

Virden Roselea Unit #1
2016 Annual EOR Report

Executive Summary

In 2016 oil production in the Virden Roselea Unit #1 (VRU #1) was 59.8 m³/d (376 bbl/d) totaling 21.8 e³m³ (137.2 mmbbl). Annual production declined by 11.5% from 2015 to 2016. By the end of 2016 cumulative oil production from the VRU #1 was 3,016 e³m³ (18.97 mmbbl). The original forecasted recovery was 845 e³m³ (5.3 mmbbl) on primary recovery and 2 300 e³m³ (14.4 mmbbl) total primary plus secondary recovery.

In December 2016 there were 54 producing oil wells and 16 water injectors active in the unit. In 2014, three horizontal Scallion wells were drilled in the unit and three horizontal Virden wells were also drilled. In 2015, only one well was drilled in the Virden formation. In 2016, two wells were drilled in the Virden formation and some existing Scallion horizontals were perforated in the Oolites.

Discussion

The VRU #1 has been under waterflood since 1965, 11 years after initial production in 1954. Water injection increased the oil production rate from $\sim 125 \text{ m}^3/\text{d}$ (786 bbl/d) just prior to injection to $\sim 250 \text{ m}^3/\text{d}$ ($\sim 1,570$ bbl/d), equivalent to peak production from the field. Expected ultimate oil recovery was increased by 2.5 – 3 times due to the waterflood. Due to this there are areas in the unit that have a higher recovery than what is seen in the other Roselea units, and overall, the unit has a higher recovery.

Horizontal drilling has offset the production decline over the last decade. In 2014, an additional three Scallion horizontals and three Virden horizontals were drilled in this unit with variable results. In 2015, one Virden horizontal was drilled and in 2016 another two Virden wells were drilled.

In this unit it appears as if there may be a preferential orientation as in large portions of the unit the wells offsetting injectors in the E-W direction were generally more successful than the adjacent producers to the North and South. The majority of the horizontals are aligned in an E-W orientation and the unit outline may support implementing an E-W line drive; technical work has yet to be conducted. The water injection rate was $1\,590 \text{ m}^3/\text{d}$ (10,000 bbl/d) in 2016 and the producing WOR was 26 m^3/m^3 . The injected water at VRU #1 is not filtered or treated in any way.

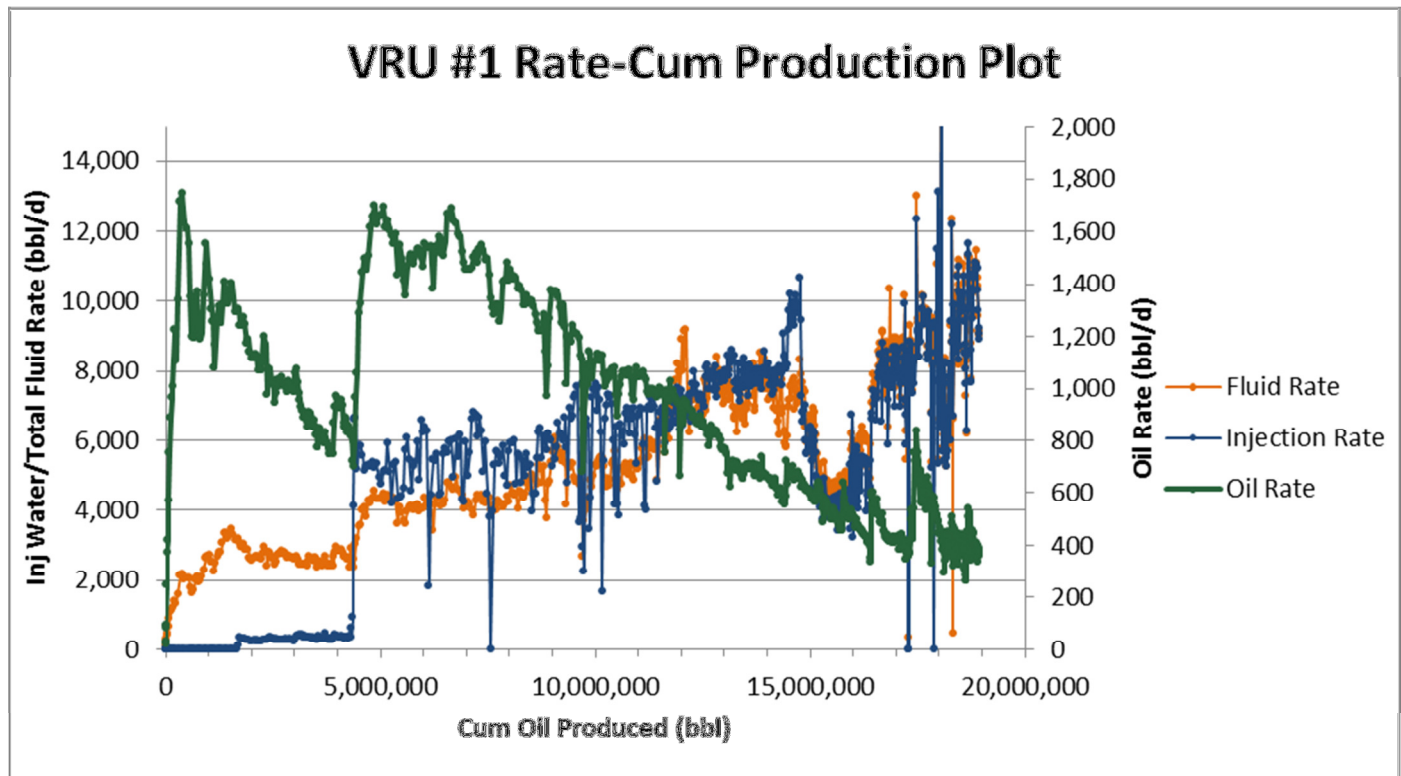
Significant events in 2016 are as follows:

- January 2016, drilled the 102/09-23-010-26W1/00 well in the Virden formation.
- January 2016, drilled the 103/09-23-010-26W1/00 well in the Virden formation.
- February 2016, abandoned the 100/07-29-010-25W1/00 injection well.
- July 2016, perforate the Oolites in the 102/11-23-010-26W1/00 horizontal well.
- July 2016, perforate the Oolites in the 102/08-25-010-26W1/00 horizontal well.
- August 2016, perforate the Oolites in the 103/12-24-010-26W1/00 horizontal well.
- August 2016, abandon 100/05-29-010-25W1/00 vertical well.
- August 2016, abandon 100/06-29-010-25W1/00 vertical well.
- August 2016, abandon 100/07-29-010-25W1/00 vertical well.

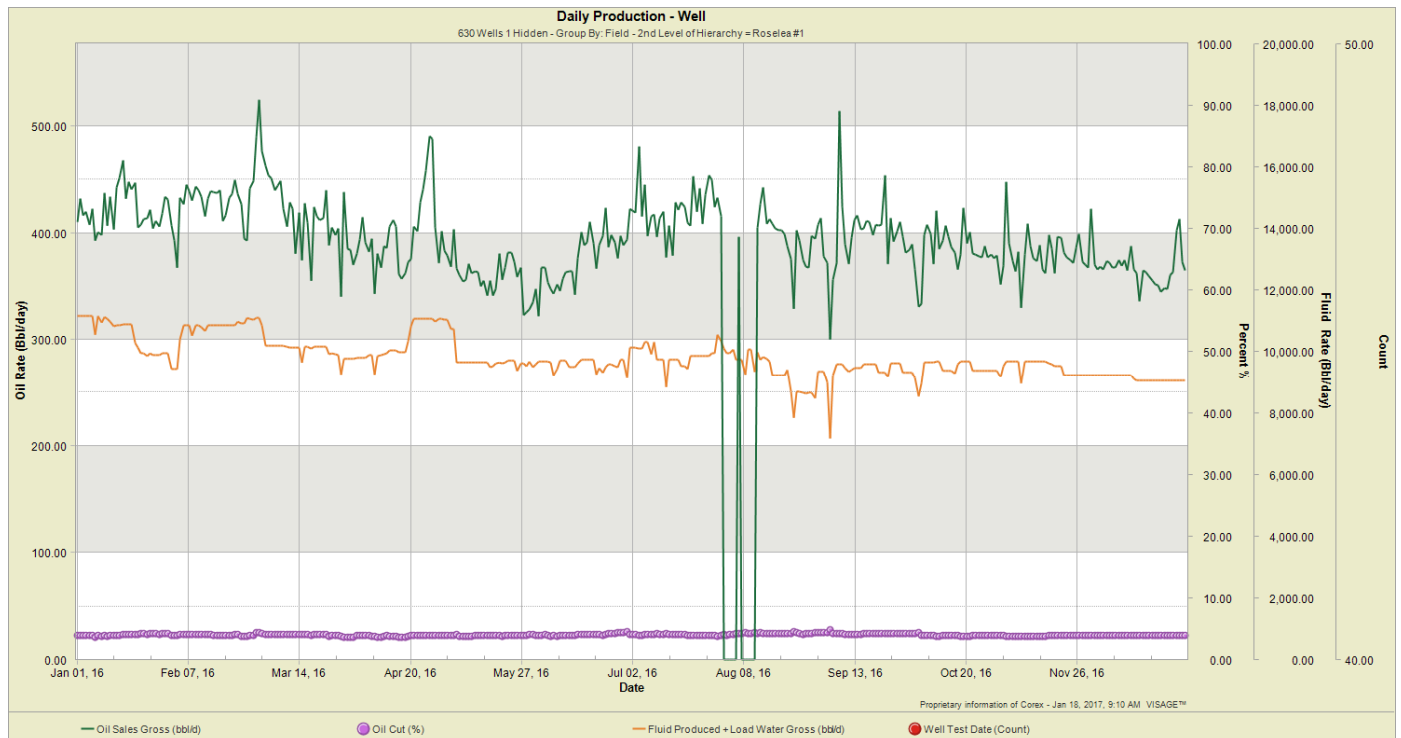
In the composite rate – cumulative oil plot below, waterflood response is clearly demonstrated at a cumulative oil production of $650 \text{ e}^3\text{m}^3$ (4 MMbbl).

Detailed production, injection, voidage tables and plots for the total unit and each injection pattern are at the end of this report.

VRU #1 – Rate vs Cumulative Oil Production



VRU #1 – Rate vs Time



2016 Reservoir Pressure Surveys

Unit	UWI	License	Test Type	Date of Pressure	Duration of SI (days)	Datum BHP (kPaa)
VRU #1	102/09-23-010-26W1/00	10494	FL Shot	5/5/2016	21	1,627

In 2016, only one pressure was taken in the unit.

In 2014, there were nine reservoir pressures recorded averaging 7,200 kPaa. As with most of the Virden units there is a large range in pressure, the pressure recorded in 2015 appears to be a bit under pressure. The initial reservoir pressure is estimated at 6,340 kPaa and the bubble point pressure as 1,273 kPaa. The pressure taken in 2016 is quite low; this is on a poor horizontal well producing out of the Virden. There is a question of if this is a valid pressure or not, the perm may be too low for the well to have built properly; however, due to the poor production the pressure may truly be low in this area.

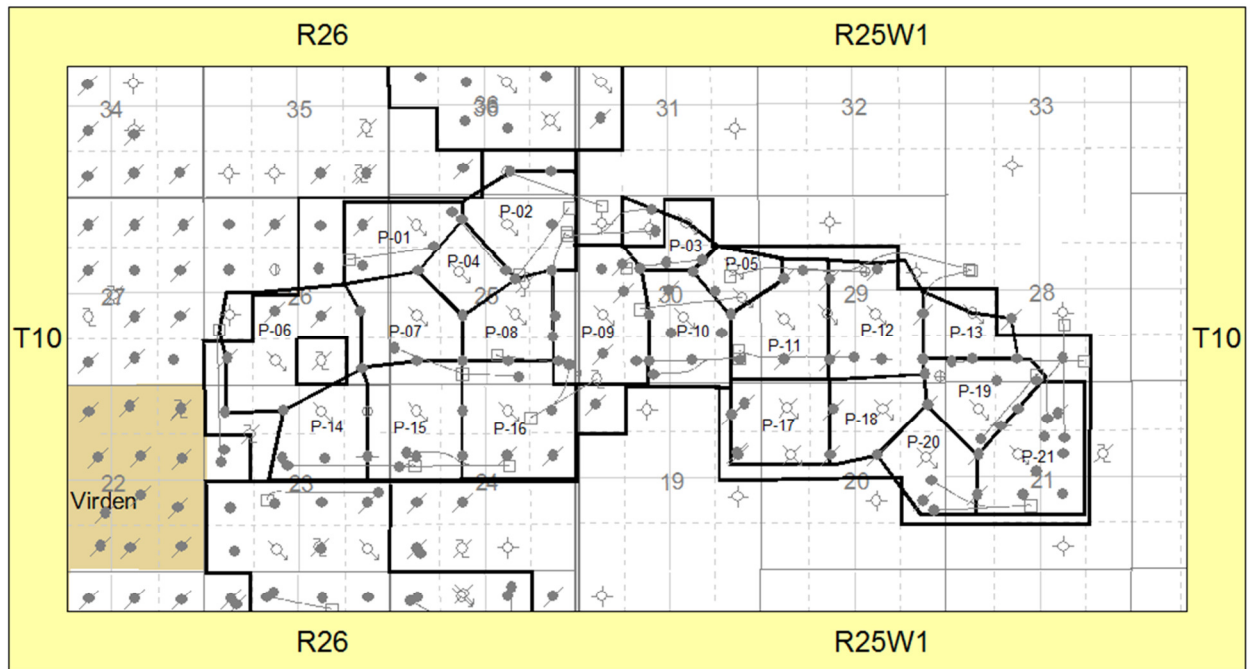
The voidage replacement ratio (VRR) in 2016 was maintained close to 1.00. The cumulative VRR at the end of 2016 was 0.96. An oil formation volume factor of 1.06 rm^3/sm^3 and a water formation volume factor of 1.04 rm^3/sm^3 were used in the VRR calculations.

The higher than initial reservoir pressure is inconsistent with the cumulative VRR of 0.96. The pressure inconsistency may be due to the partial pressure support for the field from an aquifer on the west side of the unit. This water influx from the aquifer is not accounted for in the VRR calculation.

2016 Well Servicing

UWI	Unit	Licence	Operation	Date	Objective
103/09-23-010-26W1/00	VRU#1	10495	Construction	6-Jan-16	
103/09-23-010-26W1/00	VRU#1	10495	Drilling - original	19-Jan-16	
103/09-23-010-26W1/00	VRU#1	10495	Initial Completion	31-Jan-16	VIRDEN COMPLETION
103/09-23-010-26W1/00	VRU#1	10495	Upsize Pump	8-Jun-16	
TURNAROUND	VRU#1	T16VIR008	Turnaround	15-Jul-16	
102/13-24-010-26W1/00	VRU#1	10122	Pump Repair	21-Jan-16	Wax Removal
103/12-24-010-26W1/00	VRU#1	10123	Perforating	3-Aug-16	
100/06-29-010-25W1/00	VRU#1	001384	Equipment Pressure Integrity Test	18-Feb-16	
100/06-29-010-25W1/00	VRU#1	001384	Abandon Well	11-Aug-16	
100/05-29-010-25W1/00	VRU#1	001303	Equipment Pressure Integrity Test	18-Feb-16	
100/05-29-010-25W1/00	VRU#1	001303	Abandon Well	9-Aug-16	
102/01-29-010-25W1/00	VRU#1	006278	Major Surface R&M	15-Sep-16	
104/11-23-010-26W1/00	VRU#1	10296	Pump Repair	10-Jun-16	
102/08-25-010-26W1/00	VRU#1	006197	Perforating	22-Jul-16	
102/12-23-010-26W1/00	VRU#1	6394	Upsize Pump	14-Jun-16	
100/07-29-010-25W1/00	VRU#1	001405	Equipment Pressure Integrity Test	18-Feb-16	
100/07-29-010-25W1/00	VRU#1	001405	Packer Repair	22-Feb-16	
100/07-29-010-25W1/00	VRU#1	001405	Abandon Well	24-Feb-16	
100/08-30-010-25W1/00	VRU#1	001053	Inhibitor Squeeze	12-Feb-16	
100/08-30-010-25W1/00	VRU#1	001053	Inhibitor Squeeze	30-Sep-16	
104/08-30-010-25W1/00	VRU#1	005124	Major Surface R&M	12-Sep-16	
100/16-25-010-26W1/00	VRU#1	000653	In Line Inspection	15-Aug-16	
102/07-25-010-26W1/00	VRU#1	9932	Pump Repair	11-Jan-16	
102/11-23-010-26W1/00	VRU#1	6389	Perforating	18-Jul-16	
104/10-30-010-25W1/00	VRU#1	004985	Pump Repair	15-Sep-16	
102/09-23-010-26W1/00	VRU#1	10494	Construction	18-Jan-16	
102/09-23-010-26W1/00	VRU#1	10494	Equip & Tie-In	18-Jan-16	
102/09-23-010-26W1/00	VRU#1	10494	Drilling - original	25-Jan-16	
102/09-23-010-26W1/00	VRU#1	10494	Initial Completion	2-Feb-16	VIRDEN COMPLETION
102/09-23-010-26W1/00	VRU#1	10494	Pump Repair	9-May-16	

VRU #1 Waterflood Pattern Map

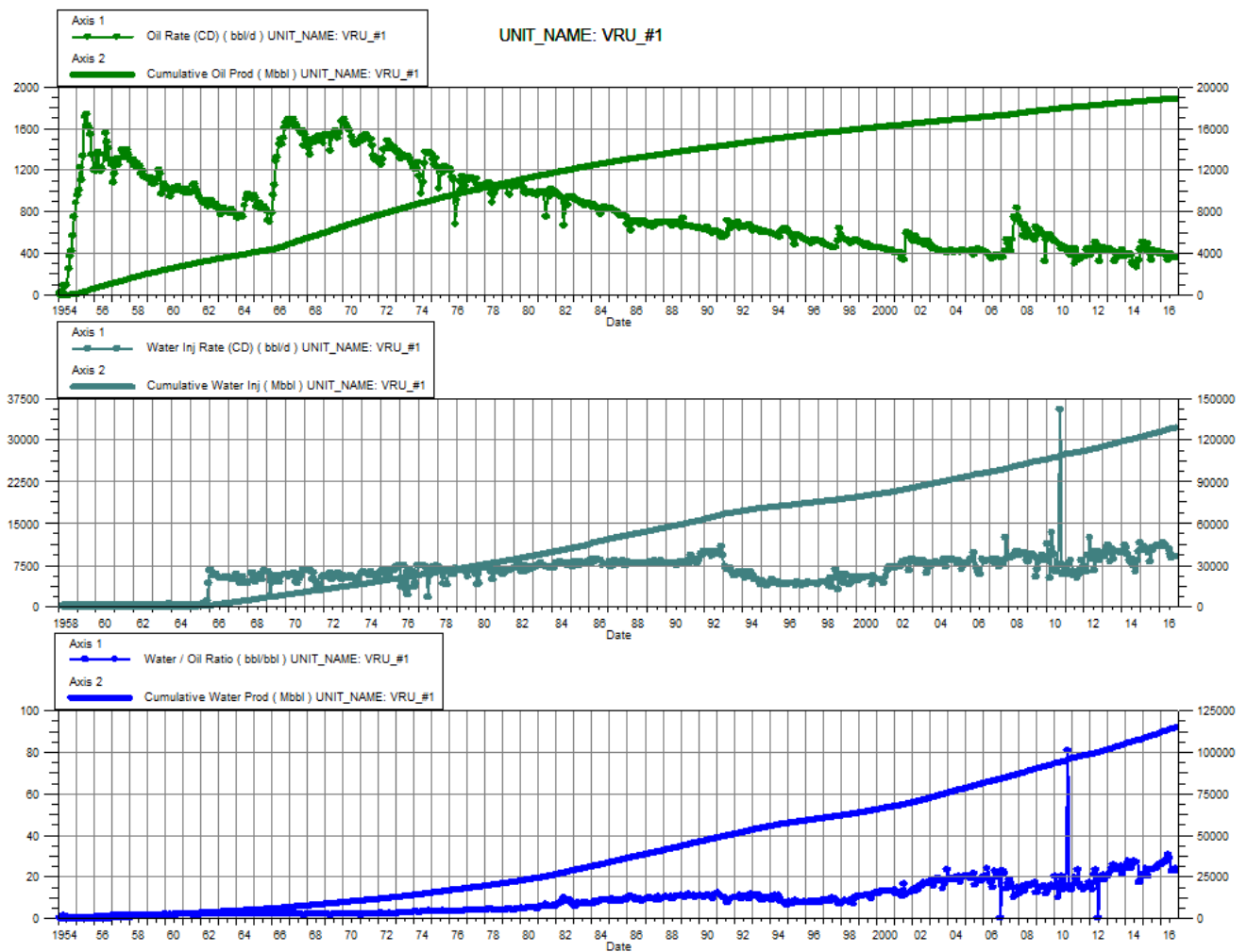


VRU #1 Waterflood Pattern Table

Pattern	Well
P-01	100/13-25-010-26W1/00
P-02	100/15-25-010-26W1/00
P-03	100/15-30-010-25W1/00
P-04	100/11-25-010-26W1/00
P-05	100/09-30-010-25W1/00
P-06	100/03-26-010-26W1/00
P-07	100/05-25-010-26W1/00
P-08	100/07-25-010-26W1/00
P-09	100/05-30-010-25W1/00
P-09	103/01-25-010-26W1/00
	100/07-30-010-25W1/00
P-10	104/08-30-010-25W1/00
P-11	100/05-29-010-25W1/00
P-12	100/06-29-010-25W1/00
P-12	100/07-29-010-25W1/00
P-13	100/05-28-010-25W1/00
P-14	100/15-23-010-26W1/00
P-15	100/13-24-010-26W1/00
P-16	100/15-24-010-26W1/00
P-16	103/01-25-010-26W1/00
P-19	100/13-21-010-25W1/00
P-21	100/11-21-010-25W1/00

Total for VRU #1

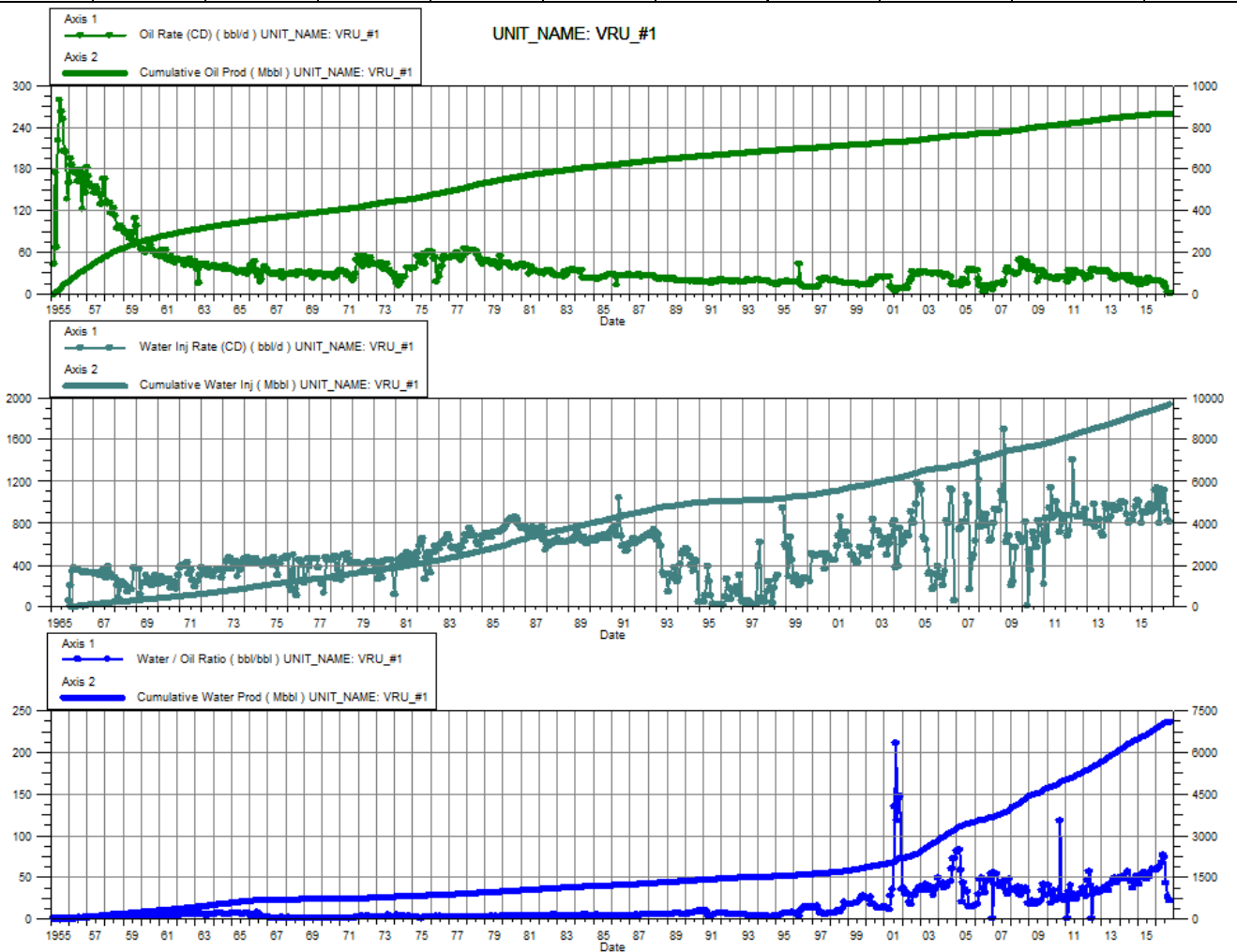
Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa
1/31/2016	63.53	2994.90	1651.62	17859.53	1710.12	20107.82	26.00	1.00	0.96	5,684.84
2/29/2016	64.91	2996.79	1757.08	17910.48	1822.15	20160.66	27.07	1.00	0.96	5,551.64
3/31/2016	62.79	2998.73	1672.35	17962.32	1726.45	20214.18	26.63	0.99	0.96	6,156.77
4/30/2016	60.02	3000.53	1707.34	18013.54	1768.89	20267.25	28.45	1.00	0.96	6,140.33
5/31/2016	53.88	3002.20	1645.92	18064.57	1707.08	20320.17	30.55	1.00	0.96	6,290.65
6/30/2016	56.24	3003.89	1602.83	18112.65	1664.46	20370.10	28.50	1.00	0.96	6,166.50
7/31/2016	63.65	3005.86	1459.57	18157.90	1517.63	20417.15	22.93	1.00	0.96	6,354.68
8/31/2016	61.76	3007.78	1391.50	18201.04	1413.21	20460.96	22.53	0.97	0.96	6,345.24
9/30/2016	60.42	3009.59	1382.67	18242.52	1436.41	20504.05	22.88	1.00	0.96	6,353.75
10/31/2016	57.65	3011.38	1380.80	18285.32	1437.23	20548.61	23.95	1.00	0.96	6,389.19
11/30/2016	55.58	3013.05	1383.28	18326.82	1440.41	20591.82	24.89	1.00	0.96	6,364.00
12/31/2016	54.44	3014.73	1362.33	18369.05	1421.03	20635.87	25.02	1.00	0.96	6,334.19



VRU No. 1

Pattern P-01 - 00/13-25-010-26W1/0

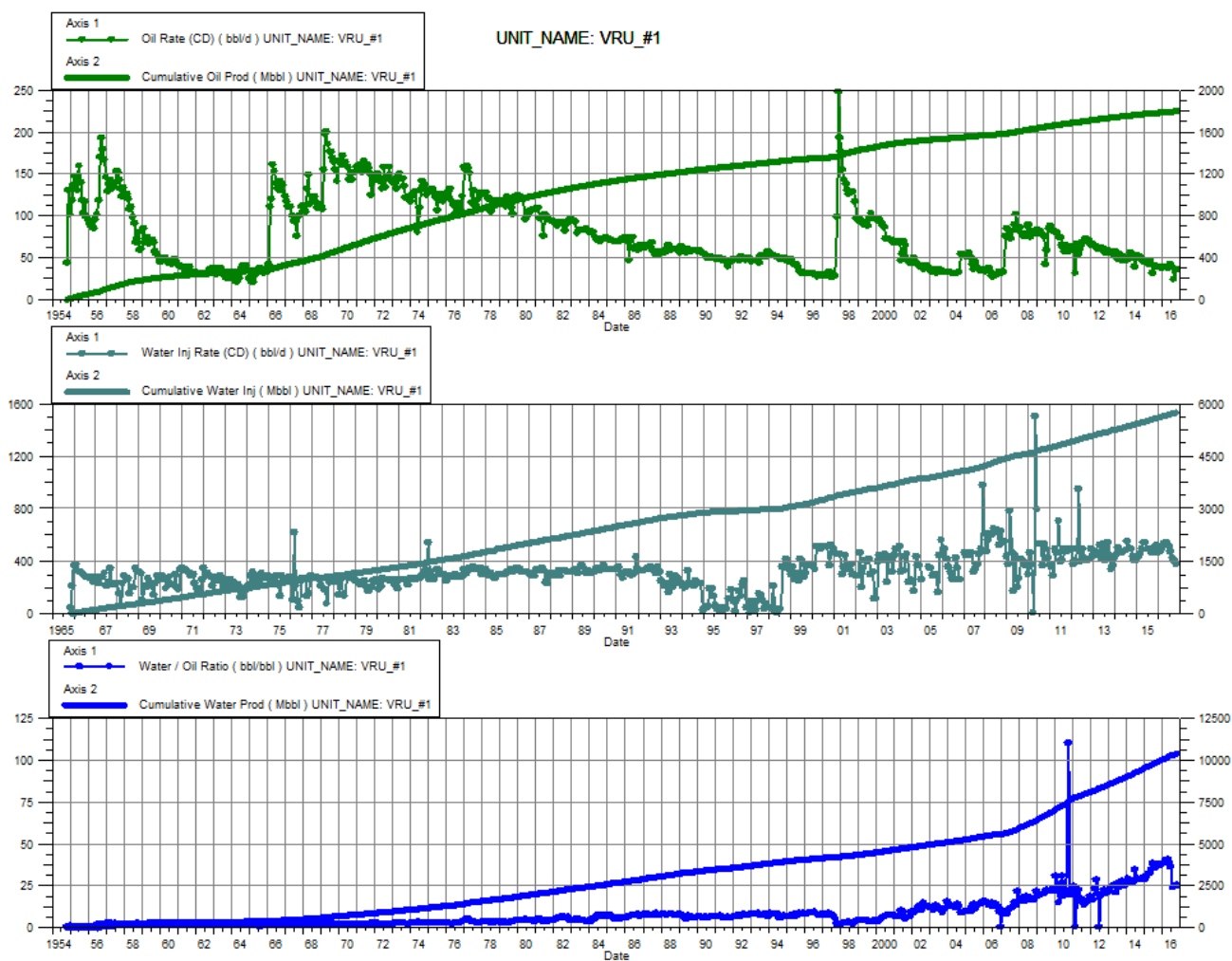
Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa
1/31/2016	3.19	137.45	187.50	1095.30	148.45	1501.92	58.77	0.78	1.22	4,806.45
2/29/2016	3.24	137.54	197.73	1101.03	176.88	1507.05	61.07	0.88	1.21	5,006.90
3/31/2016	3.25	137.64	200.63	1107.25	181.12	1512.66	61.64	0.89	1.21	5,193.55
4/30/2016	2.93	137.73	198.06	1113.20	126.37	1516.45	67.60	0.63	1.21	5,003.33
5/31/2016	2.63	137.81	199.32	1119.38	179.51	1522.02	75.72	0.89	1.21	5,093.55
6/30/2016	2.63	137.89	194.23	1125.20	160.09	1526.82	73.76	0.81	1.21	4,910.00
7/31/2016	1.79	137.94	78.00	1127.62	177.53	1532.33	43.65	2.22	1.21	5,200.00
8/31/2016	0.39	137.96	10.04	1127.93	144.78	1536.81	25.93	13.88	1.21	5,193.55
9/30/2016	0.32	137.97	6.96	1128.14	131.03	1540.75	21.74	17.99	1.21	5,006.67
10/31/2016	0.33	137.98	6.90	1128.35	128.36	1544.72	20.98	17.73	1.22	5,200.00
11/30/2016	0.32	137.99	6.87	1128.56	132.80	1548.71	21.47	18.45	1.22	5,206.67
12/31/2016	0.33	138.00	7.01	1128.78	132.40	1552.81	21.29	18.03	1.22	5,400.00



VRU No. 1

Pattern P-02 - 00/15-25-010-26W1/0

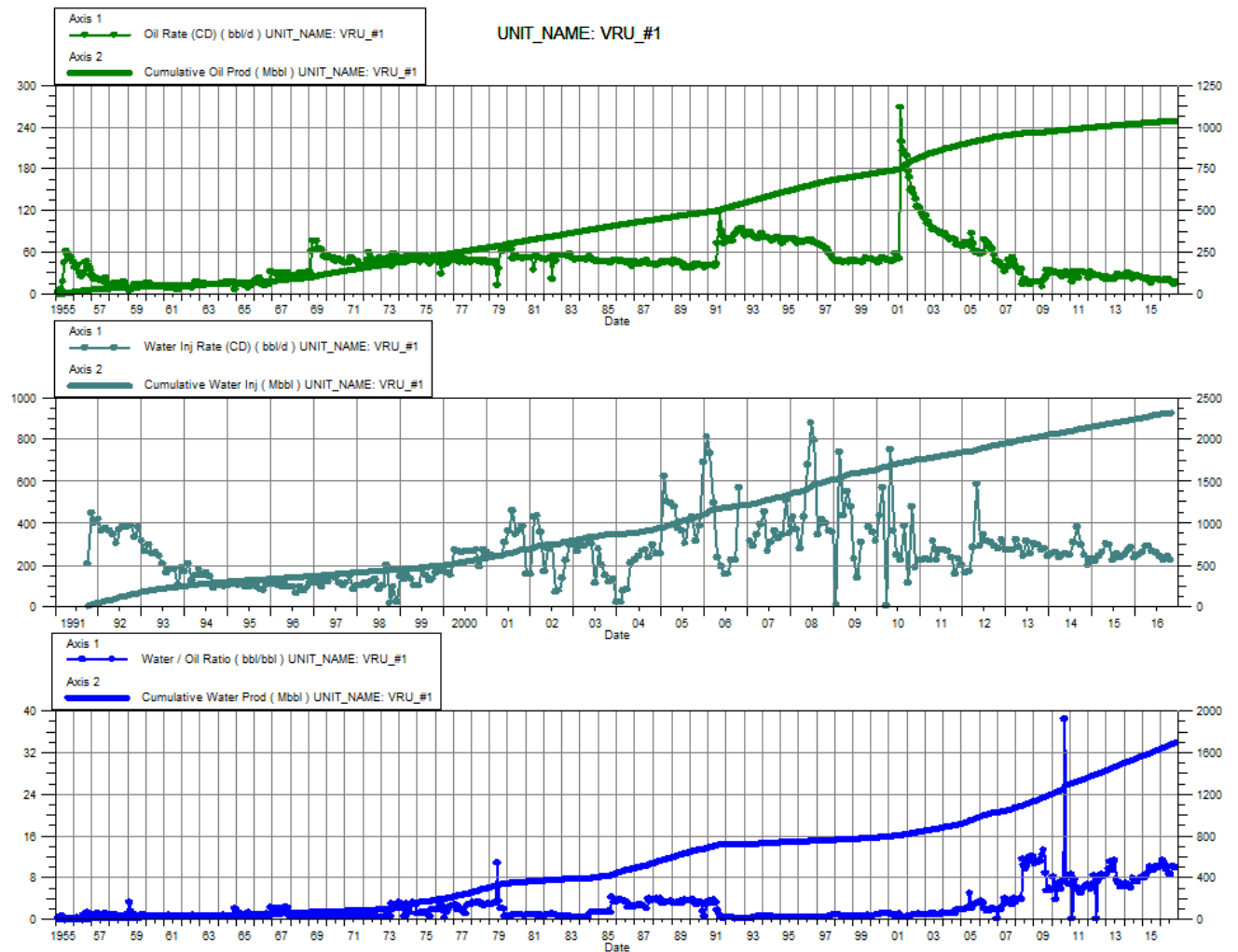
Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa
1/31/2016	6.09	284.50	232.52	1600.80	75.34	894.29	38.20	0.32	0.47	5,806.45
2/29/2016	6.14	284.68	244.58	1607.90	78.91	896.58	39.80	0.32	0.47	6,006.90
3/31/2016	6.34	284.88	249.14	1615.62	84.80	899.21	39.32	0.33	0.47	6,196.77
4/30/2016	6.06	285.06	245.76	1622.99	86.53	901.81	40.53	0.34	0.47	6,103.33
5/31/2016	6.20	285.25	238.65	1630.39	85.71	904.46	38.51	0.35	0.47	6,193.55
6/30/2016	6.62	285.45	235.52	1637.46	81.59	906.91	35.59	0.34	0.47	6,006.67
7/31/2016	6.32	285.65	149.09	1642.08	75.11	909.24	23.58	0.48	0.47	6,200.00
8/31/2016	3.80	285.76	91.25	1644.91	67.33	911.33	24.01	0.71	0.47	6,206.45
9/30/2016	5.71	285.94	139.68	1649.10	64.58	913.26	24.46	0.44	0.47	6,393.33
10/31/2016	5.64	286.11	142.17	1653.51	60.33	915.14	25.20	0.41	0.47	6,200.00
11/30/2016	5.84	286.29	138.68	1657.67	61.30	916.97	23.73	0.42	0.47	6,200.00
12/31/2016	6.01	286.47	138.56	1661.96	61.44	918.88	23.04	0.43	0.47	6,200.00



VRU No. 1

Pattern P-03 - 00/15-30-010-25W1/0

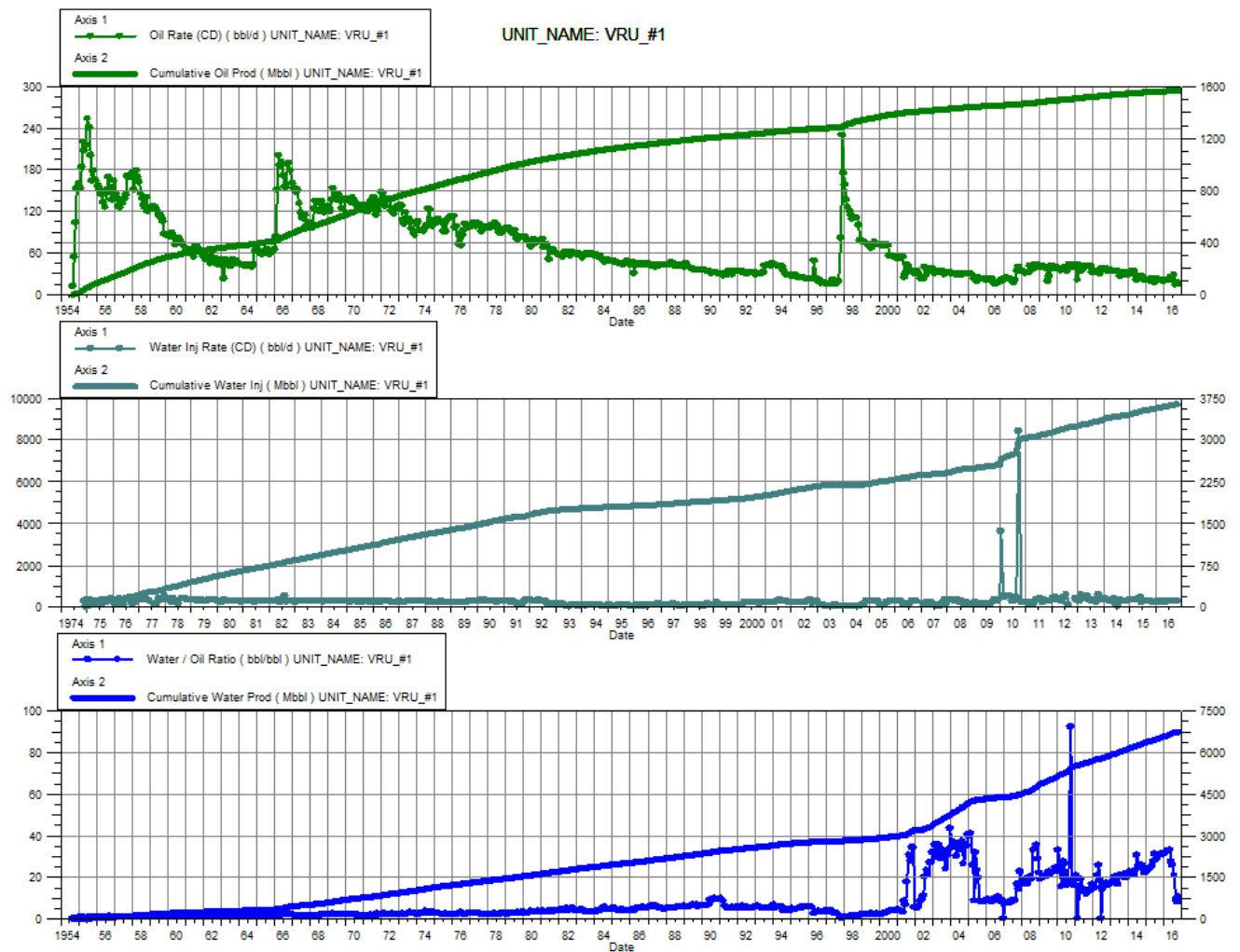
Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa
1/31/2016	3.20	164.24	32.48	261.12	38.81	358.56	10.16	1.09	0.84	6,606.45
2/29/2016	3.04	164.33	34.62	262.12	41.56	359.77	11.37	1.10	0.84	6,813.79
3/31/2016	3.16	164.43	34.40	263.19	45.66	361.18	10.88	1.21	0.84	7,193.55
4/30/2016	3.35	164.53	32.27	264.16	45.56	362.55	9.62	1.28	0.84	7,006.67
5/31/2016	3.13	164.63	31.68	265.14	42.24	363.86	10.11	1.21	0.84	7,190.32
6/30/2016	3.36	164.73	29.67	266.03	41.29	365.10	8.83	1.25	0.84	6,910.00
7/31/2016	3.08	164.82	26.49	266.85	38.55	366.29	8.59	1.30	0.84	7,200.00
8/31/2016	2.65	164.90	26.67	267.68	35.28	367.39	10.05	1.20	0.84	7,200.00
9/30/2016	2.23	164.97	22.64	268.36	37.96	368.53	10.15	1.52	0.84	7,200.00
10/31/2016	2.68	165.05	26.45	269.18	35.54	369.63	9.86	1.22	0.85	7,196.77
11/30/2016	2.65	165.13	24.91	269.92	36.49	370.72	9.39	1.32	0.85	7,100.00
12/31/2016	2.73	165.22	24.68	270.69	36.92	371.87	9.04	1.34	0.85	7,100.00



VRU No. 1

Pattern P-04 - 00/11-25-010-26W1/0

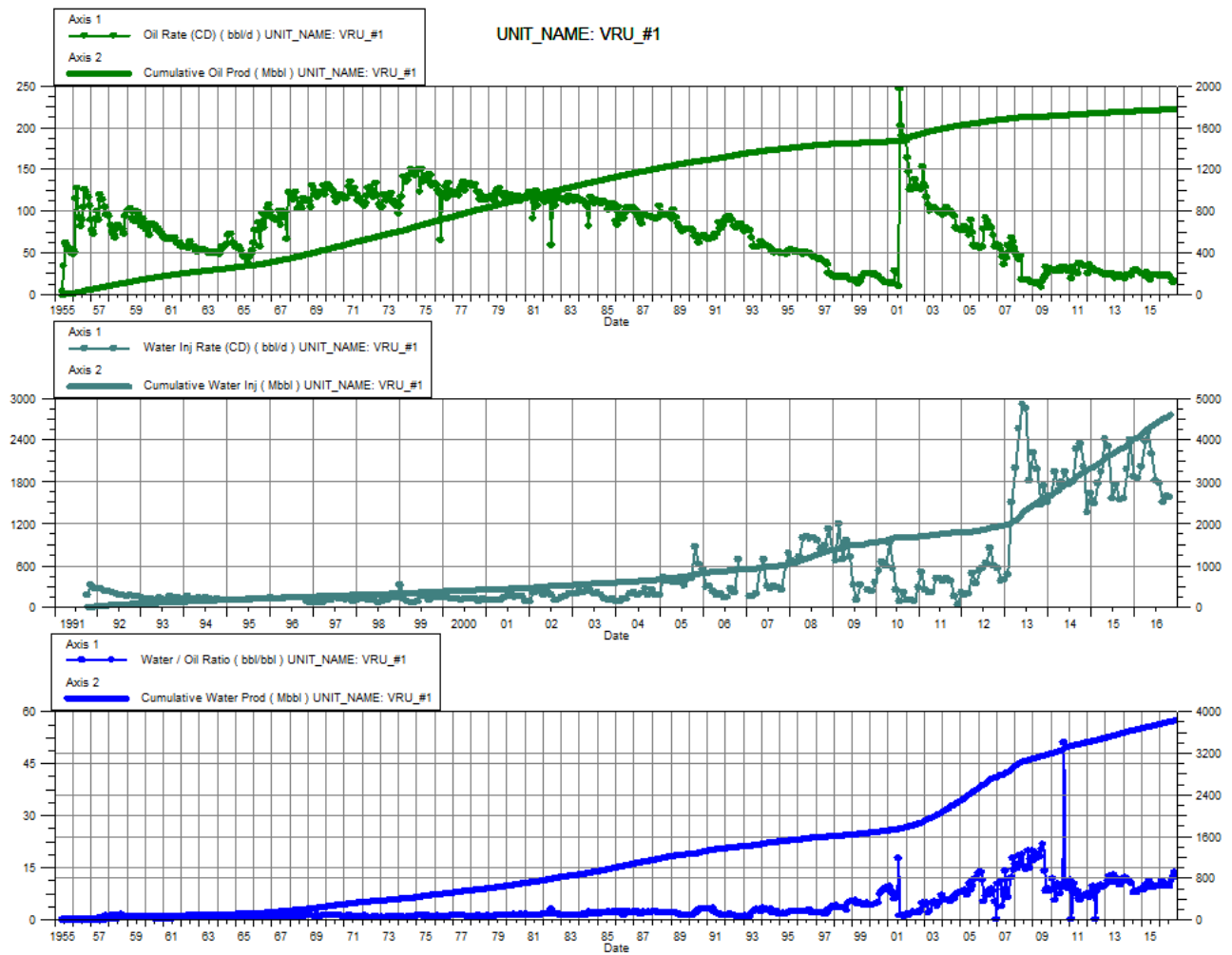
Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa
1/31/2016	3.32	248.78	104.29	1048.90	39.12	569.52	31.42	0.36	0.44	6,006.45
2/29/2016	3.37	248.87	109.99	1052.08	40.18	570.69	32.61	0.35	0.44	6,203.45
3/31/2016	3.48	248.98	112.04	1055.56	31.04	571.65	32.22	0.27	0.44	6,300.00
4/30/2016	3.32	249.08	109.92	1058.86	42.32	572.92	33.11	0.37	0.44	6,303.33
5/31/2016	3.90	249.20	107.02	1062.17	31.97	573.91	27.44	0.29	0.44	6,393.55
6/30/2016	4.12	249.33	105.21	1065.33	38.55	575.07	25.56	0.35	0.44	6,206.67
7/31/2016	4.47	249.46	93.68	1068.23	39.66	576.30	20.97	0.40	0.44	6,400.00
8/31/2016	2.28	249.54	21.40	1068.90	38.66	577.50	9.37	1.63	0.44	6,406.45
9/30/2016	2.83	249.62	22.42	1069.57	45.89	578.87	7.93	1.81	0.44	6,600.00
10/31/2016	2.43	249.70	25.24	1070.35	44.99	580.27	10.39	1.62	0.44	6,600.00
11/30/2016	2.12	249.76	25.60	1071.12	41.27	581.51	12.08	1.49	0.44	6,600.00
12/31/2016	2.19	249.83	26.74	1071.95	30.17	582.44	12.22	1.04	0.44	6,593.55



VRU No. 1

Pattern P-05 - 00/09-30-010-25W1/0

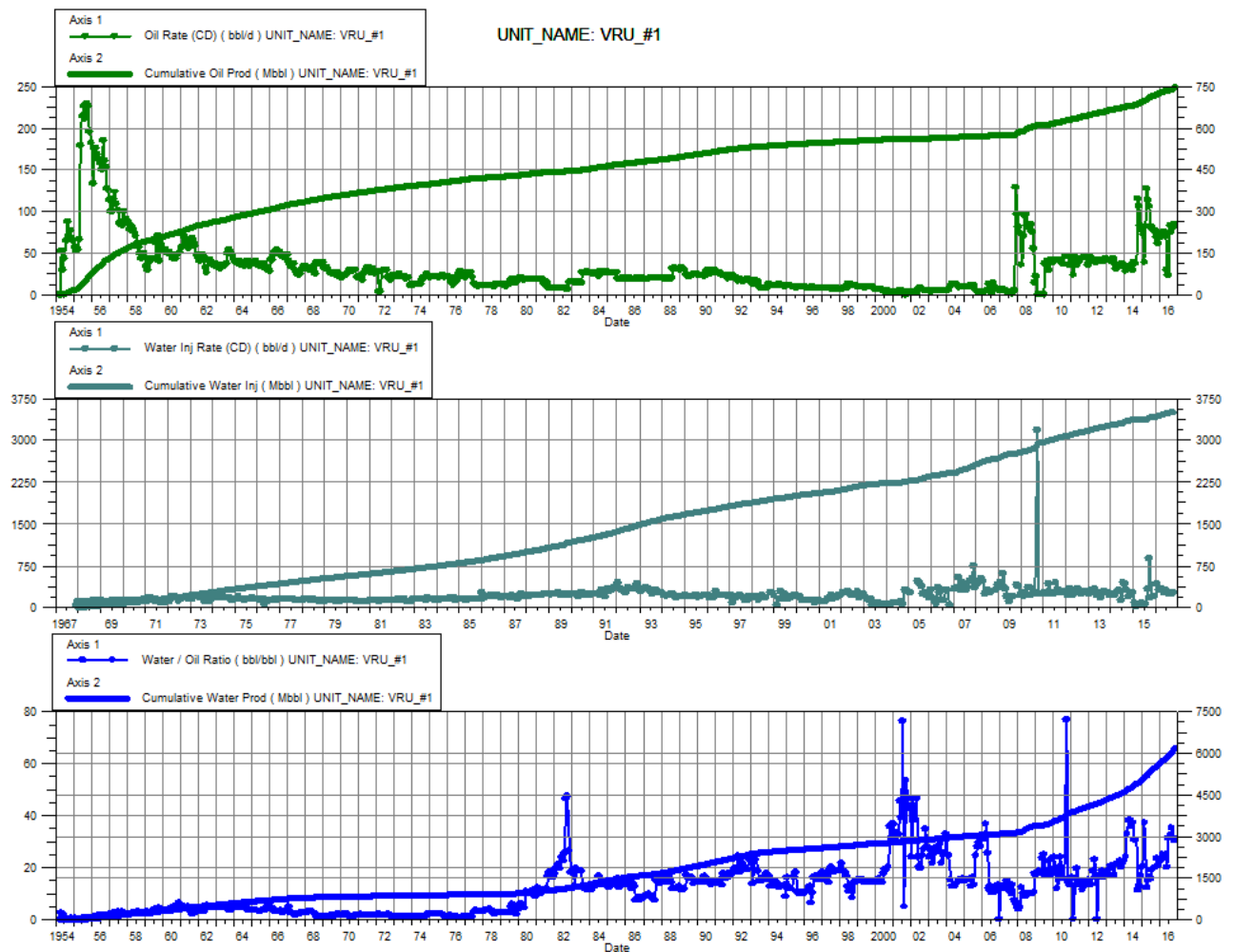
Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa
1/31/2016	3.71	281.95	36.76	598.96	295.36	649.33	9.92	7.29	0.73	6,806.45
2/29/2016	3.52	282.05	38.27	600.07	321.75	658.66	10.88	7.69	0.74	7,006.90
3/31/2016	3.68	282.16	38.73	601.27	378.73	670.40	10.53	8.92	0.75	7,196.77
4/30/2016	3.83	282.28	36.01	602.35	399.95	682.40	9.39	10.02	0.77	7,096.67
5/31/2016	3.66	282.39	36.90	603.50	349.50	693.24	10.09	8.60	0.78	7,006.45
6/30/2016	3.73	282.50	36.19	604.58	290.85	701.96	9.69	7.27	0.79	7,203.33
7/31/2016	3.48	282.61	32.75	605.60	284.16	710.77	9.42	7.83	0.80	7,296.77
8/31/2016	3.03	282.71	32.96	606.62	241.28	718.25	10.87	6.69	0.80	7,200.00
9/30/2016	2.40	282.78	29.26	607.50	254.26	725.88	12.19	8.02	0.81	7,200.00
10/31/2016	2.51	282.86	33.67	608.54	252.46	733.71	13.42	6.97	0.82	7,196.77
11/30/2016	2.57	282.93	31.03	609.47	265.36	741.67	12.09	7.89	0.83	7,103.33
12/31/2016	2.73	283.02	28.96	610.37	256.92	749.63	10.61	8.09	0.83	7,200.00



VRU No. 1

Pattern P-06 - 00/03-26-010-26W1/0

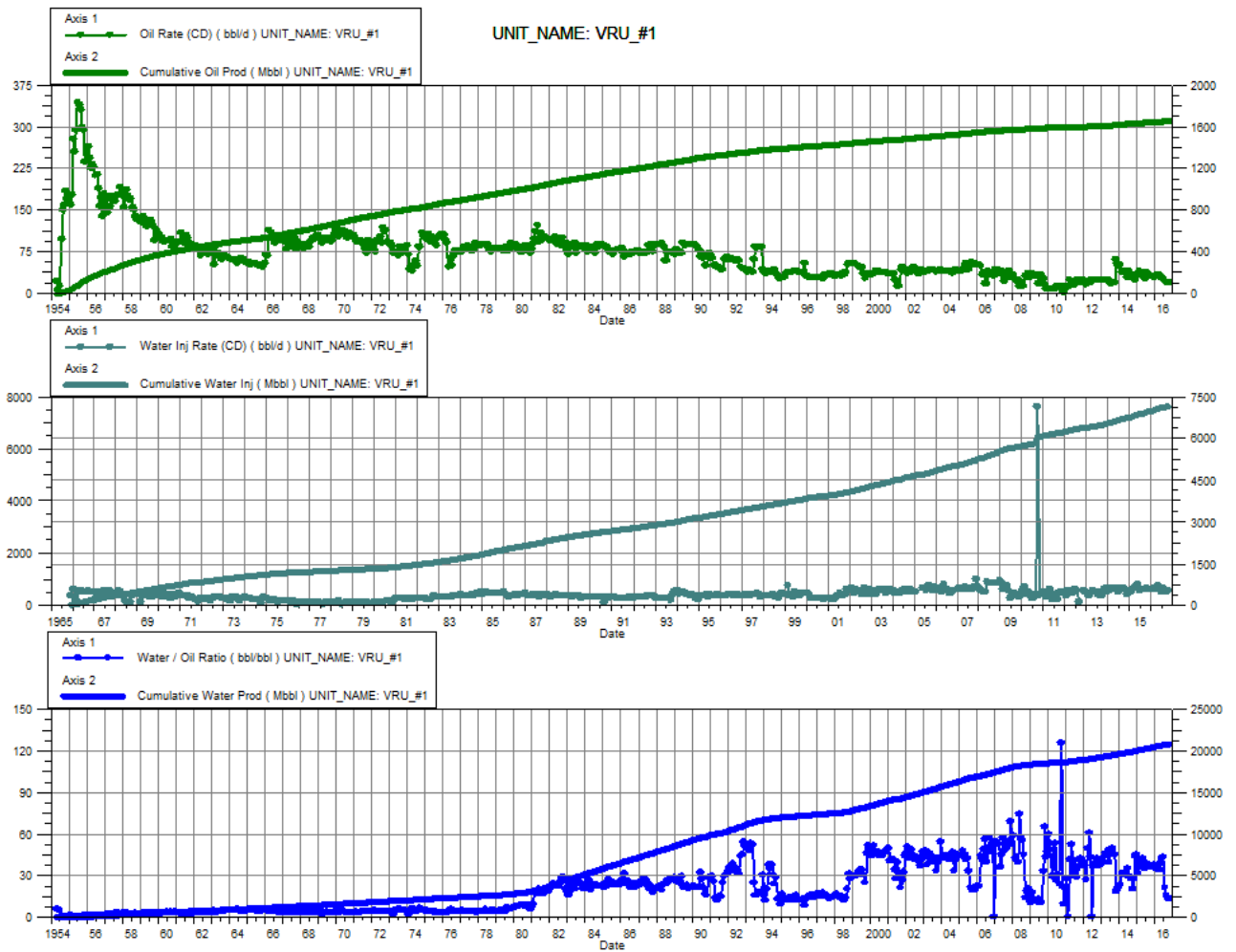
Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa
1/31/2016	11.83	115.92	263.99	901.24	67.25	547.55	22.32	0.24	0.54	3,893.55
2/29/2016	11.12	116.25	277.68	909.29	48.44	548.96	24.97	0.17	0.53	3,725.86
3/31/2016	12.09	116.62	283.89	918.09	47.45	550.43	23.47	0.16	0.53	4,454.84
4/30/2016	11.40	116.96	283.00	926.58	50.86	551.96	24.82	0.17	0.53	4,608.33
5/31/2016	4.72	117.11	94.14	929.50	42.23	553.26	19.93	0.43	0.53	4,845.16
6/30/2016	3.91	117.23	121.98	933.16	47.42	554.69	31.17	0.38	0.53	4,706.67
7/31/2016	13.32	117.64	428.81	946.45	41.95	555.99	32.19	0.10	0.52	4,900.00
8/31/2016	11.94	118.01	421.31	959.51	38.57	557.18	35.29	0.09	0.52	4,896.77
9/30/2016	12.92	118.40	405.51	971.68	39.02	558.35	31.38	0.09	0.51	4,806.67
10/31/2016	13.60	118.82	414.56	984.53	40.82	559.62	30.48	0.10	0.51	5,000.00
11/30/2016	12.66	119.20	414.91	996.97	40.26	560.83	32.78	0.09	0.50	4,996.67
12/31/2016	11.85	119.57	409.83	1009.68	39.93	562.07	34.59	0.10	0.50	4,900.00



VRU No. 1

Pattern P-07 - 00/05-25-010-26W1/0

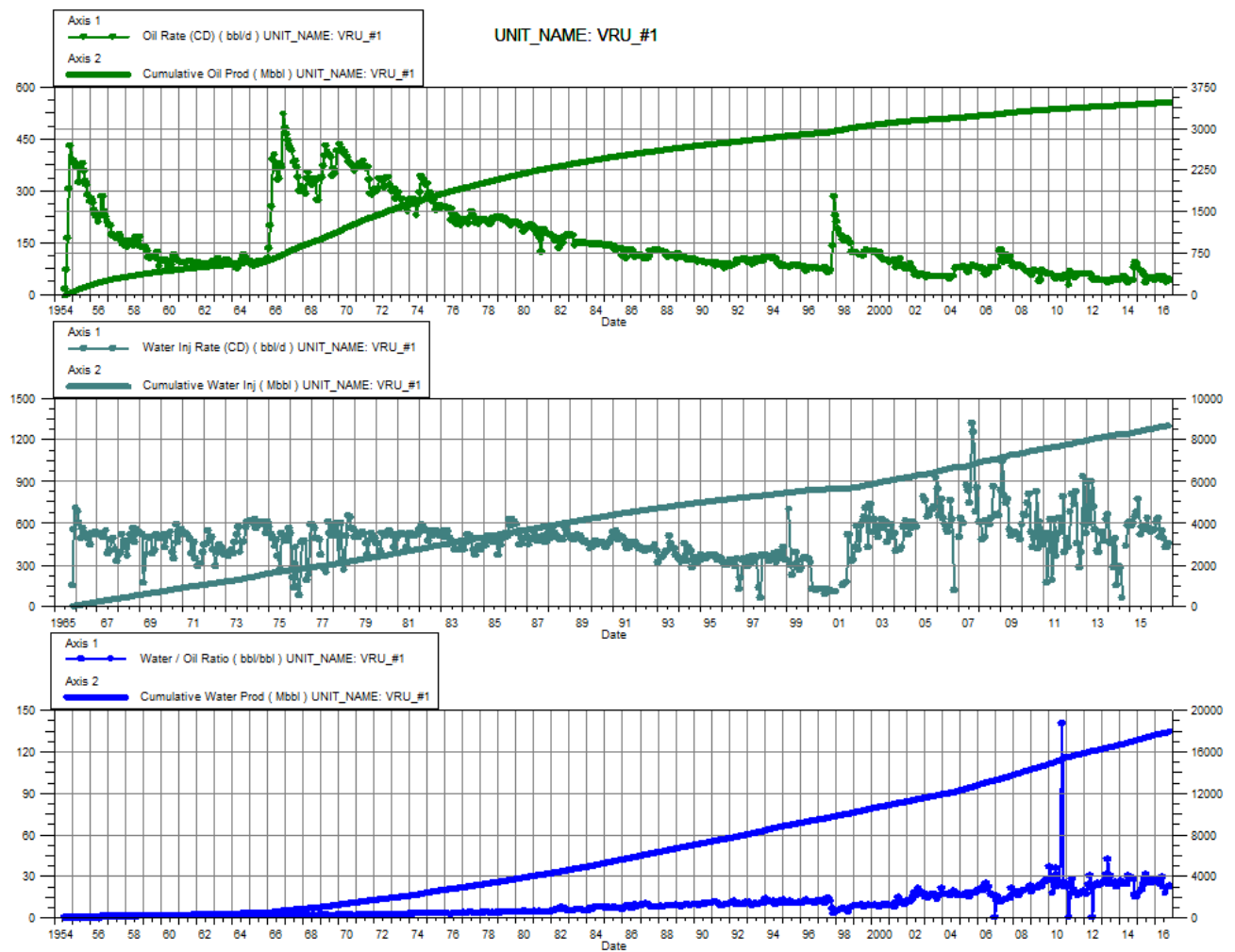
Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa
1/31/2016	5.00	261.80	175.73	3263.20	98.65	1115.17	35.17	0.55	0.32	5,806.45
2/29/2016	5.20	261.95	184.03	3268.53	102.50	1118.14	35.39	0.54	0.32	6,006.90
3/31/2016	5.52	262.12	186.72	3274.32	106.90	1121.46	33.83	0.56	0.32	6,196.77
4/30/2016	4.77	262.26	184.11	3279.85	117.95	1124.99	38.60	0.62	0.32	6,103.33
5/31/2016	4.45	262.40	189.43	3285.72	94.74	1127.93	42.58	0.49	0.32	6,193.55
6/30/2016	4.28	262.53	186.02	3291.30	80.10	1130.33	43.50	0.42	0.32	6,006.67
7/31/2016	3.36	262.63	71.47	3293.51	106.28	1133.63	21.26	1.42	0.32	6,203.23
8/31/2016	3.23	262.73	51.66	3295.12	81.36	1136.15	15.98	1.48	0.32	6,300.00
9/30/2016	3.06	262.82	40.96	3296.35	81.74	1138.60	13.40	1.86	0.32	6,303.33
10/31/2016	3.12	262.92	40.65	3297.61	85.88	1141.27	13.02	1.96	0.32	6,400.00
11/30/2016	3.01	263.01	40.25	3298.81	85.16	1143.82	13.37	1.97	0.32	6,393.33
12/31/2016	3.02	263.10	41.16	3300.09	85.92	1146.48	13.65	1.94	0.32	6,196.77



VRU No. 1

Pattern P-08 - 00/07-25-010-26W1/0

Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa
1/31/2016	7.71	550.55	200.60	2807.80	85.81	1359.76	26.02	0.41	0.40	6,612.90
2/29/2016	8.03	550.78	211.70	2813.94	88.29	1362.32	26.35	0.40	0.40	7,006.90
3/31/2016	8.45	551.04	206.63	2820.34	96.00	1365.29	24.44	0.45	0.40	7,196.77
4/30/2016	8.36	551.29	202.95	2826.43	100.44	1368.31	24.27	0.48	0.40	7,100.00
5/31/2016	6.67	551.50	193.24	2832.42	78.55	1370.74	28.95	0.39	0.40	7,096.77
6/30/2016	8.78	551.76	197.35	2838.34	86.97	1373.35	22.47	0.42	0.40	7,013.33
7/31/2016	6.43	551.96	113.22	2841.85	77.04	1375.74	17.60	0.64	0.40	7,396.77
8/31/2016	5.47	552.13	116.75	2845.47	67.86	1377.84	21.35	0.56	0.40	7,300.00
9/30/2016	7.18	552.35	159.06	2850.24	67.28	1379.86	22.14	0.40	0.40	7,300.00
10/31/2016	7.03	552.57	161.69	2855.25	71.29	1382.07	22.99	0.42	0.40	7,300.00
11/30/2016	7.18	552.78	158.11	2860.00	69.78	1384.17	22.02	0.42	0.40	7,290.00
12/31/2016	7.36	553.01	158.43	2864.91	72.22	1386.40	21.52	0.44	0.40	7,000.00

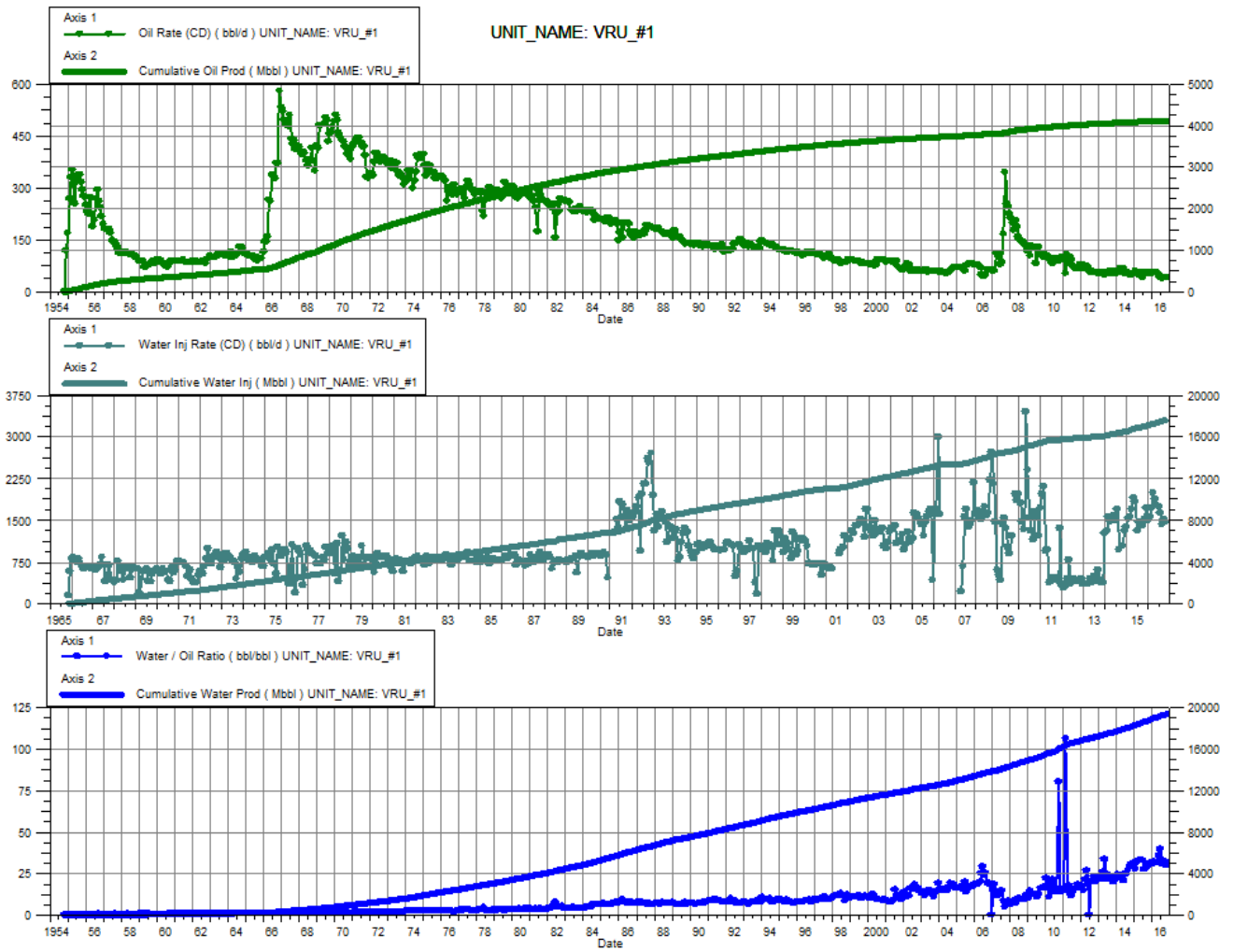


VRU No. 1

Pattern P-09 – 00/05-30-010-25W1/0

P-09 – 03/01-25-010-26W1/0

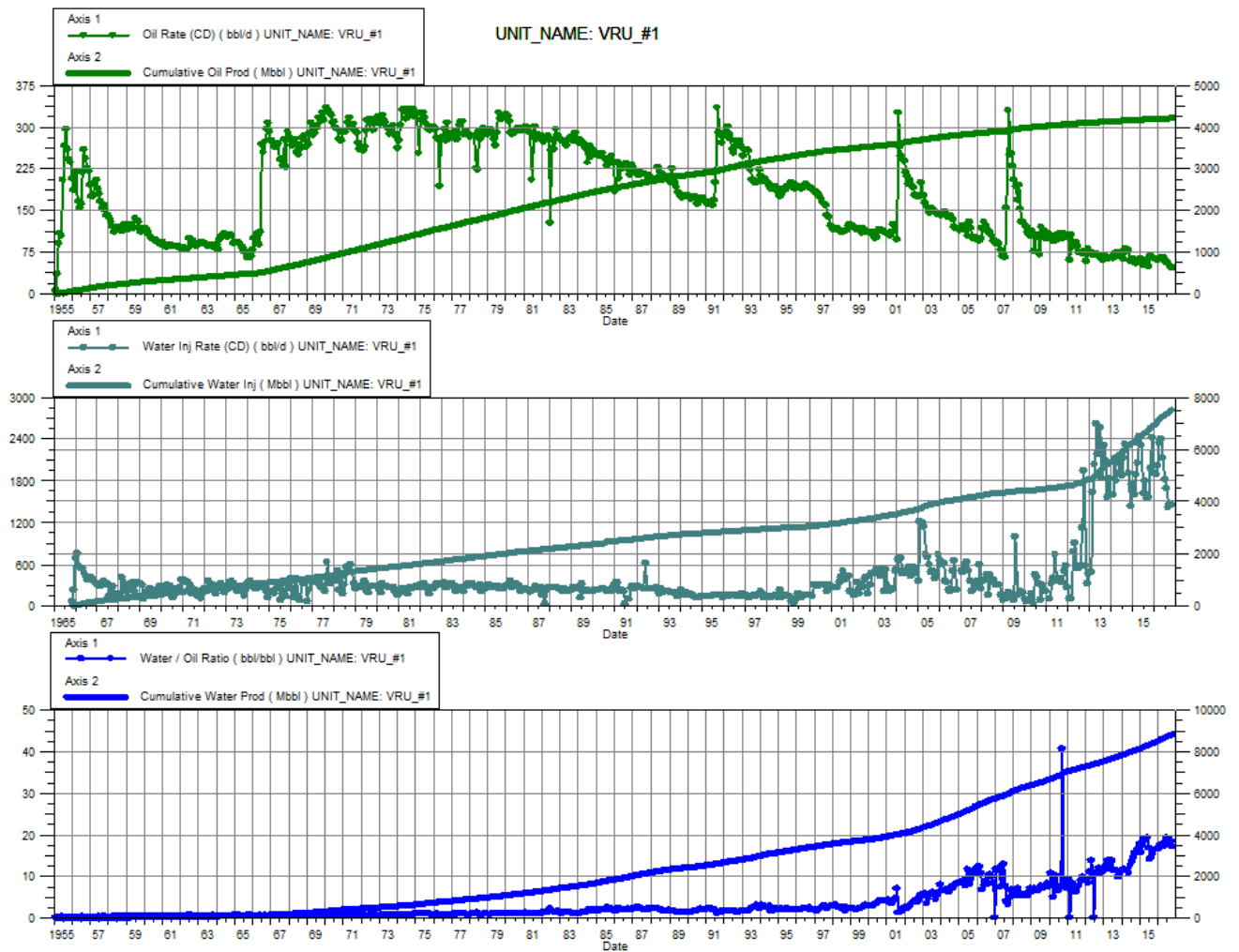
Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa	Water Inj Pressure kPa
1/31/2016	8.88	654.04	274.58	3012.72	249.96	2735.99	30.92	0.88	0.74	6,206.45	--
2/29/2016	9.07	654.30	288.93	3021.10	276.07	2744.00	31.85	0.93	0.74	6,406.90	--
3/31/2016	9.08	654.59	287.19	3030.00	316.54	2753.81	31.62	1.07	0.75	6,590.32	--
4/30/2016	8.78	654.85	284.57	3038.54	300.63	2762.83	32.41	1.02	0.75	6,313.33	--
5/31/2016	7.75	655.09	279.55	3047.20	280.70	2771.53	36.08	0.98	0.75	6,693.55	--
6/30/2016	6.99	655.30	280.68	3055.62	277.96	2779.87	40.14	0.97	0.75	6,506.67	--
7/31/2016	6.29	655.49	190.57	3061.53	259.01	2787.90	30.31	1.32	0.75	6,690.32	--
8/31/2016	5.96	655.68	198.19	3067.67	228.16	2794.97	33.23	1.12	0.75	6,412.90	--
9/30/2016	6.89	655.89	223.19	3074.37	241.20	2802.21	32.38	1.05	0.75	6,800.00	--
10/31/2016	7.04	656.10	210.45	3080.89	233.27	2809.44	29.88	1.07	0.75	6,800.00	--
11/30/2016	7.69	656.34	216.05	3087.37	225.54	2816.21	28.11	1.01	0.75	6,806.67	--
12/31/2016	7.08	656.55	185.58	3093.13	215.37	2822.88	26.22	1.12	0.75	7,000.00	--



VRU No. 1

Pattern P-10 - 00/07-30-010-25W1/0

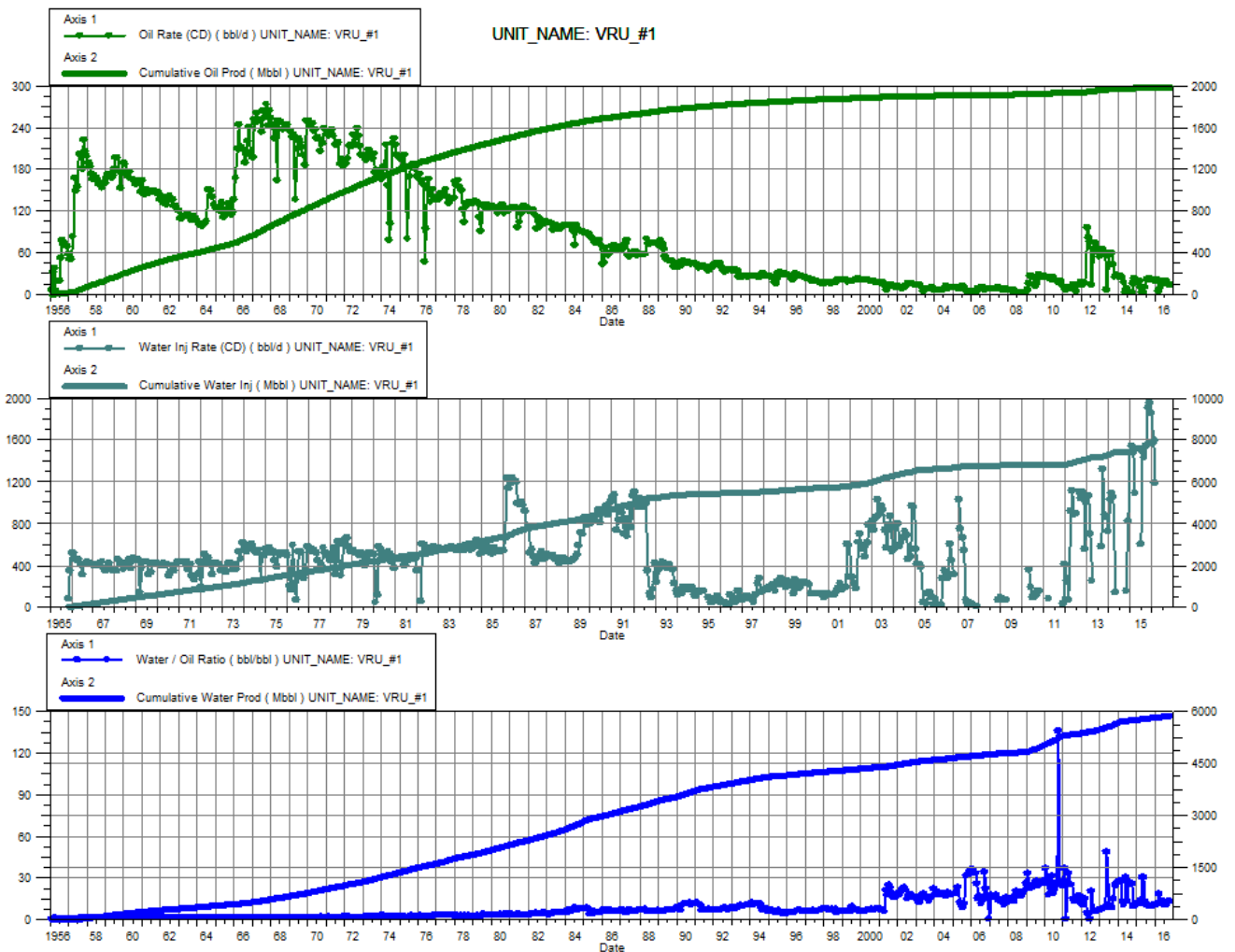
Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa	Water Inj Pressure kPa
1/31/2016	10.17	668.88	167.74	1359.73	300.55	1117.28	16.49	1.69			
2/29/2016	10.19	669.18	177.38	1364.87	322.64	1126.64	17.41	1.72	0.55	6,406.45	6,406.45
3/31/2016	10.34	669.50	179.90	1370.45	372.78	1138.19	17.41	1.96	0.55	6,896.77	7,000.00
4/30/2016	10.29	669.81	175.94	1375.73	381.94	1149.65	17.10	2.05	0.56	6,800.00	7,003.33
5/31/2016	9.59	670.11	174.47	1381.14	339.70	1160.18	18.19	1.84	0.56	6,793.55	7,087.10
6/30/2016	9.07	670.38	173.92	1386.35	289.40	1168.87	19.18	1.58	0.57	6,613.33	6,710.00
7/31/2016	8.95	670.66	155.36	1391.17	269.17	1177.21	17.37	1.64	0.57	7,000.00	7,006.45
8/31/2016	8.24	670.91	155.45	1395.99	225.14	1184.19	18.88	1.37	0.57	7,000.00	7,196.77
9/30/2016	7.58	671.14	138.33	1400.14	234.47	1191.22	18.26	1.61	0.57	7,003.33	7,100.00
10/31/2016	7.56	671.37	130.12	1404.17	232.48	1198.43	17.22	1.69	0.57	7,096.77	7,100.00
11/30/2016	7.70	671.60	136.85	1408.28	245.87	1205.81	17.77	1.70	0.58	7,006.67	7,103.33
12/31/2016	7.13	671.82	105.56	1411.55	242.79	1213.33	14.80	2.15	0.58	7,200.00	7,200.00



VRU No. 1

Pattern P-11 - 00/05-29-010-25W1/0

Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa
1/31/2016	3.28	316.10	34.94	927.06	250.61	1267.83	10.64	6.55	1.02	6,703.23
2/29/2016	3.32	316.19	36.78	928.12	189.16	1273.32	11.08	4.71	1.02	6,800.00
3/31/2016	0.81	316.22	14.80	928.58		1273.32	18.20		1.02	6,800.00
4/30/2016	1.67	316.27	22.39	929.25		1273.32	13.43		1.02	6,800.00
5/31/2016	3.10	316.36	37.76	930.42		1273.32	12.19		1.02	6,800.00
6/30/2016	2.44	316.44	32.10	931.39		1273.32	13.14		1.02	6,800.00
7/31/2016	3.15	316.53	31.71	932.37		1273.32	10.07		1.02	6,800.00
8/31/2016	3.02	316.63	31.83	933.36		1273.32	10.54		1.01	6,800.00
9/30/2016	2.34	316.70	29.71	934.25		1273.32	12.72		1.01	6,800.00
10/31/2016	2.29	316.77	28.91	935.14		1273.32	12.64		1.01	6,800.00
11/30/2016	2.23	316.84	28.76	936.01		1273.32	12.88		1.01	6,800.00
12/31/2016	2.26	316.91	29.35	936.92		1273.32	12.98		1.01	6,800.00

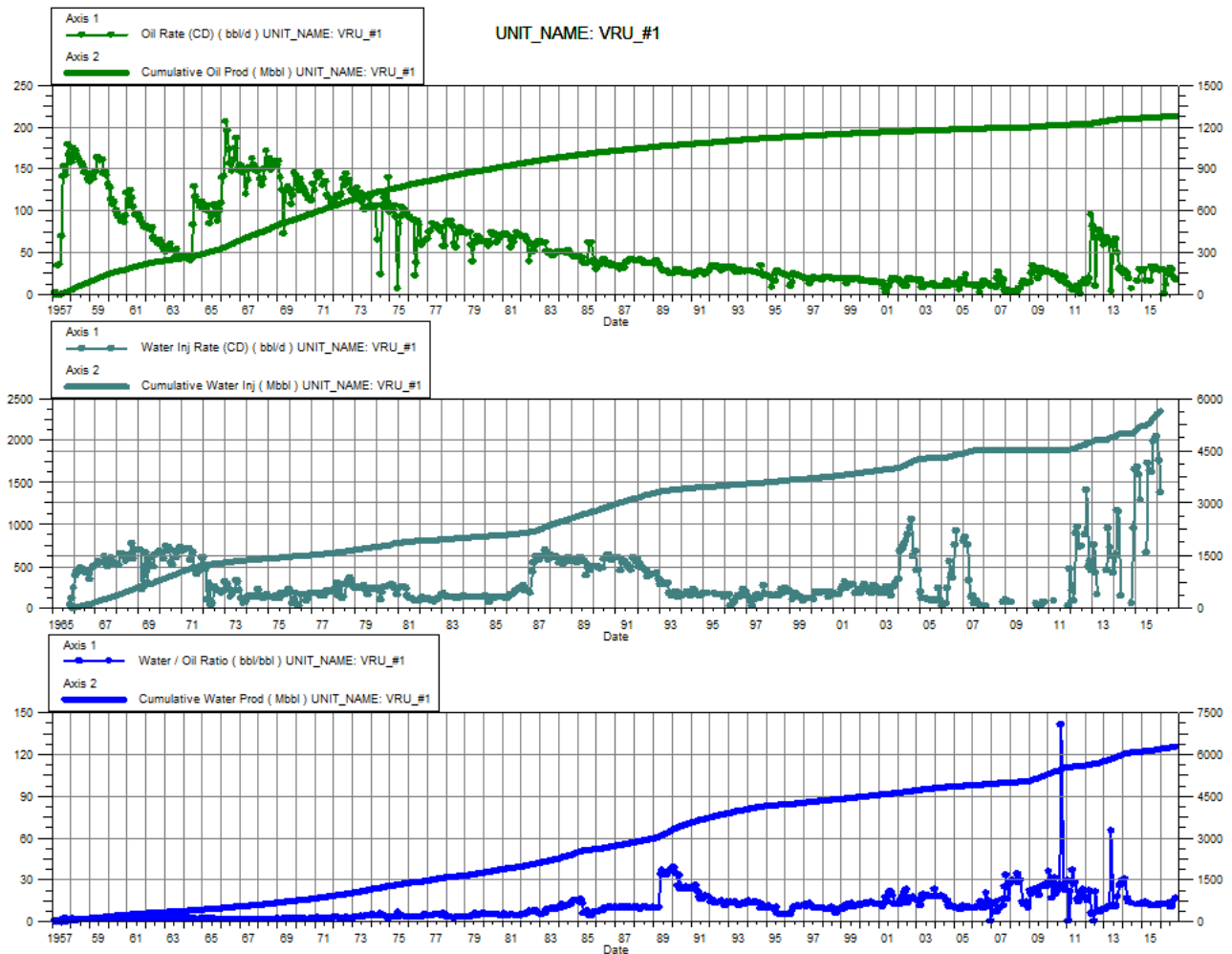


VRU No. 1

Pattern P-12 – 00/06-29-010-25W1/0

P-12 – 00/07-29-010-25W1/0

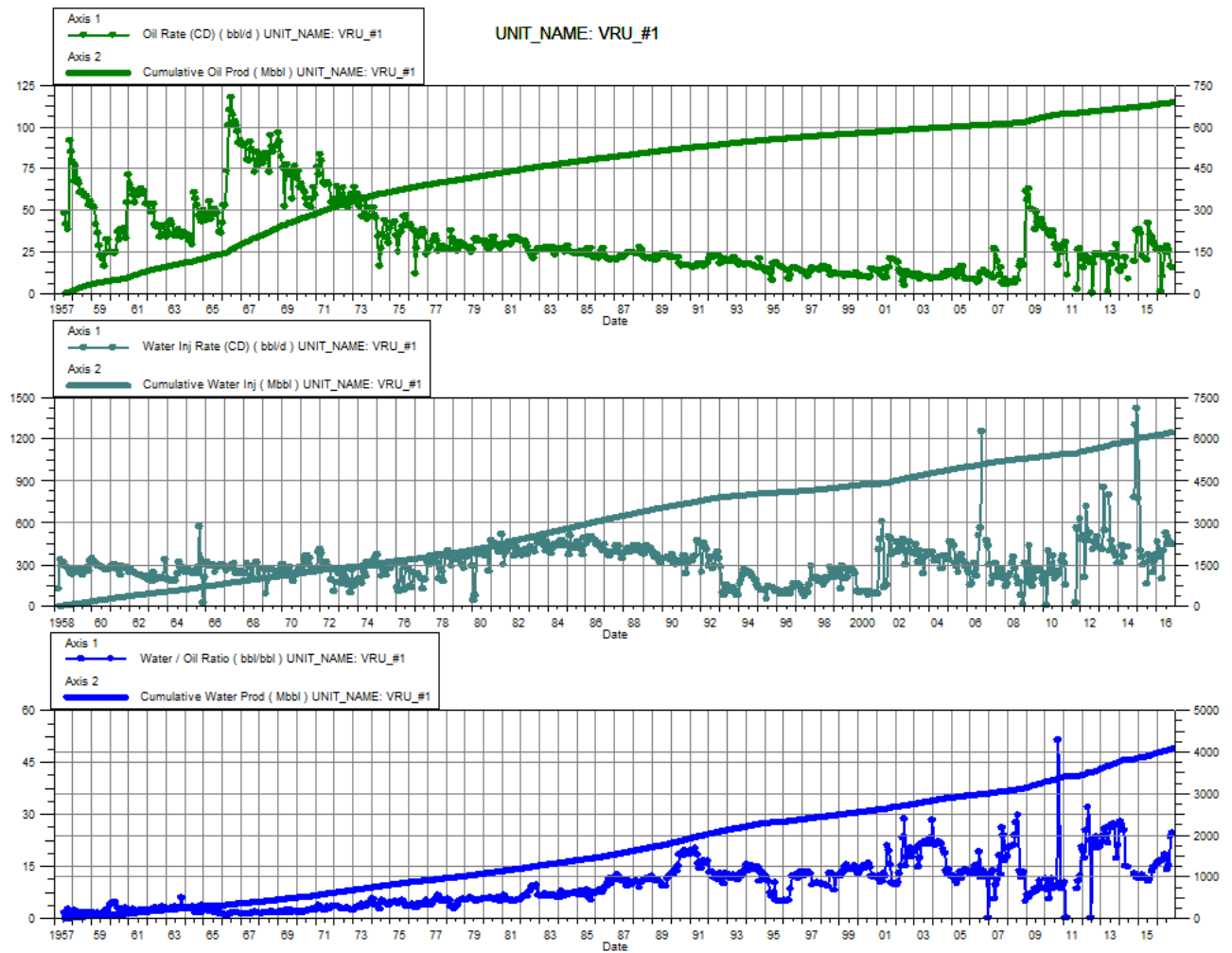
Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa	Water Inj Pressure kPa
1/31/2016	4.67	202.73	54.42	987.28	280.89	895.58	11.66	4.75	0.75	6,606.45	6,406.45
2/29/2016	4.73	202.87	57.38	988.95	220.26	901.97	12.13	3.54	0.75	6,800.00	6,606.90
3/31/2016	0.27	202.88	3.30	989.05		901.97	12.04		0.75	6,800.00	6,800.00
4/30/2016	1.81	202.93	22.12	989.71		901.97	12.20		0.75	6,800.00	6,800.00
5/31/2016	4.41	203.07	58.81	991.54		901.97	13.35		0.75	6,800.00	6,800.00
6/30/2016	3.87	203.19	50.96	993.07		901.97	13.17		0.75	6,800.00	6,800.00
7/31/2016	5.01	203.34	51.73	994.67		901.97	10.32		0.75	6,800.00	6,800.00
8/31/2016	4.81	203.49	51.91	996.28		901.97	10.79		0.75	6,800.00	6,800.00
9/30/2016	3.23	203.59	48.69	997.74		901.97	15.09		0.75	6,800.00	6,800.00
10/31/2016	2.95	203.68	47.62	999.21		901.97	16.13		0.75	6,800.00	6,800.00
11/30/2016	2.88	203.76	47.36	1000.64		901.97	16.43		0.75	6,800.00	6,800.00
12/31/2016	2.92	203.86	48.33	1002.13		901.97	16.57		0.75	6,800.00	6,800.00



VRU No. 1

Pattern P-13 - 00/05-28-010-25W1/0

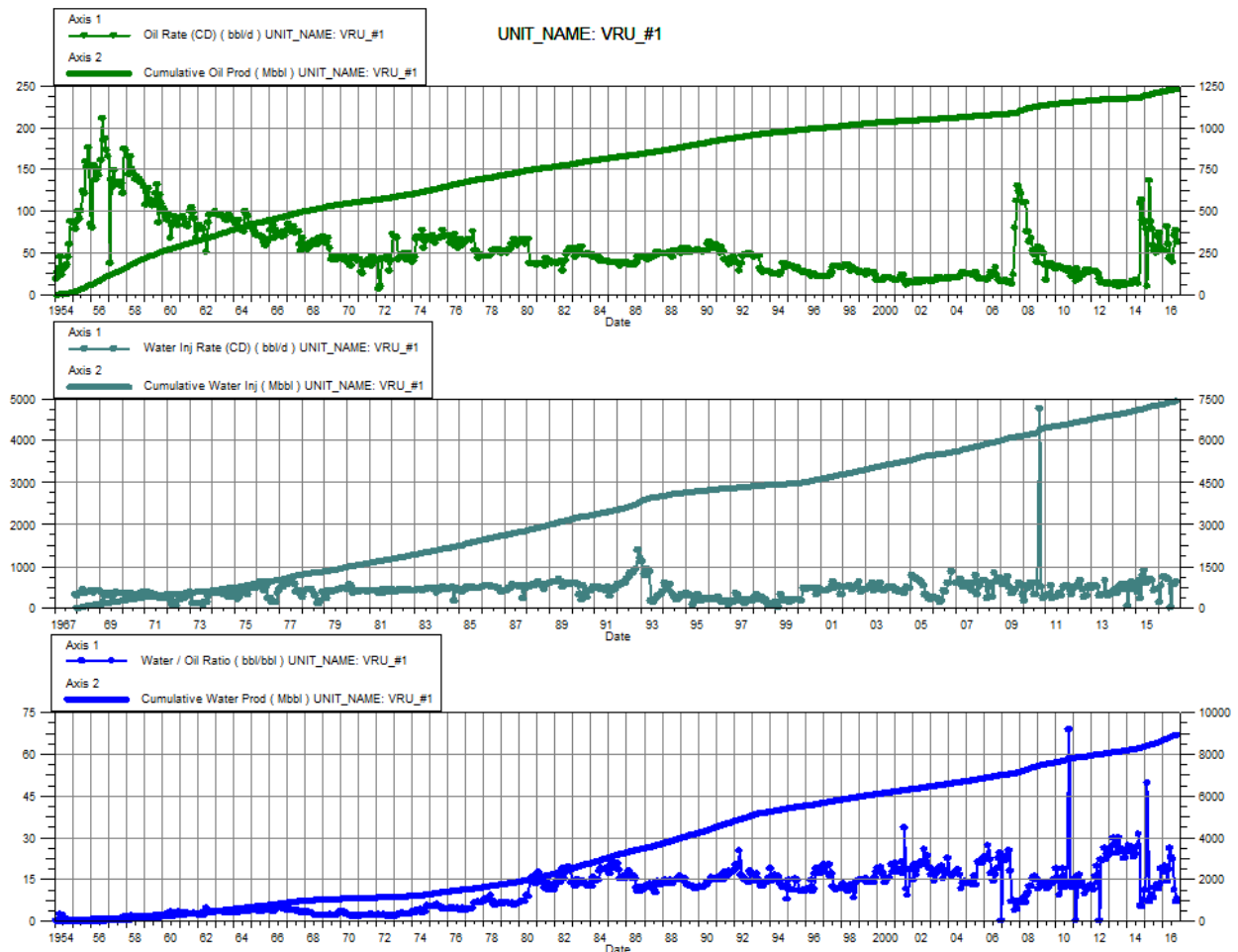
Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa
1/31/2016	4.30	108.59	68.26	634.05	73.08	978.93	15.89	1.01	1.31	4,993.55
2/29/2016	4.35	108.72	71.98	636.14	55.62	980.54	16.54	0.73	1.31	4,806.90
3/31/2016	0.25	108.73	4.14	636.27		980.54	16.45		1.31	5,000.00
4/30/2016	1.67	108.78	27.75	637.10	30.72	981.46	16.62	1.04	1.31	5,033.33
5/31/2016	4.05	108.90	73.78	639.39	63.78	983.44	18.20	0.82	1.31	5,987.10
6/30/2016	3.94	109.02	69.92	641.49	83.85	985.96	17.76	1.13	1.31	5,610.00
7/31/2016	4.61	109.16	64.89	643.50	78.60	988.39	14.07	1.13	1.31	5,896.77
8/31/2016	4.26	109.30	64.73	645.51	71.14	990.60	15.19	1.03	1.31	5,796.77
9/30/2016	2.65	109.38	62.11	647.37	72.78	992.78	23.41	1.12	1.31	5,710.00
10/31/2016	2.52	109.45	62.22	649.30	70.66	994.97	24.66	1.09	1.31	5,993.55
11/30/2016	2.46	109.53	61.88	651.15	70.86	997.10	25.12	1.10	1.31	5,793.33
12/31/2016	2.49	109.60	63.15	653.11	70.46	999.28	25.36	1.07	1.31	5,600.00



VRU No. 1

Pattern P-14 - 00/15-23-010-26W1/0

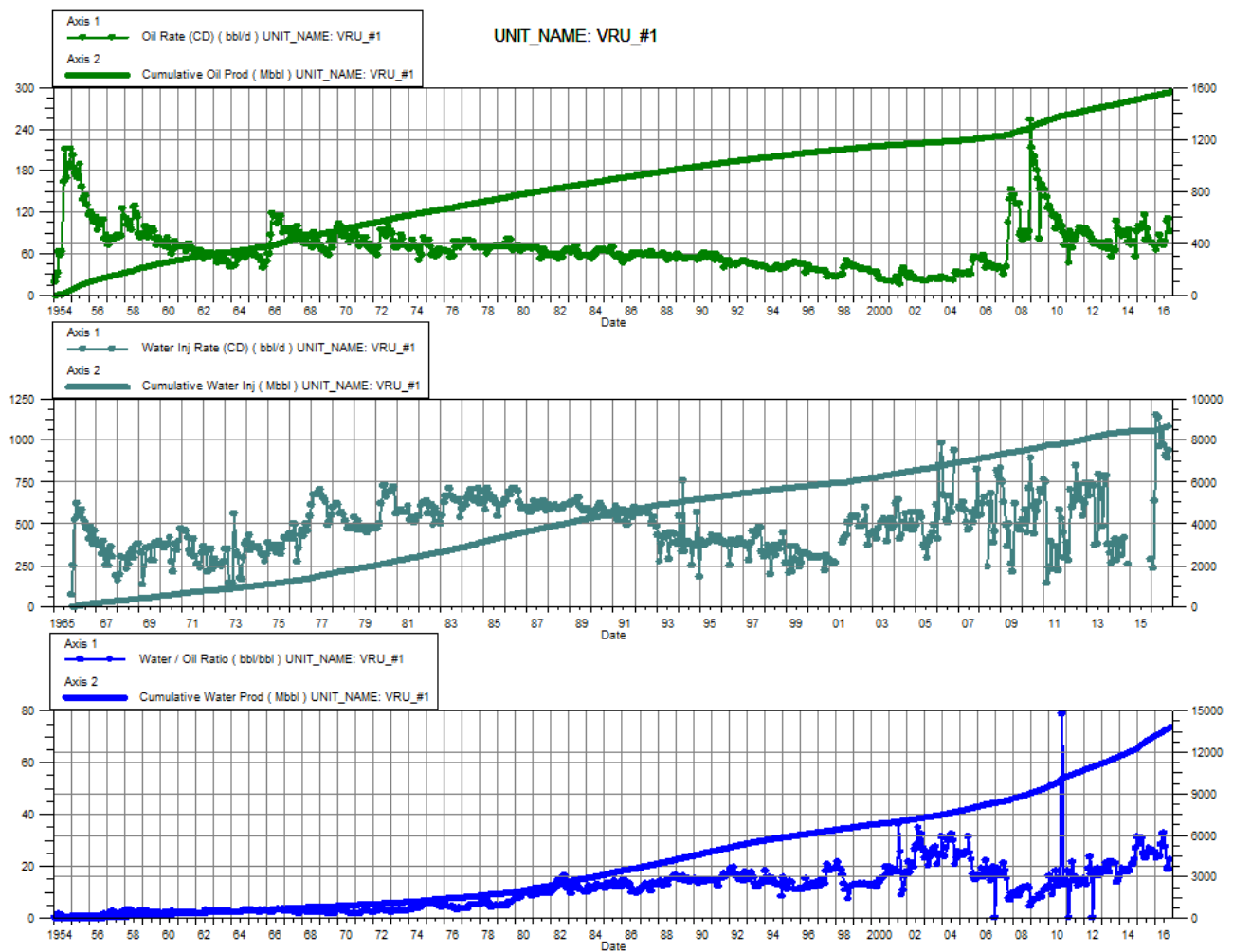
Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa
1/31/2016	8.45	193.73	146.59	1380.48	19.73	1157.66	17.35	0.13	0.73	3,870.97
2/29/2016	8.42	193.97	167.87	1385.35	86.21	1160.16	19.93	0.49	0.73	155.17
3/31/2016	13.10	194.38	186.66	1391.13	119.63	1163.87	14.25	0.60	0.73	4,506.45
4/30/2016	9.74	194.67	179.97	1396.53	119.53	1167.46	18.48	0.63	0.73	4,705.00
5/31/2016	6.85	194.88	178.89	1402.08	113.44	1170.98	26.10	0.61	0.73	4,848.39
6/30/2016	7.46	195.11	172.09	1407.24	106.95	1174.18	23.07	0.60	0.73	4,806.67
7/31/2016	6.35	195.30	139.08	1411.55	3.27	1174.29	21.91	0.02	0.73	5,000.00
8/31/2016	11.32	195.66	123.66	1415.38	89.76	1177.07	10.93	0.66	0.73	4,998.39
9/30/2016	12.34	196.03	83.46	1417.89	89.41	1179.75	6.76	0.93	0.73	4,951.67
10/31/2016	10.11	196.34	81.07	1420.40	97.05	1182.76	8.02	1.06	0.73	5,000.00
11/30/2016	8.54	196.60	79.02	1422.77	90.21	1185.46	9.25	1.03	0.73	4,993.33
12/31/2016	7.69	196.83	79.53	1425.24	93.26	1188.36	10.34	1.07	0.73	4,796.77



VRU No. 1

Pattern P-15 - 00/13-24-010-26W1/0

Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa
1/31/2016	10.50	245.50	242.06	2102.33	37.04	1341.05	23.06	0.15	0.57	2,129.03
2/29/2016	11.61	245.84	286.02	2110.62	101.24	1343.98	24.63	0.34	0.57	151.72
3/31/2016	13.79	246.27	324.77	2120.69	183.64	1349.67	23.55	0.54	0.57	4,416.13
4/30/2016	12.01	246.63	341.19	2130.93	180.75	1355.10	28.42	0.51	0.57	4,910.00
5/31/2016	11.72	246.99	380.78	2142.73	153.92	1359.87	32.49	0.39	0.57	5,196.77
6/30/2016	11.51	247.33	376.69	2154.03	170.71	1364.99	32.73	0.44	0.57	5,106.67
7/31/2016	12.55	247.72	342.55	2164.65	154.14	1369.77	27.31	0.43	0.57	5,300.00
8/31/2016	17.10	248.25	329.58	2174.87	144.28	1374.24	19.28	0.42	0.57	5,300.00
9/30/2016	17.73	248.79	333.89	2184.88	142.79	1378.52	18.84	0.41	0.57	5,300.00
10/31/2016	14.79	249.24	336.30	2195.31	149.88	1383.17	22.74	0.43	0.57	5,300.00
11/30/2016	13.93	249.66	336.09	2205.39	151.06	1387.70	24.13	0.43	0.56	5,296.67
12/31/2016	14.12	250.10	344.89	2216.08	154.99	1392.51	24.43	0.43	0.56	5,196.77

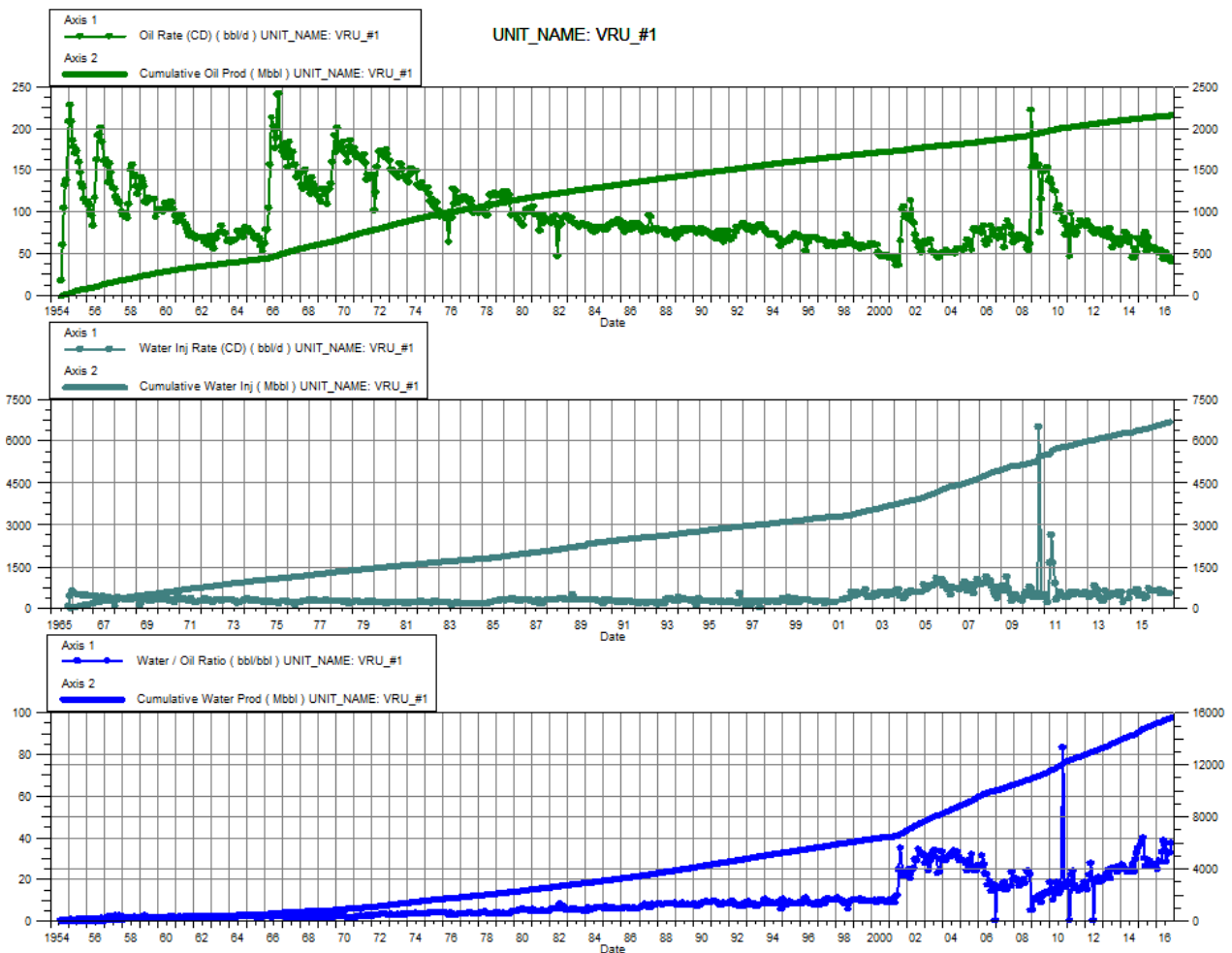


VRU No. 1

Pattern P-16 – 00/15-24-010-26W1/0

P-16 – 03/01-25-010-26W1/0

Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa	Water Inj Pressure kPa
1/31/2016	8.13	340.79	198.78	2417.36	98.68	1037.48	24.44	0.48	0.38	6,316.13	-
2/29/2016	8.16	341.03	232.24	2424.10	98.60	1040.34	28.45	0.41	0.38	6,800.00	-
3/31/2016	8.63	341.30	245.03	2431.69	100.41	1043.46	28.40	0.40	0.38	6,796.77	-
4/30/2016	7.82	341.53	256.59	2439.39	104.23	1046.58	32.83	0.39	0.38	6,703.33	-
5/31/2016	7.02	341.75	269.21	2447.74	84.00	1049.19	38.35	0.30	0.38	6,793.55	-
6/30/2016	7.30	341.97	267.46	2455.76	96.40	1052.08	36.64	0.35	0.38	6,616.67	-
7/31/2016	8.22	342.22	232.79	2462.98	88.57	1054.82	28.33	0.37	0.38	7,100.00	-
8/31/2016	6.85	342.44	224.46	2469.93	83.40	1057.41	32.78	0.36	0.38	7,096.77	-
9/30/2016	7.17	342.65	230.83	2476.86	82.68	1059.89	32.19	0.35	0.38	7,000.00	-
10/31/2016	6.37	342.85	238.19	2484.24	85.32	1062.54	37.37	0.35	0.38	7,000.00	-
11/30/2016	6.12	343.03	239.69	2491.43	85.46	1065.10	39.14	0.35	0.38	6,990.00	-
12/31/2016	6.23	343.23	246.04	2499.06	86.08	1067.77	39.48	0.34	0.38	6,700.00	-

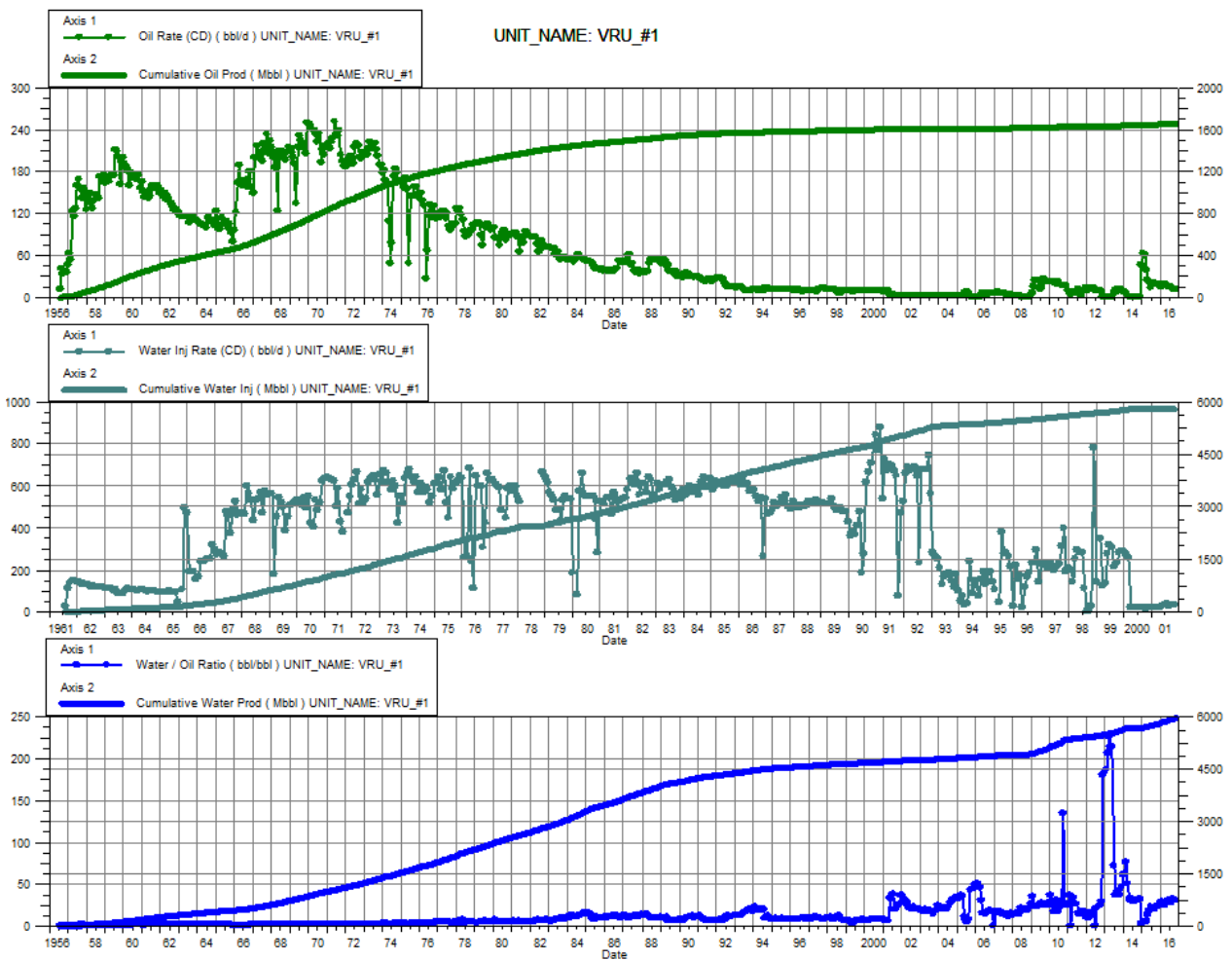


VRU No. 1

Pattern P-17 - 00/13-20-010-25W1/0 &

00/12-20-010-25W1/0

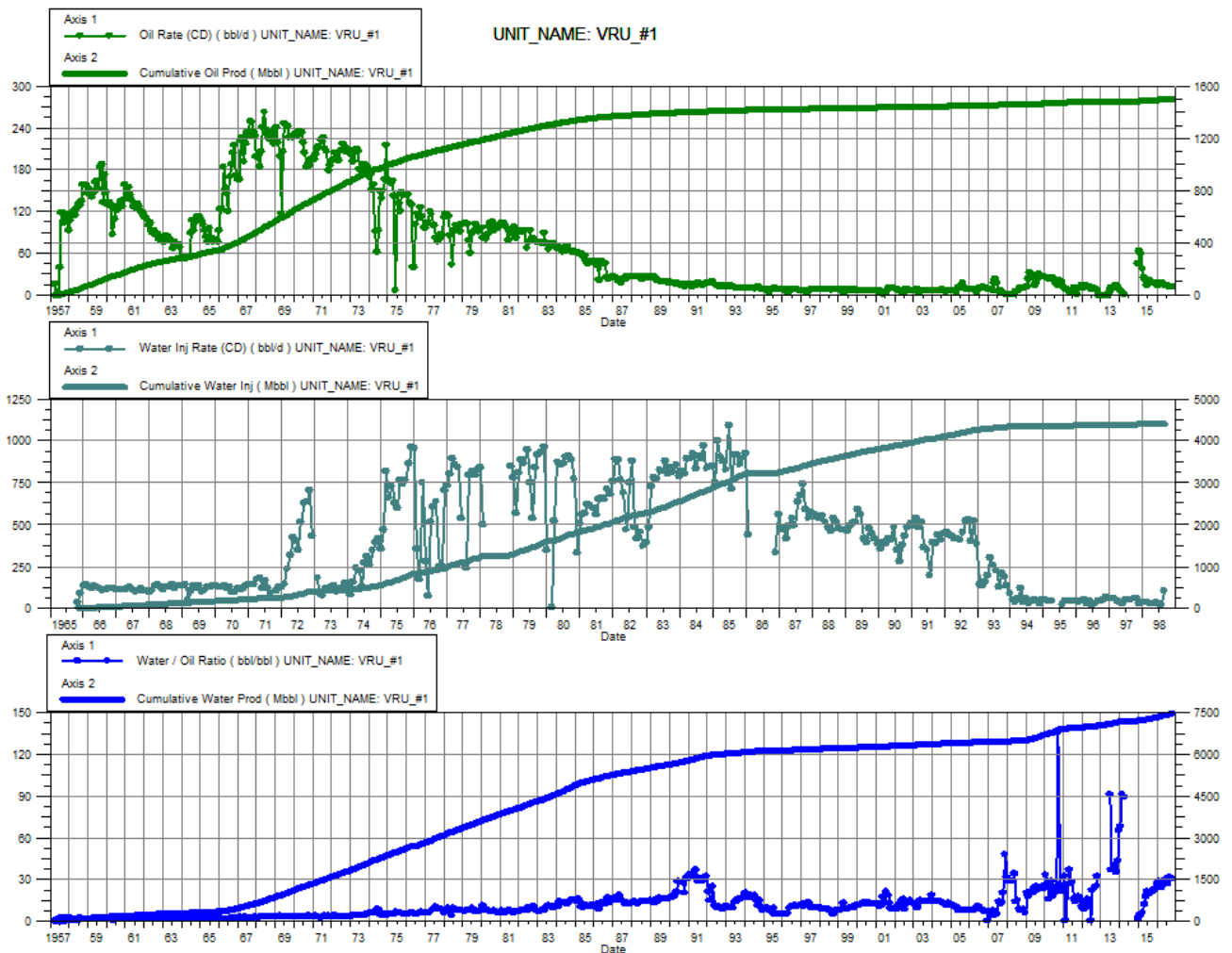
Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa
1/31/2016	2.42	262.67	70.11	927.96		922.03	29.02		0.77	-
2/29/2016	2.70	262.75	75.48	930.15		922.03	27.95		0.77	-
3/31/2016	3.10	262.85	76.82	932.53		922.03	24.76		0.77	-
4/30/2016	2.98	262.94	75.60	934.80		922.03	25.40		0.77	-
5/31/2016	2.55	263.01	76.89	937.18		922.03	30.13		0.77	-
6/30/2016	2.48	263.09	75.25	939.44		922.03	30.34		0.76	-
7/31/2016	2.39	263.16	66.71	941.51		922.03	27.87		0.76	-
8/31/2016	2.07	263.23	66.86	943.58		922.03	32.23		0.76	-
9/30/2016	2.06	263.29	66.74	945.58		922.03	32.45		0.76	-
10/31/2016	2.07	263.35	64.11	947.57		922.03	31.01		0.76	-
11/30/2016	2.08	263.42	65.71	949.54		922.03	31.54		0.76	-
12/31/2016	2.07	263.48	66.90	951.61		922.03	32.35		0.76	-



VRU No. 1

Pattern P-18 - 00/15-20-010-25W1/0

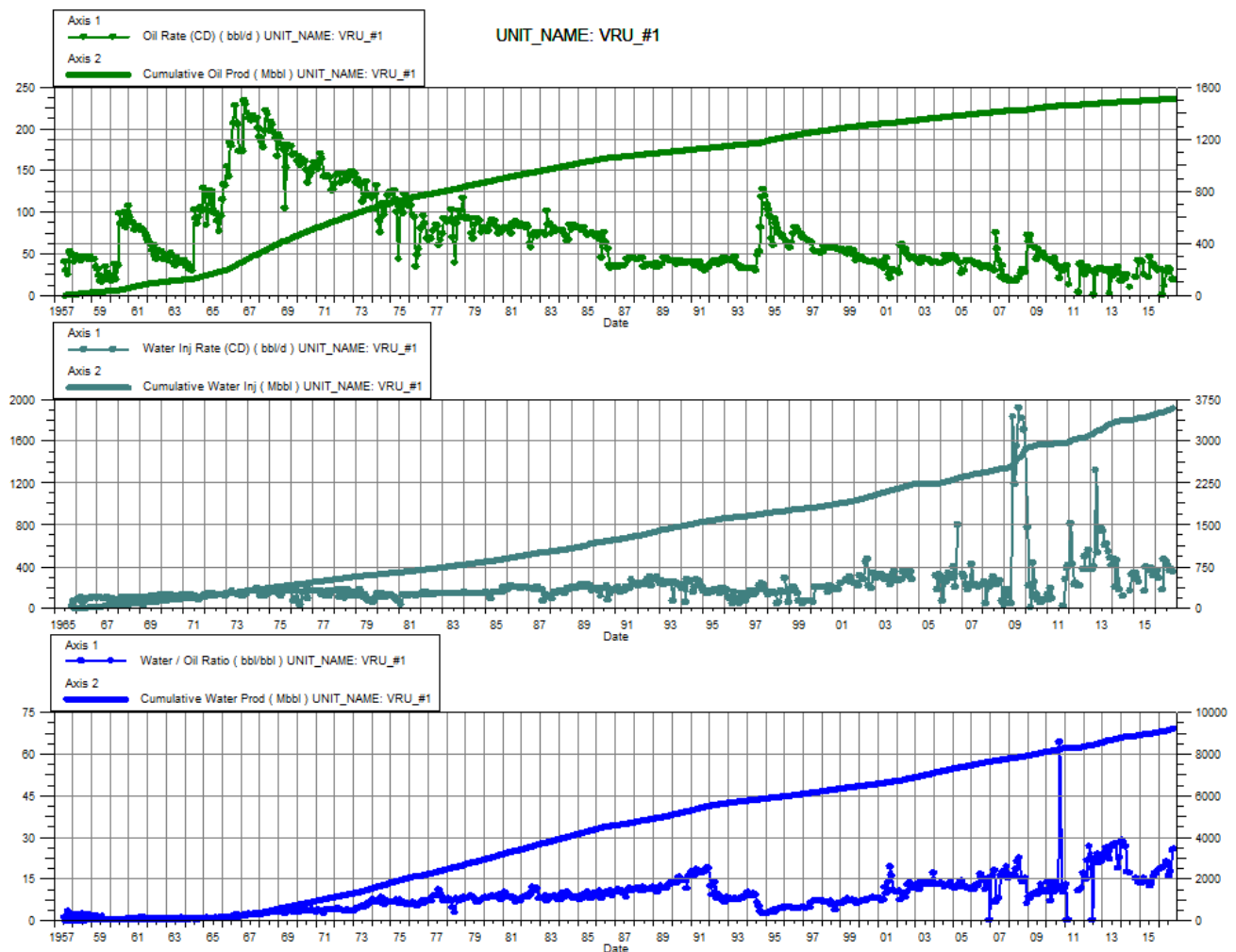
Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa
1/31/2016	2.21	237.97	62.96	1168.98		700.19	28.49		0.50	-
2/29/2016	2.49	238.05	67.94	1170.95		700.19	27.29		0.50	-
3/31/2016	2.89	238.14	69.15	1173.09		700.19	23.95		0.50	-
4/30/2016	2.77	238.22	68.03	1175.13		700.19	24.59		0.49	-
5/31/2016	2.36	238.29	69.17	1177.28		700.19	29.33		0.49	-
6/30/2016	2.35	238.36	68.40	1179.33		700.19	29.06		0.49	-
7/31/2016	2.27	238.43	60.75	1181.21		700.19	26.79		0.49	-
8/31/2016	1.95	238.49	60.88	1183.10		700.19	31.14		0.49	-
9/30/2016	1.93	238.55	60.82	1184.92		700.19	31.51		0.49	-
10/31/2016	1.91	238.61	58.42	1186.73		700.19	30.54		0.49	-
11/30/2016	1.93	238.67	60.04	1188.53		700.19	31.06		0.49	-
12/31/2016	1.91	238.73	61.12	1190.43		700.19	31.95		0.49	-



VRU No. 1

Pattern P-19 - 00/13-21-010-25W1/0

Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa
1/31/2016	4.95	239.58	90.41	1444.17	56.87	557.22	18.28	0.60	0.33	6,306.45
2/29/2016	4.99	239.73	94.86	1446.92	46.10	558.56	19.00	0.46	0.33	6,503.45
3/31/2016	0.29	239.73	5.44	1447.08		558.56	18.93		0.33	6,600.00
4/30/2016	1.92	239.79	36.75	1448.19	28.29	559.41	19.11	0.73	0.33	6,613.33
5/31/2016	4.67	239.94	97.72	1451.22	75.21	561.74	20.94	0.73	0.33	7,000.00
6/30/2016	4.56	240.07	93.76	1454.03	71.15	563.88	20.58	0.72	0.33	6,996.67
7/31/2016	5.31	240.24	85.95	1456.69	65.54	565.91	16.19	0.72	0.33	6,903.23
8/31/2016	4.93	240.39	85.86	1459.36	56.13	567.65	17.42	0.62	0.33	7,000.00
9/30/2016	3.20	240.49	80.50	1461.77	58.35	569.40	25.18	0.70	0.33	7,000.00
10/31/2016	3.08	240.58	79.63	1464.24	54.97	571.10	25.85	0.66	0.33	7,000.00
11/30/2016	3.00	240.67	79.20	1466.61	57.90	572.84	26.37	0.70	0.34	7,000.00
12/31/2016	3.04	240.77	80.83	1469.12	58.33	574.65	26.63	0.70	0.34	7,000.00



VRU No. 1

Pattern P-21 - 00/11-21-010-25W1/0

Date	Oil Rate (CD) m3/d	Cum Oil Prod Mm3	Water Rate (CD) m3/d	Cum Water Prod Mm3	Water Inj Rate (CD) m3/d	Cum Water Inj Mm3	Water Oil Ratio m3/m3	Voidage Replacement Ratio	Cum Voidage Replacemt Ratio	Water Inj Pressure kPa
1/31/2016	3.20	136.16	45.38	901.87		656.98	14.19		0.63	5,000.00
2/29/2016	3.36	136.26	48.70	903.28		656.98	14.49		0.63	5,000.00
3/31/2016	0.19	136.27	2.78	903.37		656.98	14.35		0.63	5,000.00
4/30/2016	1.29	136.31	18.96	903.94		656.98	14.66		0.63	5,000.00
5/31/2016	2.91	136.40	47.83	905.42		656.98	16.44		0.63	5,000.00
6/30/2016	3.21	136.49	50.29	906.93		656.98	15.65		0.63	5,000.00
7/31/2016	3.58	136.60	44.34	908.30		656.98	12.39		0.63	5,000.00
8/31/2016	3.13	136.70	44.60	909.68		656.98	14.24		0.63	5,000.00
9/30/2016	1.42	136.74	41.88	910.94		656.98	29.42		0.63	5,000.00
10/31/2016	1.46	136.79	41.34	912.22		656.98	28.35		0.63	5,000.00
11/30/2016	1.42	136.83	41.12	913.46		656.98	28.96		0.62	5,000.00
12/31/2016	1.44	136.88	41.96	914.76		656.98	29.17		0.62	5,000.00

