

Ewart Unit No. 13

Waterflood Progress Report 2019

January 1st through December 31st 2019

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

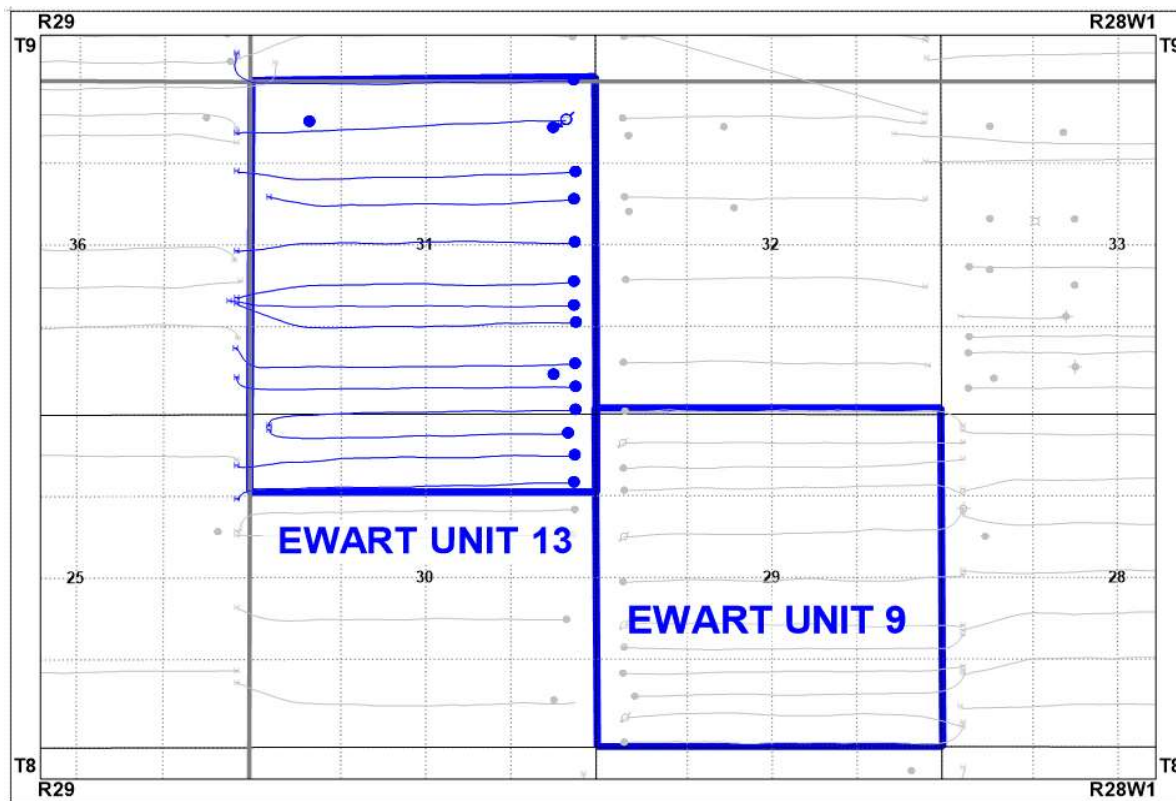
Tundra Oil and Gas

May 27, 2020

INTRODUCTION

Ewart Unit No. 13 Enhanced Oil Recovery (EOR) Waterflood Project was approved effective August 1st, 2017 with Tundra Oil and Gas as Operator. The EOR project area, outlined in blue in Figure 1, contains 3 vertical producing wells, 13 horizontal producing wells and 1 injection well in 20 LSDs in Township 8, Range 28W1.

Figure 1: Ewart Unit No. 13 Area Outline



Ewart Unit No. 13

Tundra Oil and Gas (Tundra), as the operator of the Ewart Unit No. 13 Enhanced Oil Recovery (EOR) project hereby submits the 2019 EOR report as per section 73 of the Drilling and Production Regulations.

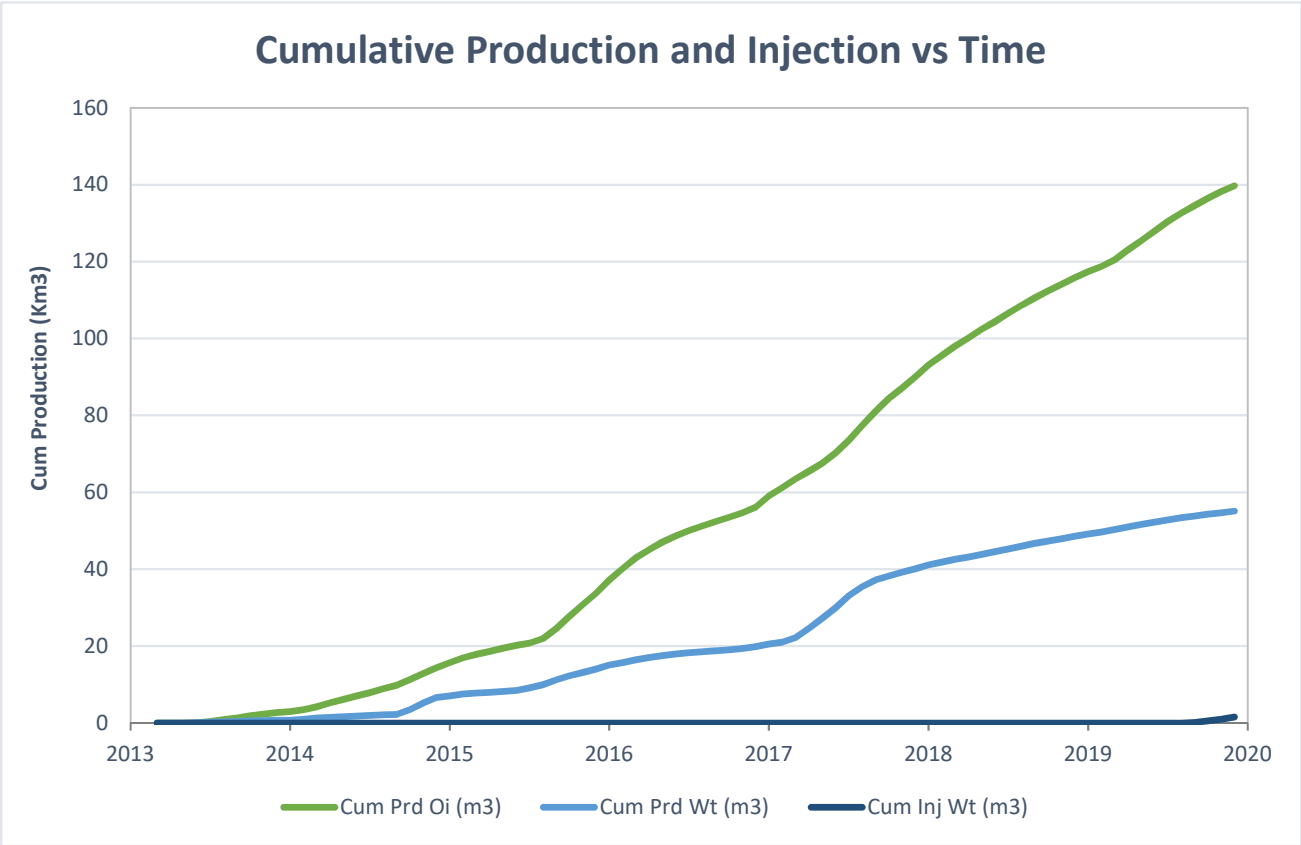
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	50.74	20.09	0.00	0.40	0
Feb-2019	46.46	16.74	0.00	0.36	0
Mar-2019	58.05	22.20	0.00	0.38	0
Apr-2019	85.38	23.10	0.00	0.27	0
May-2019	76.81	19.82	0.00	0.26	0
Jun-2019	80.04	19.89	0.00	0.25	0
Jul-2019	83.53	19.30	0.00	0.23	0
Aug-2019	70.52	17.18	0.00	0.24	0
Sep-2019	64.96	15.73	3.97	0.24	0
Oct-2019	60.74	14.21	14.45	0.23	0
Nov-2019	56.78	13.60	13.93	0.24	0
Dec-2019	50.60	13.14	17.45	0.26	0

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

2019 PRODUCTION	
Produced Oil (m ³)	23,896
Produced Gas (m ³)	0
Produced Water (m ³)	6,542
Fluid Injected (m ³)	1,526
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	139,756
Produced Water (m ³)	55,097

Ewart Unit No. 13



c) Monthly wellhead injection pressure for each injection well

MONTH	03/16-31 Inj		EU13	
	Inj Water (m ³)	Avg Inj P (kPa)	Inj Water (m ³)	Avg Inj P (kPa)
Jan-2019	0.0	0	0.0	0
Feb-2019	0.0	0	0.0	0
Mar-2019	0.0	0	0.0	0
Apr-2019	0.0	0	0.0	0
May-2019	0.0	0	0.0	0
Jun-2019	0.0	0	0.0	0
Jul-2019	0.0	0	0.0	0
Aug-2019	0.0	0	0.0	0
Sep-2019	119.0	171	119.0	171
Oct-2019	448.0	-93	448.0	-93
Nov-2019	418.0	-94	418.0	-94
Dec-2019	541.0	-94	541.0	-94
Total	1526.0		1526.0	
Avg Inj P		-9		-9

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	0.0	119.0	448.0	418.0	541.0
Daily (m³/d)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.97	14.45	13.93	17.45

2019 AVG. ANNUAL DAILY INJECTION =	4.15 m3/d
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CUMULATIVE INJECTION TO Dec 31, 2018 =	0 m3
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TOTAL 2019 ANNUAL INJECTION =	1,526 m3
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CUMULATIVE INJECTION TO Dec 31, 2019 =	1,526 m3
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d) Reservoir Pressure Surveys

Where practical, Tundra is committed to collecting pressure data from newly drilled wells. For Ewart Unit No. 13, pressures are available for the wells listed below.

UWI	Date	Depth (mTVD)	Pressure (kPaa)	Temp (°C)
03/16-30-008-28W1/0 HZ	February 8 - 20, 2017	802.3	2872	30.4
00/01-31-008-28W1/2 VT Re-completed in Lodgepole	Nov 25 – Dec 9, 2016	803.0	5897	29.2
04/01-31-008-28W1/0 HZ	February 10 - 21, 2017	810.8	5411	28.7
05/01-31-008-28W1/0 HZ	February 6 - 20, 2017	800.2	4192	29.9
03/08-31-008-28W1/0 HZ	March 10 – June 13, 2015	797.8	6883	28.5
03/09-31-008-28W1/0 HZ	March 12 – June 15, 2015	802.2	6911	27.6
04/09-31-008-28W1/3 HZ	March 12 - June 16, 2015	816.0	6058	28.7
00/13-31-008-28W1/2 VT Re-completed in Lodgepole	November 5 – 19, 2016	809.0	4738	29.5
00/16-31-008-28W1/2 VT Re-completed in Lodgepole	Aug 21 - Sept 5, 2017	802.0	3742	28.5

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) = 1.05

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	1572.9	117.43	622.9	49.18	0.0	0.00	0.000	0.000
Feb-2019	1300.9	118.73	468.6	49.65	0.0	0.00	0.000	0.000
Mar-2019	1799.6	120.53	688.2	50.33	0.0	0.00	0.000	0.000
Apr-2019	2561.3	123.09	693.1	51.03	0.0	0.00	0.000	0.000
May-2019	2381.2	125.48	614.3	51.64	0.0	0.00	0.000	0.000
Jun-2019	2401.3	127.88	596.7	52.24	0.0	0.00	0.000	0.000
Jul-2019	2589.5	130.47	598.4	52.84	0.0	0.00	0.000	0.000
Aug-2019	2186.1	132.65	532.5	53.37	0.0	0.00	0.000	0.000
Sep-2019	1948.7	134.60	471.8	53.84	119.0	0.12	0.047	0.001
Oct-2019	1882.9	136.48	440.4	54.28	448.0	0.57	0.185	0.003
Nov-2019	1703.4	138.19	408.1	54.69	418.0	0.99	0.190	0.005
Dec-2019	1568.5	139.76	407.2	55.10	541.0	1.53	0.263	0.008

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

The injection water for Ewart Unit No. 13 will be supplied from the existing source and injection water system at the Sinclair 04-01-008-29 Water Filtration Plant. All existing injection water is obtained from the Mannville formation in the 102/14-30-007-28W1 licensed water source well. Mannville water from the 102/14-30 source well is pumped to the main 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. 13 Well List

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
102/16-30-008-28W1/0	Horizontal	Producing	-
103/16-30-008-28W1/0	Horizontal	Producing	-
104/16-30-008-28W1/0	Horizontal	Producing	-
100/01-31-008-28W1/2	Vertical	Producing	-
103/01-31-008-28W1/0	Horizontal	Producing	-
104/01-31-008-28W1/0	Horizontal	Producing	-
105/01-31-008-28W1/0	Horizontal	Producing	-
102/08-31-008-28W1/0	Horizontal	Producing	-
103/08-31-008-28W1/0	Horizontal	Producing	-
104/08-31-008-28W1/0	Horizontal	Producing	-
102/09-31-008-28W1/0	Horizontal	Producing	-
103/09-31-008-28W1/0	Horizontal	Producing	-
104/09-31-008-28W1/3	Horizontal	Producing	-
100/13-31-008-28W1/2	Vertical	Producing	-
100/16-31-008-28W1/2	Vertical	Producing	-
103/16-31-008-28W1/0	Horizontal	Injection	-
105/16-31-008-28W1/0	Horizontal	Producing	-