

Ewart Unit No. 3

Waterflood Progress Report 2018

January 1st through December 31st 2018

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

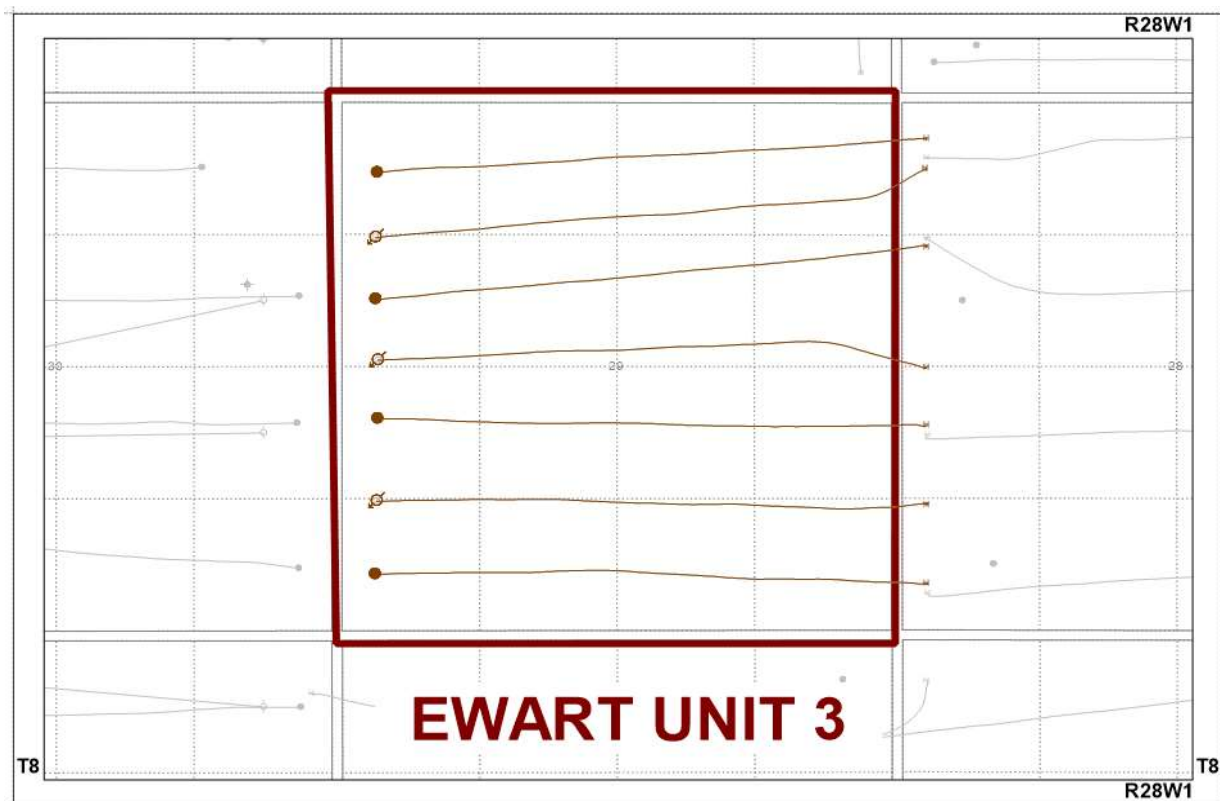
Tundra Oil and Gas

April 24, 2019

INTRODUCTION

Ewart Unit No. 3 Enhance Oil Recovery (EOR) Waterflood Project was approved under Waterflood Order No. 30 effective August 1, 2013 with Tundra Oil and Gas (Tundra) as Operator. The Unit area contains 4 producing wells and 3 injectors in 16 LSDs in Township 8 Range 28 W1 as shown in the figure below.

Figure 1: Ewart Unit No. 3 Area Outline



Ewart Unit No. 3

Tundra Oil and Gas (Tundra), as the operator of the Ewart Unit No. 3 Enhanced Oil Recovery (EOR) project hereby submits the 2018 EOR report as per section 73 of the Drilling and Production Regulations.

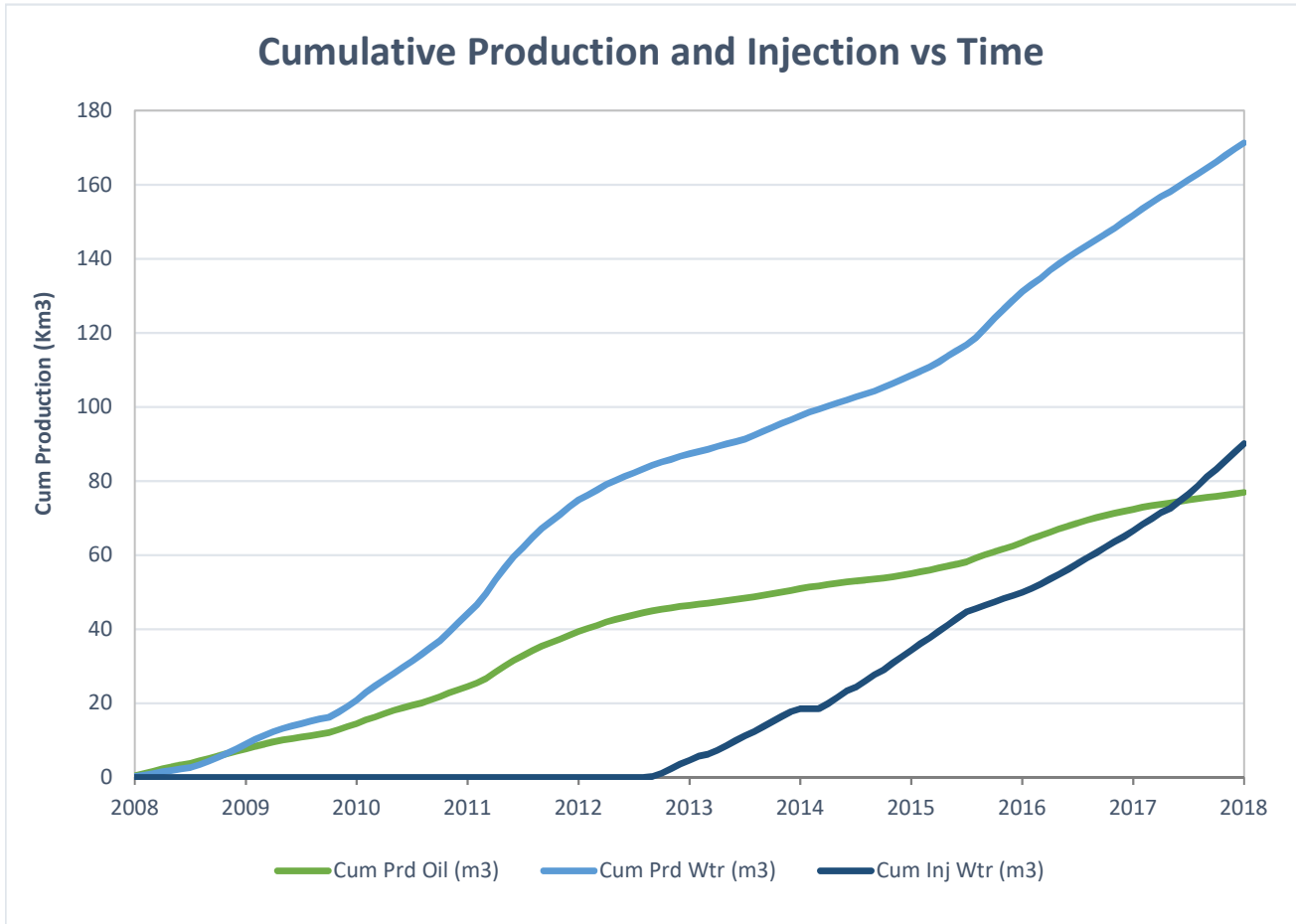
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	17.80	57.35	55.29	3.22	0
Feb-2018	15.64	56.68	54.31	3.62	0
Mar-2018	12.76	53.42	54.42	4.19	0
Apr-2018	9.12	43.42	36.76	4.76	0
May-2018	14.22	52.71	65.44	3.71	0
Jun-2018	15.15	52.72	60.43	3.48	0
Jul-2018	11.29	50.53	73.83	4.48	0
Aug-2018	10.73	52.69	79.00	4.91	0
Sep-2018	9.56	54.27	66.62	5.67	0
Oct-2018	10.05	59.53	73.92	5.92	0
Nov-2018	11.16	55.85	77.68	5.01	0
Dec-2018	13.31	53.01	75.33	3.98	0

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

2018 PRODUCTION	
Produced Oil (m ³)	4,582
Produced Gas (m ³)	0
Produced Water (m ³)	19,531
Fluid Injected (m ³)	23,560
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	76,939
Produced Water (m ³)	171,291

Ewart Unit No. 3



c) Monthly wellhead injection pressure for each injection well

	02/12-29 Inj		03/12-29 Inj		02/04-29 Inj		EU3	
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	898.1	3483	816.0	4529	0.0	0	1714.1	4006
Feb-2018	792.7	3644	728.1	4779	0.0	0	1520.8	4211
Mar-2018	884.9	3772	802.0	4833	0.0	0	1686.9	4303
Apr-2018	555.6	2349	501.8	3388	45.3	74	1102.7	2469
May-2018	922.7	3779	824.9	4774	281.1	17	2028.7	2857
Jun-2018	754.3	3354	668.7	4148	389.9	-77	1812.9	2475
Jul-2018	890.2	3898	800.3	4902	598.2	-92	2288.7	2903
Aug-2018	917.1	4241	774.1	4976	757.7	-95	2448.9	3041
Sep-2018	784.7	4116	674.0	4876	539.9	-93	1998.5	2966
Oct-2018	824.8	4038	757.0	4882	709.8	-93	2291.5	2942
Nov-2018	884.2	4462	696.9	4973	749.2	-95	2330.2	3113
Dec-2018	882.0	4610	685.2	4958	768.1	-95	2335.3	3158
Total	9991.3		8728.9		4839.0		23559.2	
Avg Inj P		3812		4668		-46		3204

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	1714.1	1520.8	1686.9	1102.7	2028.7	1812.9	2288.7	2448.9	1998.5	2291.5	2330.2	2335.3
Daily (m³/d)	55.29	54.31	54.41	36.76	65.44	60.43	73.83	79.00	66.62	73.92	77.67	75.33

2018 AVG. ANNUAL DAILY INJECTION =	64.42 m3/d
CUMULATIVE INJECTION TO Dec 31, 2017 =	66,558 m3
TOTAL 2018 ANNUAL INJECTION =	23,559 m3
CUMULATIVE INJECTION TO Dec 31, 2018 =	90,118 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
100.12-29-008-28W1.00	Pump Change	7/5/2018
102.04-29-008-28W1.00	WIW Conversion	3/12/2018

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	551.8	72.91	1777.8	153.54	1714.1	68.27	0.724	0.295
Feb-2018	437.8	73.35	1587	155.12	1520.8	69.79	0.740	0.299
Mar-2018	395.6	73.74	1656.1	156.78	1686.9	71.48	0.811	0.303
Apr-2018	273.7	74.02	1302.5	158.08	1102.7	72.58	0.691	0.306
May-2018	440.8	74.46	1634.1	159.72	2028.7	74.61	0.963	0.312
Jun-2018	454.6	74.91	1581.6	161.30	1812.9	76.42	0.876	0.316
Jul-2018	350.0	75.26	1566.3	162.87	2288.7	78.71	1.179	0.323
Aug-2018	332.5	75.59	1633.4	164.50	2448.9	81.16	1.231	0.331
Sep-2018	286.9	75.88	1628	166.13	1998.6	83.16	1.033	0.336
Oct-2018	311.5	76.19	1845.4	167.97	2291.6	85.45	1.052	0.342
Nov-2018	334.7	76.53	1675.4	169.65	2330.3	87.78	1.146	0.349
Dec-2018	412.5	76.94	1643.3	171.29	2335.3	90.12	1.120	0.355

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

The injection water for Ewart Unit No. 3 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. 3 Well List**

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
100/04-29-008-28W1/0	Horizontal	Producing	-
102/04-29-008-28W1/0	Horizontal	Injection	-
102/05-29-008-28W1/0	Horizontal	Producing	-
100/12-29-008-28W1/0	Horizontal	Producing	-
102/12-29-008-28W1/0	Horizontal	Injection	-
103/12-29-008-28W1/0	Horizontal	Injection	-
100/13-29-008-28W1/0	Horizontal	Producing	-