

Ewart Unit No. 7

Waterflood Progress Report 2019

January 1st through December 31st 2019

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

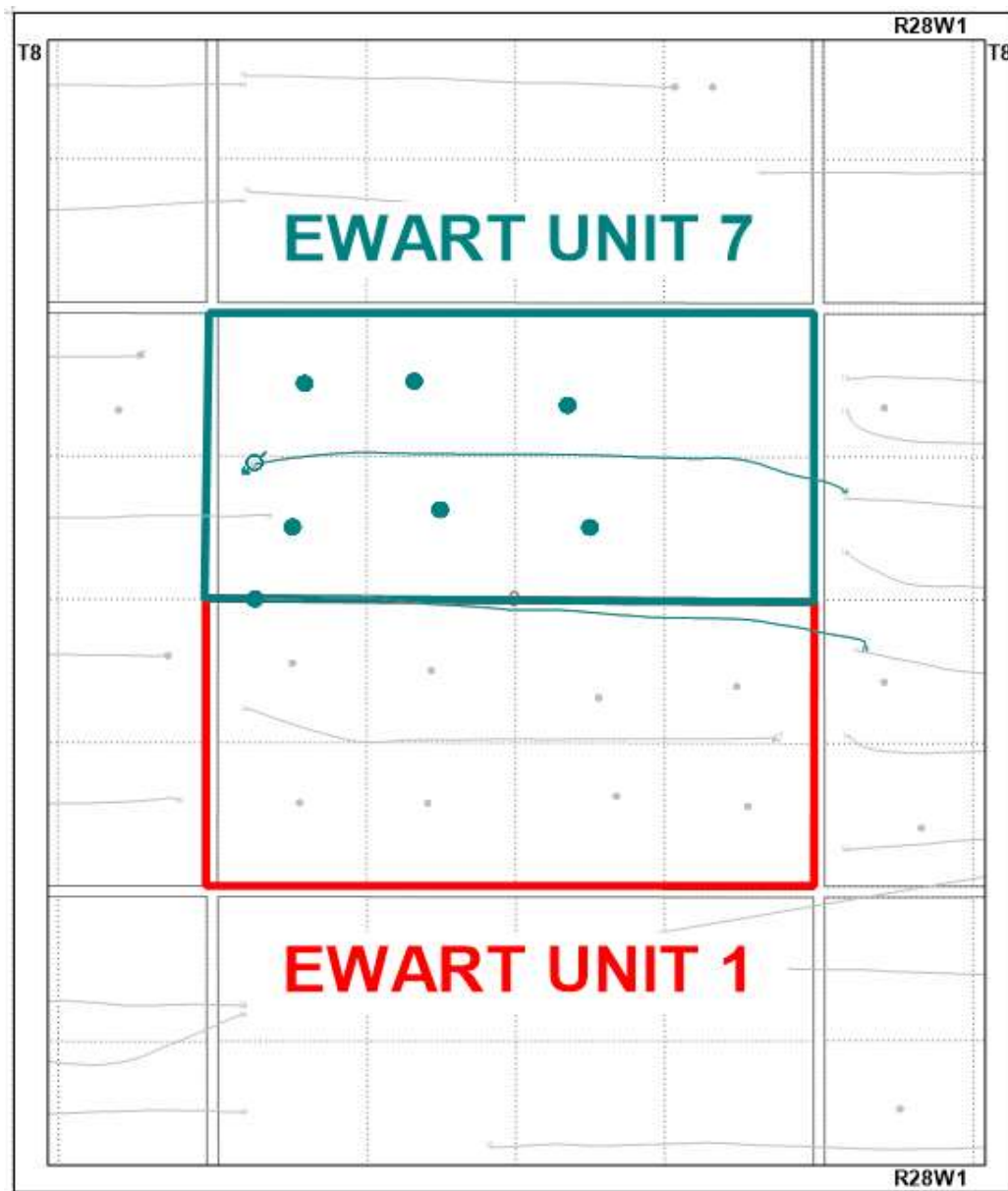
Tundra Oil and Gas

May 25, 2020

INTRODUCTION

Ewart Unit No. 7 Enhanced Oil Recovery (EOR) Waterflood Project was approved on May 1, 2015 with Tundra Oil and Gas (Tundra) as Operator. The EOR Unit area, outlined in green, contains 6 producing vertical wells, 1 producing horizontal well and 1 horizontal injector, in 8 LSDs in Township 8 Range 28 W1 as shown in the figure below.

Figure 1: Ewart Unit No. 7 Area Outline



Ewart Unit No. 7

Tundra Oil and Gas (Tundra), as the operator of the Ewart Unit No. 7 Enhanced Oil Recovery (EOR) project hereby submits the 2019 EOR report as per section 73 of the Drilling and Production Regulations.

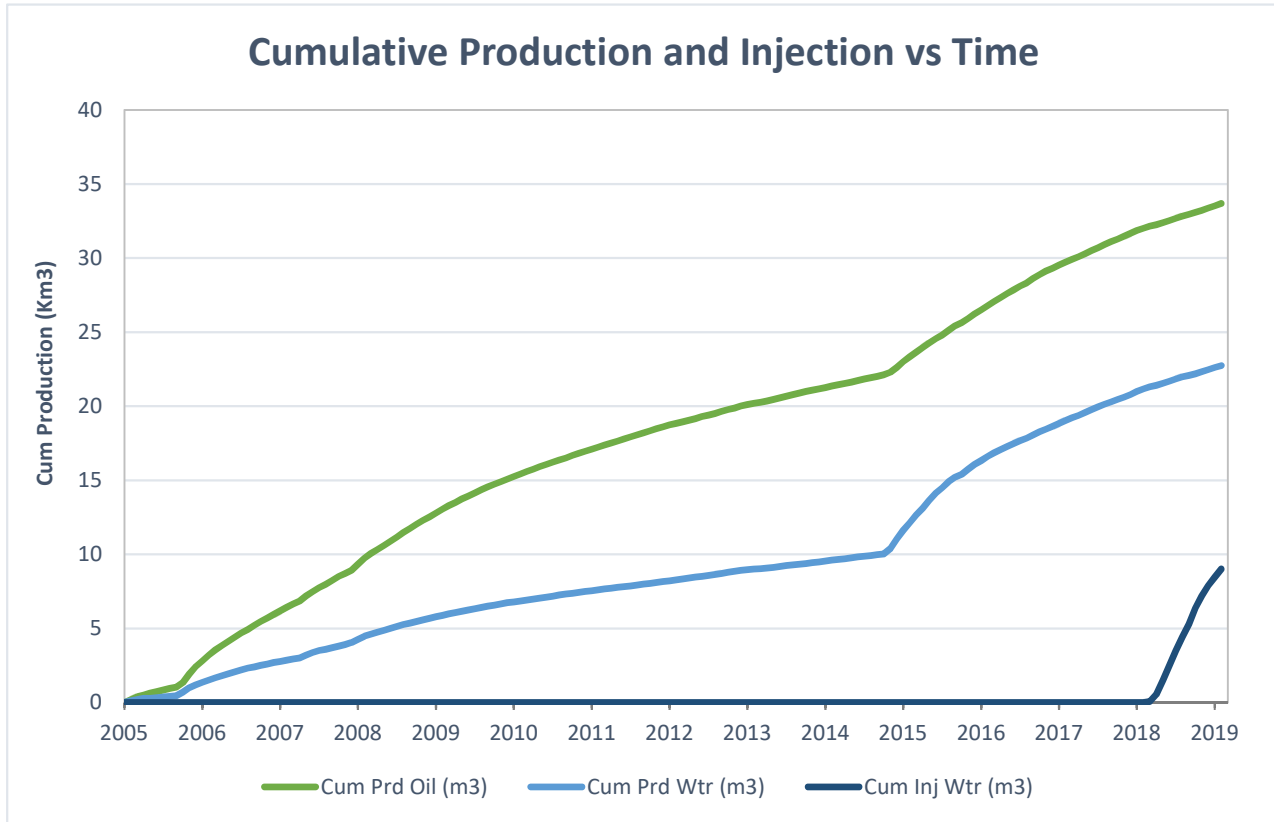
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	4.19	3.96	2.45	0.95	0
Feb-2019	3.95	3.66	17.00	0.93	0
Mar-2019	4.21	4.53	30.87	1.08	0
Apr-2019	4.78	5.30	33.20	1.11	0
May-2019	4.66	4.90	32.39	1.05	0
Jun-2019	4.59	4.10	30.07	0.89	0
Jul-2019	4.20	3.65	28.58	0.87	0
Aug-2019	4.25	3.55	34.94	0.83	0
Sep-2019	4.46	4.29	27.27	0.96	0
Oct-2019	5.03	4.57	22.23	0.91	0
Nov-2019	5.35	4.79	19.50	0.90	0
Dec-2019	5.23	4.34	17.55	0.83	0

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

2019 PRODUCTION	
Produced Oil (m ³)	1,671
Produced Gas (m ³)	0
Produced Water (m ³)	1,571
Fluid Injected (m ³)	9,016
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	33,690
Produced Water (m ³)	22,745

Ewart Unit No. 7



c) Monthly wellhead injection pressure for each injection well

MONTH	03/12-09 Inj		EU7	
	Inj Water (m ³)	Avg Inj P (kPa)	Inj Water (m ³)	Avg Inj P (kPa)
Jan-2019	76.0	100	76.0	100
Feb-2019	476.0	-51	476.0	-51
Mar-2019	957.0	-97	957.0	-97
Apr-2019	996.0	-98	996.0	-98
May-2019	1004.0	57	1004.0	57
Jun-2019	902.0	824	902.0	824
Jul-2019	886.0	1735	886.0	1735
Aug-2019	1083.0	2698	1083.0	2698
Sep-2019	818.0	2951	818.0	2951
Oct-2019	689.0	2983	689.0	2983
Nov-2019	585.0	2981	585.0	2981
Dec-2019	544.0	2936	544.0	2936
Total	9016.0		9016.0	
Avg Inj P		1418		1418

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	76.0	476.0	957.0	996.0	1004.0	902.0	886.0	1083.0	818.0	689.0	585.0	544.0
Daily (m³/d)	2.45	17.00	30.87	33.20	32.39	30.07	28.58	34.94	27.27	22.23	19.50	17.55

2019 AVG. ANNUAL DAILY INJECTION = 24.67 m3/d

CUMULATIVE INJECTION TO Dec 31, 2018 = 0 m3

TOTAL 2019 ANNUAL INJECTION = 9,016 m3
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CUMULATIVE INJECTION TO Dec 31, 2019 = 9,016 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
100.15-09-008-28W1.00	Scale Squeeze	10/23/2019

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	130.0	32.15	122.9	21.30	76.0	0.08	0.290	0.001
Feb-2019	110.5	32.26	102.4	21.40	476.0	0.55	2.156	0.010
Mar-2019	130.5	32.39	140.4	21.54	957.0	1.51	3.416	0.027
Apr-2019	143.3	32.53	159	21.70	996.0	2.51	3.187	0.044
May-2019	144.5	32.68	151.8	21.85	1004.0	3.51	3.275	0.062
Jun-2019	137.7	32.82	122.9	21.97	902.0	4.41	3.336	0.077
Jul-2019	130.2	32.95	113.3	22.09	886.0	5.30	3.506	0.092
Aug-2019	131.8	33.08	109.9	22.20	1083.0	6.38	4.314	0.111
Sep-2019	133.7	33.21	128.6	22.32	818.0	7.20	3.010	0.124
Oct-2019	155.8	33.37	141.7	22.47	689.0	7.89	2.233	0.136
Nov-2019	160.5	33.53	143.8	22.61	585.0	8.47	1.853	0.145
Dec-2019	162.1	33.69	134.6	22.74	544.0	9.02	1.765	0.153

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

The injection water for Ewart Unit No. 7 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. 7 Well List**

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
103/05-09-008-28W1/0	Horizontal	Producing	-
100/10-09-008-28W1/0	Vertical	Producing	-
100/11-09-008-28W1/0	Vertical	Producing	-
100/12-09-008-28W1/0	Vertical	Producing	-
103/12-09-008-28W1/0	Horizontal	Injection	-
100/13-09-008-28W1/0	Vertical	Producing	-
100/14-09-008-28W1/0	Vertical	Producing	-
100/15-09-008-28W1/0	Vertical	Producing	-

k) Discussion

In July 2015, a horizontal well was drilled as a future inter-unit injector at 03/05-09-008-28W1/0 (Ewart Units 1/7) to improve waterflood recovery. Tundra has no immediate plans to convert the 03/05-09 producer to an injector and will continue to produce it.