

Sinclair Unit No. 3

Waterflood Progress Report 2017

January 1st through December 31st 2017

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

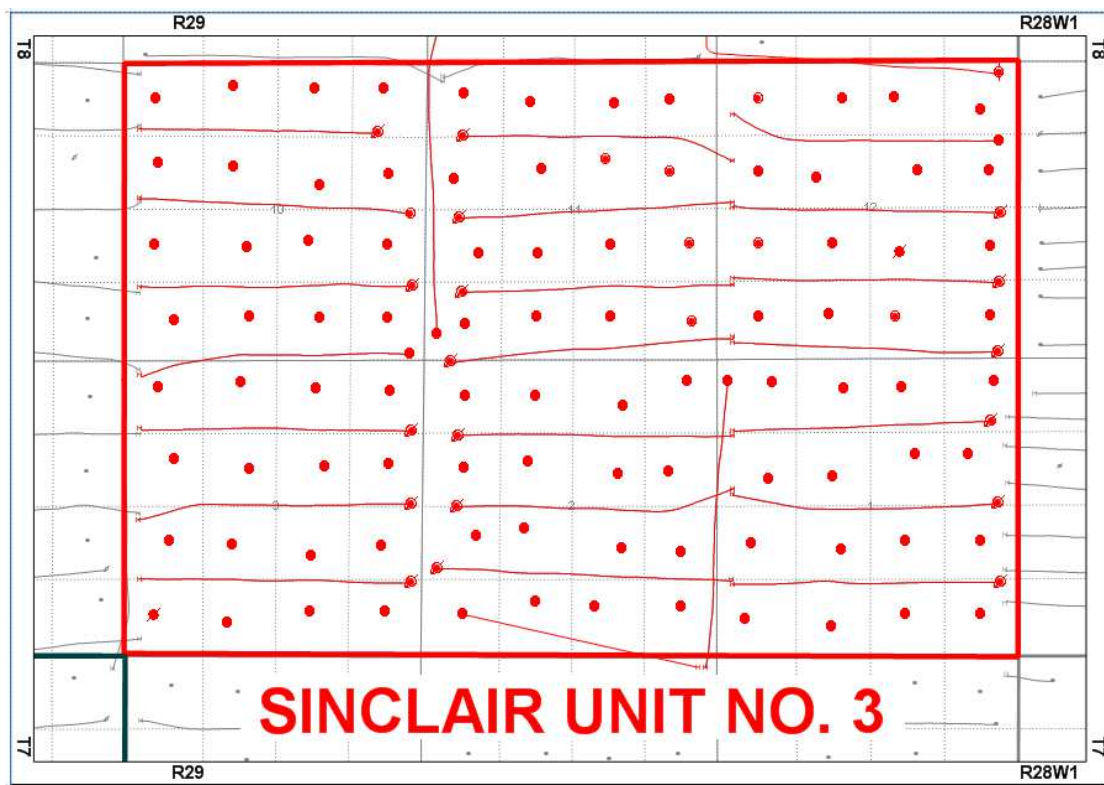
Tundra Oil and Gas

July 26, 2018

INTRODUCTION

Sinclair Unit No. 3 Enhanced Oil Recovery (EOR) Waterflood Project was approved under Waterflood Order No. 18 effective November 1, 2009 with Tundra Oil and Gas (Tundra) as Operator. The EOR project area contains 101 producing/inactive wells and 20 horizontal injectors in 6 sections in Township 8, Range 29 W1 as shown in the figure below.

Figure 1: Sinclair Unit No. 3 Area Outline



Sinclair Unit No. 3

Tundra Oil and Gas (Tundra), as the operator of the Sinclair Unit No. 3 Enhanced Oil Recovery (EOR) project hereby submits the 2017 EOR report as per section 73 of the Drilling and Production Regulations.

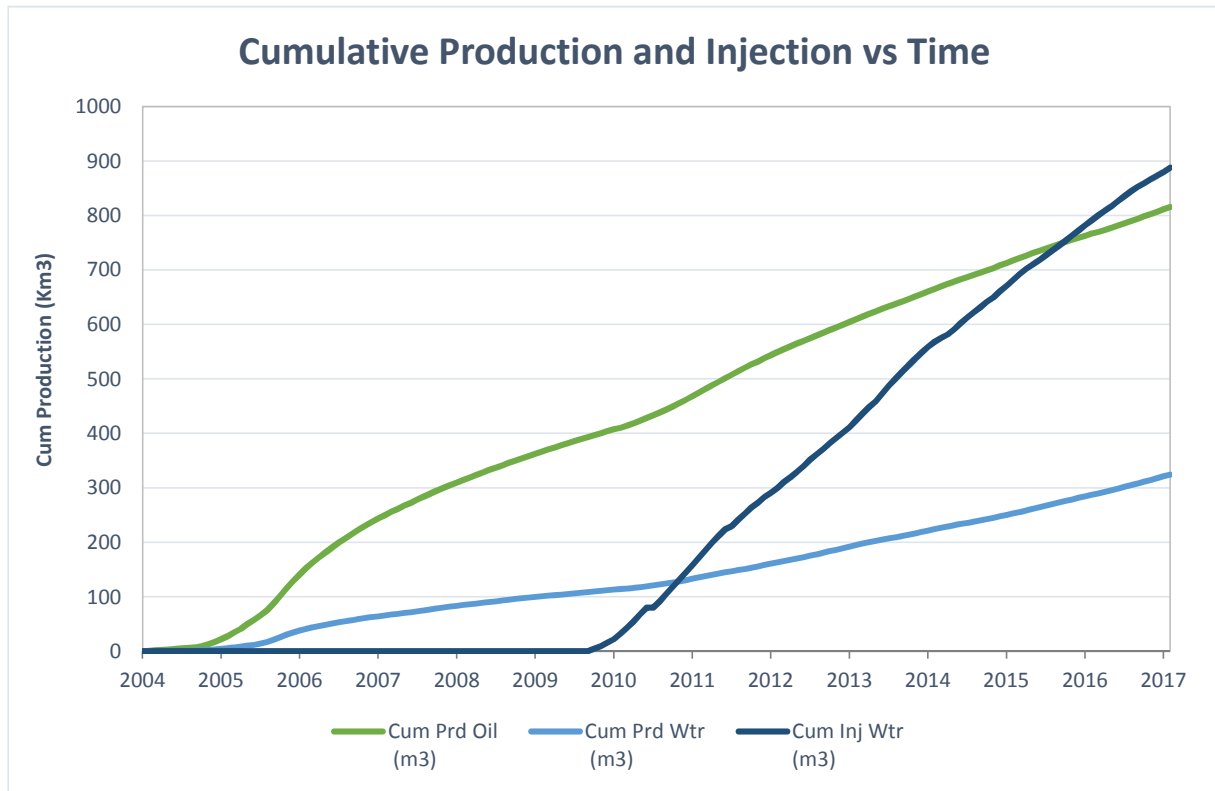
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	109.64	82.55	287.55	0.75	1.77
Feb-2017	126.40	98.67	303.68	0.78	2.12
Mar-2017	134.25	105.60	269.90	0.79	1.63
Apr-2017	131.46	102.65	302.63	0.78	2.41
May-2017	130.36	99.31	312.58	0.76	2.57
Jun-2017	134.48	95.65	298.77	0.71	2.03
Jul-2017	143.69	100.58	250.39	0.70	2.16
Aug-2017	145.25	111.56	220.45	0.77	1.07
Sep-2017	137.22	104.90	247.63	0.76	1.07
Oct-2017	137.09	109.56	210.16	0.80	0.99
Nov-2017	143.36	109.68	218.30	0.77	1.16
Dec-2017	136.63	105.82	260.45	0.77	2.93

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

2017 PRODUCTION	
Produced Oil (m ³)	48,979
Produced Gas (m ³)	89
Produced Water (m ³)	37,314
Fluid Injected (m ³)	96,679
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	815,617
Produced Water (m ³)	324,503

Sinclair Unit No. 3



c) Monthly wellhead injection pressure for each injection well

	02/01-01 Inj		02/01-03 Inj		02/01-10 Inj		02/04-11 Inj		02/05-02 Inj		02/05-11 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	559.0	6288	491.0	6207	315.0	6258	196.0	6300	521.0	6263	878.0	5237
Feb-2017	501.0	6266	425.0	6152	288.0	6249	174.0	6268	464.0	6268	935.0	5614
Mar-2017	549.0	6185	501.0	6205	312.0	6209	189.0	6301	462.0	6269	811.0	5448
Apr-2017	547.0	6257	487.0	6202	305.0	6268	181.0	6301	437.0	6270	1031.0	5643
May-2017	647.0	6540	496.0	6194	312.0	6263	184.0	6300	625.0	6237	618.0	6195
Jun-2017	589.0	6569	433.0	6028	300.0	6267	176.0	6304	479.0	6566	458.0	6273
Jul-2017	587.0	6554	279.0	6236	168.0	6254	177.0	6283	475.0	6554	445.0	6270
Aug-2017	586.0	6559	175.0	5947	78.0	5910	179.0	6259	478.0	6559	436.0	6266
Sep-2017	562.0	6555	303.0	5635	145.0	5325	168.0	6276	459.0	6568	399.0	6271
Oct-2017	516.0	6454	222.0	5283	117.0	5018	118.0	5311	422.0	6344	381.0	6204
Nov-2017	439.0	5867	436.0	5566	286.0	5539	138.0	3896	357.0	5510	292.0	5767
Dec-2017	590.0	6430	430.0	5780	332.0	5833	214.0	4520	490.0	6524	486.0	6520
Total	6672.0		4678.0		2958.0		2094.0		5669.0		7170.0	
Avg Inj P		6377		5953		5950		5860		6328		5976

	02/08-03 Inj		02/08-10 Inj		02/09-01 Inj		02/12-02 Inj		02/13-02 Inj		02/13-11 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	532.0	6266	420.0	6267	603.0	4973	467.0	6240	329.0	6266	512.0	6268
Feb-2017	487.0	6264	389.0	6236	550.0	4973	405.0	6239	296.0	6262	442.0	6221
Mar-2017	318.0	5929	430.0	6264	443.0	4238	448.0	6246	308.0	6266	473.0	6269
Apr-2017	466.0	5665	417.0	6276	652.0	4793	446.0	6238	297.0	6273	443.0	6266
May-2017	594.0	6226	433.0	6271	888.0	5949	457.0	6187	305.0	6280	446.0	6267
Jun-2017	517.0	6225	417.0	6296	930.0	6363	474.0	6532	353.0	6565	420.0	6263
Jul-2017	293.0	6267	239.0	6324	944.0	6534	484.0	6499	334.0	6567	418.0	6251
Aug-2017	139.0	5940	109.0	5727	893.0	6547	475.0	6489	326.0	6561	410.0	6245
Sep-2017	299.0	5617	252.0	4916	825.0	6568	471.0	6537	311.0	6569	391.0	6264
Oct-2017	213.0	5288	214.0	4534	764.0	6324	428.0	6233	284.0	6500	358.0	6153
Nov-2017	28.0	4946	369.0	5064	624.0	5342	370.0	5612	223.0	6037	287.0	5441
Dec-2017	58.0	4454	335.0	5290	810.0	6318	459.0	6496	299.0	6363	475.0	6531
Total	3944.0		4024.0		8926.0		5384.0		3665.0		5075.0	
Avg Inj P		5757		5789		5743		6296		6376		6203

c) Monthly wellhead injection pressure for each injection well

	02/16-01 Inj		02/16-03 Inj		02/16-10 Inj		03/01-10 Inj		03/05-02 Inj		02/01-12 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	645.0	6273	386.0	6269	397.0	6236	454.0	6265	387.0	6267	448.0	6243
Feb-2017	692.0	6265	379.0	6269	362.0	6224	410.0	6246	350.0	6277	388.0	6238
Mar-2017	337.0	5158	396.0	6268	396.0	6265	453.0	6267	354.0	6127	417.0	6232
Apr-2017	697.0	5357	383.0	6269	379.0	6269	434.0	6265	384.0	6136	400.0	6244
May-2017	903.0	6523	390.0	6252	384.0	6258	442.0	6231	393.0	6276	492.0	6525
Jun-2017	778.0	6571	373.0	6262	364.0	6270	428.0	6266	387.0	6237	440.0	6538
Jul-2017	746.0	6555	212.0	6264	205.0	6272	244.0	6264	425.0	6547	438.0	6538
Aug-2017	726.0	6554	106.0	5798	104.0	5803	117.0	5857	416.0	6527	430.0	6528
Sep-2017	686.0	6573	238.0	5302	227.0	4879	262.0	5460	396.0	6569	413.0	6536
Oct-2017	612.0	6389	171.0	4929	163.0	4446	221.0	5161	361.0	6425	377.0	6446
Nov-2017	504.0	5820	434.0	5762	289.0	5057	410.0	5425	290.0	5647	323.0	6003
Dec-2017	675.0	6442	139.0	5416	291.0	5270	440.0	5791	410.0	6389	440.0	6523
Total	8001.0		3607.0		3561.0		4315.0		4553.0		5006.0	
Avg Inj P		6207		5922		5771		5958		6285		6383

	02/08-12 Inj		03/01-12 Inj		SU3	
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)
Jan-2017	374.0	6263	0.0	3333	8914.0	5999
Feb-2017	347.0	6274	219.0	4278	8503.0	6054
Mar-2017	377.0	6257	393.0	6257	8367.0	6033
Apr-2017	369.0	6261	324.0	6269	9079.0	6076
May-2017	378.0	6258	303.0	6265	9690.0	6275
Jun-2017	369.0	6280	278.0	6273	8963.0	6347
Jul-2017	375.0	6255	274.0	6261	7762.0	6377
Aug-2017	380.0	6248	271.0	6254	6834.0	6229
Sep-2017	368.0	6271	254.0	6273	7429.0	6048
Oct-2017	340.0	6111	233.0	6150	6515.0	5785
Nov-2017	268.0	5373	182.0	5244	6549.0	5446
Dec-2017	421.0	6189	280.0	5860	8074.0	5947
Total	4366.0		3011.0		96679.0	
Avg Inj P		6170		5727		6051

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	8914.0	8503.0	8367.0	9079.0	9690.0	8963.0	7762.0	6834.0	7429.0	6515.0	6549.0	8074.0
Daily (m ³ /d)	287.55	303.68	269.90	302.63	312.58	298.77	250.39	220.45	247.63	210.16	218.30	260.45

2017 AVG. ANNUAL DAILY INJECTION = 265.21 m3/d
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CUMULATIVE INJECTION TO Dec 31, 2016 = 791,231 m3

TOTAL 2017 ANNUAL INJECTION = 96,679 m3

CUMULATIVE INJECTION TO Dec 31, 2017 = 887,910 m3

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
100.02-02-008-29W1.00	Pump Change	9/27/2017
100.15-02-008-29W1.00	Tbg Leak & Acid Job	6/26/2017
100.01-03-008-29W1.00	Pump Change	9/15/2017
100.05-03-008-29W1.00	Pump Change	10/20/2017
100.05-10-008-29W1.00	Tbg Leak & Acid Job	11/2/2017
100.14-10-008-29W1.00	Tbg Leak & Acid Job	6/12/2017
100.08-11-008-29W1.00	Pump Change	3/2/2017
100.13-12-008-29W1.00	Pump Change	7/7/2017

f) **Calculations of voidage replacement ratio on a monthly and cumulative basis**

VOIDAGE CALCULATIONS

OIL FORMATION VOLUME FACTOR (Rm3/Sm3) = 1.071

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	3398.8	770.04	2559.2	289.75	8914.0	800.14	1.438	0.718
Feb-2017	3539.1	773.58	2762.7	292.51	8503.0	808.65	1.298	0.721
Mar-2017	4161.7	777.74	3273.7	295.78	8367.0	817.01	1.082	0.724
Apr-2017	3943.7	781.68	3079.6	298.86	9079.0	826.09	1.243	0.727
May-2017	4041.2	785.72	3078.6	301.94	9690.0	835.78	1.308	0.731
Jun-2017	4034.5	789.76	2869.6	304.81	8963.0	844.75	1.246	0.734
Jul-2017	4454.5	794.21	3118.1	307.93	7762.0	852.51	0.984	0.736
Aug-2017	4502.6	798.71	3458.3	311.39	6834.0	859.34	0.825	0.736
Sep-2017	4116.5	802.83	3146.9	314.54	7429.0	866.77	0.983	0.738
Oct-2017	4249.8	807.08	3396.4	317.93	6515.0	873.29	0.820	0.739
Nov-2017	4300.9	811.38	3290.4	321.22	6549.0	879.84	0.829	0.739
Dec-2017	4235.6	815.62	3280.3	324.50	8074.0	887.91	1.033	0.741

g) **An outline of the method used for quality control and treatment of the injected fluid**

The injection water for Sinclair Unit No. 3 is sourced from the 16-32-007-29W1 well (Lodgepole formation). The water is treated at the 03-04-008-29W1 battery where it is filtered to 0.5 microns and has scale inhibitor added. The injection water is then distributed to the injectors through the dedicated infrastructure system.

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>
100/01-01-008-29W1/0	Vertical	Producing	-
102/01-01-008-29W1/0	Horizontal	Injection	-
100/02-01-008-29W1/0	Vertical	Producing	-
100/03-01-008-29W1/0	Vertical	Producing	-
100/04-01-008-29W1/0	Vertical	Producing	-
100/05-01-008-29W1/0	Vertical	Producing	-
102/06-01-008-29W1/0	Vertical	Producing	-
100/07-01-008-29W1/0	Vertical	Producing	-
100/08-01-008-29W1/0	Vertical	Producing	-
100/09-01-008-29W1/0	Vertical	Producing	-
102/09-01-008-29W1/0	Horizontal	Injection	-
100/10-01-008-29W1/0	Vertical	Producing	-
100/11-01-008-29W1/0	Vertical	Producing	-
100/12-01-008-29W1/0	Vertical	Producing	-
100/13-01-008-29W1/0	Vertical	Producing	-
102/13-01-008-29W1/0	Horizontal	Producing	-
100/14-01-008-29W1/0	Vertical	Producing	-
100/15-01-008-29W1/0	Vertical	Producing	-
100/16-01-008-29W1/0	Vertical	Producing	-
102/16-01-008-29W1/0	Horizontal	Injection	-
100/01-02-008-29W1/0	Vertical	Producing	-
100/02-02-008-29W1/0	Vertical	Producing	-
100/03-02-008-29W1/0	Vertical	Producing	-
100/04-02-008-29W1/0	Vertical	Producing	-
102/04-02-008-29W1/0	Horizontal	Producing	-
100/05-02-008-29W1/0	Vertical	Producing	-
102/05-02-008-29W1/0	Horizontal	Injection	-
103/05-02-008-29W1/0	Horizontal	Injection	-
100/06-02-008-29W1/0	Vertical	Producing	-
100/07-02-008-29W1/0	Vertical	Producing	-
100/08-02-008-29W1/0	Vertical	Producing	-
100/09-02-008-29W1/0	Vertical	Producing	-
100/10-02-008-29W1/0	Vertical	Producing	-
100/11-02-008-29W1/0	Vertical	Producing	-
100/12-02-008-29W1/0	Vertical	Producing	-
102/12-02-008-29W1/0	Horizontal	Injection	-
100/13-02-008-29W1/0	Vertical	Producing	-
102/13-02-008-29W1/0	Horizontal	Injection	-
100/14-02-008-29W1/0	Vertical	Producing	-
100/15-02-008-29W1/0	Vertical	Producing	-
100/16-02-008-29W1/0	Vertical	Producing	-
100/01-03-008-29W1/0	Vertical	Producing	-
102/01-03-008-29W1/0	Horizontal	Injection	-
100/02-03-008-29W1/0	Vertical	Producing	-
100/03-03-008-29W1/0	Vertical	Producing	-

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
100/04-03-008-29W1/0	Vertical	Suspended	-
100/05-03-008-29W1/0	Vertical	Producing	-
100/06-03-008-29W1/0	Vertical	Producing	-
100/07-03-008-29W1/0	Vertical	Producing	-
100/08-03-008-29W1/0	Vertical	Producing	-
102/08-03-008-29W1/0	Horizontal	Injection	-
100/09-03-008-29W1/0	Vertical	Producing	-
100/10-03-008-29W1/0	Vertical	Producing	-
100/11-03-008-29W1/0	Vertical	Producing	-
100/12-03-008-29W1/0	Vertical	Producing	-
100/13-03-008-29W1/0	Vertical	Producing	-
100/14-03-008-29W1/0	Vertical	Producing	-
100/15-03-008-29W1/0	Vertical	Producing	-
100/16-03-008-29W1/0	Vertical	Producing	-
102/16-03-008-29W1/0	Horizontal	Injection	-
100/01-10-008-29W1/0	Vertical	Producing	-
102/01-10-008-29W1/0	Horizontal	Injection	-
103/01-10-008-29W1/0	Horizontal	Producing	-
100/02-10-008-29W1/0	Vertical	Producing	-
100/03-10-008-29W1/0	Vertical	Producing	-
100/04-10-008-29W1/0	Vertical	Producing	-
100/05-10-008-29W1/0	Vertical	Producing	-
100/06-10-008-29W1/0	Vertical	Producing	-
100/07-10-008-29W1/0	Vertical	Producing	-
100/08-10-008-29W1/0	Vertical	Producing	-
102/08-10-008-29W1/0	Horizontal	Potential	-
100/09-10-008-29W1/0	Vertical	Producing	-
100/10-10-008-29W1/0	Vertical	Producing	-
100/11-10-008-29W1/0	Vertical	Producing	-
100/12-10-008-29W1/0	Vertical	Producing	-
100/13-10-008-29W1/0	Vertical	Producing	-
100/14-10-008-29W1/0	Vertical	Producing	-
100/15-10-008-29W1/0	Vertical	Producing	-
100/16-10-008-29W1/0	Vertical	Producing	-
102/16-10-008-29W1/0	Horizontal	Injection	-
100/01-11-008-29W1/0	Vertical	Potential	-
100/02-11-008-29W1/0	Vertical	Producing	-
100/03-11-008-29W1/0	Vertical	Producing	-
100/04-11-008-29W1/0	Vertical	Producing	-
102/04-11-008-29W1/0	Horizontal	Injection	-
103/04-11-008-29W1/0	Horizontal	Producing	-
100/05-11-008-29W1/0	Vertical	Producing	-
102/05-11-008-29W1/0	Horizontal	Injection	-
100/06-11-008-29W1/0	Vertical	Producing	-
100/07-11-008-29W1/0	Vertical	Producing	-
100/08-11-008-29W1/0	Vertical	Potential	-

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
100/09-11-008-29W1/0	Vertical	Potential	-
100/10-11-008-29W1/0	Vertical	Potential	-
100/11-11-008-29W1/0	Vertical	Producing	-
100/12-11-008-29W1/0	Vertical	Producing	-
100/13-11-008-29W1/0	Vertical	Producing	-
102/13-11-008-29W1/0	Horizontal	Injection	-
100/14-11-008-29W1/0	Vertical	Producing	-
100/15-11-008-29W1/0	Vertical	Producing	-
100/16-11-008-29W1/0	Vertical	Producing	-
100/01-12-008-29W1/0	Vertical	Producing	-
102/01-12-008-29W1/0	Horizontal	Injection	-
103/01-12-008-29W1/0	Horizontal	Injection	-
100/02-12-008-29W1/0	Vertical	Potential	-
100/03-12-008-29W1/0	Vertical	Producing	-
100/04-12-008-29W1/0	Vertical	Producing	-
100/05-12-008-29W1/0	Vertical	Potential	-
100/06-12-008-29W1/0	Vertical	Producing	-
100/07-12-008-29W1/0	Vertical	Suspended	-
100/08-12-008-29W1/0	Vertical	Producing	-
102/08-12-008-29W1/0	Horizontal	Injection	-
100/09-12-008-29W1/0	Vertical	Producing	-
102/09-12-008-29W1/0	Horizontal	Producing	-
100/10-12-008-29W1/0	Vertical	Producing	-
100/11-12-008-29W1/0	Vertical	Producing	-
100/12-12-008-29W1/0	Vertical	Producing	-
100/13-12-008-29W1/0	Vertical	Potential	-
100/14-12-008-29W1/0	Vertical	Producing	-
100/15-12-008-29W1/0	Vertical	Producing	-
100/16-12-008-29W1/0	Vertical	Producing	-
102/16-12-008-29W1/0	Horizontal	Drilled & Cased	-