

Ewart Unit No. 2
Waterflood Progress Report 2019
January 1st through December 31st 2019

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

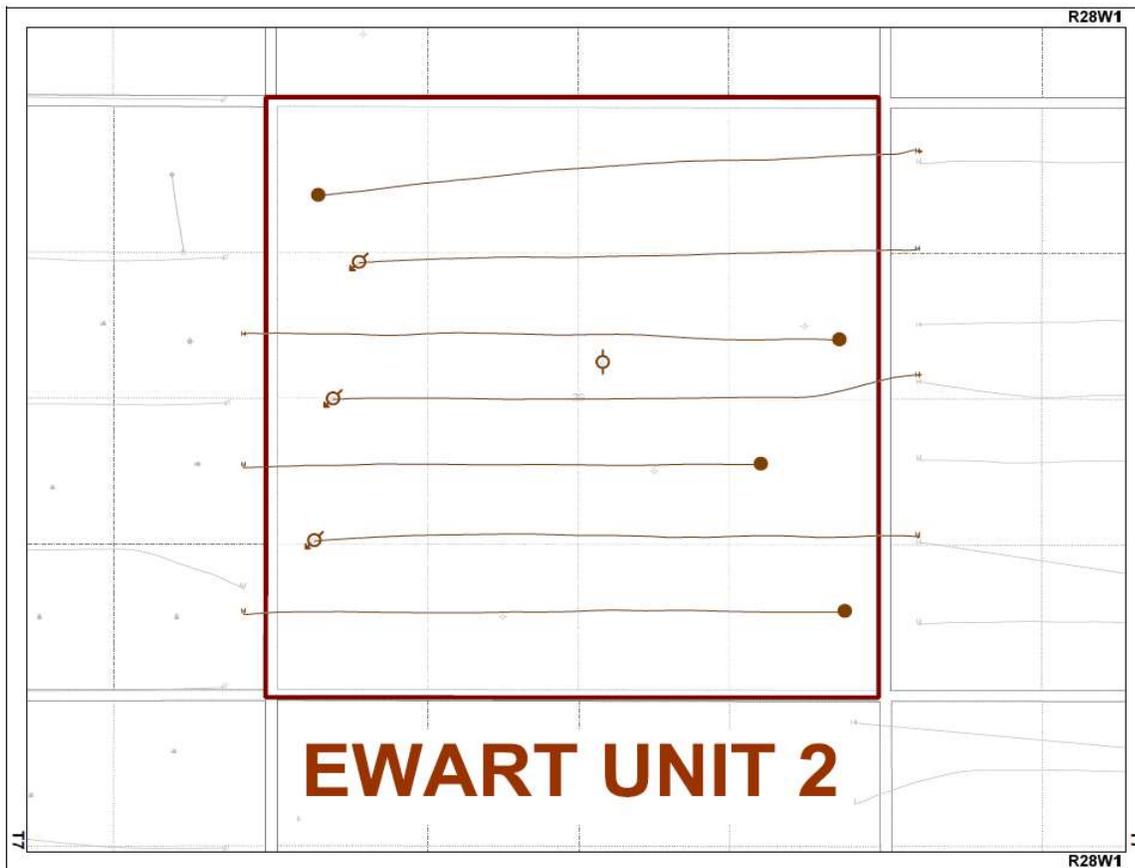
Tundra Oil and Gas

May 25, 2020

INTRODUCTION

Ewart Unit No. 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 2019 EOR report as per section 73 of the Drilling and Production Regulations.

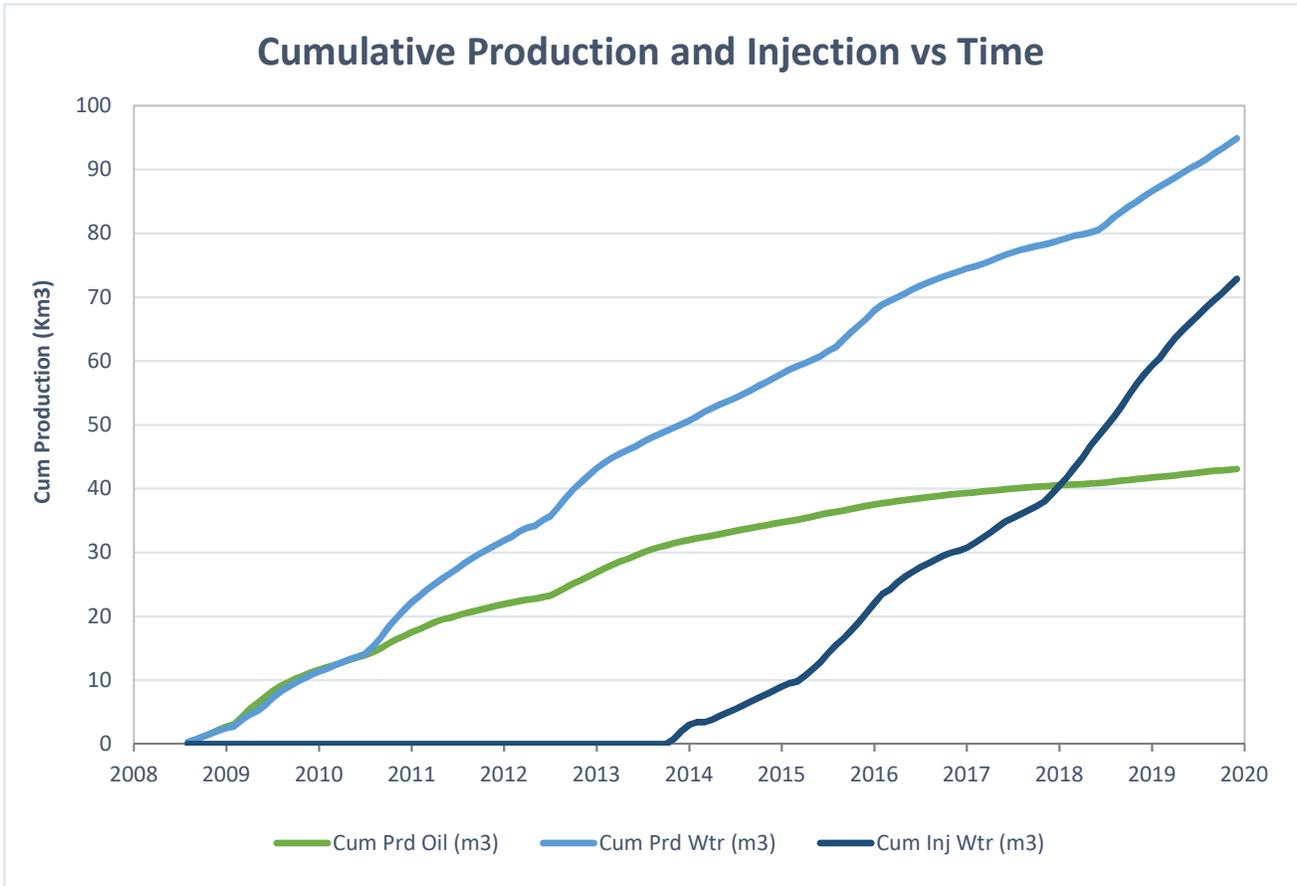
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	4.08	25.56	45.19	6.26	0
Feb-2019	4.58	24.49	41.86	5.34	0
Mar-2019	3.37	22.36	52.55	6.63	0
Apr-2019	3.50	24.42	50.27	6.98	0
May-2019	4.86	25.51	41.77	5.25	0
Jun-2019	4.64	24.32	37.03	5.24	0
Jul-2019	4.25	19.48	38.29	4.58	0
Aug-2019	4.83	22.79	38.48	4.72	0
Sep-2019	4.43	30.54	35.93	6.90	0
Oct-2019	2.90	24.85	33.90	8.56	0
Nov-2019	3.21	26.32	39.20	8.21	0
Dec-2019	3.20	27.57	37.35	8.61	0

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

2019 PRODUCTION	
Produced Oil (m ³)	1,454
Produced Gas (m ³)	0
Produced Water (m ³)	9,065
Fluid Injected (m ³)	14,959
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	43,076
Produced Water (m ³)	94,904

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-2019	345.0	4946	447.0	5999	609.0	3191	1401.0	4712
Feb-2019	339.0	4971	379.0	6031	454.0	3523	1172.0	4841
Mar-2019	566.0	5912	421.0	5976	642.0	2755	1629.0	4881
Apr-2019	533.0	5798	404.0	5930	571.0	2854	1508.0	4860
May-2019	508.0	5919	389.0	6007	398.0	3294	1295.0	5073
Jun-2019	475.0	8966	361.0	6007	275.0	2990	1111.0	5988
Jul-2019	513.0	7288	402.0	10271	272.0	4788	1187.0	7449
Aug-2019	523.0	5973	398.0	5890	272.0	4622	1193.0	5495
Sep-2019	489.0	5858	361.0	6036	228.0	4031	1078.0	5308
Oct-2019	481.0	5746	347.0	5911	223.0	3331	1051.0	4996
Nov-2019	457.0	7202	367.0	6051	352.0	3345	1176.0	5533
Dec-2019	468.0	5849	364.0	6063	326.0	2981	1158.0	4965
Total	5697.0		4640.0		4622.0		14959.0	
Avg Inj P		6202		6348		3475		5342

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	1401.0	1172.0	1629.0	1508.0	1295.0	1111.0	1187.0	1193.0	1078.0	1051.0	1176.0	1158.0
Daily (m³/d)	45.19	41.86	52.55	50.27	41.77	37.03	38.29	38.48	35.93	33.90	39.20	37.35

2019 AVG. ANNUAL DAILY INJECTION = 40.99 m3/d

CUMULATIVE INJECTION TO Dec 31, 2018 = 57,904 m3

TOTAL 2019 ANNUAL INJECTION = 14,959 m3

CUMULATIVE INJECTION TO Dec 31, 2019 = 72,863 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

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-2019	126.6	41.75	792.5	86.63	1401.0	59.31	1.510	0.452
Feb-2019	128.3	41.88	685.6	87.32	1172.0	60.48	1.424	0.458
Mar-2019	104.6	41.98	693.2	88.01	1629.0	62.11	2.023	0.467
Apr-2019	105.0	42.09	732.6	88.74	1508.0	63.61	1.784	0.475
May-2019	150.7	42.24	790.7	89.53	1295.0	64.91	1.360	0.482
Jun-2019	139.3	42.38	729.5	90.26	1111.0	66.02	1.264	0.487
Jul-2019	131.9	42.51	603.8	90.87	1187.0	67.21	1.593	0.493
Aug-2019	149.7	42.66	706.6	91.57	1193.0	68.40	1.376	0.498
Sep-2019	132.8	42.79	916.3	92.49	1078.0	69.48	1.018	0.502
Oct-2019	90.0	42.88	770.4	93.26	1051.0	70.53	1.213	0.507
Nov-2019	96.2	42.98	789.5	94.05	1176.0	71.71	1.318	0.512
Dec-2019	99.3	43.08	854.6	94.90	1158.0	72.86	1.205	0.517

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	-