

Goodlands Unit No. 2

Waterflood Progress Report 2018

January 1st through December 31st 2018

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

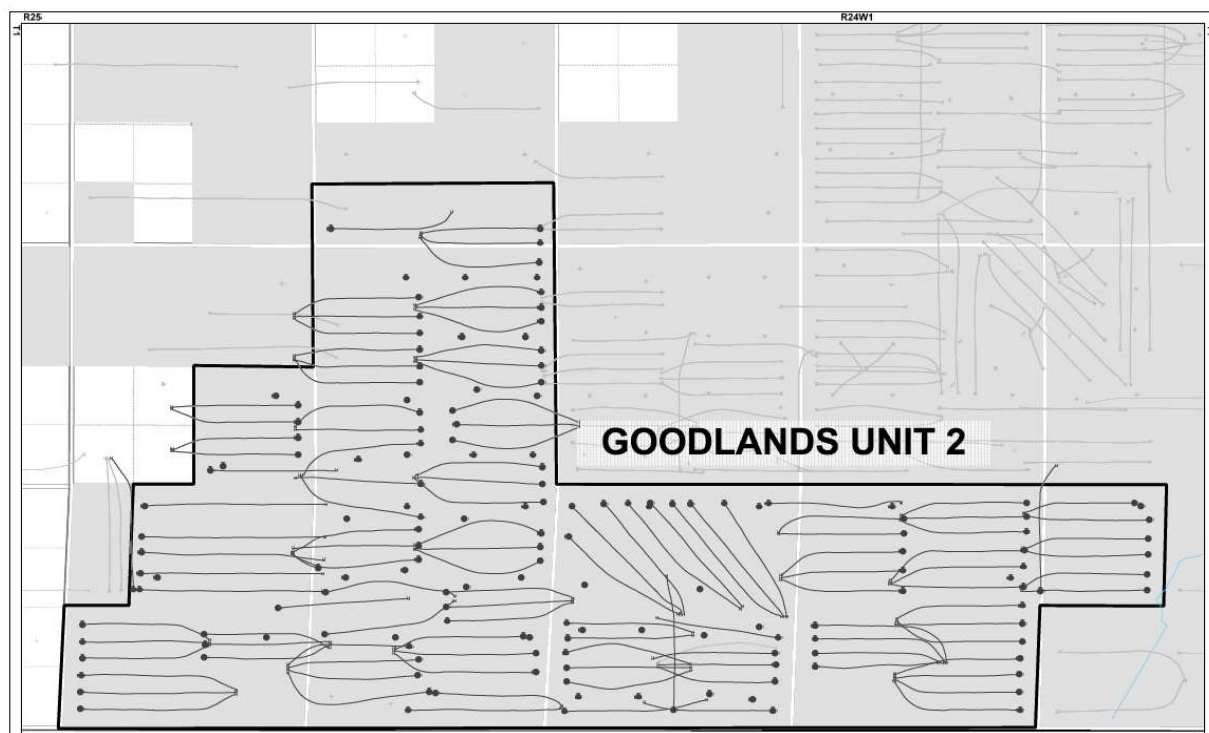
Tundra Oil and Gas

June 25, 2019

INTRODUCTION

Goodlands Unit No. 2 Enhanced Oil Recovery (EOR) Waterflood project was approved under Waterflood Order No. 57 effective December 2016 with Tundra Oil and Gas (Tundra) as Operator. The EOR project area contains 13 abandoned wells, 138 active/inactive producing wells and 11 injection wells covering 90 LSDs in Township 1, Range 24W1.

Figure 1: Goodlands Unit No. 2 Area Outline



Goodlands Unit No. 2

Tundra Oil and Gas (Tundra), as the operator of the Goodlands Unit No. 2 Enhanced Oil Recovery (EOR) project hereby submits the 2018 EOR report as per section 73 of the Drilling and Production Regulations.

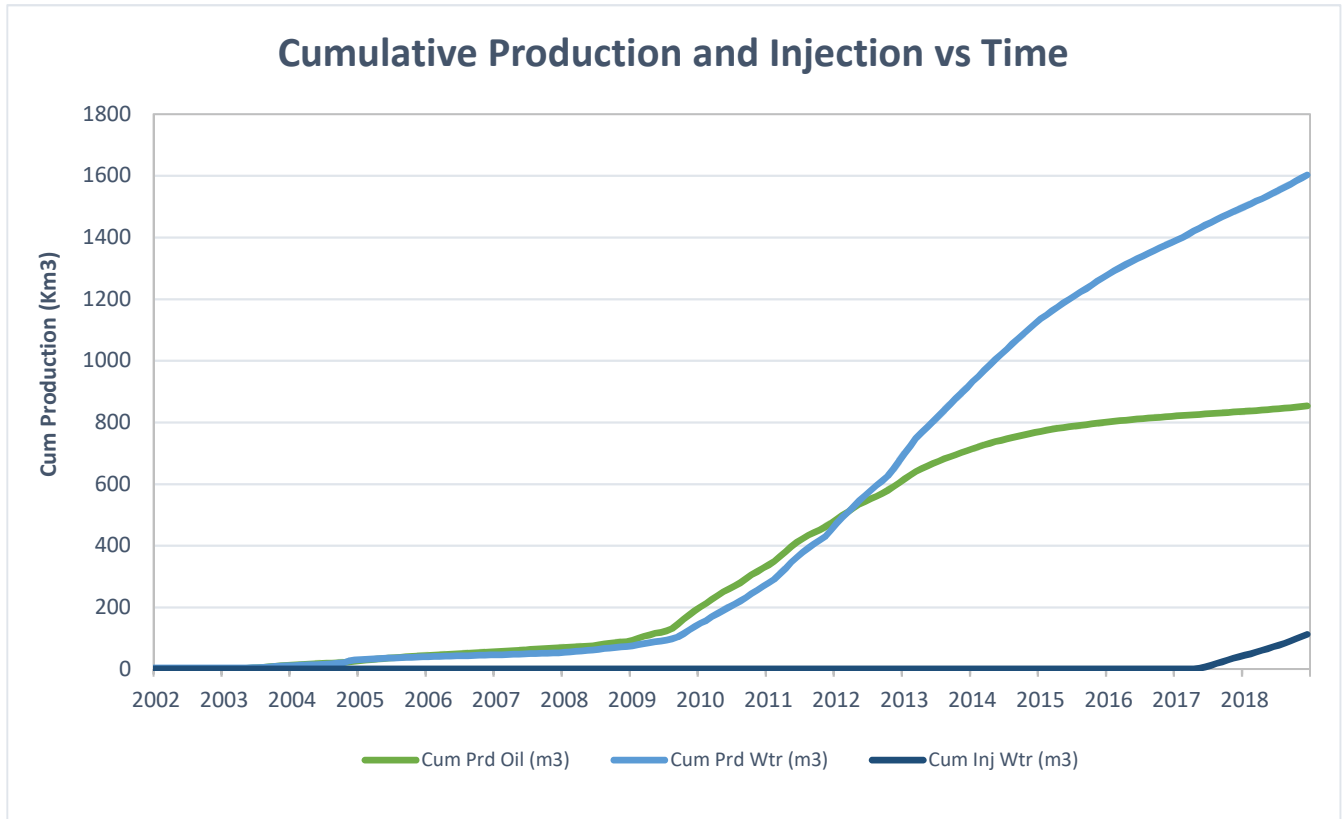
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	40.26	269.78	158.58	6.70	0
Feb-2018	42.19	285.85	164.36	6.77	0
Mar-2018	45.27	291.07	168.16	6.43	0
Apr-2018	43.46	267.63	194.73	6.16	0
May-2018	48.85	285.50	185.06	5.85	0
Jun-2018	56.57	303.57	200.57	5.37	0
Jul-2018	52.68	304.89	180.68	5.79	0
Aug-2018	55.25	306.47	196.13	5.55	0
Sep-2018	53.08	299.15	214.87	5.64	0
Oct-2018	60.60	344.72	248.90	5.69	0
Nov-2018	57.37	340.48	238.03	5.93	0
Dec-2018	55.74	330.77	234.23	5.93	0

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

2018 PRODUCTION	
Produced Oil (m ³)	18,614
Produced Gas (m ³)	0
Produced Water (m ³)	110,458
Fluid Injected (m ³)	72,572
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	853,455
Produced Water (m ³)	1,603,109

Goodlands Unit No. 2



c) Monthly wellhead injection pressure for each injection well

	02/05-03 Inj		02/08-03 Inj		02/09-03 Inj		02/14-04 Inj		02/15-04 Inj		02/16-03 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	615.0	-87	615.0	2585	615.0	-93	0.0	-90	615.0	-51	616.0	2442
Feb-2018	653.0	579	397.0	2453	652.0	-93	0.0	-88	651.0	-51	402.0	2724
Mar-2018	748.0	1253	472.0	156	754.0	-95	0.0	-23	754.0	-55	380.0	286
Apr-2018	756.0	1763	761.0	-94	750.0	-95	0.0	-2	751.0	-55	754.0	818
May-2018	742.0	1986	770.0	-93	769.0	-94	0.0	-5	756.0	-59	628.0	1966
Jun-2018	659.0	1989	805.0	-92	746.0	-93	0.0	-4	748.0	-60	569.0	2319
Jul-2018	367.0	1008	908.0	-92	437.0	-92	0.0	-4	758.0	-61	546.0	2959
Aug-2018	714.0	-90	922.0	-91	768.0	-89	0.0	-3	771.0	-59	464.0	2985
Sep-2018	799.0	-88	945.0	152	799.0	-87	0.0	0	736.0	-57	545.0	3336
Oct-2018	923.0	474	1077.0	1198	923.0	-84	0.0	3	770.0	-57	561.0	3979
Nov-2018	873.0	1686	1002.0	1918	894.0	-80	0.0	6	746.0	-54	470.0	3979
Dec-2018	787.0	2298	894.0	1990	920.0	-80	199.0	-21	766.0	-54	560.0	4227
Total	8636.0		9568.0		9027.0		199.0		8822.0		6495.0	
Avg Inj P		1064		832		-89		-19		-56		2668

	03/11-03 Inj		03/14-03 Inj		04/05-03 Inj		04/14-04 Inj		05/09-03 Inj		GU2	
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	613.0	1432	614.0	-82	0.0	0	0.0	304	613.0	-80	4916.0	628
Feb-2018	548.0	2164	649.0	-80	0.0	0	0.0	323	650.0	-77	4602.0	785
Mar-2018	601.0	2685	752.0	-85	0.0	0	0.0	334	752.0	-82	5213.0	437
Apr-2018	570.0	2982	751.0	-85	0.0	0	0.0	338	749.0	130	5842.0	570
May-2018	540.0	2952	755.0	-89	0.0	0	8.0	343	769.0	1270	5737.0	818
Jun-2018	506.0	2985	747.0	594	0.0	0	531.0	-44	706.0	2212	6017.0	981
Jul-2018	512.0	2942	762.0	1110	0.0	0	606.0	-85	705.0	2889	5601.0	1058
Aug-2018	505.0	2982	743.0	1899	0.0	0	615.0	-85	578.0	2985	6080.0	1043
Sep-2018	587.0	3339	740.0	2439	106.0	-37	588.0	-83	601.0	3333	6446.0	1184
Oct-2018	685.0	3980	907.0	3818	616.0	-92	614.0	-81	640.0	3980	7716.0	1556
Nov-2018	656.0	3980	778.0	3980	589.0	-90	595.0	-82	538.0	3980	7141.0	1748
Dec-2018	715.0	4083	795.0	4169	670.0	-90	385.0	-65	570.0	4170	7261.0	1875
Total	7038.0		8993.0		1981.0		3942.0		7871.0		72572.0	
Avg Inj P		3042		1466		-26		93		2059		1057

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	4916.0	4602.0	5213.0	5842.0	5737.0	6017.0	5601.0	6080.0	6446.0	7716.0	7141.0	7261.0
Daily (m³/d)	158.58	164.36	168.16	194.73	185.06	200.57	180.68	196.13	214.87	248.90	238.03	234.23

2018 AVG. ANNUAL DAILY INJECTION = 198.69 m3/d
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CUMULATIVE INJECTION TO Dec 31, 2017 = 39,838 m3
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TOTAL 2018 ANNUAL INJECTION = 72,572 m3

CUMULATIVE INJECTION TO Dec 31, 2018 = 112,410 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
100.01-05-001-24W1.00	Pump Change	1/18/2018
100.07-06-001-24W1.00	Cemented Liner Clean Out	11/18/2018
100.13-04-001-24W1.00	Drill Out Baker Frac Ports - Acidize HZ Lateral	9/29/2018
100.15-04-001-24W1.00	Pump Change	9/10/2018
102.01-03-001-24W1.00	Pump Change	8/28/2018
102.01-04-001-24W1.00	WIW Conversion	9/19/2018
102.03-16-001-24W1.00	Cemented Liner Clean Out	10/23/2018
102.04-04-001-24W1.00	Spearfish Cemented Liner Cleanout	6/27/2018
102.05-03-001-24W1.00	WIW Cemented Liner Cleanout	7/27/2018
102.05-04-001-24W1.00	Cemented Liner Clean Out and Convert to WIW	9/4/2018
102.08-03-001-24W1.00	WIW Cleanout	3/2/2018
102.08-04-001-24W1.00	Cemented Liner Clean Out	10/4/2018
102.09-03-001-24W1.00	WIW Cemented Liner Cleanout	7/20/2018
102.11-02-001-24W1.00	WIW Conversion	9/12/2018
102.14-02-001-24W1.00	Pump Change	11/16/2018
102.14-02-001-24W1.00	Cemented Liner Clean Out	7/5/2018
102.14-03-001-24W1.00	Pump Change	2/10/2018
102.14-04-001-24W1.00	WIW Cemented Liner Cleanout	3/3/2018
102.16-03-001-24W1.00	Water Injection Well Cemented Liner Cleanout	3/2/2018
102.16-04-001-24W1.00	Pump Change	1/17/2018
102.16-04-001-24W1.00	Cleanout	3/12/2018
103.04-06-001-24W1.00	Cleanout	10/30/2018
103.05-03-001-24W1.00	Pump Change	2/16/2018
104.05-03-001-24W1.00	WIW Conversion	8/24/2018
104.09-03-001-24W1.00	Cleanout	3/13/2018
104.14-02-001-24W1.00	Cemented Liner Clean Out	7/27/2018
104.14-05-001-24W1.00	Cemented Liner Clean Out	1/16/2018
105.08-04-001-24W1.00	Cemented Liner Clean Out	7/13/2018

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	1248.0	836.09	8363.3	1501.01	4916.0	44.75	0.500	0.018
Feb-2018	1181.4	837.27	8003.8	1509.02	4602.0	49.36	0.490	0.020
Mar-2018	1403.3	838.67	9023.3	1518.04	5213.0	54.57	0.489	0.022
Apr-2018	1303.9	839.98	8029	1526.07	5842.0	60.41	0.611	0.024
May-2018	1514.2	841.49	8850.5	1534.92	5737.0	66.15	0.540	0.026
Jun-2018	1697.0	843.19	9107.2	1544.03	6017.0	72.17	0.542	0.029

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
Jul-2018	1633.1	844.82	9451.5	1553.48	5601.0	77.77	0.493	0.031
Aug-2018	1712.7	846.53	9500.6	1562.98	6080.0	83.85	0.528	0.033
Sep-2018	1592.4	848.13	8974.5	1571.95	6446.0	90.29	0.595	0.035
Oct-2018	1878.6	850.01	10686.4	1582.64	7716.0	98.01	0.599	0.038
Nov-2018	1721.2	851.73	10214.3	1592.86	7141.0	105.15	0.584	0.041
Dec-2018	1727.8	853.45	10253.8	1603.11	7261.0	112.41	0.592	0.043

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>
100/11-02-001-24W1/0	Horizontal	Producing	-
102/11-02-001-24W1/0	Horizontal	Suspended	-
103/11-02-001-24W1/0	Horizontal	Producing	-
100/14-02-001-24W1/0	Vertical	Abandoned Zone	-
102/14-02-001-24W1/0	Horizontal	Producing	WIW Conversion
103/14-02-001-24W1/0	Horizontal	Producing	-
104/14-02-001-24W1/0	Horizontal	Producing	WIW Conversion
100/01-03-001-24W1/0	Horizontal	Producing	-
102/01-03-001-24W1/0	Horizontal	Producing	-
103/01-03-001-24W1/0	Horizontal	Producing	-
100/03-03-001-24W1/0	Horizontal	Drilled & Cased	-
102/03-03-001-24W1/0	Horizontal	Drilled & Cased	-
100/05-03-001-24W1/0	Horizontal	Producing	-
102/05-03-001-24W1/0	Horizontal	Injection	-
103/05-03-001-24W1/0	Horizontal	Producing	-
104/05-03-001-24W1/0	Horizontal	Producing	-
100/08-03-001-24W1/0	Horizontal	Producing	-
102/08-03-001-24W1/0	Horizontal	Injection	-
103/08-03-001-24W1/0	Horizontal	Producing	-
100/09-03-001-24W1/0	Vertical	Abandoned	-
102/09-03-001-24W1/0	Horizontal	Injection	-
103/09-03-001-24W1/0	Horizontal	Producing	-
104/09-03-001-24W1/0	Horizontal	Producing	-
105/09-03-001-24W1/0	Horizontal	Injection	-
106/09-03-001-24W1/0	Horizontal	Producing	-
100/11-03-001-24W1/0	Horizontal	Producing	-
102/11-03-001-24W1/0	Horizontal	Producing	-
103/11-03-001-24W1/0	Horizontal	Injection	-
100/14-03-001-24W1/0	Vertical	Pumping	-
102/14-03-001-24W1/0	Horizontal	Producing	-
103/14-03-001-24W1/0	Horizontal	Injection	-
100/16-03-001-24W1/0	Horizontal	Producing	-
102/16-03-001-24W1/0	Horizontal	Injection	-
103/16-03-001-24W1/0	Horizontal	Producing	-
100/01-04-001-24W1/0	Vertical	Producing	-
102/01-04-001-24W1/0	Horizontal	Suspended	-
103/01-04-001-24W1/0	Horizontal	Producing	-
100/02-04-001-24W1/0	Vertical	Abandoned Zone	-
100/03-04-001-24W1/0	Vertical	Abandoned Zone	-
102/03-04-001-24W1/0	Horizontal	Producing	-
100/04-04-001-24W1/0	Vertical	Abandoned Zone	-
102/04-04-001-24W1/0	Horizontal	Producing	-
103/04-04-001-24W1/0	Horizontal	Producing	-
104/04-04-001-24W1/0	Horizontal	Producing	-
100/05-04-001-24W1/0	Vertical	Abandoned Zone	-

j) Well List

Goodlands Unit No.2 Well List

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
102/05-04-001-24W1/0	Horizontal	Suspended	-
103/05-04-001-24W1/0	Horizontal	Producing	-
104/05-04-001-24W1/0	Horizontal	Producing	-
100/06-04-001-24W1/0	Vertical	Abandoned Zone	-
100/07-04-001-24W1/0	Vertical	Abandoned Zone	-
100/08-04-001-24W1/0	Vertical	Producing	-
102/08-04-001-24W1/0	Horizontal	Producing	-
104/08-04-001-24W1/0	Horizontal	Suspended	-
105/08-04-001-24W1/0	Horizontal	Producing	-
100/10-04-001-24W1/0	Vertical	Producing	-
100/12-04-001-24W1/0	Vertical	Producing	-
100/13-04-001-24W1/0	Horizontal	Producing	-
102/13-04-001-24W1/0	Horizontal	Producing	-
103/13-04-001-24W1/0	Horizontal	Producing	-
100/14-04-001-24W1/0	Vertical	Producing	-
102/14-04-001-24W1/0	Horizontal	Injection	-
103/14-04-001-24W1/0	Horizontal	Producing	-
104/14-04-001-24W1/0	Horizontal	Injection	-
100/15-04-001-24W1/0	Horizontal	Producing	-
102/15-04-001-24W1/0	Horizontal	Injection	-
100/16-04-001-24W1/0	Vertical	Producing	-
102/16-04-001-24W1/0	Horizontal	Producing	-
100/01-05-001-24W1/0	Horizontal	Producing	-
100/02-05-001-24W1/0	Horizontal	Producing	-
102/03-05-001-24W1/0	Horizontal	Producing	-
103/03-05-001-24W1/0	Horizontal	Producing	-
104/03-05-001-24W1/0	Horizontal	Producing	-
100/05-05-001-24W1/0	Horizontal	Producing	-
102/05-05-001-24W1/0	Horizontal	Suspended	-
100/06-05-001-24W1/2	Vertical	Producing	-
102/06-05-001-24W1/0	Horizontal	Producing	-
103/06-05-001-24W1/0	Horizontal	Producing	-
100/07-05-001-24W1/0	Horizontal	Suspended	-
100/08-05-001-24W1/0	Vertical	Producing	-
102/08-05-001-24W1/0	Horizontal	Producing	-
103/08-05-001-24W1/0	Horizontal	Producing	-
100/09-05-001-24W1/0	Vertical	Producing	-
102/09-05-001-24W1/0	Horizontal	Producing	-
100/10-05-001-24W1/0	Vertical	Producing	-
102/10-05-001-24W1/0	Horizontal	Suspended	-
103/10-05-001-24W1/0	Horizontal	Suspended	-
100/11-05-001-24W1/0	Vertical	Producing	-
102/11-05-001-24W1/2	Horizontal	Producing	-
100/12-05-001-24W1/0	Vertical	Producing	-
102/12-05-001-24W1/0	Horizontal	Producing	-
103/12-05-001-24W1/0	Dir/Dev	Producing	-

j) Well List

Goodlands Unit No.2 Well List

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
100/13-05-001-24W1/0	Vertical	Producing	-
100/14-05-001-24W1/0	Vertical	Producing	-
102/14-05-001-24W1/0	Horizontal	Suspended	-
103/14-05-001-24W1/0	Horizontal	Producing	-
104/14-05-001-24W1/0	Horizontal	Producing	-
100/15-05-001-24W1/0	Vertical	Producing	-
100/16-05-001-24W1/0	Vertical	Producing	-
102/16-05-001-24W1/0	Horizontal	Producing	-
103/16-05-001-24W1/0	Horizontal	Suspended	-
104/16-05-001-24W1/0	Horizontal	Suspended	-
100/04-06-001-24W1/0	Horizontal	Producing	-
102/04-06-001-24W1/0	Horizontal	Producing	-
103/04-06-001-24W1/0	Horizontal	Producing	-
100/05-06-001-24W1/0	Horizontal	Producing	-
102/05-06-001-24W1/0	Horizontal	Producing	-
103/05-06-001-24W1/0	Horizontal	Producing	-
100/07-06-001-24W1/0	Horizontal	Producing	-
102/07-06-001-24W1/0	Horizontal	Producing	-
103/07-06-001-24W1/0	Horizontal	Producing	-
100/08-06-001-24W1/0	Vertical	Abandoned	-
100/11-06-001-24W1/0	Vertical	Abandoned	-
102/11-06-001-24W1/0	Horizontal	Producing	-
103/11-06-001-24W1/0	Horizontal	Producing	-
104/11-06-001-24W1/0	Horizontal	Producing	-
105/11-06-001-24W1/0	Horizontal	Producing	-
100/14-06-001-24W1/0	Horizontal	Producing	-
102/14-06-001-24W1/0	Horizontal	Producing	-
100/01-07-001-24W1/0	Horizontal	Suspended	-
102/01-07-001-24W1/0	Horizontal	Suspended	-
100/02-07-001-24W1/0	Vertical	Producing	-
102/02-07-001-24W1/0	Horizontal	Producing	-
100/08-07-001-24W1/0	Vertical	Abandoned Zone	-
102/08-07-001-24W1/0	Horizontal	Suspended	-
103/08-07-001-24W1/0	Horizontal	Producing	-
100/01-08-001-24W1/0	Vertical	Producing	-
102/01-08-001-24W1/0	Horizontal	Suspended	-
103/01-08-001-24W1/0	Horizontal	Suspended	-
100/02-08-001-24W1/0	Vertical	Abandoned Zone	-
102/02-08-001-24W1/0	Horizontal	Producing	-
100/03-08-001-24W1/0	Vertical	Producing	-
102/03-08-001-24W1/0	Horizontal	Suspended	-
103/03-08-001-24W1/0	Horizontal	Suspended	-
104/03-08-001-24W1/0	Horizontal	Suspended	-
100/04-08-001-24W1/0	Vertical	Producing	-
100/06-08-001-24W1/0	Vertical	Producing	-
102/06-08-001-24W1/0	Horizontal	Producing	-

j) Well List

Goodlands Unit No.2 Well List

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
103/06-08-001-24W1/0	Horizontal	Suspended	-
100/07-08-001-24W1/0	Vertical	Producing	-
102/07-08-001-24W1/0	Horizontal	Suspended	-
103/07-08-001-24W1/0	Horizontal	Producing	-
100/08-08-001-24W1/0	Vertical	Producing	-
102/08-08-001-24W1/0	Horizontal	Producing	-
100/09-08-001-24W1/0	Vertical	Producing	-
102/09-08-001-24W1/0	Horizontal	Suspended	-
103/09-08-001-24W1/0	Horizontal	Producing	-
104/09-08-001-24W1/0	Horizontal	Producing	-
100/10-08-001-24W1/0	Vertical	Producing	-
100/11-08-001-24W1/0	Horizontal	Producing	-
102/11-08-001-24W1/0	Horizontal	Suspended	-
103/11-08-001-24W1/0	Horizontal	Suspended	-
104/11-08-001-24W1/0	Horizontal	Suspended	-
100/14-08-001-24W1/0	Vertical	Abandoned	-
102/14-08-001-24W1/0	Horizontal	Suspended	-
100/15-08-001-24W1/0	Vertical	Producing	-
100/16-08-001-24W1/0	Vertical	Producing	-
102/16-08-001-24W1/0	Horizontal	Producing	-
103/16-08-001-24W1/0	Horizontal	Producing	-
104/16-08-001-24W1/0	Horizontal	Producing	-
100/01-17-001-24W1/0	Horizontal	Suspended	-
102/01-17-001-24W1/0	Horizontal	Producing	-
100/04-17-001-24W1/0	Horizontal	Suspended	-