Sinclair 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:

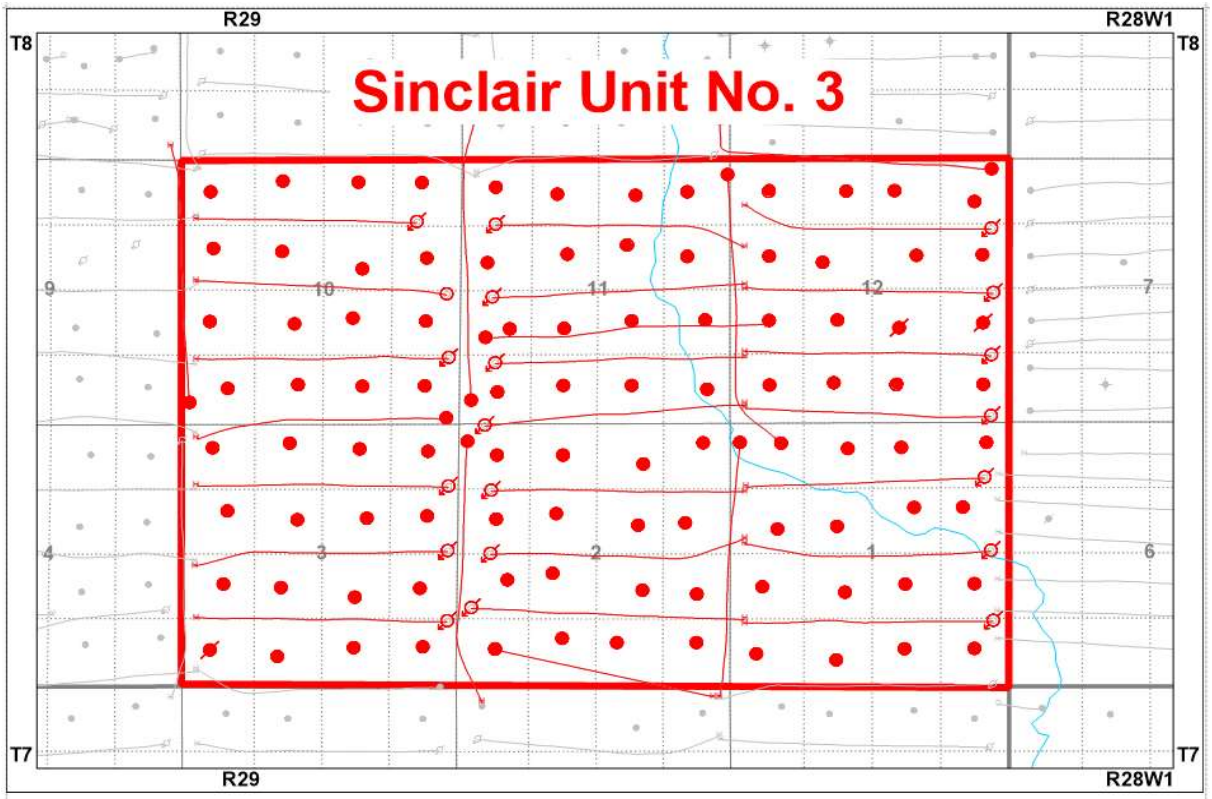
Tundra Oil and Gas

June 11, 2020

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 wells, 3 suspended wells and 21 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 2019 EOR report as per section 73 of the Drilling and Production Regulations.

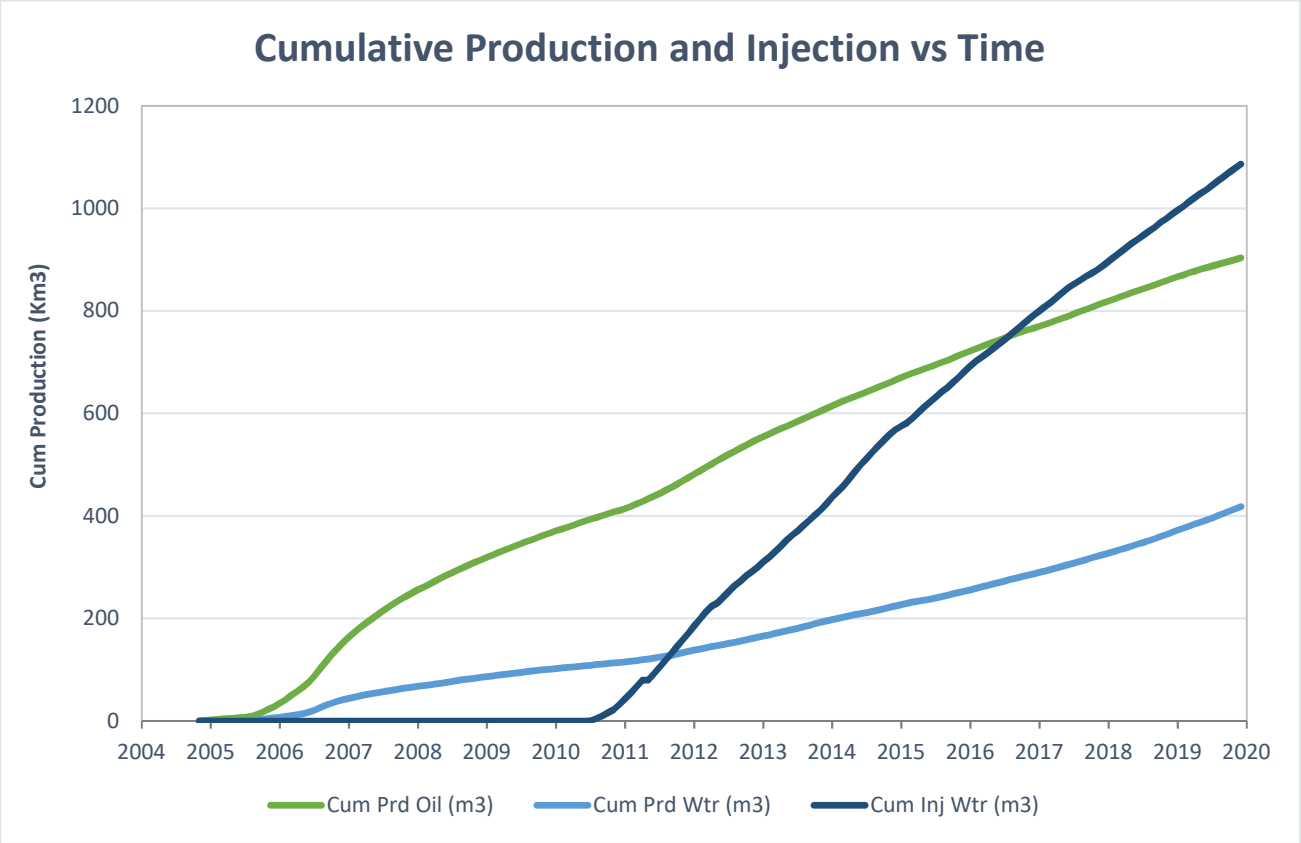
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	123.06	141.26	270.97	1.15	2.52
Feb-2019	122.69	135.69	267.46	1.11	2.27
Mar-2019	132.30	123.92	273.81	0.94	2.41
Apr-2019	116.72	130.15	270.23	1.12	2.66
May-2019	107.84	125.24	257.65	1.16	2.96
Jun-2019	103.76	131.44	235.17	1.27	2.96
Jul-2019	104.74	125.56	287.48	1.20	1.97
Aug-2019	104.68	145.33	265.13	1.39	2
Sep-2019	104.62	149.53	279.73	1.43	2.33
Oct-2019	102.17	138.43	274.06	1.35	3.03
Nov-2019	106.86	147.11	269.93	1.38	2.46
Dec-2019	107.69	152.68	267.61	1.42	2.52

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

2019 PRODUCTION	
Produced Oil (m^3)	40,651
Produced Gas (m^3)	102
Produced Water (m^3)	50,071
Fluid Injected (m^3)	97,939
CUMULATIVE PRODUCTION	
Produced Oil (m^3)	903,550
Produced Water (m^3)	418,174

Sinclair Unit No. 3



c) Monthly wellhead injection pressure for each injection well

MONTH	02/01-01 Inj		02/01-03 Inj		02/01-10 Inj		02/04-11 Inj		02/05-02 Inj		02/05-11 Inj	
	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	489.0	6560	444.0	6391	253.0	6324	288.0	6587	446.0	6563	322.0	6556
Feb-2019	436.0	6563	399.0	6394	268.0	6592	260.0	6592	404.0	6560	289.0	6562
Mar-2019	475.0	6566	435.0	6420	282.0	6603	285.0	6598	457.0	6560	317.0	6567
Apr-2019	442.0	6535	367.0	6311	244.0	6535	274.0	6600	507.0	6560	306.0	6568
May-2019	455.0	6480	356.0	6111	187.0	6130	275.0	6363	519.0	6519	309.0	6542
Jun-2019	440.0	6398	242.0	5739	140.0	5712	262.0	6490	498.0	6232	300.0	6477
Jul-2019	464.0	6545	463.0	6389	310.0	6358	277.0	6589	535.0	6510	312.0	6558
Aug-2019	456.0	6497	439.0	6391	129.0	6068	132.0	6293	350.0	5257	307.0	6543
Sep-2019	437.0	6535	428.0	6427	338.0	6240	296.0	6500	287.0	4333	293.0	6570
Oct-2019	447.0	6562	426.0	6365	337.0	6562	273.0	6591	298.0	4204	304.0	6559
Nov-2019	431.0	6565	421.0	6357	303.0	6659	254.0	6607	286.0	4186	294.0	6564
Dec-2019	435.0	6522	431.0	6402	294.0	6649	255.0	6568	286.0	4112	300.0	6539
Total	5407.0		4851.0		3085.0		3131.0		4873.0		3653.0	
Avg Inj P		6527		6308		6369		6532		5633		6550

MONTH	02/08-03 Inj		02/08-10 Inj		02/09-01 Inj		02/12-02 Inj		02/13-02 Inj		02/13-11 Inj	
	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	609.0	6557	447.0	6543	693.0	6560	414.0	6524	271.0	6561	332.0	6558
Feb-2019	520.0	6566	401.0	6542	612.0	6565	373.0	6530	242.0	6567	297.0	6567
Mar-2019	563.0	6570	438.0	6565	659.0	6567	410.0	6526	265.0	6566	322.0	6565
Apr-2019	485.0	6494	395.0	6517	638.0	6570	395.0	6514	252.0	6563	307.0	6569
May-2019	430.0	6200	370.0	6097	652.0	6553	401.0	6529	256.0	6552	311.0	6529
Jun-2019	314.0	5844	273.0	5799	605.0	6236	375.0	6215	242.0	6458	295.0	6409
Jul-2019	622.0	6499	496.0	6520	651.0	6511	410.0	6480	203.0	6314	314.0	6559
Aug-2019	566.0	6525	466.0	6519	613.0	6288	413.0	6438	158.0	5894	306.0	6526
Sep-2019	524.0	6566	444.0	6575	739.0	6248	399.0	6514	170.0	5881	292.0	6562
Oct-2019	509.0	6499	429.0	6506	767.0	6415	414.0	6514	163.0	5719	302.0	6553
Nov-2019	498.0	6586	425.0	6577	732.0	6567	394.0	6526	160.0	5922	287.0	6559
Dec-2019	502.0	6556	450.0	6541	736.0	6496	398.0	6442	167.0	5580	293.0	6527
Total	6142.0		5034.0		8097.0		4796.0		2549.0		3658.0	
Avg Inj P		6455		6442		6465		6479		6215		6540

c) Monthly wellhead injection pressure for each injection well

MONTH	02/16-01 Inj		02/16-03 Inj		02/16-10 Inj		03/01-10 Inj		03/05-02 Inj		02/01-12 Inj	
	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	551.0	6555	356.0	6557	317.0	6545	453.0	6551	382.0	6564	369.0	6524
Feb-2019	495.0	6561	327.0	6567	282.0	6568	409.0	6559	346.0	6567	332.0	6530
Mar-2019	541.0	6562	338.0	6572	306.0	6555	451.0	6563	380.0	6566	363.0	6536
Apr-2019	516.0	6567	309.0	6440	268.0	6440	400.0	6466	368.0	6565	344.0	6529
May-2019	526.0	6559	297.0	6245	238.0	6099	384.0	6193	374.0	6553	351.0	6513
Jun-2019	501.0	6396	219.0	5915	169.0	5793	270.0	5901	360.0	6345	342.0	6408
Jul-2019	539.0	6542	383.0	6549	331.0	6483	509.0	6527	393.0	6532	359.0	6520
Aug-2019	534.0	6514	368.0	6555	312.0	6472	483.0	6546	388.0	6488	346.0	6473
Sep-2019	509.0	6560	335.0	6540	295.0	6548	460.0	6554	374.0	6528	336.0	7152
Oct-2019	525.0	6556	335.0	6492	288.0	6475	461.0	6486	384.0	6564	345.0	6528
Nov-2019	504.0	6566	328.0	6554	281.0	6556	457.0	6561	365.0	6562	332.0	6538
Dec-2019	514.0	6513	334.0	6548	283.0	6534	481.0	6350	369.0	6504	338.0	6496
Total	6255.0		3929.0		3370.0		5218.0		4483.0		4157.0	
Avg Inj P		6538		6461		6422		6438		6528		6562

MONTH	02/08-12 Inj		03/01-12 Inj		02/09-12 Inj		SU3	
	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	384.0	6545	230.0	6552	350.0	-93	8400.0	6218
Feb-2019	344.0	6562	205.0	6566	248.0	-93	7489.0	6237
Mar-2019	377.0	6571	224.0	6570	600.0	-92	8488.0	6242
Apr-2019	363.0	6569	212.0	6570	715.0	-93	8107.0	6209
May-2019	366.0	6504	214.0	6538	716.0	-94	7987.0	6082
Jun-2019	351.0	6351	203.0	6425	654.0	-88	7055.0	5879
Jul-2019	379.0	6558	216.0	6550	746.0	226	8912.0	6206
Aug-2019	374.0	6516	214.0	6533	865.0	1244	8219.0	6123
Sep-2019	360.0	6571	205.0	6566	871.0	2370	8392.0	6207
Oct-2019	373.0	6538	211.0	6558	905.0	2771	8496.0	6191
Nov-2019	359.0	6697	203.0	6562	784.0	2987	8098.0	6250
Dec-2019	364.0	6499	205.0	6530	861.0	3360	8296.0	6203
Total	4394.0		2542.0		8315.0		97939.0	
Avg Inj P		6540		6543		1034		6171

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	8400.0	7489.0	8488.0	8107.0	7987.0	7055.0	8912.0	8219.0	8392.0	8496.0	8098.0	8296.0
Daily (m^3/d)	270.97	267.46	273.81	270.23	257.65	235.17	287.48	265.13	279.73	274.06	269.93	267.61

c) Monthly wellhead injection pressure for each injection well

2019 AVG. ANNUAL DAILY INJECTION =	268.27 m3/d
CUMULATIVE INJECTION TO Dec 31, 2018 =	988,580 m3
TOTAL 2019 ANNUAL INJECTION =	97,939 m3
CUMULATIVE INJECTION TO Dec 31, 2019 =	1,086,519 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
100.02-10-008-29W1.00	Refrac Bakken Vertical	8/30/2019
100.03-02-008-29W1.00	Pump Change / Acid Job	8/15/2019
100.03-03-008-29W1.00	VT PC & Acid	10/21/2019
100.03-11-008-29W1.00	Pump Change/Acid Job	8/7/2019
100.04-02-008-29W1.00	Rigless Acid	10/17/2019
100.04-12-008-29W1.00	Pump Change / Acid Job	8/19/2019
100.05-01-008-29W1.00	Pump Change / Acid Job	10/31/2019
100.05-12-008-29W1.00	Pump Change / Acid Job	8/30/2019
100.06-12-008-29W1.00	Rig Acid Stimulation	10/24/2019
100.07-02-008-29W1.00	Broken Polish Rod	12/18/2019
100.08-01-008-29W1.00	Pump Change	3/15/2019
100.09-01-008-29W1.00	Pump Change / Acid Job	10/30/2019
100.09-02-008-29W1.00	PC & Acid	7/4/2019
100.09-02-008-29W1.00	Casing Leak Repair	8/22/2019
100.09-11-008-29W1.00	Rig Acid Stimulation	10/18/2019
100.10-01-008-29W1.00	Pump Change / Acid Job	8/16/2019
100.10-03-008-29W1.00	VT PC & Acid	10/28/2019
100.10-10-008-29W1.00	Rig Acid Stimulation	10/23/2019
100.11-01-008-29W1.00	Pump Change	10/17/2019
100.11-02-008-29W1.00	Pump Change / Acid Job	10/24/2019
100.11-11-008-29W1.00	Tubing Leak	10/10/2019
100.12-03-008-29W1.00	VT PC & Acid	10/22/2019
100.12-11-008-29W1.00	Rigless Acid	10/17/2019
100.12-12-008-29W1.00	Rig Acid Stimulation	10/23/2019
100.13-02-008-29W1.00	Pump Change / Acid Job	10/22/2019
100.13-03-008-29W1.00	VT PC & Acid	10/24/2019
100.13-10-008-29W1.00	Rigless Acid	10/17/2019
100.14-01-008-29W1.00	Pump Change / Acid Job	10/25/2019
100.14-02-008-29W1.00	Tubing Failure/Potential Acid	10/8/2019
100.14-11-008-29W1.00	Pump Change	8/29/2019
100.15-01-008-29W1.00	Pump Change / Acid Job	10/28/2019
100.15-02-008-29W1.00	Rigless Acid	10/17/2019
100.15-11-008-29W1.00	Rigless Acid	10/17/2019
100.15-12-008-29W1.00	Pump Change / Acid job	10/21/2019
103.04-11-008-29W1.00	Pump Change/Polish Rod Repair	7/23/2019

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-2019	3814.9	866.71	4379.2	372.48	8400.0	996.98	0.992	0.766
Feb-2019	3435.3	870.15	3799.3	376.28	7489.0	1004.47	1.001	0.768
Mar-2019	4101.2	874.25	3841.6	380.12	8488.0	1012.96	1.031	0.769
Apr-2019	3501.7	877.75	3904.4	384.03	8107.0	1021.06	1.059	0.771
May-2019	3342.9	881.10	3882.3	387.91	7987.0	1029.05	1.070	0.773
Jun-2019	3112.8	884.21	3943.2	391.85	7055.0	1036.11	0.969	0.774
Jul-2019	3246.8	887.46	3892.3	395.75	8912.0	1045.02	1.209	0.776
Aug-2019	3245.2	890.70	4505.1	400.25	8219.0	1053.24	1.030	0.778
Sep-2019	3138.5	893.84	4485.8	404.74	8392.0	1061.63	1.069	0.779
Oct-2019	3167.2	897.01	4291.2	409.03	8496.0	1070.12	1.106	0.781
Nov-2019	3205.8	900.21	4413.3	413.44	8098.0	1078.22	1.032	0.783
Dec-2019	3338.3	903.55	4733	418.17	8296.0	1086.52	0.999	0.784

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

j) Well List

Sinclair Unit No.3 Well List

UWI	*Type*	*Status*	*Future Plans*
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	-
103/13-02-008-29W1/0	Horizontal	Producing	-
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	-

j) Well List

Sinclair Unit No.3 Well List

UWI	*Type*	*Status*	*Future Plans*
100/03-03-008-29W1/0	Vertical	Producing	-
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	Injection	-
100/02-10-008-29W1/0	Vertical	Producing	-
100/03-10-008-29W1/0	Vertical	Producing	-
100/04-10-008-29W1/0	Vertical	Producing	-
102/04-10-008-29W1/0	Horizontal	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	Injection	-
100/09-10-008-29W1/0	Vertical	Producing	-
100/10-10-008-29W1/0	Vertical	Producing	-
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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	Producing	-
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	-
103/05-11-008-29W1/0	Horizontal	Producing	-

j) Well List

Sinclair Unit No.3 Well List

UWI	*Type*	*Status*	*Future Plans*
100/06-11-008-29W1/0	Vertical	Producing	-
100/07-11-008-29W1/0	Vertical	Producing	-
100/08-11-008-29W1/0	Vertical	Producing	-
100/09-11-008-29W1/0	Vertical	Producing	-
100/10-11-008-29W1/0	Vertical	Producing	-
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	-
102/16-11-008-29W1/0	Horizontal	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	Producing	-
100/03-12-008-29W1/0	Vertical	Producing	-
100/04-12-008-29W1/0	Vertical	Producing	-
100/05-12-008-29W1/0	Vertical	Producing	-
100/06-12-008-29W1/0	Vertical	Producing	-
100/07-12-008-29W1/0	Vertical	Suspended	-
100/08-12-008-29W1/0	Vertical	Suspended	-
102/08-12-008-29W1/0	Horizontal	Injection	-
100/09-12-008-29W1/0	Vertical	Producing	-
102/09-12-008-29W1/0	Horizontal	Injection	-
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	Producing	-
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	Producing	-