Prairie Petro-Chem
738 - 6th Street, Estevan, Saskatchewan S4A 1A4

LAB REPORT

WATER ANALYSIS REPORT

Company : Tundra Oil & Gas
Address : Virden, MB
Lease :
Well : 04-06-07-29w1
Sample Pt. : Wellhead

Date : Oct. 7, 04
Date Sampled :
Analysis No. : 1

	ANALYSIS		mg/L		* meq/L
1.	pH	7.1			
2.	H2S (qualitative)	Positive			
3.	Specific Gravity	1.1227			
4.	Total Dissolved Solids		190383.6		
5.	Bicarbonate	HCO3	56.0	HCO3	0.9
6.	Chloride	Cl	111100.0	Cl	3134.0
7.	Sulfate	SO4	5410.0	SO4	112.7
8.	Calcium	Ca	2360.0	Ca	117.8
9.	Magnesium	Mg	558.0	Mg	45.9
10.	Sodium (calculated)	Na	70898.8	Na	3083.9
11.	Iron	Fe	0.8		

PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter

```
+------+                    +------+
|   118| *Ca <----- *HCO3   |     1|
|------|   /------->        |------|
|    46| *Mg -----> *SO4    |   113|
|------|     <---------/    |------|
|  3084| *Na -----> *Cl     |  3134|
+------+                    +------+
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Saturation Values Dist. Water 20 C

CaCO3	13 mg/L
CaSO4 * 2H2O	2090 mg/L
BaSO4	2.4 mg/L

Compound	Equiv wt	X meq/L	= mg/L
Ca(HCO3)2	81.0	0.9	74
CaSO4	68.1	112.7	7668
CaCl2	55.5	4.2	232
Mg(HCO3)2	73.2		
MgSO4	60.2		
MgCl2	47.6	45.9	2185
NaHCO3	84.0		
Na2SO4	71.0		
NaCl	58.4	3083.9	180223

Prairie Petro-Chem

Respectfully submitted,
B. Frehlick

Prairie Petro-Chem
738 - 6th Street, Estevan, Saskatchewan S4A 1A4

LAB REPORT

STABILITY INDEX CALCULATIONS
(Stiff-Davis Method)
CaCO3 Scaling Tendency

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 1
Well	: 04-06-07-29w1		
Sample Pt.	: Wellhead		

S.I. = pH - pCa - pALK - K

where S.I. = stability index
pH = pH as measured on fresh sample
pCa = negative logarithm of calcium concentration
K = constant, depends on temperature and salt content

pH = 7.11 pCa = 1.23 pALK = 3.04

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x (3.3 x 10-5)	=	0.000
HCO3	(56)	x (0.8 x 10-5)	=	0.000
Cl	(111100)	x (1.4 x 10-5)	=	1.567
SO4	(5410)	x (2.1 x 10-5)	=	0.113
Ca	(2360)	x (5.0 x 10-5)	=	0.118
Mg	(558)	x (8.2 x 10-5)	=	0.046
Fe	(1)	x (8.1 x 10-5)	=	0.000
Ba	(0)	x (1.5 x 10-5)	=	0.000
Sr	(0)	x (2.3 x 10-5)	=	0.000
Na	(70899)	x (2.2 x 10-5)	=	1.542

Total Ionic Strength = 3.386

K = 2.82	@ 68	degrees F	or	20 degrees C.
K = 2.78	@ 86	degrees F	or	30 degrees C.
K = 2.74	@ 104	degrees F	or	40 degrees C.
K = 2.69	@ 122	degrees F	or	50 degrees C.
K = 2.65	@ 140	degrees F	or	60 degrees C.

STABILITY INDEX CALCULATION

S.I. =	7.11 -	1.23 -	3.04 -	2.82 =	0.02 at	68 deg. F or	20 deg. C.
S.I. =	7.11 -	1.23 -	3.04 -	2.78 =	0.06 at	86 deg. F or	30 deg. C.
S.I. =	7.11 -	1.23 -	3.04 -	2.74 =	0.10 at	104 deg. F or	40 deg. C.
S.I. =	7.11 -	1.23 -	3.04 -	2.69 =	0.15 at	122 deg. F or	50 deg. C.
S.I. =	7.11 -	1.23 -	3.04 -	2.65 =	0.20 at	140 deg. F or	60 deg. C.

S.I. = 0 when K = 2.841

CALCIUM SULFATE SCALING TENDENCY CALCULATIONS
(Skillman-McDonald-Stiff Method)

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 1
Well	: 04-06-07-29w1		
Sample Pt.	: Wellhead		

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right)$$

where S = Solubility of Calcium Sulfate under given conditions
X = Excess Common Ion Factor
K = Constant dependent on Ionic Strength and Temperature
eq wt = Equivalent Weight

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x (3.3 x 10-5)	= 0.000
HCO3	(56)	x (0.8 x 10-5)	= 0.000
Cl	(111100)	x (1.4 x 10-5)	= 1.567
SO4	(5410)	x (2.1 x 10-5)	= 0.113
Ca	(2360)	x (5.0 x 10-5)	= 0.118
Mg	(558)	x (8.2 x 10-5)	= 0.046
Fe	(1)	x (8.1 x 10-5)	= 0.000
Ba	(0)	x (1.5 x 10-5)	= 0.000
Sr	(0)	x (2.3 x 10-5)	= 0.000
Na	(70899)	x (2.2 x 10-5)	= 1.542

Total Ionic Strength = 3.386

K = 3.07 x 10-3	@	68	degrees F	or	20 degrees C.
K = 3.30 x 10-3	@	86	degrees F	or	30 degrees C.
K = 3.49 x 10-3	@	104	degrees F	or	40 degrees C.
K = 3.55 x 10-3	@	122	degrees F	or	50 degrees C.
K = 3.61 x 10-3	@	140	degrees F	or	60 degrees C.

Calculation of Excess Common Ion Factor

$X = | (2.5[Ca] - 1.04[SO4]) | \times 10\text{-}5$ where [Ca] and [SO4] are mg/L
$X = | (2.5[2360.00] - 1.04[5410.00) | \times 10\text{-}5$
$X = 255.15 \times 10\text{-}5$

Calculation of Solubility

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right) * \text{eq wt} = \text{Solubility of CaSO4 in mq/L.}$$

S =	7365.16	@ 68	degrees F or	20 degrees C.
S =	7645.95	@ 86	degrees F or	30 degrees C.
S =	7866.43	@ 104	degrees F or	40 degrees C.
S =	7937.08	@ 122	degrees F or	50 degrees C.
S =	8007.12	@ 140	degrees F or	60 degrees C.

Solubility Difference = Actual [CaSO4] - Calculated S of CaSO4 in mq/L

S.D. = 7667.73 -	7365.16 =	302.57	@ 68	degrees F or	20 degrees C.
S.D. = 7667.73 -	7645.95 =	21.79	@ 86	degrees F or	30 degrees C.
S.D. = 7667.73 -	7866.43 =	-198.70	@ 104	degrees F or	40 degrees C.
S.D. = 7667.73 -	7937.08 =	-269.35	@ 122	degrees F or	50 degrees C.
S.D. = 7667.73 -	8007.12 =	-339.39	@ 140	degrees F or	60 degrees C.

Prairie Petro-Chem
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LAB REPORT

WATER ANALYSIS REPORT

Company : Tundra Oil & Gas
Address : Virden, MB
Lease :
Well : 05-06-07-29w1
Sample Pt. : Wellhead

Date : Oct. 7, 04
Date Sampled :
Analysis No. : 2

	ANALYSIS		mg/L		* meq/L
1.	pH	7.3			
2.	H2S (qualitative)	Positive			
3.	Specific Gravity	1.1228			
4.	Total Dissolved Solids		190323.7		
5.	Bicarbonate	HCO3	64.0	HCO3	1.0
6.	Chloride	Cl	111500.0	Cl	3145.3
7.	Sulfate	SO4	4905.0	SO4	102.1
8.	Calcium	Ca	2240.0	Ca	111.8
9.	Magnesium	Mg	559.0	Mg	46.0
10.	Sodium (calculated)	Na	71055.3	Na	3090.7
11.	Iron	Fe	0.4		

PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter

112	*Ca <----- *HCO3	1
	/------->	
46	*Mg -----> *SO4	102
	<---------/	
3091	*Na -----> *Cl	3145

Saturation Values Dist. Water 20 C

CaCO3	13 mg/L
CaSO4 * 2H2O	2090 mg/L
BaSO4	2.4 mg/L

Compound	Equiv wt	X meq/L	= mg/L
Ca(HCO3)2	81.0	1.0	85
CaSO4	68.1	102.1	6952
CaCl2	55.5	8.6	476
Mg(HCO3)2	73.2		
MgSO4	60.2		
MgCl2	47.6	46.0	2189
NaHCO3	84.0		
Na2SO4	71.0		
NaCl	58.4	3090.7	180621

Prairie Petro-Chem

Respectfully submitted,
B. Frehlick

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LAB REPORT

STABILITY INDEX CALCULATIONS
(Stiff-Davis Method)
CaCO3 Scaling Tendency

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 2
Well	: 05-06-07-29w1		
Sample Pt.	: Wellhead		

S.I. = pH - pCa - pALK - K

where S.I. = stability index
pH = pH as measured on fresh sample
pCa = negative logarithm of calcium concentration
K = constant, depends on temperature and salt content

pH = 7.34 pCa = 1.25 pALK = 2.98

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x	(3.3 x 10-5)	= 0.000
HCO3	(64)	x	(0.8 x 10-5)	= 0.001
Cl	(111500)	x	(1.4 x 10-5)	= 1.573
SO4	(4905)	x	(2.1 x 10-5)	= 0.102
Ca	(2240)	x	(5.0 x 10-5)	= 0.112
Mg	(559)	x	(8.2 x 10-5)	= 0.046
Fe	(0)	x	(8.1 x 10-5)	= 0.000
Ba	(0)	x	(1.5 x 10-5)	= 0.000
Sr	(0)	x	(2.3 x 10-5)	= 0.000
Na	(71055)	x	(2.2 x 10-5)	= 1.545

Total Ionic Strength = 3.378

K = 2.83	@	68	degrees F	or	20	degrees C.
K = 2.78	@	86	degrees F	or	30	degrees C.
K = 2.74	@	104	degrees F	or	40	degrees C.
K = 2.69	@	122	degrees F	or	50	degrees C.
K = 2.65	@	140	degrees F	or	60	degrees C.

STABILITY INDEX CALCULATION

S.I. =	7.34 -	1.25 -	2.98 -	2.83 =	0.28 at	68	deg. F or	20	deg. C.
S.I. =	7.34 -	1.25 -	2.98 -	2.78 =	0.32 at	86	deg. F or	30	deg. C.
S.I. =	7.34 -	1.25 -	2.98 -	2.74 =	0.37 at	104	deg. F or	40	deg. C.
S.I. =	7.34 -	1.25 -	2.98 -	2.69 =	0.41 at	122	deg. F or	50	deg. C.
S.I. =	7.34 -	1.25 -	2.98 -	2.65 =	0.46 at	140	deg. F or	60	deg. C.

S.I. = 0 when K = 3.109

CALCIUM SULFATE SCALING TENDENCY CALCULATIONS
(Skillman-McDonald-Stiff Method)

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 2
Well	: 05-06-07-29w1		
Sample Pt.	: Wellhead		

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right)$$

where S = Solubility of Calcium Sulfate under given conditions
X = Excess Common Ion Factor
K = Constant dependent on Ionic Strength and Temperature
eq wt = Equivalent Weight

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x	(3.3 x 10-5)	= 0.000
HCO3	(64)	x	(0.8 x 10-5)	= 0.001
Cl	(111500)	x	(1.4 x 10-5)	= 1.573
SO4	(4905)	x	(2.1 x 10-5)	= 0.102
Ca	(2240)	x	(5.0 x 10-5)	= 0.112
Mg	(559)	x	(8.2 x 10-5)	= 0.046
Fe	(0)	x	(8.1 x 10-5)	= 0.000
Ba	(0)	x	(1.5 x 10-5)	= 0.000
Sr	(0)	x	(2.3 x 10-5)	= 0.000
Na	(71055)	x	(2.2 x 10-5)	= 1.545

Total Ionic Strength = 3.378

K = 3.06 x 10-3 @ 68 degrees F or 20 degrees C.
K = 3.30 x 10-3 @ 86 degrees F or 30 degrees C.
K = 3.49 x 10-3 @ 104 degrees F or 40 degrees C.
K = 3.55 x 10-3 @ 122 degrees F or 50 degrees C.
K = 3.61 x 10-3 @ 140 degrees F or 60 degrees C.

Calculation of Excess Common Ion Factor

$X = | (2.5[Ca] - 1.04[SO4]) | \times 10\text{-}5$ where [Ca] and [SO4] are mg/L
$X = | (2.5[2240.00] - 1.04[4905.00) | \times 10\text{-}5$
$X = 481.58 \times 10\text{-}5$

Calculation of Solubility

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right) * \text{eq wt} = \text{Solubility of CaSO4 in mq/L.}$$

S = 7214.46 @ 68 degrees F or 20 degrees C.
S = 7495.02 @ 86 degrees F or 30 degrees C.
S = 7715.32 @ 104 degrees F or 40 degrees C.
S = 7786.83 @ 122 degrees F or 50 degrees C.
S = 7857.72 @ 140 degrees F or 60 degrees C.

Solubility Difference = Actual [CaSO4] - Calculated S of CaSO4 in mq/L
S.D. = 6951.98 - 7214.46 = -262.48 @ 68 degrees F or 20 degrees C.
S.D. = 6951.98 - 7495.02 = -543.04 @ 86 degrees F or 30 degrees C.
S.D. = 6951.98 - 7715.32 = -763.33 @ 104 degrees F or 40 degrees C.
S.D. = 6951.98 - 7786.83 = -834.84 @ 122 degrees F or 50 degrees C.
S.D. = 6951.98 - 7857.72 = -905.73 @ 140 degrees F or 60 degrees C.

Prairie Petro-Chem
738 - 6th Street, Estevan, Saskatchewan S4A 1A4

LAB REPORT

WATER ANALYSIS REPORT

Company : Tundra Oil & Gas
Address : Virden, MB
Lease :
Well : 02-06-07-29w1
Sample Pt. : Wellhead

Date : Oct. 7, 04
Date Sampled :
Analysis No. : 3

	ANALYSIS		mg/L		* meq/L
1.	pH	7.1			
2.	H2S (qualitative)	Positive			
3.	Specific Gravity	1.1223			
4.	Total Dissolved Solids		188425.8		
5.	Bicarbonate	HCO3	72.0	HCO3	1.2
6.	Chloride	Cl	110000.0	Cl	3103.0
7.	Sulfate	SO4	5285.0	SO4	110.1
8.	Calcium	Ca	2300.0	Ca	114.8
9.	Magnesium	Mg	547.0	Mg	45.0
10.	Sodium (calculated)	Na	70221.3	Na	3054.4
11.	Iron	Fe	0.5		

PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter

115	*Ca <----- *HCO3	1
	/------->	
45	*Mg -----> *SO4	110
	<---------/	
3054	*Na -----> *Cl	3103

Saturation Values Dist. Water 20 C

CaCO3	13 mg/L
CaSO4 * 2H2O	2090 mg/L
BaSO4	2.4 mg/L

Compound	Equiv wt	X meq/L	= mg/L
Ca(HCO3)2	81.0	1.2	96
CaSO4	68.1	110.1	7491
CaCl2	55.5	3.5	196
Mg(HCO3)2	73.2		
MgSO4	60.2		
MgCl2	47.6	45.0	2142
NaHCO3	84.0		
Na2SO4	71.0		
NaCl	58.4	3054.4	178501

Prairie Petro-Chem

Respectfully submitted,
B. Frehlick

STABILITY INDEX CALCULATIONS
(Stiff-Davis Method)
CaCO3 Scaling Tendency

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 3
Well	: 02-06-07-29w1		
Sample Pt.	: Wellhead		

S.I. = pH - pCa - pALK - K

where S.I. = stability index
pH = pH as measured on fresh sample
pCa = negative logarithm of calcium concentration
K = constant, depends on temperature and salt content

pH = 7.14 pCa = 1.24 pALK = 2.93

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x	(3.3 x 10-5)	= 0.000
HCO3	(72)	x	(0.8 x 10-5)	= 0.001
Cl	(110000)	x	(1.4 x 10-5)	= 1.551
SO4	(5285)	x	(2.1 x 10-5)	= 0.110
Ca	(2300)	x	(5.0 x 10-5)	= 0.115
Mg	(547)	x	(8.2 x 10-5)	= 0.045
Fe	(1)	x	(8.1 x 10-5)	= 0.000
Ba	(0)	x	(1.5 x 10-5)	= 0.000
Sr	(0)	x	(2.3 x 10-5)	= 0.000
Na	(70221)	x	(2.2 x 10-5)	= 1.527

Total Ionic Strength = 3.349

K = 2.83	@	68	degrees F	or	20	degrees C.
K = 2.79	@	86	degrees F	or	30	degrees C.
K = 2.74	@	104	degrees F	or	40	degrees C.
K = 2.69	@	122	degrees F	or	50	degrees C.
K = 2.65	@	140	degrees F	or	60	degrees C.

STABILITY INDEX CALCULATION

S.I. =	7.14 -	1.24 -	2.93 -	2.83 =	0.14 at	68	deg. F or	20	deg. C.
S.I. =	7.14 -	1.24 -	2.93 -	2.79 =	0.18 at	86	deg. F or	30	deg. C.
S.I. =	7.14 -	1.24 -	2.93 -	2.74 =	0.23 at	104	deg. F or	40	deg. C.
S.I. =	7.14 -	1.24 -	2.93 -	2.69 =	0.28 at	122	deg. F or	50	deg. C.
S.I. =	7.14 -	1.24 -	2.93 -	2.65 =	0.32 at	140	deg. F or	60	deg. C.

S.I. = 0 when K = 2.971

CALCIUM SULFATE SCALING TENDENCY CALCULATIONS
(Skillman-McDonald-Stiff Method)

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 3
Well	: 02-06-07-29w1		
Sample Pt.	: Wellhead		

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right)$$

where S = Solubility of Calcium Sulfate under given conditions
X = Excess Common Ion Factor
K = Constant dependent on Ionic Strength and Temperature
eq wt = Equivalent Weight

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x (3.3 x 10-5)	= 0.000
HCO3	(72)	x (0.8 x 10-5)	= 0.001
Cl	(110000)	x (1.4 x 10-5)	= 1.551
SO4	(5285)	x (2.1 x 10-5)	= 0.110
Ca	(2300)	x (5.0 x 10-5)	= 0.115
Mg	(547)	x (8.2 x 10-5)	= 0.045
Fe	(1)	x (8.1 x 10-5)	= 0.000
Ba	(0)	x (1.5 x 10-5)	= 0.000
Sr	(0)	x (2.3 x 10-5)	= 0.000
Na	(70221)	x (2.2 x 10-5)	= 1.527

Total Ionic Strength = 3.349

K = 3.06 x 10-3	@	68	degrees F	or	20 degrees C.
K = 3.29 x 10-3	@	86	degrees F	or	30 degrees C.
K = 3.48 x 10-3	@	104	degrees F	or	40 degrees C.
K = 3.54 x 10-3	@	122	degrees F	or	50 degrees C.
K = 3.61 x 10-3	@	140	degrees F	or	60 degrees C.

Calculation of Excess Common Ion Factor

$X = | (2.5[Ca] - 1.04[SO4]) | \times 10\text{-}5$ where [Ca] and [SO4] are mg/L
$X = | (2.5[2300.00] - 1.04[5285.00) | \times 10\text{-}5$
$X = 235.61 \times 10\text{-}5$

Calculation of Solubility

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right) * \text{eq wt} = \text{Solubility of CaSO4 in mq/L.}$$

S =	7369.75 @	68	degrees F	or	20 degrees C.
S =	7650.37 @	86	degrees F	or	30 degrees C.
S =	7870.62 @	104	degrees F	or	40 degrees C.
S =	7945.25 @	122	degrees F	or	50 degrees C.
S =	8019.21 @	140	degrees F	or	60 degrees C.

Solubility Difference = Actual [CaSO4] - Calculated S of CaSO4 in mq/L

S.D. = 7490.57	- 7369.75 =	120.82 @	68	degrees F	or 20	degrees C.
S.D. = 7490.57	- 7650.37 =	-159.80 @	86	degrees F	or 30	degrees C.
S.D. = 7490.57	- 7870.62 =	-380.05 @	104	degrees F	or 40	degrees C.
S.D. = 7490.57	- 7945.25 =	-454.69 @	122	degrees F	or 50	degrees C.
S.D. = 7490.57	- 8019.21 =	-528.64 @	140	degrees F	or 60	degrees C.

Prairie Petro-Chem
738 - 6th Street, Estevan, Saskatchewan S4A 1A4

LAB REPORT

WATER ANALYSIS REPORT

Company : Tundra Oil & Gas
Address : Virden, MB
Lease :
Well : 03-06-07-29w1
Sample Pt. : Wellhead

Date : Oct. 7, 04
Date Sampled :
Analysis No. : 4

	ANALYSIS		mg/L		* meq/L
1.	pH	7.6			
2.	H2S (qualitative)	Positive			
3.	Specific Gravity	1.1230			
4.	Total Dissolved Solids		189504.3		
5.	Bicarbonate	HCO3	130.0	HCO3	2.1
6.	Chloride	Cl	110600.0	Cl	3119.9
7.	Sulfate	SO4	5300.0	SO4	110.4
8.	Calcium	Ca	2320.0	Ca	115.8
9.	Magnesium	Mg	558.0	Mg	45.9
10.	Sodium (calculated)	Na	70595.7	Na	3070.7
11.	Iron	Fe	0.6		

PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter

```
+------+                    +------+
|   116| *Ca <----- *HCO3   |     2|
|------|   /------->        |------|
|    46| *Mg -----> *SO4    |   110|
|------|     <---------/    |------|
|  3071| *Na -----> *Cl     |  3120|
+------+                    +------+
```

Saturation Values Dist. Water 20 C

CaCO3	13 mg/L
CaSO4 * 2H2O	2090 mg/L
BaSO4	2.4 mg/L

Compound	Equiv wt	X meq/L	= mg/L
Ca(HCO3)2	81.0	2.1	173
CaSO4	68.1	110.4	7512
CaCl2	55.5	3.3	181
Mg(HCO3)2	73.2		
MgSO4	60.2		
MgCl2	47.6	45.9	2185
NaHCO3	84.0		
Na2SO4	71.0		
NaCl	58.4	3070.7	179452

Prairie Petro-Chem

Respectfully submitted,
B. Frehlick

STABILITY INDEX CALCULATIONS
(Stiff-Davis Method)
CaCO3 Scaling Tendency

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 4
Well	: 03-06-07-29w1		
Sample Pt.	: Wellhead		

S.I. = pH - pCa - pALK - K

where S.I. = stability index
pH = pH as measured on fresh sample
pCa = negative logarithm of calcium concentration
K = constant, depends on temperature and salt content

pH = 7.60 pCa = 1.24 pALK = 2.67

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(	0)	x (3.3 x 10-5)	= 0.000
HCO3	(	130)	x (0.8 x 10-5)	= 0.001
Cl	(110600)		x (1.4 x 10-5)	= 1.560
SO4	(	5300)	x (2.1 x 10-5)	= 0.110
Ca	(	2320)	x (5.0 x 10-5)	= 0.116
Mg	(	558)	x (8.2 x 10-5)	= 0.046
Fe	(	1)	x (8.1 x 10-5)	= 0.000
Ba	(	0)	x (1.5 x 10-5)	= 0.000
Sr	(	0)	x (2.3 x 10-5)	= 0.000
Na	(70596)		x (2.2 x 10-5)	= 1.535

Total Ionic Strength = 3.368

K = 2.83	@	68	degrees F	or	20 degrees C.
K = 2.79	@	86	degrees F	or	30 degrees C.
K = 2.74	@	104	degrees F	or	40 degrees C.
K = 2.69	@	122	degrees F	or	50 degrees C.
K = 2.65	@	140	degrees F	or	60 degrees C.

STABILITY INDEX CALCULATION

S.I. =	7.60 -	1.24 -	2.67 -	2.83 =	0.86 at	68	deg. F or	20	deg. C.
S.I. =	7.60 -	1.24 -	2.67 -	2.79 =	0.91 at	86	deg. F or	30	deg. C.
S.I. =	7.60 -	1.24 -	2.67 -	2.74 =	0.95 at	104	deg. F or	40	deg. C.
S.I. =	7.60 -	1.24 -	2.67 -	2.69 =	1.00 at	122	deg. F or	50	deg. C.
S.I. =	7.60 -	1.24 -	2.67 -	2.65 =	1.05 at	140	deg. F or	60	deg. C.

S.I. = 0 when K = 3.691

CALCIUM SULFATE SCALING TENDENCY CALCULATIONS
(Skillman-McDonald-Stiff Method)

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 4
Well	: 03-06-07-29w1		
Sample Pt.	: Wellhead		

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right)$$

where S = Solubility of Calcium Sulfate under given conditions
X = Excess Common Ion Factor
K = Constant dependent on Ionic Strength and Temperature
eq wt = Equivalent Weight

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x (3.3 x 10-5)	= 0.000
HCO3	(130)	x (0.8 x 10-5)	= 0.001
Cl	(110600)	x (1.4 x 10-5)	= 1.560
SO4	(5300)	x (2.1 x 10-5)	= 0.110
Ca	(2320)	x (5.0 x 10-5)	= 0.116
Mg	(558)	x (8.2 x 10-5)	= 0.046
Fe	(1)	x (8.1 x 10-5)	= 0.000
Ba	(0)	x (1.5 x 10-5)	= 0.000
Sr	(0)	x (2.3 x 10-5)	= 0.000
Na	(70596)	x (2.2 x 10-5)	= 1.535

Total Ionic Strength = 3.368

K = 3.06 x 10-3	@	68	degrees F	or	20 degrees C.
K = 3.29 x 10-3	@	86	degrees F	or	30 degrees C.
K = 3.48 x 10-3	@	104	degrees F	or	40 degrees C.
K = 3.55 x 10-3	@	122	degrees F	or	50 degrees C.
K = 3.61 x 10-3	@	140	degrees F	or	60 degrees C.

Calculation of Excess Common Ion Factor

$X = | (2.5[Ca] - 1.04[SO4]) | \times 10\text{-}5$ where [Ca] and [SO4] are mg/L
$X = | (2.5[2320.00] - 1.04[5300.00) | \times 10\text{-}5$
$X = 269.89 \times 10\text{-}5$

Calculation of Solubility

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right) * \text{eq wt} = \text{Solubility of CaSO4 in mq/L.}$$

S =	7351.33 @	68	degrees F	or	20 degrees C.
S =	7632.02 @	86	degrees F	or	30 degrees C.
S =	7852.37 @	104	degrees F	or	40 degrees C.
S =	7925.07 @	122	degrees F	or	50 degrees C.
S =	7997.12 @	140	degrees F	or	60 degrees C.

Solubility Difference = Actual [CaSO4] - Calculated S of CaSO4 in mq/L

S.D. = 7511.83	- 7351.33 =	160.50 @	68	degrees F	or	20 degrees C.
S.D. = 7511.83	- 7632.02 =	-120.19 @	86	degrees F	or	30 degrees C.
S.D. = 7511.83	- 7852.37 =	-340.54 @	104	degrees F	or	40 degrees C.
S.D. = 7511.83	- 7925.07 =	-413.24 @	122	degrees F	or	50 degrees C.
S.D. = 7511.83	- 7997.12 =	-485.29 @	140	degrees F	or	60 degrees C.

Prairie Petro-Chem
738 - 6th Street, Estevan, Saskatchewan S4A 1A4

LAB REPORT

WATER ANALYSIS REPORT

Company : Tundra Oil & Gas
Address : Virden, MB
Lease :
Well : 12-28-07-29w1
Sample Pt. : Wellhead

Date : Oct. 7, 04
Date Sampled :
Analysis No. : 5

	ANALYSIS		mg/L		* meq/L
1.	pH	7.5			
2.	H2S (qualitative)	Positive			
3.	Specific Gravity	1.1176			
4.	Total Dissolved Solids		179631.8		
5.	Bicarbonate	HCO3	64.0	HCO3	1.0
6.	Chloride	Cl	104750.0	Cl	2954.9
7.	Sulfate	SO4	5210.0	SO4	108.5
8.	Calcium	Ca	2200.0	Ca	109.8
9.	Magnesium	Mg	583.0	Mg	48.0
10.	Sodium (calculated)	Na	66824.3	Na	2906.7
11.	Iron	Fe	0.5		

PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter

110	*Ca <----- *HCO3	1
	/------->	
48	*Mg -----> *SO4	108
	<---------/	
2907	*Na -----> *Cl	2955

Saturation Values Dist. Water 20 C

CaCO3	13 mg/L
CaSO4 * 2H2O	2090 mg/L
BaSO4	2.4 mg/L

Compound	Equiv wt	X meq/L	= mg/L
Ca(HCO3)2	81.0	1.0	85
CaSO4	68.1	108.5	7384
CaCl2	55.5	0.2	13
Mg(HCO3)2	73.2		
MgSO4	60.2		
MgCl2	47.6	48.0	2283
NaHCO3	84.0		
Na2SO4	71.0		
NaCl	58.4	2906.7	169866

Prairie Petro-Chem

Respectfully submitted,
B. Frehlick

STABILITY INDEX CALCULATIONS
(Stiff-Davis Method)
CaCO3 Scaling Tendency

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 5
Well	: 12-28-07-29w1		
Sample Pt.	: Wellhead		

S.I. = pH - pCa - pALK - K

where S.I. = stability index
pH = pH as measured on fresh sample
pCa = negative logarithm of calcium concentration
K = constant, depends on temperature and salt content

pH = 7.49 pCa = 1.26 pALK = 2.98

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x	(3.3 x 10-5)	= 0.000
HCO3	(64)	x	(0.8 x 10-5)	= 0.001
Cl	(104750)	x	(1.4 x 10-5)	= 1.477
SO4	(5210)	x	(2.1 x 10-5)	= 0.108
Ca	(2200)	x	(5.0 x 10-5)	= 0.110
Mg	(583)	x	(8.2 x 10-5)	= 0.048
Fe	(1)	x	(8.1 x 10-5)	= 0.000
Ba	(0)	x	(1.5 x 10-5)	= 0.000
Sr	(0)	x	(2.3 x 10-5)	= 0.000
Na	(66824)	x	(2.2 x 10-5)	= 1.453

Total Ionic Strength = 3.198

K = 2.84	@	68	degrees F	or	20	degrees C.
K = 2.80	@	86	degrees F	or	30	degrees C.
K = 2.75	@	104	degrees F	or	40	degrees C.
K = 2.70	@	122	degrees F	or	50	degrees C.
K = 2.65	@	140	degrees F	or	60	degrees C.

STABILITY INDEX CALCULATION

S.I. =	7.49 -	1.26 -	2.98 -	2.84 =	0.41 at	68	deg. F or	20	deg. C.
S.I. =	7.49 -	1.26 -	2.98 -	2.80 =	0.45 at	86	deg. F or	30	deg. C.
S.I. =	7.49 -	1.26 -	2.98 -	2.75 =	0.50 at	104	deg. F or	40	deg. C.
S.I. =	7.49 -	1.26 -	2.98 -	2.70 =	0.55 at	122	deg. F or	50	deg. C.
S.I. =	7.49 -	1.26 -	2.98 -	2.65 =	0.60 at	140	deg. F or	60	deg. C.

S.I. = 0 when K = 3.251

CALCIUM SULFATE SCALING TENDENCY CALCULATIONS
(Skillman-McDonald-Stiff Method)

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 5
Well	: 12-28-07-29w1		
Sample Pt.	: Wellhead		

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right)$$

where S = Solubility of Calcium Sulfate under given conditions
X = Excess Common Ion Factor
K = Constant dependent on Ionic Strength and Temperature
eq wt = Equivalent Weight

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x	(3.3 x 10-5)	= 0.000
HCO3	(64)	x	(0.8 x 10-5)	= 0.001
Cl	(104750)	x	(1.4 x 10-5)	= 1.477
SO4	(5210)	x	(2.1 x 10-5)	= 0.108
Ca	(2200)	x	(5.0 x 10-5)	= 0.110
Mg	(583)	x	(8.2 x 10-5)	= 0.048
Fe	(1)	x	(8.1 x 10-5)	= 0.000
Ba	(0)	x	(1.5 x 10-5)	= 0.000
Sr	(0)	x	(2.3 x 10-5)	= 0.000
Na	(66824)	x	(2.2 x 10-5)	= 1.453

Total Ionic Strength = 3.198

K = 3.03 x 10-3 @ 68 degrees F or 20 degrees C.
K = 3.26 x 10-3 @ 86 degrees F or 30 degrees C.
K = 3.45 x 10-3 @ 104 degrees F or 40 degrees C.
K = 3.52 x 10-3 @ 122 degrees F or 50 degrees C.
K = 3.59 x 10-3 @ 140 degrees F or 60 degrees C.

Calculation of Excess Common Ion Factor

$X = | (2.5[Ca] - 1.04[SO4]) | \times 10\text{-}5$ where [Ca] and [SO4] are mg/L
$X = | (2.5[2200.00] - 1.04[5210.00) | \times 10\text{-}5$
$X = 64.20 \times 10\text{-}5$

Calculation of Solubility

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right) * \text{eq wt} = \text{Solubility of CaSO4 in mq/L.}$$

S = 7453.58 @ 68 degrees F or 20 degrees C.
S = 7733.72 @ 86 degrees F or 30 degrees C.
S = 7954.15 @ 104 degrees F or 40 degrees C.
S = 8034.87 @ 122 degrees F or 50 degrees C.
S = 8114.78 @ 140 degrees F or 60 degrees C.

Solubility Difference = Actual [CaSO4] - Calculated S of CaSO4 in mq/L

S.D. = 7384.27	- 7453.58 =	-69.31 @	68	degrees F or	20	degrees C.
S.D. = 7384.27	- 7733.72 =	-349.45 @	86	degrees F or	30	degrees C.
S.D. = 7384.27	- 7954.15 =	-569.89 @	104	degrees F or	40	degrees C.
S.D. = 7384.27	- 8034.87 =	-650.60 @	122	degrees F or	50	degrees C.
S.D. = 7384.27	- 8114.78 =	-730.51 @	140	degrees F or	60	degrees C.

Prairie Petro-Chem
738 - 6th Street, Estevan, Saskatchewan S4A 1A4

LAB REPORT

WATER ANALYSIS REPORT

Company : Tundra Oil & Gas
Address : Virden, MB
Lease :
Well : A3-07-08-29w1
Sample Pt. : Wellhead

Date : Oct. 7, 04
Date Sampled :
Analysis No. : 6

	ANALYSIS		mg/L		* meq/L
1.	pH	7.8			
2.	H2S (qualitative)	Positive			
3.	Specific Gravity	1.1158			
4.	Total Dissolved Solids		176658.5		
5.	Bicarbonate	HCO3	125.0	HCO3	2.0
6.	Chloride	Cl	102000.0	Cl	2877.3
7.	Sulfate	SO4	6190.0	SO4	128.9
8.	Calcium	Ca	2240.0	Ca	111.8
9.	Magnesium	Mg	546.0	Mg	44.9
10.	Sodium (calculated)	Na	65557.1	Na	2851.5
11.	Iron	Fe	0.4		

PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter

112	*Ca <----- *HCO3	2
	/------->	
45	*Mg -----> *SO4	129
	<---------/	
2852	*Na -----> *Cl	2877

Saturation Values Dist. Water 20 C

CaCO3	13 mg/L
CaSO4 * 2H2O	2090 mg/L
BaSO4	2.4 mg/L

Compound	Equiv wt	X meq/L	= mg/L
Ca(HCO3)2	81.0	2.0	166
CaSO4	68.1	109.7	7468
CaCl2	55.5		
Mg(HCO3)2	73.2		
MgSO4	60.2	19.2	1154
MgCl2	47.6	25.7	1225
NaHCO3	84.0		
Na2SO4	71.0		
NaCl	58.4	2851.5	166645

Prairie Petro-Chem

Respectfully submitted,
B. Frehlick

STABILITY INDEX CALCULATIONS
(Stiff-Davis Method)
CaCO3 Scaling Tendency

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 6
Well	: A3-07-08-29w1		
Sample Pt.	: Wellhead		

S.I. = pH - pCa - pALK - K

where S.I. = stability index
pH = pH as measured on fresh sample
pCa = negative logarithm of calcium concentration
K = constant, depends on temperature and salt content

pH = 7.78 pCa = 1.25 pALK = 2.69

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x	(3.3 x 10-5)	= 0.000
HCO3	(125)	x	(0.8 x 10-5)	= 0.001
Cl	(102000)	x	(1.4 x 10-5)	= 1.439
SO4	(6190)	x	(2.1 x 10-5)	= 0.129
Ca	(2240)	x	(5.0 x 10-5)	= 0.112
Mg	(546)	x	(8.2 x 10-5)	= 0.045
Fe	(0)	x	(8.1 x 10-5)	= 0.000
Ba	(0)	x	(1.5 x 10-5)	= 0.000
Sr	(0)	x	(2.3 x 10-5)	= 0.000
Na	(65557)	x	(2.2 x 10-5)	= 1.426

Total Ionic Strength = 3.151

K = 2.85	@	68	degrees F	or	20 degrees C.
K = 2.80	@	86	degrees F	or	30 degrees C.
K = 2.75	@	104	degrees F	or	40 degrees C.
K = 2.70	@	122	degrees F	or	50 degrees C.
K = 2.65	@	140	degrees F	or	60 degrees C.

STABILITY INDEX CALCULATION

S.I. =	7.78 -	1.25 -	2.69 -	2.85 =	0.99 at	68 deg. F or	20 deg. C.
S.I. =	7.78 -	1.25 -	2.69 -	2.80 =	1.04 at	86 deg. F or	30 deg. C.
S.I. =	7.78 -	1.25 -	2.69 -	2.75 =	1.09 at	104 deg. F or	40 deg. C.
S.I. =	7.78 -	1.25 -	2.69 -	2.70 =	1.14 at	122 deg. F or	50 deg. C.
S.I. =	7.78 -	1.25 -	2.69 -	2.65 =	1.19 at	140 deg. F or	60 deg. C.

S.I. = 0 when K = 3.840

CALCIUM SULFATE SCALING TENDENCY CALCULATIONS
(Skillman-McDonald-Stiff Method)

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 6
Well	: A3-07-08-29w1		
Sample Pt.	: Wellhead		

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right)$$

where S = Solubility of Calcium Sulfate under given conditions
X = Excess Common Ion Factor
K = Constant dependent on Ionic Strength and Temperature
eq wt = Equivalent Weight

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x (3.3 x 10-5)	= 0.000
HCO3	(125)	x (0.8 x 10-5)	= 0.001
Cl	(102000)	x (1.4 x 10-5)	= 1.439
SO4	(6190)	x (2.1 x 10-5)	= 0.129
Ca	(2240)	x (5.0 x 10-5)	= 0.112
Mg	(546)	x (8.2 x 10-5)	= 0.045
Fe	(0)	x (8.1 x 10-5)	= 0.000
Ba	(0)	x (1.5 x 10-5)	= 0.000
Sr	(0)	x (2.3 x 10-5)	= 0.000
Na	(65557)	x (2.2 x 10-5)	= 1.426

Total Ionic Strength = 3.151

K = 3.03 x 10-3 @ 68 degrees F or 20 degrees C.
K = 3.26 x 10-3 @ 86 degrees F or 30 degrees C.
K = 3.44 x 10-3 @ 104 degrees F or 40 degrees C.
K = 3.51 x 10-3 @ 122 degrees F or 50 degrees C.
K = 3.58 x 10-3 @ 140 degrees F or 60 degrees C.

Calculation of Excess Common Ion Factor

$X = | (2.5[Ca] - 1.04[SO4]) | \times 10\text{-}5$ where [Ca] and [SO4] are mg/L
$X = | (2.5[2240.00] - 1.04[6190.00) | \times 10\text{-}5$
$X = 856.41 \times 10\text{-}5$

Calculation of Solubility

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right) * \text{eq wt} = \text{Solubility of CaSO4 in mq/L.}$$

S = 6928.04 @ 68 degrees F or 20 degrees C.
S = 7207.22 @ 86 degrees F or 30 degrees C.
S = 7427.34 @ 104 degrees F or 40 degrees C.
S = 7507.67 @ 122 degrees F or 50 degrees C.
S = 7587.20 @ 140 degrees F or 60 degrees C.

Solubility Difference = Actual [CaSO4] - Calculated S of CaSO4 in mq/L
S.D. = 7607.50 - 6928.04 = 679.47 @ 68 degrees F or 20 degrees C.
S.D. = 7607.50 - 7207.22 = 400.29 @ 86 degrees F or 30 degrees C.
S.D. = 7607.50 - 7427.34 = 180.16 @ 104 degrees F or 40 degrees C.
S.D. = 7607.50 - 7507.67 = 99.84 @ 122 degrees F or 50 degrees C.
S.D. = 7607.50 - 7587.20 = 20.31 @ 140 degrees F or 60 degrees C.

Prairie Petro-Chem
738 - 6th Street, Estevan, Saskatchewan S4A 1A4

LAB REPORT

WATER ANALYSIS REPORT

Company : Tundra Oil & Gas
Address : Virden, MB
Lease :
Well : 09-09-08-29w1
Sample Pt. : Wellhead

Date : Oct. 7, 04
Date Sampled :
Analysis No. : 7

	ANALYSIS		mg/L		* meq/L
1.	pH	7.4			
2.	H2S (qualitative)	Positive			
3.	Specific Gravity	1.1058			
4.	Total Dissolved Solids		160268.3		
5.	Bicarbonate	HCO3	105.0	HCO3	1.7
6.	Chloride	Cl	91500.0	Cl	2581.1
7.	Sulfate	SO4	6780.0	SO4	141.2
8.	Calcium	Ca	2100.0	Ca	104.8
9.	Magnesium	Mg	486.0	Mg	40.0
10.	Sodium (calculated)	Na	59296.7	Na	2579.2
11.	Iron	Fe	0.6		

PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter

105	*Ca <----- *HCO3	2
	/------->	
40	*Mg -----> *SO4	141
	<---------/	
2579	*Na -----> *Cl	2581

Saturation Values Dist. Water 20 C

CaCO3	13 mg/L
CaSO4 * 2H2O	2090 mg/L
BaSO4	2.4 mg/L

Compound	Equiv wt	X meq/L	= mg/L
Ca(HCO3)2	81.0	1.7	139
CaSO4	68.1	103.1	7015
CaCl2	55.5		
Mg(HCO3)2	73.2		
MgSO4	60.2	38.1	2294
MgCl2	47.6	1.9	89
NaHCO3	84.0		
Na2SO4	71.0		
NaCl	58.4	2579.2	150731

Prairie Petro-Chem

Respectfully submitted,
B. Frehlick

Prairie Petro-Chem
738 - 6th Street, Estevan, Saskatchewan S4A 1A4

LAB REPORT

STABILITY INDEX CALCULATIONS
(Stiff-Davis Method)
CaCO3 Scaling Tendency

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 7
Well	: 09-09-08-29w1		
Sample Pt.	: Wellhead		

S.I. = pH - pCa - pALK - K

where S.I. = stability index
pH = pH as measured on fresh sample
pCa = negative logarithm of calcium concentration
K = constant, depends on temperature and salt content

pH = 7.43 pCa = 1.28 pALK = 2.76

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(	0)	x (3.3 x 10-5)	= 0.000
HCO3	(	105)	x (0.8 x 10-5)	= 0.001
Cl	(	91500)	x (1.4 x 10-5)	= 1.291
SO4	(	6780)	x (2.1 x 10-5)	= 0.141
Ca	(	2100)	x (5.0 x 10-5)	= 0.105
Mg	(	486)	x (8.2 x 10-5)	= 0.040
Fe	(	1)	x (8.1 x 10-5)	= 0.000
Ba	(	0)	x (1.5 x 10-5)	= 0.000
Sr	(	0)	x (2.3 x 10-5)	= 0.000
Na	(	59297)	x (2.2 x 10-5)	= 1.290

Total Ionic Strength = 2.867

K = 2.87	@	68	degrees F	or	20 degrees C.
K = 2.82	@	86	degrees F	or	30 degrees C.
K = 2.77	@	104	degrees F	or	40 degrees C.
K = 2.71	@	122	degrees F	or	50 degrees C.
K = 2.65	@	140	degrees F	or	60 degrees C.

STABILITY INDEX CALCULATION

S.I. =	7.43 -	1.28 -	2.76 -	2.87 =	0.51 at	68 deg. F or	20 deg. C.
S.I. =	7.43 -	1.28 -	2.76 -	2.82 =	0.56 at	86 deg. F or	30 deg. C.
S.I. =	7.43 -	1.28 -	2.76 -	2.77 =	0.62 at	104 deg. F or	40 deg. C.
S.I. =	7.43 -	1.28 -	2.76 -	2.71 =	0.68 at	122 deg. F or	50 deg. C.
S.I. =	7.43 -	1.28 -	2.76 -	2.65 =	0.73 at	140 deg. F or	60 deg. C.

S.I. = 0 when K = 3.385

CALCIUM SULFATE SCALING TENDENCY CALCULATIONS
(Skillman-McDonald-Stiff Method)

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 7
Well	: 09-09-08-29w1		
Sample Pt.	: Wellhead		

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right)$$

where S = Solubility of Calcium Sulfate under given conditions
X = Excess Common Ion Factor
K = Constant dependent on Ionic Strength and Temperature
eq wt = Equivalent Weight

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x (3.3 x 10-5)	= 0.000
HCO3	(105)	x (0.8 x 10-5)	= 0.001
Cl	(91500)	x (1.4 x 10-5)	= 1.291
SO4	(6780)	x (2.1 x 10-5)	= 0.141
Ca	(2100)	x (5.0 x 10-5)	= 0.105
Mg	(486)	x (8.2 x 10-5)	= 0.040
Fe	(1)	x (8.1 x 10-5)	= 0.000
Ba	(0)	x (1.5 x 10-5)	= 0.000
Sr	(0)	x (2.3 x 10-5)	= 0.000
Na	(59297)	x (2.2 x 10-5)	= 1.290

Total Ionic Strength = 2.867

K = 2.98 x 10-3 @ 68 degrees F or 20 degrees C.
K = 3.21 x 10-3 @ 86 degrees F or 30 degrees C.
K = 3.40 x 10-3 @ 104 degrees F or 40 degrees C.
K = 3.46 x 10-3 @ 122 degrees F or 50 degrees C.
K = 3.53 x 10-3 @ 140 degrees F or 60 degrees C.

Calculation of Excess Common Ion Factor

$X = | (2.5[Ca] - 1.04[SO4]) | \times 10\text{-}5$ where [Ca] and [SO4] are mg/L
$X = | (2.5[2100.00] - 1.04[6780.00) | \times 10\text{-}5$
$X = 1820.04 \times 10\text{-}5$

Calculation of Solubility

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right) * \text{eq wt} = \text{Solubility of CaSO4 in mq/L.}$$

S = 6295.42 @ 68 degrees F or 20 degrees C.
S = 6570.32 @ 86 degrees F or 30 degrees C.
S = 6790.40 @ 104 degrees F or 40 degrees C.
S = 6864.61 @ 122 degrees F or 50 degrees C.
S = 6938.16 @ 140 degrees F or 60 degrees C.

Solubility Difference = Actual [CaSO4] - Calculated S of CaSO4 in mq/L
S.D. = 7132.04 - 6295.42 = 836.61 @ 68 degrees F or 20 degrees C.
S.D. = 7132.04 - 6570.32 = 561.72 @ 86 degrees F or 30 degrees C.
S.D. = 7132.04 - 6790.40 = 341.64 @ 104 degrees F or 40 degrees C.
S.D. = 7132.04 - 6864.61 = 267.42 @ 122 degrees F or 50 degrees C.
S.D. = 7132.04 - 6938.16 = 193.88 @ 140 degrees F or 60 degrees C.

Prairie Petro-Chem
738 - 6th Street, Estevan, Saskatchewan S4A 1A4

LAB REPORT

WATER ANALYSIS REPORT

Company : Tundra Oil & Gas
Address : Virden, MB
Lease :
Well : 08-25-07-29w1
Sample Pt. : Wellhead

Date : Oct. 7, 04
Date Sampled :
Analysis No. : 8

	ANALYSIS		mg/L		* meq/L
1.	pH	6.8			
2.	H2S (qualitative)	Positive			
3.	Specific Gravity	1.1058			
4.	Total Dissolved Solids		162312.7		
5.	Bicarbonate	HCO3	156.0	HCO3	2.6
6.	Chloride	Cl	93100.0	Cl	2626.2
7.	Sulfate	SO4	6410.0	SO4	133.5
8.	Calcium	Ca	2160.0	Ca	107.8
9.	Magnesium	Mg	607.0	Mg	49.9
10.	Sodium (calculated)	Na	59878.7	Na	2604.6
11.	Iron	Fe	1.0		

PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter

```
+------+                  +------+
|   108| *Ca <----- *HCO3 |     3|
|------|   /------->      |------|
|    50| *Mg -----> *SO4  |   133|
|------|     <---------/  |------|
|  2605| *Na -----> *Cl   |  2626|
+------+                  +------+
```

Saturation Values Dist. Water 20 C

CaCO3	13 mg/L
CaSO4 * 2H2O	2090 mg/L
BaSO4	2.4 mg/L

Compound	Equiv wt	X meq/L	= mg/L
Ca(HCO3)2	81.0	2.6	207
CaSO4	68.1	105.2	7162
CaCl2	55.5		
Mg(HCO3)2	73.2		
MgSO4	60.2	28.3	1700
MgCl2	47.6	21.7	1032
NaHCO3	84.0		
Na2SO4	71.0		
NaCl	58.4	2604.6	152210

Prairie Petro-Chem

Respectfully submitted,
B. Frehlick

STABILITY INDEX CALCULATIONS
(Stiff-Davis Method)
CaCO3 Scaling Tendency

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 8
Well	: 08-25-07-29w1		
Sample Pt.	: Wellhead		

S.I. = pH - pCa - pALK - K

where S.I. = stability index
pH = pH as measured on fresh sample
pCa = negative logarithm of calcium concentration
K = constant, depends on temperature and salt content

pH = 6.76 pCa = 1.27 pALK = 2.59

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x	(3.3 x 10-5)	= 0.000
HCO3	(156)	x	(0.8 x 10-5)	= 0.001
Cl	(93100)	x	(1.4 x 10-5)	= 1.313
SO4	(6410)	x	(2.1 x 10-5)	= 0.133
Ca	(2160)	x	(5.0 x 10-5)	= 0.108
Mg	(607)	x	(8.2 x 10-5)	= 0.050
Fe	(1)	x	(8.1 x 10-5)	= 0.000
Ba	(0)	x	(1.5 x 10-5)	= 0.000
Sr	(0)	x	(2.3 x 10-5)	= 0.000
Na	(59879)	x	(2.2 x 10-5)	= 1.302

Total Ionic Strength = 2.908

K = 2.87	@	68	degrees F	or	20 degrees C.
K = 2.82	@	86	degrees F	or	30 degrees C.
K = 2.77	@	104	degrees F	or	40 degrees C.
K = 2.71	@	122	degrees F	or	50 degrees C.
K = 2.65	@	140	degrees F	or	60 degrees C.

STABILITY INDEX CALCULATION

S.I. =	6.76 -	1.27 -	2.59 -	2.87 =	0.03 at	68 deg. F or	20 deg. C.
S.I. =	6.76 -	1.27 -	2.59 -	2.82 =	0.08 at	86 deg. F or	30 deg. C.
S.I. =	6.76 -	1.27 -	2.59 -	2.77 =	0.13 at	104 deg. F or	40 deg. C.
S.I. =	6.76 -	1.27 -	2.59 -	2.71 =	0.19 at	122 deg. F or	50 deg. C.
S.I. =	6.76 -	1.27 -	2.59 -	2.65 =	0.25 at	140 deg. F or	60 deg. C.

S.I. = 0 when K = 2.899

CALCIUM SULFATE SCALING TENDENCY CALCULATIONS
(Skillman-McDonald-Stiff Method)

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 8
Well	: 08-25-07-29w1		
Sample Pt.	: Wellhead		

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right)$$

where S = Solubility of Calcium Sulfate under given conditions
X = Excess Common Ion Factor
K = Constant dependent on Ionic Strength and Temperature
eq wt = Equivalent Weight

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x (3.3 x 10-5)	= 0.000
HCO3	(156)	x (0.8 x 10-5)	= 0.001
Cl	(93100)	x (1.4 x 10-5)	= 1.313
SO4	(6410)	x (2.1 x 10-5)	= 0.133
Ca	(2160)	x (5.0 x 10-5)	= 0.108
Mg	(607)	x (8.2 x 10-5)	= 0.050
Fe	(1)	x (8.1 x 10-5)	= 0.000
Ba	(0)	x (1.5 x 10-5)	= 0.000
Sr	(0)	x (2.3 x 10-5)	= 0.000
Na	(59879)	x (2.2 x 10-5)	= 1.302

Total Ionic Strength = 2.908

K = 2.99 x 10-3 @ 68 degrees F or 20 degrees C.
K = 3.22 x 10-3 @ 86 degrees F or 30 degrees C.
K = 3.40 x 10-3 @ 104 degrees F or 40 degrees C.
K = 3.47 x 10-3 @ 122 degrees F or 50 degrees C.
K = 3.53 x 10-3 @ 140 degrees F or 60 degrees C.

Calculation of Excess Common Ion Factor

$X = | (2.5[Ca] - 1.04[SO4]) | \times 10\text{-}5$ where [Ca] and [SO4] are mg/L
$X = | (2.5[2160.00] - 1.04[6410.00) | \times 10\text{-}5$
$X = 1285.08 \times 10\text{-}5$

Calculation of Solubility

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right) * \text{eq wt} = \text{Solubility of CaSO4 in mq/L.}$$

S = 6617.19 @ 68 degrees F or 20 degrees C.
S = 6894.20 @ 86 degrees F or 30 degrees C.
S = 7115.42 @ 104 degrees F or 40 degrees C.
S = 7190.75 @ 122 degrees F or 50 degrees C.
S = 7265.38 @ 140 degrees F or 60 degrees C.

Solubility Difference = Actual [CaSO4] - Calculated S of CaSO4 in mq/L
S.D. = 7335.81 - 6617.19 = 718.62 @ 68 degrees F or 20 degrees C.
S.D. = 7335.81 - 6894.20 = 441.61 @ 86 degrees F or 30 degrees C.
S.D. = 7335.81 - 7115.42 = 220.39 @ 104 degrees F or 40 degrees C.
S.D. = 7335.81 - 7190.75 = 145.06 @ 122 degrees F or 50 degrees C.
S.D. = 7335.81 - 7265.38 = 70.43 @ 140 degrees F or 60 degrees C.

Prairie Petro-Chem
738 - 6th Street, Estevan, Saskatchewan S4A 1A4

LAB REPORT

WATER ANALYSIS REPORT

Company : Tundra Oil & Gas
Address : Virden, MB
Lease :
Well : 16-08-08-28w1
Sample Pt. : Tank

Date : Oct. 7, 04
Date Sampled :
Analysis No. : 9

	ANALYSIS		mg/L		* meq/L
1.	pH	7.2			
2.	H2S (qualitative)	Positive			
3.	Specific Gravity	1.0897			
4.	Total Dissolved Solids		135045.8		
5.	Bicarbonate	HCO3	148.0	HCO3	2.4
6.	Chloride	Cl	75500.0	Cl	2129.8
7.	Sulfate	SO4	7450.0	SO4	155.1
8.	Calcium	Ca	2280.0	Ca	113.8
9.	Magnesium	Mg	340.0	Mg	28.0
10.	Sodium (calculated)	Na	49327.0	Na	2145.6
11.	Iron	Fe	0.8		

PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter

114	*Ca <----- *HCO3	2
	/------->	
28	*Mg -----> *SO4	155
	<---------/	
2146	*Na -----> *Cl	2130

Saturation Values Dist. Water 20 C

CaCO3	13 mg/L
CaSO4 * 2H2O	2090 mg/L
BaSO4	2.4 mg/L

Compound	Equiv wt	X meq/L	= mg/L
Ca(HCO3)2	81.0	2.4	197
CaSO4	68.1	111.3	7578
CaCl2	55.5		
Mg(HCO3)2	73.2		
MgSO4	60.2	28.0	1683
MgCl2	47.6		
NaHCO3	84.0		
Na2SO4	71.0	15.8	1124
NaCl	58.4	2129.8	124463

Prairie Petro-Chem

Respectfully submitted,
B. Frehlick

STABILITY INDEX CALCULATIONS
(Stiff-Davis Method)
CaCO3 Scaling Tendency

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 9
Well	: 16-08-08-28w1		
Sample Pt.	: Tank		

S.I. = pH - pCa - pALK - K

where S.I. = stability index
pH = pH as measured on fresh sample
pCa = negative logarithm of calcium concentration
K = constant, depends on temperature and salt content

pH = 7.21 pCa = 1.25 pALK = 2.61

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x	(3.3 x 10-5)	= 0.000
HCO3	(148)	x	(0.8 x 10-5)	= 0.001
Cl	(75500)	x	(1.4 x 10-5)	= 1.065
SO4	(7450)	x	(2.1 x 10-5)	= 0.155
Ca	(2280)	x	(5.0 x 10-5)	= 0.114
Mg	(340)	x	(8.2 x 10-5)	= 0.028
Fe	(1)	x	(8.1 x 10-5)	= 0.000
Ba	(0)	x	(1.5 x 10-5)	= 0.000
Sr	(0)	x	(2.3 x 10-5)	= 0.000
Na	(49327)	x	(2.2 x 10-5)	= 1.073

Total Ionic Strength = 2.436

K = 2.91	@	68	degrees F	or	20	degrees C.
K = 2.85	@	86	degrees F	or	30	degrees C.
K = 2.79	@	104	degrees F	or	40	degrees C.
K = 2.72	@	122	degrees F	or	50	degrees C.
K = 2.66	@	140	degrees F	or	60	degrees C.

STABILITY INDEX CALCULATION

S.I. =	7.21 -	1.25 -	2.61 -	2.91 =	0.44 at	68	deg. F or	20	deg. C.
S.I. =	7.21 -	1.25 -	2.61 -	2.85 =	0.50 at	86	deg. F or	30	deg. C.
S.I. =	7.21 -	1.25 -	2.61 -	2.79 =	0.56 at	104	deg. F or	40	deg. C.
S.I. =	7.21 -	1.25 -	2.61 -	2.72 =	0.63 at	122	deg. F or	50	deg. C.
S.I. =	7.21 -	1.25 -	2.61 -	2.66 =	0.69 at	140	deg. F or	60	deg. C.

S.I. = 0 when K = 3.350

CALCIUM SULFATE SCALING TENDENCY CALCULATIONS
(Skillman-McDonald-Stiff Method)

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 9
Well	: 16-08-08-28w1		
Sample Pt.	: Tank		

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right)$$

where S = Solubility of Calcium Sulfate under given conditions
X = Excess Common Ion Factor
K = Constant dependent on Ionic Strength and Temperature
eq wt = Equivalent Weight

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x (3.3 x 10-5)	= 0.000
HCO3	(148)	x (0.8 x 10-5)	= 0.001
Cl	(75500)	x (1.4 x 10-5)	= 1.065
SO4	(7450)	x (2.1 x 10-5)	= 0.155
Ca	(2280)	x (5.0 x 10-5)	= 0.114
Mg	(340)	x (8.2 x 10-5)	= 0.028
Fe	(1)	x (8.1 x 10-5)	= 0.000
Ba	(0)	x (1.5 x 10-5)	= 0.000
Sr	(0)	x (2.3 x 10-5)	= 0.000
Na	(49327)	x (2.2 x 10-5)	= 1.073

Total Ionic Strength = 2.436

K = 2.87 x 10-3 @ 68 degrees F or 20 degrees C.
K = 3.09 x 10-3 @ 86 degrees F or 30 degrees C.
K = 3.27 x 10-3 @ 104 degrees F or 40 degrees C.
K = 3.34 x 10-3 @ 122 degrees F or 50 degrees C.
K = 3.40 x 10-3 @ 140 degrees F or 60 degrees C.

Calculation of Excess Common Ion Factor

$X = | (2.5[Ca] - 1.04[SO4]) | \times 10\text{-}5$ where [Ca] and [SO4] are mg/L
$X = | (2.5[2280.00] - 1.04[7450.00) | \times 10\text{-}5$
$X = 2068.56 \times 10\text{-}5$

Calculation of Solubility

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right) * \text{eq wt} = \text{Solubility of CaSO4 in mq/L.}$$

S = 6023.82 @ 68 degrees F or 20 degrees C.
S = 6290.98 @ 86 degrees F or 30 degrees C.
S = 6507.32 @ 104 degrees F or 40 degrees C.
S = 6581.42 @ 122 degrees F or 50 degrees C.
S = 6654.85 @ 140 degrees F or 60 degrees C.

Solubility Difference = Actual [CaSO4] - Calculated S of CaSO4 in mq/L
S.D. = 7743.35 - 6023.82 = 1719.54 @ 68 degrees F or 20 degrees C.
S.D. = 7743.35 - 6290.98 = 1452.38 @ 86 degrees F or 30 degrees C.
S.D. = 7743.35 - 6507.32 = 1236.04 @ 104 degrees F or 40 degrees C.
S.D. = 7743.35 - 6581.42 = 1161.93 @ 122 degrees F or 50 degrees C.
S.D. = 7743.35 - 6654.85 = 1088.51 @ 140 degrees F or 60 degrees C.

Prairie Petro-Chem
738 - 6th Street, Estevan, Saskatchewan S4A 1A4

LAB REPORT

WATER ANALYSIS REPORT

Company : Tundra Oil & Gas
Address : Virden, MB
Lease :
Well : 01-04-08-29w1
Sample Pt. : Wellhead

Date : Oct. 7, 04
Date Sampled :
Analysis No. : 10

	ANALYSIS		mg/L		* meq/L
1.	pH	6.8			
2.	H2S (qualitative)	Positive			
3.	Specific Gravity	1.1077			
4.	Total Dissolved Solids		164487.7		
5.	Bicarbonate	HCO3	152.0	HCO3	2.5
6.	Chloride	Cl	93800.0	Cl	2646.0
7.	Sulfate	SO4	7090.0	SO4	147.6
8.	Calcium	Ca	2160.0	Ca	107.8
9.	Magnesium	Mg	583.0	Mg	48.0
10.	Sodium (calculated)	Na	60702.1	Na	2640.4
11.	Iron	Fe	0.6		

PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter

108	*Ca <----- *HCO3	2
	/------->	
48	*Mg -----> *SO4	148
	<---------/	
2640	*Na -----> *Cl	2646

Saturation Values Dist. Water 20 C

CaCO3	13 mg/L
CaSO4 * 2H2O	2090 mg/L
BaSO4	2.4 mg/L

Compound	Equiv wt	X meq/L	= mg/L
Ca(HCO3)2	81.0	2.5	202
CaSO4	68.1	105.3	7166
CaCl2	55.5		
Mg(HCO3)2	73.2		
MgSO4	60.2	42.4	2549
MgCl2	47.6	5.6	267
NaHCO3	84.0		
Na2SO4	71.0		
NaCl	58.4	2640.4	154303

Prairie Petro-Chem

Respectfully submitted,
B. Frehlick

STABILITY INDEX CALCULATIONS
(Stiff-Davis Method)
CaCO3 Scaling Tendency

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 10
Well	: 01-04-08-29w1		
Sample Pt.	: Wellhead		

S.I. = pH - pCa - pALK - K

where S.I. = stability index
pH = pH as measured on fresh sample
pCa = negative logarithm of calcium concentration
K = constant, depends on temperature and salt content

pH = 6.85 pCa = 1.27 pALK = 2.60

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x (3.3 x 10-5)	= 0.000
HCO3	(152)	x (0.8 x 10-5)	= 0.001
Cl	(93800)	x (1.4 x 10-5)	= 1.323
SO4	(7090)	x (2.1 x 10-5)	= 0.148
Ca	(2160)	x (5.0 x 10-5)	= 0.108
Mg	(583)	x (8.2 x 10-5)	= 0.048
Fe	(1)	x (8.1 x 10-5)	= 0.000
Ba	(0)	x (1.5 x 10-5)	= 0.000
Sr	(0)	x (2.3 x 10-5)	= 0.000
Na	(60702)	x (2.2 x 10-5)	= 1.320

Total Ionic Strength = 2.948

K = 2.86 @ 68 degrees F or 20 degrees C.
K = 2.81 @ 86 degrees F or 30 degrees C.
K = 2.76 @ 104 degrees F or 40 degrees C.
K = 2.71 @ 122 degrees F or 50 degrees C.
K = 2.65 @ 140 degrees F or 60 degrees C.

STABILITY INDEX CALCULATION

S.I. = 6.85 - 1.27 - 2.60 - 2.86 = 0.11 at 68 deg. F or 20 deg. C.
S.I. = 6.85 - 1.27 - 2.60 - 2.81 = 0.16 at 86 deg. F or 30 deg. C.
S.I. = 6.85 - 1.27 - 2.60 - 2.76 = 0.21 at 104 deg. F or 40 deg. C.
S.I. = 6.85 - 1.27 - 2.60 - 2.71 = 0.27 at 122 deg. F or 50 deg. C.
S.I. = 6.85 - 1.27 - 2.60 - 2.65 = 0.33 at 140 deg. F or 60 deg. C.

S.I. = 0 when K = 2.978

CALCIUM SULFATE SCALING TENDENCY CALCULATIONS
(Skillman-McDonald-Stiff Method)

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 10
Well	: 01-04-08-29w1		
Sample Pt.	: Wellhead		

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right)$$

where S = Solubility of Calcium Sulfate under given conditions
X = Excess Common Ion Factor
K = Constant dependent on Ionic Strength and Temperature
eq wt = Equivalent Weight

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x	(3.3 x 10-5)	= 0.000
HCO3	(152)	x	(0.8 x 10-5)	= 0.001
Cl	(93800)	x	(1.4 x 10-5)	= 1.323
SO4	(7090)	x	(2.1 x 10-5)	= 0.148
Ca	(2160)	x	(5.0 x 10-5)	= 0.108
Mg	(583)	x	(8.2 x 10-5)	= 0.048
Fe	(1)	x	(8.1 x 10-5)	= 0.000
Ba	(0)	x	(1.5 x 10-5)	= 0.000
Sr	(0)	x	(2.3 x 10-5)	= 0.000
Na	(60702)	x	(2.2 x 10-5)	= 1.320

Total Ionic Strength = 2.948

K = 2.99 x 10-3	@	68	degrees F	or 20 degrees C.
K = 3.22 x 10-3	@	86	degrees F	or 30 degrees C.
K = 3.41 x 10-3	@	104	degrees F	or 40 degrees C.
K = 3.48 x 10-3	@	122	degrees F	or 50 degrees C.
K = 3.54 x 10-3	@	140	degrees F	or 60 degrees C.

Calculation of Excess Common Ion Factor

$X = | (2.5[Ca] - 1.04[SO4]) | \times 10\text{-}5$ where [Ca] and [SO4] are mg/L
$X = | (2.5[2160.00] - 1.04[7090.00) | \times 10\text{-}5$
$X = 1993.12 \times 10\text{-}5$

Calculation of Solubility

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right) * \text{eq wt} = \text{Solubility of CaSO4 in mq/L.}$$

S = 6214.94	@	68	degrees F	or 20 degrees C.
S = 6489.69	@	86	degrees F	or 30 degrees C.
S = 6708.76	@	104	degrees F	or 40 degrees C.
S = 6784.23	@	122	degrees F	or 50 degrees C.
S = 6859.01	@	140	degrees F	or 60 degrees C.

Solubility Difference = Actual [CaSO4] - Calculated S of CaSO4 in mq/L

S.D. = 7335.81	- 6214.94 =	1120.87	@ 68	degrees F	or 20	degrees C.
S.D. = 7335.81	- 6489.69 =	846.12	@ 86	degrees F	or 30	degrees C.
S.D. = 7335.81	- 6708.76 =	627.05	@ 104	degrees F	or 40	degrees C.
S.D. = 7335.81	- 6784.23 =	551.57	@ 122	degrees F	or 50	degrees C.
S.D. = 7335.81	- 6859.01 =	476.80	@ 140	degrees F	or 60	degrees C.

Prairie Petro-Chem
738 - 6th Street, Estevan, Saskatchewan S4A 1A4

LAB REPORT

WATER ANALYSIS REPORT

Company : Tundra Oil & Gas
Address : Virden, MB
Lease :
Well : 04-28-07-29w1
Sample Pt. : Wellhead

Date : Oct. 7, 04
Date Sampled :
Analysis No. : 11

	ANALYSIS		mg/L		* meq/L
1.	pH	6.8			
2.	H2S (qualitative)	Positive			
3.	Specific Gravity	1.1122			
4.	Total Dissolved Solids		168181.2		
5.	Bicarbonate	HCO3	164.0	HCO3	2.7
6.	Chloride	Cl	96900.0	Cl	2733.4
7.	Sulfate	SO4	6215.0	SO4	129.4
8.	Calcium	Ca	2520.0	Ca	125.7
9.	Magnesium	Mg	680.0	Mg	55.9
10.	Sodium (calculated)	Na	61701.7	Na	2683.8
11.	Iron	Fe	0.5		

PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter

126	*Ca <----- *HCO3	3
	/------->	
56	*Mg -----> *SO4	129
	<---------/	
2684	*Na -----> *Cl	2733

Saturation Values Dist. Water 20 C

CaCO3	13 mg/L
CaSO4 * 2H2O	2090 mg/L
BaSO4	2.4 mg/L

Compound	Equiv wt	X meq/L	= mg/L
Ca(HCO3)2	81.0	2.7	218
CaSO4	68.1	123.1	8375
CaCl2	55.5		
Mg(HCO3)2	73.2		
MgSO4	60.2	6.4	383
MgCl2	47.6	49.6	2360
NaHCO3	84.0		
Na2SO4	71.0		
NaCl	58.4	2683.8	156844

Prairie Petro-Chem

Respectfully submitted,
B. Frehlick

STABILITY INDEX CALCULATIONS
(Stiff-Davis Method)
CaCO3 Scaling Tendency

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 11
Well	: 04-28-07-29w1		
Sample Pt.	: Wellhead		

S.I. = pH - pCa - pALK - K

where S.I. = stability index
pH = pH as measured on fresh sample
pCa = negative logarithm of calcium concentration
K = constant, depends on temperature and salt content

pH = 6.85 pCa = 1.20 pALK = 2.57

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x (3.3 x 10-5)	= 0.000
HCO3	(164)	x (0.8 x 10-5)	= 0.001
Cl	(96900)	x (1.4 x 10-5)	= 1.367
SO4	(6215)	x (2.1 x 10-5)	= 0.129
Ca	(2520)	x (5.0 x 10-5)	= 0.126
Mg	(680)	x (8.2 x 10-5)	= 0.056
Fe	(1)	x (8.1 x 10-5)	= 0.000
Ba	(0)	x (1.5 x 10-5)	= 0.000
Sr	(0)	x (2.3 x 10-5)	= 0.000
Na	(61702)	x (2.2 x 10-5)	= 1.342

Total Ionic Strength = 3.021

K = 2.86 @ 68 degrees F or 20 degrees C.
K = 2.81 @ 86 degrees F or 30 degrees C.
K = 2.76 @ 104 degrees F or 40 degrees C.
K = 2.71 @ 122 degrees F or 50 degrees C.
K = 2.65 @ 140 degrees F or 60 degrees C.

STABILITY INDEX CALCULATION

S.I. = 6.85 - 1.20 - 2.57 - 2.86 = 0.22 at 68 deg. F or 20 deg. C.
S.I. = 6.85 - 1.20 - 2.57 - 2.81 = 0.27 at 86 deg. F or 30 deg. C.
S.I. = 6.85 - 1.20 - 2.57 - 2.76 = 0.32 at 104 deg. F or 40 deg. C.
S.I. = 6.85 - 1.20 - 2.57 - 2.71 = 0.37 at 122 deg. F or 50 deg. C.
S.I. = 6.85 - 1.20 - 2.57 - 2.65 = 0.43 at 140 deg. F or 60 deg. C.

S.I. = 0 when K = 3.080

CALCIUM SULFATE SCALING TENDENCY CALCULATIONS
(Skillman-McDonald-Stiff Method)

Company	: Tundra Oil & Gas	Date	: Oct. 7, 04
Address	: Virden, MB	Date Sampled	:
Lease	:	Analysis No.	: 11
Well	: 04-28-07-29w1		
Sample Pt.	: Wellhead		

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right)$$

where S = Solubility of Calcium Sulfate under given conditions
X = Excess Common Ion Factor
K = Constant dependent on Ionic Strength and Temperature
eq wt = Equivalent Weight

CALCULATION OF IONIC STRENGTH AND K VALUE

CO3	(0)	x (3.3 x 10-5)	= 0.000
HCO3	(164)	x (0.8 x 10-5)	= 0.001
Cl	(96900)	x (1.4 x 10-5)	= 1.367
SO4	(6215)	x (2.1 x 10-5)	= 0.129
Ca	(2520)	x (5.0 x 10-5)	= 0.126
Mg	(680)	x (8.2 x 10-5)	= 0.056
Fe	(1)	x (8.1 x 10-5)	= 0.000
Ba	(0)	x (1.5 x 10-5)	= 0.000
Sr	(0)	x (2.3 x 10-5)	= 0.000
Na	(61702)	x (2.2 x 10-5)	= 1.342

Total Ionic Strength = 3.021

K = 3.01 x 10-3	@	68	degrees F	or	20 degrees C.
K = 3.24 x 10-3	@	86	degrees F	or	30 degrees C.
K = 3.42 x 10-3	@	104	degrees F	or	40 degrees C.
K = 3.49 x 10-3	@	122	degrees F	or	50 degrees C.
K = 3.56 x 10-3	@	140	degrees F	or	60 degrees C.

Calculation of Excess Common Ion Factor

$X = | (2.5[Ca] - 1.04[SO4]) | \times 10\text{-}5$ where [Ca] and [SO4] are mg/L
$X = | (2.5[2520.00] - 1.04[6215.00) | \times 10\text{-}5$
$X = 183.84 \times 10\text{-}5$

Calculation of Solubility

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right) * \text{eq wt} = \text{Solubility of CaSO4 in mq/L.}$$

S =	7339.48 @	68	degrees F or	20 degrees C.
S =	7618.93 @	86	degrees F or	30 degrees C.
S =	7840.66 @	104	degrees F or	40 degrees C.
S =	7918.81 @	122	degrees F or	50 degrees C.
S =	7996.20 @	140	degrees F or	60 degrees C.

Solubility Difference = Actual [CaSO4] - Calculated S of CaSO4 in mq/L

S.D. = 8558.44	- 7339.48 =	1218.96 @	68	degrees F or	20	degrees C.
S.D. = 8558.44	- 7618.93 =	939.51 @	86	degrees F or	30	degrees C.
S.D. = 8558.44	- 7840.66 =	717.78 @	104	degrees F or	40	degrees C.
S.D. = 8558.44	- 7918.81 =	639.63 @	122	degrees F or	50	degrees C.
S.D. = 8558.44	- 7996.20 =	562.24 @	140	degrees F or	60	degrees C.