

Ebor 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:

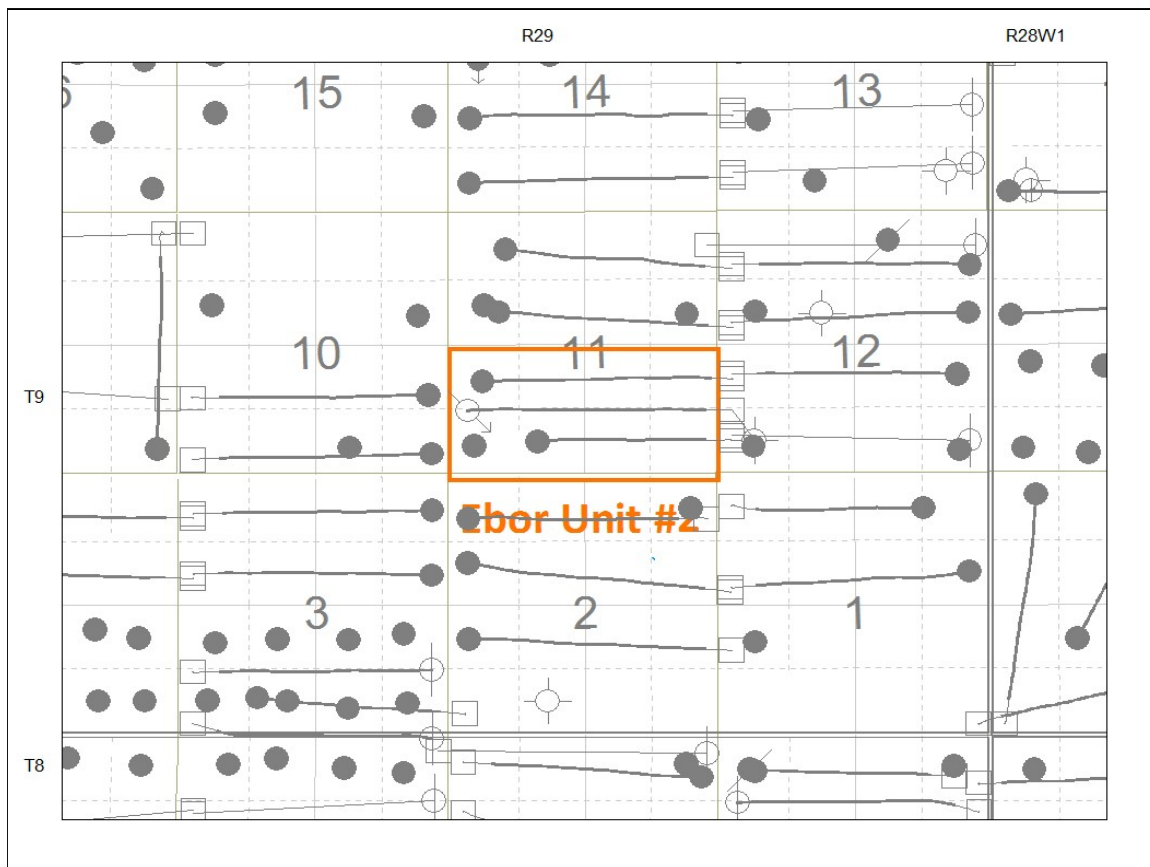
Tundra Oil and Gas

July 8, 2019

INTRODUCTION

Ebor Unit No. 2 Enhanced Oil Recovery (EOR) Waterflood Project was approved under Waterflood Order No. 20 effective March 2010 with Tundra Oil and Gas (Tundra) as Operator. The EOR project area, outlined in orange in Figure 1, contains 4 wells in the south half of Section 11 in Township 9, Range 29 W1.

Figure 1: Ebor Unit No. 2 Area Outline



Ebor Unit No. 2

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

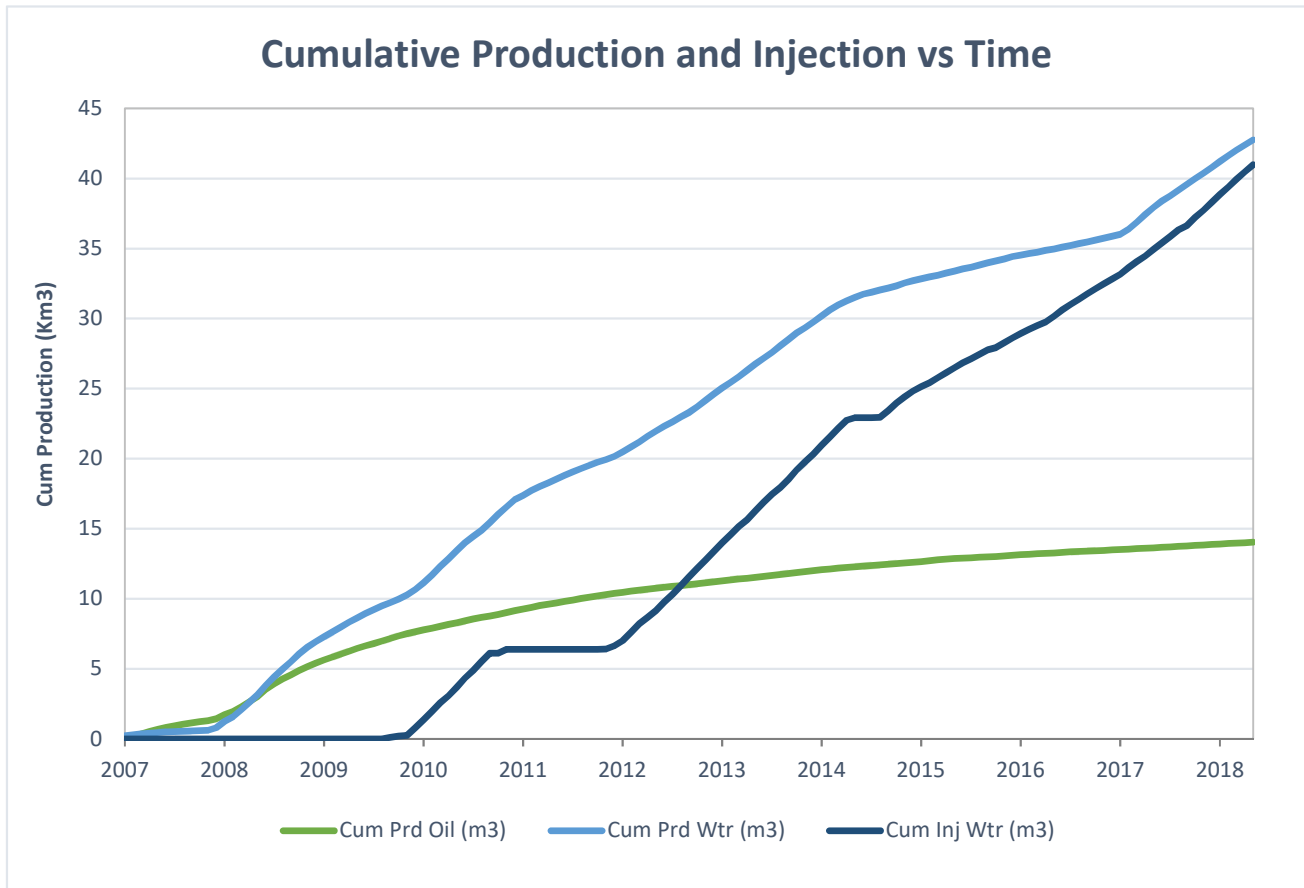
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	1.22	14.82	15.35	12.19	0
Feb-2018	0.91	13.36	15.68	14.61	0
Mar-2018	1.35	13.42	15.45	9.95	0
Apr-2018	0.96	13.53	10.17	14.14	0
May-2018	0.88	13.11	19.23	14.83	0
Jun-2018	1.35	12.83	16.87	9.48	0
Jul-2018	1.17	13.60	18.26	11.58	0
Aug-2018	1.08	13.91	18.52	12.84	0
Sep-2018	0.95	13.40	17.53	14.15	0
Oct-2018	0.96	12.41	17.48	12.91	0
Nov-2018	1.07	12.19	17.33	11.36	0
Dec-2018	1.14	12.15	17.00	10.67	0

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

2018 PRODUCTION	
Produced Oil (m ³)	398
Produced Gas (m ³)	0
Produced Water (m ³)	4,829
Fluid Injected (m ³)	6,056
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	14,035
Produced Water (m ³)	42,760

Ebor Unit No. 2



c) Monthly wellhead injection pressure for each injection well

MONTH	02/04-11 Inj		EBOR2	
	Inj Water (m ³)	Avg Inj P (kPa)	Inj Water (m ³)	Avg Inj P (kPa)
Jan-2018	476.0	5422	476.0	5422
Feb-2018	439.0	5569	439.0	5569
Mar-2018	479.0	5938	479.0	5938
Apr-2018	305.0	4673	305.0	4673
May-2018	596.0	6236	596.0	6236
Jun-2018	506.0	5855	506.0	5855
Jul-2018	566.0	6320	566.0	6320
Aug-2018	574.0	6502	574.0	6502
Sep-2018	526.0	6402	526.0	6402
Oct-2018	542.0	6454	542.0	6454
Nov-2018	520.0	6499	520.0	6499
Dec-2018	527.0	6526	527.0	6526
Total	6056.0		6056.0	
Avg Inj P		6033		6033

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	476.0	439.0	479.0	305.0	596.0	506.0	566.0	574.0	526.0	542.0	520.0	527.0
Daily (m³/d)	15.35	15.68	15.45	10.17	19.23	16.87	18.26	18.52	17.53	17.48	17.33	17.00

2018 AVG. ANNUAL DAILY INJECTION = 16.57 m3/d

CUMULATIVE INJECTION TO Dec 31, 2017 = 34,936 m3
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TOTAL 2018 ANNUAL INJECTION = 6,056 m3
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CUMULATIVE INJECTION TO Dec 31, 2018 = 40,992 m3
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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

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	37.7	13.68	459.5	38.39	476.0	35.41	0.952	0.668
Feb-2018	25.6	13.70	374.1	38.76	439.0	35.85	1.093	0.671
Mar-2018	41.8	13.74	416.1	39.18	479.0	36.33	1.039	0.674
Apr-2018	28.7	13.77	405.8	39.59	305.0	36.63	0.699	0.674
May-2018	27.4	13.80	406.3	39.99	596.0	37.23	1.368	0.680
Jun-2018	40.6	13.84	384.9	40.38	506.0	37.74	1.181	0.684
Jul-2018	36.4	13.88	421.6	40.80	566.0	38.30	1.229	0.688
Aug-2018	33.6	13.91	431.3	41.23	574.0	38.88	1.228	0.693
Sep-2018	28.4	13.94	401.9	41.63	526.0	39.40	1.217	0.697
Oct-2018	29.8	13.97	384.6	42.02	542.0	39.94	1.301	0.701
Nov-2018	32.2	14.00	365.8	42.38	520.0	40.46	1.299	0.705
Dec-2018	35.3	14.04	376.8	42.76	527.0	40.99	1.271	0.709

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

The injection water for Ebor Unit No. 2 was sourced from the 02/16-32-007-29W1 well (Lodgepole formation) until June 2016 when it was switched over to the newly recompleted source water well at 02/14-30-007-28W1 (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**Ebor Unit No. 2 Well List**

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</i>
100/03-11-009-29W1/0	Horizontal	Producing	-
100/04-11-009-29W1/0	Vertical	Producing	-
102/04-11-009-29W1/2	Horizontal	Injection	-
100/05-11-009-29W1/0	Horizontal	Producing	-

k) Discussion

Water injection started in April 2010 and was suspended in June 2011 after signs of breakthrough in the horizontal producer at 00/05-11 shortly after injection began. In July 2012, injection was restarted.