Waskada Unit No. 19

Waterflood Progress Report 2019

January 1st through December 31st 2019

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:

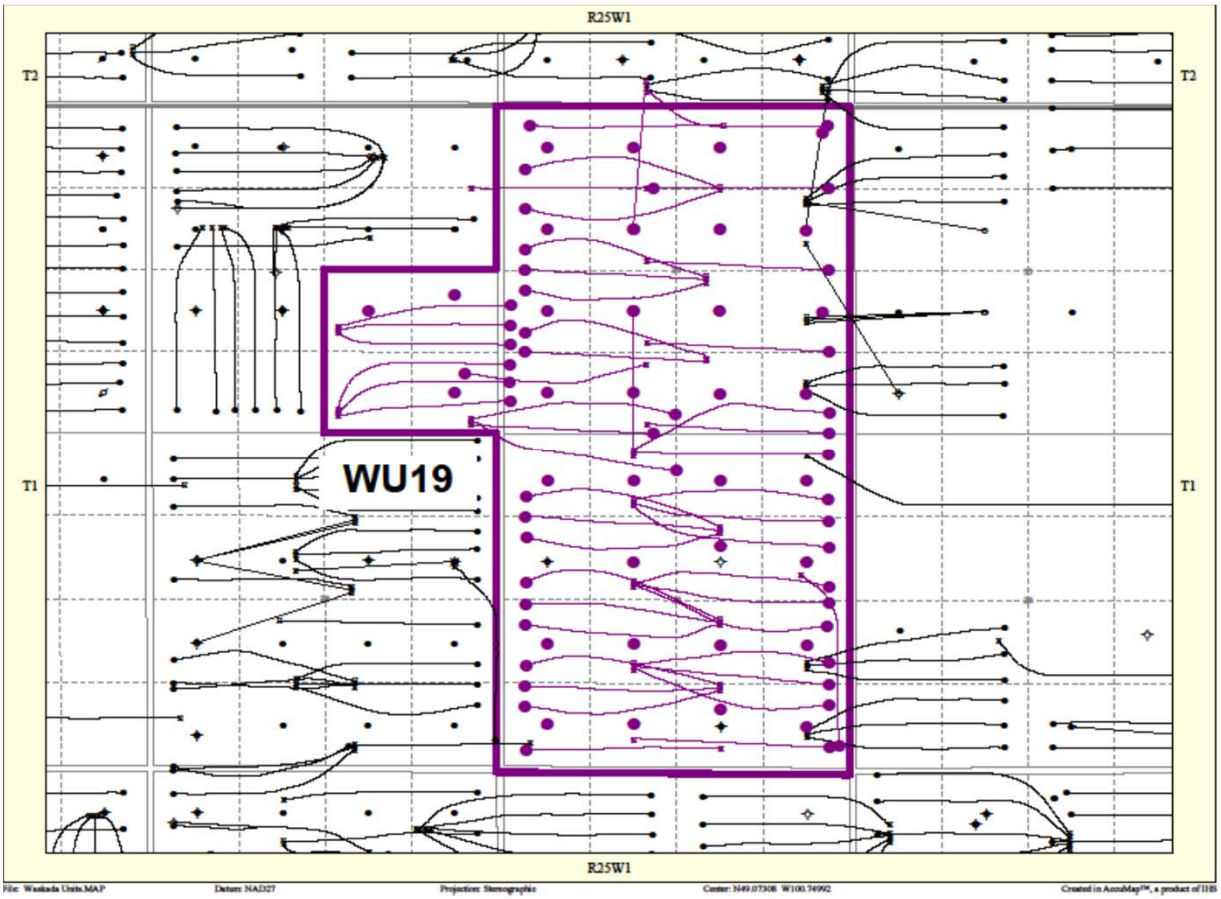
Tundra Oil and Gas

March 20, 2020

INTRODUCTION

The Waskada Unit No. 19 pressure maintenance project commenced water injection into the Lower Amaranth A pool in accordance with Manitoba Energy and Mines Order No. PM 14, dated August 1, 2003. Waskada Unit No. 19 was acquired from EOG Resources Canada Inc. effective October 1, 2014 (closing date December 1, 2014) with Tundra Oil and Gas (Tundra) as the new operator. THE EOR project area, outlined in purple in Figure 1, contains 85 wells (28 abandoned/suspended, 36 producing and 21 injectors) over 36 LSDs in Township 1, Range 25W1.

Figure 1: Waskada Unit No. 19 Area Outline



Waskada Unit No. 19

Tundra Oil and Gas (Tundra), as the operator of the Waskada Unit No. 19 Enhanced Oil Recovery (EOR) project hereby submits the 2019 EOR report as per section 73 of the Drilling and Production Regulations.

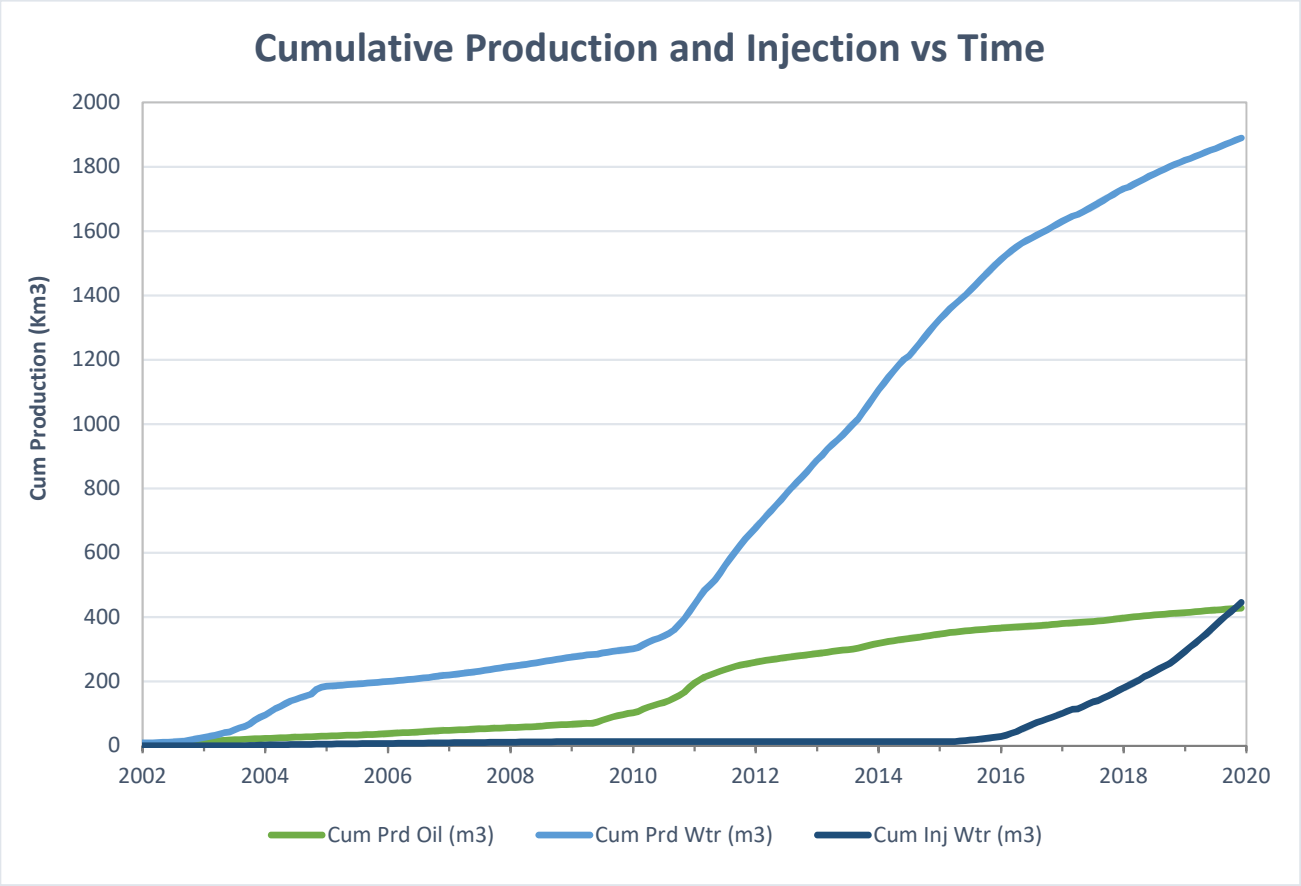
a) Monthly oil and water production rates, injection rate, GOR and WOR

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	40.77	204.46	687.39	5.01	23.74
Feb-2019	39.31	204.32	762.16	5.20	27.26
Mar-2019	45.25	219.17	624.52	4.84	20.53
Apr-2019	43.55	202.02	720.27	4.64	21.13
May-2019	43.46	210.54	428.65	4.84	0
Jun-2019	45.27	202.36	446.93	4.47	0
Jul-2019	37.28	175.97	477.26	4.72	0
Aug-2019	44.18	225.53	491.89	5.10	0
Sep-2019	41.94	213.67	455.21	5.09	0
Oct-2019	37.07	211.44	436.54	5.70	0
Nov-2019	39.32	208.30	462.64	5.30	0
Dec-2019	40.41	200.71	480.94	4.97	0

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

2019 PRODUCTION	
Produced Oil (m^3)	15,144
Produced Gas (m^3)	116
Produced Water (m^3)	75,394
Fluid Injected (m^3)	165,603
CUMULATIVE PRODUCTION	
Produced Oil (m^3)	427,998
Produced Water (m^3)	1,889,432

Waskada Unit No. 19



c) Monthly wellhead injection pressure for each injection well

MONTH	00/02-34 Inj		00/10-34 Inj		02/12-34 Inj		00/08-34 Inj		04/12-27 Inj		03/05-34 Inj	
	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)	Inj Water (m^3)	Avg Inj P (kPa)
Jan-2019	0.0	4850	0.0	4800	662.8	4830	0.0	4800	619.5	4695	546.2	4874
Feb-2019	0.0	4850	0.0	4800	601.2	4977	0.0	4800	564.9	4969	479.3	4991
Mar-2019	0.0	3263	0.0	4800	573.2	4300	0.0	4800	443.7	3470	426.1	4197
Apr-2019	0.0	1065	0.0	4800	618.1	4892	0.0	4800	511.8	4930	549.4	4927
May-2019	0.0	1065	0.0	3043	620.9	4967	0.0	4800	510.6	4981	531.1	4977
Jun-2019	0.0	1065	0.0	2984	578.8	4947	0.0	4800	483.2	4931	492.7	4965
Jul-2019	0.0	1065	0.0	2984	580.8	4971	0.0	4800	406.3	4980	494.3	4986
Aug-2019	0.0	1065	0.0	2984	563.4	4958	0.0	4800	513.1	4978	484.3	4907
Sep-2019	0.0	1065	0.0	2984	535.2	4911	0.0	4800	452.7	4984	458.9	5028
Oct-2019	0.0	1065	0.0	2984	529.8	4916	0.0	4800	448.1	4943	456.9	4946
Nov-2019	0.0	1065	0.0	2984	516.0	4963	0.0	4800	430.2	4967	434.6	4977
Dec-2019	0.0	1065	0.0	2984	524.5	4938	0.0	4837	435.1	4983	440.2	4985
Total	0.0		0.0		6904.7		0.0		5819.2		5794.0	
Avg Inj P		1879		3594		4881		4803		4817		4897

MONTH	02/09-27 Inj		04/09-27 Inj		02/14-34 Inj		00/07-27 Inj		02/03-34 Inj		03/04-27 Inj	
	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)	Inj Water (m^3)	Avg Inj P (kPa)
Jan-2019	521.2	3477	1288.5	4176	1220.4	2574	373.8	1704	1065.5	4285	884.8	4734
Feb-2019	486.1	3971	1152.6	4637	1233.1	2975	378.4	1989	1101.6	4943	834.2	4942
Mar-2019	455.6	3277	1128.4	3895	1113.2	2718	374.6	1570	993.1	4214	809.7	4470
Apr-2019	508.5	3883	1298.7	4730	1292.4	2962	440.8	1920	1132.7	4852	879.1	4915
May-2019	542.3	3975	1372.0	4936	1370.9	3127	482.7	1996	1205.2	4968	908.7	4976
Jun-2019	567.7	4217	1292.7	4840	1404.5	3362	484.2	1927	1167.6	4969	470.8	3445
Jul-2019	627.9	4976	1316.4	4944	1528.6	3719	447.9	1991	1220.1	4965	841.1	4945
Aug-2019	622.6	4969	1297.3	4960	1532.7	3829	538.7	2092	1223.0	4660	956.8	4969
Sep-2019	590.3	4953	1228.5	4943	1472.8	3781	526.9	2010	1184.1	4493	859.0	5009
Oct-2019	588.8	4831	1226.8	4955	1507.5	3967	552.6	1915	1223.2	4531	870.3	4911
Nov-2019	568.5	4954	1162.8	4965	1412.0	3841	546.0	1974	1186.7	4470	847.9	4946
Dec-2019	582.2	4970	1174.0	4982	1455.8	3868	584.5	1993	1225.7	4483	880.8	4973
Total	6661.7		14938.7		16543.9		5731.1		13928.5		10043.2	
Avg Inj P		4371		4747		3394		1923		4653		4770

c) Monthly wellhead injection pressure for each injection well

MONTH	02/04-34 Inj		03/16-34 Inj		02/16-34 Inj		02/09-34 Inj		02/13-34 Inj		03/01-34 Inj	
	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)	Inj Water (m^3)	Avg Inj P (kPa)
Jan-2019	894.0	4784	822.7	1181	621.3	-92	770.7	-89	548.1	-89	744.9	-90
Feb-2019	795.4	4972	831.5	2071	819.5	-94	831.2	613	554.1	143	831.2	-93
Mar-2019	710.9	4684	750.7	2263	717.1	-95	731.3	1600	502.5	242	750.0	-92
Apr-2019	767.7	4890	833.3	2819	861.7	-94	781.0	2460	774.8	1142	865.5	-93
May-2019	769.6	4968	712.7	2929	882.9	-94	634.2	2979	916.8	1898	915.0	-93
Jun-2019	710.1	4950	727.5	3173	1115.3	344	652.9	3332	1117.4	2444	1099.3	-88
Jul-2019	707.9	6662	922.3	3536	99.9	1532	904.7	4381	1519.0	3493	1534.5	643
Aug-2019	686.7	4883	764.7	3808	0.0	1533	810.8	4664	1469.8	3568	1517.5	1747
Sep-2019	650.9	6418	0.0	3979	0.0	1533	592.7	4977	1482.7	3774	1251.6	1965
Oct-2019	640.9	4957	0.0	3979	0.0	1533	466.7	4952	1515.9	3834	1088.3	1985
Nov-2019	608.0	4971	617.4	3101	0.0	1533	381.0	4965	1483.0	3886	1095.5	2432
Dec-2019	610.2	4977	919.2	3830	0.0	1533	341.5	4972	1541.4	3838	1381.1	3934
Total	8552.3		7901.9		5117.5		7898.7		13425.5		13074.3	
Avg Inj P		5176		3056		756		3317		2348		1013

MONTH	03/13-27 Inj		02/08-34 Inj		04/04-34 Inj		WU19	
	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-2019	779.8	708	775.1	266	93.0	-68	13232.2	2769
Feb-2019	833.5	1411	830.5	1251	555.5	-93	13713.7	3001
Mar-2019	752.4	1290	592.7	1599	506.3	-92	12331.4	2684
Apr-2019	863.9	1833	25.9	1993	603.6	66	13609.0	3033
May-2019	912.6	2134	0.0	1993	0.0	228	13288.1	3083
Jun-2019	1043.2	2672	0.0	1993	0.0	228	13407.9	3119
Jul-2019	977.3	3270	401.2	1721	264.9	257	14795.0	3563
Aug-2019	1076.0	2749	347.0	1994	844.2	731	15248.5	3564
Sep-2019	1183.7	3286	0.0	2000	1186.2	1543	13656.2	3735
Oct-2019	1224.0	3330	0.0	2000	1192.8	1957	13532.5	3681
Nov-2019	1186.9	3426	324.7	1900	1077.9	2062	13879.1	3675
Dec-2019	1227.4	3437	358.8	1806	1226.7	2552	14909.0	3807
Total	12060.7		3655.9		7550.9		165602.6	
Avg Inj P		2462		1710		781		3309

c) Monthly wellhead injection pressure for each injection well

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	13232.2	13713.7	12331.4	13609.0	13288.1	13407.9	14795.0	15248.5	13656.2	13532.5	13879.1	14909.0
Daily (m^3/d)	426.85	489.78	397.79	453.63	428.65	446.93	477.26	491.89	455.21	436.53	462.64	480.94

2019 AVG. ANNUAL DAILY INJECTION =	454.01 m3/d
CUMULATIVE INJECTION TO Dec 31, 2018 =	280,163 m3
TOTAL 2019 ANNUAL INJECTION =	165,603 m3
CUMULATIVE INJECTION TO Dec 31, 2019 =	445,766 m3

d) Summary of the result of any survey of reservoir pressure conducted in 2019. N/A

e) Date and type of any well servicing.

Well	Service Description	Date
102.04-27-001-25W1.00	Rigless Acid Job	3/2/2019
102.05-34-001-25W1.00	Pump Change	7/23/2019
102.08-34-001-25W1.00	Packer Repair	7/12/2019
102.08-34-001-25W1.00	Packer Repair	11/4/2019
102.08-34-001-25W1.00	Packer Repair	12/9/2019
102.13-27-001-25W1.00	Rigless Acid Job	3/2/2019
102.14-27-001-25W1.00	CLCO w/Select Acid, No Csg PT	8/2/2019
102.16-27-001-25W1.00	Rigless Acid Job	3/9/2019
103.03-34-001-25W1.00	Rigless Acid Job	3/9/2019
103.03-34-001-25W1.00	CLCO w/ Select Acid and Fluid Tracer	11/12/2019
103.08-27-001-25W1.00	Rigless Acid Job	3/2/2019
103.08-34-001-25W1.00	Rigless Acid	8/8/2019
103.08-34-001-25W1.00	Pump Change	8/22/2019
103.09-34-001-25W1.00	Pump Change	7/25/2019
103.09-34-001-25W1.00	Rigless Acid	10/24/2019
103.16-34-001-25W1.00	Packer Repair	11/6/2019
104.01-27-001-25W1.00	Rigless Acid Job	2/24/2019
104.04-34-001-25W1.00	Packer Repair	7/8/2019
104.04-34-001-25W1.00	Packer Repair	8/2/2019
104.08-27-001-25W1.00	Rigless Acid Job	2/24/2019
107.05-34-001-25W1.00	Rigless Acid Job	3/9/2019

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

VOIDAGE CALCULATIONS

OIL FORMATION VOLUME FACTOR (Rm3/Sm3) = 1.17

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	1263.9	414.12	6338.4	1820.38	13232.2	293.40	1.693	0.127
Feb-2019	1100.7	415.22	5720.9	1826.10	13713.7	307.11	1.957	0.133
Mar-2019	1402.9	416.62	6794.2	1832.89	12331.4	319.44	1.462	0.138
Apr-2019	1306.5	417.93	6060.7	1838.95	13609.0	333.05	1.793	0.143
May-2019	1347.3	419.27	6526.7	1845.48	13288.2	346.34	1.640	0.148
Jun-2019	1358.1	420.63	6070.8	1851.55	13407.9	359.75	1.750	0.153
Jul-2019	1155.6	421.79	5455.1	1857.00	14795.1	374.54	2.173	0.159
Aug-2019	1369.7	423.16	6991.4	1864.00	15248.6	389.79	1.774	0.165
Sep-2019	1258.2	424.42	6410.1	1870.41	13656.2	403.45	1.733	0.170
Oct-2019	1149.3	425.57	6554.6	1876.96	13532.6	416.98	1.713	0.176
Nov-2019	1179.5	426.74	6249	1883.21	13879.1	430.86	1.819	0.181
Dec-2019	1252.7	428.00	6222	1889.43	14909.1	445.77	1.939	0.186

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

Waskada Unit No. 19 Well List

UWI	*Type*	*Status*	*Future Plans*
100/01-27-001-25W1/0	Vertical	Abandoned Zone	-
102/01-27-001-25W1/0	Horizontal	Producing	-
103/01-27-001-25W1/0	Horizontal	Producing	-
104/01-27-001-25W1/0	Horizontal	Producing	-
100/03-27-001-25W1/0	Vertical	Abandoned	-
100/04-27-001-25W1/0	Vertical	Abandoned	-
102/04-27-001-25W1/0	Horizontal	Producing	-
103/04-27-001-25W1/0	Horizontal	Injection	-
100/05-27-001-25W1/0	Vertical	Abandoned Zone	-
102/05-27-001-25W1/0	Horizontal	Producing	-
103/05-27-001-25W1/0	Horizontal	Abandoned Zone	-
104/05-27-001-25W1/0	Horizontal	Abandoned Zone	-
100/06-27-001-25W1/0	Vertical	Injection	-
100/07-27-001-25W1/0	Vertical	Injection	-
100/08-27-001-25W1/0	Vertical	Abandoned Zone	-
102/08-27-001-25W1/0	Horizontal	Abandoned Zone	-
103/08-27-001-25W1/0	Horizontal	Producing	-
104/08-27-001-25W1/0	Horizontal	Producing	-
100/09-27-001-25W1/0	Vertical	Abandoned	-
102/09-27-001-25W1/0	Horizontal	Injection	-
103/09-27-001-25W1/0	Horizontal	Producing	-
104/09-27-001-25W1/0	Horizontal	Injection	-
102/10-27-001-25W1/0	Vertical	Abandoned	-
100/11-27-001-25W1/0	Vertical	Abandoned Zone	-
100/12-27-001-25W1/0	Vertical	Abandoned	-
102/12-27-001-25W1/0	Horizontal	Producing	-
103/12-27-001-25W1/0	Horizontal	Producing	-
104/12-27-001-25W1/0	Horizontal	Injection	-
100/13-27-001-25W1/0	Vertical	Abandoned Zone	-
102/13-27-001-25W1/0	Horizontal	Producing	-
103/13-27-001-25W1/0	Horizontal	Injection	-
100/14-27-001-25W1/0	Vertical	Injection	-
102/14-27-001-25W1/0	Horizontal	Producing	-
100/15-27-001-25W1/0	Vertical	Abandoned Zone	-
100/16-27-001-25W1/0	Vertical	Producing	-
102/16-27-001-25W1/0	Horizontal	Producing	-
103/16-27-001-25W1/0	Horizontal	Producing	WIW Conversion
104/16-27-001-25W1/0	Horizontal	Producing	-
100/01-33-001-25W1/0	Vertical	Abandoned Zone	-
100/07-33-001-25W1/0	Vertical	Abandoned Zone	-
100/08-33-001-25W1/0	Vertical	Abandoned	-
100/01-34-001-25W1/0	Vertical	Pumping	-
102/01-34-001-25W1/0	Horizontal	Abandoned Zone	-
103/01-34-001-25W1/0	Horizontal	Injection	-
104/01-34-001-25W1/0	Horizontal	Drilled & Cased	-

j) Well List

Waskada Unit No. 19 Well List

UWI	*Type*	*Status*	*Future Plans*
100/02-34-001-25W1/0	Vertical	Injection	-
100/03-34-001-25W1/0	Vertical	Abandoned Zone	-
102/03-34-001-25W1/0	Horizontal	Injection	-
103/03-34-001-25W1/0	Horizontal	Producing	-
100/04-34-001-25W1/0	Vertical	Abandoned Zone	-
102/04-34-001-25W1/0	Horizontal	Injection	-
103/04-34-001-25W1/0	Horizontal	Producing	-
104/04-34-001-25W1/0	Horizontal	Injection	-
105/04-34-001-25W1/0	Horizontal	Producing	-
100/05-34-001-25W1/0	Vertical	Abandoned Zone	-
102/05-34-001-25W1/0	Horizontal	Producing	-
103/05-34-001-25W1/0	Horizontal	Injection	-
104/05-34-001-25W1/0	Horizontal	Producing	-
105/05-34-001-25W1/0	Horizontal	Producing	-
106/05-34-001-25W1/0	Horizontal	Suspended	-
107/05-34-001-25W1/0	Horizontal	Producing	-
100/06-34-001-25W1/0	Vertical	Abandoned Zone	-
100/07-34-001-25W1/0	Vertical	Pumping	-
100/08-34-001-25W1/0	Vertical	Injection	-
102/08-34-001-25W1/0	Horizontal	Injection	-
103/08-34-001-25W1/0	Horizontal	Producing	-
100/09-34-001-25W1/0	Vertical	Producing	-
102/09-34-001-25W1/0	Horizontal	Injection	-
103/09-34-001-25W1/0	Horizontal	Producing	-
100/10-34-001-25W1/0	Vertical	Injection	-
100/11-34-001-25W1/0	Vertical	Abandoned Zone	-
100/12-34-001-25W1/0	Vertical	Abandoned Zone	-
102/12-34-001-25W1/0	Horizontal	Injection	-
103/12-34-001-25W1/0	Horizontal	Producing	-
104/12-34-001-25W1/0	Horizontal	Producing	-
100/13-34-001-25W1/0	Vertical	Abandoned Zone	-
102/13-34-001-25W1/0	Horizontal	Injection	-
103/13-34-001-25W1/0	Horizontal	Producing	-
100/14-34-001-25W1/0	Vertical	Abandoned Zone	-
102/14-34-001-25W1/0	Horizontal	Injection	-
100/15-34-001-25W1/0	Vertical	Pumping	-
100/16-34-001-25W1/0	Vertical	Abandoned	-
102/16-34-001-25W1/0	Horizontal	Injection	-
103/16-34-001-25W1/0	Horizontal	Injection	-
104/16-34-001-25W1/0	Horizontal	Drilled & Cased	-

k) Discussion

Water injection commenced with 4 injector wells on October 2003. Four more injectors were added in November 2003. **In 2011, EOG received permission to convert 3 Spearfish injection wells into Mississippian SWD wells. The wells converted were 00/06-27, 00/14-27 and 02/02-27-001-25W1.**