

**Sinclair Unit No. 8**

**Waterflood Progress Report 2019**

**January 1st through December 31st 2019**

**Prepared for:**

**Manitoba Industry, Economic Development and Mines**

**Petroleum Branch**

**Prepared by:**

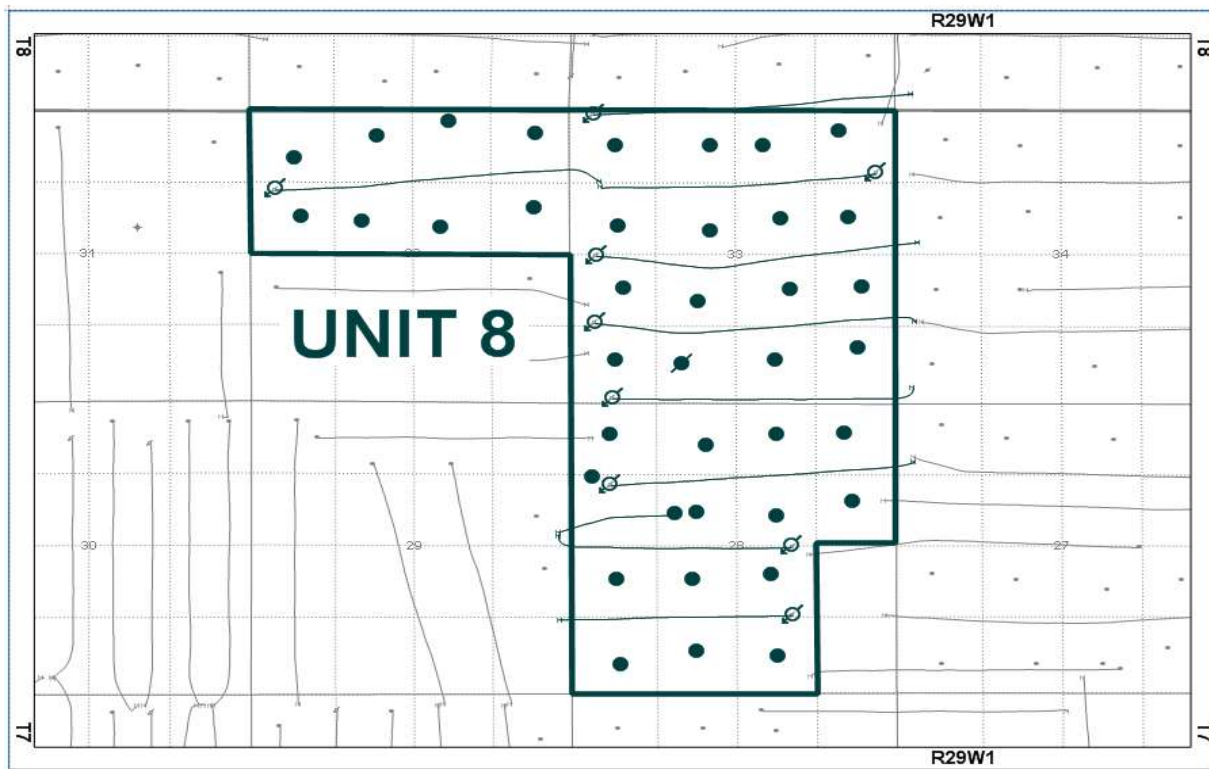
**Tundra Oil and Gas**

**June 9, 2020**

## INTRODUCTION

Sinclair Unit No. 8 Enhanced Oil Recovery (EOR) Waterflood Project was approved under Waterflood Order No. 25 effective July 1, 2013 with Tundra Oil and Gas (Tundra) as Operator. The Unit area contains 38 vertical and 10 horizontal wells in 38 LSDs in Township 7 Range 29 W1 as shown in the figure below.

**Figure 1: Sinclair Unit No. 8 Area Outline**



## Sinclair Unit No. 8

Tundra Oil and Gas (Tundra), as the operator of the Sinclair Unit No. 8 Enhanced Oil Recovery (EOR) project hereby submits the 2019 EOR report as per section 73 of the Drilling and Production Regulations.

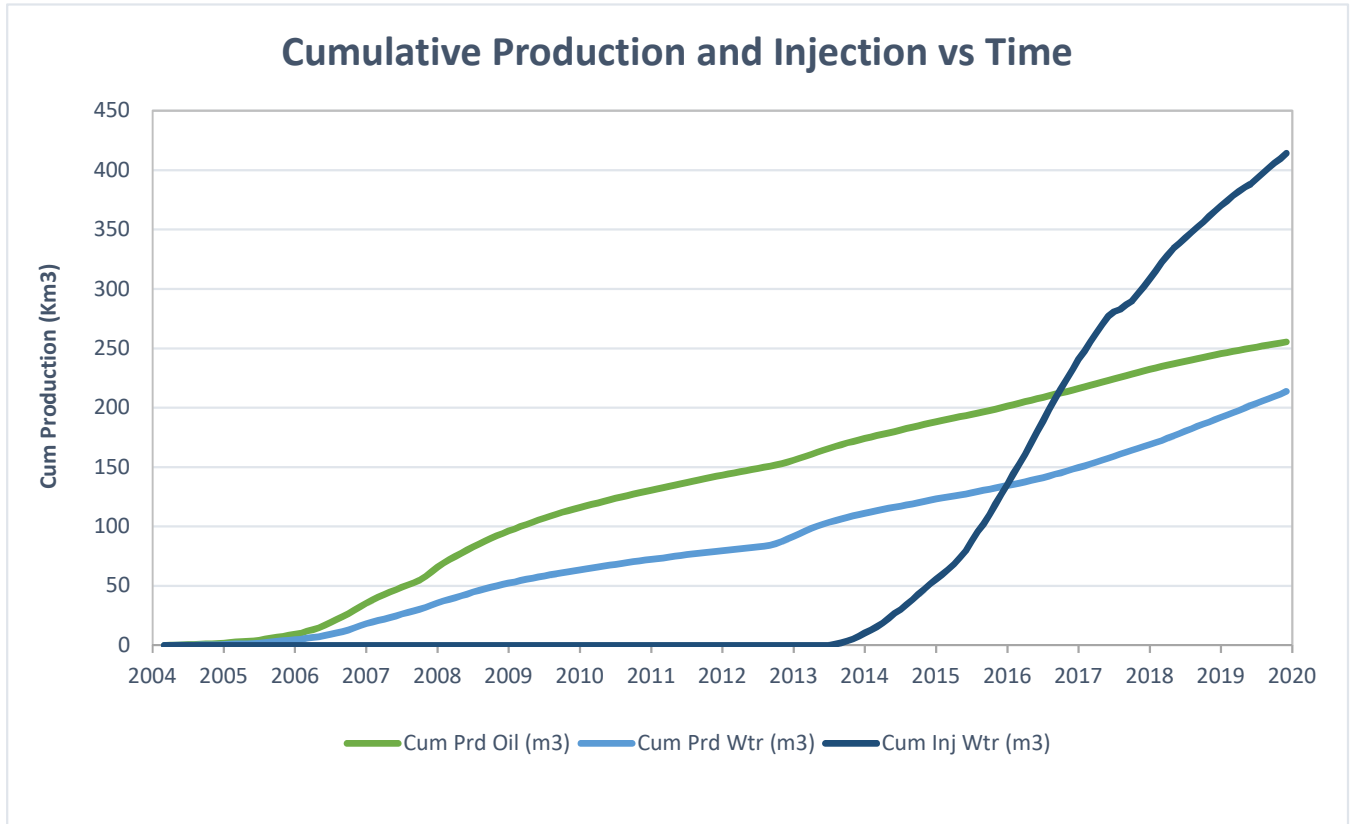
### a) Monthly oil and water production rates, injection rate, GOR and WOR

MONTH	Cal Dly Oil m <sup>3</sup> /day	Cal Dly Wtr m <sup>3</sup> /day	Cal Inj Wtr m <sup>3</sup> /day	WOR m <sup>3</sup> /m <sup>3</sup>	GOR m <sup>3</sup> /m <sup>3</sup>
Jan-2019	32.60	65.08	138.06	2.00	0
Feb-2019	33.46	64.78	142.64	1.94	0
Mar-2019	31.96	64.54	140.84	2.02	0
Apr-2019	29.79	64.84	124.37	2.18	0
May-2019	29.98	66.92	114.48	2.23	0
Jun-2019	28.92	69.16	83.23	2.39	0
Jul-2019	29.50	61.80	153.39	2.10	0
Aug-2019	27.62	60.49	140.16	2.19	0
Sep-2019	27.79	60.87	143.83	2.19	0
Oct-2019	26.93	61.43	133.26	2.28	0
Nov-2019	28.47	68.77	130.60	2.42	0
Dec-2019	29.04	74.39	145.29	2.56	0

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

2019 PRODUCTION	
Produced Oil (m <sup>3</sup> )	10,822
Produced Gas (m <sup>3</sup> )	0
Produced Water (m <sup>3</sup> )	23,817
Fluid Injected (m <sup>3</sup> )	48,385
CUMULATIVE PRODUCTION	
Produced Oil (m <sup>3</sup> )	255,340
Produced Water (m <sup>3</sup> )	213,783

## Sinclair Unit No. 8



c) Monthly wellhead injection pressure for each injection well

	02/04-33 Inj		02/05-33 Inj		02/07-28 Inj		02/12-28 Inj		02/12-32 Inj		02/13-33 Inj	
MONTH	Inj Water (m <sup>3</sup> )	Avg Inj P (kPa)	Inj Water (m <sup>3</sup> )	Avg Inj P (kPa)	Inj Water (m <sup>3</sup> )	Avg Inj P (kPa)	Inj Water (m <sup>3</sup> )	Avg Inj P (kPa)	Inj Water (m <sup>3</sup> )	Avg Inj P (kPa)	Inj Water (m <sup>3</sup> )	Avg Inj P (kPa)
Jan-2019	5.0	5701	0.0	7131	473.0	6559	496.0	6559	893.0	6262	684.0	6611
Feb-2019	179.0	3806	0.0	7131	417.0	6590	444.0	6567	764.0	6465	652.0	6567
Mar-2019	302.0	4107	0.0	7131	450.0	6567	480.0	6562	786.0	6564	688.0	6360
Apr-2019	260.0	4081	0.0	7131	388.0	6498	409.0	6468	641.0	6479	599.0	6437
May-2019	275.0	3960	0.0	7131	368.0	6311	357.0	6137	567.0	6221	604.0	6174
Jun-2019	172.0	3793	0.0	7131	263.0	5797	258.0	5744	392.0	5650	448.0	5784
Jul-2019	295.0	3831	0.0	7131	504.0	6513	552.0	6359	791.0	6485	779.0	6454
Aug-2019	395.0	3997	0.0	7131	439.0	6500	497.0	6202	665.0	6443	714.0	6450
Sep-2019	443.0	4273	0.0	7131	422.0	6561	483.0	6550	667.0	6560	673.0	6546
Oct-2019	454.0	4398	0.0	7131	404.0	6510	457.0	6483	632.0	6498	661.0	6478
Nov-2019	442.0	4286	0.0	7131	393.0	6568	447.0	6524	619.0	6564	639.0	6566
Dec-2019	702.0	4609	0.0	7131	397.0	6568	453.0	6458	615.0	6547	647.0	6566
<b>Total</b>	3924.0		0.0		4918.0		5333.0		8032.0		7788.0	
<b>Avg Inj P</b>		4237		7131		6462		6384		6395		6416

	02/16-33 Inj		03/05-33 Inj		03/07-28 Inj		SU8	
MONTH	Inj Water (m <sup>3</sup> )	Avg Inj P (kPa)	Inj Water (m <sup>3</sup> )	Avg Inj P (kPa)	Inj Water (m <sup>3</sup> )	Avg Inj P (kPa)	Inj Water (m <sup>3</sup> )	Avg Inj P (kPa)
Jan-2019	646.0	6551	750.0	6546	333.0	6558	4280.0	6497
Feb-2019	570.0	6562	668.0	6564	300.0	6567	3994.0	6313
Mar-2019	615.0	6563	718.0	6573	327.0	6569	4366.0	6333
Apr-2019	534.0	6454	615.0	6420	285.0	6490	3731.0	6273
May-2019	503.0	6209	611.0	6180	264.0	6205	3549.0	6059
Jun-2019	344.0	5584	431.0	5753	189.0	5586	2497.0	5647
Jul-2019	670.0	6487	785.0	6455	379.0	6443	4755.0	6240
Aug-2019	579.0	6401	718.0	6449	338.0	6452	4345.0	6225
Sep-2019	593.0	6556	709.0	6539	325.0	6567	4315.0	6365
Oct-2019	563.0	6493	645.0	6477	315.0	6497	4131.0	6329
Nov-2019	544.0	6569	527.0	6526	307.0	6551	3918.0	6365
Dec-2019	538.0	27506	837.0	6567	315.0	6565	4504.0	8724
<b>Total</b>	6699.0		8014.0		3677.0		48385.0	
<b>Avg Inj P</b>		8161		6421		6421		6447

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
<b>Total m3</b>	4280.0	3994.0	4366.0	3731.0	3549.0	2497.0	4755.0	4345.0	4315.0	4131.0	3918.0	4504.0
<b>Daily (m<sup>3</sup>/d)</b>	138.06	142.64	140.84	124.37	114.48	83.23	153.39	140.16	143.83	133.26	130.60	145.29

**c) Monthly wellhead injection pressure for each injection well**

2019 AVG. ANNUAL DAILY INJECTION =	132.51 m3/d
CUMULATIVE INJECTION TO Dec 31, 2018 =	365,812 m3
TOTAL 2019 ANNUAL INJECTION =	48,385 m3
CUMULATIVE INJECTION TO Dec 31, 2019 =	414,197 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
100.04-28-007-29W1.00	Pump Change & Acid Job	10/18/2019
100.04-33-007-29W1.00	Pump Change & Acid Job	9/3/2019
100.05-28-007-29W1.00	Pump Change & Acid Job	10/16/2019
100.06-28-007-29W1.00	Pump Change & Acid Job	10/11/2019
100.06-33-007-29W1.00	Pump Change & Acid Job	11/7/2019
100.07-33-007-29W1.00	Pump Change & Acid Job	10/28/2019
100.08-33-007-29W1.00	Pump Change & Acid Job	10/11/2019
100.09-32-007-29W1.00	Pump Change & Acid Job	9/17/2019
100.10-28-007-29W1.00	Pump Change & Acid Job	8/28/2019
100.11-32-007-29W1.00	Pump Change & Acid Job	11/5/2019
100.11-33-007-29W1.00	Pump Change & Acid Job	10/30/2019
100.12-32-007-29W1.00	Pump Change & Acid Job	9/19/2019
100.13-32-007-29W1.00	Pump Change & Acid Job	9/20/2019
102.04-33-007-29W1.00	WiW Packer Repair	1/24/2019

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	1010.5	245.53	2017.6	191.98	4280.0	370.09	1.381	0.813
Feb-2019	936.8	246.46	1813.9	193.80	3994.0	374.09	1.418	0.817
Mar-2019	990.8	247.46	2000.7	195.80	4366.0	378.45	1.426	0.821
Apr-2019	893.6	248.35	1945.1	197.74	3731.0	382.18	1.286	0.824
May-2019	929.5	249.28	2074.6	199.82	3549.0	385.73	1.156	0.826
Jun-2019	867.6	250.15	2074.9	201.89	2497.0	388.23	0.831	0.826
Jul-2019	914.4	251.06	1915.7	203.81	4755.0	392.98	1.642	0.831
Aug-2019	856.2	251.92	1875.1	205.68	4345.0	397.33	1.556	0.836
Sep-2019	833.8	252.75	1826	207.51	4315.0	401.64	1.587	0.840
Oct-2019	834.9	253.59	1904.3	209.41	4131.0	405.78	1.476	0.844
Nov-2019	854.0	254.44	2063	211.48	3918.0	409.69	1.316	0.847
Dec-2019	900.1	255.34	2306.1	213.78	4504.0	414.20	1.377	0.850

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

The injection water for Sinclair Unit No. 8 will be 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>
102/02-28-007-29W1/0	Vertical	Producing	-
100/03-28-007-29W1/0	Vertical	Producing	-
100/04-28-007-29W1/0	Vertical	Producing	-
100/05-28-007-29W1/0	Vertical	Producing	-
100/06-28-007-29W1/0	Vertical	Producing	-
100/07-28-007-29W1/0	Vertical	Producing	-
102/07-28-007-29W1/0	Horizontal	Injection	-
103/07-28-007-29W1/0	Horizontal	Injection	-
100/09-28-007-29W1/0	Vertical	Producing	-
100/10-28-007-29W1/0	Vertical	Producing	-
100/11-28-007-29W1/0	Vertical	Producing	-
102/11-28-007-29W1/0	Horizontal	Producing	-
100/12-28-007-29W1/0	Vertical	Producing	-
102/12-28-007-29W1/0	Horizontal	Injection	-
100/13-28-007-29W1/0	Vertical	Producing	-
100/14-28-007-29W1/0	Vertical	Producing	-
100/15-28-007-29W1/0	Vertical	Producing	-
100/16-28-007-29W1/0	Vertical	Producing	-
100/09-32-007-29W1/0	Vertical	Producing	-
100/10-32-007-29W1/0	Vertical	Producing	-
100/11-32-007-29W1/0	Vertical	Producing	-
100/12-32-007-29W1/0	Vertical	Producing	-
102/12-32-007-29W1/0	Horizontal	Injection	-
100/13-32-007-29W1/0	Vertical	Producing	-
100/14-32-007-29W1/0	Vertical	Producing	-
100/15-32-007-29W1/0	Vertical	Producing	-
100/16-32-007-29W1/0	Vertical	Producing	-
100/01-33-007-29W1/0	Vertical	Producing	-
100/02-33-007-29W1/0	Vertical	Producing	-
100/03-33-007-29W1/0	Vertical	Producing	-
100/04-33-007-29W1/0	Vertical	Producing	-
102/04-33-007-29W1/0	Horizontal	Injection	-
100/05-33-007-29W1/0	Vertical	Producing	-
102/05-33-007-29W1/0	Horizontal	Injection	-
103/05-33-007-29W1/0	Horizontal	Injection	-
100/06-33-007-29W1/0	Vertical	Producing	-
100/07-33-007-29W1/0	Vertical	Producing	-
100/08-33-007-29W1/0	Vertical	Producing	-
100/09-33-007-29W1/0	Vertical	Producing	-
100/10-33-007-29W1/0	Vertical	Producing	-
100/11-33-007-29W1/0	Vertical	Producing	-
100/12-33-007-29W1/0	Vertical	Producing	-
100/13-33-007-29W1/0	Vertical	Producing	-
102/13-33-007-29W1/0	Horizontal	Injection	-
100/14-33-007-29W1/0	Vertical	Producing	-

**j) Well List****Sinclair Unit No. 8 Well List**

<i><b>UWI</b></i>	<i><b>Type</b></i>	<i><b>Status</b></i>	<i><b>Future Plans</b></i>
100/15-33-007-29W1/0	Vertical	Producing	-
100/16-33-007-29W1/0	Vertical	Producing	-
102/16-33-007-29W1/0	Horizontal	Injection	-