

Sinclair Unit No. 5

Waterflood Progress Report 2018

January 1st through December 31st 2018

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

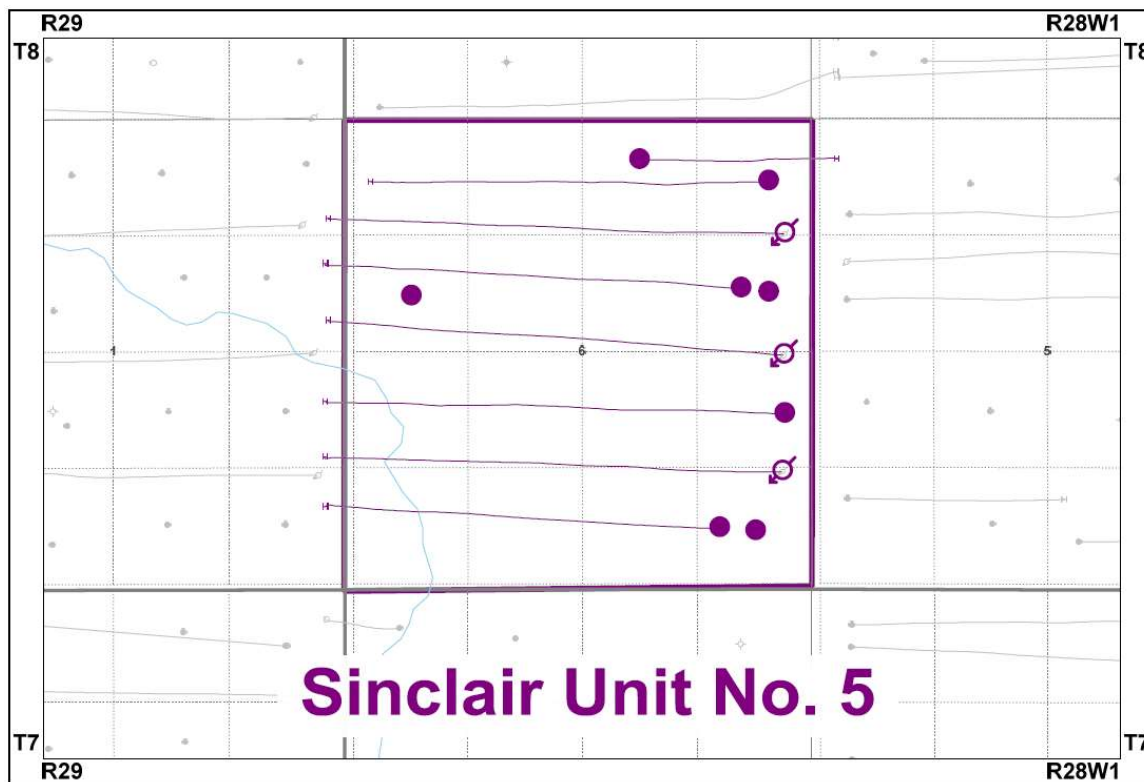
Tundra Oil and Gas

May 27, 2019

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 2018 EOR report as per section 73 of the Drilling and Production Regulations.

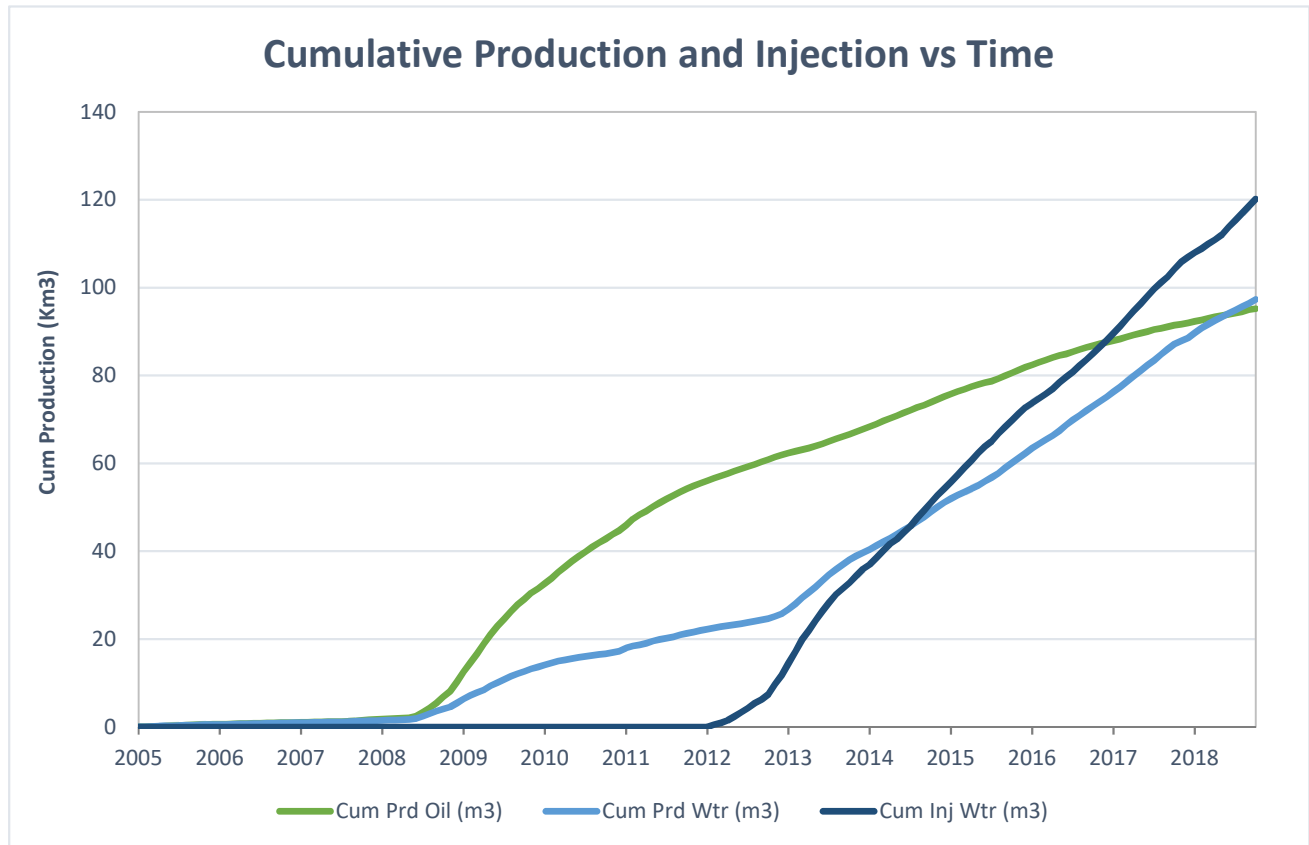
a) Monthly oil and water production rates, injection rate, GOR and WOR

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-2018	9.35	24.65	52.77	2.64	0
Feb-2018	9.85	22.53	38.75	2.29	0
Mar-2018	10.65	37.73	32.97	3.54	0
Apr-2018	10.84	36.58	30.03	3.38	0
May-2018	11.43	28.73	35.61	2.51	0
Jun-2018	10.66	26.96	31.80	2.53	0
Jul-2018	9.80	26.27	37.35	2.68	0
Aug-2018	9.59	25.86	54.52	2.70	0
Sep-2018	9.88	24.93	51.50	2.52	0
Oct-2018	10.62	24.88	52.81	2.34	0
Nov-2018	13.09	25.85	52.70	1.97	0
Dec-2018	9.21	28.11	51.39	3.05	0

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

2018 PRODUCTION	
Produced Oil (m ³)	3,800
Produced Gas (m ³)	0
Produced Water (m ³)	10,144
Fluid Injected (m ³)	15,906
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	95,214
Produced Water (m ³)	97,292

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-2018	335.0	6550	546.0	2481	755.0	6020	1636.0	5017
Feb-2018	261.0	6551	138.0	753	686.0	6213	1085.0	4506
Mar-2018	288.0	6560	0.0	132	734.0	6273	1022.0	4322
Apr-2018	205.0	5652	2.0	110	694.0	6276	901.0	4013
May-2018	366.0	6464	0.0	-91	738.0	6364	1104.0	4246
Jun-2018	306.0	6240	0.0	-69	648.0	5625	954.0	3932
Jul-2018	332.0	6522	86.0	-21	740.0	6253	1158.0	4251
Aug-2018	315.0	6551	610.0	2105	765.0	6244	1690.0	4967
Sep-2018	281.0	6499	553.0	2959	711.0	5733	1545.0	5064
Oct-2018	283.0	6549	598.0	3651	756.0	5680	1637.0	5293
Nov-2018	264.0	6551	576.0	4154	741.0	5876	1581.0	5527
Dec-2018	259.0	6543	572.0	4478	762.0	6072	1593.0	5698
Total	3495.0		3681.0		8730.0		15906.0	
Avg Inj P		6436		1720		6052		4736

MONTH	Jan-2018	Feb-2018	Mar-2018	Apr-2018	May-2018	Jun-2018	Jul-2018	Aug-2018	Sep-2018	Oct-2018	Nov-2018	Dec-2018
Total m3	1636.0	1085.0	1022.0	901.0	1104.0	954.0	1158.0	1690.0	1545.0	1637.0	1581.0	1593.0
Daily (m³/d)	52.77	38.75	32.97	30.03	35.61	31.80	37.35	54.52	51.50	52.81	52.70	51.39

2018 AVG. ANNUAL DAILY INJECTION = 43.52 m3/d

CUMULATIVE INJECTION TO Dec 31, 2017 = 104,230 m3

TOTAL 2018 ANNUAL INJECTION = 15,906 m3

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

d) Summary of the result of any survey of reservoir pressure conducted in 2018. N/A

e) **Date and type of any well servicing.**

Well	Service Description	Date
100.08-06-008-28W1.00	Pump Change	3/9/2018
102.09-06-008-28W1.00	Pump Change	1/23/2018
102.09-06-008-28W1.00	Pump Change	3/7/2018

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-2018	289.8	91.70	764.2	87.91	1636.0	105.87	1.522	0.569
Feb-2018	275.8	91.98	630.9	88.54	1085.0	106.95	1.171	0.572
Mar-2018	330.3	92.31	1169.5	89.71	1022.0	107.97	0.671	0.573
Apr-2018	325.1	92.63	1097.5	90.81	901.0	108.87	0.623	0.573
May-2018	354.4	92.99	890.6	91.70	1104.0	109.98	0.869	0.575
Jun-2018	319.7	93.31	808.8	92.51	954.0	110.93	0.829	0.576
Jul-2018	303.7	93.61	814.4	93.32	1158.0	112.09	1.016	0.579
Aug-2018	297.2	93.91	801.7	94.13	1690.0	113.78	1.509	0.584
Sep-2018	296.3	94.21	748	94.87	1545.0	115.32	1.450	0.589
Oct-2018	329.3	94.54	771.4	95.65	1637.0	116.96	1.456	0.594
Nov-2018	392.7	94.93	775.5	96.42	1581.0	118.54	1.322	0.598
Dec-2018	285.5	95.21	871.3	97.29	1593.0	120.14	1.353	0.603

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	-