

SINCLAIR UNIT NO. 8
WATERFLOOD EOR PROJECT
ANNUAL REPORT FOR 2016

July 4, 2017

Tundra Oil and Gas Partnership

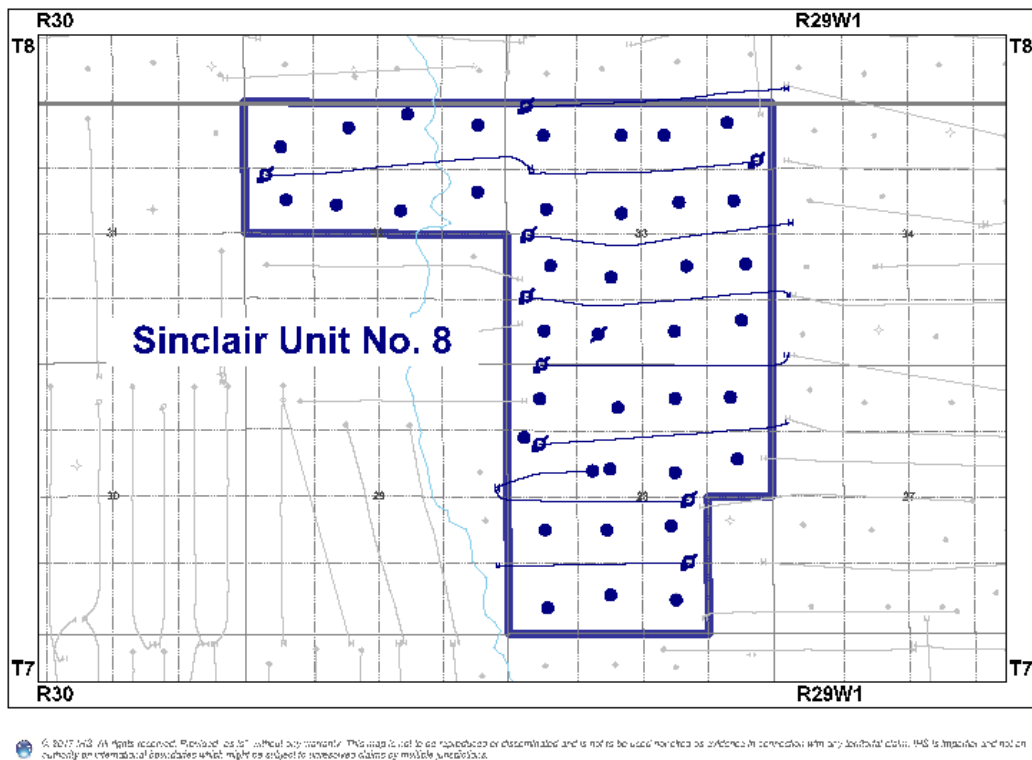
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102/07-28-007-29W1	
103/07-28-007-29W1	
102/12-28-007-29W1	
102/12-32-007-29W1	
102/04-33-007-29W1	
102/05-33-007-29W1	
103/05-33-007-29W1	
102/16-33-007-29W1	
102/13-33-007-29W1 (Inter-Unit Injector)	

INTRODUCTION

Sinclair Unit No. 8 Enhanced Oil Recovery (EOR) Waterflood Project was approved under Waterflood Order No. 25 effective July 1, 2013 with Tundra Oil and Gas (Tundra) as Operator. The Unit area contains 38 vertical and 10 horizontal wells in 38 LSDs in Township 7 Range 29 W1 as shown in the figure below.

Figure 1: Sinclair Unit 8 Area Outline



In accordance with Section 73 of the Manitoba Drilling and Production Regulation, Tundra hereby submits the following 2016 Annual Progress Report for Sinclair Unit No. 8.

DISCUSSION

Production History

For the wells included in Sinclair Unit No. 8, production started in March 2004 with 00/12-28-007-29W1. Average oil production peaked at 3.3 m³/d per well in January 2008. This production was coming from 38 wells and totaled 124 m³/d for the whole Unit.

In December 2016, the Unit was producing 43.04 m³/d of oil and 50.03 m³/d of water and had an average WOR of 0.98 m³/m³. Water injection commenced in Sinclair Unit No. 8 in August 2013. The rates and WOR are presented in Figure 2.

Figure 2: Sinclair Unit 8 Production/Injection Rates and WOR vs Time

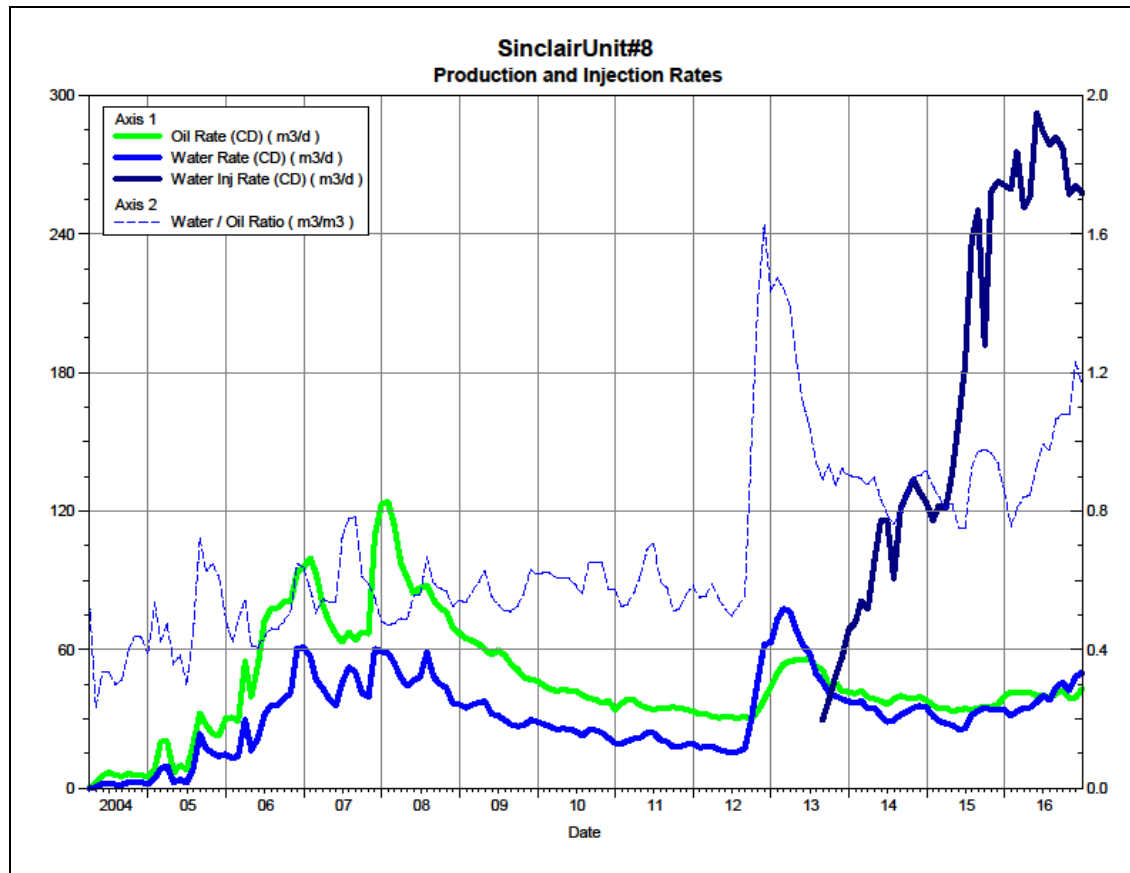
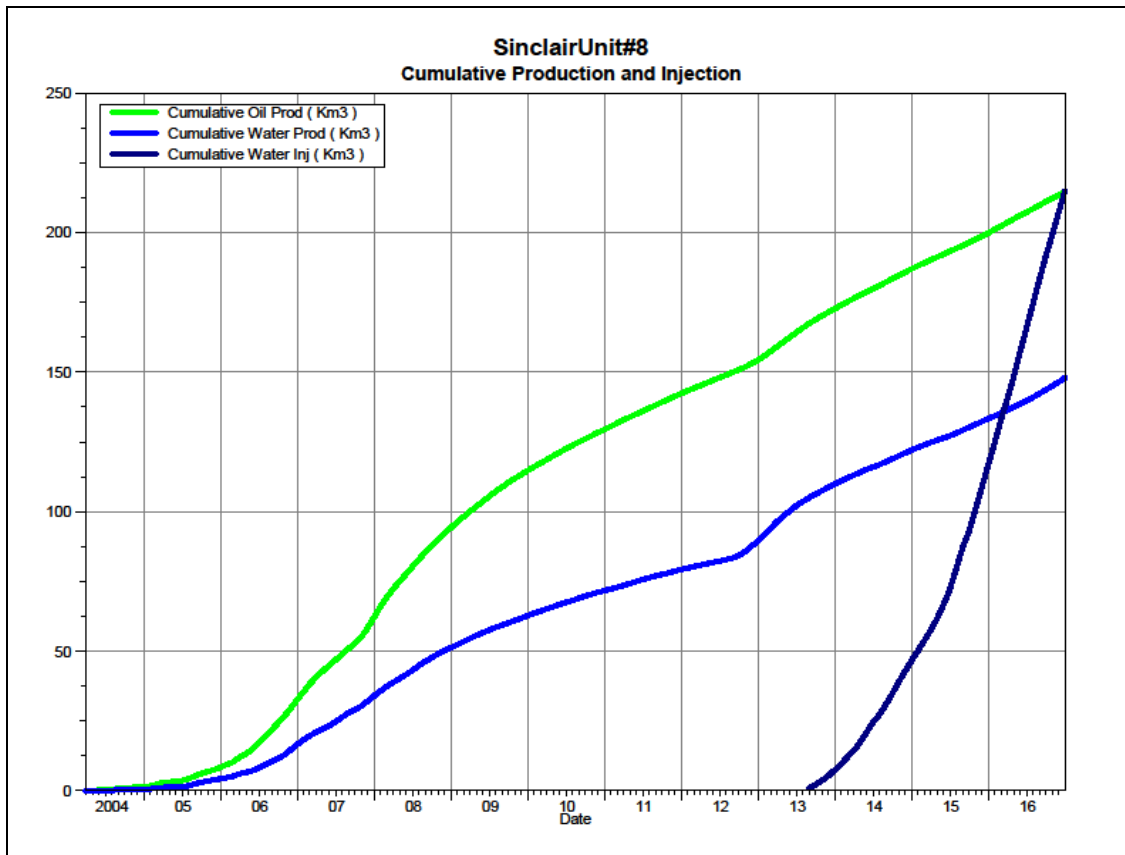


Figure 3 shows the cumulative production for Sinclair Unit No. 8 to the end of December 2016 as 214.8 e³m³ of oil, and 148.0 e³m³ of water, representing a 10.0% recovery factor of the OOIP. The cumulative water injected is 215.1 e³m³. The cumulative volume of oil, and water produced and fluid injected for each injection pattern is presented in Appendix D.

Figure 3: Sinclair Unit 8 Cumulative Oil, Water and Water Injected vs Time



Waterflood Development Plan

Sinclair Unit No. 8 Waterflood (WF) Development Plan

In 2012, the 8 proposed horizontal injectors were drilled. In 2013, an inter-unit horizontal well was drilled at 02/13-33-007-29W1/0 and the 02/04-33 and 02/05-33-007-29W1 wells were converted to injection. Water injection commenced in Sinclair Unit No. 8 in August 2013. In January 2016, the 02/07-28 well, the last of the proposed injectors, was converted to water injection. All of the horizontal wells are fracture stimulated to improve the injection rates. As of December 2016, Sinclair Unit No. 8 had 9 injection patterns in place, including the inter-unit injector.

Production performance by injector pattern are summarized in Appendix A.

Any future revisions to the waterflood development or surveillance plan would be based on new production or performance response data, technical studies, or observed reservoir behavior and reserves recovery interpretations.

Waterflood EOR Operating Strategy and Performance

Water Source and Quality

The injection water for Sinclair Unit No. 8 will be sourced from the 16-32-007-29W1 well (Lodgepole formation). The water is treated at the 03-04-008-29W1 battery where it is filtered to 0.5 microns and has scale inhibitor added. The injection water is then distributed to the injectors through the dedicated infrastructure system.

Injection Wellhead Pressures

Injection started in this Unit in August 2013. The monthly wellhead injection pressure for each injector is summarized in Appendix C. Since injection in this Unit is still in the early stages, the injectors are still building up to a target injection pressure of 6300 kPaa.

Reservoir Pressure

Where practical, Tundra is committed to collecting pressure data from newly drilled injection wells. For Sinclair Unit No. 8, pressure data taken in 2012 and 2013 from 9 locations is available. A summary table is presented in Appendix B. Pressures are corrected to a common datum of -450 m SS for comparison with other units in the area.

Well Servicing

The following table summarizes the well servicing performed within Sinclair Unit No. 8 during 2016:

Table 1: Sinclair Unit No. 8 Well Servicing

100/14-33-007-29W1/00	Repair Parted Rod	11/14/2016
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Voidage Replacement

Tundra intends to inject water to re-pressurize the reservoir due to cumulative primary production and corresponding pressure depletion. During the initial fill-up period, the instantaneous voidage replacement ratio (VRR) is expected to average approximately 1.25 to 2.0 by individual pattern. The injector pattern VRRs will be discussed in the waterflood performance section of the report.

Waterflood Performance Discussion

As of the end of 2016, 9 horizontal wells, including the inter-unit injector, were on injection. The injection patterns generally consist of an east-west horizontal injector placed between 8 vertical producers – 4 to the north, 4 to the south. An overall summary for each injector pattern is presented in Appendix A.

Plots of the production and injection data along with the VRR information is presented in Appendix D for each of the injection patterns.

List of Appendices

Appendix A: Sinclair Unit No. 8 Injection Pattern Summary

Appendix B: Sinclair Unit No. 8 Reservoir Pressure Summary

Appendix C: Sinclair Unit No. 8 Monthly Injection Pressures

Appendix D: Production/Injection Rates, Cumulative and VRR Plots for the following injectors:

102/07-28-007-29W1

103/07-28-007-29W1

102/12-28-007-29W1

102/12-32-007-29W1

102/04-33-007-29W1

102/05-33-007-29W1

103/05-33-007-29W1

102/16-33-007-29W1

102/13-33-007-29W1 (Inter-Unit Injector)

Appendix A

Sinclair Unit No. 8 Injection Pattern Summary as of December 2016

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APPENDIX B

Sinclair Unit No. 8 - Pressure Summary

Location	Test Date	Final Pressure (kPaa)	MPP (mTVD)	KB	Datum Depth	Gradient	Pressure @ -450 masl
102/07-28-007-29W1/00	Jun 12 - Aug 21, 2012	3119.6	1003.52	518.46	-450	8.25	2830
103/07-28-007-29W1/00	Jun 20 - Aug 5, 2012	2726.5	1005.65	521.9	-450	8.25	2448
102/12-28-007-29W1/0	Oct 25, 2012 - Jan 14, 2013	2557.0	1010.1	524.91	-450	8.25	2267
102/12-32-007-29W1/00	Aug 26 - Sep 17, 2012	3395.6	1007.52	526.14	-450	8.25	3137
102/04-33-007-29W1/00	Oct 17 - 26, 2012	2948.8	1010.91	524.55	-450	8.25	2649
102/05-33-007-29W1/00	Oct 10 - Nov 5, 2012	3119.1	1005.61	524.01	-450	8.25	2858
103/05-33-007-29W1/00	Jun 28 - Aug 7, 2012	2554.4	1003.37	525.29	-450	8.25	2323
102/13-33-007-29W1/00	Jul 20 - 24, 2013	2457.4	989.07	525.65	-450	8.25	2347
102/16-33-007-29W1/00	Sep 12 - 28, 2012	2234.5	996.56	526.11	-450	8.25	2066

Appendix C

Average Monthly Injection Pressure (kPag)									
Month	102/07-28	103/07-28	102/12-28	102/12-32	102/04-33	102/05-33	103/05-33	102/13-33	102/16-33
Jan-14	0	50	0	0	0	0	0	0	0
Feb-14	0	-62	0	0	0	0	0	0	0
Mar-14	0	-80	0	0	-17	0	-69	0	0
Apr-14	0	-82	0	0	-86	-3	-79	-72	0
May-14	0	-81	0	0	-87	-75	-84	-82	0
Jun-14	0	-81	0	0	-87	8	-83	-79	0
Jul-14	0	-79	0	0	-83	43	-82	-78	0
Aug-14	0	-81	0	0	-85	563	-83	-70	0
Sep-14	0	530	0	0	-84	720	-81	-74	0
Oct-14	0	1643	0	0	-84	1464	-79	-72	0
Nov-14	0	2720	0	0	-84	1869	-80	-74	0
Dec-14	0	3292	0	0	-25	2010	44	-73	0
Jan-15	0	3895	0	0	332	1661	397	35	0
Feb-15	0	4152	0	0	701	2416	674	281	0
Mar-15	0	4590	0	0	910	2771	889	310	0
Apr-15	0	4988	0	11	1300	3261	1321	382	-30
May-15	0	4996	0	-76	1507	3676	1636	540	-77
Jun-15	0	5057	-38	-79	1809	4081	1976	1722	-80
Jul-15	0	5800	-79	-82	2098	4654	2305	2703	-83
Aug-15	0	6223	-77	-81	2524	5071	2774	2872	-81
Sep-15	0	5802	-81	-80	2422	4833	2487	1610	-83
Oct-15	0	6283	-86	-80	3113	5573	3319	82	-80
Nov-15	0	6290	-85	-79	3640	5982	3794	2260	-79
Dec-15	0	6296	-84	-79	3799	6204	4060	2925	-79
Jan-16	2109	6303	444	-78	4171	6294	4445	2977	-79
Feb-16	-58	6276	1410	-70	4680	6287	4740	3361	-78
Mar-16	-62	6300	1078	337	4990	6174	4929	3705	276
Apr-16	-77	6243	1519	356	5324	6247	5381	4530	275
May-16	-90	6267	2908	1185	5619	6270	5654	4939	1061
Jun-16	-89	6270	2991	1903	5908	6270	5976	4978	1787
Jul-16	-88	6266	3264	2393	6075	6271	6217	5092	2262
Aug-16	-86	6263	4401	2834	6191	6256	6251	5577	2699
Sep-16	-87	6254	4915	3357	6247	6254	6249	5987	3250
Oct-16	9	6276	4973	3775	6253	6262	6265	6214	3663
Nov-16	649	6227	4975	4219	6244	6269	6271	6273	4094
Dec-16	1880	6268	5474	4496	6178	6264	6270	6274	4311

Appendix D

Rates and VRR Plots

Pattern: 02/07-28-007-29Inj Set: SinclairUnit#8

Oil Formation Vol Factor : 1.07100 m3/m3

Water Formation Vol Factor : 1.00150 m3/m3

Water / Oil Ratio : 0.43 m3/m3

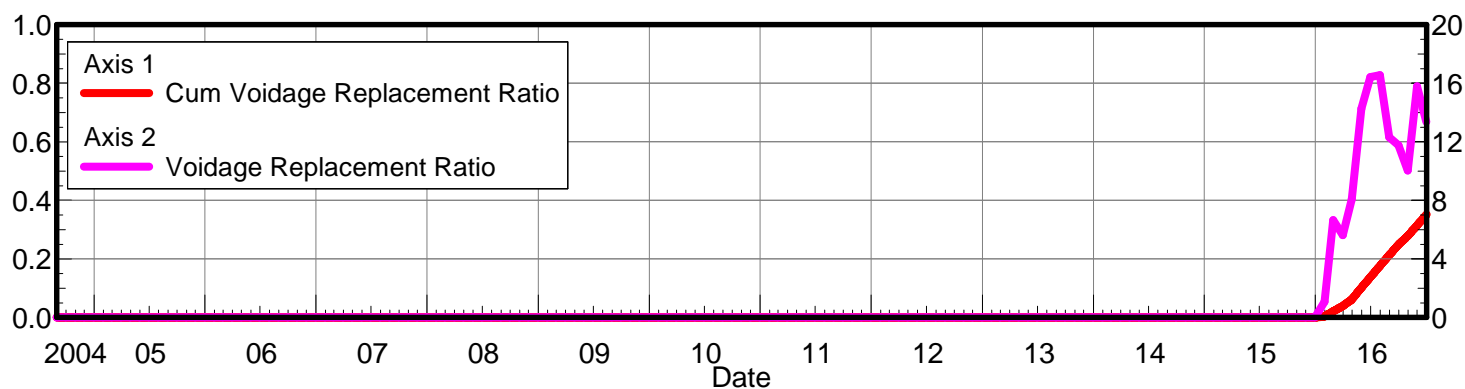
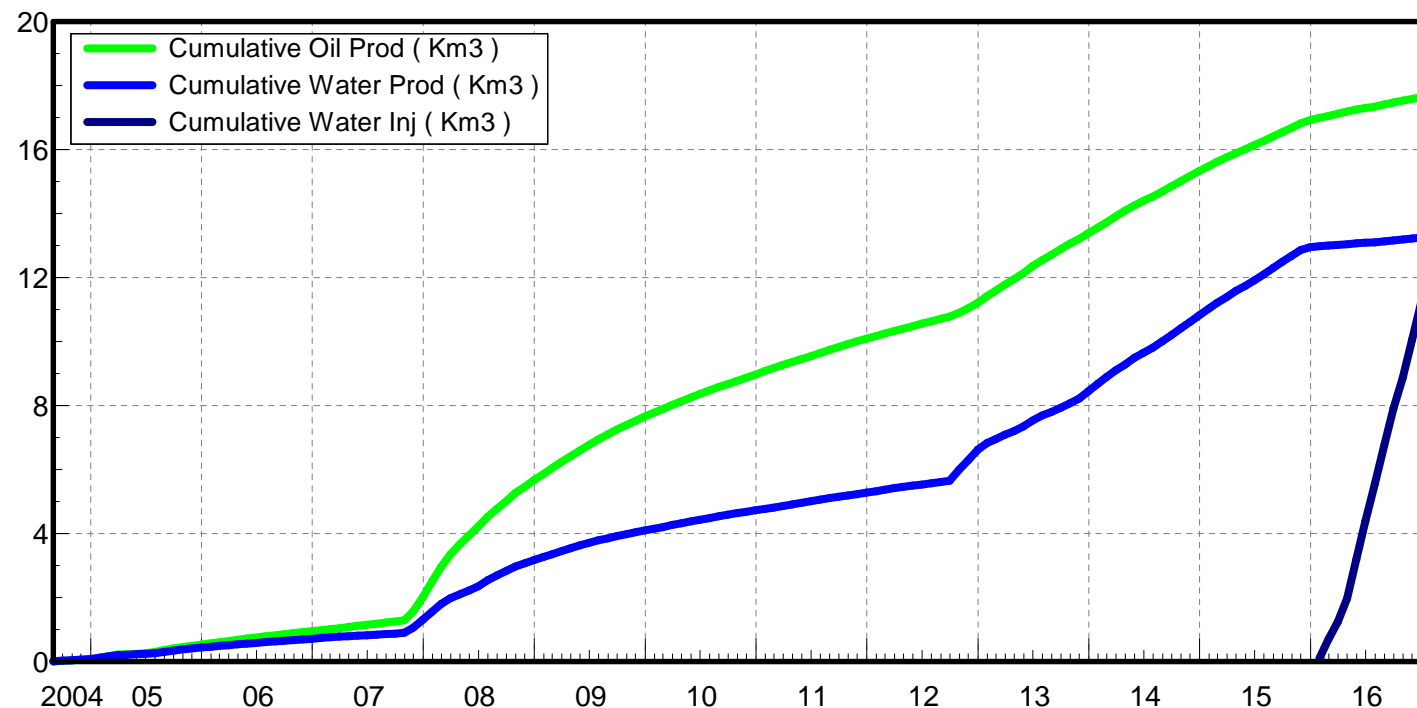
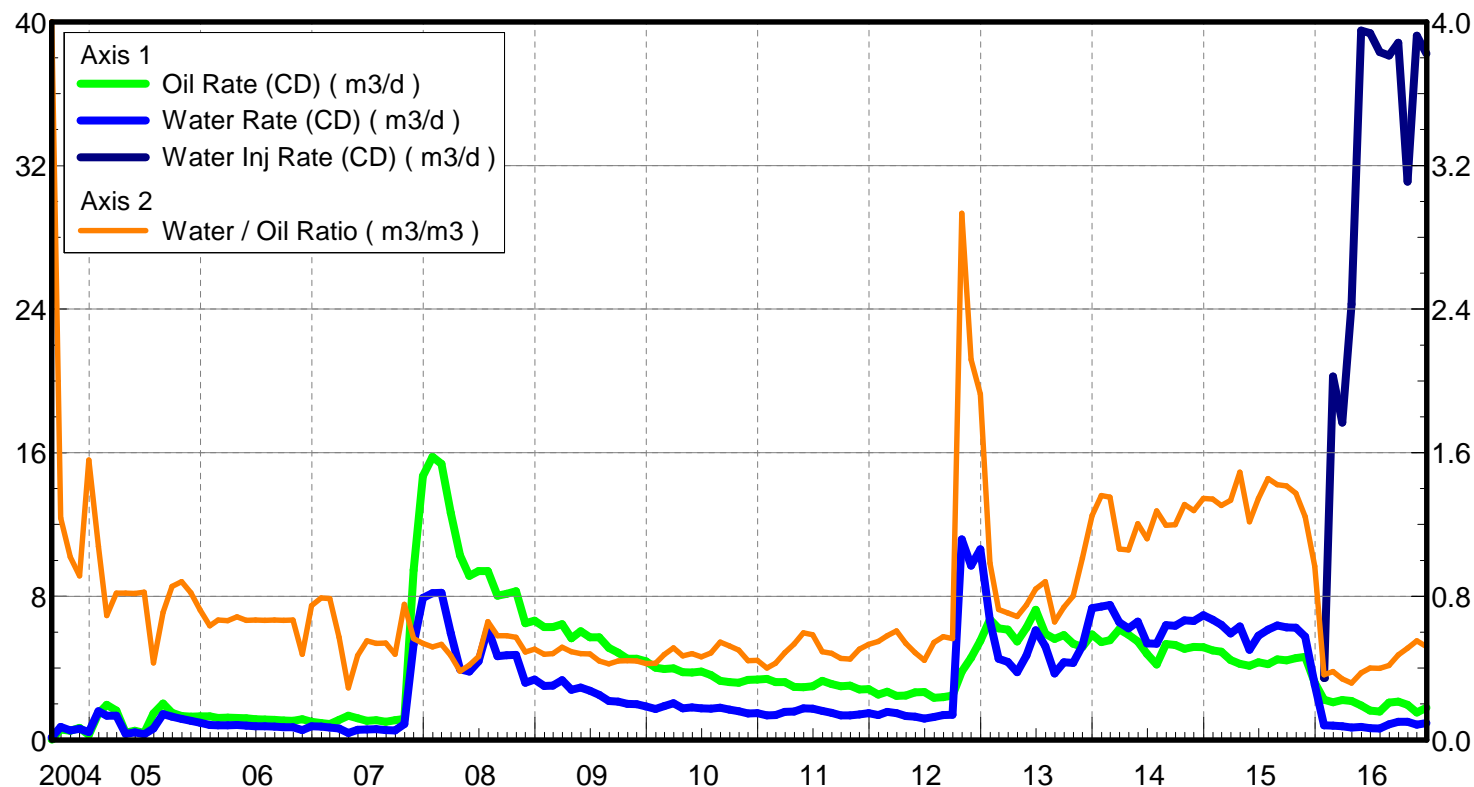
June 28, 2017

Operator: TUNDRA_OIL_&_GAS_LIMITED

Oil Rate (CD) : 2.12 m3/d

Water Rate (CD) : 1.59 m3/d

Water Inj Rate (CD) : 28.68 m3/d



Pattern: 03/07-28-007-29Inj Set: SinclairUnit#8

Oil Formation Vol Factor : 1.07100 m3/m3

Water Formation Vol Factor : 1.00150 m3/m3

Water / Oil Ratio : 0.37 m3/m3

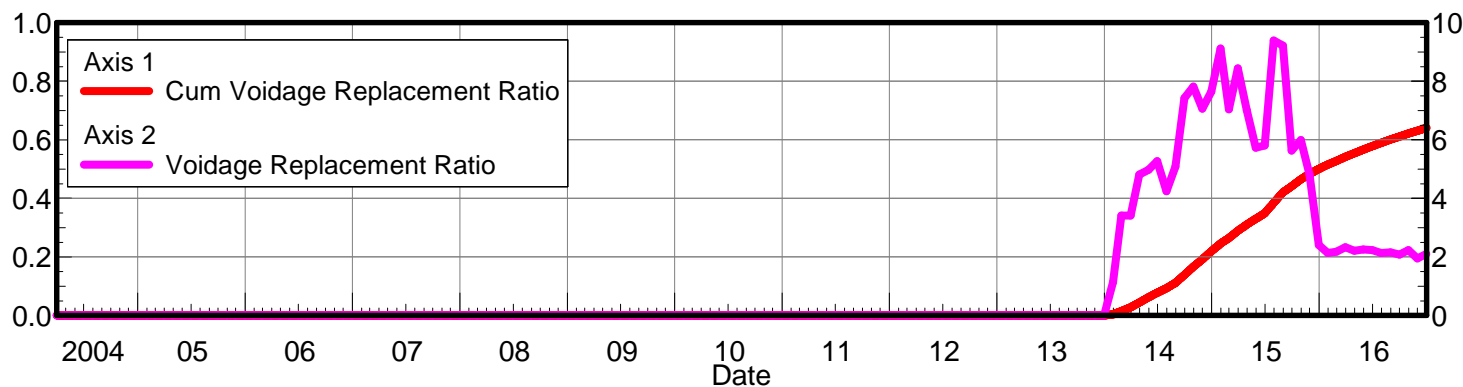
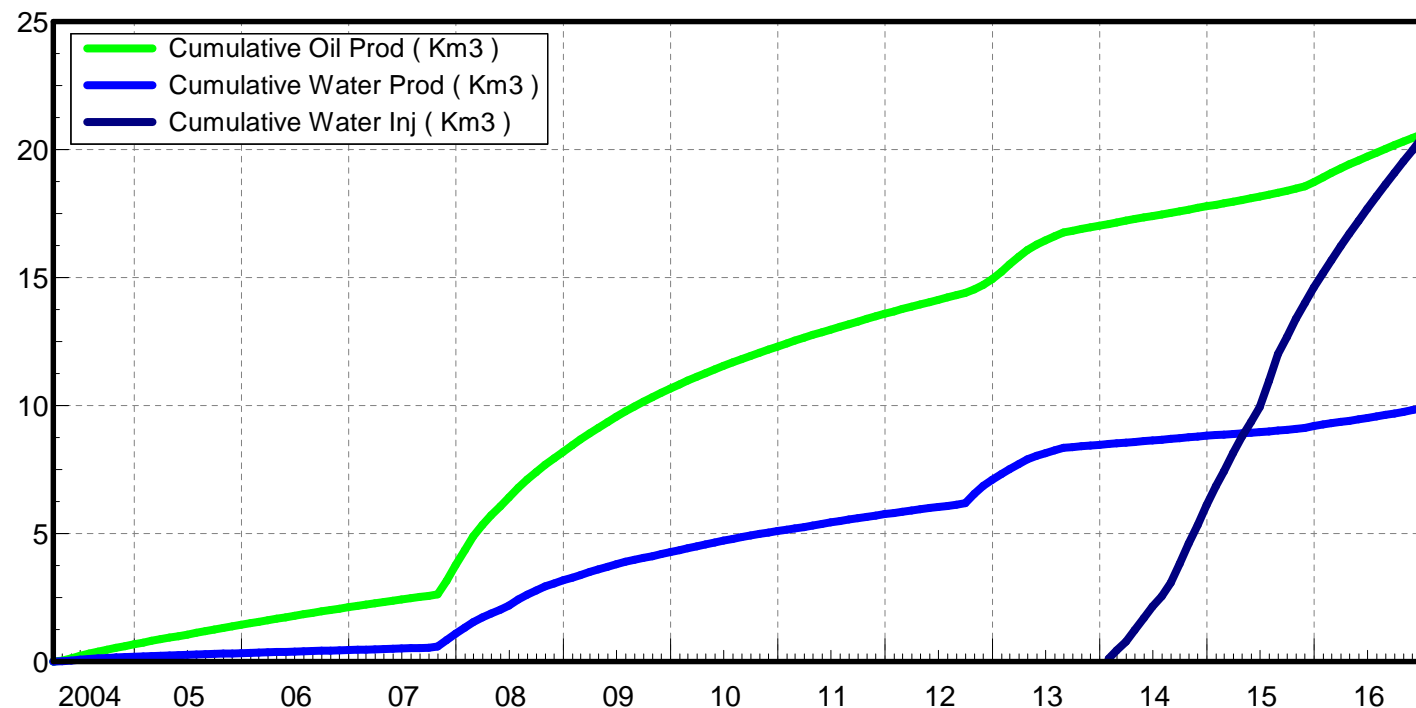
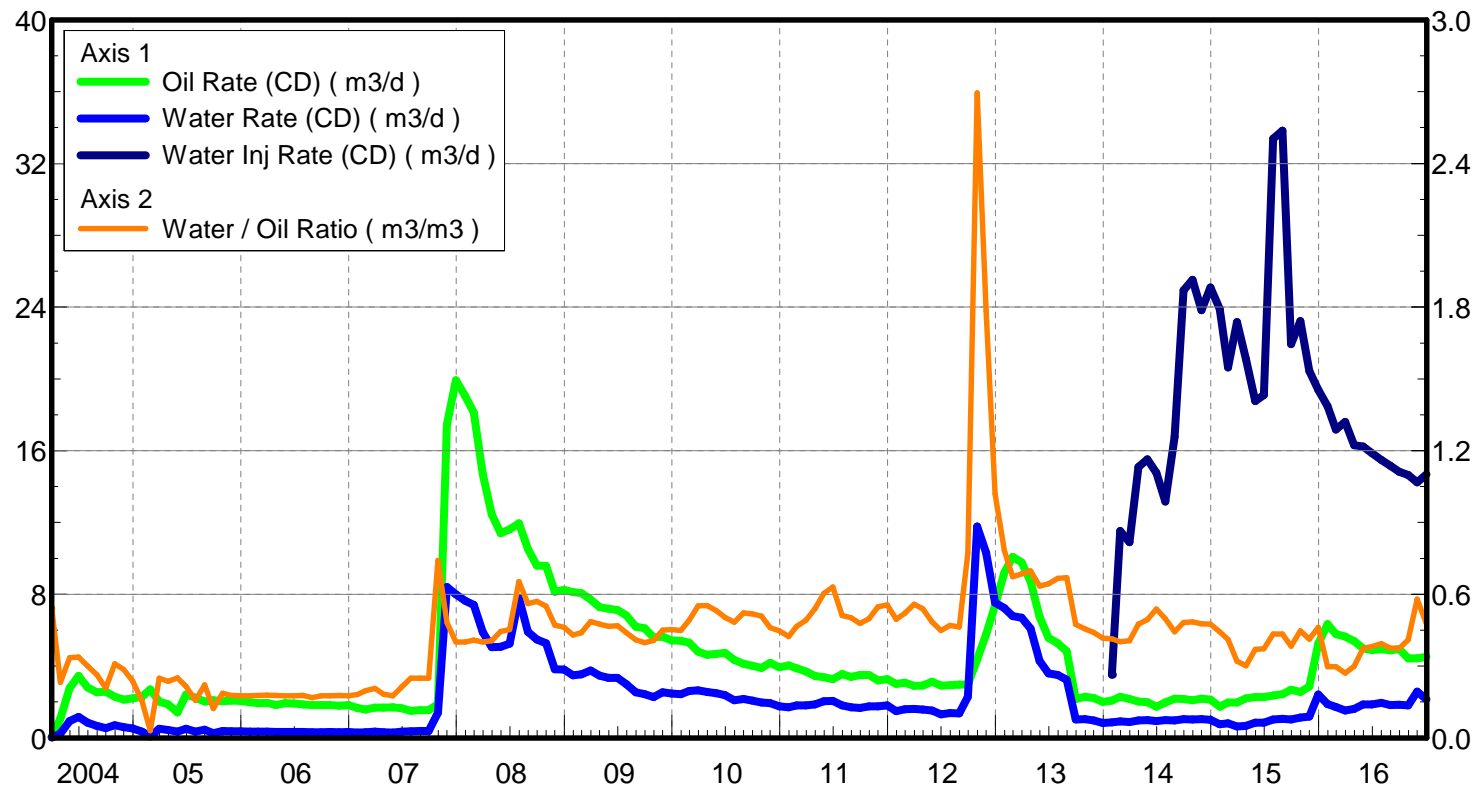
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Operator: TUNDRA_OIL_&_GAS_LIMITED

Oil Rate (CD) : 5.79 m3/d

Water Rate (CD) : 2.06 m3/d

Water Inj Rate (CD) : 13.61 m3/d



Pattern: 02/12-28-007-29Inj Set: SinclairUnit#8

Oil Formation Vol Factor : 1.07100 m3/m3

Water Formation Vol Factor : 1.00150 m3/m3

Water / Oil Ratio : 0.92 m3/m3

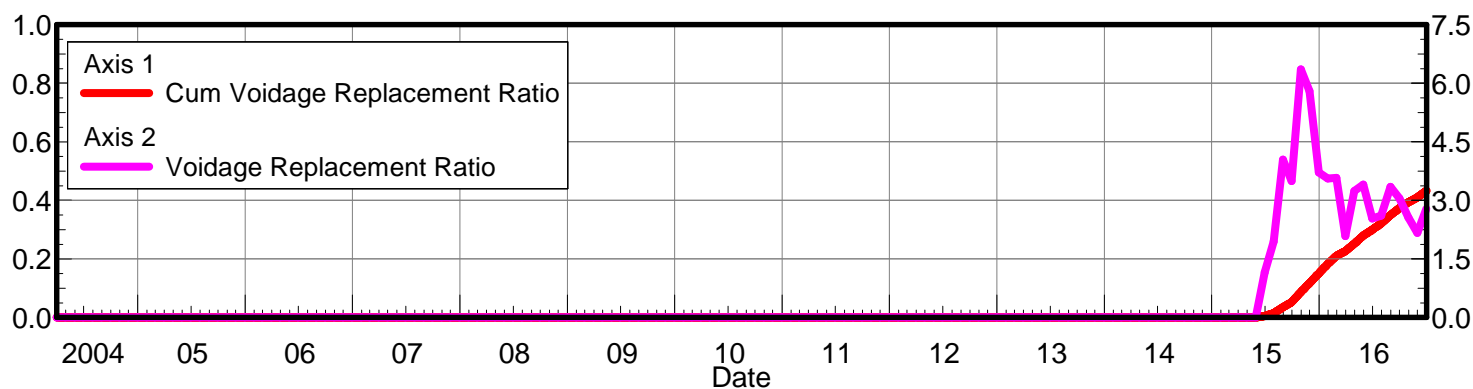
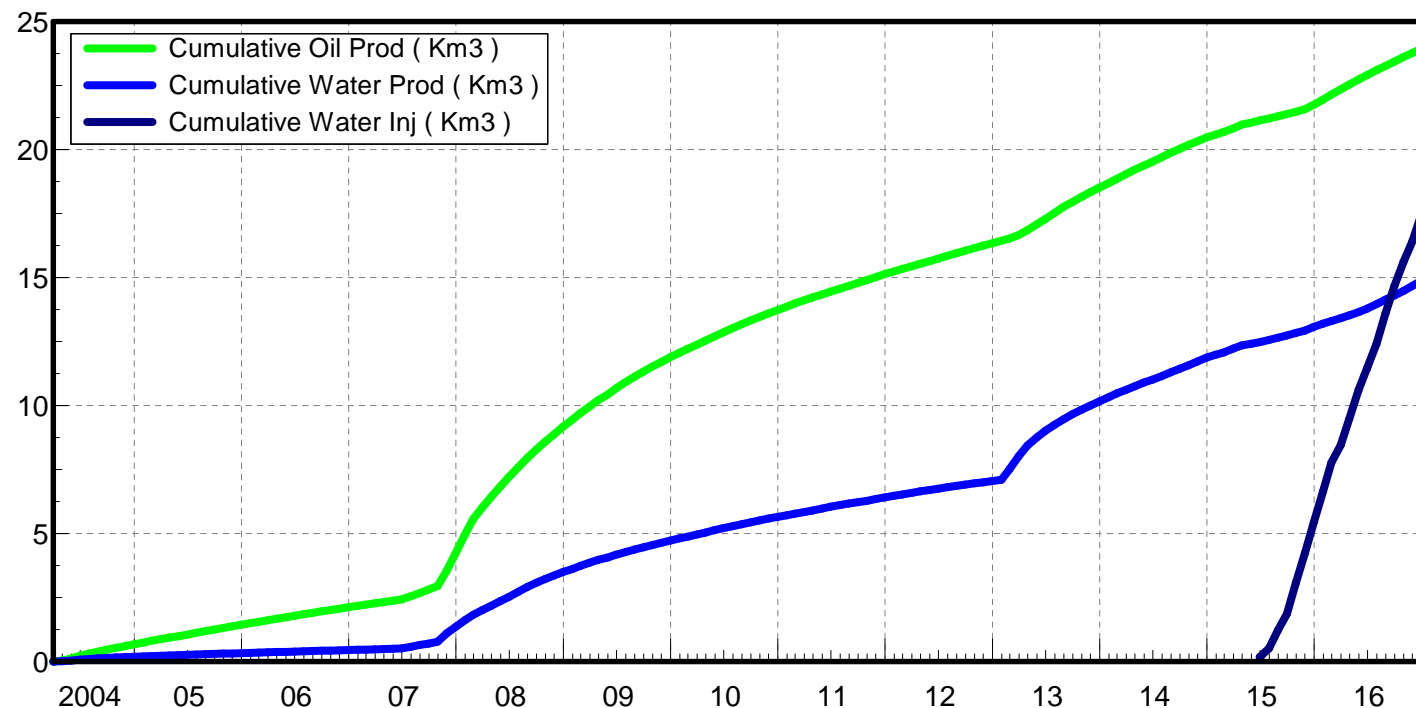
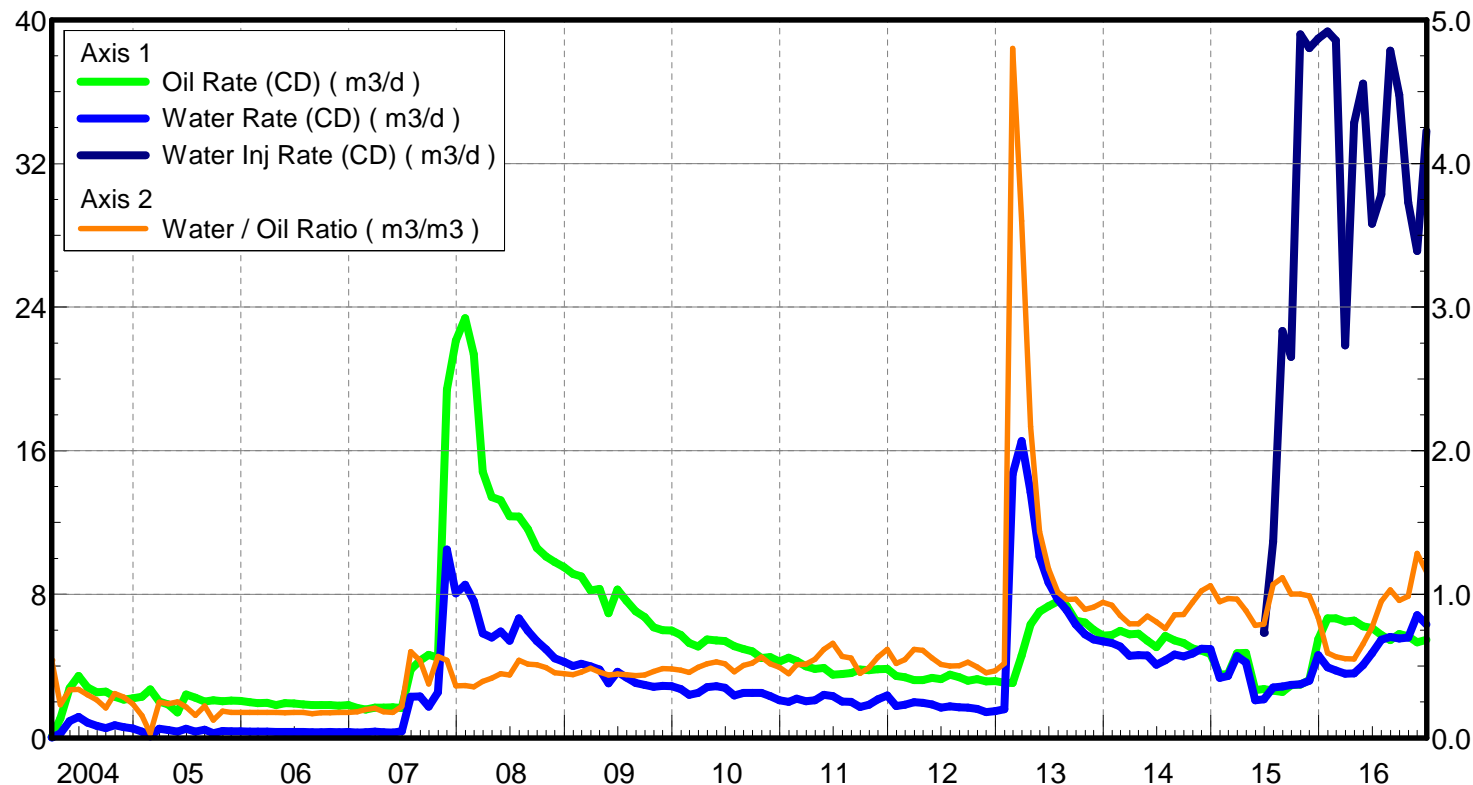
June 28, 2017

Operator: TUNDRA_OIL_&_GAS_LIMITED

Oil Rate (CD) : 6.49 m3/d

Water Rate (CD) : 5.52 m3/d

Water Inj Rate (CD) : 28.97 m3/d



Pattern: 02/12-32-007-29Inj Set: SinclairUnit#8

Oil Formation Vol Factor : 1.07100 m3/m3

Water Formation Vol Factor : 1.00150 m3/m3

Water / Oil Ratio : 1.85 m3/m3

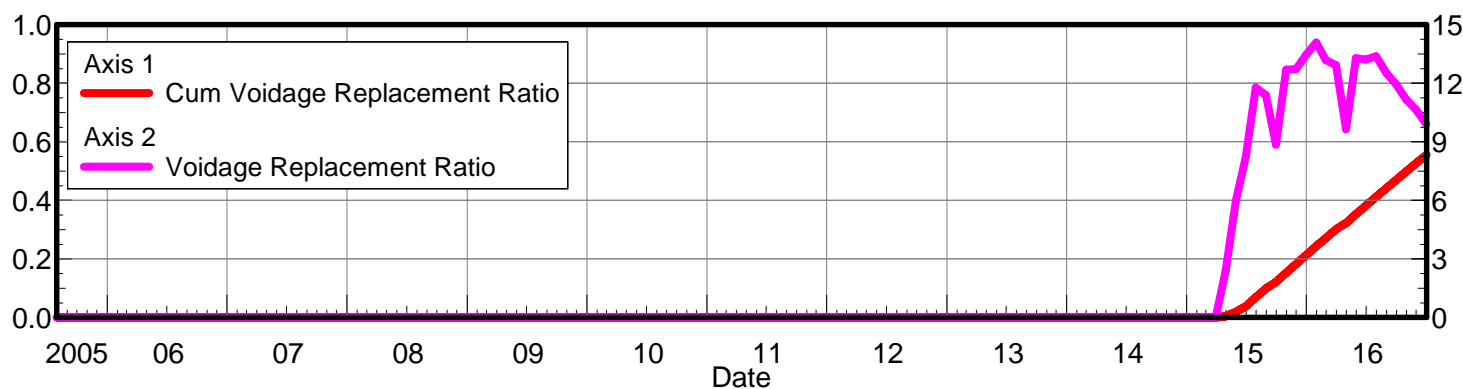
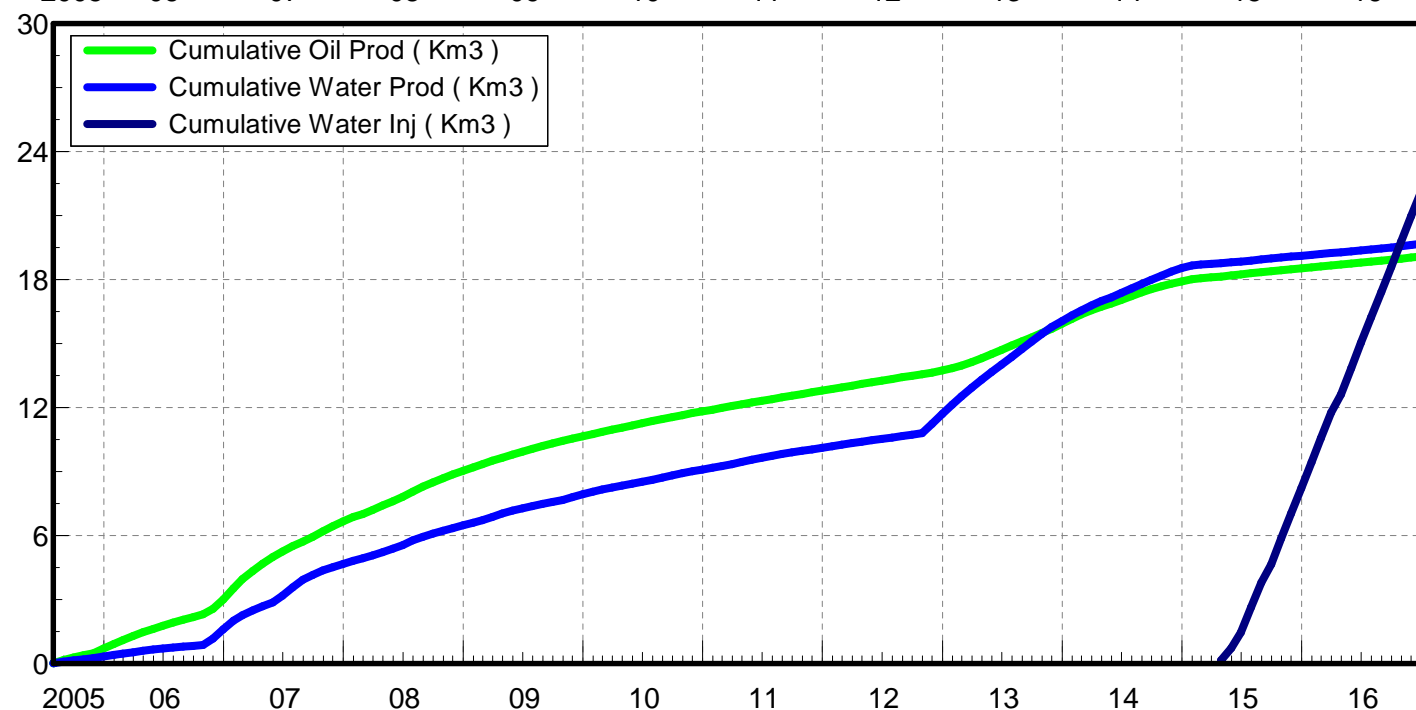
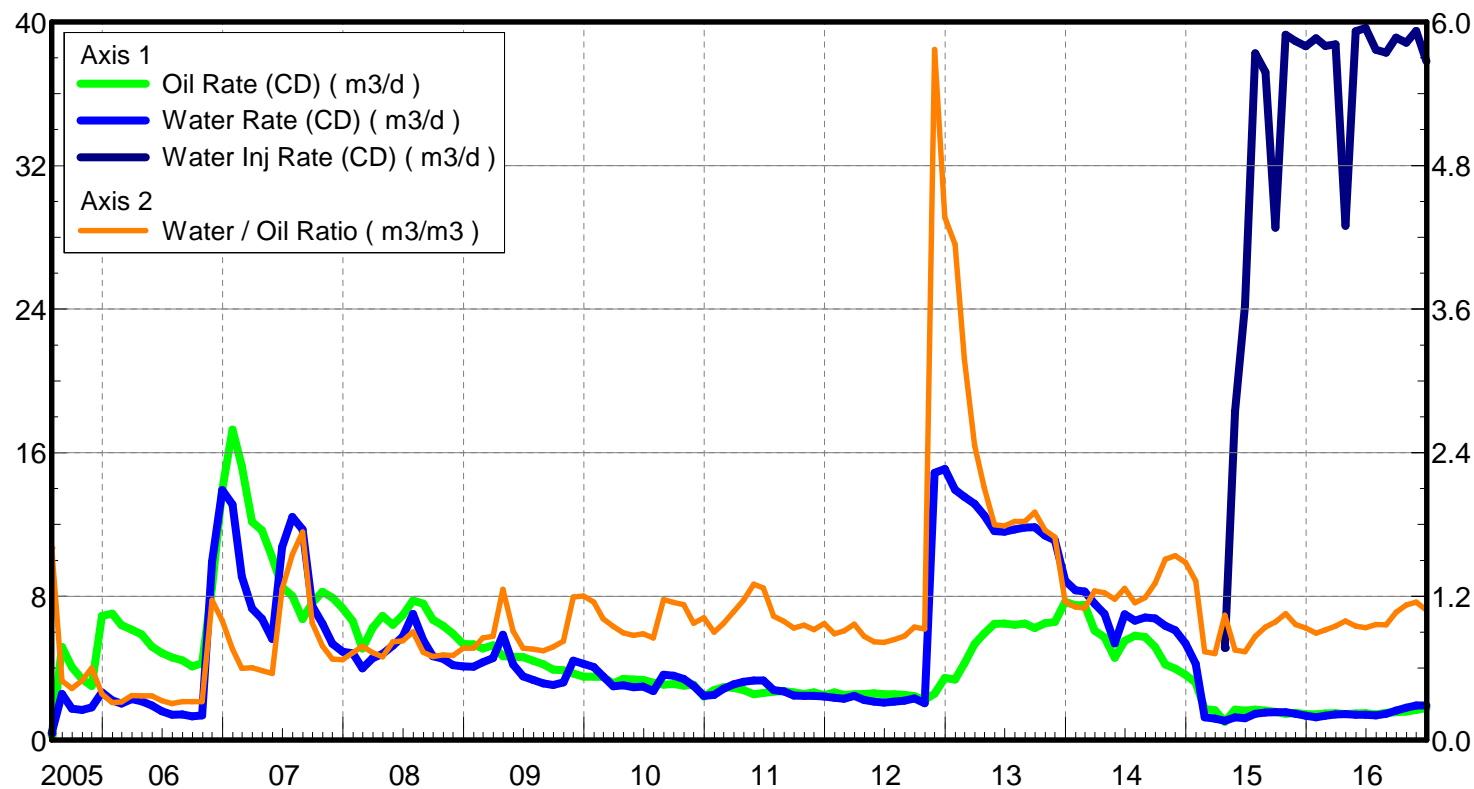
June 28, 2017

Operator: TUNDRA_OIL_&_GAS_LIMITED

Oil Rate (CD) : 2.12 m3/d

Water Rate (CD) : 2.31 m3/d

Water Inj Rate (CD) : 31.45 m3/d



Pattern: 02/04-33-007-29Inj Set: SinclairUnit#8

Oil Formation Vol Factor : 1.07100 m3/m3

Water Formation Vol Factor : 1.00150 m3/m3

Water / Oil Ratio : 2.06 m3/m3

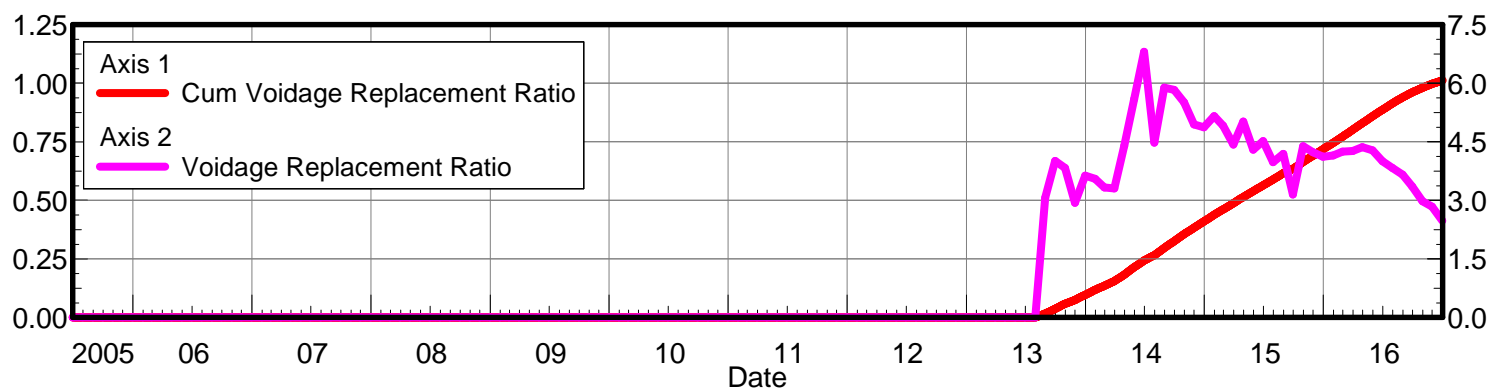
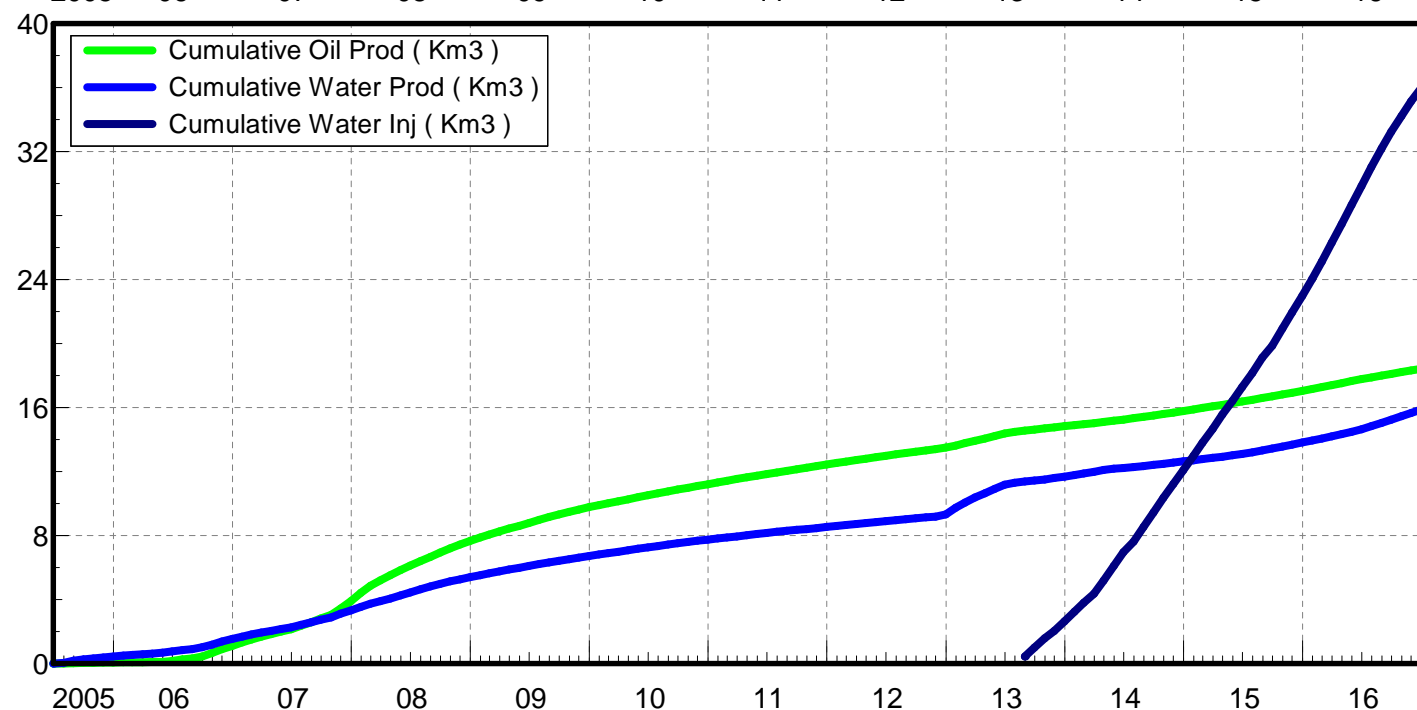
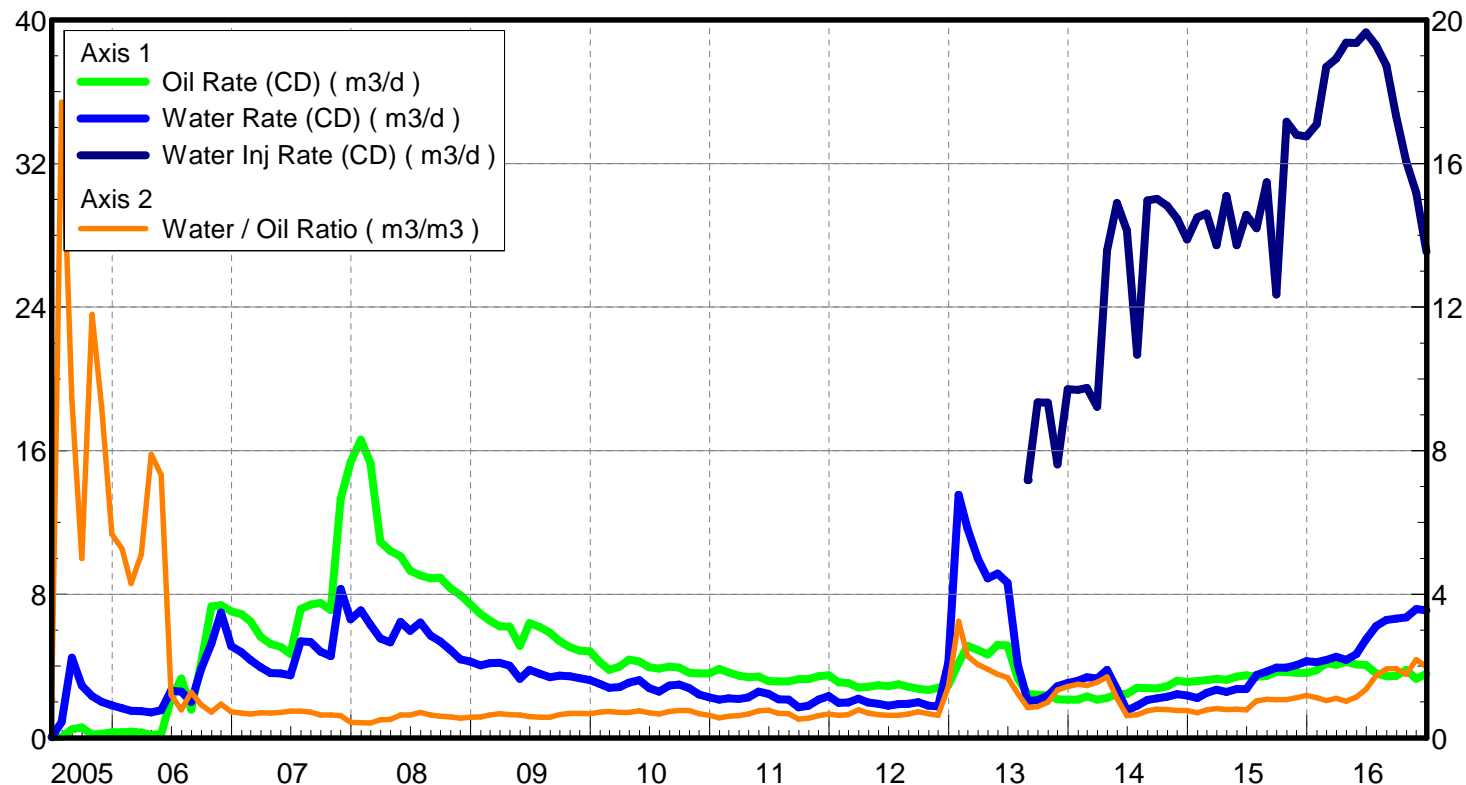
June 28, 2017

Operator: TUNDRA_OIL_&_GAS_LIMITED

Oil Rate (CD) : 3.80 m3/d

Water Rate (CD) : 6.43 m3/d

Water Inj Rate (CD) : 28.87 m3/d



Pattern: 02/05-33-007-29Inj Set: SinclairUnit#8

Oil Formation Vol Factor : 1.07100 m3/m3

Water Formation Vol Factor : 1.00150 m3/m3

Water / Oil Ratio : 3.82 m3/m3

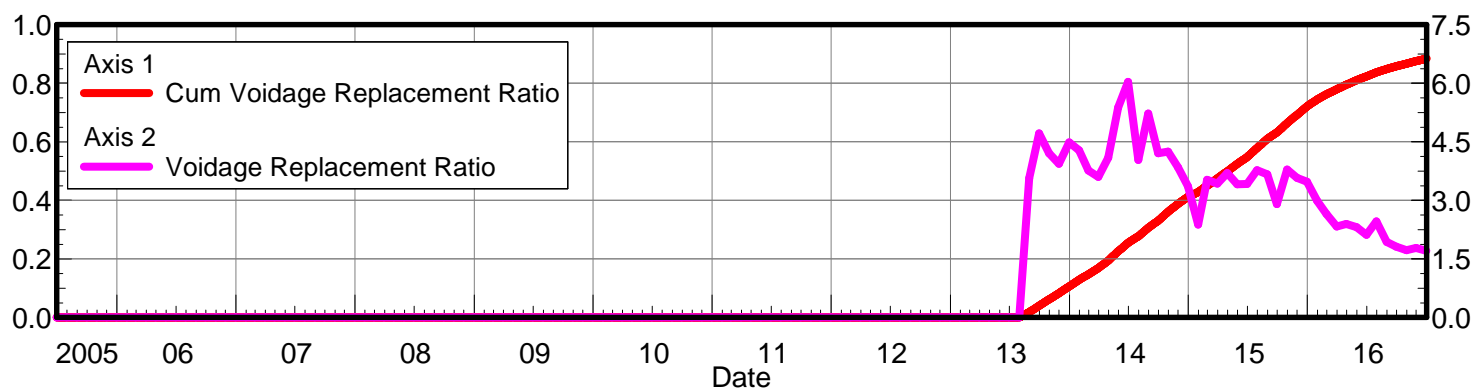
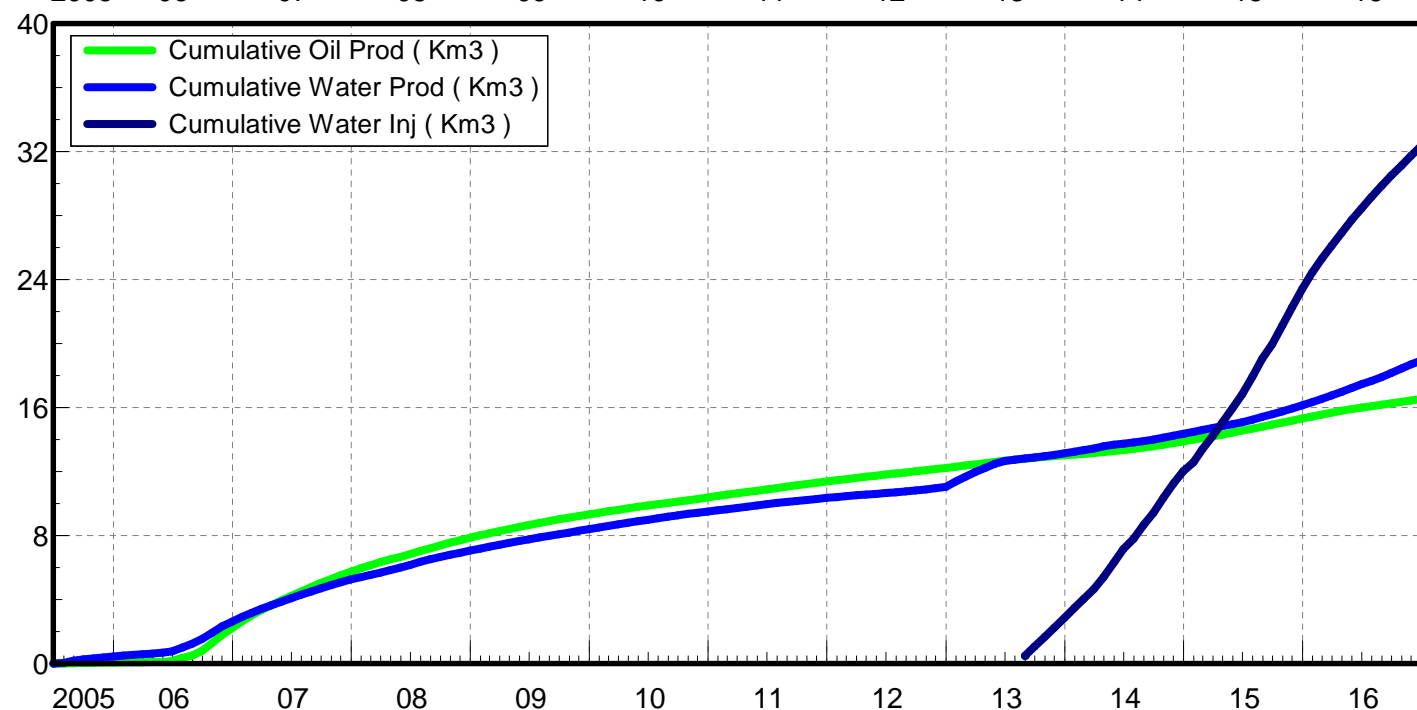
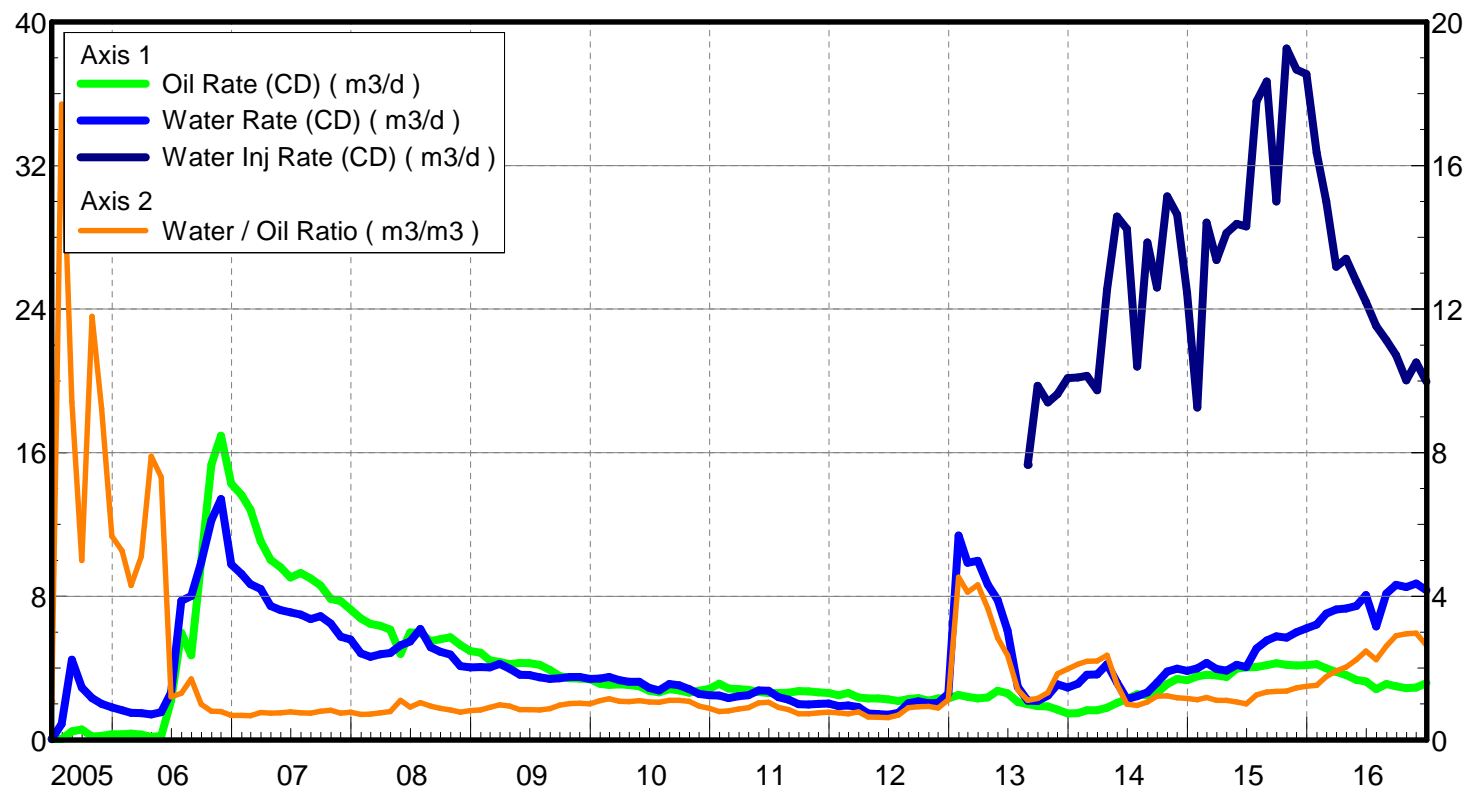
June 28, 2017

Operator: TUNDRA_OIL_&_GAS_LIMITED

Oil Rate (CD) : 2.91 m3/d

Water Rate (CD) : 8.07 m3/d

Water Inj Rate (CD) : 20.61 m3/d



Pattern: 03/05-33-007-29Inj Set: SinclairUnit#8

Oil Formation Vol Factor : 1.07100 m3/m3

Water Formation Vol Factor : 1.00150 m3/m3

Water / Oil Ratio : 1.83 m3/m3

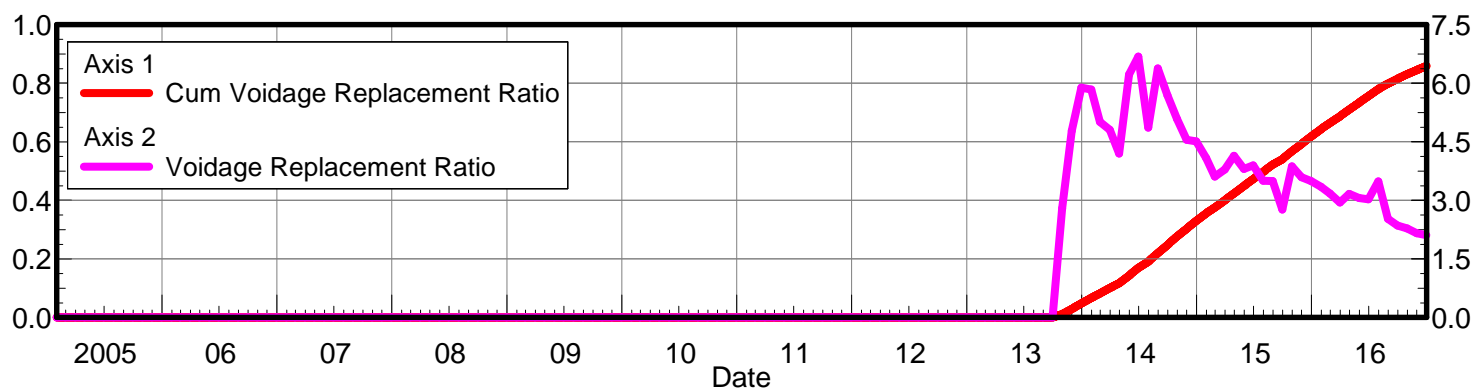
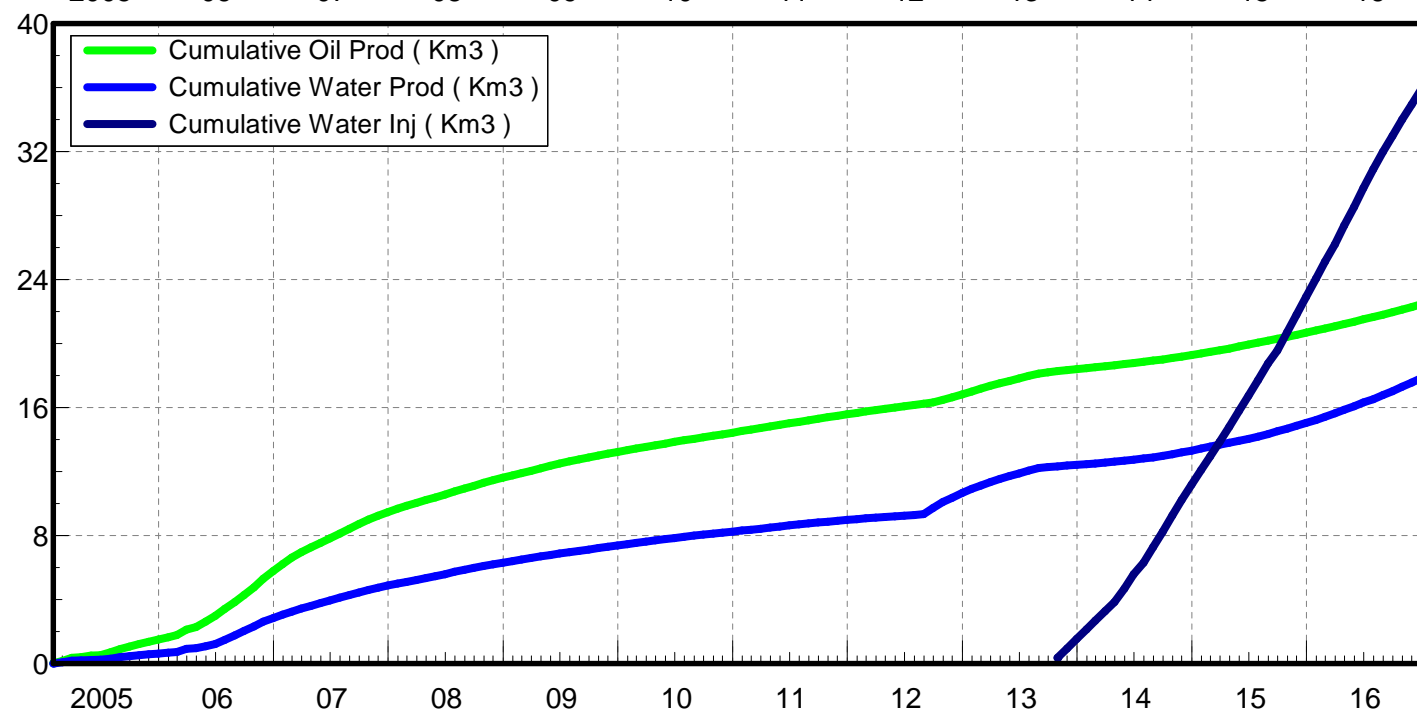
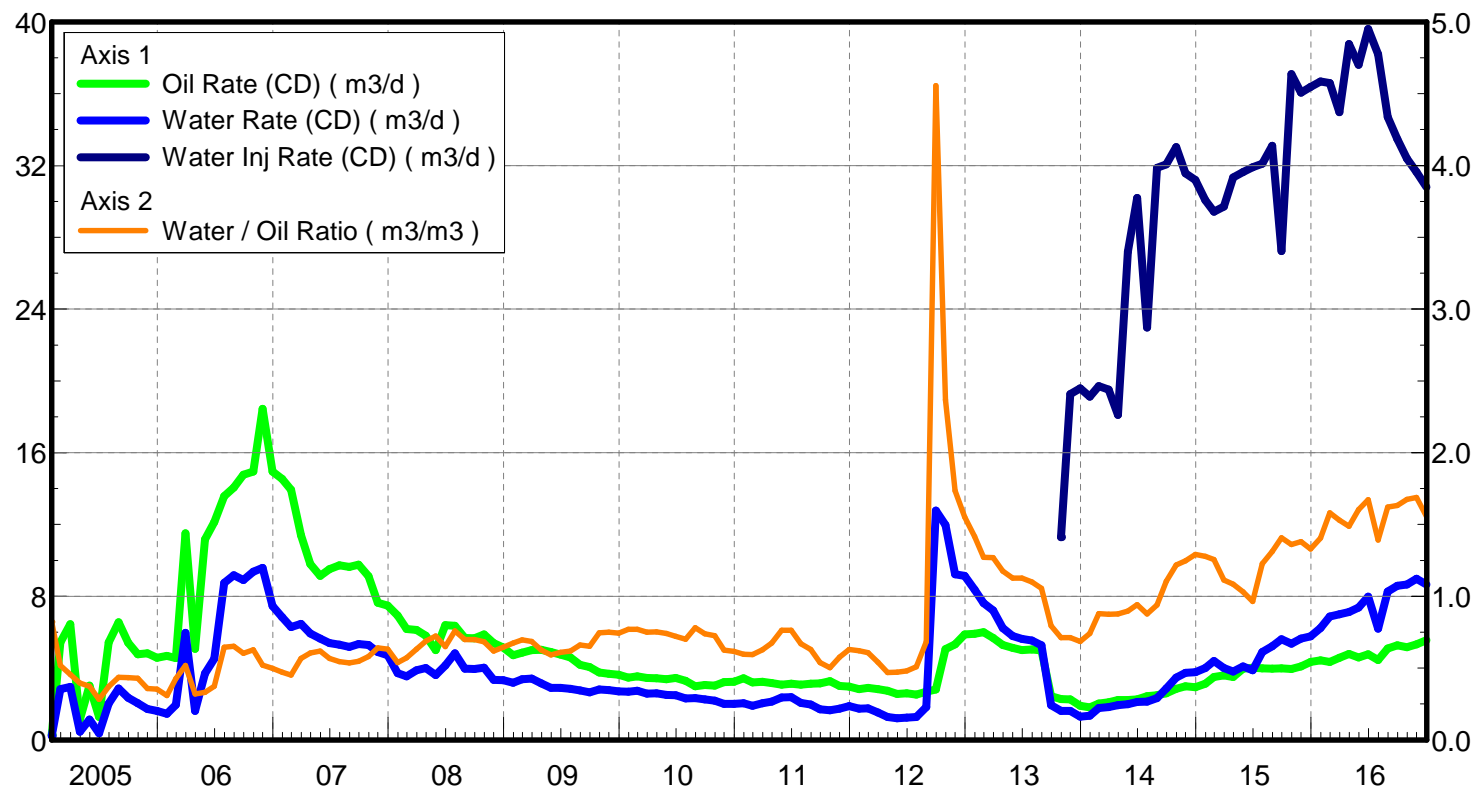
June 28, 2017

Operator: TUNDRA_OIL_&_GAS_LIMITED

Oil Rate (CD) : 5.23 m3/d

Water Rate (CD) : 8.47 m3/d

Water Inj Rate (CD) : 28.65 m3/d



Pattern: 02/16-33-007-29Inj Set: SinclairUnit#8

Oil Formation Vol Factor : 1.07100 m3/m3

Water Formation Vol Factor : 1.00150 m3/m3

Water / Oil Ratio : 0.83 m3/m3

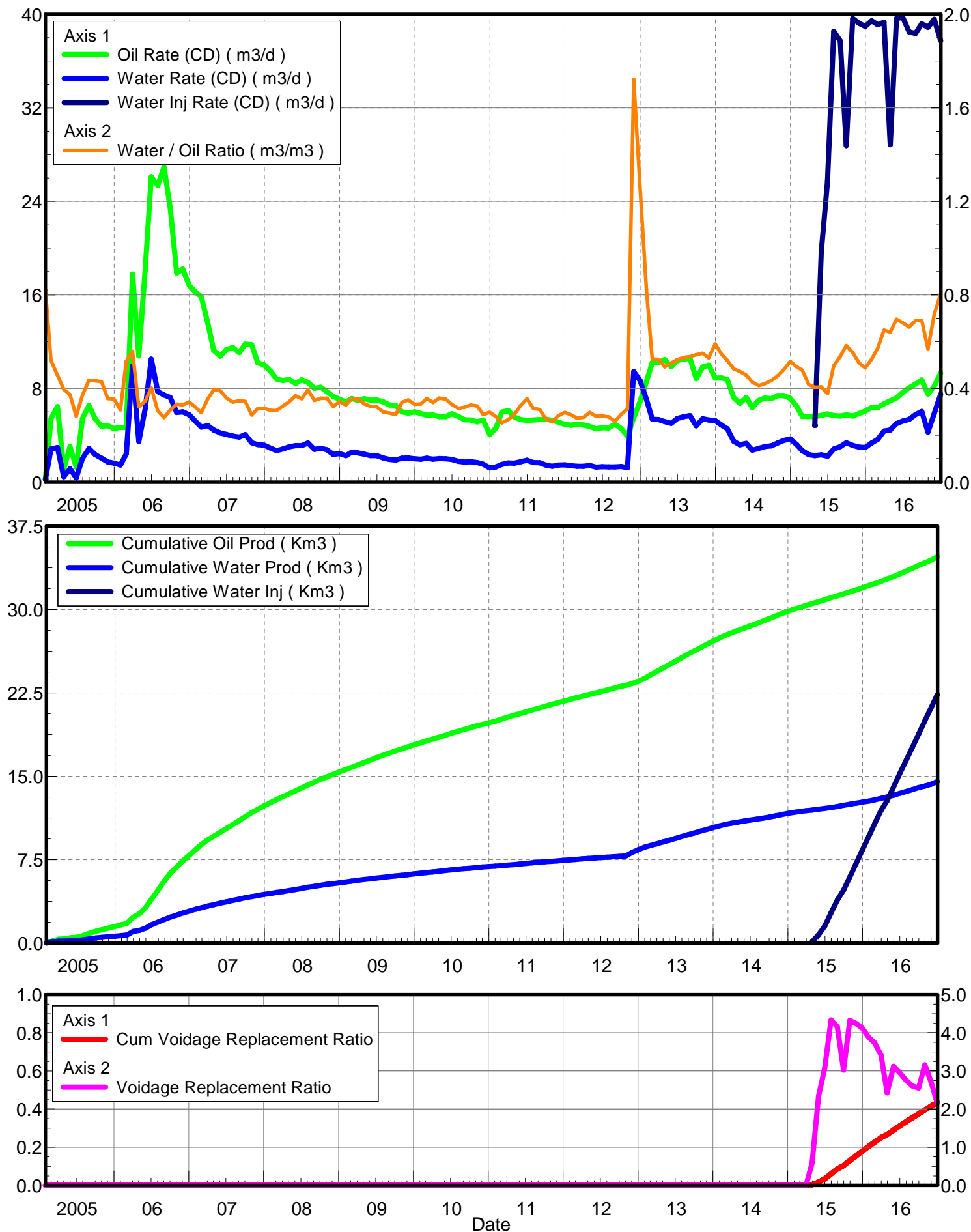
June 28, 2017

Operator: TUNDRA_OIL_&_GAS_LIMITED

Oil Rate (CD) : 9.54 m3/d

Water Rate (CD) : 7.09 m3/d

Water Inj Rate (CD) : 36.45 m3/d



Pattern: 02/13-33-007-29Inj Set: SinclairUnit#8

Oil Formation Vol Factor : 1.07100 m3/m3

Water Formation Vol Factor : 1.00150 m3/m3

Water / Oil Ratio : 0.60 m3/m3

June 28, 2017

Operator: TUNDRA_OIL_&_GAS_LIMITED

Oil Rate (CD) : 3.58 m3/d

Water Rate (CD) : 0.80 m3/d

Water Inj Rate (CD) : 32.71 m3/d

