Namao (Carbondale) - Atco Midstream 364.6 0.2 100.0% 69.7 2 1629 Progress - Suncor 389.1 - 100.0% 69.7 3 1658 Rainbow - Gibson 1,882.0 127.9 92.6% 70.0 4 1045 Bonnie Glen - Imperial 3,281.6 125.8 96.1% 95.9 5 1654 Swalwell - Viking Keywest 517.6 138.9 79.3% 70.0 6 1458 Brazeau R. (West Pembina) - Atco Midstream 107.983.1 1,624.1 98.6% 98.4 11 7 1147 Sinclair (Hythe Brainard) - EnCana 28,431.8 296.2 99.0% 98.3 2 8 1051 Savanna Ck. (Coleman) - Northstar 137,197.0 1,369.9 99.0% 98.6 13 9 1134 Quirk Ck Imperial 86,771.0 1,002.1 98.9% 98.3 9 1 1482 Brazeau R Petro-Canada 97,601.0 917.1 99.1% 98.4 9 Totals 3,103,888.0 21,094.0 99.3% 3,102							11,875.6
1585 Hays - Anadarko 2,390.2 129.0 94.5% 90.0 1 1638 Campbell-Namao (Carbondale) - Atco Midstream 364.6 0.2 100.0% 69.7 2 1629 Progress - Suncor 389.1 - 100.0% 69.7 3 1658 Rainbow - Gibson 1,882.0 127.9 92.6% 70.0 4 1045 Bonnie Glen - Imperial 3,281.6 125.8 96.1% 95.9 5 1654 Swalwell - Viking Keywest 517.6 138.9 79.3% 70.0 6 1458 Brazeau R. (West Pembina) - Atco Midstream 107,983.1 1,624.1 98.6% 98.4 11 7 1147 Sinclair (Hythe Brainard) - EnCana 28,431.8 296.2 99.0% 98.3 2 8 1051 Savanna Ck. (Coleman) - Northstar 137,197.0 1,369.9 99.0% 98.6 13 9 1134 Quirk Ck Imperial 86,771.0 1,002.1 98.9% 98.3 9 1 1482 Brazeau R Petro-Canada 97,601.0 917.1 99.1% 98.4 9 Totals 3,103,888.0 21,094.0 99.3% 3,102							9,060.8
1 1638 Campbell-Namao (Carbondale) - Atco Midstream 364.6 0.2 100.0% 69.7 2 1629 Progress - Suncor 389.1 - 100.0% 69.7 3 1658 Rainbow - Gibson 1,882.0 127.9 92.6% 70.0 4 1045 Bonnie Glen - Imperial 3,281.6 125.8 96.1% 95.9 5 1654 Swalwell - Viking Keywest 517.6 138.9 79.3% 70.0 6 1458 Brazeau R. (West Pembina) - Atco Midstream 107,983.1 1,624.1 98.6% 98.4 11 7 1147 Sinclair (Hythe Brainard) - EnCana 28,431.8 296.2 99.0% 98.3 2 8 1051 Savanna Ck. (Coleman) - Northstar 137,197.0 1,369.9 99.0% 98.6 13 9 1134 Quirk Ck Imperial 86,771.0 1,002.1 98.9% 98.3 9 1 1482 Brazeau R Petro-Canada 97,601.0 917.1 99.1% 98.4 9 Totals Totals 3,103,888.0 21,094.0 99.3% 3,102		•					2,217.
2 1629 Progress - Suncor 389.1 - 100.0% 69.7 3 1658 Rainbow - Gibson 1,882.0 127.9 92.6% 70.0 4 1045 Bonnie Glen - Imperial 3,281.6 125.8 96.1% 95.9 5 1654 Swalwell - Viking Keywest 517.6 138.9 79.3% 70.0 6 1458 Brazeau R. (West Pembina) - Atco Midstream 107,983.1 1,624.1 98.6% 98.4 11 7 1147 Sinclair (Hythe Brainard) - EnCana 28,431.8 296.2 99.0% 98.3 2 8 1051 Savanna Ck. (Coleman) - Northstar 137,197.0 1,369.9 99.0% 98.6 13 9 1134 Quirk Ck Imperial 86,771.0 1,002.1 98.9% 98.3 9 0 1892 Saddle Hills - EnCana 125,906.9 1,292.3 99.0% 98.4 12 1 1482 Brazeau R Petro-Canada 97,601.0 917.1 99.1% 98.4 9 Totals 3,103,888.0 21,094.0 99							403.7
3 1658		. , ,					336.7
4 1045							1,597.4
5 1654 Swalwell - Viking Keywest 517.6 138.9 79.3% 70.0 6 1458 Brazeau R. (West Pembina) - Atco Midstream 107,983.1 1,624.1 98.6% 98.4 11 7 1147 Sinclair (Hythe Brainard) - EnCana 28,431.8 296.2 99.0% 98.3 2 8 1051 Savanna Ck. (Coleman) - Northstar 137,197.0 1,369.9 99.0% 98.6 13 9 1134 Quirk Ck Imperial 86,771.0 1,002.1 98.9% 98.3 9 0 1892 Saddle Hills - EnCana 125,906.9 1,292.3 99.0% 98.4 12 1 1482 Brazeau R Petro-Canada 97,601.0 917.1 99.1% 98.4 9 Totals 3,103,888.0 21,094.0 99.3% 3,102			·				3,062.0
6 1458 Brazeau R. (West Pembina) - Atco Midstream 107,983.1 1,624.1 98.6% 98.4 11 7 1147 Sinclair (Hythe Brainard) - EnCana 28,431.8 296.2 99.0% 98.3 2 8 1051 Savanna Ck. (Coleman) - Northstar 137,197.0 1,369.9 99.0% 98.6 13 9 1134 Quirk Ck Imperial 86,771.0 1,002.1 98.9% 98.3 9 10 1892 Saddle Hills - EnCana 125,906.9 1,292.3 99.0% 98.4 12 1 1482 Brazeau R Petro-Canada 97,601.0 917.1 99.1% 98.4 9 Totals 3,103,888.0 21,094.0 99.3% 3,102							533.4
7 1147 Sinclair (Hythe Brainard) - EnCana 28,431.8 296.2 99.0% 98.3 2 8 1051 Savanna Ck. (Coleman) - Northstar 137,197.0 1,369.9 99.0% 98.6 13 9 1134 Quirk Ck Imperial 86,771.0 1,002.1 98.9% 98.3 9 0 1892 Saddle Hills - EnCana 125,906.9 1,292.3 99.0% 98.4 12 1 1482 Brazeau R Petro-Canada 97,601.0 917.1 99.1% 98.4 9 Totals 3,103,888.0 21,094.0 99.3% 3,102							112,615.2
8 1051 Savanna Ck. (Coleman) - Northstar 137,197.0 1,369.9 99.0% 98.6 13 9 1134 Quirk Ck Imperial 86,771.0 1,002.1 98.9% 98.3 9 0 1892 Saddle Hills - EnCana 125,906.9 1,292.3 99.0% 98.4 12 1 1482 Brazeau R Petro-Canada 97,601.0 917.1 99.1% 98.4 9 Totals 3,103,888.0 21,094.0 99.3% 3,102		,					28,291.8
9 1134 Quirk Ck Imperial 86,771.0 1,002.1 98.9% 98.3 9 0 1892 Saddle Hills - EnCana 125,906.9 1,292.3 99.0% 98.4 12 1 1482 Brazeau R Petro-Canada 97,601.0 917.1 99.1% 98.4 9 Totals 3,103,888.0 21,094.0 99.3% 3,102							136,352.7
0 1892 Saddle Hills - EnCana 125,906.9 1,292.3 99.0% 98.4 12 1 1482 Brazeau R Petro-Canada 97,601.0 917.1 99.1% 98.4 9 Totals 3,103,888.0 21,094.0 99.3% 3,102		, ,					90,372.6
Totals 3,103,888.0 21,094.0 99.3% 3,102			125,906.9	1,292.3			126,382.7
	1 1482	Brazeau R Petro-Canada	97,601.0	917.1	99.1%	98.4	96,505.4
	Totals		3,103,888.0	21,094.0	99.3%		3,102,702.9
	+						
Grand Totals 6,527,662.2 77,443.2 98.8% 6,534,		Grand Totals	6,527,662.2	77,443.2	98.8%		6,534,396.6

		Total	Total Annual	Annual Sulphur	Current Required Sulphur	Total Actual
Pla	nnt	Inlet	Emissions	Recovery	Recovery Effic.	Production
Co	de Field-Operator	(t/y)	(t S/y)	(%)	(%)	(t/y)
andfa	thered Plants			•		
103		159,304.1	1,759.3	98.9%	98.3	159,813
114 110	, , ,	654,943.3 49,297.5	5,796.3 251.3	99.1% 99.5%	98.1 92.1	648,082 Injected (49055.2
103	, ,	112,414.3	3,626.9	96.8%	96.2	111,405
114	, <u>,</u>	338,814.6	5,687.8	98.2%	98.1	318,962
110	-	150,523.7	1,888.3	98.7%	98.4	148,177
108	Edson - Talisman	42,494.4	903.0	97.9%	97.9	42,891
120	, ,	-	-	0.0%	0.0	-
111		17,871.6	312.2	98.3%	96.5	17,578
0 113		60,316.4	858.4	98.6%	98.1	58,810
1 108 2 111		39,820.7 12,951.3	1,541.4 527.4	96.2% 96.0%	95.5 94.0	38,998 12,610
3 110	-	1,945.0	227.1	86.6%	94.0 85.0	1,473
4 104	` '	4,186.8	153.0	96.3%	95.6	4,000
5 102		2,733.1	218.6	92.0%	90.0	2,502
6 105	` ,	143,395.4	2,306.5	98.4%	98.0	139,416
7 105		577,000.0	6,164.2	98.9%	98.7	571,948
8 113		144,635.7	4,775.7	96.8%	96.5	144,192
9 137	, ,	277.6	39.5	80.9%	69.7	166
0 112 1 112		15,973.7 12,582.3	468.8 697.8	97.1% 94.5%	97.0 93.5	15,574 11,934
2 121		11,398.1	554.6	94.5% 95.1%	93.5	10,700
3 129	•	7,107.6	350.2	95.1%	92.0	6,73
4 153	•	81,605.3	1,251.4	98.6%	98.4	86,308
5 102		1,008.5	83.4	92.0%	80.0	956
6 105	Wildcat Hills - Petro-Canada	71,396.2	1,331.9	98.1%	97.5	69,567
7 126		23,881.8	600.8	97.5%	95.6	23,107
8 113		40,627.1	757.7	98.1%	98.0	39,820
Tot	tals	2,778,506.2	43,133.5	98.4%		2,685,738
3randfa	athered Plants That Were Previously Acid Gas Flar	ing and Are Now S	Sulphur Recover	у		
111	4 Bantry - Altagas	435.4	216.6	44.0%	70.0	170
109	6 Wilson Creek - Petro-Canada	576.5	45.2	92.9%	85.0	590
longra	ndfathered Plants (Plants Meeting the Requiremen	ts for New Plants)				
		,				
107	9 Crossfield E Primewest	126,853.1	1,643.2	98.7%	98.4	
107 110	9 Crossfield E Primewest Rainbow - Husky	126,853.1 37,611.6	1,643.2 104.2	99.7%	98.3	Injected (3761)
107 110 100	9 Crossfield E Primewest 15 Rainbow - Husky 14 Homeglen Rimbey - KeySpan	126,853.1 37,611.6 9,949.6	1,643.2 104.2 203.4	99.7% 98.3%	98.3 98.3	Injected (37619 11,862
107 110 100 102	9 Crossfield E Primewest 15 Rainbow - Husky 14 Homeglen Rimbey - KeySpan 15 Garrington (Olds) - Esprit	126,853.1 37,611.6 9,949.6 113,568.0	1,643.2 104.2 203.4 1,396.0	99.7% 98.3% 98.8%	98.3 98.3 98.4	Injected (3761) 11,862 112,248
107 110 100 102 136	9 Crossfield E Primewest 15 Rainbow - Husky 14 Homeglen Rimbey - KeySpan 15 Garrington (Olds) - Esprit 16 Basing (Hanlan Robb) - Petro-Canada	126,853.1 37,611.6 9,949.6	1,643.2 104.2 203.4	99.7% 98.3%	98.3 98.3	Injected (3761) 11,862 112,244 247,988
107 110 100 102 136	Crossfield E Primewest Rainbow - Husky Homeglen Rimbey - KeySpan Garrington (Olds) - Esprit Basing (Hanlan Robb) - Petro-Canada Caroline - Shell	126,853.1 37,611.6 9,949.6 113,568.0 250,472.1	1,643.2 104.2 203.4 1,396.0 2,771.1	99.7% 98.3% 98.8% 98.9%	98.3 98.3 98.4 98.5	Injected (3761) 11,862 112,244 247,988 1,753,36
107 110 100 102 136 166 100	79 Crossfield E Primewest 15 Rainbow - Husky 14 Homeglen Rimbey - KeySpan 15 Garrington (Olds) - Esprit 16 Basing (Hanlan Robb) - Petro-Canada 17 Caroline - Shell 18 Nevis - Duke Energy 18 Harmattan - Solex	126,853.1 37,611.6 9,949.6 113,568.0 250,472.1 1,742,825.2 38,006.9 6,942.2	1,643.2 104.2 203.4 1,396.0 2,771.1 2,169.6 376.1 79.1	99.7% 98.3% 98.8% 98.9% 99.9% 99.0% 98.9%	98.3 98.3 98.4 98.5 99.5 98.4 98.6	Injected (3761 11,86; 112,24; 247,98; 1,753,36 37,89; 6,87;
107 110 100 102 136 166 100 106	79 Crossfield E Primewest 15 Rainbow - Husky 14 Homeglen Rimbey - KeySpan 15 Garrington (Olds) - Esprit 16 Basing (Hanlan Robb) - Petro-Canada 17 Caroline - Shell 18 Nevis - Duke Energy 19 Harmattan - Solex 10 Progress - Anadarko	126,853.1 37,611.6 9,949.6 113,568.0 250,472.1 1,742,825.2 38,006.9 6,942.2 10,729.5	1,643.2 104.2 203.4 1,396.0 2,771.1 2,169.6 376.1 79.1 211.9	99.7% 98.3% 98.8% 98.9% 99.9% 99.0% 98.9%	98.3 98.3 98.4 98.5 99.5 98.4 98.6 96.5	Injected (3761s 11,862 112,244 247,988 1,753,36 37,898 6,87 10,528
107 110 100 102 136 166 100 106 150 0 158	79 Crossfield E Primewest 15 Rainbow - Husky 16 Homeglen Rimbey - KeySpan 17 Garrington (Olds) - Esprit 18 Basing (Hanlan Robb) - Petro-Canada 18 Caroline - Shell 19 Nevis - Duke Energy 10 Harmattan - Solex 10 Progress - Anadarko 10 Hays - Anadarko	126,853.1 37,611.6 9,949.6 113,568.0 250,472.1 1,742,825.2 38,006.9 6,942.2 10,729.5 2,419.6	1,643.2 104.2 203.4 1,396.0 2,771.1 2,169.6 376.1 79.1 211.9	99.7% 98.3% 98.8% 98.9% 99.9% 99.0% 98.9% 98.0% 95.5%	98.3 98.3 98.4 98.5 99.5 98.4 98.6 96.5	Injected (3761) 11,862 112,244 247,986 1,753,36 ⁻ 37,899 6,877 10,528 2,278
107 110 100 102 136 166 100 106 150 0 158 1 163	79 Crossfield E Primewest 15 Rainbow - Husky 16 Homeglen Rimbey - KeySpan 17 Garrington (Olds) - Esprit 18 Basing (Hanlan Robb) - Petro-Canada 18 Caroline - Shell 19 Nevis - Duke Energy 10 Harmattan - Solex 10 Progress - Anadarko 11 Hays - Anadarko 12 Campbell-Namao (Carbondale) - Atco Midstream	126,853.1 37,611.6 9,949.6 113,568.0 250,472.1 1,742,825.2 38,006.9 6,942.2 10,729.5 2,419.6 287.0	1,643.2 104.2 203.4 1,396.0 2,771.1 2,169.6 376.1 79.1 211.9	99.7% 98.3% 98.8% 98.9% 99.9% 99.0% 98.9% 98.0% 95.5% 100.0%	98.3 98.3 98.4 98.5 99.5 98.4 98.6 96.5 90.0	Injected (3761) 11,862 112,244 247,981 1,753,36 37,899 6,87 10,520 2,270
107 110 100 102 136 166 100 106 150 0 158 1 163 2 162	79 Crossfield E Primewest 15 Rainbow - Husky 16 Homeglen Rimbey - KeySpan 17 Garrington (Olds) - Esprit 18 Basing (Hanlan Robb) - Petro-Canada 18 Caroline - Shell 19 Nevis - Duke Energy 10 Harmattan - Solex 10 Progress - Anadarko 11 Hays - Anadarko 12 Campbell-Namao (Carbondale) - Atco Midstream 12 Progress - Suncor	126,853.1 37,611.6 9,949.6 113,568.0 250,472.1 1,742,825.2 38,006.9 6,942.2 10,729.5 2,419.6 287.0 688.6	1,643.2 104.2 203.4 1,396.0 2,771.1 2,169.6 376.1 79.1 211.9	99.7% 98.3% 98.8% 98.99% 99.9% 99.0% 98.9% 98.0% 95.5% 100.0%	98.3 98.3 98.4 98.5 99.5 98.4 98.6 96.5 90.0 69.7	Injected (3761) 11,862 112,244 247,981 1,753,36 37,899 6,87 10,520 2,270
107 110 100 102 136 166 100 150 0 158 1 163 2 162 3 165	79 Crossfield E Primewest 15 Rainbow - Husky 16 Homeglen Rimbey - KeySpan 17 Garrington (Olds) - Esprit 18 Basing (Hanlan Robb) - Petro-Canada 18 Caroline - Shell 19 Nevis - Duke Energy 19 Harmattan - Solex 19 Progress - Anadarko 19 Hays - Anadarko 19 Campbell-Namao (Carbondale) - Atco Midstream 19 Progress - Suncor 18 Rainbow - Gibson	126,853.1 37,611.6 9,949.6 113,568.0 250,472.1 1,742,825.2 38,006.9 6,942.2 10,729.5 2,419.6 287.0 688.6 3,288.1	1,643.2 104.2 203.4 1,396.0 2,771.1 2,169.6 376.1 79.1 211.9 106.4	99.7% 98.3% 98.8% 98.99% 99.9% 99.0% 98.0% 95.5% 100.0% 100.0%	98.3 98.3 98.4 98.5 99.5 98.4 98.6 96.5 90.0 69.7 69.7	Injected (3761) 11,862 112,244 247,981 1,753,36 37,899 6,873 10,520 2,270 294 669 3,084
107 110 100 102 136 166 100 150 0 158 1 163 2 162 3 165 4 104	79 Crossfield E Primewest 15 Rainbow - Husky 16 Homeglen Rimbey - KeySpan 17 Garrington (Olds) - Esprit 18 Basing (Hanlan Robb) - Petro-Canada 18 Caroline - Shell 19 Nevis - Duke Energy 10 Harmattan - Solex 10 Progress - Anadarko 10 Progress - Anadarko 10 Campbell-Namao (Carbondale) - Atco Midstream 10 Progress - Suncor 10 Rainbow - Gibson 10 Bonnie Glen - Imperial	126,853.1 37,611.6 9,949.6 113,568.0 250,472.1 1,742,825.2 38,006.9 6,942.2 10,729.5 2,419.6 287.0 688.6 3,288.1 4,830.1	1,643.2 104.2 203.4 1,396.0 2,771.1 2,169.6 376.1 79.1 211.9 106.4	99.7% 98.3% 98.8% 98.9% 99.9% 99.0% 98.0% 95.5% 100.0% 100.0% 95.8% 96.7%	98.3 98.3 98.4 98.5 99.5 98.4 98.6 96.5 90.0 69.7 69.7 89.7	Injected (3761) 11,862 112,24(247,98(1,753,36(37,89(6,87(10,52(2,27(294(66(3,084(4,52(11,86(11,
107 110 100 102 136 166 100 0 158 1 163 2 162 3 165 4 104 5 165	Crossfield E Primewest Rainbow - Husky Homeglen Rimbey - KeySpan Garrington (Olds) - Esprit Rainbow - Husky Homeglen Rimbey - KeySpan Garrington (Olds) - Esprit Rainbow - Shell Reinbow - Shell Reinbow - Shell Reinbow - Shell Reinbow - Rainbow - Rainbow - Rainbow - Gibson Rainbow - Gibson Rainbow - Gibson Reinbow - Gibson Reinbow - Rimbow - Rainbow - Rainbow - Reinbow - Rainbow - Reinbow - R	126,853.1 37,611.6 9,949.6 113,568.0 250,472.1 1,742,825.2 38,006.9 6,942.2 10,729.5 2,419.6 287.0 688.6 3,288.1 4,830.1 573.7	1,643.2 104.2 203.4 1,396.0 2,771.1 2,169.6 376.1 79.1 211.9 106.4 - - 134.9 154.9	99.7% 98.3% 98.8% 98.9% 99.9% 99.0% 98.0% 95.5% 100.0% 100.0% 95.8% 96.7% 71.6%	98.3 98.3 98.4 98.5 99.5 98.4 98.6 96.5 90.0 69.7 69.7 89.7 95.9 70.0	Injected (3761s 11,862 112,24s 247,98s 1,753,36 37,89s 6,87; 10,52s 2,27s 29s 66s 3,08s 4,52s
107 110 100 102 136 166 100 150 0 158 1 163 2 162 3 165 4 104 5 165 6 145	Crossfield E Primewest Rainbow - Husky Homeglen Rimbey - KeySpan Garrington (Olds) - Esprit Basing (Hanlan Robb) - Petro-Canada Caroline - Shell Nevis - Duke Energy Harmattan - Solex Progress - Anadarko Hays - Anadarko Campbell-Namao (Carbondale) - Atco Midstream Progress - Suncor Rainbow - Gibson Sonnie Glen - Imperial Swalwell - Viking Brazeau R. (West Pembina) - Atco Midstream	126,853.1 37,611.6 9,949.6 113,568.0 250,472.1 1,742,825.2 38,006.9 6,942.2 10,729.5 2,419.6 287.0 688.6 3,288.1 4,830.1 573.7 128,781.5	1,643.2 104.2 203.4 1,396.0 2,771.1 2,169.6 376.1 79.1 211.9 106.4 - - 134.9 154.9 168.3 1,699.1	99.7% 98.3% 98.8% 98.9% 99.9% 99.0% 98.9% 100.0% 100.0% 95.5% 100.0% 95.8% 96.7% 71.6% 98.7%	98.3 98.3 98.4 98.5 99.5 98.4 98.6 96.5 90.0 69.7 69.7 89.7 95.9 70.0 98.4	Injected (3761) 11,862 112,244 247,981 1,753,36 37,893 6,873 10,522 2,277 299 666 3,084 4,522 423 131,383
107 110 100 102 1366 166 100 150 0 158 1 163 2 162 3 165 4 164 5 165 6 145 7 114	79 Crossfield E Primewest 75 Rainbow - Husky 76 Homeglen Rimbey - KeySpan 77 Garrington (Olds) - Esprit 78 Basing (Hanlan Robb) - Petro-Canada 78 Caroline - Shell 79 Nevis - Duke Energy 79 Harmattan - Solex 79 Progress - Anadarko 79 Progress - Anadarko 79 Progress - Suncor 79 Rainbow - Gibson 79 Bonnie Glen - Imperial 70 Swalwell - Viking 70 Brazeau R. (West Pembina) - Atco Midstream 70 Sinclair (Hythe Brainard) - EnCana	126,853.1 37,611.6 9,949.6 113,568.0 250,472.1 1,742,825.2 38,006.9 6,942.2 10,729.5 2,419.6 287.0 688.6 3,288.1 4,830.1 573.7 128,781.5 38,386.1	1,643.2 104.2 203.4 1,396.0 2,771.1 2,169.6 376.1 79.1 211.9 106.4 - - 134.9 154.9 168.3 1,699.1 378.9	99.7% 98.3% 98.8% 98.9% 99.9% 99.0% 98.9% 100.0% 100.0% 171.6% 98.7% 99.0%	98.3 98.3 98.4 98.5 99.5 98.4 98.6 96.5 90.0 69.7 69.7 89.7 95.9 70.0 98.4 98.3	Injected (3761) 11,86; 112,24(247,98(1,753,36) 37,89(6,87; 10,52(2,27(29) 66(3,08(4,52; 42; 131,38; 37,85(
107 110 100 102 136 166 166 150 0 158 1 163 2 162 3 165 4 104 5 164 6 145 7 114 8 105	Crossfield E Primewest Rainbow - Husky Homeglen Rimbey - KeySpan Garrington (Olds) - Esprit Basing (Hanlan Robb) - Petro-Canada Caroline - Shell Nevis - Duke Energy Harmattan - Solex Progress - Anadarko Campbell-Namao (Carbondale) - Atco Midstream Progress - Suncor Rainbow - Gibson Bonnie Glen - Imperial Swalwell - Viking Brazeau R. (West Pembina) - Atco Midstream Sinclair (Hythe Brainard) - EnCana Savanna Ck. (Coleman) - Northstar	126,853.1 37,611.6 9,949.6 113,568.0 250,472.1 1,742,825.2 38,006.9 6,942.2 10,729.5 2,419.6 287.0 688.6 3,288.1 4,830.1 573.7 128,781.5 38,386.1 147,177.8	1,643.2 104.2 203.4 1,396.0 2,771.1 2,169.6 376.1 79.1 211.9 106.4 - - 134.9 154.9 168.3 1,699.1 378.9	99.7% 98.3% 98.8% 98.9% 99.9% 99.0% 98.9% 100.0% 100.0% 95.5% 100.0% 95.8% 96.7% 71.6% 98.7%	98.3 98.3 98.4 98.5 99.5 98.4 98.6 96.5 90.0 69.7 69.7 89.7 95.9 70.0 98.4 98.3	Injected (3761) 11,862 112,244 247,986 1,753,366 37,899 6,877 10,520 2,276 29 666 3,08 4,522 422 131,385 37,856
107 110 100 102 136 166 100 0 158 1 163 2 162 3 165 4 104 5 165 6 145 7 114 8 105	Crossfield E Primewest Rainbow - Husky Homeglen Rimbey - KeySpan Garrington (Olds) - Esprit Basing (Hanlan Robb) - Petro-Canada Caroline - Shell Nevis - Duke Energy Harmattan - Solex Progress - Anadarko Campbell-Namao (Carbondale) - Atco Midstream Progress - Suncor Rainbow - Gibson Bonnie Glen - Imperial Swalwell - Viking Brazeau R. (West Pembina) - Atco Midstream Sinclair (Hythe Brainard) - EnCana Savanna Ck. (Coleman) - Northstar	126,853.1 37,611.6 9,949.6 113,568.0 250,472.1 1,742,825.2 38,006.9 6,942.2 10,729.5 2,419.6 287.0 688.6 3,288.1 4,830.1 573.7 128,781.5 38,386.1	1,643.2 104.2 203.4 1,396.0 2,771.1 2,169.6 376.1 79.1 211.9 106.4 - - 134.9 154.9 168.3 1,699.1 378.9	99.7% 98.3% 98.8% 98.9% 99.9% 99.9% 99.0% 95.5% 100.0% 100.0% 95.8% 96.7% 71.6% 98.7% 99.0%	98.3 98.3 98.4 98.5 99.5 98.4 98.6 96.5 90.0 69.7 69.7 89.7 95.9 70.0 98.4 98.3	Injected (3761) 11,862 112,244 247,986 1,753,36 37,899 6,873 10,528 2,278 294 669 3,084 4,522 423 131,387 37,856 144,767
107 110 100 102 136 160 100 106 150 0 158 1 163 2 162 3 165 4 104 5 165 6 145 7 114 8 105 9 113 0 189	Crossfield E Primewest Rainbow - Husky Homeglen Rimbey - KeySpan Garrington (Olds) - Esprit Basing (Hanlan Robb) - Petro-Canada Caroline - Shell Nevis - Duke Energy Harmattan - Solex Progress - Anadarko Hays - Anadarko Campbell-Namao (Carbondale) - Atco Midstream Progress - Suncor Rainbow - Gibson Sonnie Glen - Imperial Swalwell - Viking Brazeau R. (West Pembina) - Atco Midstream Sinclair (Hythe Brainard) - EnCana Savanna Ck. (Coleman) - Northstar Quirk Ck Imperial Saddle Hills - EnCana	126,853.1 37,611.6 9,949.6 113,568.0 250,472.1 1,742,825.2 38,006.9 6,942.2 10,729.5 2,419.6 287.0 688.6 3,288.1 4,830.1 573.7 128,781.5 38,386.1 147,177.8 99,276.9	1,643.2 104.2 203.4 1,396.0 2,771.1 2,169.6 376.1 79.1 211.9 106.4 - - 134.9 154.9 168.3 1,699.1 378.9 1,578.5	99.7% 98.3% 98.8% 99.9% 99.9% 99.0% 98.9% 95.5% 100.0% 100.0% 95.8% 96.7% 71.6% 98.7% 99.0%	98.3 98.3 98.4 98.5 99.5 98.4 98.6 96.5 90.0 69.7 69.7 89.7 95.9 70.0 98.4 98.3 98.6	Injected (37615 11,862 112,246 247,988 1,753,361 37,895 6,873 10,526 2,276 294 669 3,084 4,522 423 1311,387 37,856 144,761 100,515
107 1100 102 136 160 100 106 150 0 158 1 163 2 162 3 165 4 104 5 165 6 145 7 114 8 105 9 113 0 189 1 148	Crossfield E Primewest Rainbow - Husky Homeglen Rimbey - KeySpan Garrington (Olds) - Esprit Basing (Hanlan Robb) - Petro-Canada Caroline - Shell Nevis - Duke Energy Harmattan - Solex Progress - Anadarko Hays - Anadarko Campbell-Namao (Carbondale) - Atco Midstream Progress - Suncor Rainbow - Gibson Sonnie Glen - Imperial Swalwell - Viking Brazeau R. (West Pembina) - Atco Midstream Sinclair (Hythe Brainard) - EnCana Savanna Ck. (Coleman) - Northstar Quirk Ck Imperial Saddle Hills - EnCana	126,853.1 37,611.6 9,949.6 113,568.0 250,472.1 1,742,825.2 38,006.9 6,942.2 10,729.5 2,419.6 287.0 688.6 3,288.1 4,830.1 573.7 128,781.5 38,386.1 147,177.8 99,276.9 142,733.2	1,643.2 104.2 203.4 1,396.0 2,771.1 2,169.6 376.1 79.1 211.9 106.4 - - 134.9 154.9 168.3 1,699.1 378.9 1,578.5 1,240.4	99.7% 98.3% 98.8% 99.9% 99.9% 99.0% 98.9% 95.5% 100.0% 100.0% 95.8% 96.7% 71.6% 98.7% 99.9%	98.3 98.3 98.4 98.5 99.5 98.4 98.6 96.5 90.0 69.7 69.7 89.7 95.9 70.0 98.4 98.3 98.6	124,331 Injected (37619 11,862 1112,248 247,988 1,753,361 37,895 6,873 10,528 2,278 294 669 3,084 4,522 423 131,387 37,858 144,761 100,519 137,923 135,530 3,004,343