

WASKADA UNIT NO. 6
WATERFLOOD EOR PROJECT
ANNUAL REPORT FOR 2014

June 16, 2015

Tundra Oil and Gas Partnership

Table of Contents

Monthly Production	1
Cumulative Production	1
Water Injection Summary.....	2
Well Servicing	3
Voidage Replacement Summary.....	3
Well List	4
Discussion	5
Appendices	6

Cumulative Production Plot

Daily Production and Injection Rates Plot

Attention: **Stacy McBride, P.Eng.**
A/Chief Petroleum Engineer

RE: Waskada Unit No.6

Tundra Oil and Gas (Tundra), as the operator of the Waskada Unit 6 Enhanced Oil Recovery (EOR) project hereby submits the 2014 EOR report as per section 73 of the Drilling and Production Regulations.

a) Monthly oil and water production rates, injection rate, GOR and WOR

MONTH	AVERAGE OIL PRODUCTION m ³ /day	AVERAGE FLUID INJECTION RATE m ³ /day	AVERAGE WATER PRODUCTION m ³ /day	GOR m ³ /m ³	WOR m ³ /m ³
JAN.	49.9	524.1	360.8	48	7.2
FEB.	53.3	218.3	298.7	48	5.6
MAR.	46.3	456.7	281.3	48	6.1
APRIL	46.0	435.2	391.6	48	8.5
MAY	45.2	446.0	391.7	48	8.7
JUNE	37.1	433.5	389.3	48	10.5
JULY	29.6	362.0	322.5	48	10.9
AUG.	31.8	415.5	399.7	48	12.6
SEPT.	26.1	399.5	338.8	48	13.0
OCT.	26.3	0.0	378.6	48	14.4
NOV.	21.4	433.9	389.4	48	18.2
DEC.	21.8	406.6	390.3	48	17.9

b) Cumulative 2014 volume of oil, gas and water produced and fluid injected

2014 PRODUCTION	
Produced Oil	13,191 m ³
Produced Gas	633,168 m ³
Produced Water	131,905 m ³
Fluid Injected	138,114 m ³
CUMMULATIVE PRODUCTION	
Produced Oil	301,573 m ³
Produced Water	2,163,100 m ³

c) Monthly wellhead injection pressure for each injection well

MONTHLY INJECTION VOLUMES AND PRESSURES										
	100/13-06-01-25		102/13-07-01-25		100/15-07-01-25		100/15-12-01-26		Waskada Unit 6	
	Inj Water (m ³)	Avg Inj P (kPa)	Inj Water (m ³)	Avg Inj P (kPa)	Inj Water (m ³)	Avg Inj P (kPa)	Inj Water (m ³)	Avg Inj P (kPa)	Total Inj Water (m ³)	Avg Inj P (kPa)
JAN	2657	3119	8944	2955	1406	2740	3240	2497	16247	2872
FEB	1677	3535	2547	1806	406	2142	1482	1636	6112	2261
MAR	2282	3020	7943	2429	1188	3137	2746	2004	14159	2501
APR	2095	3255	7276	2229	1141	3394	2544	1850	13056	2422
MAY	1872	3221	6423	1745	1841	2195	3689	1337	13825	1896
JUNE	1807	3062	5734	2597	1807	2144	3656	2447	13004	2557
JULY	1606	3268	5241	1854	1485	2798	2889	2002	11221	2220
AUG	1793	2284	5520	2178	1969	3207	3600	1853	12882	2259
SEPT	1852	3266	5024	2823	1717	3600	3393	2081	11986	2793
OCT	2291	3510	5853	2606	1842	3786	3819	1994	13805	2744
NOV	2010	2401	5233	1892	2097	2899	3676	1832	13016	2116
DEC	2054	2511	5075	1854	1878	2413	3599	1420	12606	1920
TOTAL	23996	-	70813	-	18777	-	38333	-	151919	2380
AVG INJ P	-	3038	-	2247	-	2871	-	1913	-	-

2014 WATER INJECTION SUMMARY												
	JAN.	FEB.	MAR.	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
TOTAL(m3)	16247	6112	14159	13056	13825	13004	11221	12882	11986	13805	13016	12606
DAILY(m3/day)	524.1	218.3	456.7	435.2	446.0	433.5	362.0	415.5	399.5	445.3	433.9	406.6
2014 AVG. ANNUAL DAILY INJECTION =						415	m3/day					
CUMULATIVE INJECTION TO Dec 31, 2013 =						3,149,655	m3					
TOTAL 2014 ANNUAL INJECTION =						151,919	m3					
CUMULATIVE INJECTION TO Dec 31, 2014 =						3,301,574	m3					

d) Summary of the result of any survey of reservoir pressure conducted in 2014. N/A

e) Date and type of any well servicing.

03/10-12-001-26W1/0	Pump Change	1/9/2014
02/04-18-001-25W1/0	Pump Change/Tubing Reconfiguration	1/10/2014
02/16-07-001-25W1/0	Spearfish Frac Completion	3/15/2014
03/16-07-001-25W1/0	Spearfish Frac Completion	3/16/2014
03/10-12-001-26W1/0	Rod Failure	4/17/2014
03/10-01-001-26W1/0	Cleanout lateral/ Acidize	8/13/2014
03/07-01-001-26W1/0	Pump Change	8/19/2014
04/16-12-001-26W1/0	Pump Change	9/15/2014
03/15-01-001-26W1/0	HZ Cemented Liner Cleanout & Conversion to WIW	11/8/2014
02/07-01-001-26W1/0	HZ Cemented Liner Cleanout & Conversion to WIW	11/12/2014
03/03-12-001-26W1/0	HZ Cemented Liner Cleanout	11/27/2014
02/03-12-001-26W1/0	HZ Cemented Liner Cleanout	12/2/2014

f) Calculations of voidage replacement ratio on a monthly and cumulative basis

2014 VOIDAGE CALCULATIONS							
OIL FORMATION VOLUME FACTOR = 1.17 Rm3							
MONTH	OIL PRODUCTION	WATER PRODUCTION	OIL VOIDAGE	TOTAL VOIDAGE	TOTAL INJECTION	NET VOIDAGE	VOIDAGE REPLACEMENT RATIO
	m3	m3	Rm3	Rm3	Rm3	Rm3	VRR (Rm3/m3)
JAN.	1548	11186	1811	12996	16247	-3251	1.25
FEB.	1492	8363	1746	10109	6112	3997	0.60
MAR.	1437	8721	1681	10401	14159	-3758	1.36
APRIL	1380	11747	1615	13362	13056	306	0.98
MAY	1402	12143	1640	13783	13825	-42	1.00
JUNE	1112	11678	1301	12979	13004	-25	1.00
JULY	919	9999	1075	11074	11221	-147	1.01
AUG.	987	12390	1155	13545	12882	663	0.95
SEPT.	782	10163	915	11078	11986	-908	1.08
OCT.	815	11737	954	12690	0	12690	0.00
NOV.	642	11681	751	12432	13016	-584	1.05
DEC.	675	12100	790	12890	12606	284	0.98
TOTAL	13191	131905	15433	147339	138114	9225	0.94

g) An outline of the method used for quality control and treatment of the injected fluid

The injected fluid is treated by filtration.

h) A report of any unusual performance problems and remedial measures taken or being considered. N/A

i) Any other information necessary to evaluate the project

j) Well List

Waskada Unit No. 6 Well List

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
100/12-06-001-25W1/0	Vertical	Abandoned	-
100/13-06-001-25W1/0	Vertical	Injector	-
100/04-07-001-25W1/2	Vertical	Abandoned	-
102/05-07-001-25W1/0	Vertical	ABD Injector	-
100/11-07-001-25W1/0	Vertical	Abandoned	-
103/12-07-001-25W1/0	Vertical	Producer	-
102/13-07-001-25W1/0	Vertical	Injector	-
102/14-07-001-25W1/0	Vertical	Producer - Shut-In	-
100/15-07-001-25W1/0	Vertical	Injector - Suspended	-
100/16-07-001-25W1/0	Vertical	Producer	-
102/16-07-001-25W1/0	Horizontal	Producer	-
103/16-07-001-25W1/0	Horizontal	Producer	-
100/03-18-001-25W1/0	Vertical	Abandoned - Q4 2011	-
100/04-18-001-25W1/0	Vertical	Abandoned	-
102/04-18-001-25W1/0	Horizontal	Producer	-
100/05-18-001-25W1/0	Vertical	ABD Injector	-
100/06-18-001-25W1/0	Vertical	Abandoned	-
100/07-01-001-26W1/0	Vertical	Abandoned - Q4 2011	-
102/07-01-001-26W1/0	Horizontal	Injector	-
103/07-01-001-26W1/0	Horizontal	Producer	-
100/08-01-001-26W1/2	Vertical	Abandoned - Q4 2011	-
100/09-01-001-26W1/0	Vertical	Abandoned - Q4 2011	-
100/10-01-001-26W1/2	Vertical	Abandoned - Q4 2011	-
102/10-01-001-26W1/0	Horizontal	Producer	-
103/10-01-001-26W1/0	Horizontal	Producer	-
100/15-01-001-26W1/2	Vertical	Abandoned - Q4 2011	-
102/15-01-001-26W1/0	Horizontal	Producer	-
103/15-01-001-26W1/0	Horizontal	Injector	-
100/16-01-001-26W1/2	Vertical	Abandoned - Q4 2011	-
100/01-12-001-26W1/0	Vertical	Abandoned - Q4 2011	-
100/02-12-001-26W1/2	Vertical	Abandoned	-

100/03-12-001-26W1/2	Vertical	Abandoned	-
102/03-12-001-26W1/0	Horizontal	Producer	-
103/03-12-001-26W1/0	Horizontal	Producer	-
100/05-12-001-26W1/0	Vertical	ABD Injector	-
100/06-12-001-26W1/2	Vertical	Producer	-
102/06-12-001-26W1/0	Horizontal	Producer	-
100/07-12-001-26W1/0	Vertical	ABD Injector	-
102/07-12-001-26W1/0	Horizontal	Producer	-
100/08-12-001-26W1/0	Vertical	Producer	-
102/09-12-001-26W1/0	Vertical	Mannville WSW	-
100/10-12-001-26W1/0	Vertical	Producer	-
102/10-12-001-26W1/0	Horizontal	Producer	-
103/10-12-001-26W1/0	Horizontal	Producer	-
100/15-12-001-26W1/0	Vertical	Injector	-
102/15-12-001-26W1/0	Horizontal	Producer	-
102/16-12-001-26W1/0	Vertical	Producer	-
104/16-12-001-26W1/0	Horizontal	Producer	-

k) Discussion

The Waskada Unit No. 6 field has been producing with Lower Amaranth redevelopment with infill horizontal (HZ) wells. The following operations were carried out in 2014 to further assess and improve upon our EOR strategy:

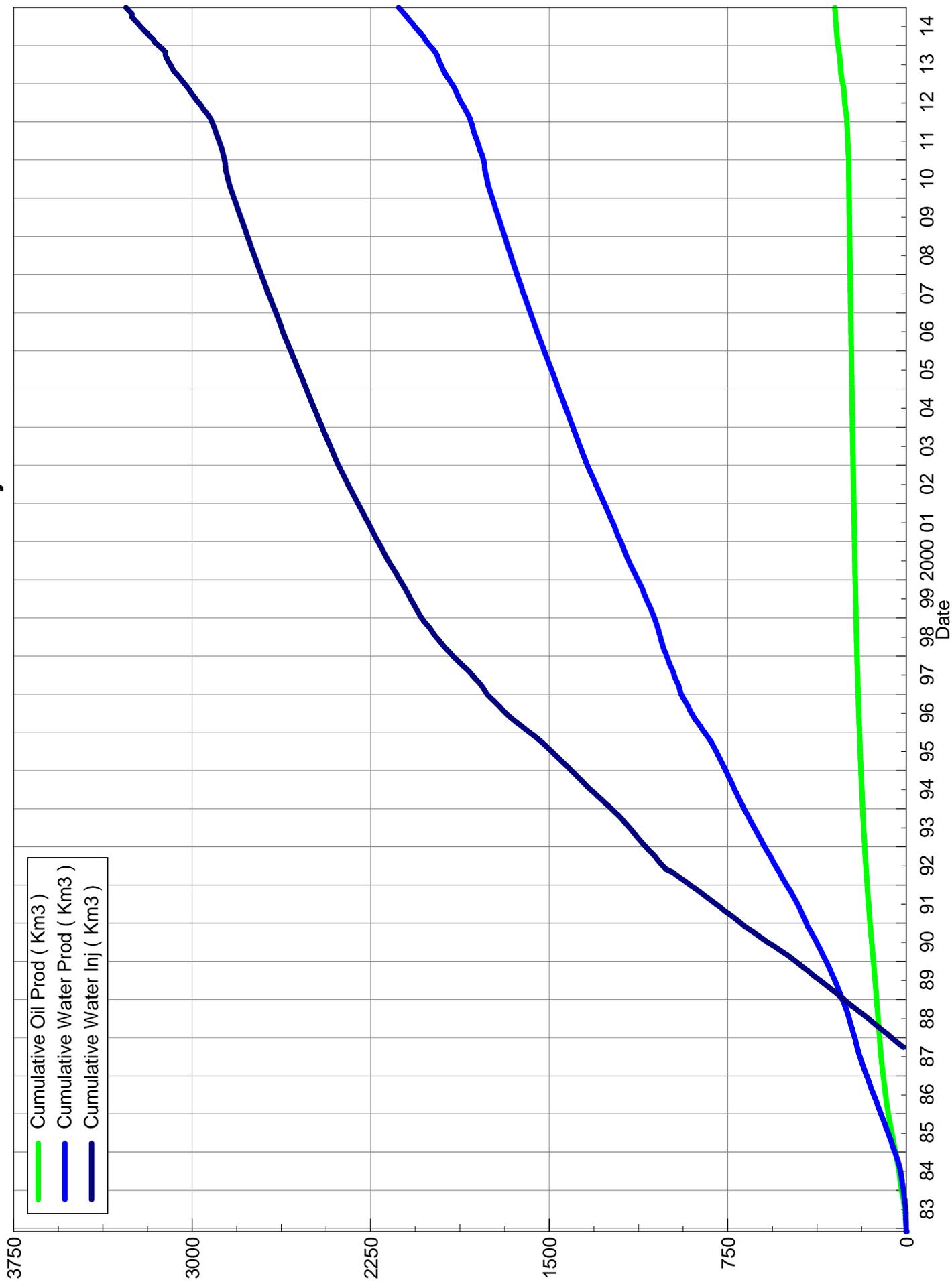
1. HZ cemented liner cleanouts (in the south of the unit) in order to test whether declines in production were due to scale or lack of reservoir pressure.
2. Two water injection conversions to increase reservoir pressure support (03/15-01-001-26W1/0 and 02/07-01-001-26W1/0).
3. Conversion of 02/09-12-001-26W1/0 producer to Mannville source water well for injection.
4. New water filtration system and injection infrastructure.

We continue to test production performance in different parts of the Unit. In an effort to improve oil recovery moving forward, a detailed EOR study of the Unit was conducted. This study encompassed a detailed look at geological, completion and production data over the history of the Unit, in hopes of developing an improved EOR strategy. From this work, it was concluded that additional injection was needed in the south of Waskada Unit No. 6. Therefore, 2 horizontal wells were converted to injection: 03/15-01-001-26W1/0 and 02/07-01-001-26W1/0. These wells will inject filtered Mannville water from 02/09-12-001-26W1/0, starting in 2015. Injectivity will be closely monitored.

Three HZ cemented liner cleanouts were also completed in the unit. These wells initially showed improved performance due to the removal of scale, but it was also evident that reservoir pressure support was lacking. The HZ injection conversions listed above should provide the support required.

WaskadaUnit6

Cumulative Production and Injection



WaskadaUnit6

Production and Injection Rates

