

Waskada Unit No. 6

Waterflood Progress Report 2019

January 1st through December 31st 2019

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

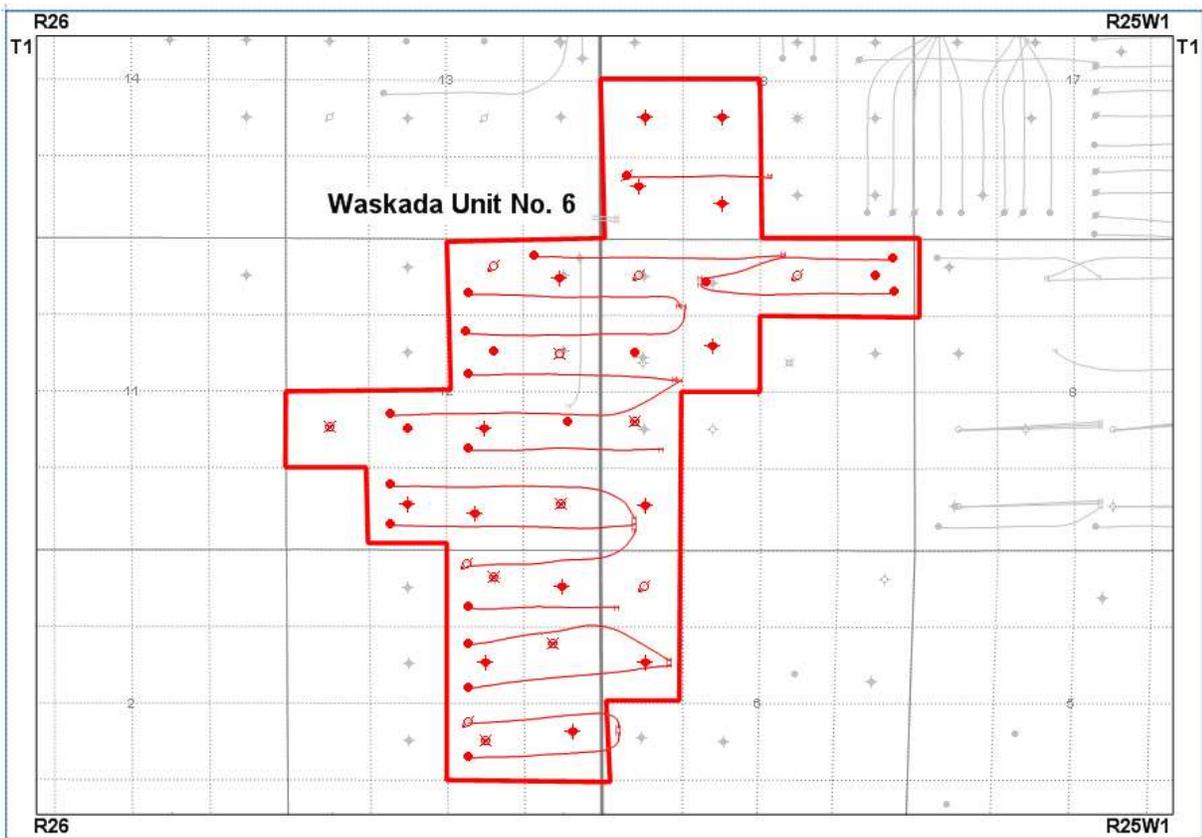
Tundra Oil and Gas

March 19, 2020

INTRODUCTION

Waskada Unit No. 6 Enhanced Oil Recovery (EOR) Waterflood Project was approved under Board Order No. PM 44 effective May 1985 and then amended into WF Order No. 1 in May 1995. Waskada Unit No. 6 area contains 33 abandoned/suspended wells, including 13 inactive/abandoned injectors, and 15 producing/injection wells in 31 LSDs in Township 1, Range 26 W1 as shown in the figure below.

Figure 1: Waskada Unit No. 6 Area Outline



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 2019 EOR report as per section 73 of the Drilling and Production Regulations.

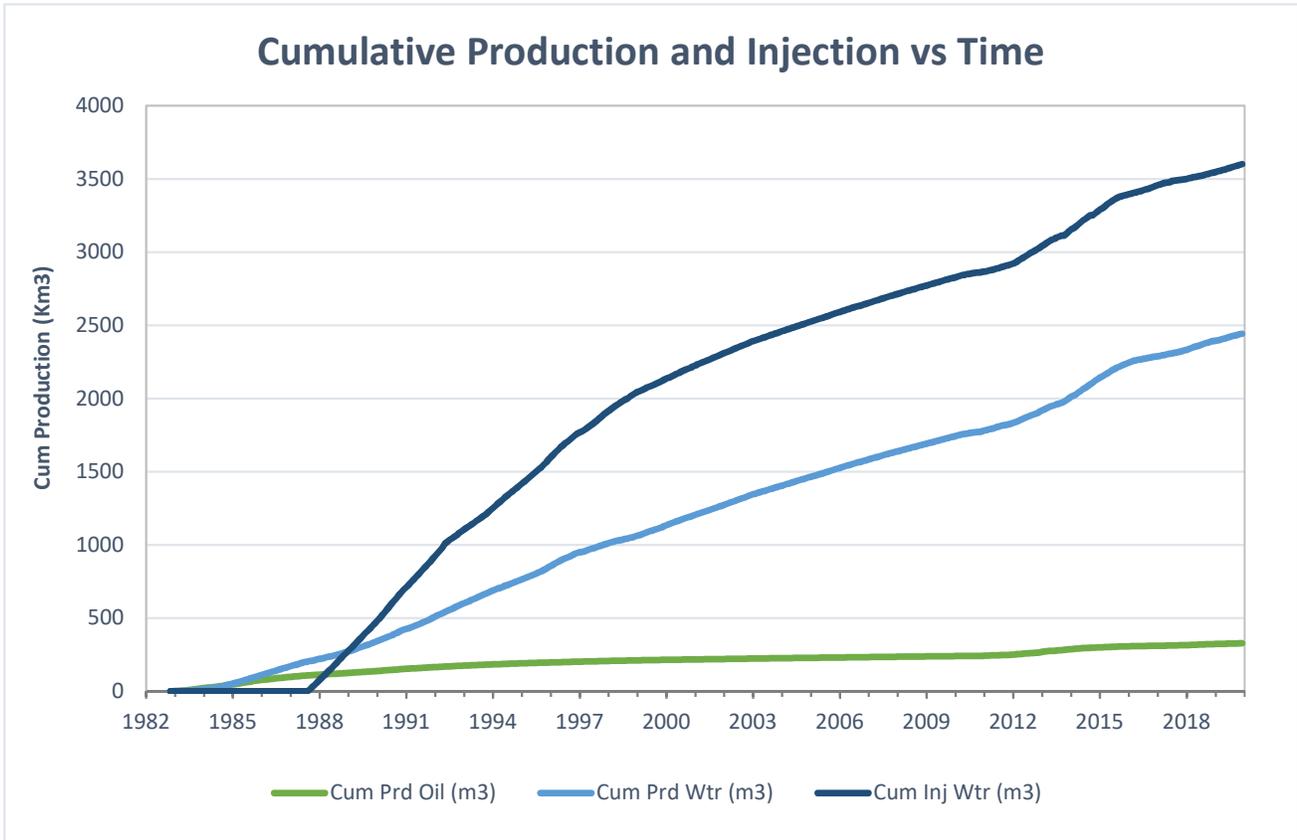
a) Monthly oil and water production rates, injection rate, GOR and WOR

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-2019	14.53	96.13	142.84	6.62	26.65
Feb-2019	11.02	111.45	152.36	10.12	35.01
Mar-2019	14.49	141.93	154.29	9.79	26.27
Apr-2019	15.44	150.17	157.00	9.72	25.47
May-2019	11.35	136.92	154.71	12.07	0
Jun-2019	12.82	159.23	153.60	12.42	0
Jul-2019	15.86	149.60	144.52	9.43	0
Aug-2019	14.32	157.47	192.74	11.00	0
Sep-2019	13.36	147.15	166.17	11.01	0
Oct-2019	12.56	141.29	163.03	11.25	0
Nov-2019	12.79	124.02	164.00	9.69	0
Dec-2019	10.69	139.77	179.55	13.07	0

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

2019 PRODUCTION	
Produced Oil (m ³)	4,849
Produced Gas (m ³)	46
Produced Water (m ³)	50,395
Fluid Injected (m ³)	58,571
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	327,442
Produced Water (m ³)	2,442,770

Waskada Unit No. 6



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-2019	0.0	0	0.0	0	1184.0	3723	1211.0	2695	957.0	2167	1076.0	375
Feb-2019	0.0	0	0.0	0	1071.0	3845	1172.0	2970	978.0	2610	1045.0	672
Mar-2019	0.0	0	0.0	0	1179.0	3959	1344.0	3182	1056.0	2800	1204.0	1050
Apr-2019	0.0	0	0.0	0	1153.0	3976	1331.0	3201	1037.0	2964	1189.0	1266
May-2019	0.0	0	0.0	0	1174.0	3980	1376.0	3219	1014.0	3086	1232.0	1446
Jun-2019	0.0	0	0.0	0	1116.0	3929	1393.0	3319	927.0	2969	1172.0	1275
Jul-2019	0.0	0	0.0	0	1057.0	3901	1357.0	3328	859.0	3428	1075.0	1402
Aug-2019	0.0	0	0.0	0	1136.0	3943	1527.0	3567	1014.0	2885	1233.0	1733
Sep-2019	0.0	0	0.0	0	1069.0	3917	1467.0	3326	77.0	159	1185.0	1810
Oct-2019	0.0	0	0.0	0	1099.0	3978	1521.0	3458	0.0	107	1212.0	1973
Nov-2019	0.0	0	0.0	0	1032.0	3868	1464.0	3515	118.0	45	1112.0	2082
Dec-2019	0.0	0	0.0	0	1028.0	3679	1465.0	3455	509.0	-91	1333.0	2375
Total	0.0		0.0		13298.0		16628.0		8546.0		14068.0	
Avg Inj P		0		0		3892		3270		1928		1455

MONTH	03/10-12 Inj		WU6	
	Inj Water (m ³)	Avg Inj P (kPa)	Inj Water (m ³)	Avg Inj P (kPa)
Jan-2019	0.0	0	4428.0	1493
Feb-2019	0.0	0	4266.0	1683
Mar-2019	0.0	0	4783.0	1832
Apr-2019	0.0	0	4710.0	1901
May-2019	0.0	0	4796.0	1955
Jun-2019	0.0	0	4608.0	1915
Jul-2019	132.0	106	4480.0	1817
Aug-2019	1065.0	-85	5975.0	1720
Sep-2019	1187.0	-84	4985.0	1304
Oct-2019	1222.0	-91	5054.0	1346
Nov-2019	1194.0	-91	4920.0	1346
Dec-2019	1231.0	-91	5566.0	1333
Total	6031.0		58571.0	
Avg Inj P		-28		1637

c) Monthly wellhead injection pressure for each injection well

MONTH	Jan-2019	Feb-2019	Mar-2019	Apr-2019	May-2019	Jun-2019	Jul-2019	Aug-2019	Sep-2019	Oct-2019	Nov-2019	Dec-2019
Total m3	4428.0	4266.0	4783.0	4710.0	4796.0	4608.0	4480.0	5975.0	4985.0	5054.0	4920.0	5566.0
Daily (m³/d)	142.84	152.36	154.29	157.00	154.71	153.60	144.52	192.74	166.17	163.03	164.00	179.55

2019 AVG. ANNUAL DAILY INJECTION = 160.40 m3/d

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

TOTAL 2019 ANNUAL INJECTION = 58,571 m3

CUMULATIVE INJECTION TO Dec 31, 2019 = 3,601,459 m3

d) Summary of the result of any survey of reservoir pressure conducted in 2019. N/A

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

Well	Service Description	Date
102.10-01-001-26W1.00	Rigless Acid	6/13/2019
102.15-01-001-26W1.00	Pump Change	2/1/2019
103.07-01-001-26W1.00	Rigless Acid	6/13/2019
102.03-12-001-26W1.00	Rigless Acid	6/13/2019
102.06-12-001-26W1.00	Pump Change	3/7/2019
102.06-12-001-26W1.00	Inspect Rods For Corrosion	11/14/2019
102.06-12-001-26W1.00	Pump Change	12/13/2019
102.07-12-001-26W1.00	Rigless Acid	7/5/2019
102.10-12-001-26W1.00	Pump Change	2/12/2019
102.10-12-001-26W1.00	Pump Change	5/31/2019
102.15-12-001-26W1.00	Pump Change/Acid Job	2/27/2019
102.15-12-001-26W1.00	Rod Failure / Pump Change	11/14/2019
103.10-12-001-26W1.00	WIW Conversion	1/23/2019

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 (m3)	Cum Oil Prod (Km3)	Mth Water Prod (m3)	Cum Water Prod (Km3)	Mth Water Inj (m3)	Cum Water Inj (Km3)	VRR	Cum VRR
Jan-2019	450.3	323.04	2980.1	2395.36	4428.0	3547.32	1.263	1.279
Feb-2019	308.5	323.35	3120.5	2398.48	4266.0	3551.58	1.225	1.279
Mar-2019	449.2	323.80	4399.9	2402.88	4783.0	3556.36	0.971	1.278
Apr-2019	463.3	324.26	4505.2	2407.38	4710.0	3561.07	0.933	1.278
May-2019	351.8	324.62	4244.5	2411.63	4796.0	3565.87	1.030	1.277
Jun-2019	384.6	325.00	4777	2416.40	4608.0	3570.48	0.882	1.277
Jul-2019	491.8	325.49	4637.7	2421.04	4480.0	3574.96	0.859	1.276
Aug-2019	443.9	325.94	4881.5	2425.92	5975.0	3580.93	1.106	1.276
Sep-2019	400.9	326.34	4414.6	2430.34	4985.0	3585.92	1.021	1.275
Oct-2019	389.5	326.73	4380.1	2434.72	5054.0	3590.97	1.045	1.275
Nov-2019	383.8	327.11	3720.7	2438.44	4920.0	3595.89	1.180	1.275
Dec-2019	331.4	327.44	4332.8	2442.77	5566.0	3601.46	1.179	1.274

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	Abandoned Zone	-
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	Abandoned Zone	-
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	Abandoned Zone	-
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	Injection	-
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	-