

Sinclair Unit No. 5

Waterflood Progress Report 2019

January 1st through December 31st 2019

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

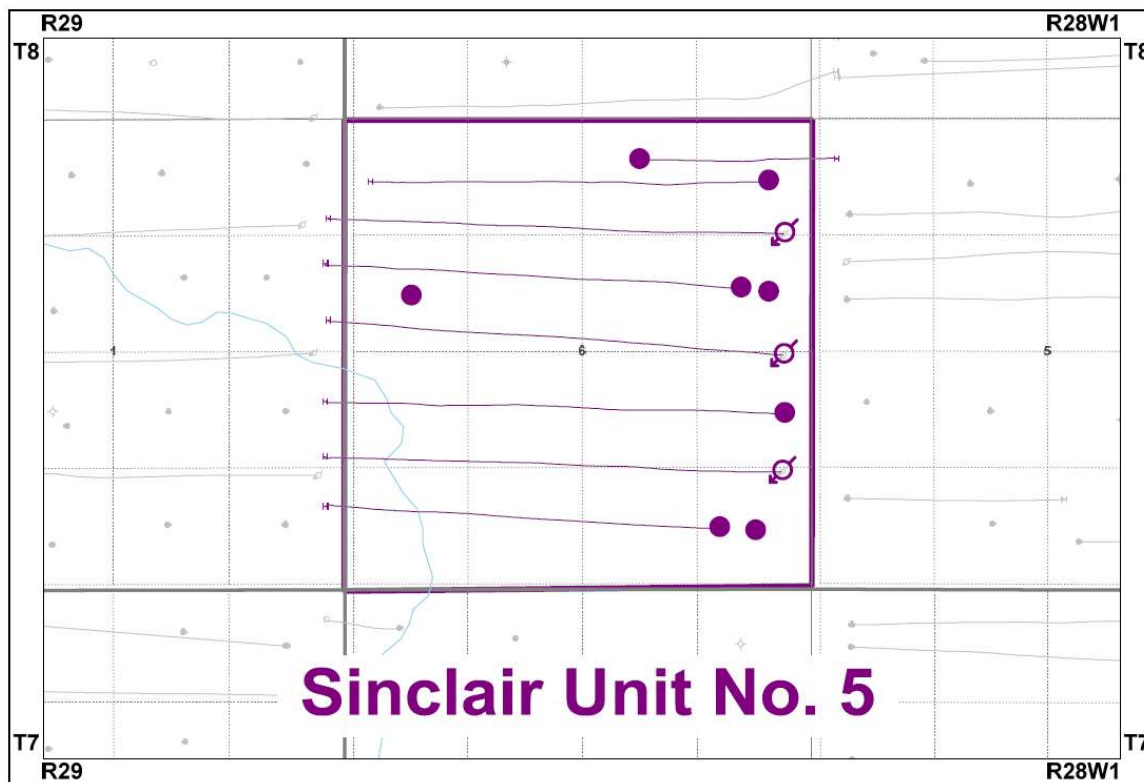
Tundra Oil and Gas

June 8, 2020

INTRODUCTION

Sinclair Unit No. 5 Enhanced Oil Recovery (EOR) Waterflood Project was approved under Waterflood Order No. 21 effective October 1, 2010 with Tundra Oil and Gas (Tundra) as Operator. The EOR project area, outlined in purple on Figure 1, contains 6 producing wells, 2 suspended wells and 3 injection wells within Section 6 in Township 8, Range 28 W1.

Figure 1: Sinclair Unit No. 5 Area Outline



Sinclair Unit No. 5

Tundra Oil and Gas (Tundra), as the operator of the Sinclair Unit No. 5 Enhanced Oil Recovery (EOR) project hereby submits the 2019 EOR report as per section 73 of the Drilling and Production Regulations.

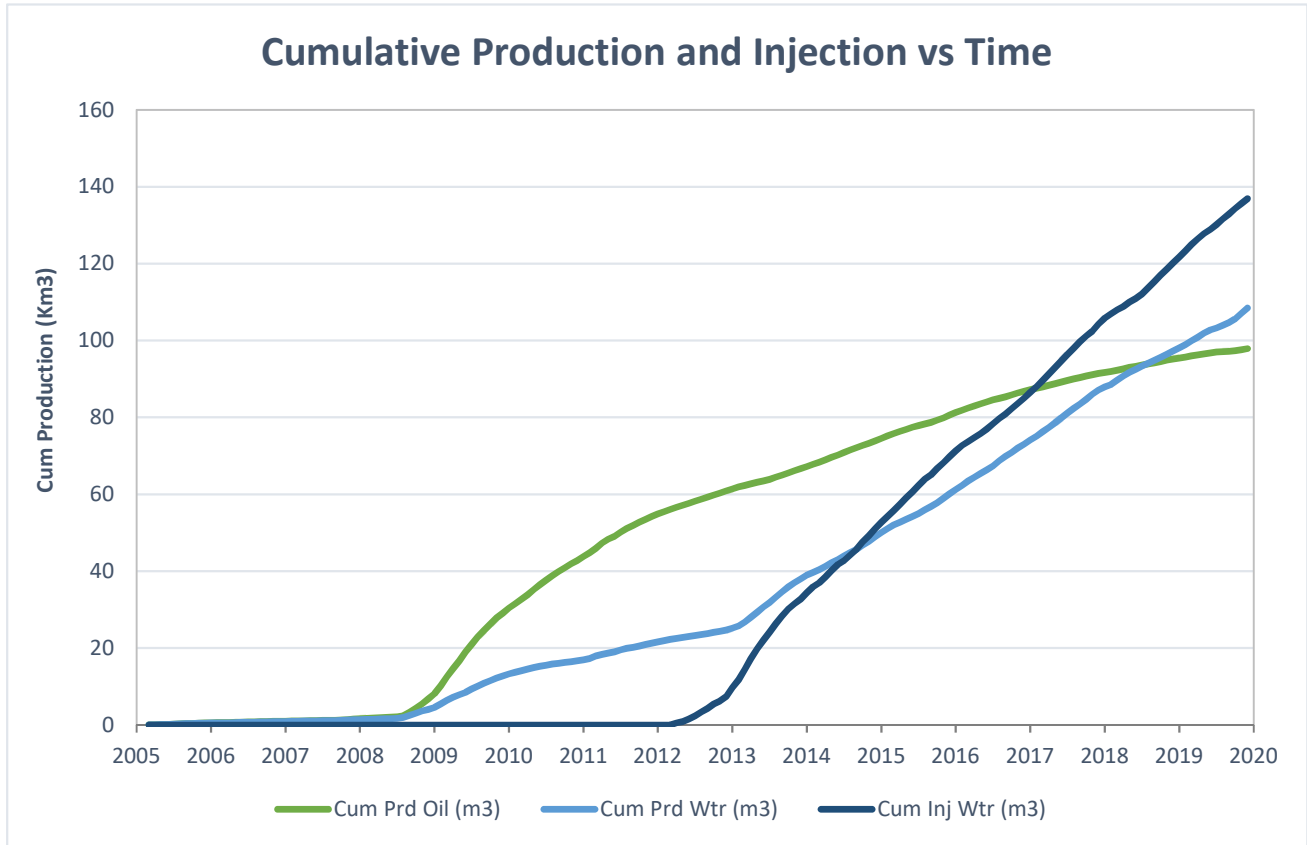
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	8.41	27.21	52.55	3.23	0
Feb-2019	9.02	29.37	54.68	3.26	0
Mar-2019	9.70	30.60	54.81	3.15	0
Apr-2019	7.09	31.57	50.37	4.45	0
May-2019	8.45	34.54	42.00	4.08	0
Jun-2019	9.10	27.38	36.87	3.01	0
Jul-2019	6.68	17.73	41.13	2.65	0
Aug-2019	3.51	19.45	44.06	5.54	0
Sep-2019	4.17	26.87	44.67	6.44	0
Oct-2019	4.56	29.88	44.55	6.55	0
Nov-2019	7.96	49.06	45.10	6.17	0
Dec-2019	9.42	44.03	40.94	4.68	0

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

2019 PRODUCTION	
Produced Oil (m ³)	2,675
Produced Gas (m ³)	0
Produced Water (m ³)	11,175
Fluid Injected (m ³)	16,762
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	97,889
Produced Water (m ³)	108,467

Sinclair Unit No. 5



c) Monthly wellhead injection pressure for each injection well

	02/08-06 Inj		02/16-06 Inj		02/01-06 Inj		SU5	
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)
Jan-2019	250.0	6545	565.0	4764	814.0	6084	1629.0	5798
Feb-2019	214.0	6557	506.0	5022	811.0	6376	1531.0	5985
Mar-2019	226.0	6558	586.0	5336	887.0	6416	1699.0	6103
Apr-2019	210.0	6556	538.0	5433	763.0	6178	1511.0	6056
May-2019	208.0	6501	530.0	5374	564.0	4357	1302.0	5410
Jun-2019	194.0	6369	386.0	4674	526.0	4297	1106.0	5113
Jul-2019	210.0	6537	466.0	4654	599.0	4541	1275.0	5244
Aug-2019	211.0	6500	556.0	4350	599.0	4842	1366.0	5231
Sep-2019	208.0	6546	572.0	4459	560.0	5105	1340.0	5370
Oct-2019	217.0	6481	611.0	4284	553.0	4920	1381.0	5229
Nov-2019	210.0	6537	581.0	4190	562.0	3986	1353.0	4904
Dec-2019	215.0	6493	466.0	3469	588.0	3846	1269.0	4603
Total	2573.0		6363.0		7826.0		16762.0	
Avg Inj P		6515		4667		5079		5420

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	1629.0	1531.0	1699.0	1511.0	1302.0	1106.0	1275.0	1366.0	1340.0	1381.0	1353.0	1269.0
Daily (m³/d)	52.55	54.68	54.81	50.37	42.00	36.87	41.13	44.06	44.67	44.55	45.10	40.94

2019 AVG. ANNUAL DAILY INJECTION = 45.98 m3/d

CUMULATIVE INJECTION TO Dec 31, 2018 = 120,136 m3

TOTAL 2019 ANNUAL INJECTION = 16,762 m3

CUMULATIVE INJECTION TO Dec 31, 2019 = 136,898 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
100.01-06-008-28W1.00	Pump Change	10/16/2019
100.08-06-008-28W1.00	Packers Plus Drill out	10/25/2019
100.16-06-008-28W1.00	Pump Change	5/2/2019
102.01-06-008-28W1.00	Tracer Study for Waterflood Pattern Learnings	10/30/2019
102.09-06-008-28W1.00	Pump Change	11/21/2019
102.09-06-008-28W1.00	Packers Plus Drill out	7/25/2019

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	260.8	95.47	843.4	98.14	1629.0	121.76	1.451	0.608
Feb-2019	252.6	95.73	822.4	98.96	1531.0	123.30	1.401	0.612
Mar-2019	300.7	96.03	948.7	99.91	1699.0	124.99	1.337	0.616
Apr-2019	212.6	96.24	947	100.85	1511.0	126.51	1.286	0.620
May-2019	262.1	96.50	1070.6	101.92	1302.0	127.81	0.964	0.623
Jun-2019	273.0	96.78	821.3	102.75	1106.0	128.91	0.993	0.625
Jul-2019	207.1	96.98	549.6	103.30	1275.0	130.19	1.653	0.628
Aug-2019	108.8	97.09	603	103.90	1366.0	131.55	1.898	0.633
Sep-2019	125.2	97.22	806	104.70	1340.0	132.89	1.425	0.636
Oct-2019	141.4	97.36	926.3	105.63	1381.0	134.28	1.281	0.640
Nov-2019	238.7	97.60	1471.7	107.10	1353.0	135.63	0.783	0.641
Dec-2019	291.9	97.89	1364.9	108.47	1269.0	136.90	0.756	0.642

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

The injection water for Sinclair Unit No. 5 was sourced from the 02/16-32-007-29W1 well (Lodgepole formation) until June 2016 when it was switched over to the newly recompleted source water well at 02/14-30-007-28W1 (Mannville formation). The water is treated at the 04-01-008-29W1 filtration plant where it is filtered to 0.1 microns and has scale inhibitor and biocide 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. 5 Well List

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
100/01-06-008-28W1/0	Horizontal	Producing	-
102/01-06-008-28W1/0	Horizontal	Injection	-
103/01-06-008-28W1/0	Vertical	Producing	-
100/08-06-008-28W1/0	Horizontal	Producing	-
102/08-06-008-28W1/0	Horizontal	Injection	-
100/09-06-008-28W1/0	Vertical	Suspended	-
102/09-06-008-28W1/0	Horizontal	Producing	-
100/12-06-008-28W1/0	Vertical	Suspended	-
100/15-06-008-28W1/0	Horizontal	Producing	-
100/16-06-008-28W1/0	Horizontal	Producing	-
102/16-06-008-28W1/0	Horizontal	Injection	-