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March 8, 2017

Manitoba Mineral Resources  
Petroleum Branch  
Suite 360, 1395 Ellice Avenue  
Winnipeg, Manitoba  
R3G 3P2  
Attention: Mr. Leonardo Leonen, Technical Engineering Officer

Re: Sinclair Unit No. 4: 2016 Annual EOR Report

Dear Mr. Leonen:

Please accept the attached annual EOR report for the Sinclair Unit No. 4. This was the seventh year of operation for the Sinclair Unit No. 4 Waterflood project.

Should you require any further information or clarification; please contact Ben MacIsaac at 403-930-2842 or via email at [bmacisaac@redriveroil.ca](mailto:bmacisaac@redriveroil.ca) at your earliest convenience.

Regards,



Ben MacIsaac  
Production Engineer  
Red River Oil Inc.  
403-930-2842 (dir)  
587-582-4168 (cell)

## Sinclair Unit No. 4: EOR Report 2016

### Overview

The Sinclair Unit No. 4 is a two section, two pattern water flood in the three forks formation. Pattern #1, located in Section 14-7-29 W1M, consists of three injectors at 13-14, 15-14 and 16-14, three horizontal producers at 9-14, 02/16-14 and 14-14 and two vertical producers at 4-14 and 11-14. Pattern #2 is located in Section 11-7-29 W1M and consists of two injectors at 02/2-11 and 3-11, four horizontal producers at 1-11, 2-11, 4-11 and 02/13-11 and two vertical producers at 6-11 and 14-11. A horizontal wellbore exists at 13-11 that was downhole-abandoned in 2016. Figure 1 below is a map of the Unit showing the patterns and wellbore layout.

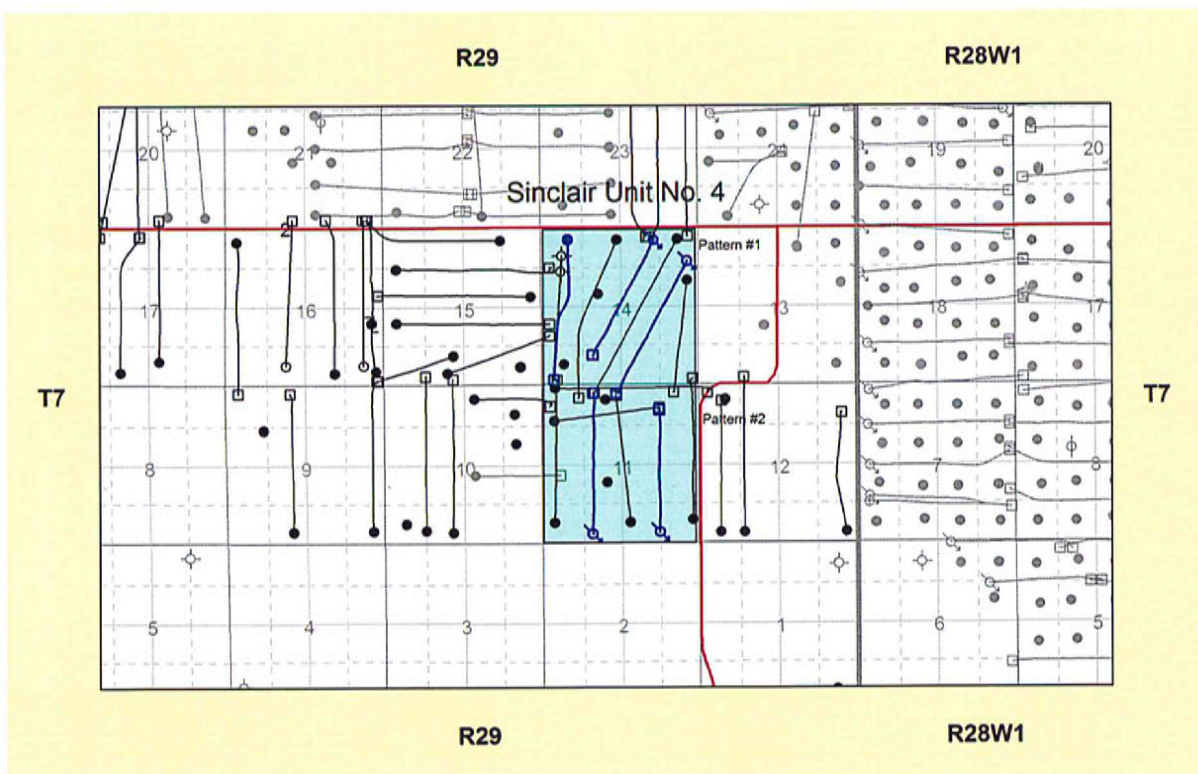


Figure 1: Sinclair Unit No. 4 Map

Unit No. 4 continues to show positive responses since Red River took over operatorship as a variety of optimization work focused on improve Unit performance continues to be executed.



The current recovery of the OOIP (8,551 mstb) for Unit No. 4 is approximately 4.7% (403.3 mstb). Primary recovery was originally estimated at 8% (684 mstb). This is consistent with reservoir work Red River has completed on its lands whereby the primary recovery factor is generally estimated at 5% (4 wells per section) and 8% with infill drilling. Furthermore, Red River estimates that secondary recovery of an additional 10% is still a reasonable projection as the Unit is further optimized.

In order to maximize recovery in Unit No. 4 Red River has continued to focus on improving the sweep efficiency and VRR of the project area through wellbore optimization work. Red River is pleased to report that a considerable optimization program was initiated in 2016 and is ongoing into 2017.

In June 2016 Red river completed a successful downhole abandonment on the 00/13-11 wellbore. 00/13-11 was a non-active east-west oriented open-hole horizontal well that was determined to be in communication with the north-south oriented 00/03-11 injection well. In order to improve sweep between the 00/03-11 injection well and the offset section 11 producers and to mitigate risk of further communication issues, the 00/13-11 lateral section was cemented off. The operation has been deemed successful as the communication has been rectified and the 00/03-11 injector has reverted to a more typical performance behaviour trend for the area.

In November and December 2016 Red River completed Packers-Plus frac ball seat drillouts and acid stimulations on the 00/01-11 and 02/16-14 producing wells respectively. Red River is pleased to report that both producing well workovers have been deemed successful considering the productivity has been improved at both wells. The improved productivity is a good indication that there previously was a degree of skin build up (potential sand bridging or frac seat scaling) at some point along the wellbore. Removal of this skin buildup will ultimately help to improve sweep efficiency of offset injection due to more uniform drawdown at the producers. Note that performance results from these workovers are not apparent when observing 2016 data as there is downtime and load fluid recovery associated with the workovers in late 2016.

Red River has identified additional candidates for intervention workovers and has plans to execute in continued efforts to optimize Unit performance.

## **Performance Data Discussion**

Overall Unit WOR for the year averaged 4.57, bringing the cumulative Unit WOR to 3.27 at year end. Injection, although still below target, improved again from the previous year. A yearly VRR of 0.8 helped increase the Unit cumulative VRR to 0.54 at year end. Figure 2 in appendix A

illustrates the overall pool performance in graphical and tabular format. Appendix A, Table 1 illustrates the overall pool performance, both monthly and cumulatively, in tabular format. Appendix A also includes individual injection well profiles and monthly average injection pressures.

#### **Pattern #1: Section 14-7-29W1M**

The pattern WOR remained relatively flat throughout the year with an average of 2.31 overall resulting in the cumulative WOR to date remaining unchanged year over year at 2.11. The yearly VRR equated to 2.01, which in turn improved the pattern cumulative VRR from 0.56 at the beginning of the year to 0.62 at year end. Appendix A, Figure 3 illustrates the Pattern #1 performance in graphical and tabular format.

#### **Pattern #2: Section 11-7-29W1M**

Section 11's WOR averaged 6.21 for 2015, bringing the cumulative to date WOR to 4.38 from 4.29 at the beginning of the year. A yearly VRR of 0.40 slightly decreased the pattern overall VRR from 0.50 at the beginning of the year to 0.49 by December. Figure 4 illustrates the Pattern #2 performance in graphical and tabular format.

### **73(1) (a-c)(f) Production and Injection Data**

The requested data referred to in clauses 1(a) to (c) and (f) of subsection 73(1) of the Oil and Gas Act (C.C.S.M. c. 034) is attached in appendix A as follows:

1. Figure 2: Unit No. 4 Monthly produced fluids and ratios in graphical and tabular format
2. Figure 3: Pattern #1 data in graphical and tabular format
3. Figure 4: Pattern #2 data in graphical and tabular format
4. Table 1: Sinclair Unit No. 4 monthly and cumulative production fluid and ratio data in tabular form
5. Individual injection well rate and pressure profiles:
  - a. 00/15-14
  - b. 00/16-14
  - c. 00/13-14
  - d. 02/02-11
  - e. 00/03-11
6. Table 2: Monthly average injection rate and pressure data

### **73(1)(d) Reservoir Pressure Surveys**

There were no pressure surveys executed in Unit No. 4 in 2016.



### **73(1)(e) Well Servicing**

As previously discussed, Red River completed the following well servicing workovers other than routine maintenance pump changes in 2016.

1. 00/13-11 downhole abandonment (June 2016)
2. 00/01-11 Packers Plus drillout and stimulation (Nov 2011)
3. 02/16-14 Packers Plus drillout and stimulation (Dec 2016)

### **73(1)(g) Injection Fluid Quality Control and Treatment**

Injection water for Sinclair Unit No. 04 is sourced from the Manville formation via the 100/14-09-007-29W1 water source well. The 100/14-09 source well is pipeline connected to Red River's 08-16 facility. At 08-16, injection water is filtered to 1 micron nominal remaining particulate through two six-bag canister filters and injected down the 5 unit injection wells. All water is treated with scale inhibitor and biocide. Injection pressures at the wellhead are limited to a maximum of 6000 kPa.

**Appendix A: Sinclair Unit No. 4 Production and Injection Data**

Figure 2: Sinclair Unit #4 Produced Fluids

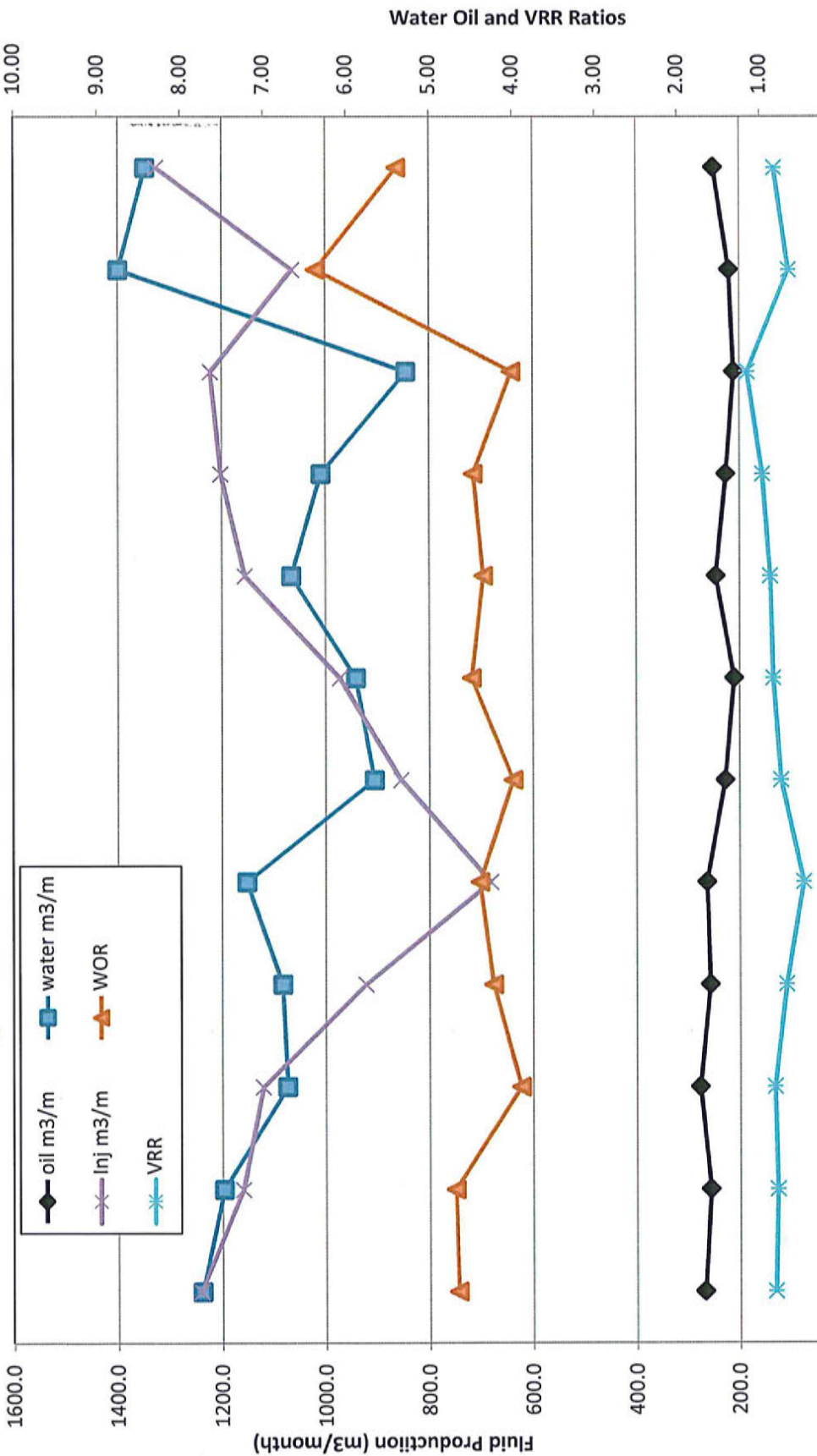


Figure 3: Produced Fluids Pattern #1 Sec 14-7-29W1M

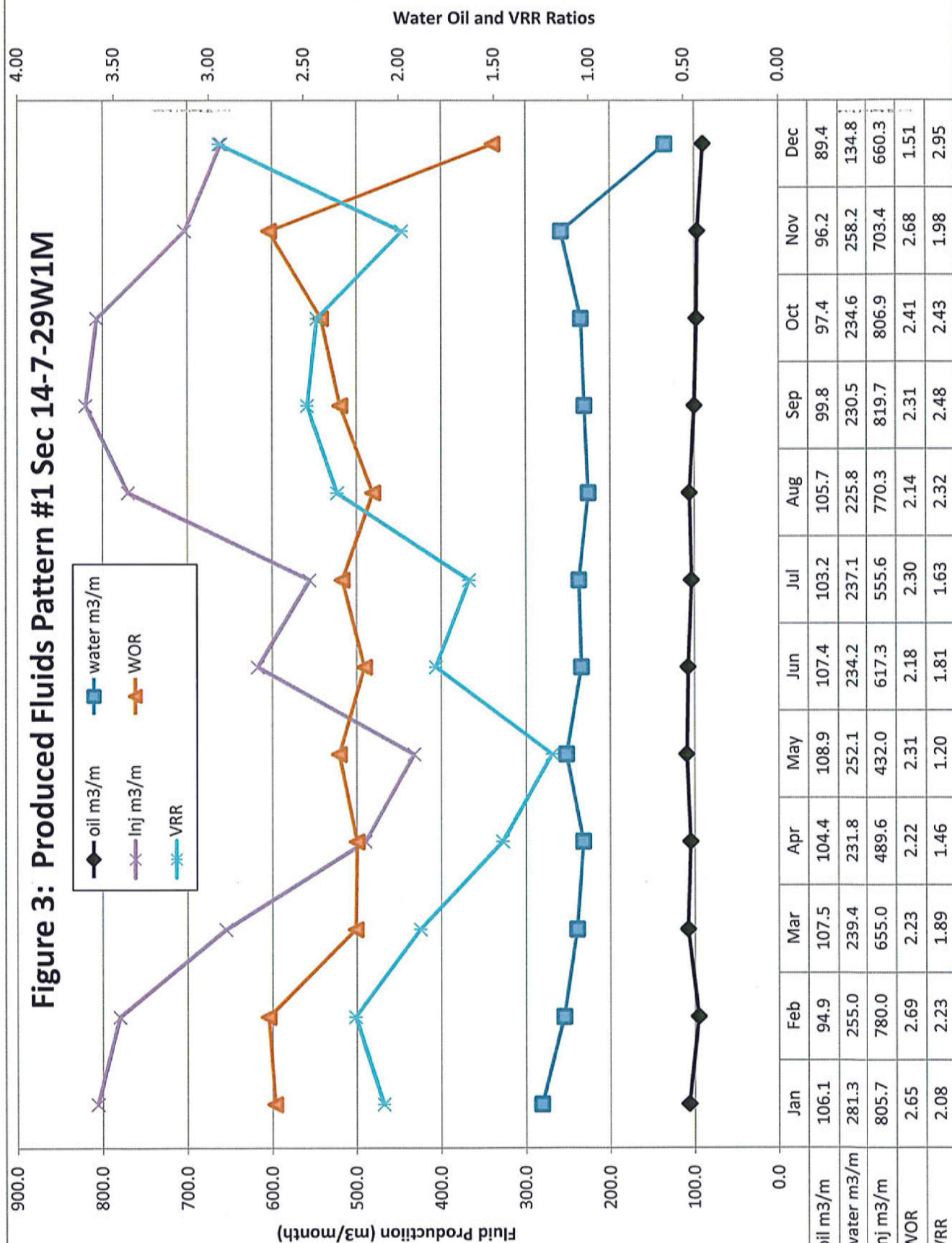
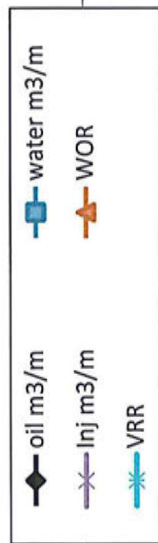




Figure 4: Produced Fluids Pattern #2 Sec 11-7-29W1M



Fluid Production (m3/month)

Water Oil and VRR Ratios

10.00

9.00

8.00

7.00

6.00

5.00

4.00

3.00

2.00

1.00

0.00

1400.0

1200.0

1000.0

800.0

600.0

400.0

200.0

0.0

|            | Jan   | Feb   | Mar   | Apr   | May   | Jun   | Jul   | Aug   | Sep   | Oct   | Nov    | Dec    |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| oil m3/m   | 160.3 | 160.6 | 168.4 | 151.9 | 153.5 | 119.6 | 106.5 | 139.4 | 125.9 | 113.2 | 123.5  | 160.3  |
| water m3/m | 957.8 | 942.1 | 834.9 | 851.7 | 900.5 | 671.6 | 704.1 | 840.4 | 778.7 | 610.3 | 1141.5 | 1212.4 |
| Inj m3/m   | 436.0 | 380.0 | 466.5 | 432.7 | 250.0 | 237.0 | 416.8 | 385.7 | 382.7 | 415.6 | 361.2  | 666.1  |
| WOR        | 5.97  | 5.87  | 4.96  | 5.61  | 5.87  | 5.61  | 6.61  | 6.03  | 6.18  | 5.39  | 9.24   | 7.56   |
| VRR        | 0.39  | 0.34  | 0.46  | 0.43  | 0.24  | 0.30  | 0.51  | 0.39  | 0.42  | 0.57  | 0.29   | 0.49   |

Table 1: Sinclair Unit #4 Produced Fluids

| 2016 Oil Production m3/month | Prior CTD | Jan   | Feb   | Mar   | Apr   | May   | Jun   | Jul   | Aug   | Sep   | Oct   | Nov   | Dec   | 2016   | CTD     |
|------------------------------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|---------|
| Pattern #1 Sec 14            | 30136.8   | 106.1 | 94.9  | 107.5 | 104.4 | 108.9 | 107.4 | 103.2 | 105.7 | 99.8  | 97.4  | 96.2  | 89.4  | 1221.0 | 31357.8 |
| Pattern #2 Sec 11            | 31082.9   | 160.3 | 160.6 | 168.4 | 151.9 | 153.5 | 119.6 | 106.5 | 139.4 | 125.9 | 113.2 | 123.5 | 160.3 | 1683.3 | 32766.2 |
| Unit #4 Total Production     | 61219.7   | 266.4 | 255.5 | 275.9 | 256.3 | 262.5 | 227.0 | 209.7 | 245.2 | 225.8 | 210.6 | 219.8 | 249.7 | 2904.3 | 64124.0 |

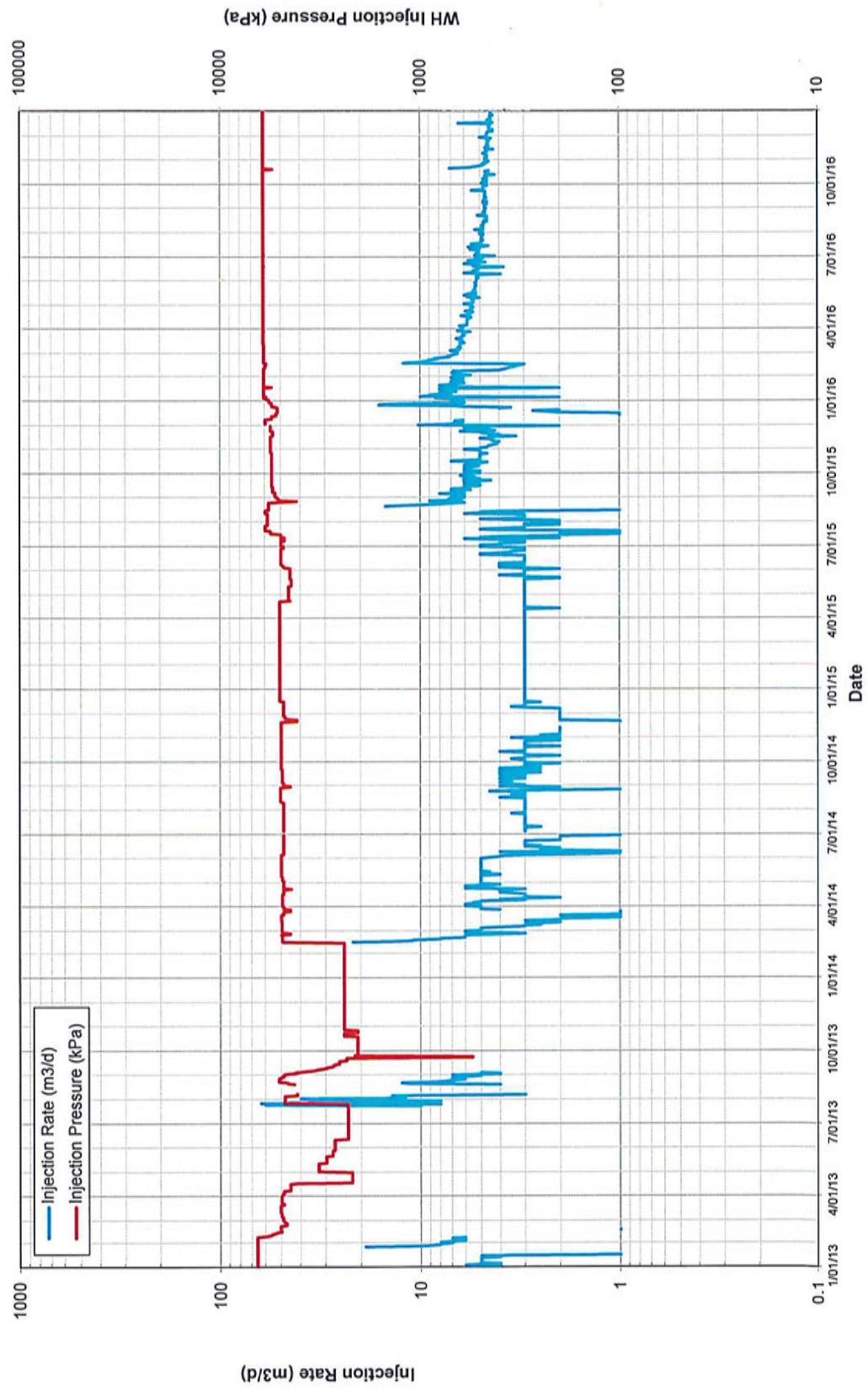
| 2016 Water Production m3/month | Prior CTD | Jan    | Feb    | Mar    | Apr    | May    | Jun   | Jul   | Aug    | Sep    | Oct   | Nov    | Dec    | 2016    | CTD      |
|--------------------------------|-----------|--------|--------|--------|--------|--------|-------|-------|--------|--------|-------|--------|--------|---------|----------|
| Pattern #1 Sec 14              | 63500.8   | 281.3  | 255.0  | 239.4  | 231.8  | 252.1  | 234.2 | 237.1 | 225.8  | 230.5  | 234.6 | 258.2  | 134.8  | 2815.0  | 66315.8  |
| Pattern #2 Sec 11              | 133228.4  | 957.8  | 942.1  | 834.9  | 851.7  | 900.5  | 671.6 | 704.1 | 840.4  | 778.7  | 610.3 | 1141.5 | 1212.4 | 10446.0 | 143674.4 |
| Unit #4 Total Production       | 196729.2  | 1239.1 | 1197.1 | 1074.3 | 1083.6 | 1152.6 | 905.9 | 941.3 | 1066.2 | 1009.2 | 844.9 | 1399.6 | 1347.1 | 13260.9 | 209990.2 |

|             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Unit #4 WOR | 3.21 | 4.65 | 4.69 | 3.89 | 4.23 | 4.39 | 3.99 | 4.49 | 4.35 | 4.47 | 4.01 | 6.37 | 5.39 | 4.57 | 3.27 |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|

| 2016 Water Injection m3/month | Prior CTD | Jan    | Feb    | Mar    | Apr   | May   | Jun   | Jul   | Aug    | Sep    | Oct    | Nov    | Dec    | 2016    | CTD      |
|-------------------------------|-----------|--------|--------|--------|-------|-------|-------|-------|--------|--------|--------|--------|--------|---------|----------|
| Pattern #1 Sec 14             | 52213.5   | 805.7  | 780.0  | 655.0  | 489.6 | 432.0 | 617.3 | 555.6 | 770.3  | 819.7  | 806.9  | 703.4  | 660.3  | 8095.9  | 60309.5  |
| Pattern #2 Sec 11             | 81824.2   | 436.0  | 380.0  | 466.5  | 432.7 | 250.0 | 237.0 | 416.8 | 385.7  | 382.7  | 415.6  | 361.2  | 666.1  | 4830.3  | 86654.5  |
| Unit #4 Injection             | 134037.7  | 1241.7 | 1160.0 | 1121.5 | 922.3 | 682.0 | 854.3 | 972.5 | 1156.0 | 1202.4 | 1222.5 | 1064.6 | 1326.4 | 12926.3 | 146964.0 |

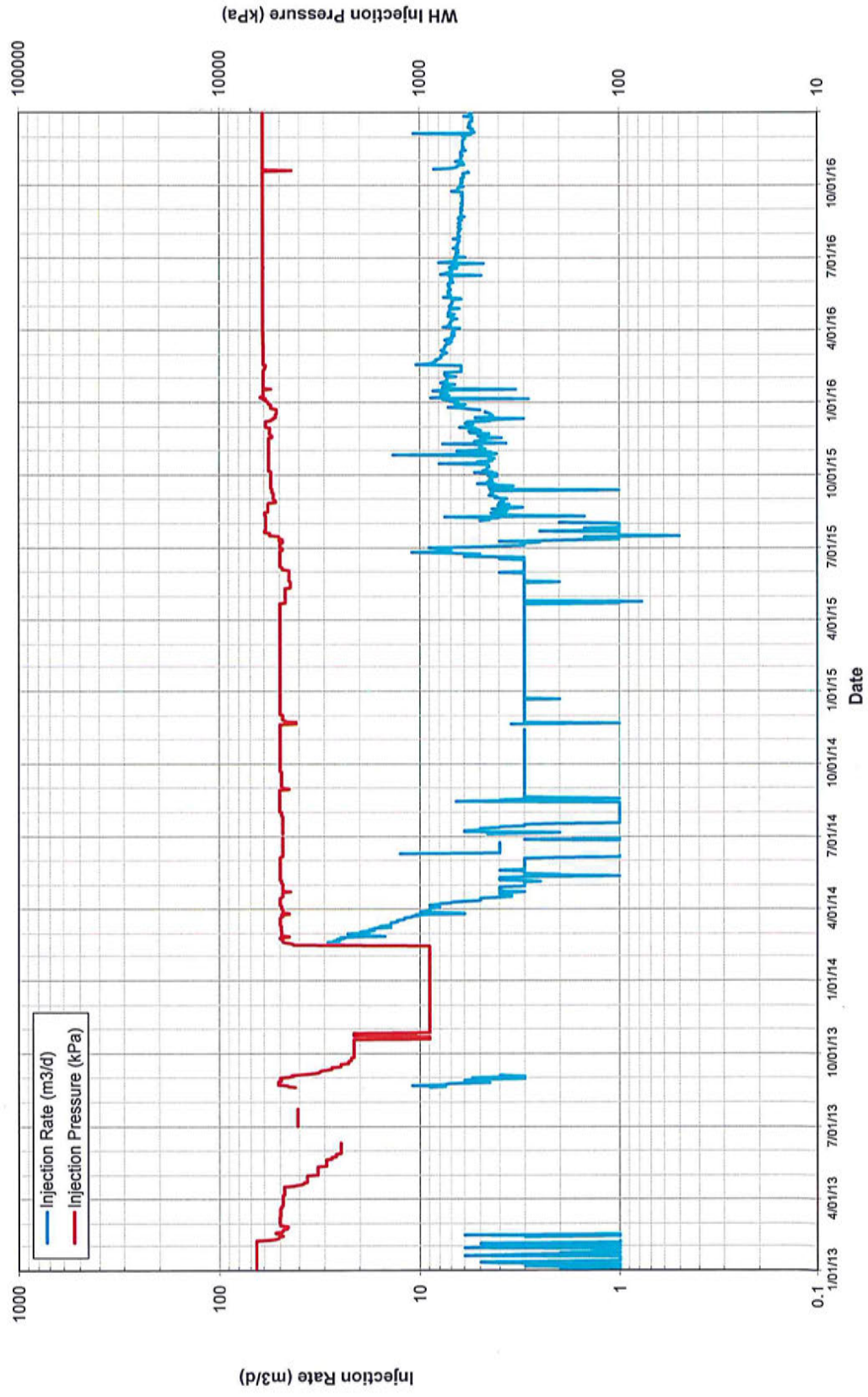
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|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Unit #4 VRR | 0.52 | 0.82 | 0.80 | 0.83 | 0.69 | 0.48 | 0.75 | 0.84 | 0.88 | 0.97 | 1.16 | 0.66 | 0.83 | 0.80 | 0.54 |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|

00/15-14-7-29 W1M

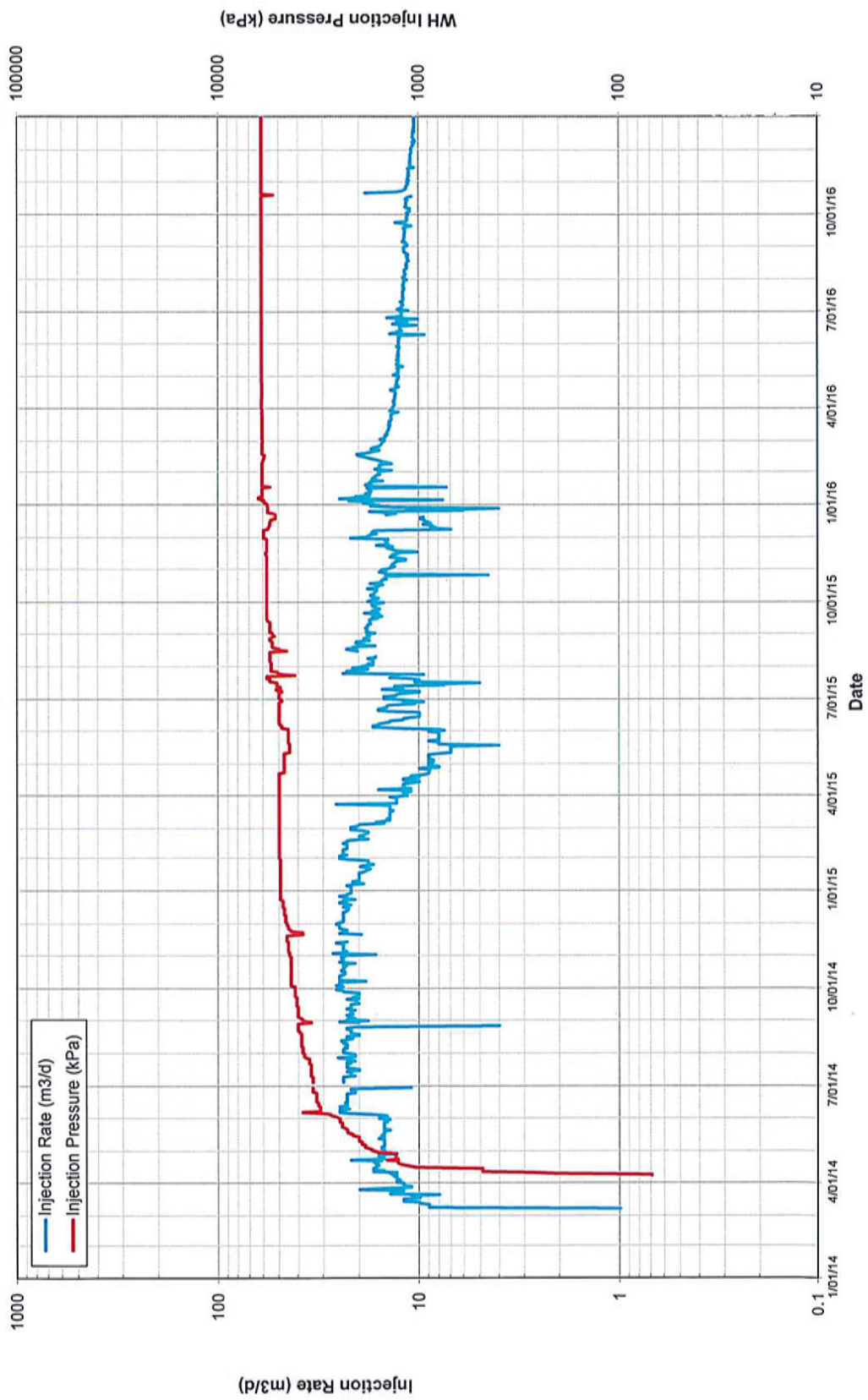




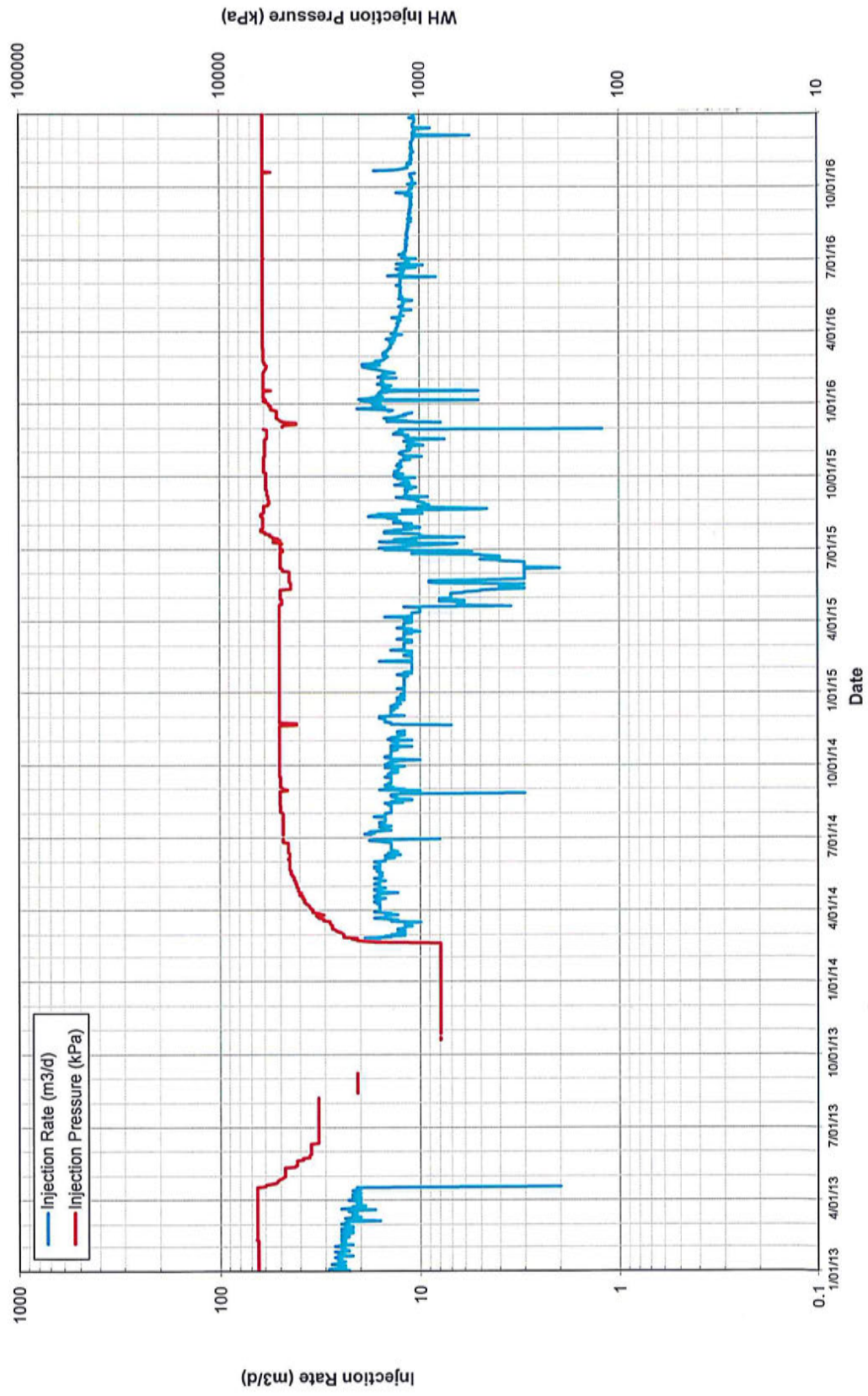
00/16-14-7-29 W1M



00/13-14-7-29 W1M



02/02-11-7-29 W1M





00/03-11-7-29 W1M

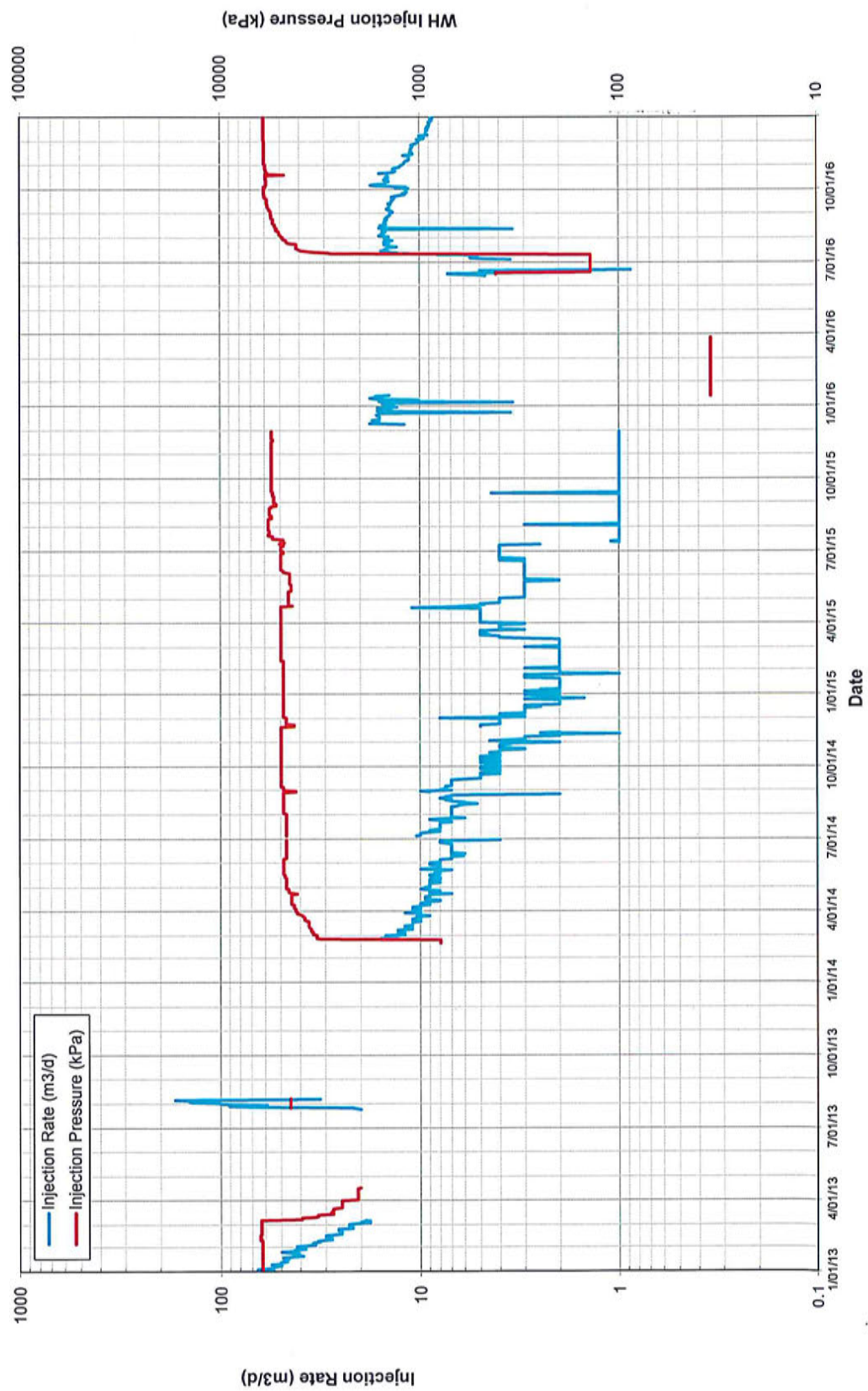


Table 2: Sinclair Unit #4 Monthly Average Injection Data

| Pattern #1 Monthly Averages       | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|-----------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| 00/15-14 Injection Rate (m3/d)    | 7    | 7    | 6    | 6    | 5    | 5    | 5    | 5    | 5    | 5    | 5    | 5    |
| 00/15-14 Injection Pressure (kPa) | 5988 | 6025 | 6054 | 6067 | 6067 | 6066 | 6066 | 6067 | 6067 | 6047 | 6067 | 6067 |
| 00/16-14 Injection Rate (m3/d)    | 7    | 8    | 7    | 7    | 7    | 7    | 6    | 6    | 6    | 6    | 6    | 6    |
| 00/16-14 Injection Pressure (kPa) | 6000 | 6025 | 6043 | 6067 | 6067 | 6066 | 6067 | 6067 | 6067 | 6012 | 6067 | 6067 |
| 00/13-14 Injection Rate (m3/d)    | 17   | 16   | 14   | 13   | 13   | 12   | 12   | 12   | 12   | 11   | 11   | 11   |
| 00/13-14 Injection Pressure (kPa) | 6006 | 6024 | 6034 | 6057 | 6067 | 6067 | 6067 | 6067 | 6067 | 6043 | 6067 | 6067 |

| Pattern #2 Monthly Averages      | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|----------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| 02/2-11 Injection Rate (m3/d)    | 15   | 16   | 14   | 13   | 12   | 12   | 12   | 11   | 11   | 11   | 11   | 10   |
| 02/2-11 Injection Pressure (kPa) | 5978 | 5986 | 6056 | 6067 | 6067 | 6067 | 6065 | 6067 | 6067 | 6050 | 6067 | 6067 |
| 00/3-11 Injection Rate (m3/d)    | 6    | 0    | 0    | 0    | 0    | 1    | 11   | 15   | 13   | 13   | 11   | 9    |
| 00/3-11 Injection Pressure (kPa) | 21   | 34   | 30   | 0    | 0    | 101  | 2852 | 5281 | 5828 | 5857 | 5996 | 6032 |