

Goodlands Unit No. 2

Waterflood Progress Report 2017

January 1st through December 31st 2017

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

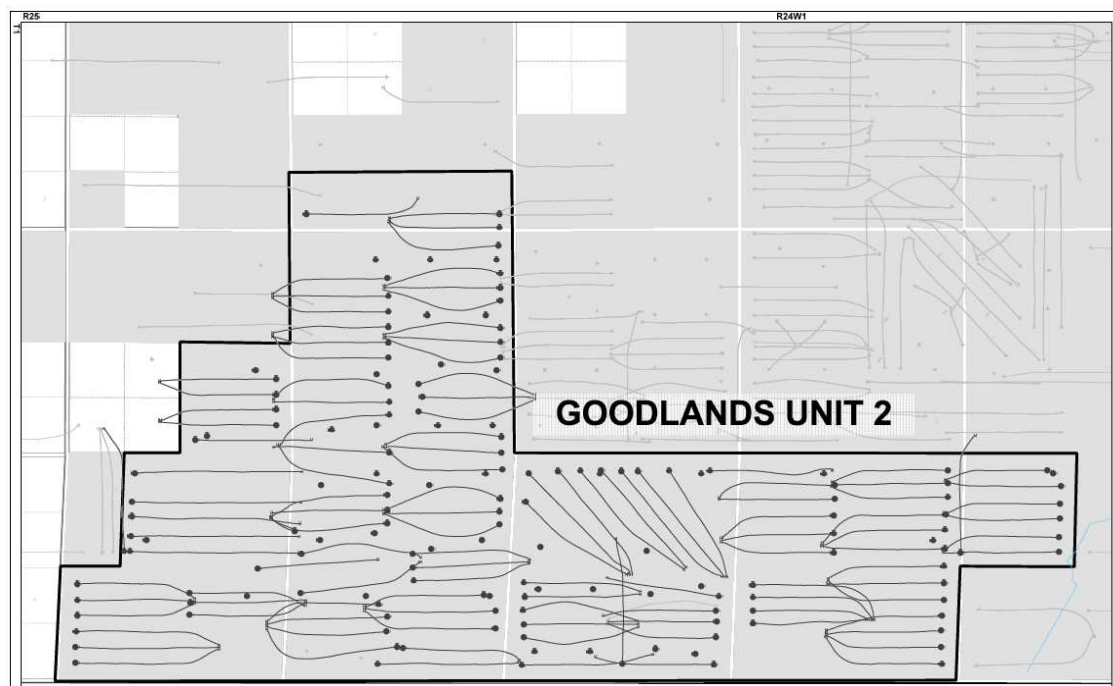
Tundra Oil and Gas

July 24, 2018

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 12 abandoned wells, 138 active/inactive producing wells and 10 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 2017 EOR report as per section 73 of the Drilling and Production Regulations.

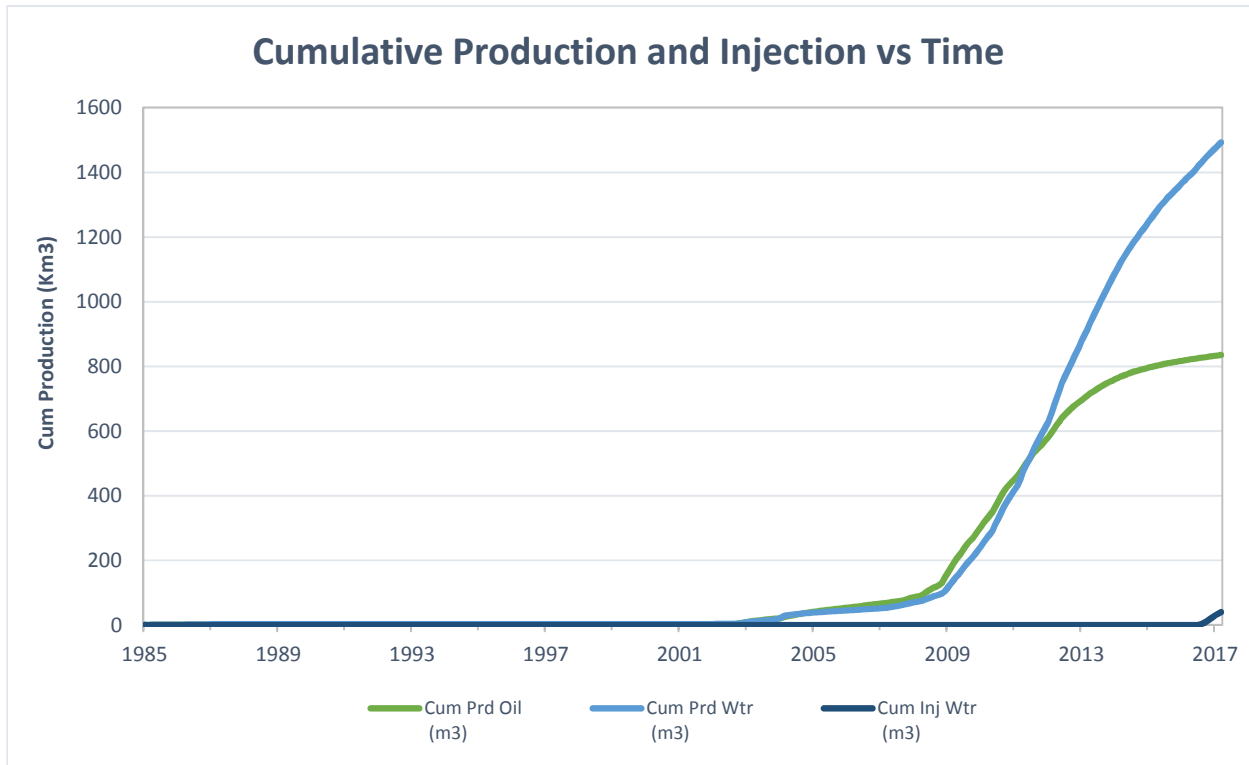
a) Monthly oil and water production rates, injection rate, GOR and WOR

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-2017	39.97	268.96	0.00	6.73	0
Feb-2017	43.10	302.59	0.00	7.02	0
Mar-2017	47.58	339.52	0.00	7.14	0
Apr-2017	43.57	341.17	0.00	7.83	0
May-2017	35.37	292.33	78.48	8.27	0
Jun-2017	38.55	330.96	154.33	8.59	0
Jul-2017	43.10	292.47	152.90	6.79	0
Aug-2017	40.67	295.45	196.16	7.26	0
Sep-2017	41.58	289.21	192.07	6.96	0
Oct-2017	39.76	267.31	185.10	6.72	0
Nov-2017	38.28	295.13	177.17	7.71	0
Dec-2017	39.25	277.00	165.77	7.06	0

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

2017 PRODUCTION	
Produced Oil (m ³)	14,923
Produced Gas (m ³)	0
Produced Water (m ³)	109,191
Fluid Injected (m ³)	39,838
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	834,841
Produced Water (m ³)	1,492,651

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-2017	-	-	-	-	-	-	-	-	-	-	-	-
Feb-2017	-	-	-	-	-	-	-	-	-	-	-	-
Mar-2017	-	-	-	-	-	-	-	-	-	-	-	-
Apr-2017	-	-	-	-	-	-	-	-	-	-	-	-
May-2017	330.0	715	182.0	675	330.0	775	315.0	1101	331.0	440	285.0	404
Jun-2017	583.0	-89	577.0	-93	579.0	-93	576.0	2409	579.0	-59	578.0	-90
Jul-2017	548.0	-84	598.0	-93	598.0	-93	599.0	2962	601.0	-61	534.0	-115
Aug-2017	603.0	-89	614.0	-91	615.0	-93	615.0	3271	617.0	-60	615.0	-90
Sep-2017	576.0	-85	576.0	172	575.0	-90	576.0	3144	578.0	-57	577.0	-87
Oct-2017	608.0	-86	598.0	827	601.0	-94	600.0	3496	601.0	-57	601.0	84
Nov-2017	576.0	-87	593.0	1434	593.0	-94	592.0	3551	593.0	-55	593.0	1019
Dec-2017	615.0	-87	615.0	2015	614.0	-94	228.0	1235	614.0	-52	615.0	1749
Total	4439.0		4353.0		4505.0		4101.0		4514.0		4398.0	
Avg Inj P		14		606		16		2646		5		359

	03/11-03 Inj		03/14-03 Inj		04/14-04 Inj		05/09-03 Inj		Goodlands Unit No. 2	
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-2017	-	-	-	-	-	-	-	-	-	-
Feb-2017	-	-	-	-	-	-	-	-	-	-
Mar-2017	-	-	-	-	-	-	-	-	-	-
Apr-2017	-	-	-	-	-	-	-	-	-	-
May-2017	330.0	436	330.0	483	0.0	0	0.0	0	2433.0	629
Jun-2017	579.0	-91	579.0	-88	0.0	0	0.0	0	4630.0	226
Jul-2017	599.0	-91	599.0	-90	32.0	-48	32.0	46	4740.0	276
Aug-2017	616.0	-90	616.0	-89	585.0	-86	585.0	-70	6081.0	251
Sep-2017	576.0	-86	576.0	-87	576.0	-83	576.0	-81	5762.0	266
Oct-2017	600.0	-87	600.0	-86	329.0	-55	600.0	-84	5738.0	386
Nov-2017	592.0	-55	592.0	-84	0.0	174	591.0	-81	5315.0	572
Dec-2017	613.0	609	612.0	-82	0.0	265	613.0	-81	5139.0	548
Total	4505.0		4504.0		1522.0		2997.0		39838.0	
Avg Inj P		68		-15		21		-44		394

c) Monthly wellhead injection pressure for each injection well

MONTH	Jan-2017	Feb-2017	Mar-2017	Apr-2017	May-2017	Jun-2017	Jul-2017	Aug-2017	Sep-2017	Oct-2017	Nov-2017	Dec-2017
Total m3	-	-	-	-	2433.0	4630.0	4740.0	6081.0	5762.0	5738.0	5315.0	5139.0
Daily (m³/d)	-	-	-	-	78.48	154.33	152.90	196.16	192.07	185.10	177.17	165.77

2017 AVG. ANNUAL DAILY INJECTION = 162.75 m3/d
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CUMULATIVE INJECTION TO Dec 31, 2016 = 0 m3

TOTAL 2017 ANNUAL INJECTION = 39,838 m3

CUMULATIVE INJECTION TO Dec 31, 2017 = 39,838 m3
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d) Summary of the result of any survey of reservoir pressure conducted in 2017. N/A

e) Date and type of any well servicing.

Well	Service Description	Date
103.14-02-001-24W1.00	Pump Change / Tubing Reconfiguration	2/14/2017
100.05-03-001-24W1.00	Pump Change / Tubing Reconfiguration	2/12/2017
102.01-03-001-24W1.00	Pump Change / Tubing reconfiguration	7/12/2017
102.01-03-001-24W1.00	Pump Change	12/21/2017
103.01-03-001-24W1.00	Pump Change - Maintenance Job	3/2/2017
102.08-03-001-24W1.00	Water Injection Well Repair	5/19/2017
103.11-03-001-24W1.00	Spearfish Producer to WIW Conversion	2/17/2017
103.14-03-001-24W1.00	Spearfish Producer to WIW Conversion	2/14/2017
105.09-03-001-24W1.00	Spearfish Producer to WIW Conversion	6/29/2017
100.01-04-001-24W1.00	Pump Change	2/23/2017
102.14-04-001-24W1.00	Spearfish Producer to WIW Conversion	1/22/2017
104.14-04-001-24W1.00	Spearfish Producer to WIW Conversion	7/2/2017
102.08-05-001-24W1.00	Pump Change	3/4/2017
102.09-05-001-24W1.00	Pump Change / Tubing Reconfiguration	2/16/2017
103.14-05-001-24W1.00	Pump Change/Reactivation	11/23/2017
104.03-05-001-24W1.00	Pump Change/tbg leak	3/9/2017
102.05-06-001-24W1.00	Pump Change tbg re-configuration	7/14/2017
102.07-06-001-24W1.00	Pump Change/Reactivation	11/27/2017
102.11-06-001-24W1.00	Pump Change	8/18/2017
103.07-06-001-24W1.00	Pump Change	3/11/2017
103.07-06-001-24W1.00	Pump Change	10/30/2017
102.02-07-001-24W1.00	Pump Change/Reactivation	11/21/2017
102.16-08-001-24W1.00	Pump Change/Reactivation	11/13/2017
103.11-08-001-24W1.00	Suspension	12/10/2017
104.09-08-001-24W1.00	Pump Change / Lower PSN	7/17/2017
102.08-03-001-24W1.00	Pump Change Lower PSN	11/6/2017

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-2017	1239.1	821.16	8337.9	1391.80	0.0	0.00	0.000	0.000
Feb-2017	1206.7	822.36	8472.5	1400.27	0.0	0.00	0.000	0.000
Mar-2017	1475.1	823.84	10525.0	1410.80	0.0	0.00	0.000	0.000
Apr-2017	1307.0	825.15	10235.2	1421.03	0.0	0.00	0.000	0.000
May-2017	1096.4	826.24	9062.3	1430.09	2433.0	2.43	0.235	0.001
Jun-2017	1156.5	827.40	9928.8	1440.02	4630.0	7.06	0.410	0.003

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-2017	1336.0	828.73	9066.5	1449.09	4740.0	11.80	0.446	0.005
Aug-2017	1260.8	830.00	9158.8	1458.25	6081.0	17.88	0.572	0.007
Sep-2017	1247.3	831.24	8676.4	1466.92	5762.0	23.65	0.568	0.010
Oct-2017	1232.7	832.48	8286.7	1475.21	5738.0	29.38	0.590	0.012
Nov-2017	1148.5	833.62	8853.9	1484.06	5315.0	34.70	0.521	0.014
Dec-2017	1216.7	834.84	8587.1	1492.65	5139.0	39.84	0.513	0.016

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	-
100/05-03-001-24W1/0	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	WIW Conversion
103/04-04-001-24W1/0	Horizontal	Producing	-
104/04-04-001-24W1/0	Horizontal	Producing	-
100/05-04-001-24W1/0	Vertical	Producing	-
102/05-04-001-24W1/0	Horizontal	Suspended	-
103/05-04-001-24W1/0	Horizontal	Producing	-

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
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	WIW Conversion
100/10-04-001-24W1/0	Vertical	Producing	-
100/12-04-001-24W1/0	Vertical	Producing	-
100/13-04-001-24W1/0	Horizontal	Producing	WIW Conversion
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	-
100/13-05-001-24W1/0	Vertical	Producing	-
100/14-05-001-24W1/0	Vertical	Producing	-

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
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	-
103/06-08-001-24W1/0	Horizontal	Suspended	-
100/07-08-001-24W1/0	Vertical	Producing	-

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
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	-