

# Sinclair Unit No. 15: EOR Report 2017

## Overview

Note: Vermilion Energy has assumed operatorship of Sinclair Unit No.15 through the acquisition of Red River Oil Inc. effective Feb 15, 2018. Within the 2017 EOR Report, operations undertaken by Red River in 2017 will be reported as so.

The Sinclair Unit No. 15 waterflood is a one section (15-007-29W1), one pattern flood within the Bakken Three Forks formation operated by Red River Oil Inc. ("Red River" or the "Company"). The pattern consists of eight horizontal wellbores predominantly oriented east-west and spaced at 185-300m. Two injectors are located at 00/05-15 and 00/02-15, while six producers are located at 00/03-15, 02/03-15, 00/04-15, 00/09-15, 00/15-15 and 00/16-15. There is one producing vertical well at 01-15. Figure 1 below is a Unit map showing the wellbore layout.

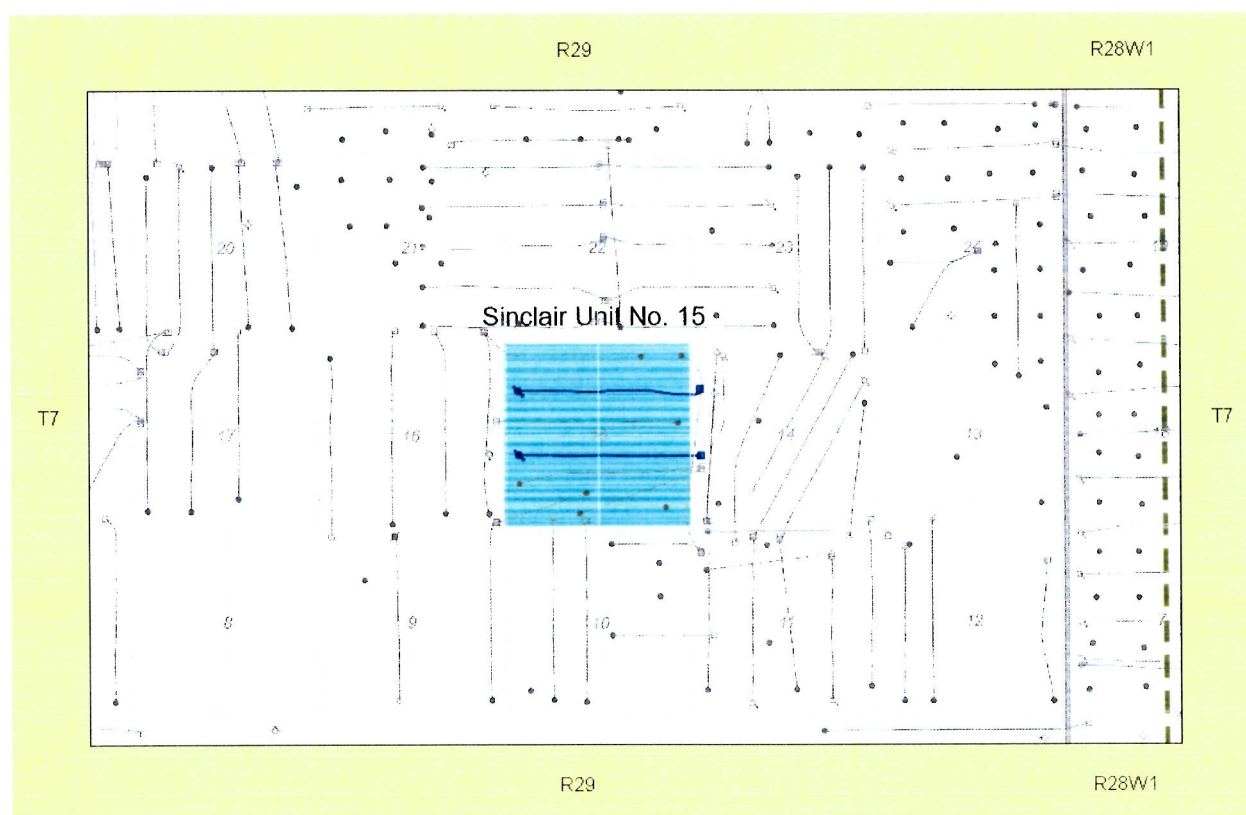


Figure 1: Sinclair Unit No. 15 Map

The main productive zones within the Three Forks in section 15-007-29W1 are the Upper Devonian Lyleton A Dolomitic Siltstone member and the overlying Mississippian Middle

Bakken Siltstone member. Horizontal wells in section 15 have undulated through both the Three Forks Lyleton A Member and the Bakken Siltstones over the length of the laterals. Red River estimates that original-oil-in-place for Unit No. 15 is  $838.3 \times 10^3 \text{m}^3$  (5,272 mstb). Current recovery to date is  $47.8 \times 10^3 \text{m}^3$  (300.8 mstb) or 5.7% of the OOIP. Primary recovery was originally estimated to recover 6.8%. An incremental 10-15% secondary recovery is expected, bringing the total estimated recovery factor to 15-20%.

### **Performance Discussion**

Two new wells (00/04-15 and 00/16-15) were drilled and brought on production in Unit 15 in August 2017. These two wells are performing as expected and will help improve the long term unit performance and efficiency. These two wells are expected to decline as primary wells for a period before they will begin to show effect from the water injection scheme, this is important to consider when observing early unit performance trends. Injection at Sinclair Unit No 15 commenced in October 2017 into both active injection wells (00/05-15 and 00/15-15). Although very early into the project, initial indications are positive as the injection wells have demonstrated an ability to meet VRR targets without any abnormal early pressure buildup. Overall Unit WOR for the year averaged 3.64, bringing the cumulative Unit WOR to 2.0 at year end. A yearly average VRR of 0.25 helped increase the Unit cumulative VRR to 0.04 at year end. Figure 2 in appendix A illustrates the overall pattern 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.

### **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: Monthly produced fluids and ratios in graphical and tabular format
2. Table 1: Monthly and cumulative produced fluids and ratios in tabular format
3. Individual injection well rate and pressure profiles:
  - a. 100/05-15

b. 100/12-15

4. Table 2: Monthly average injection rate and pressure data

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

There were no pressure surveys executed in Unit No. 15 in 2017.

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

Other than routine pump changes there were no servicing operations completed within Unit No. 15 in 2017.

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

Injection water for Sinclair Unit No. 15 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 two 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.

Figure 2: Sinclair Unit #15 Produced Fluids

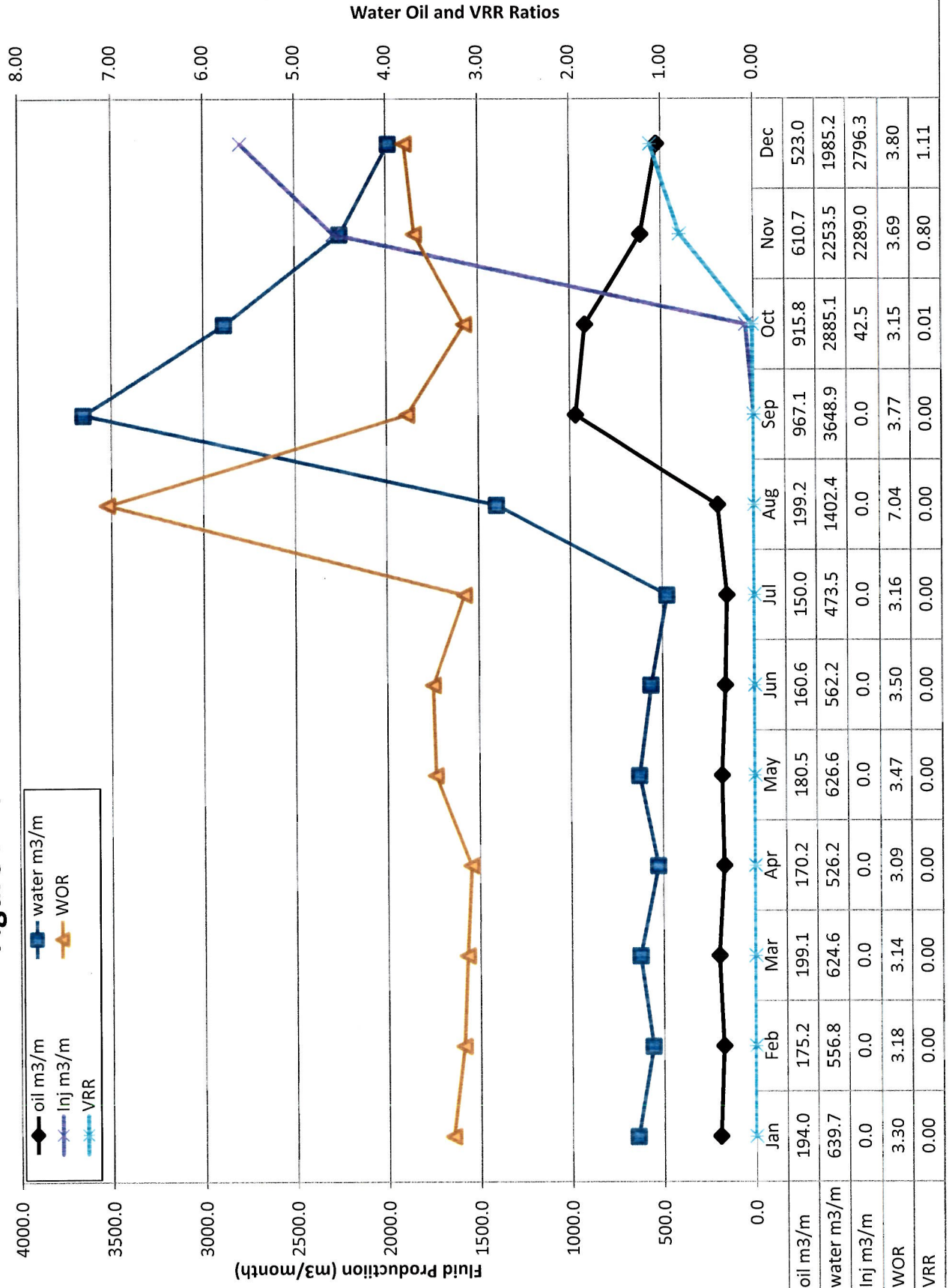




Table 1: Sinclair Unit #15 Produced Fluids

2017 Oil Production m3/month	Prior CTD	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2017	CTD
Unit #15 Total Production	43380.0	194.0	175.2	199.1	170.2	180.5	160.6	150.0	199.2	967.1	915.8	610.7	523.0	4445.5	47825.5

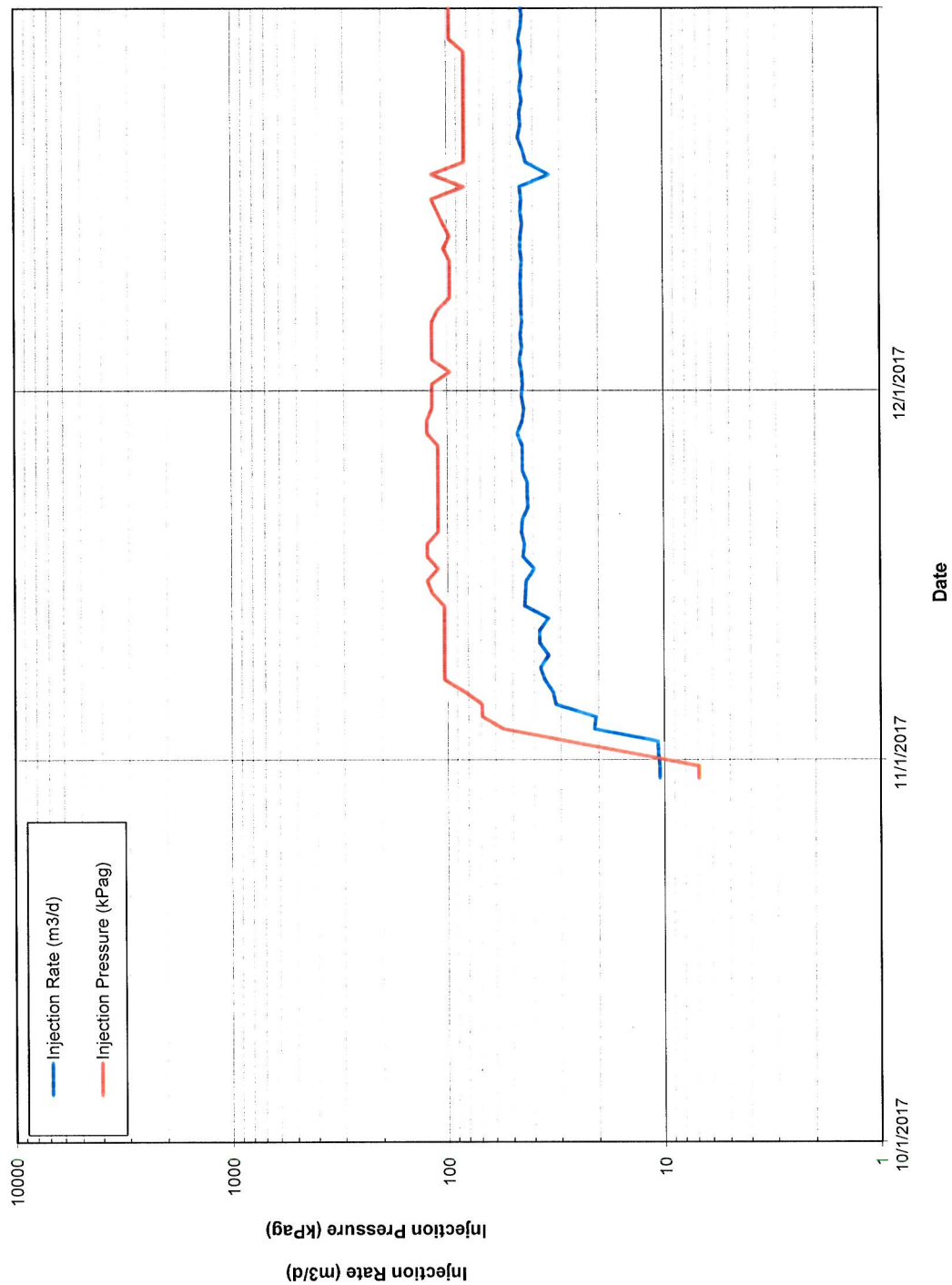
2017 Water Production m3/month	Prior CTD	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2017	CTD
Unit #15 Total Production	79320.0	639.7	556.8	624.6	526.2	626.6	562.2	473.5	1402.4	3648.9	2885.1	2253.5	1985.2	16184.5	95504.5

Unit #15 WOR	1.83	3.30	3.18	3.14	3.09	3.47	3.50	3.16	7.04	3.77	3.15	3.69	3.80	3.64	2.00
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2017 Water Injection m3/month	Prior CTD	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2017	CTD
Unit #15 Injection	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.5	2289.0	2796.3	5127.8	5127.8

Unit #15 VRR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.80	1.11	0.25	0.04
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00/05-15-7-29 W1M



00/12-15-7-29 W1M

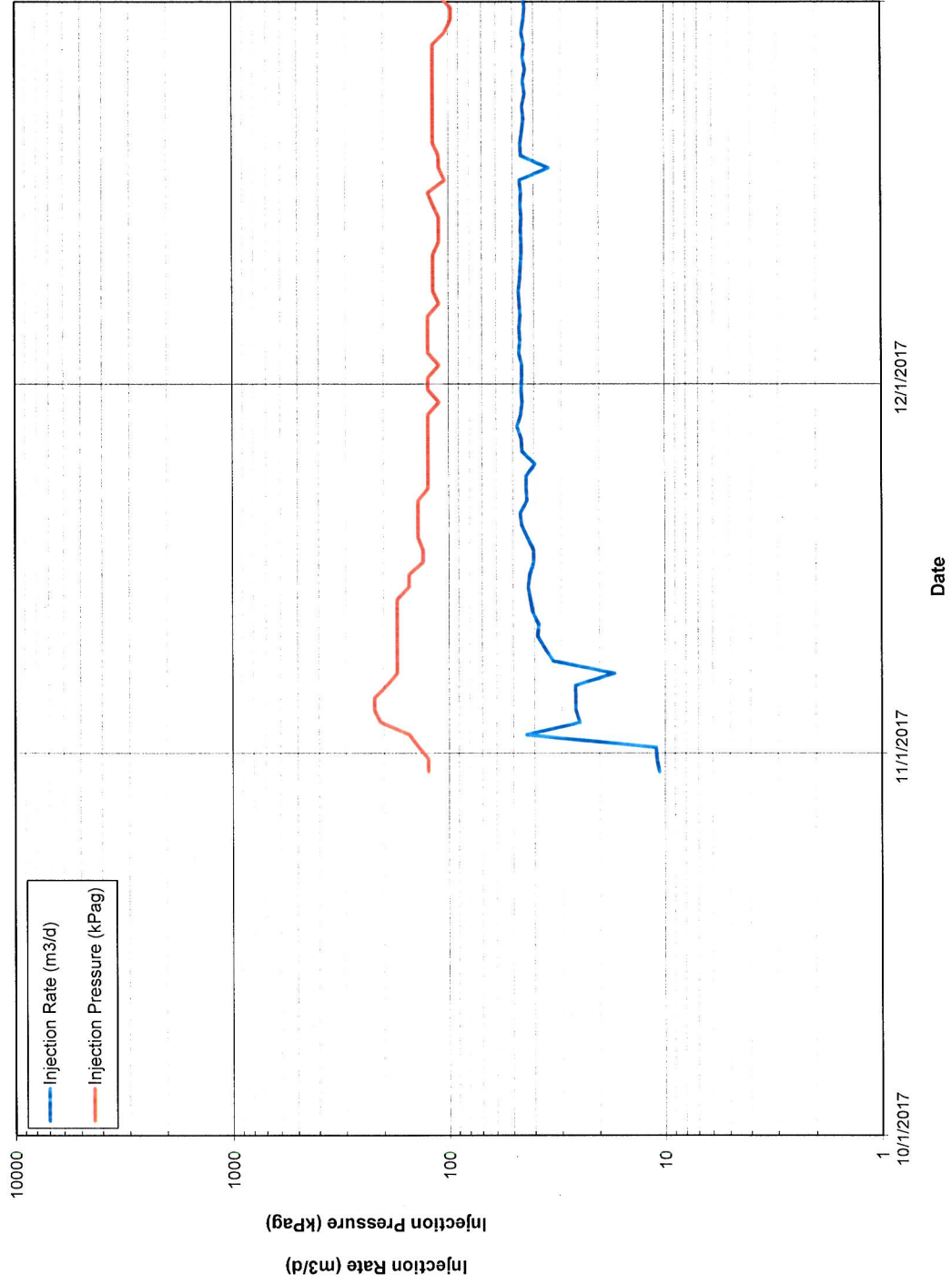


Table 2: Sinclair Unit #15 Monthly Average Injection Data

2017 Monthly Averages	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
00/05-15 Injection Rate (m3/d)										1.7	38.0	45.0
00/05-15 Injection Pressure (kPa)										1	100	98
00/12-15 Injection Rate (m3/d)										1.8	38.3	45.2
00/12-15 Injection Pressure (kPa)										21	152	115