

Waskada Unit No. 21

Waterflood Progress Report 2019

January 1st through December 31st 2019

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

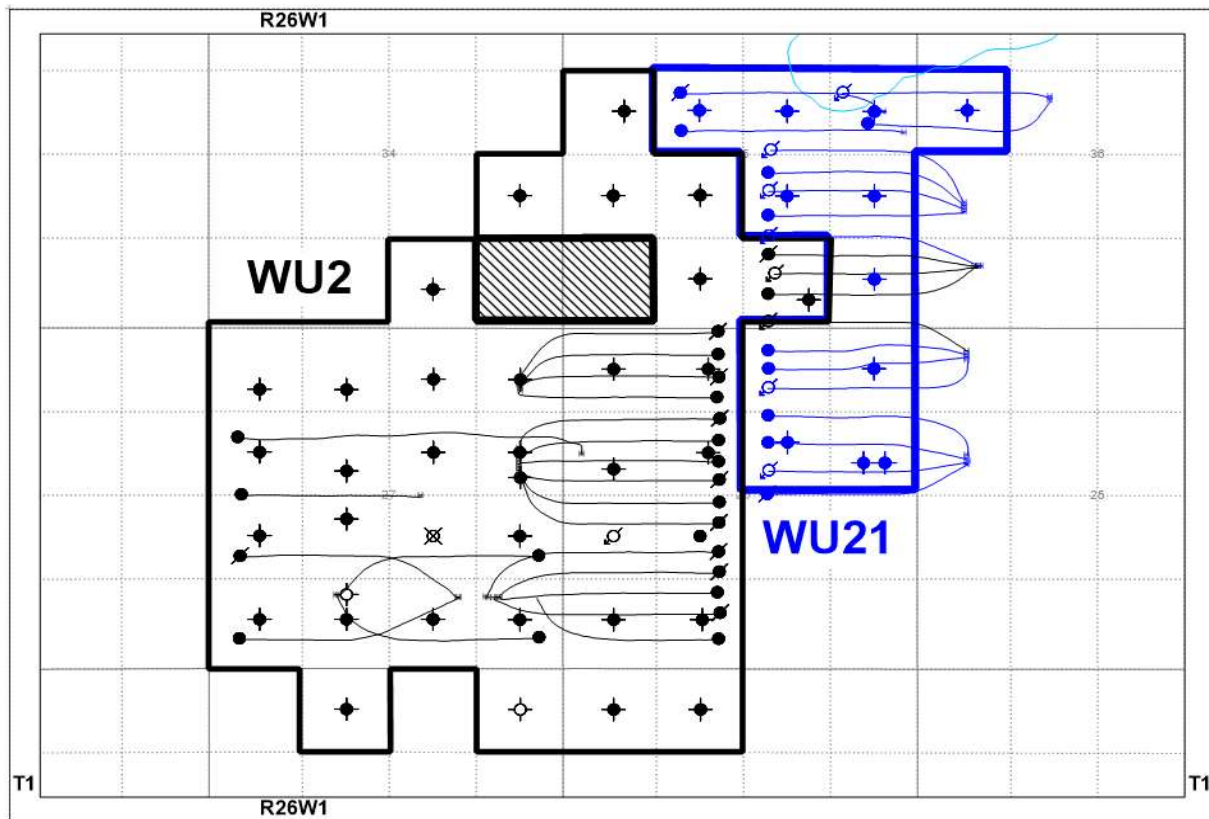
Tundra Oil and Gas

March 20, 2020

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 (2 suspended, 8 producing and 6 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 2019 EOR report as per section 73 of the Drilling and Production Regulations.

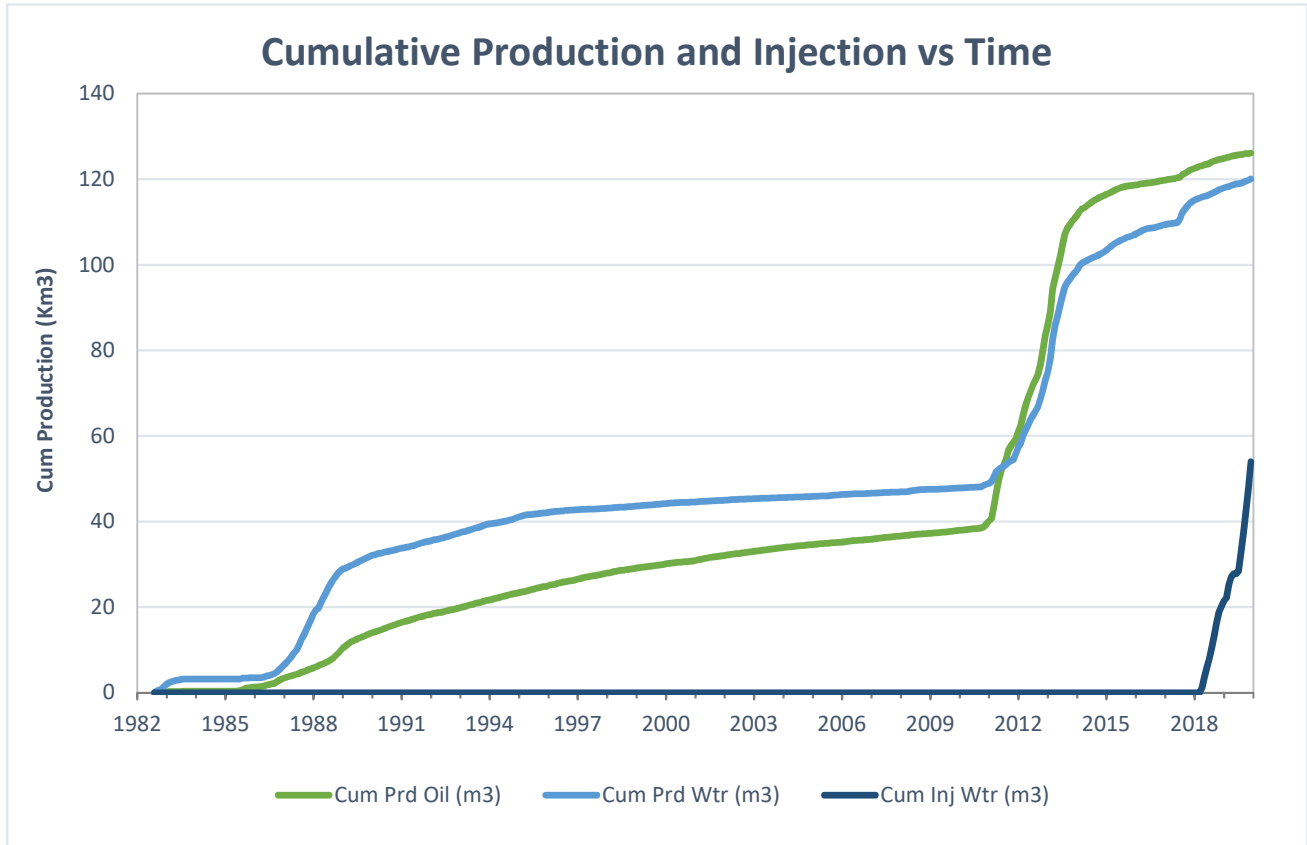
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	4.85	6.78	40.16	1.40	0
Feb-2019	4.04	5.96	20.32	1.48	0
Mar-2019	4.64	5.34	103.94	1.15	0
Apr-2019	5.23	7.94	59.23	1.52	0
May-2019	4.46	6.08	22.45	1.36	0
Jun-2019	4.60	5.12	0.00	1.11	0
Jul-2019	2.67	2.25	23.06	0.84	0
Aug-2019	2.54	3.65	144.87	1.44	0
Sep-2019	2.78	8.28	155.60	2.98	0
Oct-2019	4.41	7.27	153.48	1.65	0
Nov-2019	1.96	9.03	180.97	4.60	0
Dec-2019	2.23	9.15	197.90	4.10	0

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

2019 PRODUCTION	
Produced Oil (m ³)	1,350
Produced Gas (m ³)	0
Produced Water (m ³)	2,334
Fluid Injected (m ³)	33,705
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	126,088
Produced Water (m ³)	120,075

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-2019	303.0	-20	62.0	-90	301.0	10	215.0	-46	302.0	53	62.0	988
Feb-2019	107.0	153	0.0	-91	105.0	-55	107.0	-57	250.0	60	0.0	978
Mar-2019	544.0	1315	582.0	-72	541.0	-90	482.0	-93	606.0	27	467.0	317
Apr-2019	278.0	1561	332.0	-87	278.0	-85	224.0	-93	444.0	298	221.0	-9
May-2019	321.0	2644	21.0	-89	0.0	-95	210.0	-93	144.0	577	0.0	-16
Jun-2019	0.0	2931	0.0	-90	0.0	-95	0.0	-93	0.0	709	0.0	-16
Jul-2019	182.0	2683	177.0	-90	176.0	-94	0.0	-93	180.0	595	0.0	-16
Aug-2019	712.0	2658	936.0	-79	747.0	324	481.0	-93	865.0	1358	750.0	-72
Sep-2019	519.0	2986	1188.0	-88	741.0	1008	593.0	-93	737.0	1898	890.0	197
Oct-2019	464.0	3007	1268.0	-77	756.0	1660	675.0	7	632.0	1985	963.0	-26
Nov-2019	319.0	3056	1492.0	269	471.0	1435	1156.0	696	538.0	2564	1453.0	212
Dec-2019	402.0	3000	1540.0	636	628.0	2047	1215.0	1139	810.0	2921	1540.0	-92
Total	4151.0		7598.0		4744.0		5358.0		5508.0		6346.0	
Avg Inj P		2165		4		498		91		1087		204

	WU21	
MONTH	Inj Water (m ³)	Avg Inj P (kPa)
Jan-2019	1245.0	149
Feb-2019	569.0	165
Mar-2019	3222.0	234
Apr-2019	1777.0	264
May-2019	696.0	488
Jun-2019	0.0	558
Jul-2019	715.0	498
Aug-2019	4491.0	683
Sep-2019	4668.0	985
Oct-2019	4758.0	1093
Nov-2019	5429.0	1372
Dec-2019	6135.0	1609
Total	33705.0	
Avg Inj P		675

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	1245.0	569.0	3222.0	1777.0	696.0	0.0	715.0	4491.0	4668.0	4758.0	5429.0	6135.0
Daily (m³/d)	40.16	20.32	103.94	59.23	22.45	0.00	23.06	144.87	155.60	153.48	180.97	197.90

2019 AVG. ANNUAL DAILY INJECTION = 91.83 m3/d

CUMULATIVE INJECTION TO Dec 31, 2018 = 20,282 m3
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TOTAL 2019 ANNUAL INJECTION = 33,705 m3

CUMULATIVE INJECTION TO Dec 31, 2019 = 53,987 m3
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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
102.07-35-001-26W1.00	Pump Change / Lower PSN	10/24/2019

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	150.5	124.89	210.1	117.95	1245.0	21.53	3.224	0.082
Feb-2019	113.1	125.00	166.9	118.12	569.0	22.10	1.902	0.084
Mar-2019	143.7	125.15	165.4	118.28	3222.0	25.32	9.660	0.096
Apr-2019	156.8	125.30	238.1	118.52	1777.0	27.10	4.215	0.102
May-2019	138.4	125.44	188.6	118.71	696.0	27.79	1.986	0.105
Jun-2019	137.9	125.58	153.5	118.86	0.0	27.79	0.000	0.105
Jul-2019	82.9	125.66	69.6	118.93	715.0	28.51	4.292	0.107
Aug-2019	78.6	125.74	113.1	119.05	4491.0	33.00	21.901	0.124
Sep-2019	83.3	125.82	248.4	119.30	4668.0	37.67	13.497	0.141
Oct-2019	136.7	125.96	225.5	119.52	4758.0	42.42	12.344	0.159
Nov-2019	58.9	126.02	270.8	119.79	5429.0	47.85	15.981	0.179
Dec-2019	69.2	126.09	283.5	120.08	6135.0	53.99	16.833	0.202

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>
100/09-26-001-26W1/2	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	Injection	-
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	-