

Souris Hartney Unit No. 1

Waterflood Progress Report 2018

January 1st through December 31st 2018

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

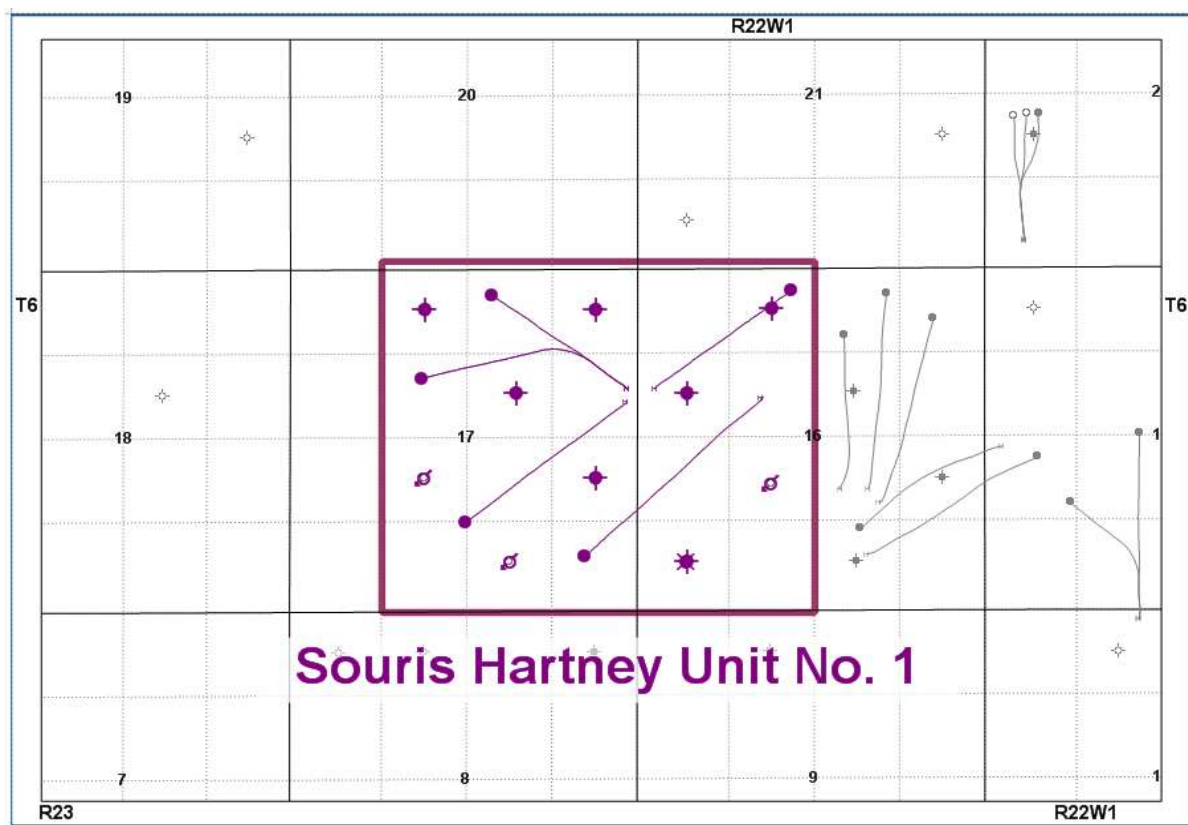
Tundra Oil and Gas

April 10, 2019

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 2018 EOR report as per section 73 of the Drilling and Production Regulations.

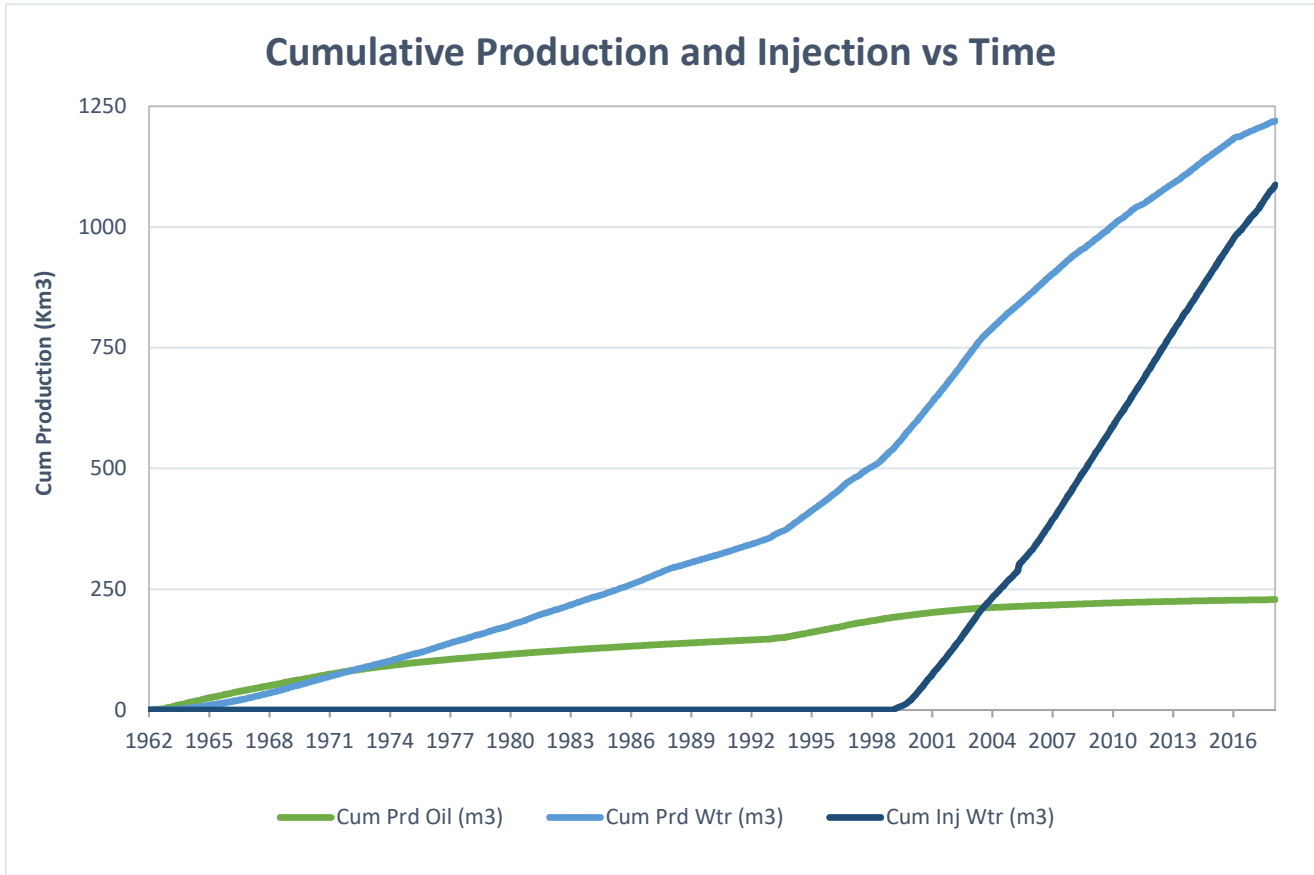
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	2.45	54.18	142.06	22.07	0
Feb-2018	1.74	48.55	172.50	27.92	0
Mar-2018	1.46	47.33	173.19	32.39	0
Apr-2018	1.48	47.44	170.38	32.05	0
May-2018	1.53	48.45	175.19	31.62	0
Jun-2018	1.01	42.90	168.23	42.48	0
Jul-2018	1.11	55.80	159.23	50.28	0
Aug-2018	2.15	56.56	181.39	26.29	0
Sep-2018	2.60	54.20	148.10	20.84	0
Oct-2018	3.44	53.95	115.74	15.68	0
Nov-2018	1.94	6.66	136.17	3.44	0
Dec-2018	2.30	55.23	183.10	24.01	0

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

2018 PRODUCTION	
Produced Oil (m ³)	708
Produced Gas (m ³)	0
Produced Water (m ³)	17,412
Fluid Injected (m ³)	58,543
CUMULATIVE PRODUCTION	
Produced Oil (m ³)	228,661
Produced Water (m ³)	1,219,350

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 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)	Inj Water (m ³)	Avg Inj P (kPa)
Jan-2018	1031.0	4319	552.0	3627	1641.0	1749	834.0	5379	4058.0	3658
Feb-2018	408.0	4775	591.0	4369	1980.0	2594	890.0	5429	3869.0	4269
Mar-2018	357.0	4863	498.0	4633	1881.0	2384	952.0	5409	3688.0	4380
Apr-2018	521.0	5176	628.0	5055	2224.0	1806	1012.0	5198	4385.0	4267
May-2018	551.0	5250	797.0	5270	2294.0	2450	944.0	5400	4586.0	4575
Jun-2018	438.0	5373	785.0	5412	1981.0	2206	972.0	5408	4176.0	4644
Jul-2018	389.0	5750	748.0	4899	2069.0	2028	681.0	5344	3887.0	4348
Aug-2018	407.0	5764	536.0	4652	2497.0	2876	800.0	5266	4240.0	4584
Sep-2018	470.0	6030	795.0	4979	1103.0	862	804.0	5676	3172.0	4413
Oct-2018	448.0	5975	766.0	5024	624.0	584	747.0	5502	2585.0	4140
Nov-2018	475.0	6009	872.0	5147	827.0	1101	904.0	5358	3078.0	4563
Dec-2018	596.0	5950	614.0	5134	2454.0	2761	821.0	5287	4485.0	4763
Total	6091.0		8182.0		21575.0		10361.0		46209.0	
Avg Inj P		5436		4850		1950		5388		4384

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	4058.0	3869.0	3688.0	4385.0	4586.0	4176.0	3887.0	4240.0	3172.0	2585.0	3078.0	4485.0
Daily (m³/d)	130.90	138.18	118.97	146.17	147.94	139.20	125.39	136.77	105.73	83.39	102.60	144.68

2018 AVG. ANNUAL DAILY INJECTION = 126.66 m3/d
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CUMULATIVE INJECTION TO Dec 31, 2017 = 1,028,625 m3

TOTAL 2018 ANNUAL INJECTION = 46,209 m3

CUMULATIVE INJECTION TO Dec 31, 2018 = 1,087,169 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
100.01-17-006-22W1.00	Pump Change	11/27/2018
100.03-17-006-22W1.00	Acid Job	7/20/2018
102.14-16-006-22W1.00	Open Hole Cleanout	7/21/2018

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-2018	76.1	228.03	1679.5	1203.62	4404.0	1033.03	2.502	0.715
Feb-2018	48.7	228.08	1359.5	1204.98	4830.0	1037.86	3.423	0.718
Mar-2018	45.3	228.12	1467.2	1206.44	5369.0	1043.23	3.544	0.721
Apr-2018	44.4	228.17	1423.2	1207.87	5111.3	1048.34	3.477	0.723
May-2018	47.5	228.22	1502.1	1209.37	5431.0	1053.77	3.499	0.726
Jun-2018	30.3	228.25	1287.0	1210.66	5047.0	1058.82	3.826	0.729
Jul-2018	34.4	228.28	1729.8	1212.39	4936.0	1063.75	2.795	0.732
Aug-2018	66.7	228.35	1753.4	1214.14	5623.0	1069.38	3.083	0.735
Sep-2018	78.0	228.42	1625.9	1215.77	4443.0	1073.82	2.601	0.737
Oct-2018	106.7	228.53	1672.6	1217.44	3588.0	1077.41	2.010	0.738
Nov-2018	58.1	228.59	199.7	1217.64	4085.0	1081.49	15.645	0.741
Dec-2018	71.3	228.66	1712.1	1219.35	5676.0	1087.17	3.175	0.744

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

j) Well List

Souris Hartney Unit No. 1 Well List

<i>UWI</i>	<i>Type</i>	<i>Status</i>	<i>Future Plans</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	Injection	-
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	-