

Ewart Unit No. 14

Waterflood Progress Report 2019

January 1st through December 31st 2019

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

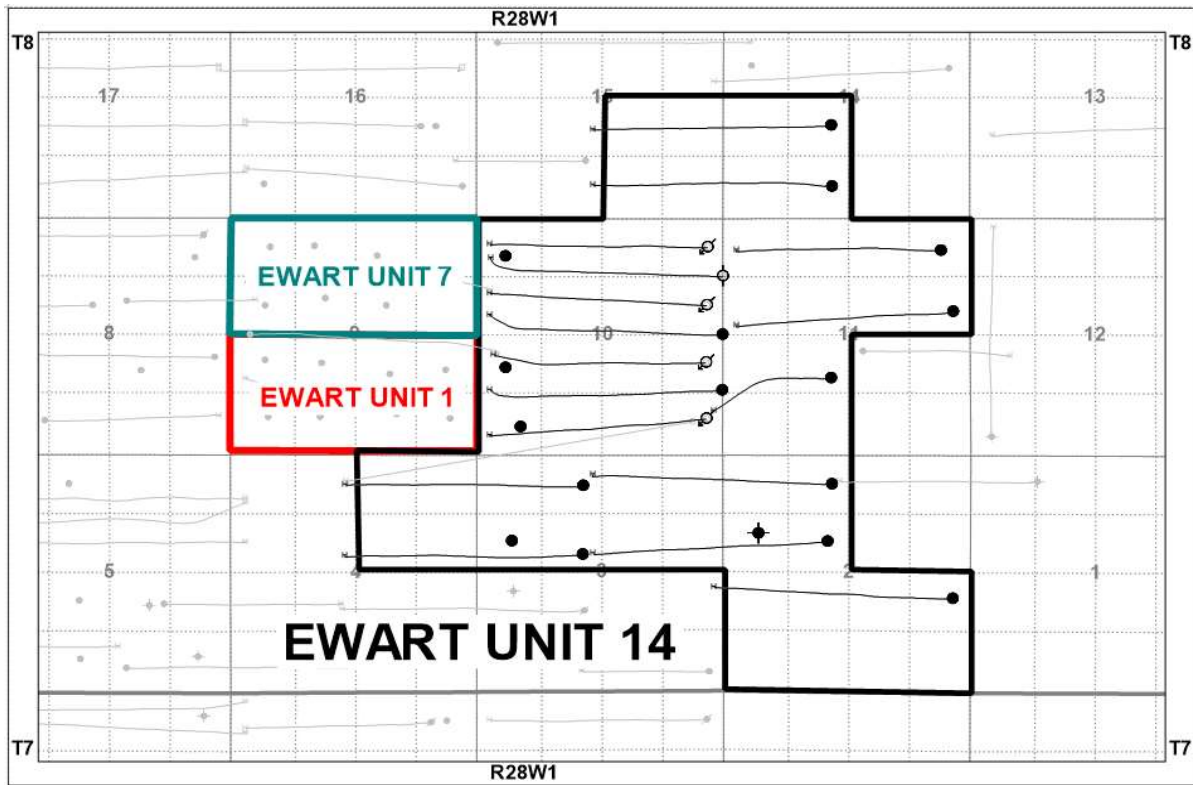
Tundra Oil and Gas

May 28, 2020

INTRODUCTION

Ewart Unit No. 14 Enhanced Oil Recovery (EOR) Waterflood Project was approved effective December 1, 2018 with Tundra Oil and Gas as Operator. The EOR project area, outlined in black in Figure 1, contains 22 wells (5 vertical, 17 horizontal) in 60 LSDs in Township 8, Range 28 W1.

Figure 1: Ewart Unit No. 14 Area Outline



Ewart Unit No. 14

Tundra Oil and Gas (Tundra), as the operator of the Ewart Unit No. 14 Enhanced Oil Recovery (EOR) project hereby submits the 2019 EOR report as per section 73 of the Drilling and Production Regulations.

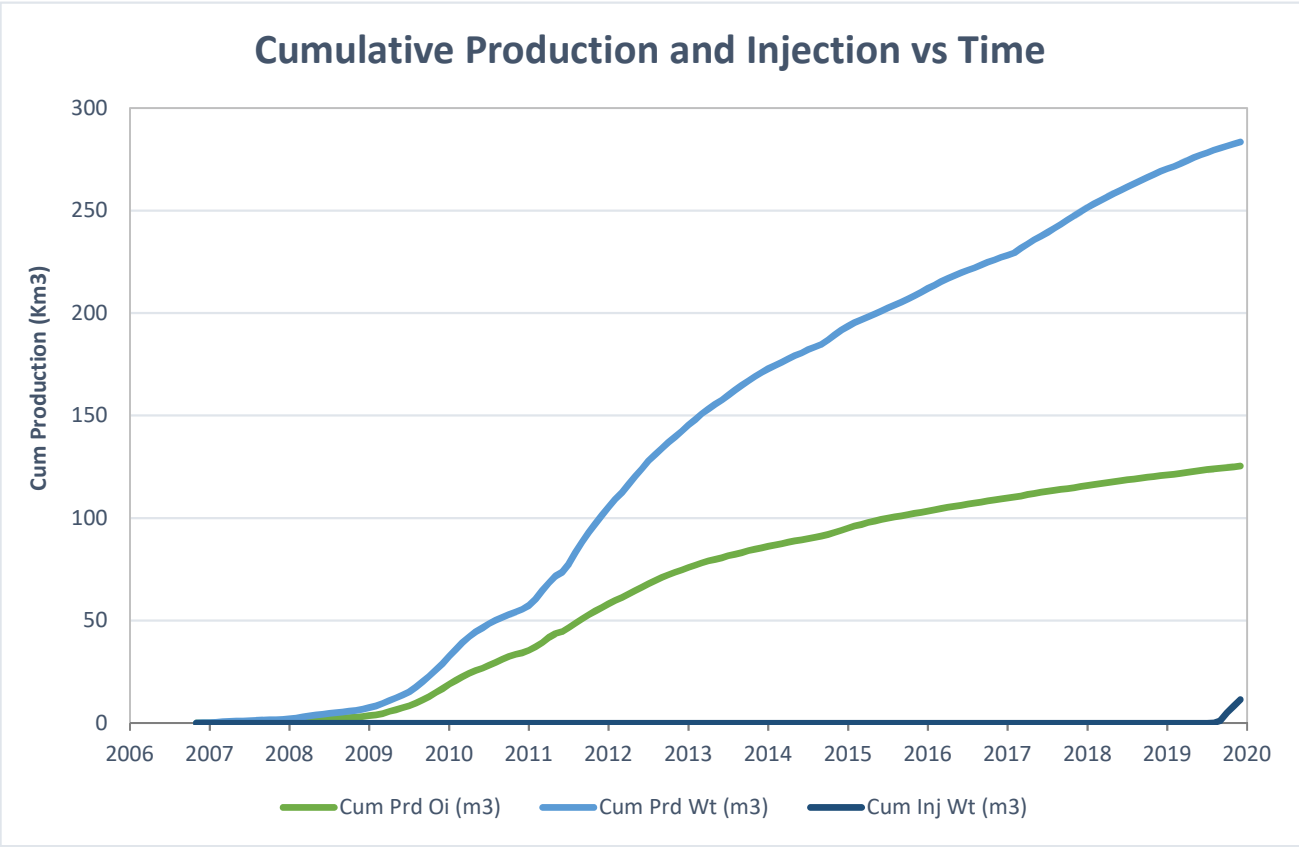
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	11.53	44.85	0.00	3.89	0
Feb-2019	9.57	33.90	0.00	3.54	0
Mar-2019	14.35	45.25	0.00	3.15	0
Apr-2019	16.77	48.77	0.00	2.91	0
May-2019	15.40	49.00	0.00	3.18	0
Jun-2019	13.15	43.99	0.00	3.34	0
Jul-2019	13.80	36.47	0.00	2.64	0
Aug-2019	10.52	36.46	1.16	3.47	0
Sep-2019	10.46	32.75	38.47	3.13	0
Oct-2019	11.86	33.47	124.65	2.82	0
Nov-2019	12.27	33.08	112.03	2.70	0
Dec-2019	12.65	33.84	100.32	2.67	0

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

2019 PRODUCTION	
Produced Oil (m ³)	4,641
Produced Gas (m ³)	0
Produced Water (m ³)	14,367
Fluid Injected (m ³)	11,525
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	125,389
Produced Water (m ³)	283,459

Ewart Unit No. 14



c) Monthly wellhead injection pressure for each injection well

	00/01-10 Inj		00/09-10 Inj		00/16-10 Inj		00/08-10 Inj		EU14	
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)
Jan-2019	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Feb-2019	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Mar-2019	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Apr-2019	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
May-2019	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Jun-2019	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Jul-2019	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Aug-2019	22.0	-51	0.0	0	14.0	-13	0.0	0	36.0	-35
Sep-2019	500.0	-95	128.0	-77	512.0	-95	14.0	-19	1154.0	-87
Oct-2019	850.0	927	1051.0	331	1186.0	-96	777.0	-58	3864.0	276
Nov-2019	540.0	991	732.0	996	1159.0	-96	930.0	-94	3361.0	449
Dec-2019	456.0	952	539.0	927	1181.0	-96	934.0	-64	3110.0	430
Total	2368.0		2450.0		4052.0		2655.0		11525.0	
Avg Inj P		227		181		-33		-19		86

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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	1154.0	3864.0	3361.0	3110.0
Daily (m³/d)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.16	38.47	124.65	112.03	100.32

2019 AVG. ANNUAL DAILY INJECTION = 31.39 m3/d

CUMULATIVE INJECTION TO Dec 31, 2018 = 0 m3

TOTAL 2019 ANNUAL INJECTION = 11,525 m3

CUMULATIVE INJECTION TO Dec 31, 2019 = 11,525 m3

d) Reservoir Pressure Surveys

Where practical, Tundra is committed to collecting pressure data from newly drilled wells. For Ewart Unit No. 14, pressures are available for the wells listed below.

UWI	Date	Depth (mTVD)	Pressure (kPaa)	Temp (°C)
00/05-10-008-28W1/0 - VT	July 22 - Aug 31, 2014	902.0	5578	30.9
00/13-10-008-28W1/0 - VT	March 5 - June 25, 2014	894.0	2549	34.0

e) Date and type of any well servicing.

Well	Service Description	Date
100.09-11-008-28W1.00	Rigless Acid Job	10/30/2019

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	357.4	121.11	1390.4	270.48	0.0	0.00	0.000	0.000
Feb-2019	268.0	121.37	949.1	271.43	0.0	0.00	0.000	0.000
Mar-2019	444.7	121.82	1402.6	272.83	0.0	0.00	0.000	0.000
Apr-2019	503.0	122.32	1463.2	274.30	0.0	0.00	0.000	0.000
May-2019	477.3	122.80	1519.1	275.82	0.0	0.00	0.000	0.000
Jun-2019	394.6	123.19	1319.6	277.14	0.0	0.00	0.000	0.000
Jul-2019	427.8	123.62	1130.7	278.27	0.0	0.00	0.000	0.000
Aug-2019	326.0	123.95	1130.2	279.40	36.0	0.04	0.024	0.000
Sep-2019	313.7	124.26	982.4	280.38	1154.0	1.19	0.875	0.003
Oct-2019	367.8	124.63	1037.7	281.42	3864.0	5.05	2.699	0.012
Nov-2019	368.1	125.00	992.5	282.41	3361.0	8.42	2.424	0.020
Dec-2019	392.2	125.39	1049.1	283.46	3110.0	11.53	2.117	0.028

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

The injection water for Ewart Unit No. 14 will be supplied from the existing Sinclair 4-1-8-29W1 Battery source and injection water system. All existing injection water is obtained from the Mannville formation in the 102/14-30-7-28W1 (102/14-30) licensed water source well. Mannville water from the 102/14-30 source well is pumped to the main Sinclair Units Water Plant at 4-1-8-29W1, filtered, and pumped up to injection system pressure.

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

Ewart Unit No. 14 Well List

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
100/08-02-008-28W1/0	Horizontal	Producing	-
100/11-02-008-28W1/0	Horizontal	Producing	-
100/12-02-008-28W1/0	Vertical	Abandoned Zone	-
100/14-02-008-28W1/0	Horizontal	Producing	-
100/11-03-008-28W1/0	Horizontal	Producing	-
100/12-03-008-28W1/0	Vertical	Producing	-
100/14-03-008-28W1/0	Horizontal	Producing	-
100/01-10-008-28W1/0	Horizontal	Injection	-
100/04-10-008-28W1/0	Vertical	Producing	-
100/05-10-008-28W1/0	Vertical	Producing	-
100/08-10-008-28W1/0	Horizontal	Injection	-
102/08-10-008-28W1/0	Horizontal	Producing	-
103/08-10-008-28W1/0	Horizontal	Producing	-
100/09-10-008-28W1/0	Horizontal	Injection	-
103/09-10-008-28W1/0	Horizontal	Drilled & Cased	-
100/13-10-008-28W1/0	Vertical	Producing	-
100/16-10-008-28W1/0	Horizontal	Injection	-
100/06-11-008-28W1/0	Horizontal	Producing	-
100/09-11-008-28W1/0	Horizontal	Producing	-
100/16-11-008-28W1/0	Horizontal	Producing	-
100/03-14-008-28W1/0	Horizontal	Producing	-
100/06-14-008-28W1/0	Horizontal	Producing	-