

Ewart Unit No. 2

Waterflood Progress Report 2018

January 1st through December 31st 2018

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

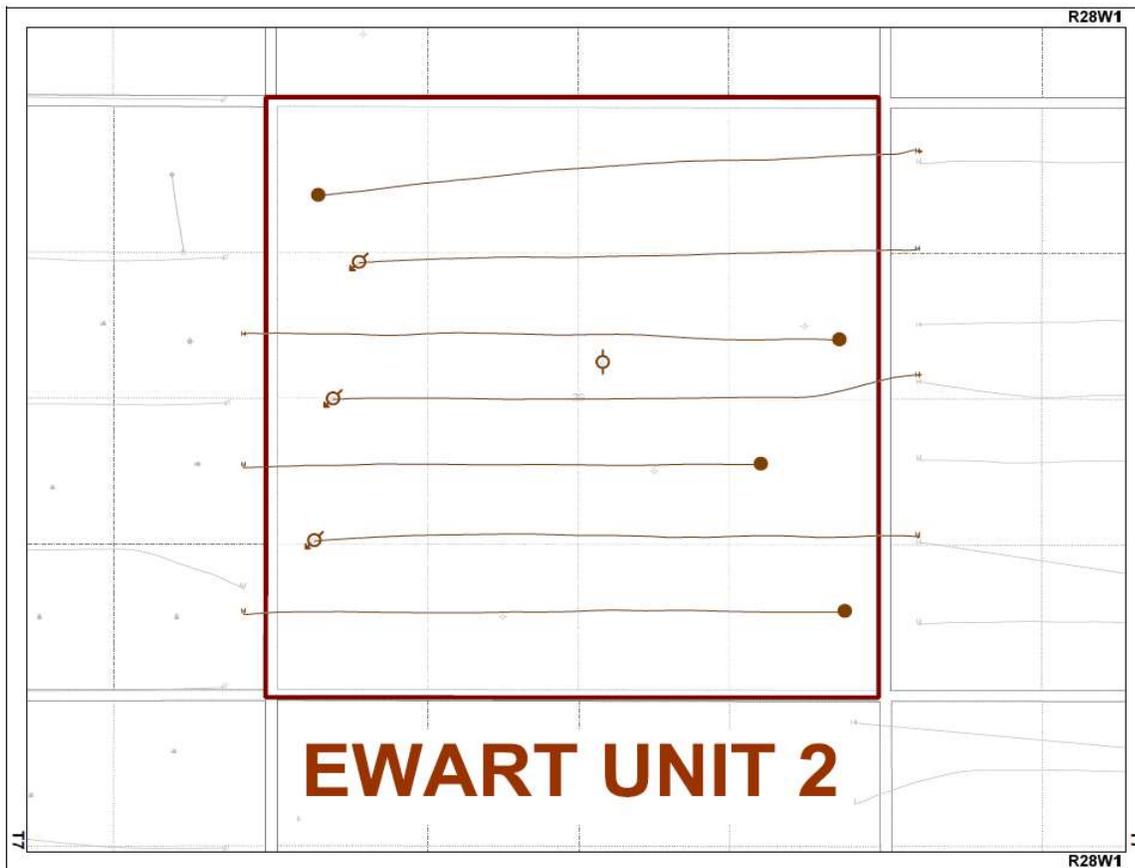
Tundra Oil and Gas

April 24, 2019

INTRODUCTION

Ewart Unit No. 2 Enhance Oil Recovery (EOR) Waterflood Project was approved under Waterflood Order No. 29 effective August 1, 2013 with Tundra Oil and Gas (Tundra) as Operator. The Unit area contains 4 producing horizontal wells, 3 horizontal injectors and 1 vertical observation well in 16 LSDs in Township 7 Range 28 W1 as shown in the figure below.

Figure 1: Ewart Unit No. 2 Area Outline



Ewart Unit No. 2

Tundra Oil and Gas (Tundra), as the operator of the Ewart Unit No. 2 Enhanced Oil Recovery (EOR) project hereby submits the 2018 EOR report as per section 73 of the Drilling and Production Regulations.

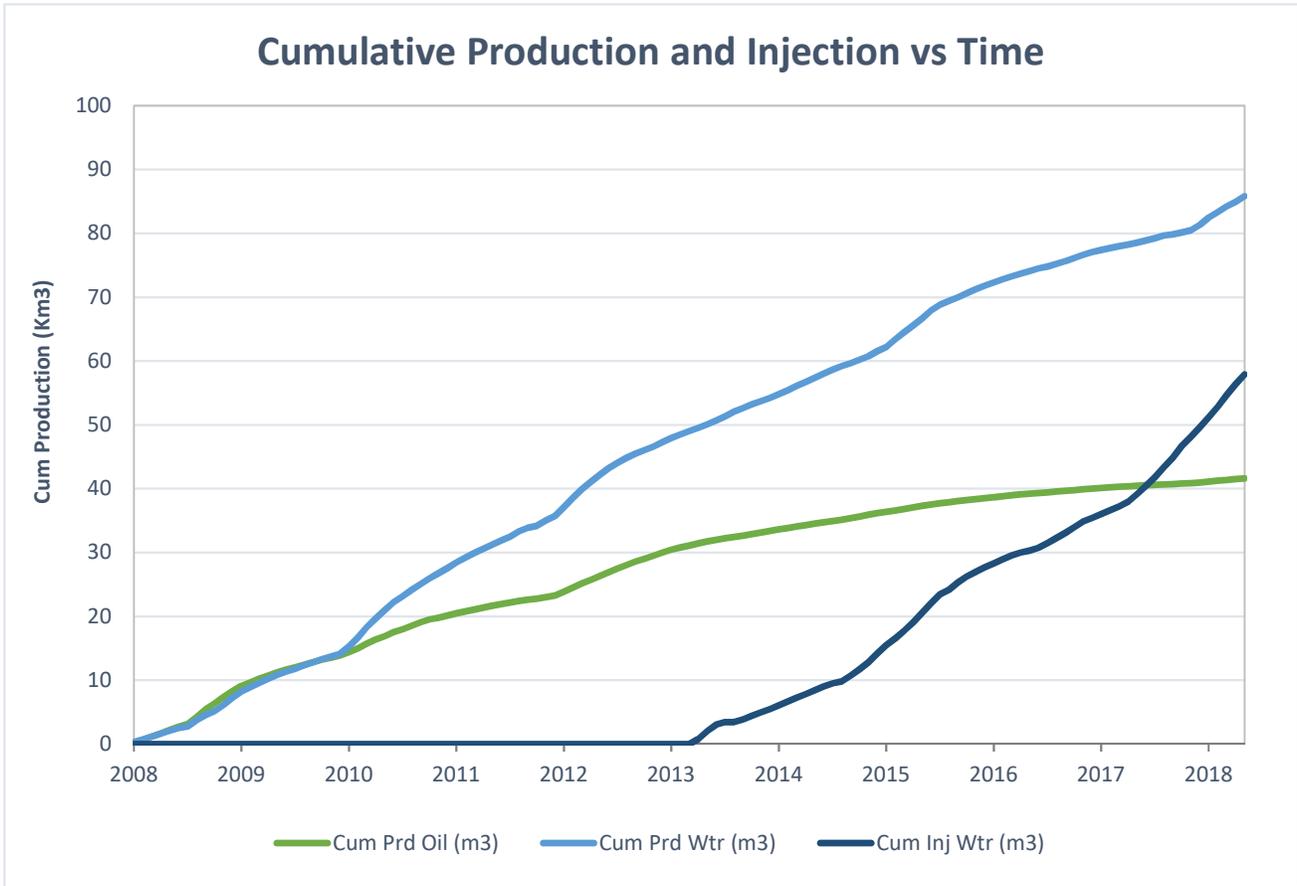
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	2.33	11.44	41.03	4.90	0
Feb-2018	1.97	12.33	48.93	6.26	0
Mar-2018	2.26	12.12	49.84	5.35	0
Apr-2018	1.89	7.98	49.40	4.23	0
May-2018	2.14	9.36	60.00	4.38	0
Jun-2018	2.38	10.97	48.17	4.61	0
Jul-2018	3.09	27.92	47.58	9.02	0
Aug-2018	4.65	36.72	49.68	7.89	0
Sep-2018	4.69	28.43	55.00	6.06	0
Oct-2018	3.63	28.66	60.52	7.90	0
Nov-2018	5.33	23.80	55.83	4.47	0
Dec-2018	3.43	28.51	49.55	8.32	0

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

2018 PRODUCTION	
Produced Oil (m ³)	1,151
Produced Gas (m ³)	0
Produced Water (m ³)	7,277
Fluid Injected (m ³)	18,726
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	41,621
Produced Water (m ³)	85,838

Ewart Unit No. 2



c) Monthly wellhead injection pressure for each injection well

MONTH	02/05-29 Inj		00/12-29 Inj		00/05-29 Inj		EU2	
	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	521.0	4926	446.0	5579	305.0	-95	1272.0	3470
Feb-2018	421.0	4979	400.0	5369	549.0	-92	1370.0	3419
Mar-2018	373.0	4829	432.0	5728	740.0	-92	1545.0	3488
Apr-2018	352.0	4704	404.0	7077	726.0	-84	1482.0	3899
May-2018	381.0	5011	421.0	6425	1058.0	-93	1860.0	3781
Jun-2018	327.0	4973	381.0	5873	737.0	56	1445.0	3634
Jul-2018	310.0	4685	431.0	5894	734.0	-84	1475.0	3498
Aug-2018	329.0	4589	447.0	6539	764.0	37	1540.0	3722
Sep-2018	336.0	4771	389.0	5824	925.0	1250	1650.0	3948
Oct-2018	392.0	4988	444.0	5868	1040.0	2510	1876.0	4455
Nov-2018	359.0	4970	439.0	5955	877.0	4707	1675.0	5211
Dec-2018	354.0	4974	451.0	6016	731.0	3394	1536.0	4794
Total	4455.0		5085.0		9186.0		18726.0	
Avg Inj P		4866		6012		951		3943

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	1272.0	1370.0	1545.0	1482.0	1860.0	1445.0	1475.0	1540.0	1650.0	1876.0	1675.0	1536.0
Daily (m³/d)	41.03	48.93	49.84	49.40	60.00	48.17	47.58	49.68	55.00	60.52	55.83	49.55

2018 AVG. ANNUAL DAILY INJECTION = 51.29 m3/d

CUMULATIVE INJECTION TO Dec 31, 2017 = 39,178 m3

TOTAL 2018 ANNUAL INJECTION = 18,726 m3

CUMULATIVE INJECTION TO Dec 31, 2018 = 57,904 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
102.09-29-007-28W1.00	Pump Change	7/6/2018

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 (m ³)	Cum Oil Prod (Km ³)	Mth Water Prod (m ³)	Cum Water Prod (Km ³)	Mth Water Inj (m ³)	Cum Water Inj (Km ³)	VRR	Cum VRR
Jan-2018	72.3	40.54	354.5	78.92	1272.0	40.45	2.945	0.331
Feb-2018	55.1	40.60	345.2	79.26	1370.0	41.82	3.389	0.341
Mar-2018	70.2	40.67	375.8	79.64	1545.0	43.37	3.426	0.352
Apr-2018	56.6	40.72	239.4	79.88	1482.0	44.85	4.940	0.363
May-2018	66.2	40.79	290.1	80.17	1860.0	46.71	5.152	0.377
Jun-2018	71.4	40.86	329	80.50	1445.0	48.15	3.564	0.388
Jul-2018	95.9	40.96	865.4	81.36	1475.0	49.63	1.524	0.396
Aug-2018	144.2	41.10	1138.4	82.50	1540.0	51.17	1.191	0.404
Sep-2018	140.7	41.24	852.9	83.35	1650.0	52.82	1.644	0.414
Oct-2018	112.4	41.36	888.4	84.24	1876.0	54.69	1.860	0.426
Nov-2018	159.9	41.52	714.1	84.95	1675.0	56.37	1.892	0.436
Dec-2018	106.2	41.62	883.9	85.84	1536.0	57.90	1.540	0.444

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

The injection water for Ewart Unit No. 2 is sourced from the 02/14-30-007-28W1 well (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**Ewart Unit No. 2 Well List**

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
100/01-29-007-28W1/0	Horizontal	Producing	-
100/05-29-007-28W1/0	Horizontal	Injection	-
102/05-29-007-28W1/0	Horizontal	Injection	-
100/08-29-007-28W1/0	Horizontal	Producing	-
102/09-29-007-28W1/0	Horizontal	Producing	-
100/10-29-007-28W1/0	Vertical	Drilled & Cased	-
100/12-29-007-28W1/0	Horizontal	Injection	-
100/13-29-007-28W1/0	Horizontal	Producing	-