

Waskada Unit No. 6

Waterflood Progress Report 2018

January 1st through December 31st 2018

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

Tundra Oil and Gas

June 26, 2019

Waskada Unit No. 6

Tundra Oil and Gas (Tundra), as the operator of the Waskada Unit No. 6 Enhanced Oil Recovery (EOR) project hereby submits the 2018 EOR report as per section 73 of the Drilling and Production Regulations.

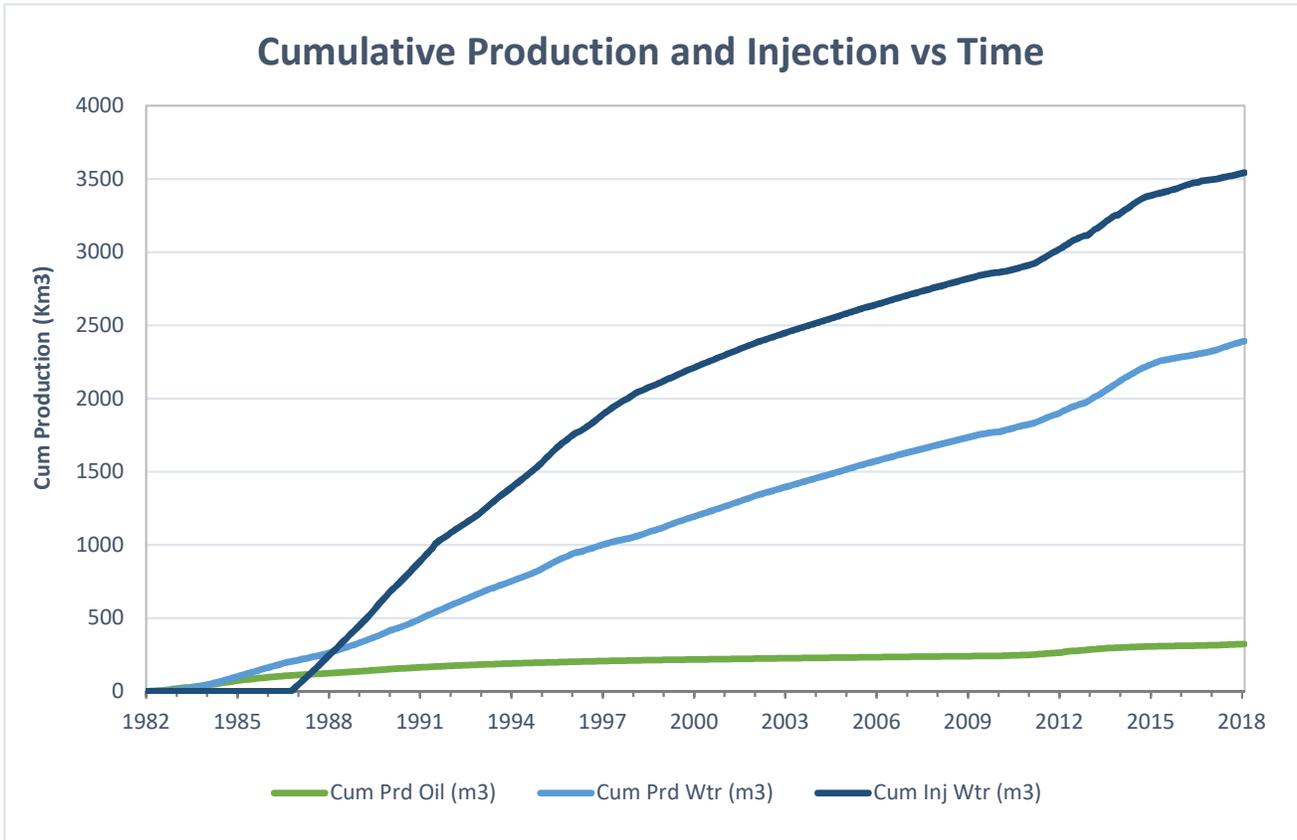
a) Monthly oil and water production rates, injection rate, GOR and WOR

MONTH	Cal Dly Oil m ³ /day	Cal Dly Wtr m ³ /day	Cal Inj Wtr m ³ /day	WOR m ³ /m ³	GOR m ³ /m ³
Jan-2018	13.35	145.13	117.68	10.87	37.69
Feb-2018	11.20	180.72	125.71	16.14	44.32
Mar-2018	19.45	201.43	125.71	10.36	23.05
Apr-2018	24.52	231.63	128.47	9.45	18.9
May-2018	21.50	160.75	119.52	7.48	15.6
Jun-2018	20.92	154.55	110.07	7.39	15.77
Jul-2018	21.39	171.08	93.35	8.00	19.3
Aug-2018	29.13	197.09	131.19	6.77	15.39
Sep-2018	19.33	172.19	135.50	8.91	23.97
Oct-2018	18.98	169.67	138.65	8.94	24.48
Nov-2018	17.74	165.19	146.63	9.31	24.81
Dec-2018	19.05	135.76	140.49	7.12	22.35

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

2018 PRODUCTION	
Produced Oil (m ³)	7,217
Produced Gas (m ³)	159
Produced Water (m ³)	63,375
Fluid Injected (m ³)	46,004
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	322,593
Produced Water (m ³)	2,392,376

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c) Monthly wellhead injection pressure for each injection well

MONTH	00/15-12 Inj		00/15-07 Inj		03/15-01 Inj		02/07-01 Inj		03/10-01 Inj		03/03-12 Inj	
	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)	Inj Water (m ³)	Avg Inj P (kPa)	Inj Water (m ³)	Avg Inj P (kPa)
Jan-2018	0.0	0	0.0	0	1208.0	2449	1208.0	2094	617.0	-93	615.0	-85
Feb-2018	0.0	0	0.0	0	1099.0	2773	1100.0	2293	661.0	-93	660.0	-83
Mar-2018	0.0	0	0.0	0	1216.0	2669	1182.0	3035	765.0	-93	734.0	-90
Apr-2018	0.0	0	0.0	0	1179.0	2772	1182.0	2260	750.0	-93	743.0	-91
May-2018	0.0	0	0.0	0	1130.0	2570	1146.0	2339	714.0	-93	715.0	-90
Jun-2018	0.0	0	0.0	0	1150.0	2973	996.0	2549	625.0	-93	531.0	-63
Jul-2018	0.0	0	0.0	0	1098.0	2794	506.0	2164	400.0	-34	890.0	-91
Aug-2018	0.0	0	0.0	0	1151.0	2964	1079.0	1978	920.0	456	917.0	-91
Sep-2018	0.0	0	0.0	0	1092.0	2993	1180.0	2588	898.0	947	895.0	-90
Oct-2018	0.0	0	0.0	0	1095.0	2920	1200.0	2735	1017.0	1600	986.0	-90
Nov-2018	0.0	0	0.0	0	1163.4	3531	1164.2	2659	1036.3	1919	1034.9	-15
Dec-2018	0.0	0	0.0	0	1157.6	3299	1174.8	2458	975.7	1906	1047.1	129
Total	0.0		0.0		13739.0		13118.0		9379.0		9768.0	
Avg Inj P		0		0		2892		2429		520		-63

MONTH	WU6	
	Inj Water (m ³)	Avg Inj P (kPa)
Jan-2018	3648.0	728
Feb-2018	3520.0	815
Mar-2018	3897.0	920
Apr-2018	3854.0	808
May-2018	3705.0	788
Jun-2018	3302.0	894
Jul-2018	2894.0	805
Aug-2018	4067.0	885
Sep-2018	4065.0	1073
Oct-2018	4298.0	1194
Nov-2018	4398.8	1349
Dec-2018	4355.2	1299
Total	46004.0	
Avg Inj P		963

c) Monthly wellhead injection pressure for each injection well

MONTH	Jan-2018	Feb-2018	Mar-2018	Apr-2018	May-2018	Jun-2018	Jul-2018	Aug-2018	Sep-2018	Oct-2018	Nov-2018	Dec-2018
Total m3	3648.0	3520.0	3897.0	3854.0	3705.0	3302.0	2894.0	4067.0	4065.0	4298.0	4398.8	4355.2
Daily (m³/d)	117.68	125.71	125.71	128.47	119.52	110.07	93.35	131.19	135.50	138.65	146.63	140.49

2018 AVG. ANNUAL DAILY INJECTION = 126.08 m3/d

CUMULATIVE INJECTION TO Dec 31, 2017 = 3,496,884 m3

TOTAL 2018 ANNUAL INJECTION = 46,004 m3

CUMULATIVE INJECTION TO Dec 31, 2018 = 3,542,888 m3

d) Summary of the result of any survey of reservoir pressure conducted in 2018. N/A

e) **Date and type of any well servicing.**

Well	Service Description	Date
102.03-12-001-26W1.00	Pump Change	12/7/2018
102.03-12-001-26W1.00	Cemented Liner Clean Out	2/28/2018
102.06-12-001-26W1.00	Pump Change	9/13/2018
102.07-12-001-26W1.00	Cemented Liner Clean Out	6/18/2018
102.10-01-001-26W1.00	Cemented Liner Clean Out	3/9/2018
102.10-12-001-26W1.00	Cleanout	3/1/2018
102.15-01-001-26W1.00	Pump Change	9/28/2018
102.15-12-001-26W1.00	Pump Change	10/17/2018
103.07-01-001-26W1.00	Cemented Liner Clean Out	8/15/2018
103.10-12-001-26W1.00	Pump Change	1/28/2018
103.10-12-001-26W1.00	Pump Change	7/11/2018
103.10-12-001-26W1.00	Pump Change	8/31/2018

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

VOIDAGE CALCULATIONS

OIL FORMATION VOLUME FACTOR (Rm³/Sm³) = 1.17

MONTH	Mth Oil Prod (m ³)	Cum Oil Prod (Km ³)	Mth Water Prod (m ³)	Cum Water Prod (Km ³)	Mth Water Inj (m ³)	Cum Water Inj (Km ³)	VRR	Cum VRR
Jan-2018	413.9	315.79	4499	2333.50	3648.0	3500.53	0.732	1.295
Feb-2018	313.6	316.10	5060.2	2338.56	3520.0	3504.05	0.649	1.294
Mar-2018	603.0	316.71	6244.3	2344.80	3897.0	3507.95	0.561	1.292
Apr-2018	735.5	317.44	6949	2351.75	3854.0	3511.80	0.493	1.290
May-2018	666.5	318.11	4983.2	2356.74	3705.0	3515.51	0.643	1.288
Jun-2018	627.6	318.74	4636.5	2361.37	3302.0	3518.81	0.615	1.287
Jul-2018	663.1	319.40	5303.5	2366.68	2894.0	3521.70	0.476	1.285
Aug-2018	902.9	320.30	6109.7	2372.79	4067.0	3525.77	0.568	1.283
Sep-2018	579.9	320.88	5165.7	2377.95	4065.0	3529.84	0.696	1.282
Oct-2018	588.3	321.47	5259.7	2383.21	4298.0	3534.13	0.723	1.281
Nov-2018	532.1	322.00	4955.7	2388.17	4398.8	3538.53	0.789	1.280
Dec-2018	590.7	322.59	4208.7	2392.38	4355.2	3542.89	0.889	1.279

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**

<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	Injection	-
100/04-07-001-25W1/2	Vertical	Abandoned	-
102/05-07-001-25W1/0	Vertical	Abandoned	-
100/11-07-001-25W1/0	Vertical	Abandoned	-
103/12-07-001-25W1/0	Vertical	Producing	-
102/13-07-001-25W1/0	Vertical	Injection	-
102/14-07-001-25W1/0	Vertical	Producing	-
100/15-07-001-25W1/0	Vertical	Injection	-
100/16-07-001-25W1/0	Vertical	Producing	-
102/16-07-001-25W1/0	Horizontal	Producing	-
103/16-07-001-25W1/0	Horizontal	Producing	-
100/03-18-001-25W1/0	Vertical	Abandoned Zone	-
100/04-18-001-25W1/0	Vertical	Abandoned	-
102/04-18-001-25W1/0	Horizontal	Suspended	-
100/05-18-001-25W1/0	Vertical	Abandoned	-
100/06-18-001-25W1/0	Vertical	Abandoned	-
100/07-01-001-26W1/0	Vertical	Abandoned	-
102/07-01-001-26W1/0	Horizontal	Injection	-
103/07-01-001-26W1/0	Horizontal	Producing	-
100/08-01-001-26W1/2	Vertical	Abandoned Zone	-
100/09-01-001-26W1/0	Vertical	Abandoned	-
100/10-01-001-26W1/2	Vertical	Abandoned Zone	-
102/10-01-001-26W1/0	Horizontal	Producing	-
103/10-01-001-26W1/0	Horizontal	Injection	-
100/15-01-001-26W1/2	Vertical	Abandoned	-
102/15-01-001-26W1/0	Horizontal	Producing	-
103/15-01-001-26W1/0	Horizontal	Injection	-
100/16-01-001-26W1/2	Vertical	Abandoned Zone	-
100/01-12-001-26W1/0	Vertical	Abandoned	-
100/02-12-001-26W1/2	Vertical	Abandoned	-
100/03-12-001-26W1/2	Vertical	Abandoned	-
102/03-12-001-26W1/0	Horizontal	Producing	-
103/03-12-001-26W1/0	Horizontal	Injection	-
100/05-12-001-26W1/0	Vertical	Abandoned	-
100/06-12-001-26W1/2	Vertical	Producing	-
102/06-12-001-26W1/0	Horizontal	Producing	-
100/07-12-001-26W1/0	Vertical	Abandoned	-
102/07-12-001-26W1/0	Horizontal	Producing	-
100/08-12-001-26W1/0	Vertical	Producing	-
102/09-12-001-26W1/0	Vertical	Source	-
100/10-12-001-26W1/0	Vertical	Producing	-
102/10-12-001-26W1/0	Horizontal	Producing	-
103/10-12-001-26W1/0	Horizontal	Producing	-
100/15-12-001-26W1/0	Vertical	Injection	-

j) Well List

Waskada Unit No. 6 Well List

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
102/15-12-001-26W1/0	Horizontal	Producing	-
102/16-12-001-26W1/0	Vertical	Abandoned Zone	-
104/16-12-001-26W1/0	Horizontal	Producing	-