

Goodlands Unit No. 1

Waterflood Progress Report 2018

January 1st through December 31st 2018

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

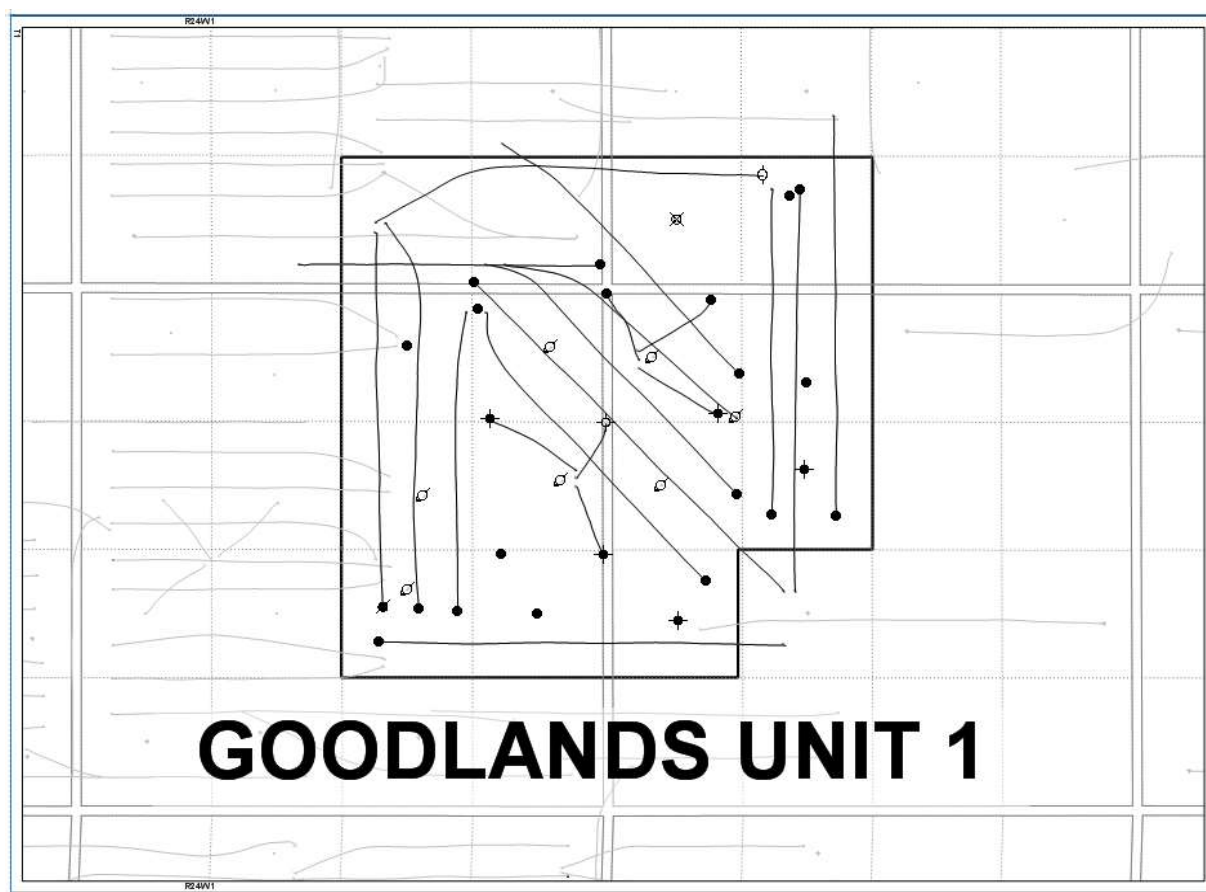
Tundra Oil and Gas

June 25, 2019

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 7 abandoned wells, 21 producing/inactive wells, and 7 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 2018 EOR report as per section 73 of the Drilling and Production Regulations.

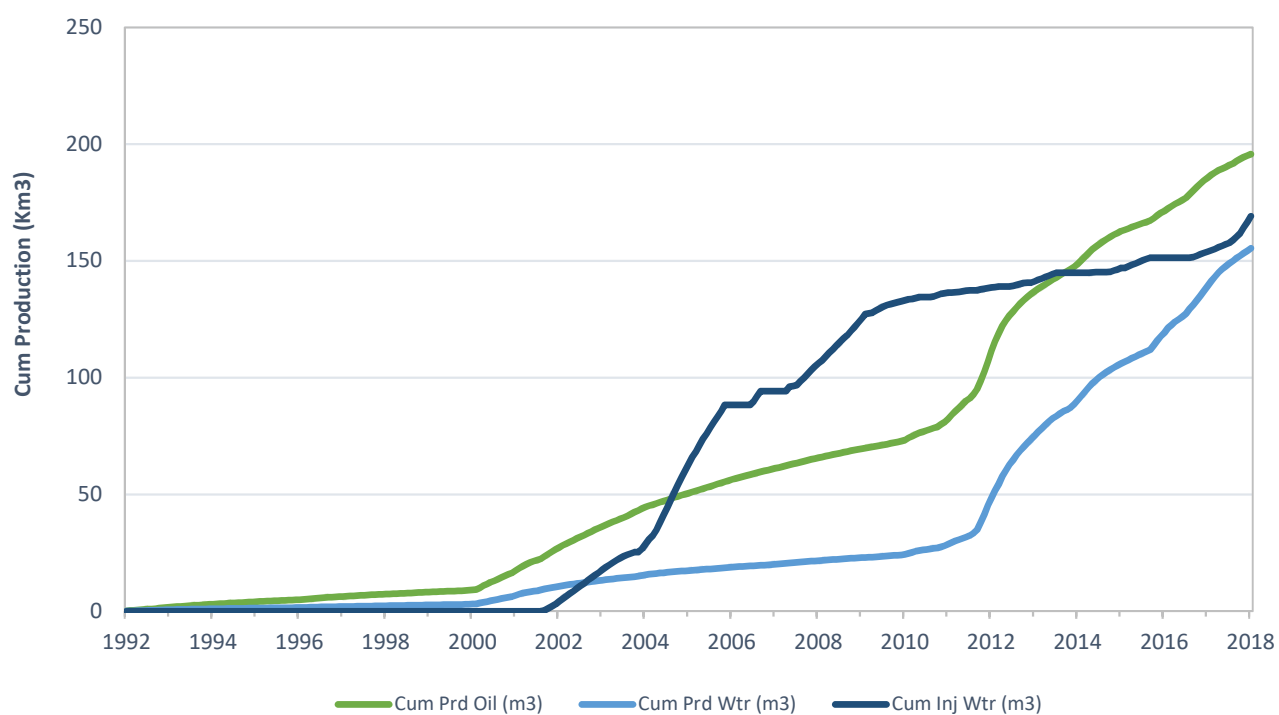
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	39.45	66.57	16.35	1.69	0
Feb-2018	34.23	60.66	19.61	1.77	0
Mar-2018	29.48	61.91	26.13	2.10	0
Apr-2018	22.57	46.79	20.17	2.07	0
May-2018	25.58	42.50	19.90	1.66	0
Jun-2018	24.30	40.51	20.00	1.67	0
Jul-2018	25.05	32.86	40.74	1.31	0
Aug-2018	34.18	40.16	41.65	1.17	0
Sep-2018	28.27	32.89	51.30	1.16	0
Oct-2018	25.16	33.53	79.39	1.33	0
Nov-2018	22.28	35.37	79.40	1.59	0
Dec-2018	20.43	34.88	79.13	1.71	0

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

2018 PRODUCTION	
Produced Oil (m ³)	10,061
Produced Gas (m ³)	0
Produced Water (m ³)	16,050
Fluid Injected (m ³)	15,077
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	195,700
Produced Water (m ³)	155,391

Cumulative Production and Injection vs Time



c) Monthly wellhead injection pressure for each injection well

MONTH	02/01-15 Inj		02/03-14 Inj		06/13-11 Inj		Goodlands Unit No. 1	
	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	507.0	-78	507.0	-78
Feb-2018	0.0	0	0.0	0	549.0	-78	549.0	-78
Mar-2018	316.0	-25	0.0	0	494.0	-80	810.0	-56
Apr-2018	605.0	-92	0.0	0	0.0	-80	605.0	-86
May-2018	617.0	-94	0.0	0	0.0	-76	617.0	-85
Jun-2018	600.0	-93	0.0	0	0.0	-50	600.0	-71
Jul-2018	608.0	-93	0.0	0	655.0	-80	1263.0	-87
Aug-2018	617.0	-94	0.0	0	674.0	-84	1291.0	-89
Sep-2018	718.0	-92	106.0	163	715.0	-85	1539.0	-49
Oct-2018	925.0	-90	616.0	-71	920.0	-83	2461.0	-81
Nov-2018	895.0	-89	595.0	-90	892.0	-81	2382.0	-87
Dec-2018	921.0	-88	613.0	-90	919.0	-77	2453.0	-85
Total	6822.0		1930.0		6325.0		15077.0	
Avg Inj P		-71		-7		-78		-78

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	507.0	549.0	810.0	605.0	617.0	600.0	1263.0	1291.0	1539.0	2461.0	2382.0	2453.0
Daily (m³/d)	16.35	19.61	26.13	20.17	19.90	20.00	40.74	41.65	51.30	79.39	79.40	79.13

2018 AVG. ANNUAL DAILY INJECTION = 41.15 m3/d

CUMULATIVE INJECTION TO Dec 31, 2017 = 154,025 m3

TOTAL 2018 ANNUAL INJECTION = 15,077 m3

CUMULATIVE INJECTION TO Dec 31, 2018 = 169,102 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
102.03-14-001-24W1.00	WIW Conversion	8/20/2018
103.03-14-001-24W1.00	Pump Change	11/20/2018

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	1223.1	186.86	2063.8	141.40	507.0	154.53	0.145	0.429
Feb-2018	958.5	187.82	1698.4	143.10	549.0	155.08	0.195	0.427
Mar-2018	913.8	188.73	1919.1	145.02	810.0	155.89	0.271	0.426
Apr-2018	677.1	189.41	1403.7	146.43	605.0	156.50	0.276	0.425
May-2018	792.9	190.20	1317.6	147.74	617.0	157.11	0.275	0.424
Jun-2018	729.1	190.93	1215.2	148.96	600.0	157.71	0.290	0.424
Jul-2018	776.6	191.71	1018.6	149.98	1263.0	158.98	0.655	0.425
Aug-2018	1059.7	192.77	1245	151.22	1291.0	160.27	0.520	0.425
Sep-2018	848.2	193.62	986.6	152.21	1539.0	161.81	0.778	0.427
Oct-2018	780.0	194.40	1039.4	153.25	2461.0	164.27	1.261	0.431
Nov-2018	668.3	195.07	1061	154.31	2382.0	166.65	1.293	0.436
Dec-2018	633.4	195.70	1081.3	155.39	2453.0	169.10	1.346	0.440

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	Producing	-
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	Injection	-
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	Producing	-
100/03-14-001-24W1/0	Vertical	Producing	-
102/03-14-001-24W1/0	Horizontal	Producing	-
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	-