

**Souris Hartney Unit No. 1**

**Waterflood Progress Report 2017**

**January 1<sup>st</sup> through December 31<sup>st</sup> 2017**

**Prepared for:**

**Manitoba Industry, Economic Development and Mines**

**Petroleum Branch**

**Prepared by:**

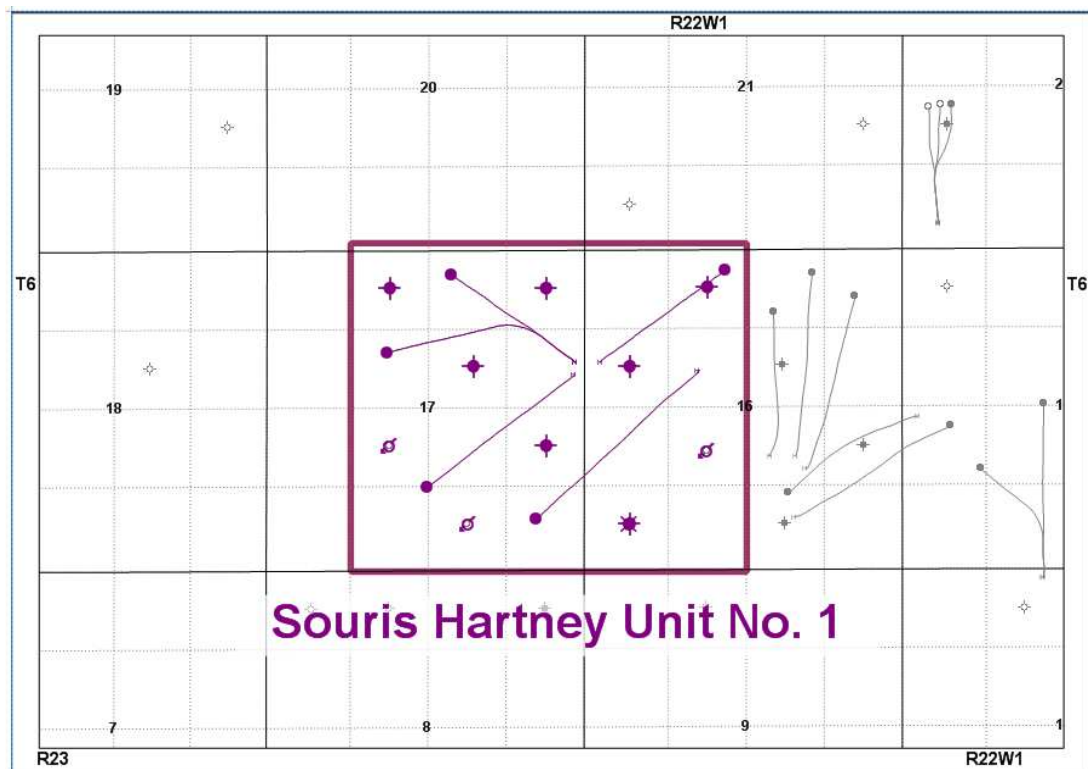
**Tundra Oil and Gas**

**July 24, 2018**

## INTRODUCTION

Souris Hartney Unit No. 1 Enhanced Oil Recovery (EOR) Waterflood Project was approved under Waterflood Order No. 9 effective November 1, 1999 with Tundra Oil and Gas (Tundra) as Operator. The EOR project area contains 15 wells in 20 LSDs in Township 6, Range 22 W1 as shown in the figure below.

Figure 1: Souris Hartney Unit No. 1 Area Outline



## Souris Hartney Unit No.1

Tundra Oil and Gas (Tundra), as the operator of the Souris Hartney Unit No. 1 Enhanced Oil Recovery (EOR) project hereby submits the 2017 EOR report as per section 73 of the Drilling and Production Regulations.

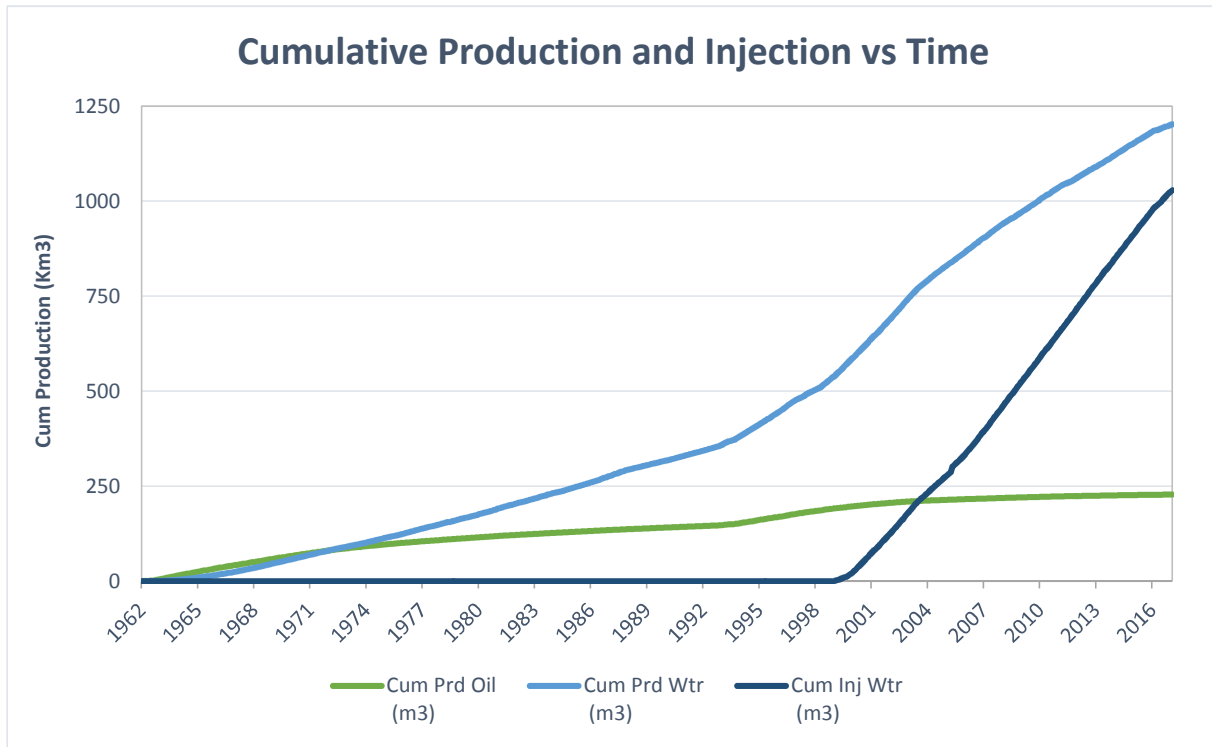
**a) Monthly oil and water production rates, injection rate, GOR and WOR**

MONTH	Cal Dly Oil m <sup>3</sup> /day	Cal Dly Wtr m <sup>3</sup> /day	Cal Inj Wtr m <sup>3</sup> /day	WOR m <sup>3</sup> /m <sup>3</sup>	GOR m <sup>3</sup> /m <sup>3</sup>
Jan-2017	1.44	44.82	141.71	31.15	0
Feb-2017	0.84	1.74	102.96	2.06	0
Mar-2017	0.77	33.25	121.84	43.13	0
Apr-2017	1.48	57.30	99.60	38.63	0
May-2017	1.68	58.46	158.03	34.78	0
Jun-2017	1.75	59.64	168.50	34.02	0
Jul-2017	2.02	49.30	128.45	24.41	0
Aug-2017	2.16	54.90	138.10	25.36	0
Sep-2017	1.84	48.12	156.20	26.10	0
Oct-2017	2.07	48.09	152.32	23.19	0
Nov-2017	2.19	44.37	105.52	20.29	0
Dec-2017	2.45	49.34	98.33	20.13	0

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

2017 PRODUCTION	
Produced Oil (m <sup>3</sup> )	632
Produced Gas (m <sup>3</sup> )	0
Produced Water (m <sup>3</sup> )	16,815
Fluid Injected (m <sup>3</sup> )	47,880
CUMULATIVE PRODUCTION	
Produced Oil (m <sup>3</sup> )	227,953
Produced Water (m <sup>3</sup> )	1,201,938

## Souris Hartney Unit No.1



c) Monthly wellhead injection pressure for each injection well

	00/02-17 Inj		00/03-17 Inj		00/06-16 Inj		00/06-17 Inj		SHU1	
MONTH	Inj Water (m <sup>3</sup> )	Avg Inj P (kPa)	Inj Water (m <sup>3</sup> )	Avg Inj P (kPa)	Inj Water (m <sup>3</sup> )	Avg Inj P (kPa)	Inj Water (m <sup>3</sup> )	Avg Inj P (kPa)	Inj Water (m <sup>3</sup> )	Avg Inj P (kPa)
Jan-2017	800.0	6284	0.0	0	2192.0	4284	3602.0	6506	6594.0	5895
Feb-2017	540.0	5893	0.0	0	1684.0	4143	1858.0	6186	4082.0	5602
Mar-2017	602.0	5400	0.0	0	2200.0	4800	2618.0	5200	5420.0	5150
Apr-2017	576.0	5400	0.0	0	1344.0	4800	2728.0	5200	4648.0	5150
May-2017	857.0	6039	0.0	0	2567.0	4826	3809.0	5406	7233.0	5419
Jun-2017	894.0	6417	0.0	0	2721.0	4573	3774.0	4964	7389.0	5229
Jul-2017	777.0	6320	0.0	0	1819.0	2293	3549.0	5575	6145.0	4941
Aug-2017	764.0	6374	0.0	0	2010.0	1166	3778.0	6357	6552.0	5064
Sep-2017	771.0	6510	0.0	0	2414.0	3850	3773.0	6351	6958.0	5761
Oct-2017	817.0	6384	0.0	0	2387.0	3548	3853.0	6438	7057.0	5696
Nov-2017	684.6	5927	20.2	44	1222.6	1726	2831.0	5490	4758.3	4385
Dec-2017	954.4	2744	604.8	2418	417.0	496	1161.0	4902	3137.2	2640
<b>Total</b>	9037.0		625.0		22977.6		37334.0		69973.6	
<b>Avg Inj P</b>		5808		205		3375		5715		5078

MONTH	Jan-2017	Feb-2017	Mar-2017	Apr-2017	May-2017	Jun-2017	Jul-2017	Aug-2017	Sep-2017	Oct-2017	Nov-2017	Dec-2017
<b>Total m3</b>	6594.0	4082.0	5420.0	4648.0	7233.0	7389.0	6145.0	6552.0	6958.0	7057.0	4758.3	3137.2
<b>Daily (m<sup>3</sup>/d)</b>	212.71	145.79	174.84	154.93	233.32	246.30	198.23	211.35	231.93	227.65	158.61	101.20

2017 AVG. ANNUAL DAILY INJECTION = 191.41 m3/d

CUMULATIVE INJECTION TO Dec 31, 2016 = 980,745 m3

TOTAL 2017 ANNUAL INJECTION = 69,974 m3

CUMULATIVE INJECTION TO Dec 31, 2017 = 1,028,625 m3

d) Summary of the result of any survey of reservoir pressure conducted in 2017. N/A

e) Date and type of any well servicing.

Well	Service Description	Date
100.02-17-006-22W1.00	Rigless Acid Stimulation	1/19/2017
100.03-17-006-22W1.00	WIW Conversion	9/29/2017

f) Calculations of voidage replacement ratio on a monthly and cumulative basis

**VOIDAGE CALCULATIONS**

OIL FORMATION VOLUME FACTOR (Rm3/Sm3) = 1.057

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-2017	44.6	227.37	1389.5	1186.51	4393.0	985.14	3.058	0.690
Feb-2017	23.6	227.39	48.6	1186.56	2883.0	988.02	39.200	0.692
Mar-2017	23.9	227.41	1030.9	1187.59	3777.0	991.80	3.576	0.695
Apr-2017	44.5	227.46	1719.0	1189.31	2988.0	994.79	1.692	0.696
May-2017	52.1	227.51	1812.2	1191.12	4899.0	999.69	2.624	0.698
Jun-2017	52.6	227.56	1789.3	1192.91	5055.0	1004.74	2.740	0.701
Jul-2017	62.6	227.62	1528.3	1194.44	3982.0	1008.72	2.497	0.703
Aug-2017	67.1	227.69	1701.9	1196.14	4281.0	1013.00	2.415	0.705
Sep-2017	55.3	227.75	1443.6	1197.59	4686.0	1017.69	3.120	0.708
Oct-2017	64.3	227.81	1490.9	1199.08	4722.0	1022.41	3.029	0.710
Nov-2017	65.6	227.88	1331.2	1200.41	3165.7	1025.58	2.260	0.712
Dec-2017	76.0	227.95	1529.5	1201.94	3048.3	1028.63	1.894	0.713

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

The injected fluid is treated by filtration.

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

<i><b>UWI</b></i>	<i><b>Type</b></i>	<i><b>Status</b></i>	<i><b>Future Plans</b></i>
100/04-16-006-22W1/0	Vertical	Abandoned	-
100/06-16-006-22W1/0	Vertical	Injection	-
100/12-16-006-22W1/0	Vertical	Abandoned Zone	-
100/14-16-006-22W1/0	Vertical	Abandoned	-
102/14-16-006-22W1/0	Horizontal	Pumping	-
100/01-17-006-22W1/0	Horizontal	Pumping	-
100/02-17-006-22W1/0	Vertical	Injection	-
100/03-17-006-22W1/0	Horizontal	Producing	-
100/06-17-006-22W1/0	Vertical	Injection	-
100/08-17-006-22W1/0	Vertical	Abandoned	-
100/10-17-006-22W1/0	Vertical	Abandoned	-
100/11-17-006-22W1/2	Horizontal	Producing	-
100/14-17-006-22W1/0	Vertical	Abandoned	-
100/15-17-006-22W1/0	Horizontal	Producing	-
100/16-17-006-22W1/0	Vertical	Abandoned	-