

Goodlands Unit No. 3

Waterflood Progress Report 2019

January 1st through December 31st 2019

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

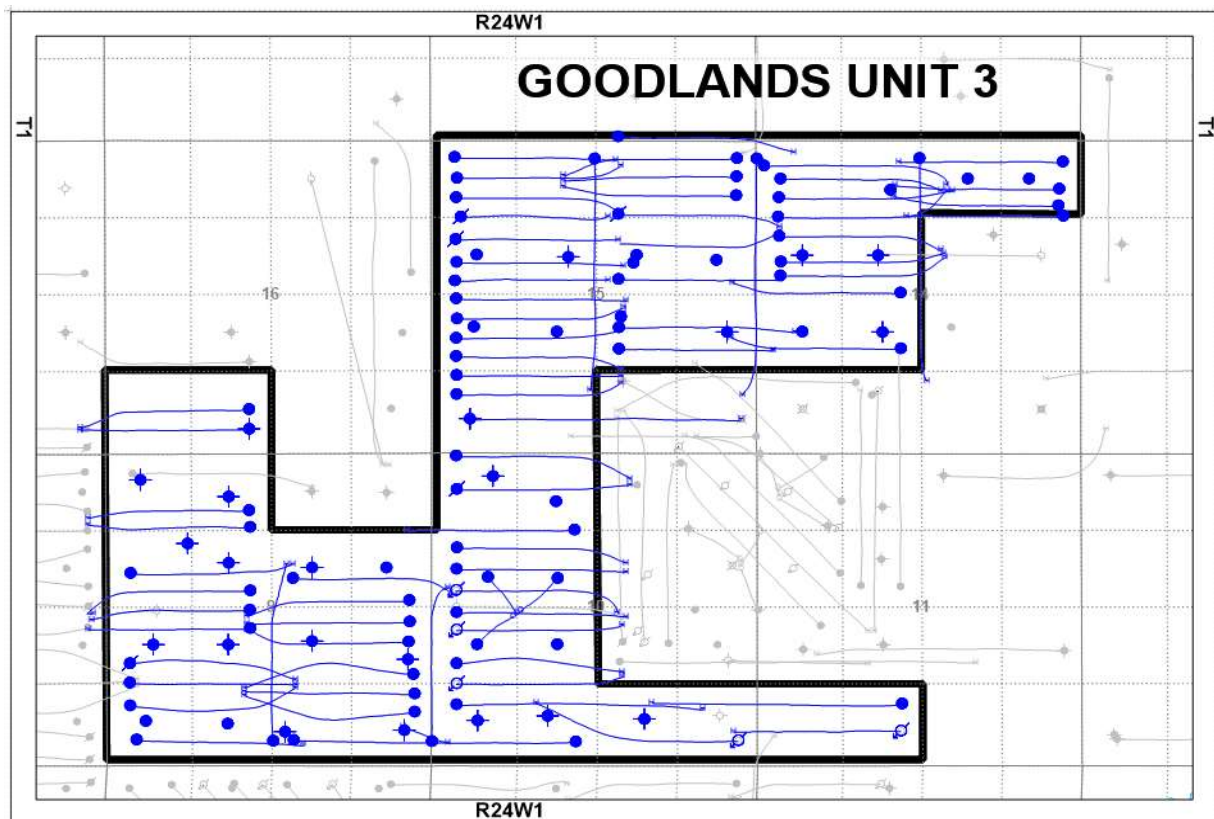
Tundra Oil and Gas

April 29, 2020

INTRODUCTION

Goodlands Unit No. 3 Enhanced Oil Recovery (EOR) Waterflood Project was approved August 1, 2017. Goodlands Unit No. 3 area contains 35 vertical wells (15 abandoned, 20 producing), 3 deviated producing wells and 76 horizontal wells (7 abandoned/suspended, 64 producing and 5 injectors) in 50 Legal Sub Divisions (LSD) in Township 1, Range 24 W1 as shown in the figure below.

Figure 1: Goodlands Unit No. 3 Area Outline



Goodlands Unit No. 3

Tundra Oil and Gas (Tundra), as the operator of the Goodlands Unit No. 3 Enhanced Oil Recovery (EOR) project hereby submits the 2019 EOR report as per section 73 of the Drilling and Production Regulations.

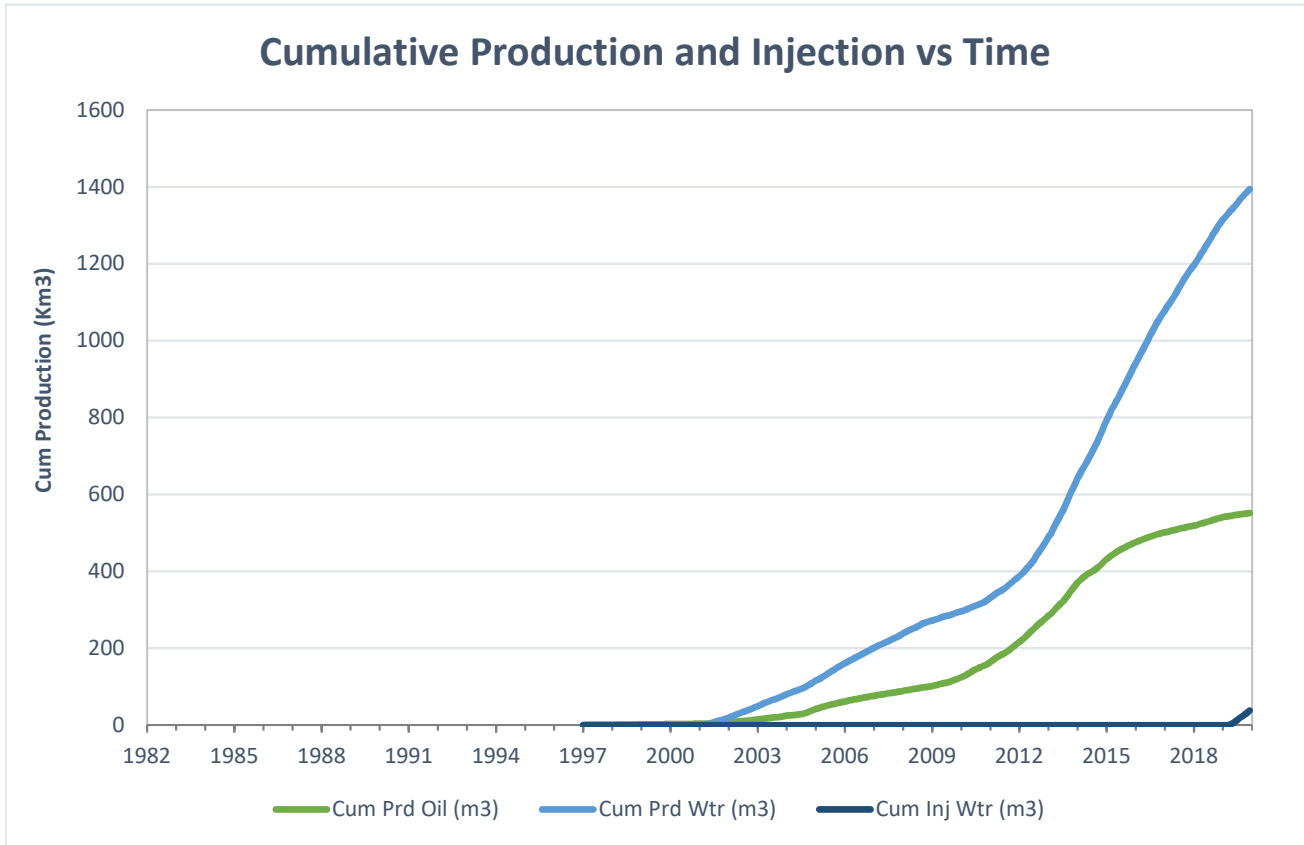
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	50.97	284.31	0.00	5.58	0
Feb-2019	43.17	259.70	0.00	6.02	0
Mar-2019	36.88	244.71	0.00	6.64	0
Apr-2019	31.33	238.80	33.60	7.62	0
May-2019	32.67	221.80	111.87	6.79	0
Jun-2019	34.58	232.66	155.63	6.73	0
Jul-2019	33.47	231.91	138.29	6.93	0
Aug-2019	27.67	257.61	160.00	9.31	0
Sep-2019	25.76	260.81	156.47	10.12	0
Oct-2019	24.60	227.47	143.45	9.25	0
Nov-2019	27.32	216.50	165.63	7.93	0
Dec-2019	38.54	217.72	174.61	5.65	0

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

2019 PRODUCTION	
Produced Oil (m ³)	12,367
Produced Gas (m ³)	0
Produced Water (m ³)	87,986
Fluid Injected (m ³)	37,915
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	551,624
Produced Water (m ³)	1,394,309

Goodlands Unit No. 3



c) Monthly wellhead injection pressure for each injection well

	02/01-10 Inj		03/05-10 Inj		03/04-10 Inj		02/03-11 Inj		02/12-10 Inj		GU3	
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	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Feb-2019	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Mar-2019	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Apr-2019	0.0	0	247.0	209	271.0	304	246.0	45	244.0	344	1008.0	226
May-2019	0.0	0	753.0	-92	1208.0	-96	753.0	-81	754.0	-88	3468.0	-89
Jun-2019	0.0	0	856.0	-97	2097.0	-99	858.0	-94	858.0	-99	4669.0	-97
Jul-2019	0.0	0	785.0	-96	1927.0	-98	787.0	-93	788.0	-97	4287.0	-96
Aug-2019	188.0	373	881.0	-95	2127.0	892	883.0	-95	881.0	-96	4960.0	169
Sep-2019	722.0	-92	869.0	-94	1366.0	1682	868.0	-93	869.0	-97	4694.0	261
Oct-2019	745.0	-88	894.0	-52	1024.0	1948	894.0	-89	890.0	-94	4447.0	325
Nov-2019	745.0	-83	1064.0	1307	988.0	2843	1086.0	-84	1086.0	-91	4969.0	778
Dec-2019	894.0	14	962.0	1922	810.0	2947	1364.0	936	1383.0	-7	5413.0	1162
Total	3294.0		7311.0		11818.0		7739.0		7753.0		37915.0	
Avg Inj P		10		243		860		29		-27		220

1/1/2020

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	0.0	0.0	0.0	1008.0	3468.0	4669.0	4287.0	4960.0	4694.0	4447.0	4969.0	5413.0
Daily (m³/d)	0.00	0.00	0.00	33.60	111.87	155.63	138.29	160.00	156.47	143.45	165.63	174.61

2019 AVG. ANNUAL DAILY INJECTION = 103.30 m3/d

CUMULATIVE INJECTION TO Dec 31, 2018 = 0 m3

TOTAL 2019 ANNUAL INJECTION = 37,915 m3

CUMULATIVE INJECTION TO Dec 31, 2019 = 37,915 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
102.03-16-001-24W1.00	Rigless Acid	8/12/2019
102.12-09-001-24W1.00	Rigless Acid	8/30/2019
102.16-15-001-24W1.00	Pump Change	9/20/2019

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	1580.2	540.84	8813.6	1315.14	0.0	0.00	0.000	0.000
Feb-2019	1208.8	542.05	7271.6	1322.41	0.0	0.00	0.000	0.000
Mar-2019	1143.3	543.19	7586	1329.99	0.0	0.00	0.000	0.000
Apr-2019	939.8	544.13	7163.9	1337.16	1008.0	1.01	0.122	0.001
May-2019	1012.7	545.14	6875.8	1344.03	3468.0	4.48	0.430	0.002
Jun-2019	1037.3	546.18	6979.9	1351.01	4669.0	9.15	0.570	0.005
Jul-2019	1037.6	547.22	7189.1	1358.20	4287.0	13.43	0.510	0.007
Aug-2019	857.8	548.07	7985.8	1366.19	4960.0	18.39	0.552	0.009
Sep-2019	772.9	548.85	7824.2	1374.01	4694.0	23.09	0.538	0.011
Oct-2019	762.7	549.61	7051.6	1381.06	4447.0	27.53	0.560	0.014
Nov-2019	819.5	550.43	6495.1	1387.56	4969.0	32.50	0.667	0.016
Dec-2019	1194.7	551.62	6749.3	1394.31	5413.0	37.92	0.664	0.019

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>
100/01-09-001-24W1/0	Vertical	Abandoned Zone	-
102/01-09-001-24W1/0	Horizontal	Producing	-
103/01-09-001-24W1/0	Horizontal	Producing	-
104/01-09-001-24W1/0	Horizontal	Producing	-
100/02-09-001-24W1/0	Vertical	Abandoned Zone	-
102/02-09-001-24W1/0	Horizontal	Producing	-
103/02-09-001-24W1/0	Horizontal	Producing	-
100/03-09-001-24W1/0	Vertical	Producing	-
100/04-09-001-24W1/0	Vertical	Producing	-
102/04-09-001-24W1/0	Horizontal	Producing	-
103/04-09-001-24W1/0	Horizontal	Producing	-
100/05-09-001-24W1/0	Vertical	Abandoned Zone	-
102/05-09-001-24W1/0	Horizontal	Producing	-
103/05-09-001-24W1/0	Horizontal	Suspended	-
100/06-09-001-24W1/0	Vertical	Abandoned Zone	-
102/06-09-001-24W1/0	Horizontal	Producing	-
103/06-09-001-24W1/2	Horizontal	Producing	-
100/07-09-001-24W1/0	Vertical	Abandoned Zone	-
100/08-09-001-24W1/0	Vertical	Abandoned Zone	-
102/08-09-001-24W1/0	Horizontal	Producing	-
103/08-09-001-24W1/0	Horizontal	Producing	-
104/08-09-001-24W1/0	Horizontal	Producing	-
100/09-09-001-24W1/0	Vertical	Producing	-
102/09-09-001-24W1/0	Horizontal	Producing	-
100/10-09-001-24W1/0	Vertical	Abandoned Zone	-
102/10-09-001-24W1/0	Horizontal	Producing	-
100/11-09-001-24W1/0	Vertical	Abandoned Zone	-
102/11-09-001-24W1/0	Horizontal	Producing	-
100/12-09-001-24W1/0	Vertical	Abandoned Zone	-
102/12-09-001-24W1/0	Horizontal	Producing	-
100/13-09-001-24W1/0	Vertical	Abandoned Zone	-
100/14-09-001-24W1/0	Vertical	Abandoned Zone	-
102/14-09-001-24W1/0	Horizontal	Producing	-
103/14-09-001-24W1/0	Horizontal	Producing	-
102/01-10-001-24W1/0	Horizontal	Injection	-
100/02-10-001-24W1/0	Vertical	Abandoned Zone	-
100/03-10-001-24W1/0	Vertical	Abandoned Zone	-
102/03-10-001-24W1/0	Horizontal	Producing	-
100/04-10-001-24W1/0	Vertical	Abandoned Zone	-
102/04-10-001-24W1/0	Horizontal	Producing	-
103/04-10-001-24W1/0	Horizontal	Injection	-
100/05-10-001-24W1/0	Dir/Dev	Producing	-
102/05-10-001-24W1/0	Horizontal	Producing	-
103/05-10-001-24W1/0	Horizontal	Injection	-
105/05-10-001-24W1/0	Horizontal	Producing	-

j) Well List

Goodlands Unit No. 3 Well List

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
100/06-10-001-24W1/0	Vertical	Pumping	-
100/11-10-001-24W1/0	Dir/Dev	Producing	-
102/11-10-001-24W1/0	Horizontal	Producing	-
100/12-10-001-24W1/0	Dir/Dev	Pumping	-
102/12-10-001-24W1/0	Horizontal	Injection	-
103/12-10-001-24W1/0	Horizontal	Producing	-
104/12-10-001-24W1/0	Horizontal	Producing	-
100/13-10-001-24W1/0	Vertical	Abandoned Zone	-
102/13-10-001-24W1/0	Horizontal	Suspended	-
103/13-10-001-24W1/0	Horizontal	Producing	-
100/14-10-001-24W1/0	Vertical	Producing	-
100/03-11-001-24W1/0	Horizontal	Producing	-
102/03-11-001-24W1/0	Horizontal	Injection	-
100/05-14-001-24W1/0	Vertical	Pumping	-
100/06-14-001-24W1/0	Vertical	Abandoned Zone	-
102/06-14-001-24W1/0	Horizontal	Producing	-
100/11-14-001-24W1/0	Vertical	Abandoned Zone	-
102/11-14-001-24W1/0	Horizontal	Producing	-
100/12-14-001-24W1/0	Vertical	Abandoned Zone	-
102/12-14-001-24W1/0	Horizontal	Producing	-
103/12-14-001-24W1/0	Horizontal	Producing	-
104/12-14-001-24W1/0	Horizontal	Producing	-
100/13-14-001-24W1/0	Horizontal	Producing	-
102/13-14-001-24W1/0	Horizontal	Producing	-
103/13-14-001-24W1/0	Horizontal	Producing	-
104/13-14-001-24W1/0	Horizontal	Producing	-
100/14-14-001-24W1/0	Vertical	Producing	-
102/14-14-001-24W1/0	Horizontal	Producing	-
100/15-14-001-24W1/0	Vertical	Producing	-
100/16-14-001-24W1/0	Vertical	Producing	-
102/16-14-001-24W1/0	Horizontal	Producing	-
103/16-14-001-24W1/0	Horizontal	Producing	-
104/16-14-001-24W1/0	Horizontal	Producing	-
105/16-14-001-24W1/0	Horizontal	Producing	-
100/04-15-001-24W1/0	Horizontal	Abandoned Zone	-
102/04-15-001-24W1/0	Horizontal	Producing	-
103/04-15-001-24W1/0	Horizontal	Producing	-
100/05-15-001-24W1/0	Vertical	Producing	-
102/05-15-001-24W1/0	Horizontal	Producing	-
103/05-15-001-24W1/0	Horizontal	Producing	-
104/05-15-001-24W1/0	Horizontal	Producing	-
105/05-15-001-24W1/0	Horizontal	Producing	-
100/06-15-001-24W1/0	Vertical	Producing	-
100/07-15-001-24W1/0	Vertical	Producing	-
102/07-15-001-24W1/0	Horizontal	Producing	-
103/07-15-001-24W1/0	Horizontal	Producing	-

j) Well List

Goodlands Unit No. 3 Well List

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
100/08-15-001-24W1/0	Vertical	Abandoned Zone	-
100/09-15-001-24W1/0	Vertical	Producing	-
100/10-15-001-24W1/0	Vertical	Pumping	-
102/10-15-001-24W1/0	Horizontal	Producing	-
103/10-15-001-24W1/0	Horizontal	Producing	-
100/11-15-001-24W1/0	Vertical	Abandoned Zone	-
100/12-15-001-24W1/0	Vertical	Producing	-
102/12-15-001-24W1/0	Horizontal	Suspended	-
103/12-15-001-24W1/0	Horizontal	Producing	-
104/12-15-001-24W1/0	Horizontal	Suspended	-
105/12-15-001-24W1/0	Horizontal	Producing	-
100/13-15-001-24W1/0	Horizontal	Producing	-
102/13-15-001-24W1/0	Horizontal	Producing	-
103/13-15-001-24W1/0	Horizontal	Producing	-
100/14-15-001-24W1/0	Horizontal	Producing	-
100/15-15-001-24W1/0	Horizontal	Suspended	-
100/16-15-001-24W1/0	Horizontal	Producing	-
102/16-15-001-24W1/0	Horizontal	Producing	-
103/16-15-001-24W1/0	Horizontal	Producing	-
104/16-15-001-24W1/0	Horizontal	Producing	-
100/03-16-001-24W1/0	Horizontal	Abandoned Zone	-
102/03-16-001-24W1/0	Horizontal	Producing	-
102/02-22-001-24W1/0	Horizontal	Producing	-