

SINCLAIR UNIT NO. 8
WATERFLOOD EOR PROJECT
ANNUAL REPORT FOR 2015

April 27, 2016

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

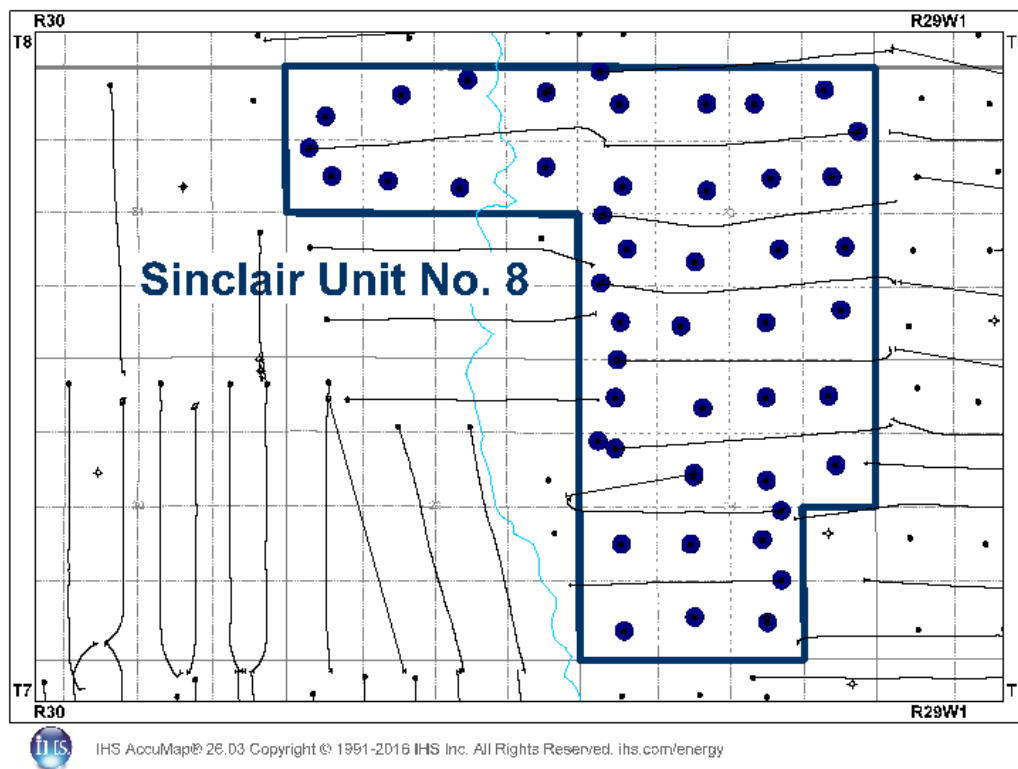
102/16-33-007-29W1

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 2015 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 2015, the Unit was producing 35.40 m³/d of oil and 31.36 m³/d of water and had an average WOR of 0.88 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

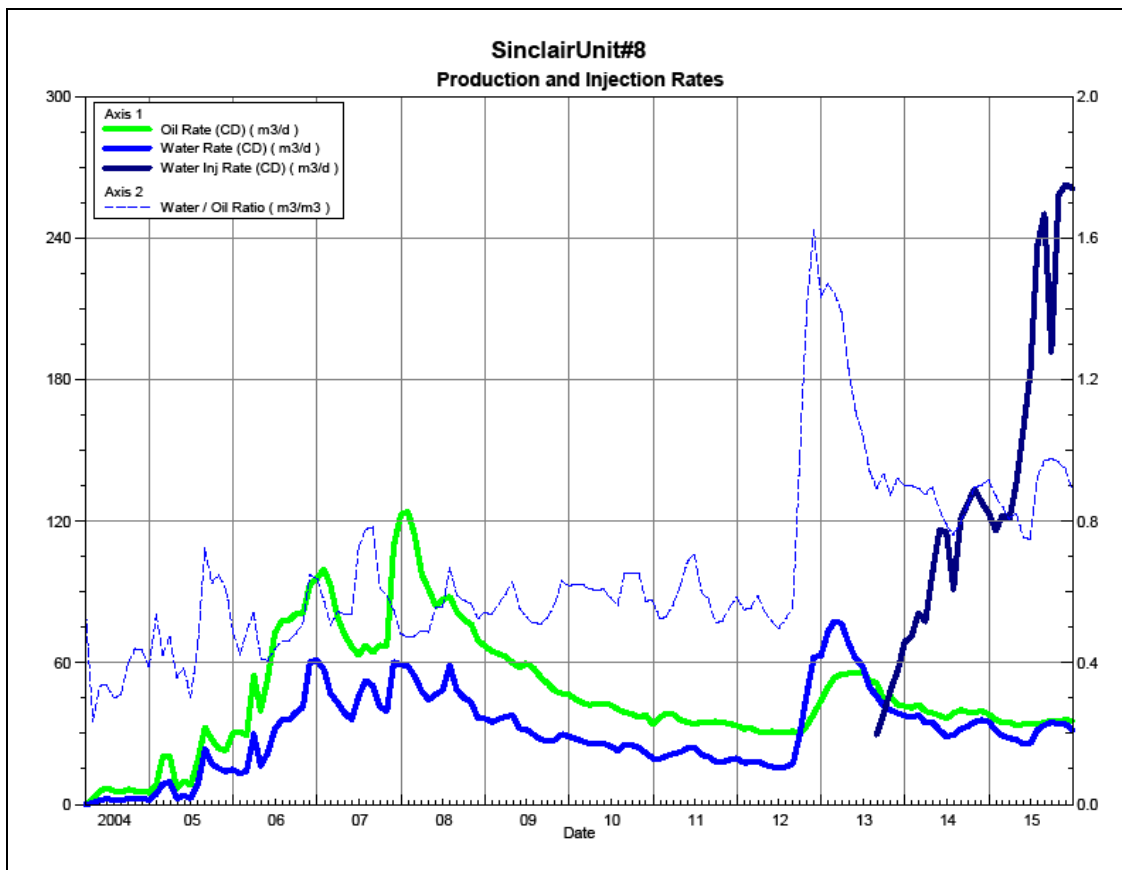
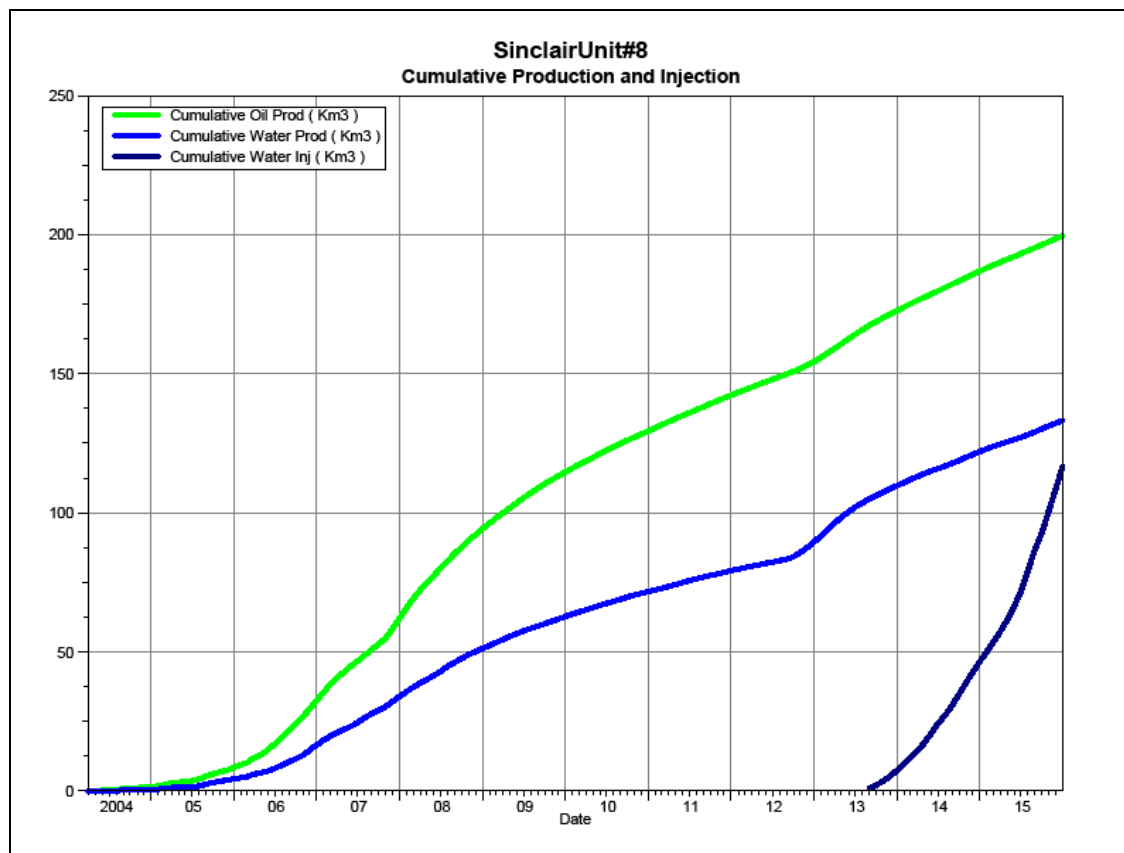


Figure 3 shows the cumulative production for Sinclair Unit No. 8 to the end of December 2015 as 199.7 e³m³ of oil, and 133.2 e³m³ of water, representing a 9.3% recovery factor of the OOIP.

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



Waterflood Development Plan

Sinclair Unit No. 8 Waterflood (WF) Development Plan

Sinclair Unit No. 8 is still in the development phase at the end of 2015. 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. As of December 2015, Sinclair Unit No. 8 had 8 injection patterns in place, including the inter-unit injector. All of the horizontal wells are fracture stimulated to improve the injection rates. Water injection commenced in Sinclair Unit No. 8 in August 2013.

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 2015:

Table 1: Sinclair Unit No. 8 Well Servicing

100/10-33-007-29W1/00	Pump Change	1/14/2015
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Waterflood Performance Discussion

As of the end of 2015, 8 horizontal wells, including the inter-unit injector, were on injection and 1 horizontal well was producing. The injection patterns generally consist of an east-west horizontal injector placed between 8 vertical producers – 4 to the north, 4 to the south. Conversion of the remaining horizontal well to water injection is anticipated to take place in 2016.

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 2015

Pattern Name	Injector BH Location (007-29W1)	Injector Surf. Location (007-29W1)	Status	Supported Wells (007-29W1)	No. of Supported Wells	Allocation Factor	Pattern Prod Start Month	Inj Start Month	Oil Rate (m³/d)	Water Rate (m³/d)	WOR (m³/m³)	Water Injection (m³/d)	Cum Oil (E³m³)	Cum Water (E³m³)	Cum Inj Water (E³m³)	Monthly VRR	Cum VRR
02/07-28-007-29W1 Injector	02/07-28	02/01-29	Capable Of Oil Prod	02-28, 03-28, 04-28, 05-28, 06-28, 07-28	6	0.5	Aug 2004	-	3.2	3.1	0.97	-	16.9	13.0	0.0	0.0	0.00
03/07-28-007-29W1 Injector	03/07-28	03/09-29	Water Injection	05-28, 06-28, 07-28, 09-28, 10-28, 11-28, 12-28	7	0.5	Mar 2004	Jan 2014	3.1	1.0	0.33	19.4	18.7	9.2	14.6	4.5	0.50
02/12-28-007-29W1 Injector	02/12-28	02/13-27	Water Injection	09-28, 10-28, 11-28, 12-28, 13-28, 14-28, 15-28, 16-28	8	0.5	Mar 2004	Jun 2015	3.4	3.2	0.95	39.0	21.7	13.0	5.4	5.8	0.15
02/12-32-007-29W1 Injector	02/12-32	02/13-33	Water Injection	09-32, 10-32, 11-32, 12-32, 13-32, 14-32, 15-32, 16-32	8	0.5	Jul 2005	Apr 2015	1.4	1.3	0.93	38.7	18.5	19.1	8.2	13.4	0.21
02/04-33-007-29W1 Injector	02/04-33	02/04-34	Water Injection	13-28, 14-28, 15-28, 16-28, 01-33, 02-33, 03-33, 04-33	8	0.5	Jun 2005	Aug 2013	3.6	4.3	1.18	33.5	17.0	13.8	23.0	4.1	0.72
02/05-33-007-29W1 Injector	02/05-33	02/05-34	Water Injection	01-33, 02-33, 03-33, 04-33, 05-33, 06-33, 07-33, 08-33	8	0.5	Jun 2005	Aug 2013	4.2	6.2	1.49	37.1	15.3	16.1	23.4	3.5	0.72
03/05-33-007-29W1 Injector	03/05-33	03/12-34	Water Injection	05-33, 06-33, 07-33, 08-33, 09-33, 10-33, 11-33, 12-33	8	0.5	Jan 2005	Oct 2013	4.3	5.8	1.33	36.4	20.7	15.0	22.9	3.5	0.62
02/16-33-007-29W1 Injector	02/16-33	02/12-33	Water Injection	09-33, 10-33, 11-33, 12-33, 13-33, 14-33, 15-33, 16-33	8	0.5	Jan 2005	Apr 2015	6.1	3.0	0.49	39.0	32.0	12.7	8.4	4.1	0.18
02/13-33-007-29W1 Injector (Inter-Unit Injector)	02/13-33	02/04-03-008-29W1	Water Injection	13-33, 14-33, 15-33, 16-33 01-04, 02-04, 03-04, 04-04 (008-29W1)	8	0.5	Jul 2004	Nov 2013	7.0	2.4	0.34	36.2	25.9	7.0	21.3	3.7	0.61

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

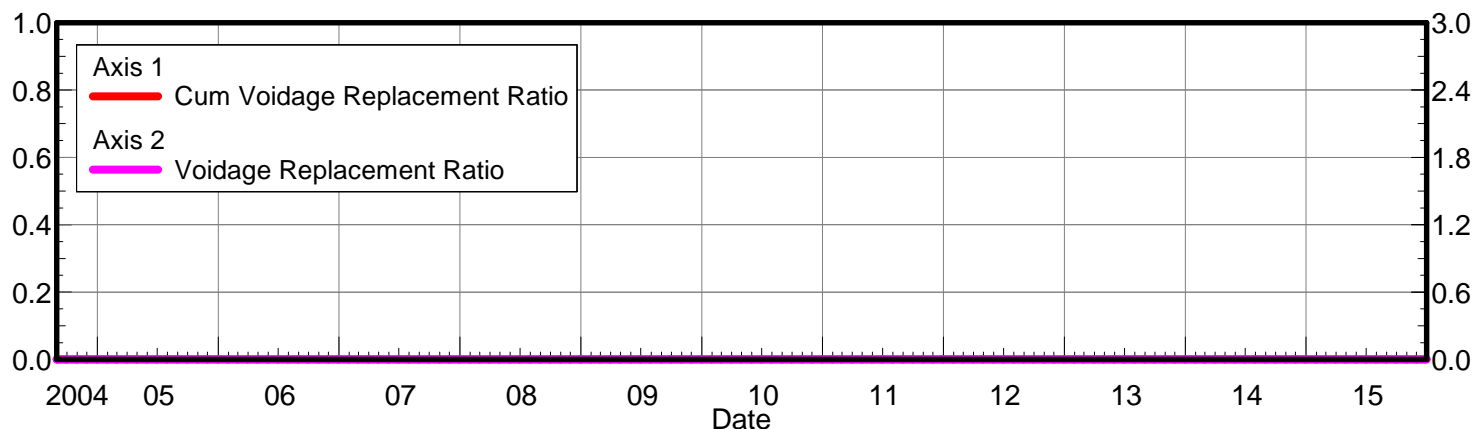
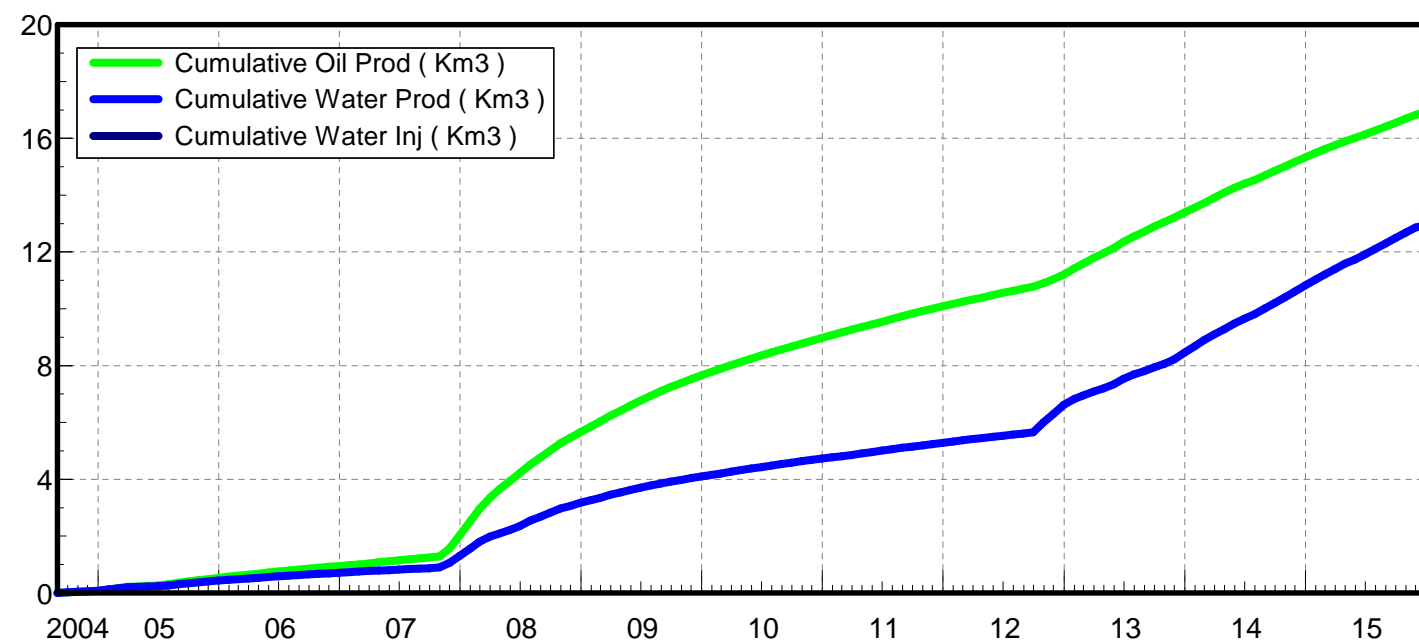
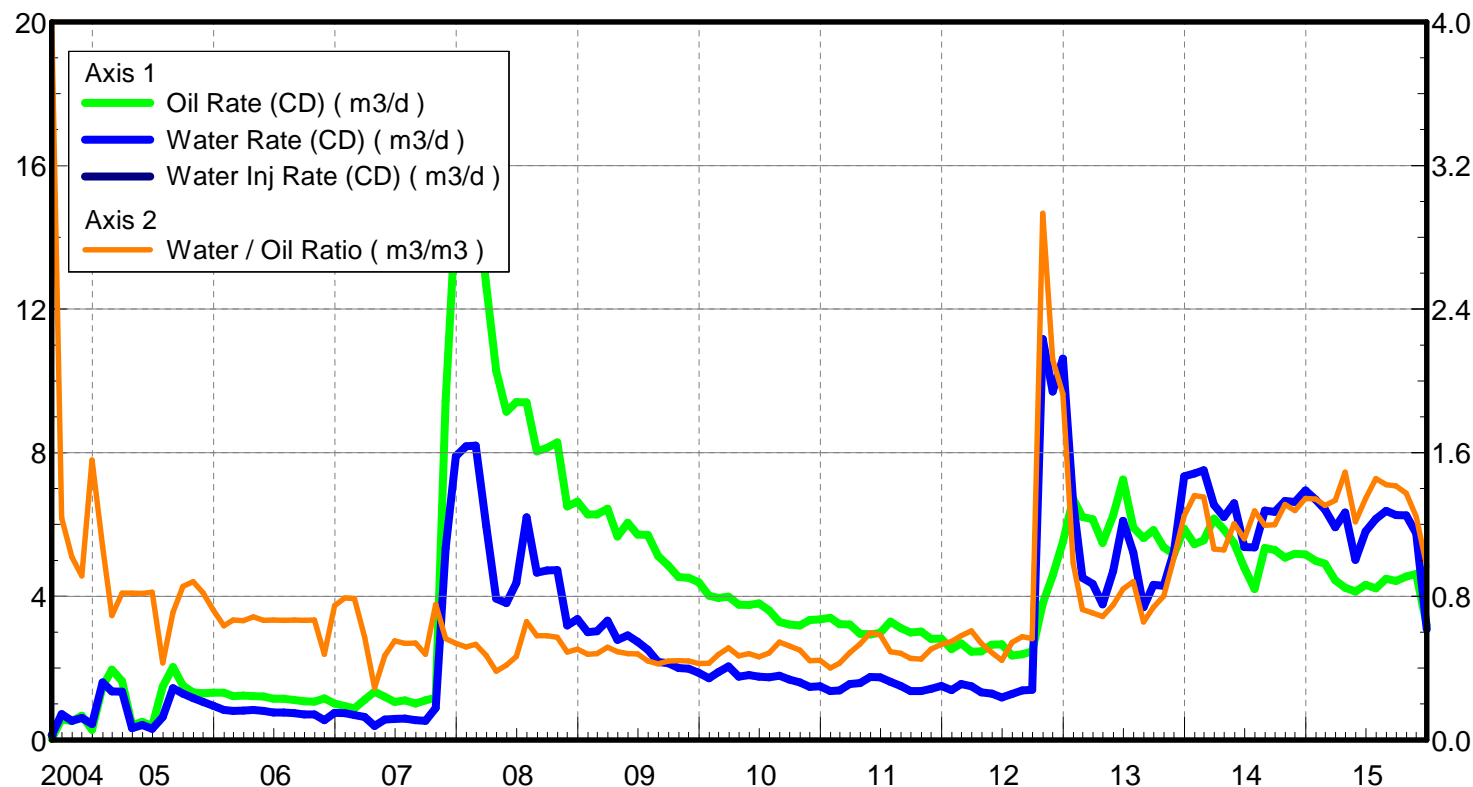
Appendix C

Month	Average Monthly Injection Pressure							
	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	50	0	0	0	0	0	0	0
Feb-14	-62	0	0	0	0	0	0	0
Mar-14	-80	0	0	-17	0	-69	0	0
Apr-14	-82	0	0	-86	-3	-79	-72	0
May-14	-81	0	0	-87	-75	-84	-82	0
Jun-14	-81	0	0	-87	8	-83	-79	0
Jul-14	-79	0	0	-83	43	-82	-78	0
Aug-14	-81	0	0	-85	563	-83	-70	0
Sep-14	530	0	0	-84	720	-81	-74	0
Oct-14	1643	0	0	-84	1464	-79	-72	0
Nov-14	2720	0	0	-84	1869	-80	-74	0
Dec-14	3292	0	0	-25	2010	44	-73	0
Jan-15	3895	0	0	332	1661	397	35	0
Feb-15	4152	0	0	701	2416	674	281	0
Mar-15	4590	0	0	910	2771	889	310	0
Apr-15	4988	0	11	1300	3261	1321	382	-30
May-15	4996	0	-76	1507	3676	1636	540	-77
Jun-15	5057	-38	-79	1809	4081	1976	1722	-80
Jul-15	5800	-79	-82	2678	4654	2305	2703	-83
Aug-15	6223	-77	-81	2524	5071	2774	2872	-81
Sep-15	5802	-81	-80	2422	4833	2487	1610	-83
Oct-15	6283	-86	-80	3113	5573	3319	82	-80
Nov-15	6290	-85	-79	3640	5982	3794	2260	-79
Dec-15	6296	-84	-79	3799	6204	4060	2925	-79

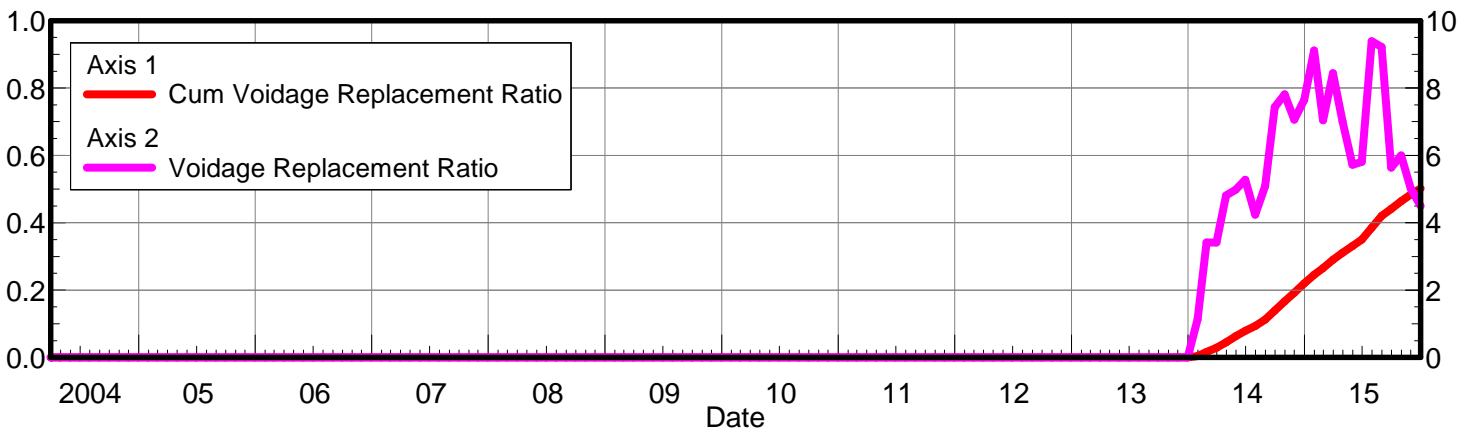
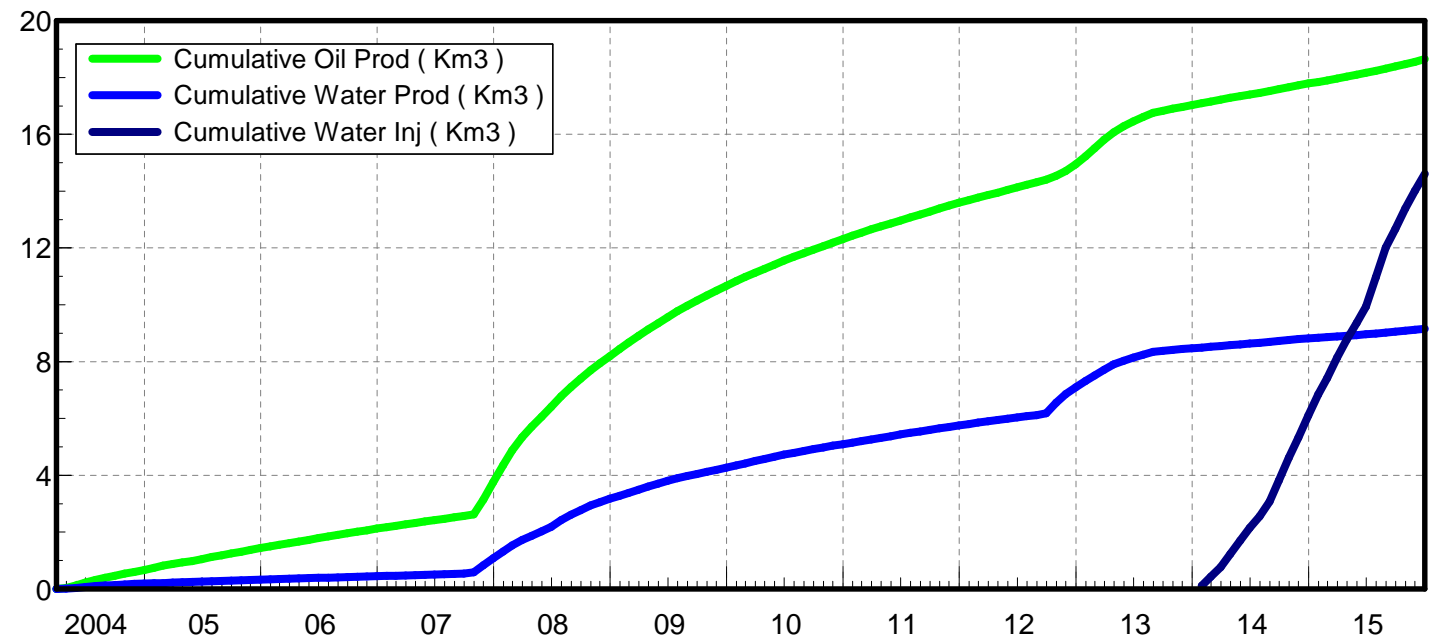
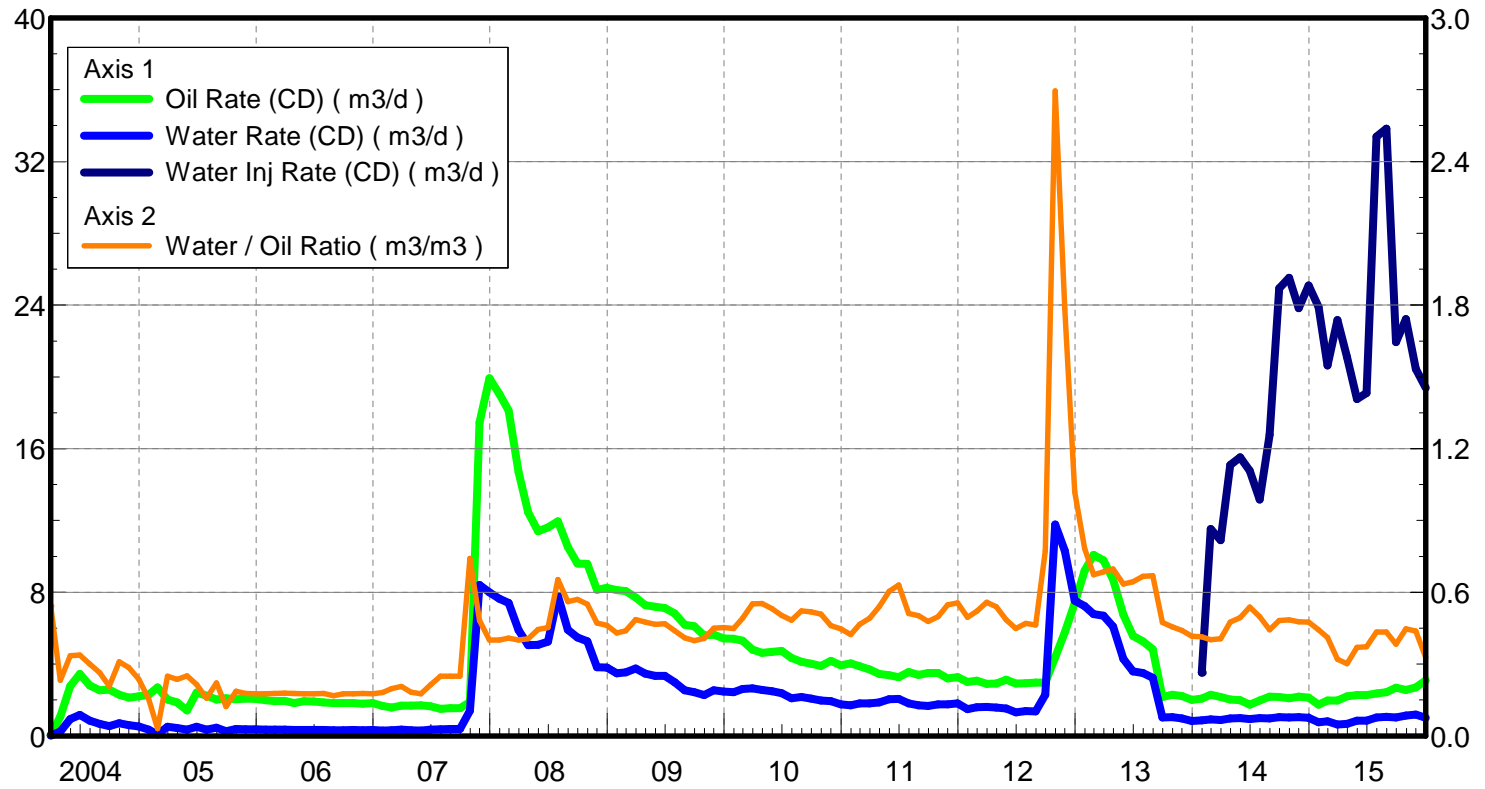
Appendix D

Rates and VRR Plots

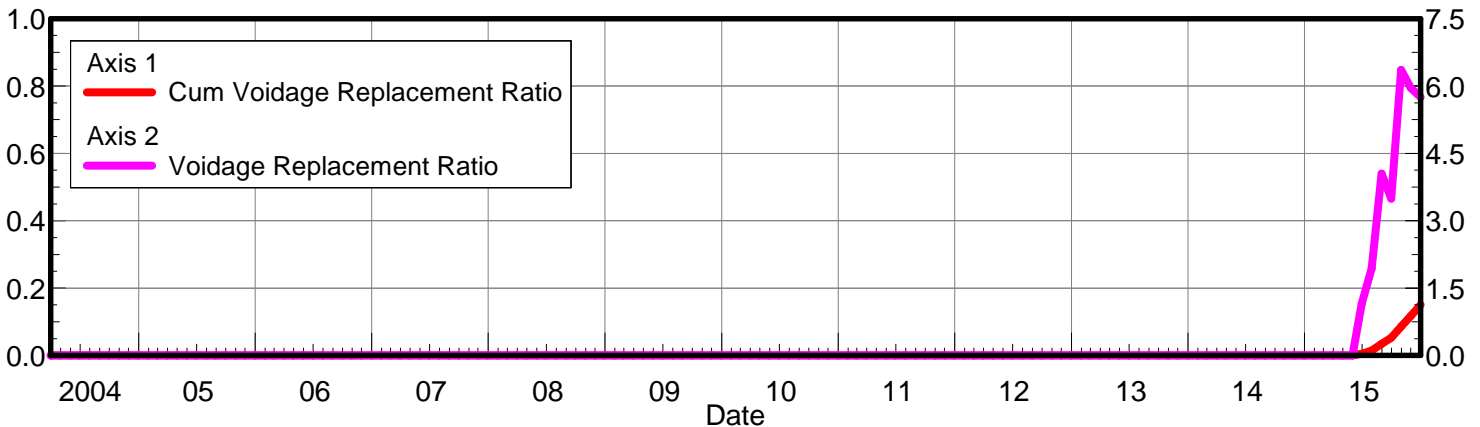
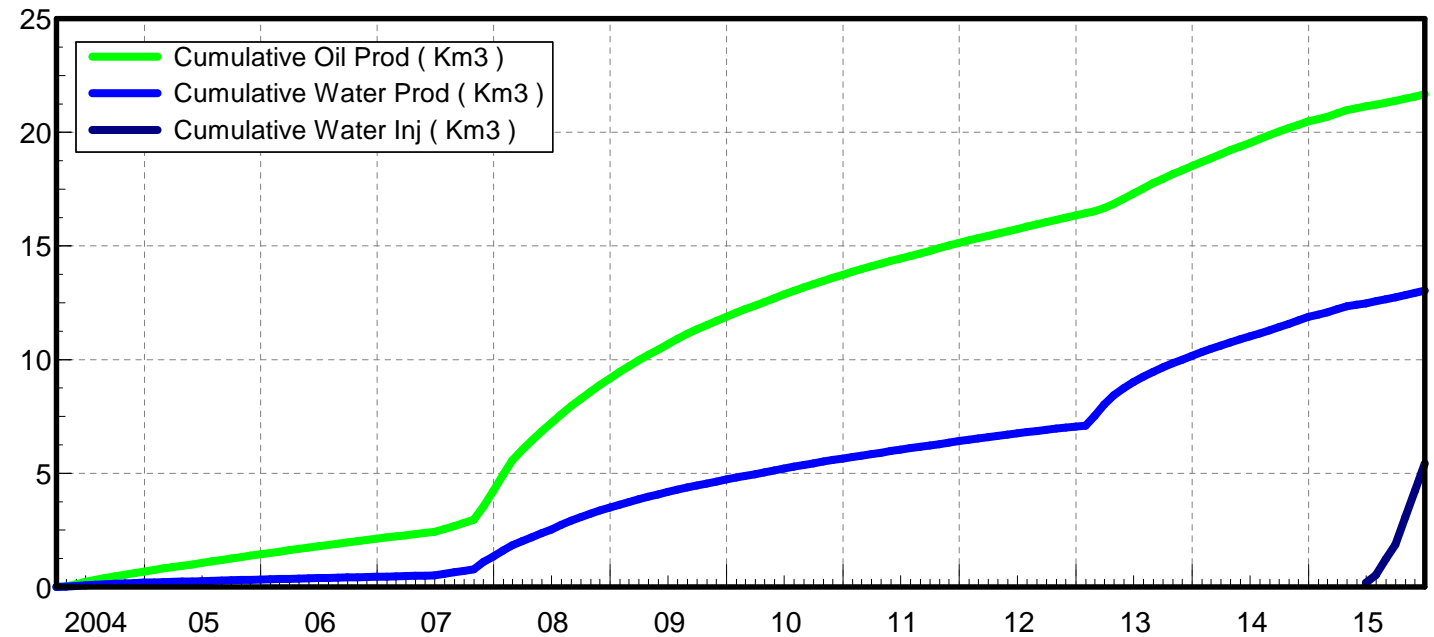
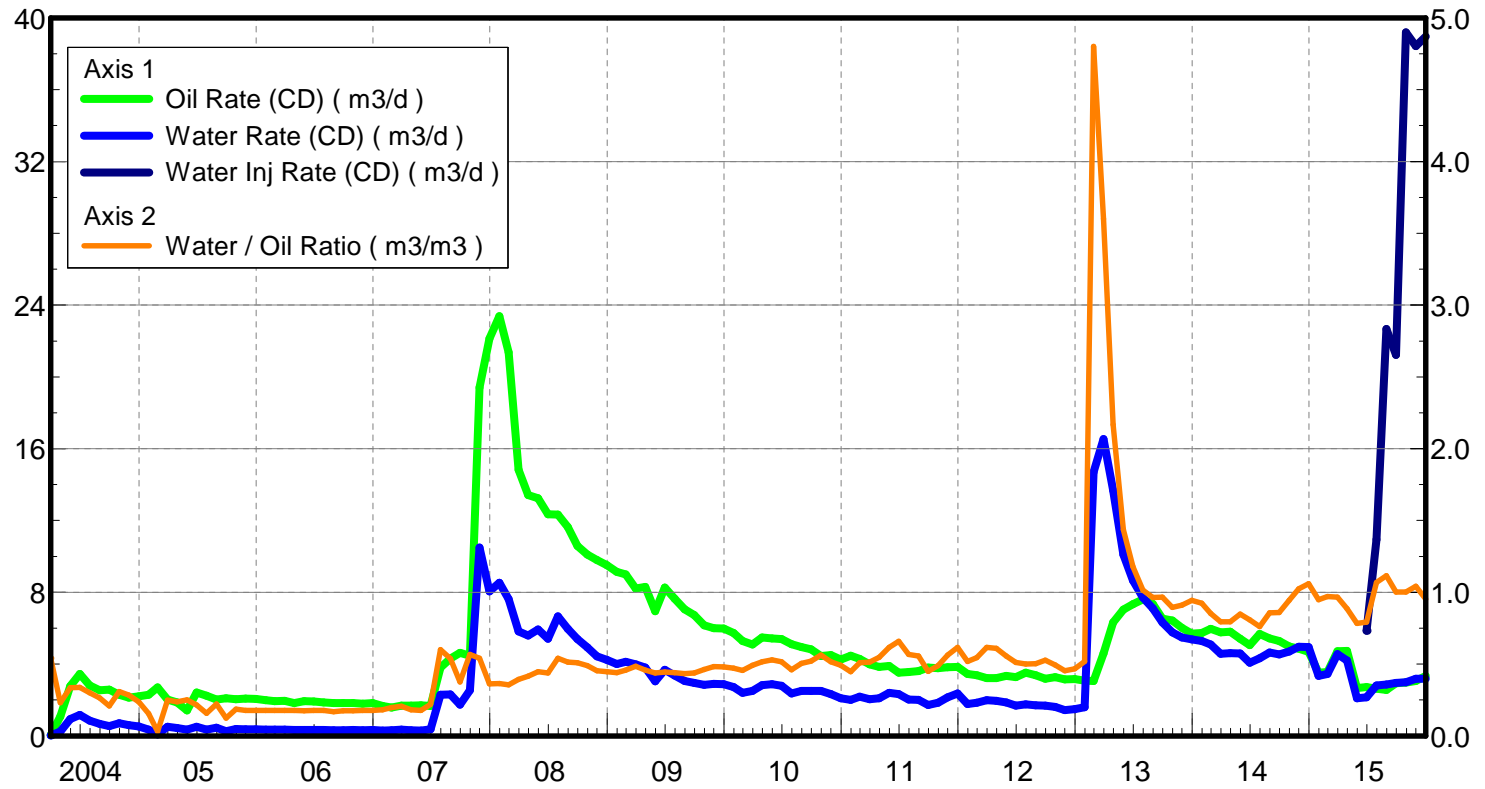
Oil Formation Vol Factor : 0.82
 Water Formation Vol Factor : 1.00150 m3/m3
 Water / Oil Ratio : 0.36 m3/m3
 Pattern : 02/07-28-007-29
 Inj Set: Sinclair Unit#8
 April 27, 2016
 Operator: Tundra_O&G_Prtshp
 Oil Rate (CD) : 2.24 m3/d
 Water Rate (CD) : 0.81 m3/d
 Water Inj Rate (CD) : 3.45 m3/d



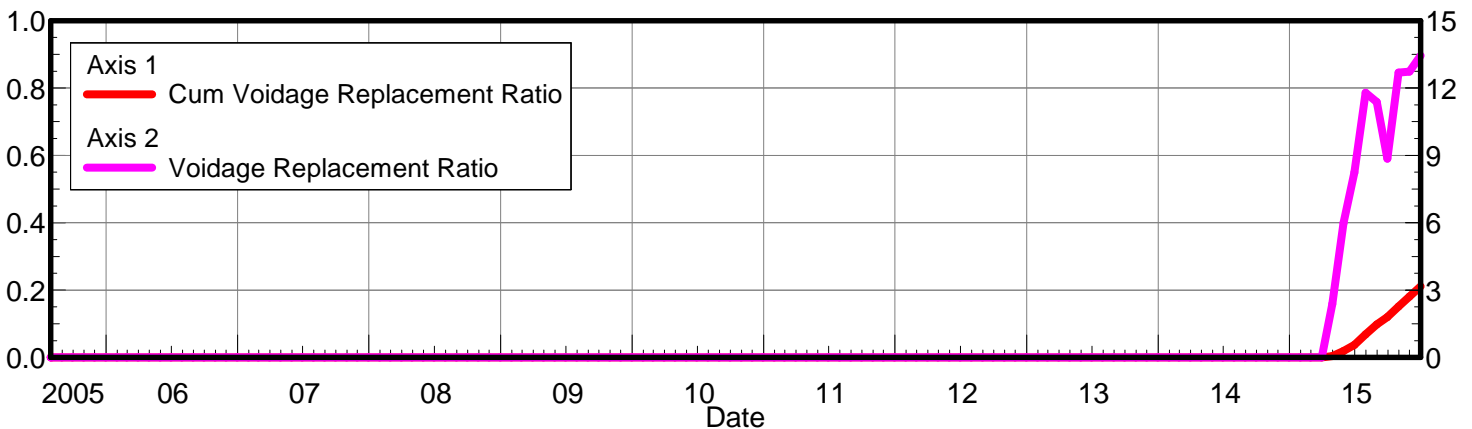
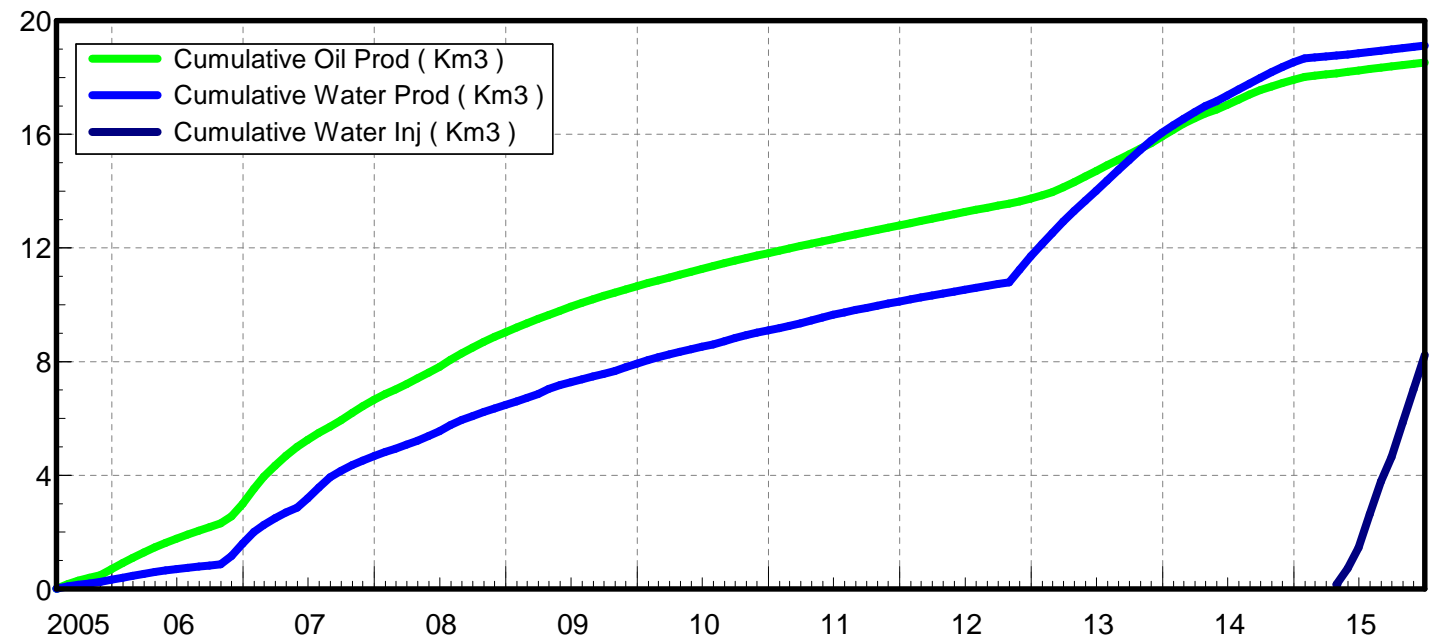
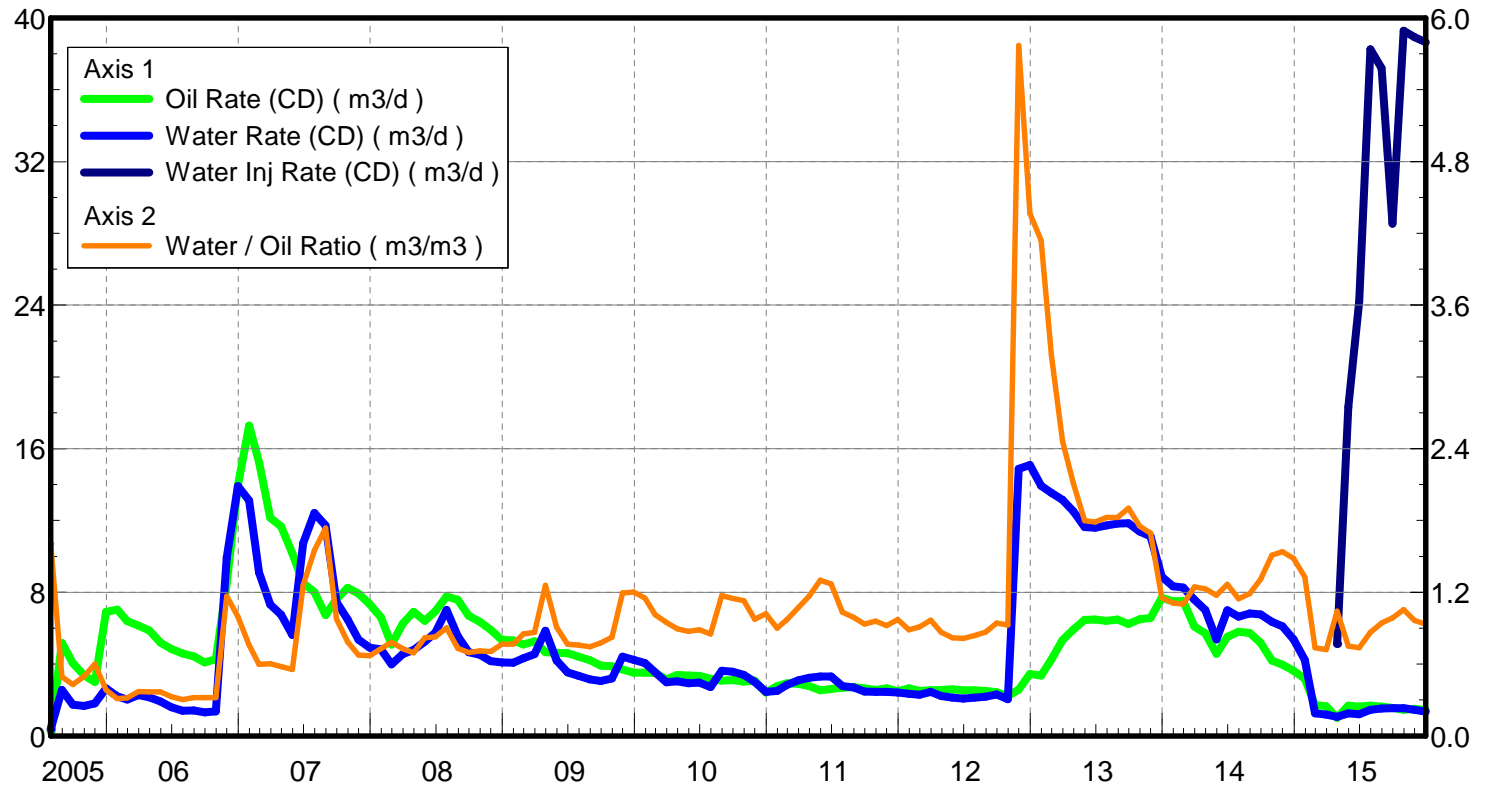
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 Water Formation Vol Factor : 1.00150 m3/m3
 Water / Oil Ratio : 0.29 m3/m3
 Pattern : 03/07-28-007-29
 Inj Set: Sinclair Unit#8
 April 27, 2016
 Operator: Tundra_O&G_Prtshp
 Oil Rate (CD) : 3.02 m3/d
 Water Rate (CD) : 0.88 m3/d
 Water Inj Rate (CD) : 18.48 m3/d



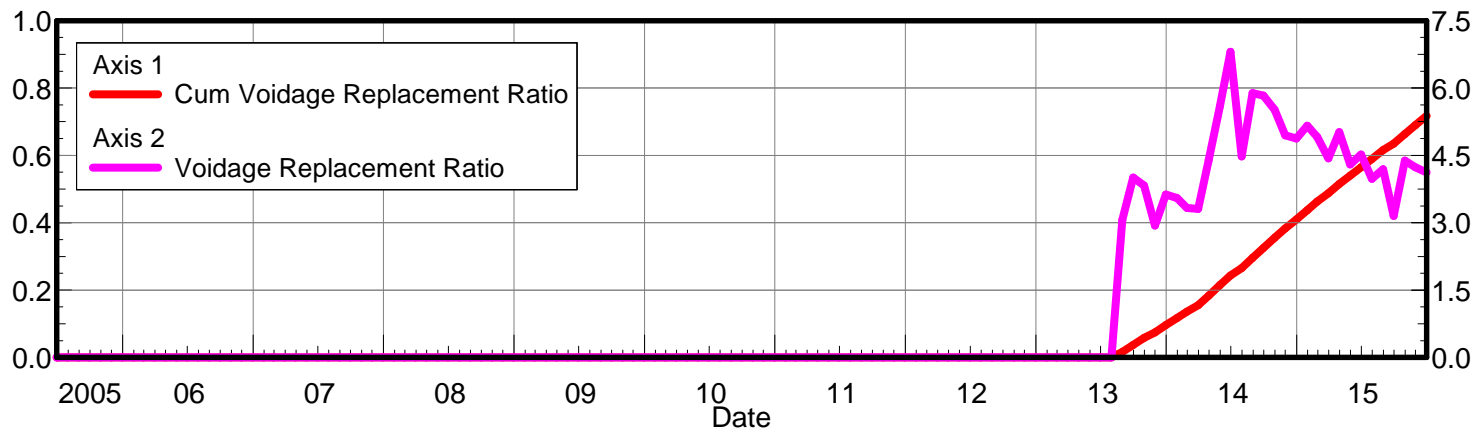
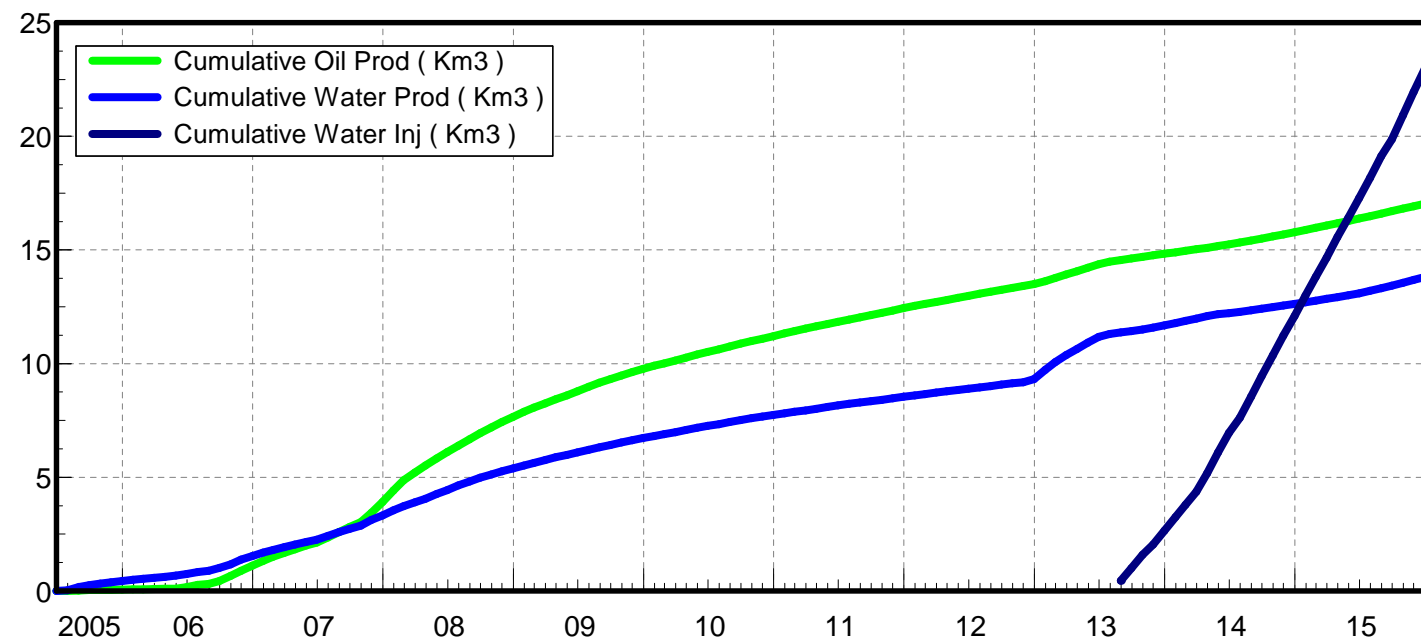
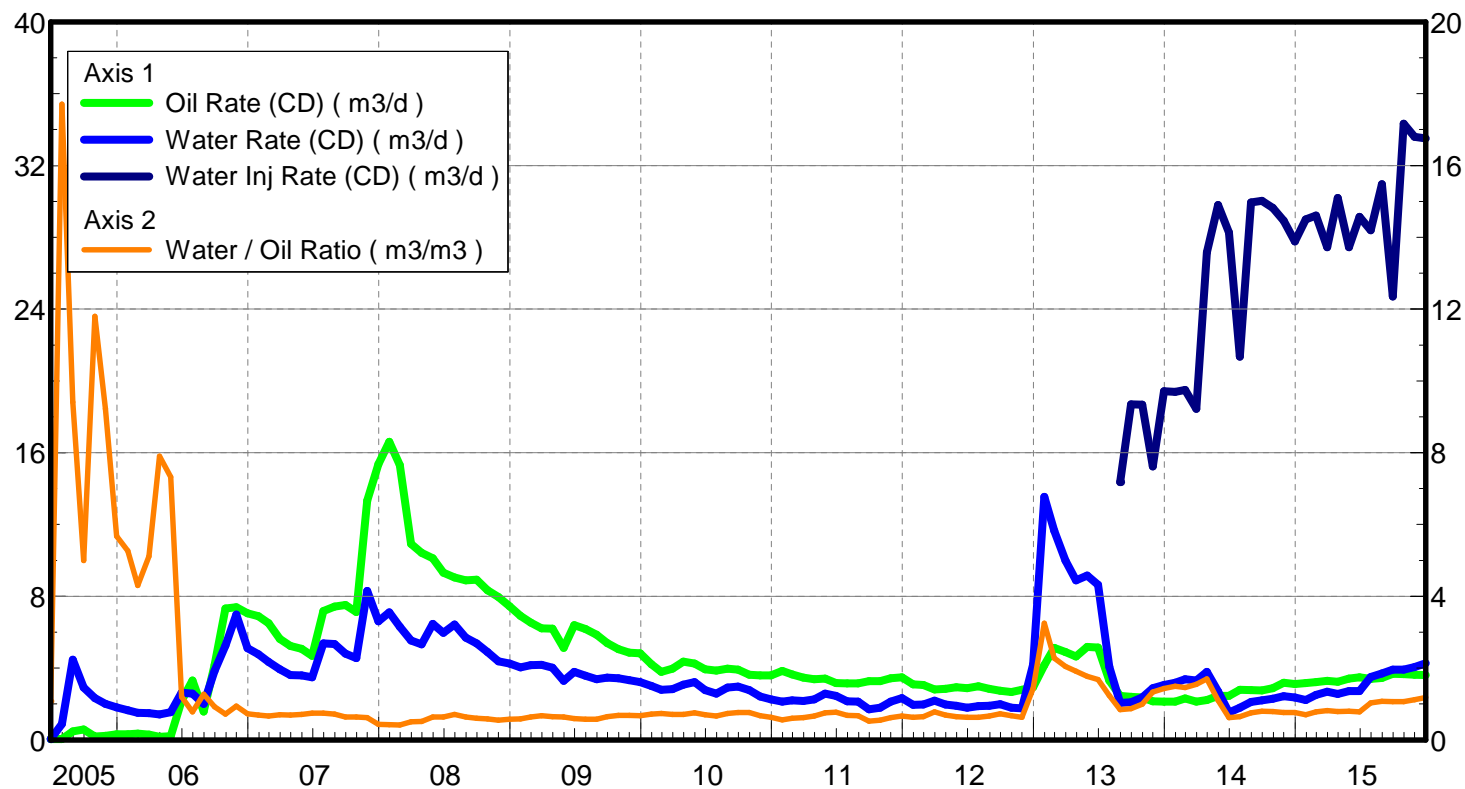
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Water Formation Vol Factor : 1.00150 m3/m3
Water / Oil Ratio : 0.88 m3/m3
Pattern : 02/12-28-007-29
Inj Set: Sinclair Unit#8
April 27, 2016
Operator: Tundra_O&G_Prtshp
Oil Rate (CD) : 3.34 m3/d
Water Rate (CD) : 2.93 m3/d
Water Inj Rate (CD) : 39.35 m3/d



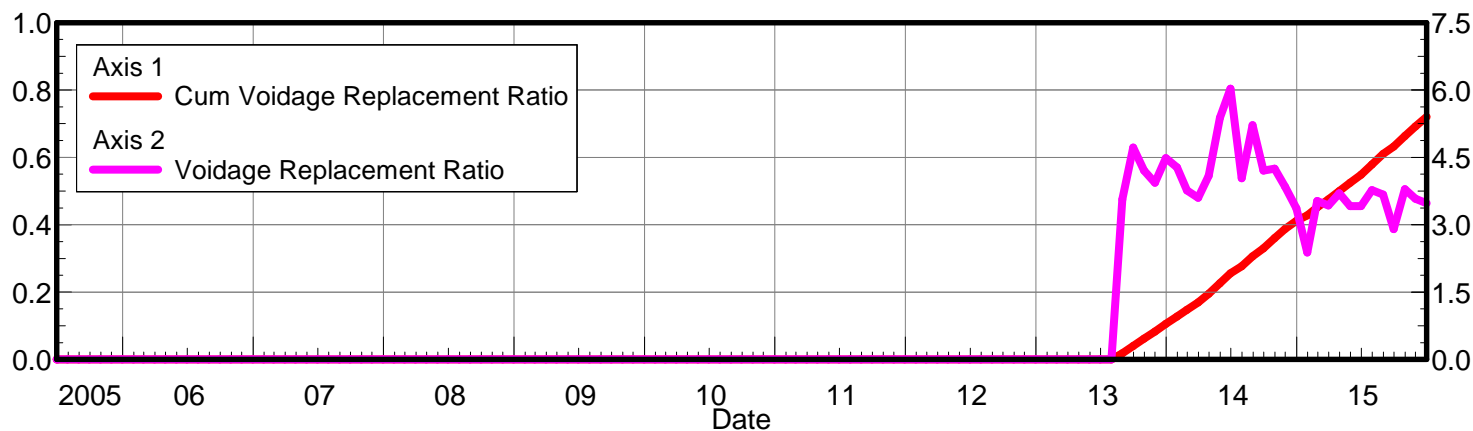
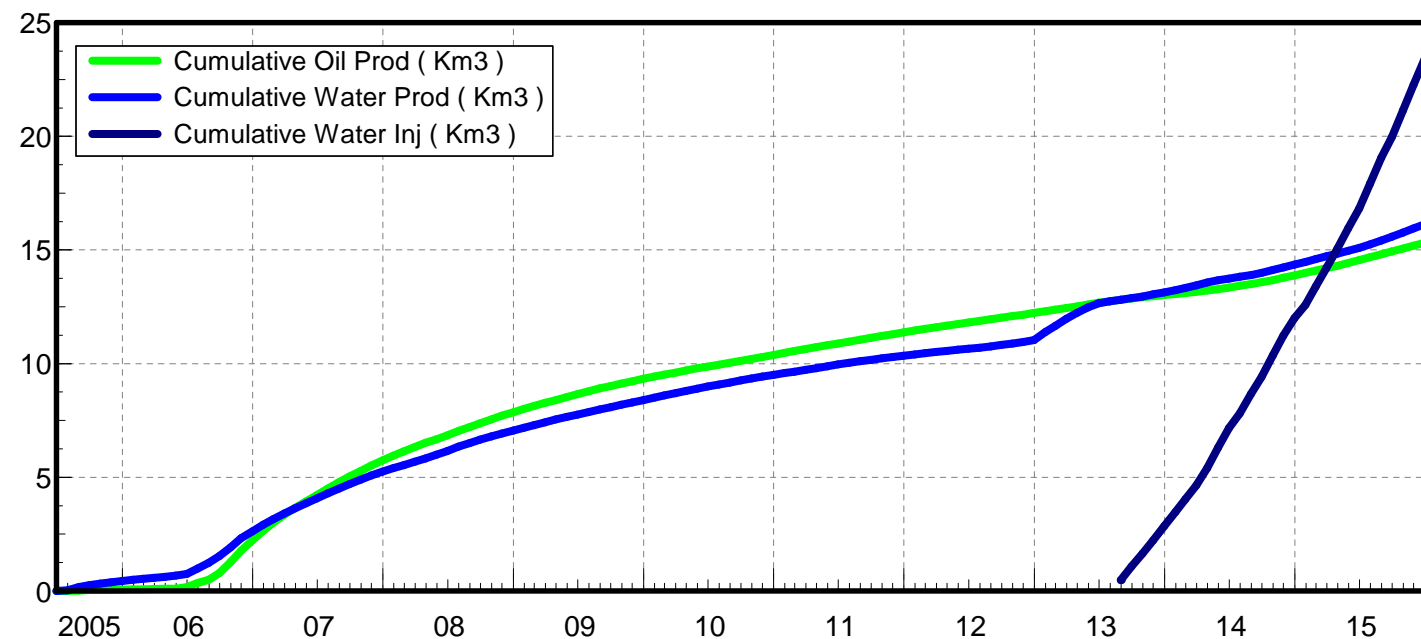
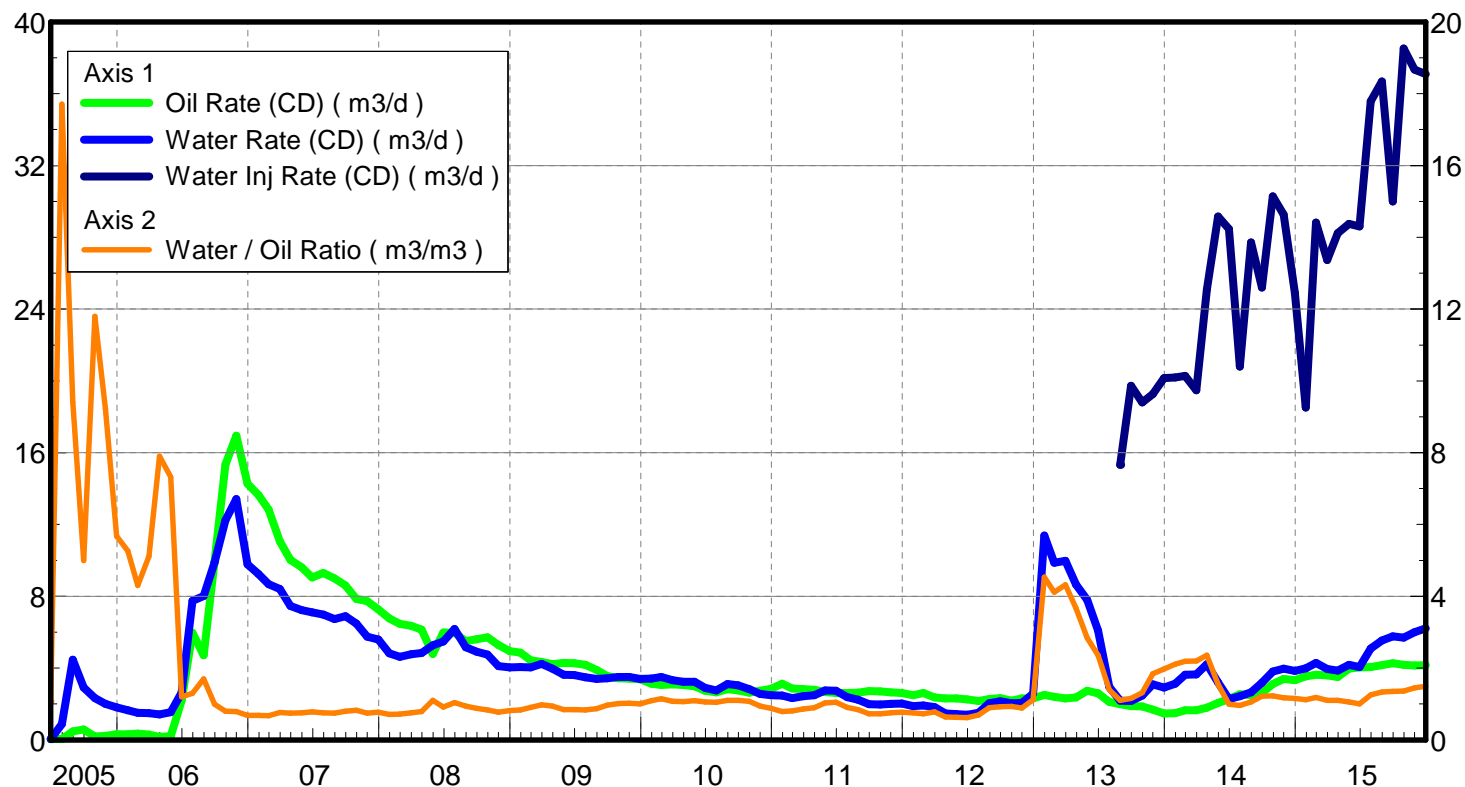
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 Water Formation Vol Factor : 1.00150 m3/m3
 Water / Oil Ratio : 0.89 m3/m3
 Pattern : 02/12-32-007-29
 Inj Set: Sinclair Unit#8
 April 27, 2016
 Operator: Tundra_O&G_Prtshp
 Oil Rate (CD) : 1.41 m3/d
 Water Rate (CD) : 1.26 m3/d
 Water Inj Rate (CD) : 39.10 m3/d



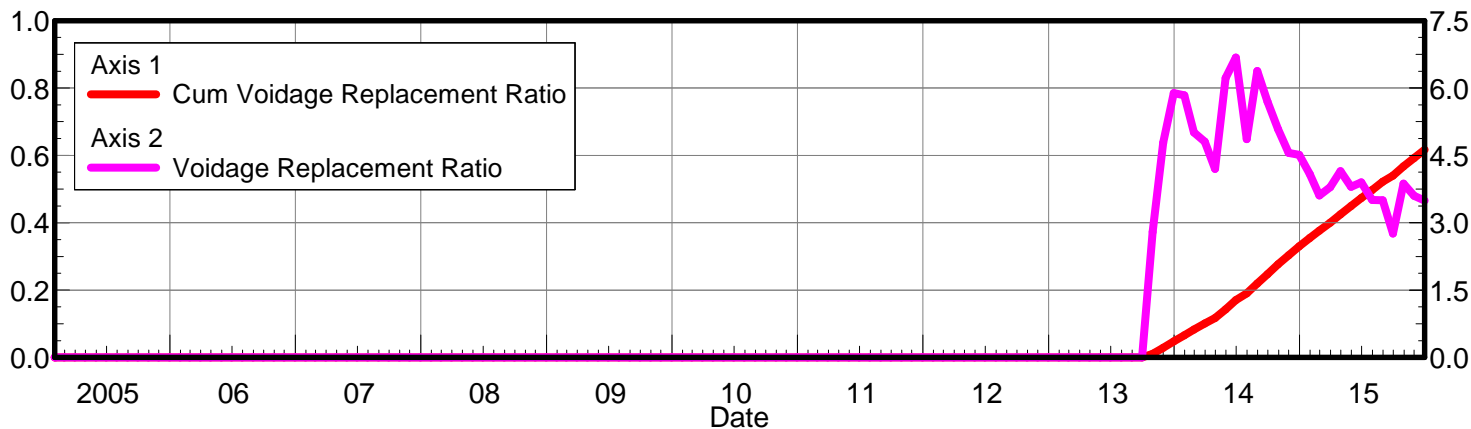
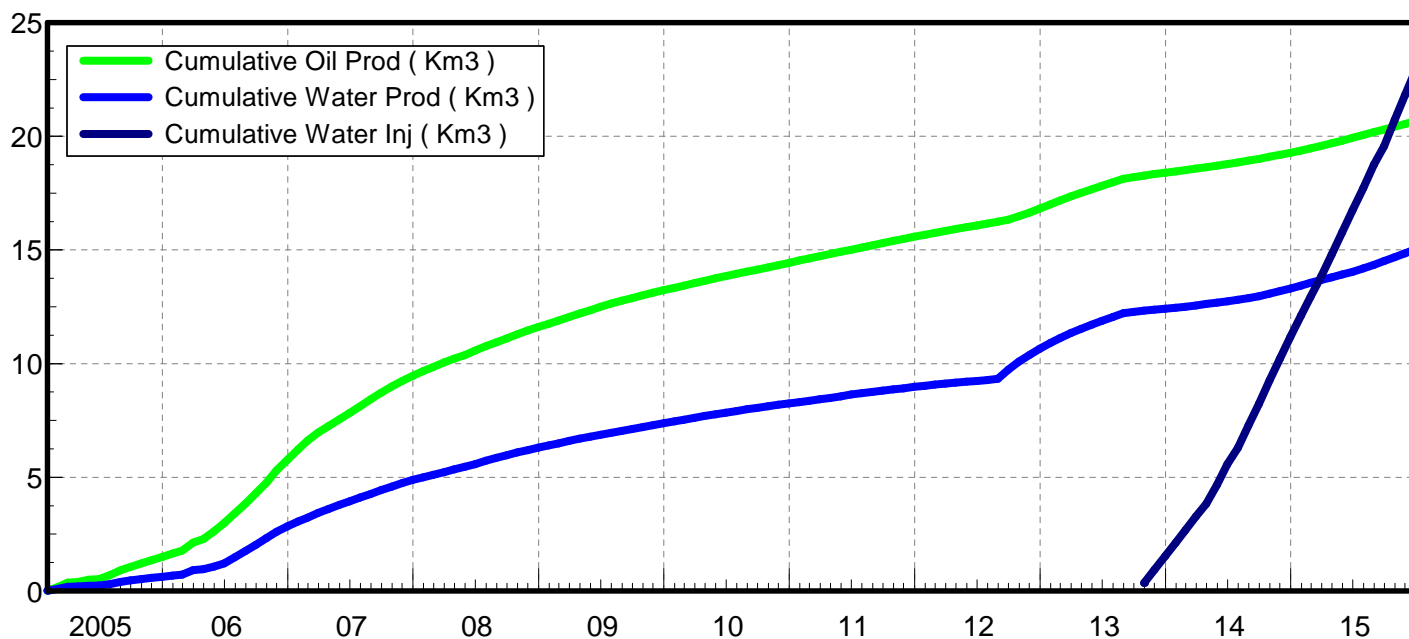
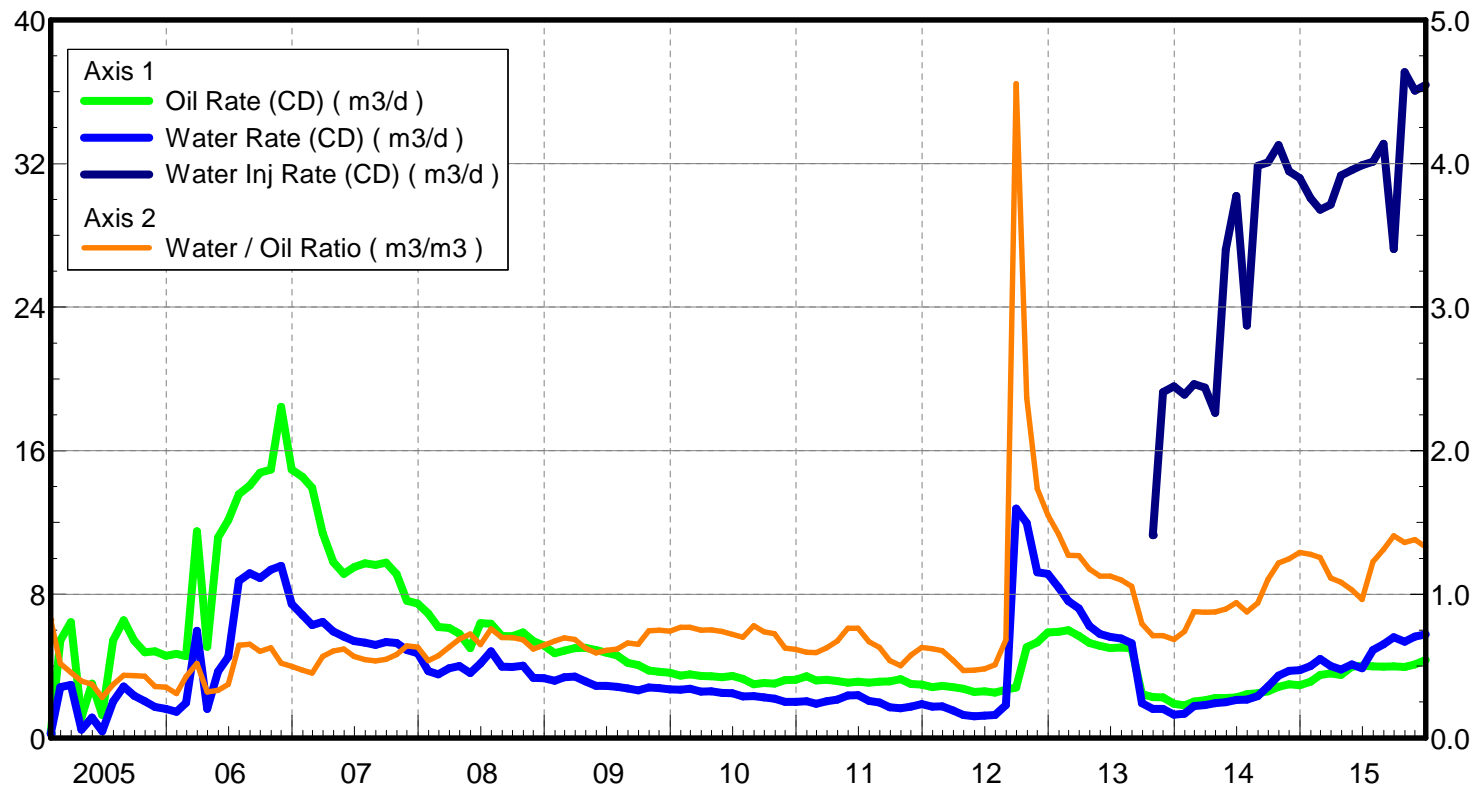
Oil Formation Vol Factor : 0.82 m³/m³ Pattern : 02/04-33-007-29 Inj Set: Sinclair Unit#8 Oil Rate (CD) : 3.77 m³/d
 Water Formation Vol Factor : 1.00150 m³/m³ April 27, 2016 Water Rate (CD) : 4.21 m³/d
 Water / Oil Ratio : 1.12 m³/m³ Operator: Tundra_O&G_Prtshp Water Inj Rate (CD) : 34.19 m³/d



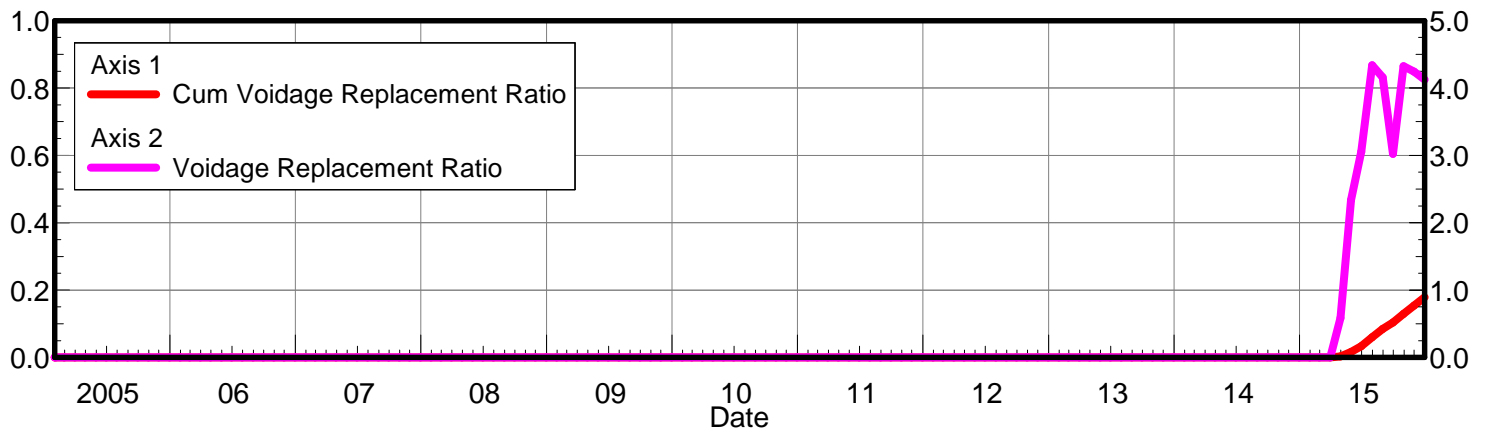
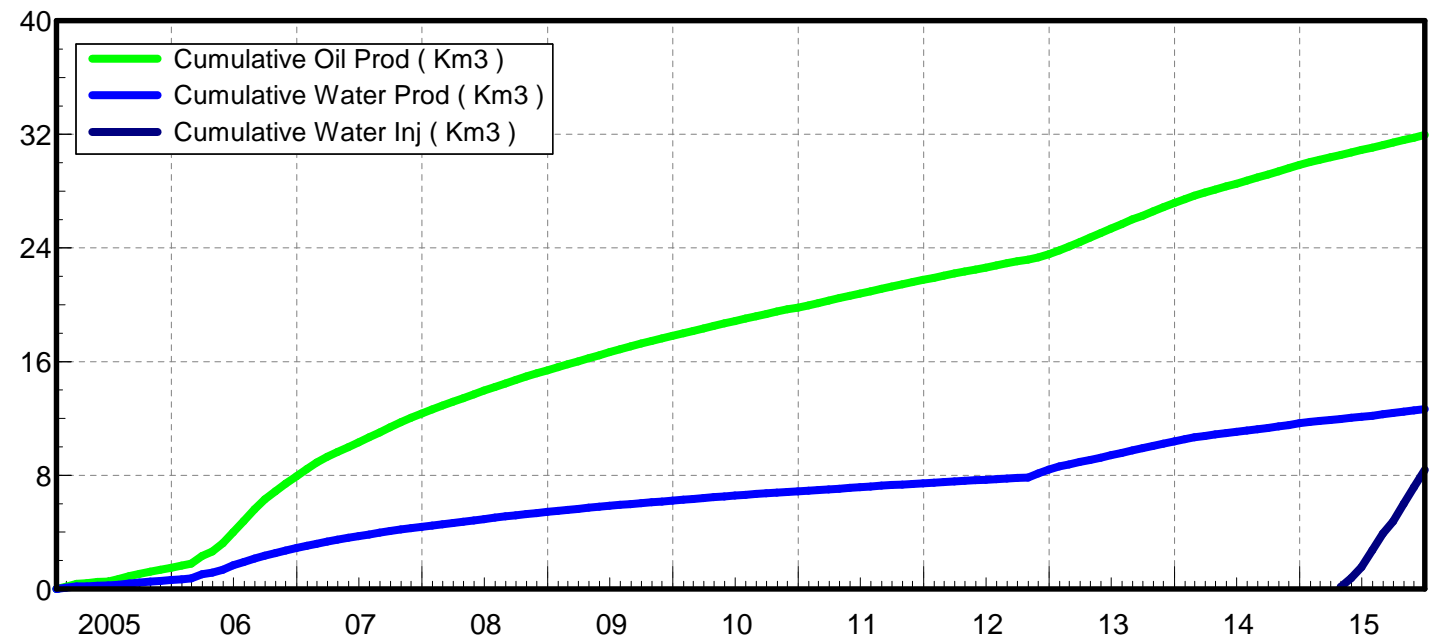
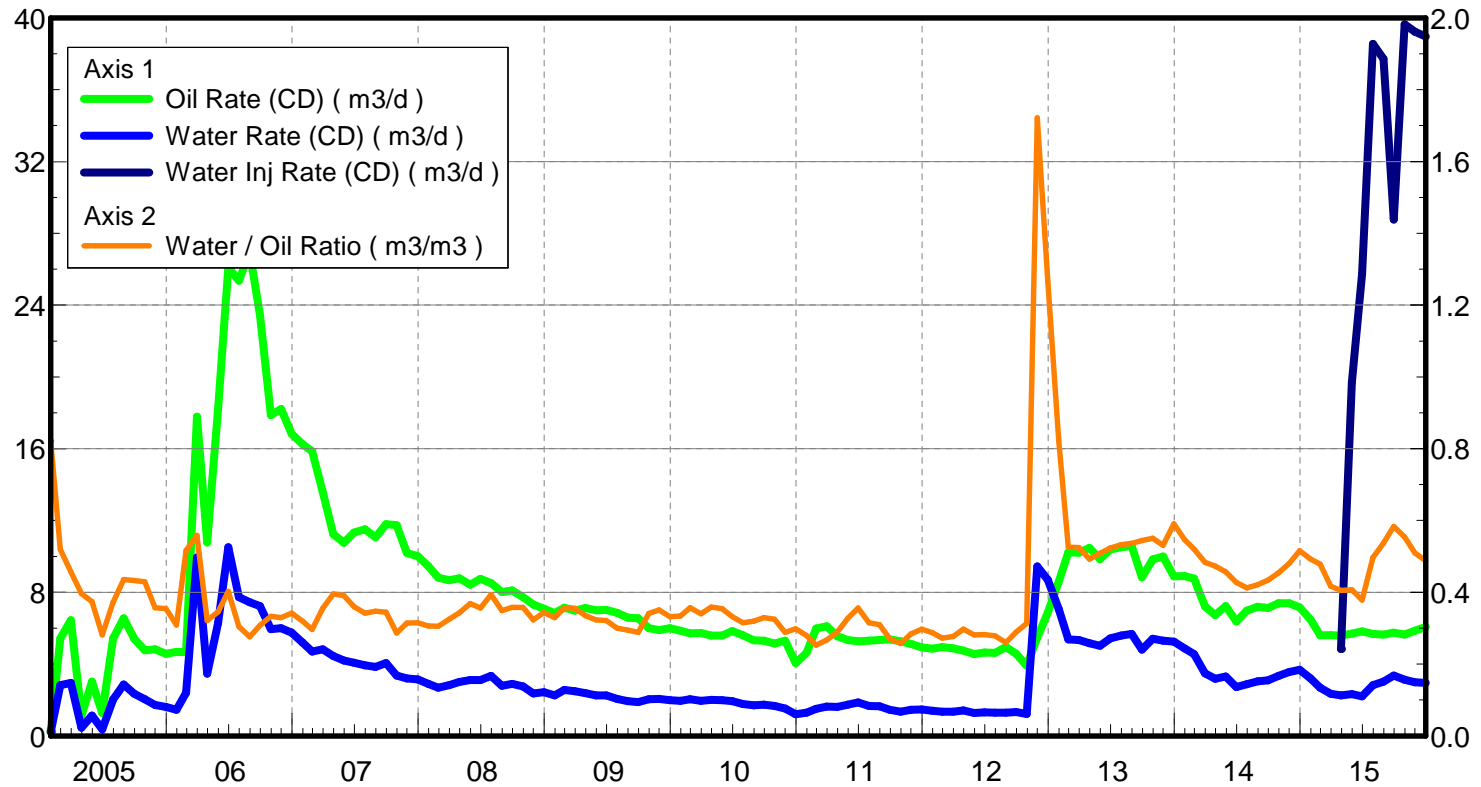
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 Water Formation Vol Factor : 1.00150 m3/m3
 Water / Oil Ratio : 1.52 m3/m3
 Pattern : 02/05-33-007-29
 Inj Set: Sinclair Unit#8
 April 27, 2016
 Operator: Tundra_O&G_Prtshp
 Oil Rate (CD) : 4.22 m3/d
 Water Rate (CD) : 6.43 m3/d
 Water Inj Rate (CD) : 32.71 m3/d



Oil Formation Vol Factor : 0.83
 Water Formation Vol Factor : 1.00150 m3/m3
 Water / Oil Ratio : 1.41 m3/m3
 Pattern : 03/05-33-007-29
 Inj Set: Sinclair Unit#8
 April 27, 2016
 Operator: Tundra_O&G_Prtshp
 Oil Rate (CD) : 4.43 m3/d
 Water Rate (CD) : 6.23 m3/d
 Water Inj Rate (CD) : 36.68 m3/d



Oil Formation Vol Factor : 0.82
 Water Formation Vol Factor : 1.00150 m3/m3
 Water / Oil Ratio : 0.53 m3/m3
 Pattern : 02/16-33-007-29
 Inj Set: Sinclair Unit#8
 April 27, 2016
 Operator: Tundra_O&G_Prtshp
 Oil Rate (CD) : 6.37 m3/d
 Water Rate (CD) : 3.35 m3/d
 Water Inj Rate (CD) : 39.45 m3/d



Oil Formation Vol Factor : 0.82
Water Formation Vol Factor : 1.00150 m3/m3
Water / Oil Ratio : 0.34 m3/m3
Pattern : 02/13-33-007-29
Inj Set: Sinclair Unit#8
April 27, 2016
Operator: Tundra_O&G_Prtshp
Oil Rate (CD) : 7.66 m3/d
Water Rate (CD) : 2.57 m3/d
Water Inj Rate (CD) : 31.81 m3/d

