

Goodlands Unit No. 1

Waterflood Progress Report 2019

January 1st through December 31st 2019

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

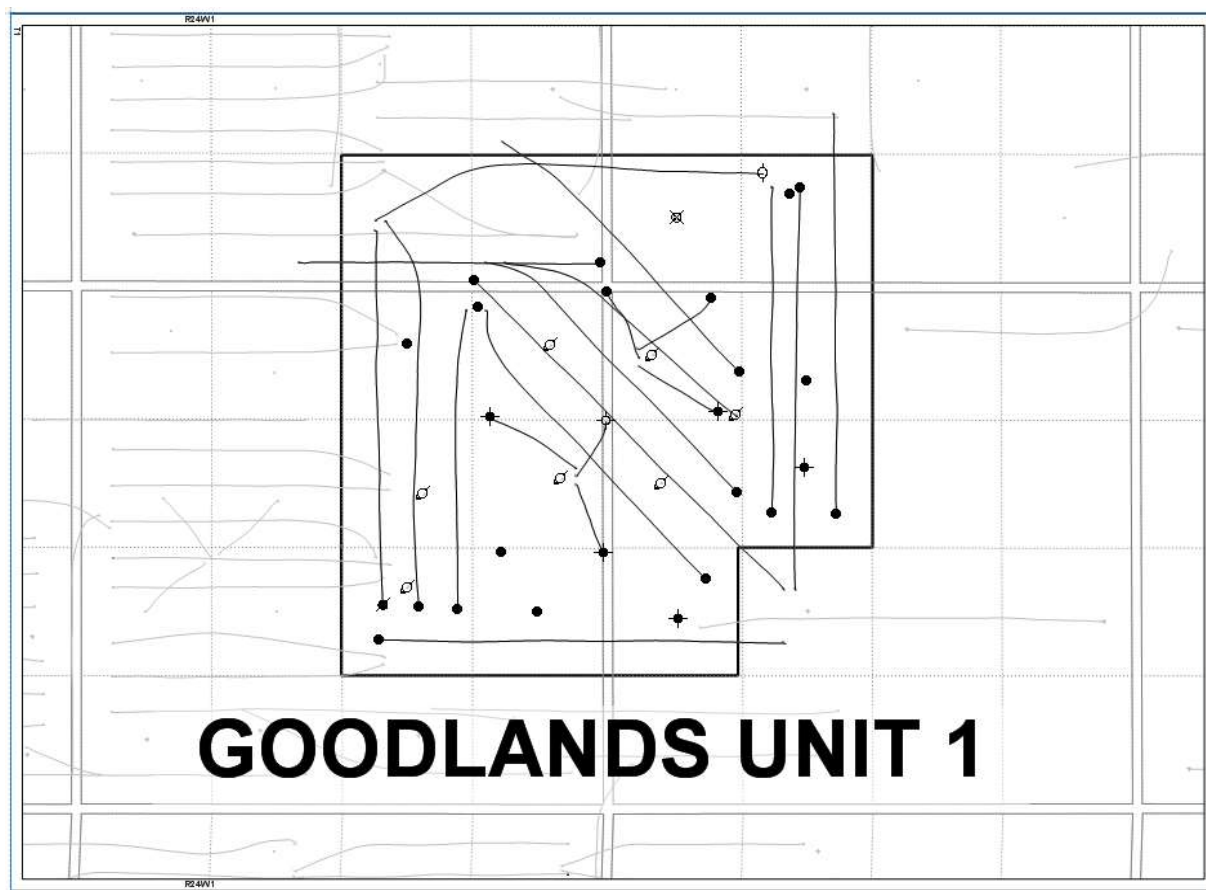
Tundra Oil and Gas

April 29, 2020

INTRODUCTION

Goodlands Unit No. 1 Enhanced Oil Recovery (EOR) Waterflood Project was approved under Waterflood Order No. 13 effective August 2002. The Unit area contains 10 abandoned wells, 16 producing/inactive wells, and 9 active/inactive injectors in 15 LSDs in Township 1, Range 24 W1 as shown in the figure below.

Figure 1: Goodlands Unit No. 1 Area Outline



Tundra Oil and Gas (Tundra), as the operator of the Goodlands Unit No. 1 Enhanced Oil Recovery (EOR) project hereby submits the 2019 EOR report as per section 73 of the Drilling and Production Regulations.

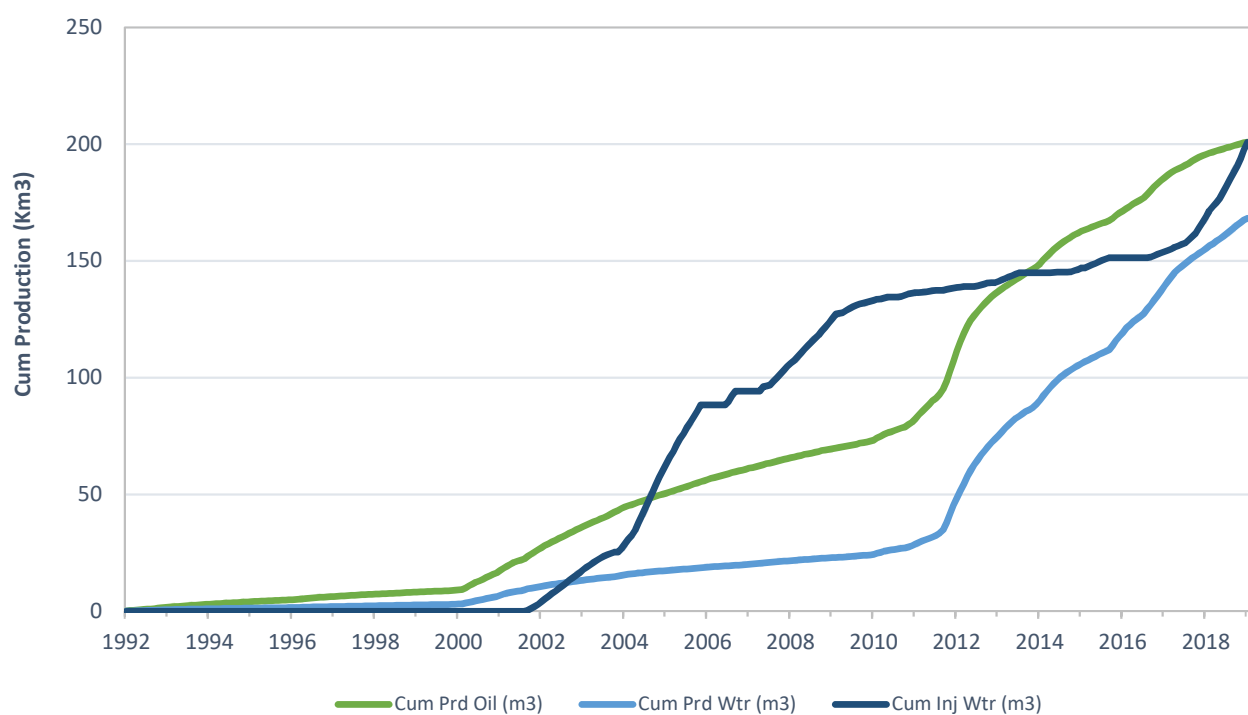
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	16.19	31.96	78.58	1.97	0
Feb-2019	14.99	30.88	64.25	2.06	0
Mar-2019	17.89	38.86	50.52	2.17	0
Apr-2019	14.03	33.64	67.70	2.40	0
May-2019	13.93	33.33	85.87	2.39	0
Jun-2019	14.27	40.06	86.87	2.81	0
Jul-2019	13.12	39.61	93.94	3.02	0
Aug-2019	14.22	40.53	84.58	2.85	0
Sep-2019	15.23	38.40	96.77	2.52	0
Oct-2019	12.99	34.20	103.39	2.63	0
Nov-2019	12.45	36.70	122.97	2.95	0
Dec-2019	11.01	24.59	103.94	2.23	0

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

2019 PRODUCTION	
Produced Oil (m ³)	5,179
Produced Gas (m ³)	0
Produced Water (m ³)	12,864
Fluid Injected (m ³)	31,653
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	200,879
Produced Water (m ³)	168,254

Cumulative Production and Injection vs Time



c) Monthly wellhead injection pressure for each injection well

	02/01-15 Inj		02/03-14 Inj		05/07-10 Inj		06/13-11 Inj		Goodlands Unit No. 1	
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)
Jan-2019	924.0	-87	591.0	-89	0.0	0	921.0	354	2436.0	60
Feb-2019	673.0	-77	455.0	-18	0.0	0	671.0	525	1799.0	143
Mar-2019	584.0	-88	393.0	100	0.0	0	589.0	568	1566.0	194
Apr-2019	760.0	-91	510.0	-92	0.0	0	761.0	960	2031.0	259
May-2019	1037.0	-91	672.0	-93	0.0	0	953.0	2352	2662.0	723
Jun-2019	1143.0	-93	718.0	-96	0.0	0	745.0	2702	2606.0	838
Jul-2019	1040.0	-92	654.0	-95	453.0	-18	765.0	2984	2912.0	700
Aug-2019	553.0	-96	720.0	-95	585.0	-90	764.0	2852	2622.0	643
Sep-2019	928.0	-91	713.0	-94	578.0	-83	684.0	2922	2903.0	663
Oct-2019	1187.0	-88	745.0	-91	619.0	-85	654.0	2923	3205.0	665
Nov-2019	1187.0	-81	742.0	-87	1162.0	-83	598.0	2986	3689.0	684
Dec-2019	1222.0	-86	763.0	-88	1189.0	-82	48.0	162	3222.0	-23
Total	11238.0		7676.0		4586.0		8153.0		31653.0	
Avg Inj P		-88		-70		-37		1858		462

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	2436.0	1799.0	1566.0	2031.0	2662.0	2606.0	2912.0	2622.0	2903.0	3205.0	3689.0	3222.0
Daily (m³/d)	78.58	64.25	50.52	67.70	85.87	86.87	93.94	84.58	96.77	103.39	122.97	103.94

2019 AVG. ANNUAL DAILY INJECTION =	86.61 m3/d
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CUMULATIVE INJECTION TO Dec 31, 2018 =	169,102 m3
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TOTAL 2019 ANNUAL INJECTION =	31,653 m3
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CUMULATIVE INJECTION TO Dec 31, 2019 =	200,755 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
103.03-14-001-24W1.00	Rigless Acid	8/15/2019
105.13-11-001-24W1.00	Rigless Acid	7/30/2019

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	501.8	196.20	990.7	156.38	2436.0	171.54	1.544	0.444
Feb-2019	419.6	196.62	864.7	157.25	1799.0	173.34	1.327	0.448
Mar-2019	554.5	197.18	1204.6	158.45	1566.0	174.90	0.845	0.449
Apr-2019	421.0	197.60	1009.1	159.46	2031.0	176.93	1.352	0.453
May-2019	431.9	198.03	1033.1	160.49	2662.0	179.60	1.730	0.458
Jun-2019	428.2	198.46	1201.9	161.69	2606.0	182.20	1.530	0.463
Jul-2019	406.8	198.86	1228	162.92	2912.0	185.11	1.709	0.468
Aug-2019	440.7	199.30	1256.3	164.18	2622.0	187.74	1.480	0.472
Sep-2019	457.0	199.76	1151.9	165.33	2903.0	190.64	1.721	0.478
Oct-2019	402.6	200.16	1060.1	166.39	3205.0	193.84	2.093	0.484
Nov-2019	373.6	200.54	1101.1	167.49	3689.0	197.53	2.398	0.491
Dec-2019	341.2	200.88	762.4	168.25	3222.0	200.76	2.774	0.498

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

Goodlands Unit No.1 Well List

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
100/07-10-001-24W1/0	Vertical	Injection	-
102/07-10-001-24W1/0	Horizontal	Producing	-
103/07-10-001-24W1/0	Horizontal	Suspended	-
104/07-10-001-24W1/0	Horizontal	Producing	-
105/07-10-001-24W1/0	Horizontal	Injection	-
100/08-10-001-24W1/0	Vertical	Pumping	-
1C0/08-10-001-24W1/0	Vertical	Producing	-
1D0/08-10-001-24W1/0	Dir/Dev	Abandoned Zone	-
100/09-10-001-24W1/0	Vertical	Abandoned	-
1W0/09-10-001-24W1/0	Dir/Dev	Abandoned	-
100/10-10-001-24W1/0	Vertical	Injection	-
100/15-10-001-24W1/0	Vertical	Pumping	-
100/16-10-001-24W1/0	Vertical	Injection	-
1B0/16-10-001-24W1/0	Dir/Dev	Abandoned Zone	-
1C0/16-10-001-24W1/0	Vertical	Producing	-
100/05-11-001-24W1/0	Vertical	Abandoned Zone	-
102/05-11-001-24W1/0	Horizontal	Producing	-
100/11-11-001-24W1/0	Vertical	Abandoned Zone	-
102/11-11-001-24W1/0	Horizontal	Producing	-
103/11-11-001-24W1/0	Horizontal	Producing	-
100/12-11-001-24W1/0	Vertical	Injection	-
102/12-11-001-24W1/0	Horizontal	Producing	-
100/13-11-001-24W1/0	Vertical	Injection	-
105/13-11-001-24W1/0	Horizontal	Producing	-
106/13-11-001-24W1/0	Horizontal	Injection	-
1A0/13-11-001-24W1/0	Dir/Dev	Abandoned Zone	-
1C0/13-11-001-24W1/0	Dir/Dev	Abandoned Zone	-
1D0/13-11-001-24W1/0	Dir/Dev	Producing	-
100/14-11-001-24W1/0	Vertical	Abandoned Zone	-
100/03-14-001-24W1/0	Vertical	Producing	-
102/03-14-001-24W1/0	Horizontal	Injection	-
103/03-14-001-24W1/0	Horizontal	Producing	-
100/04-14-001-24W1/0	Vertical	Abandoned	-
100/01-15-001-24W1/0	Horizontal	Producing	-
102/01-15-001-24W1/0	Horizontal	Injection	-