

Waskada Unit No. 21

Waterflood Progress Report 2018

January 1st through December 31st 2018

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

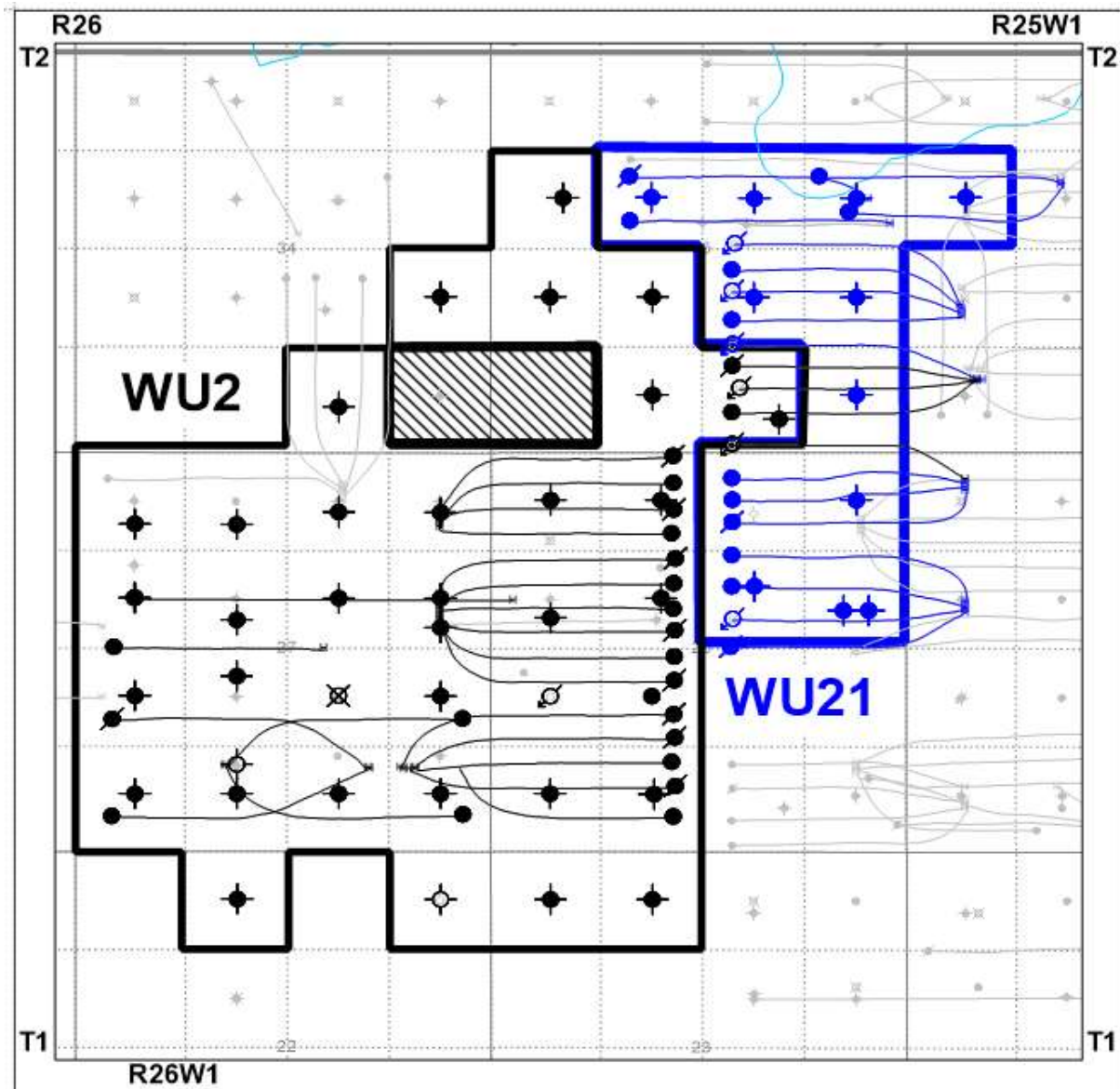
Tundra Oil and Gas

June 26, 2019

INTRODUCTION

Waskada Unit No. 21 Enhanced Oil Recovery (EOR) Waterflood Project was approved March 1, 2017 with Tundra Oil and Gas (Tundra) as operator. Waskada Unit No. 21 area contains 11 abandoned vertical wells and 16 horizontal wells (3 suspended, 8 producing and 5 on injection) in 11 Legal Sub Divisions (LSD) in Township 1, Range 26 W1 as shown in the figure below.

Figure 1: Waskada Unit No. 21 Area Outline



Waskada Unit No. 21

Tundra Oil and Gas (Tundra), as the operator of the Waskada Unit No. 21 Enhanced Oil Recovery (EOR) project hereby submits the 2018 EOR report as per section 73 of the Drilling and Production Regulations.

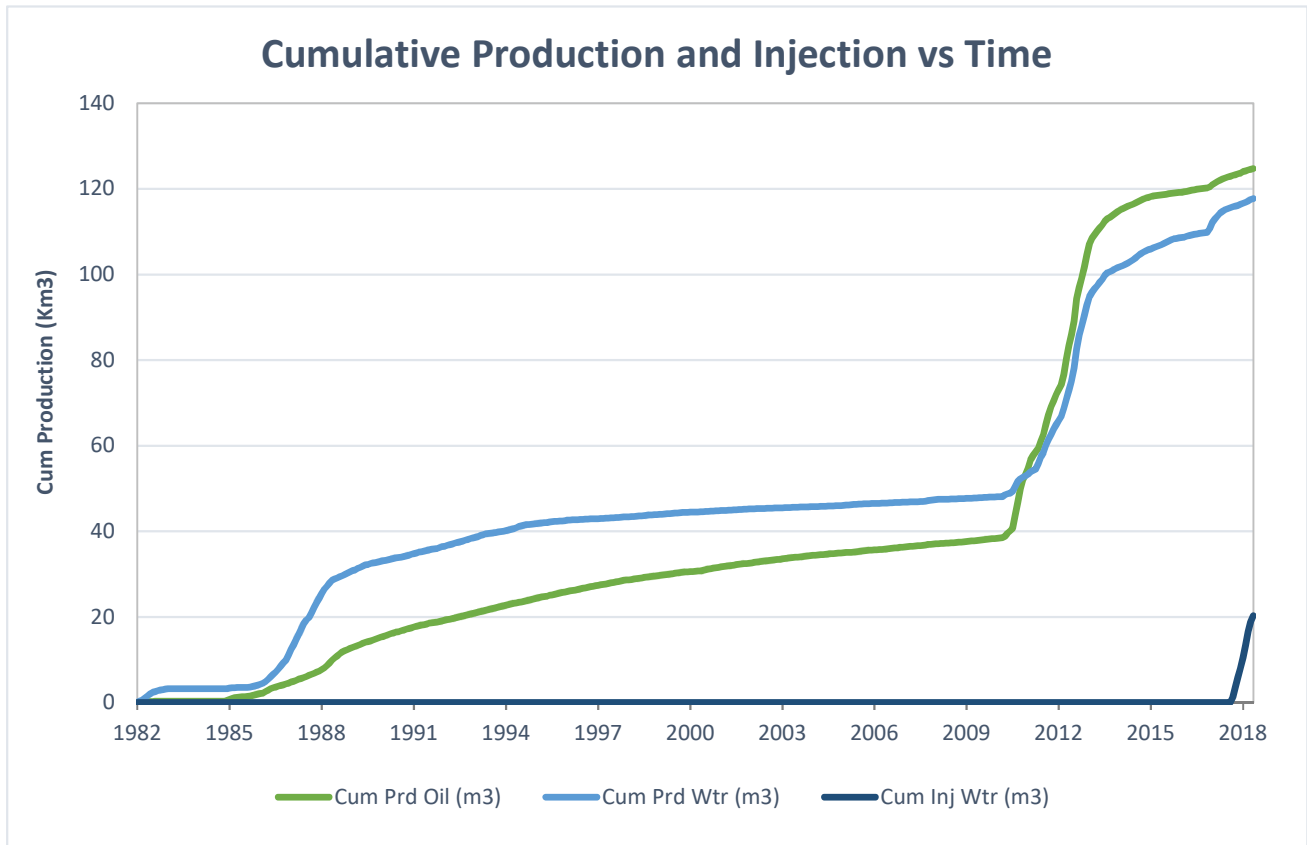
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	8.89	12.77	0.00	1.44	0
Feb-2018	6.62	8.90	0.00	1.35	0
Mar-2018	6.26	7.11	0.00	1.14	0
Apr-2018	5.94	5.78	38.87	0.97	0
May-2018	6.44	5.02	77.55	0.78	0
Jun-2018	5.52	5.36	77.90	0.97	0
Jul-2018	6.23	9.21	64.71	1.48	0
Aug-2018	10.38	8.12	81.95	0.78	0
Sep-2018	7.42	8.73	98.45	1.18	0
Oct-2018	5.89	9.70	99.71	1.65	0
Nov-2018	6.03	10.32	70.77	1.71	0
Dec-2018	4.31	7.09	41.45	1.64	0

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

2018 PRODUCTION	
Produced Oil (m ³)	2,433
Produced Gas (m ³)	0
Produced Water (m ³)	2,985
Fluid Injected (m ³)	20,282
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	124,738
Produced Water (m ³)	117,742

Waskada Unit No. 21



c) Monthly wellhead injection pressure for each injection well

	03/10-35 Inj		04/10-26 Inj		05/07-35 Inj		02/09-35 Inj		03/07-35 Inj		04/15-26 Inj	
MONTH	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	-	-	-	-	-	-	-	-	-	-	-	-
Feb-2018	-	-	-	-	-	-	-	-	-	-	-	-
Mar-2018	-	-	-	-	-	-	-	-	-	-	-	-
Apr-2018	293.0	-51	289.0	233	292.0	53	0.0	0	292.0	-30	0.0	0
May-2018	614.0	-76	612.0	-57	611.0	-91	0.0	0	567.0	-66	0.0	0
Jun-2018	584.0	-75	585.0	-83	583.0	-83	0.0	0	585.0	-77	0.0	0
Jul-2018	509.0	-10	478.0	-90	508.0	-90	0.0	0	511.0	-79	0.0	0
Aug-2018	640.6	514	611.8	-89	635.8	-86	0.0	0	652.4	-73	0.0	0
Sep-2018	741.4	1576	741.2	-91	727.2	-90	0.0	0	743.6	-83	0.0	0
Oct-2018	731.0	1903	742.0	-90	742.0	-91	129.0	335	747.0	-85	114.0	935
Nov-2018	487.0	1703	489.0	-89	486.0	-66	176.0	-37	485.0	-34	175.0	185
Dec-2018	276.0	-60	228.0	-90	274.0	-81	207.0	1	300.0	21	87.0	584
Total	4876.0		4776.0		4859.0		512.0		4883.0		376.0	
Avg Inj P		603		-49		-69		33		-56		189

	WU21	
MONTH	Inj Water (m ³)	Avg Inj P (kPa)
Jan-2018	-	-
Feb-2018	-	-
Mar-2018	-	-
Apr-2018	1166.0	51
May-2018	2404.0	-73
Jun-2018	2337.0	-80
Jul-2018	2006.0	-67
Aug-2018	2540.6	66
Sep-2018	2953.4	328
Oct-2018	3205.0	441
Nov-2018	2298.0	277
Dec-2018	1372.0	62
Total	20282.0	
Avg Inj P		112

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	0.0	0.0	0.0	1166.0	2404.0	2337.0	2006.0	2540.6	2953.4	3205.0	2298.0	1372.0
Daily (m³/d)	0.00	0.00	0.00	38.87	77.55	77.90	64.71	81.95	98.45	103.39	76.60	44.26

2018 AVG. ANNUAL DAILY INJECTION = 55.31 m3/d

CUMULATIVE INJECTION TO Dec 31, 2017 = 0 m3

TOTAL 2018 ANNUAL INJECTION = 20,282 m3

CUMULATIVE INJECTION TO Dec 31, 2018 = 20,282 m3
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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
103.09-35-001-26W1.00	Pump Change	7/10/2018
104.15-26-001-26W1.00	WIW Conversion	9/18/2018

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 (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-2018	275.5	122.58	396	115.15	0.0	0.00	0.000	0.000
Feb-2018	185.3	122.77	249.3	115.40	0.0	0.00	0.000	0.000
Mar-2018	194.0	122.96	220.4	115.62	0.0	0.00	0.000	0.000
Apr-2018	178.1	123.14	173.4	115.80	1166.0	1.17	3.054	0.004
May-2018	199.7	123.34	155.7	115.95	2404.0	3.57	6.174	0.014
Jun-2018	165.7	123.50	160.9	116.11	2337.0	5.91	6.587	0.023
Jul-2018	193.2	123.70	285.5	116.40	2006.0	7.91	3.921	0.030
Aug-2018	321.8	124.02	251.7	116.65	2540.6	10.45	4.044	0.040
Sep-2018	222.6	124.24	261.8	116.91	2953.4	13.41	5.655	0.051
Oct-2018	182.6	124.42	300.8	117.21	3205.0	16.61	6.230	0.063
Nov-2018	181.0	124.60	309.6	117.52	2298.0	18.91	4.408	0.072
Dec-2018	133.6	124.74	219.7	117.74	1372.0	20.28	3.649	0.077

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. 21 Well List

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
100/09-26-001-26W1/2	Vertical	Abandoned Zone	-
102/09-26-001-26W1/2	Vertical	Abandoned	-
100/10-26-001-26W1/2	Vertical	Abandoned Zone	-
102/10-26-001-26W1/0	Horizontal	Producing	-
103/10-26-001-26W1/0	Horizontal	Producing	-
104/10-26-001-26W1/0	Horizontal	Injection	-
105/10-26-001-26W1/0	Horizontal	Suspended	-
102/15-26-001-26W1/0	Horizontal	Producing	-
103/15-26-001-26W1/0	Horizontal	Producing	-
104/15-26-001-26W1/0	Horizontal	Suspended	WIW Conversion
100/16-26-001-26W1/0	Vertical	Abandoned	-
100/01-35-001-26W1/0	Vertical	Abandoned Zone	-
100/07-35-001-26W1/2	Vertical	Abandoned Zone	-
102/07-35-001-26W1/0	Horizontal	Producing	-
103/07-35-001-26W1/0	Horizontal	Injection	-
104/07-35-001-26W1/0	Horizontal	Producing	-
105/07-35-001-26W1/0	Horizontal	Injection	-
100/08-35-001-26W1/0	Vertical	Abandoned Zone	-
100/09-35-001-26W1/2	Vertical	Abandoned Zone	-
102/09-35-001-26W1/0	Horizontal	Injection	-
103/09-35-001-26W1/0	Horizontal	Producing	-
100/10-35-001-26W1/2	Vertical	Abandoned Zone	-
103/10-35-001-26W1/0	Horizontal	Injection	-
100/11-35-001-26W1/2	Vertical	Abandoned Zone	-
102/11-35-001-26W1/3	Horizontal	Producing	-
103/11-35-001-26W1/0	Horizontal	Suspended	-
100/12-36-001-26W1/2	Vertical	Abandoned Zone	-