

**Waskada Unit No. 17**  
**Waterflood Progress Report 2016**  
**January 1<sup>st</sup> through December 31<sup>st</sup> 2016**

**Prepared for:**  
**Manitoba Industry, Economic Development and Mines**  
**Petroleum Branch**

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**July 18, 2017**

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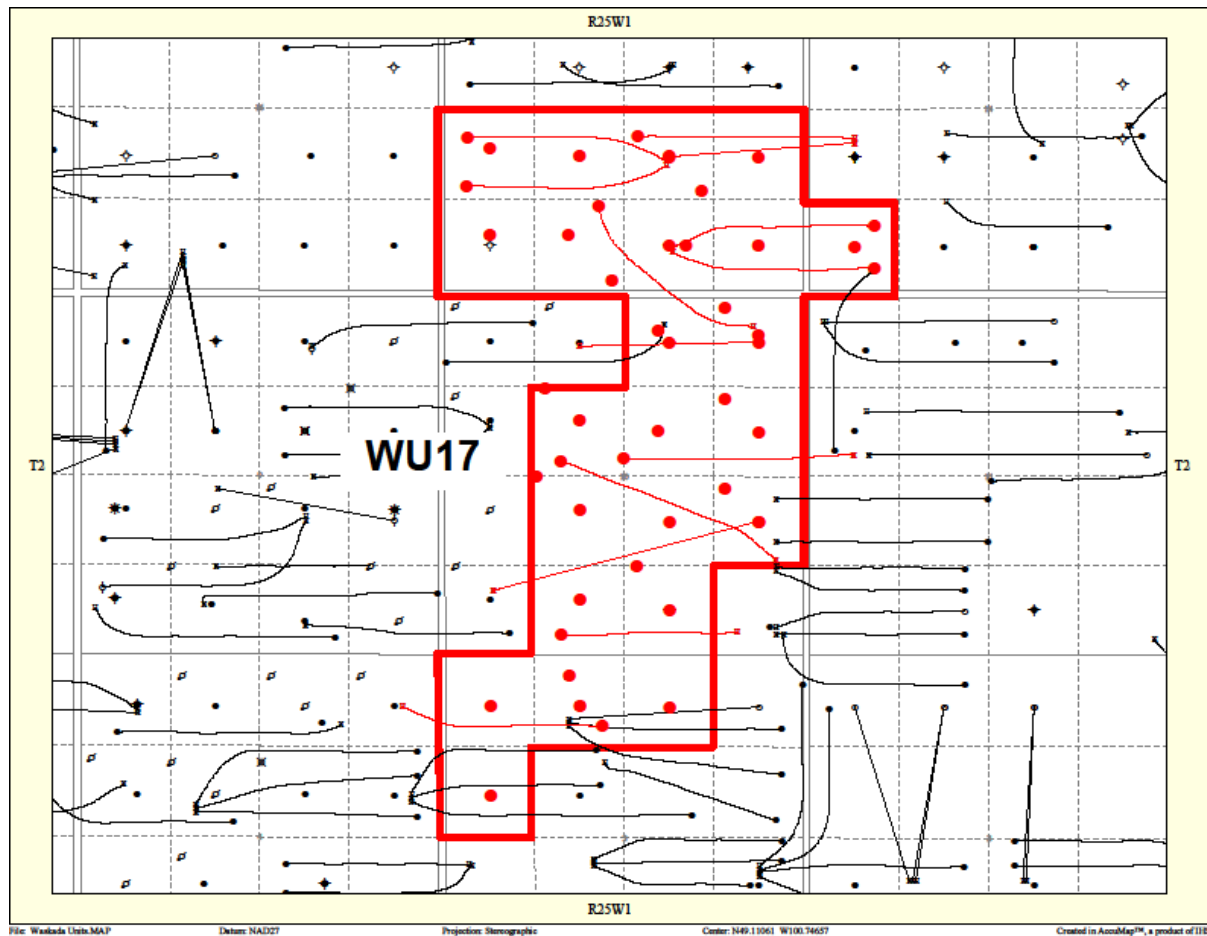
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## INTRODUCTION

The Waskada Unit No.17 pressure maintenance project commenced water injection into the Lower Amaranth A pool in accordance with Manitoba Energy and Mines Order No. PM 66, dated October 1, 1991. Waskada Unit No. 17 was acquired from EOG Resources Canada Inc. effective October 1, 2014 (closing date December 1, 2014) with Tundra Oil and Gas (Tundra) as the new operator. THE EOR project area, outlined in red in **Figure 1**, contains 47 wells over 23 LSDs in Township 2, Range 25W1 (**Table 1**).

**Figure 1: Waskada Unit No. 17 Area Outline**



## PRODUCTION HISTORY

For the wells included in Waskada Unit No. 17, production started in December 1982 with the 00/15-10-002-25W1/00 well. From 1982 – 1990, 25 wells were drilled. Oil production peaked at 72.3 m<sup>3</sup>/d in September 1990. From 2012-2014, 11 new producers were added to the unit, resulting in a peak in oil production of 212.4 m<sup>3</sup>/d in November 2014. There are currently 27 producing wells in Waskada Unit No. 17. The average production for the unit was 34.0 m<sup>3</sup>/d of oil and 48.2 m<sup>3</sup>/d of water and the average WOR was 1.4 m<sup>3</sup>/m<sup>3</sup> at the end of December 2016 (Table 4). The rates and WOR are presented in Figure 2.

Figure 2: Waskada Unit No. 17 Production/Injection Rates and WOR vs Time

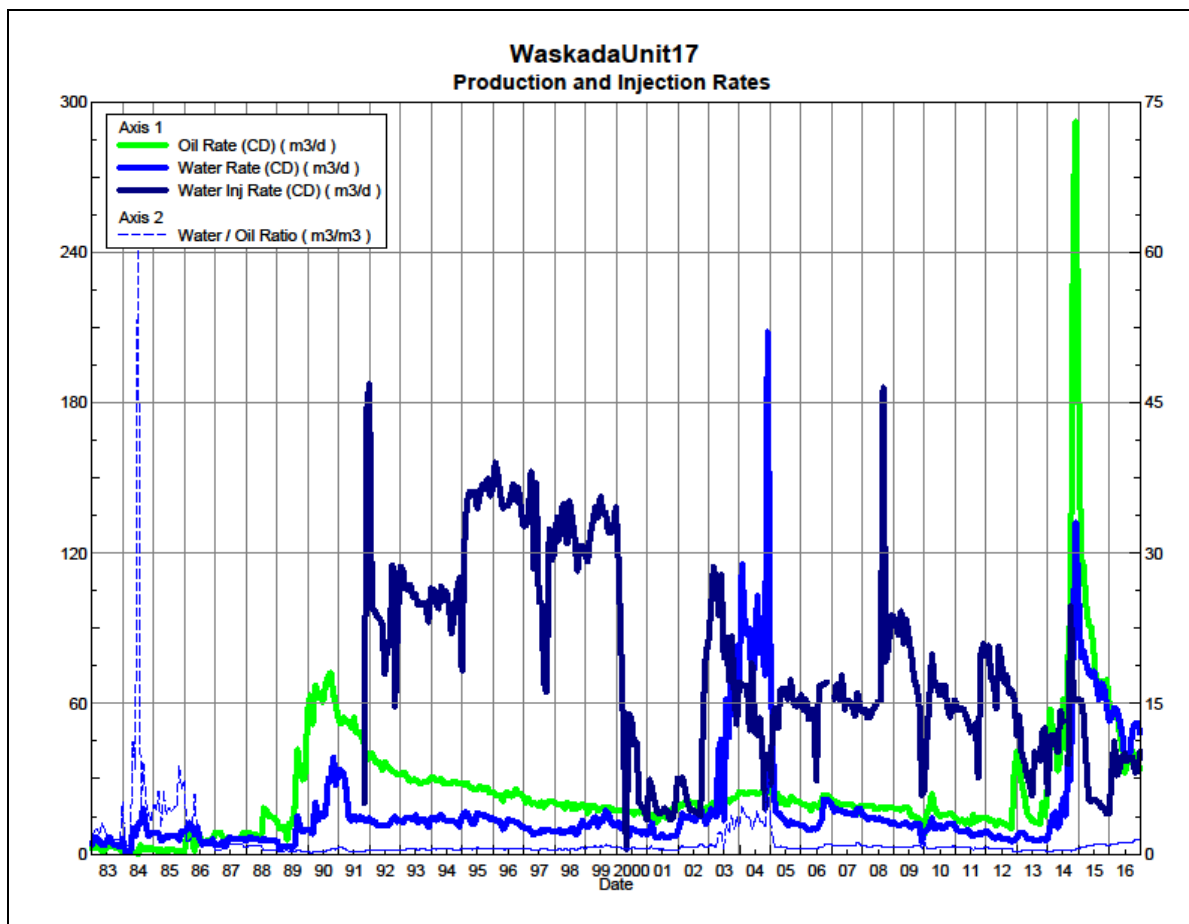
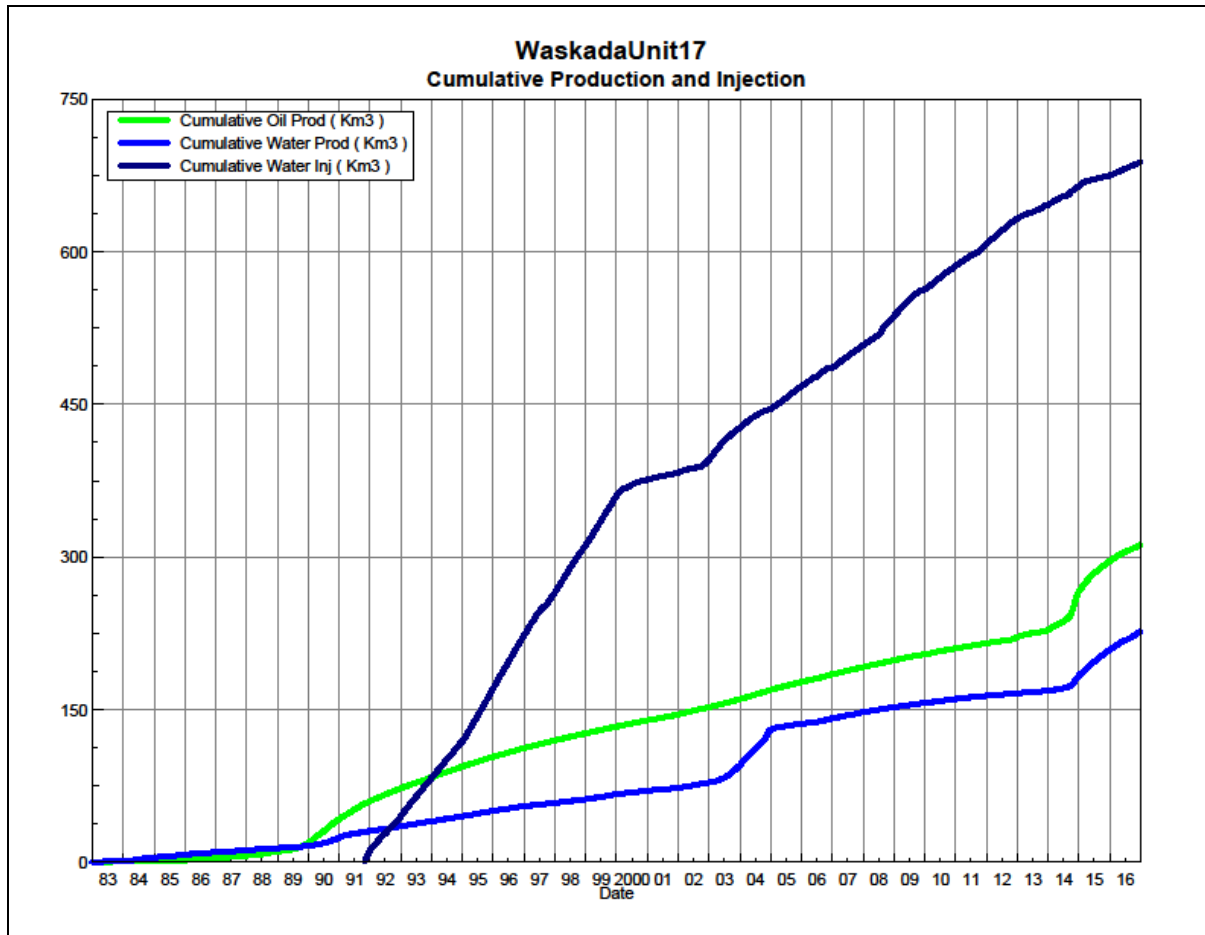


Figure 3 shows the cumulative production for Waskada Unit No. 17 to the end of December 2016 as 311.8 e<sup>3</sup>m<sup>3</sup> of oil, and 226.7 e<sup>3</sup>m<sup>3</sup> of water. The cumulative water injected is over 688.2 e<sup>3</sup>m<sup>3</sup>.

**Figure 3. Waskada Unit No. 17 Cumulative Oil, Water and Water Injected vs. Time**



### **WATERFLOOD HISTORY**

Water injection commenced with 6 injector wells on October 1991. Two more injectors wells were added in November 2001 and 7 more in October 2002. Of the 14 injector wells operating in 2016, 8 were active at the end of 2016.

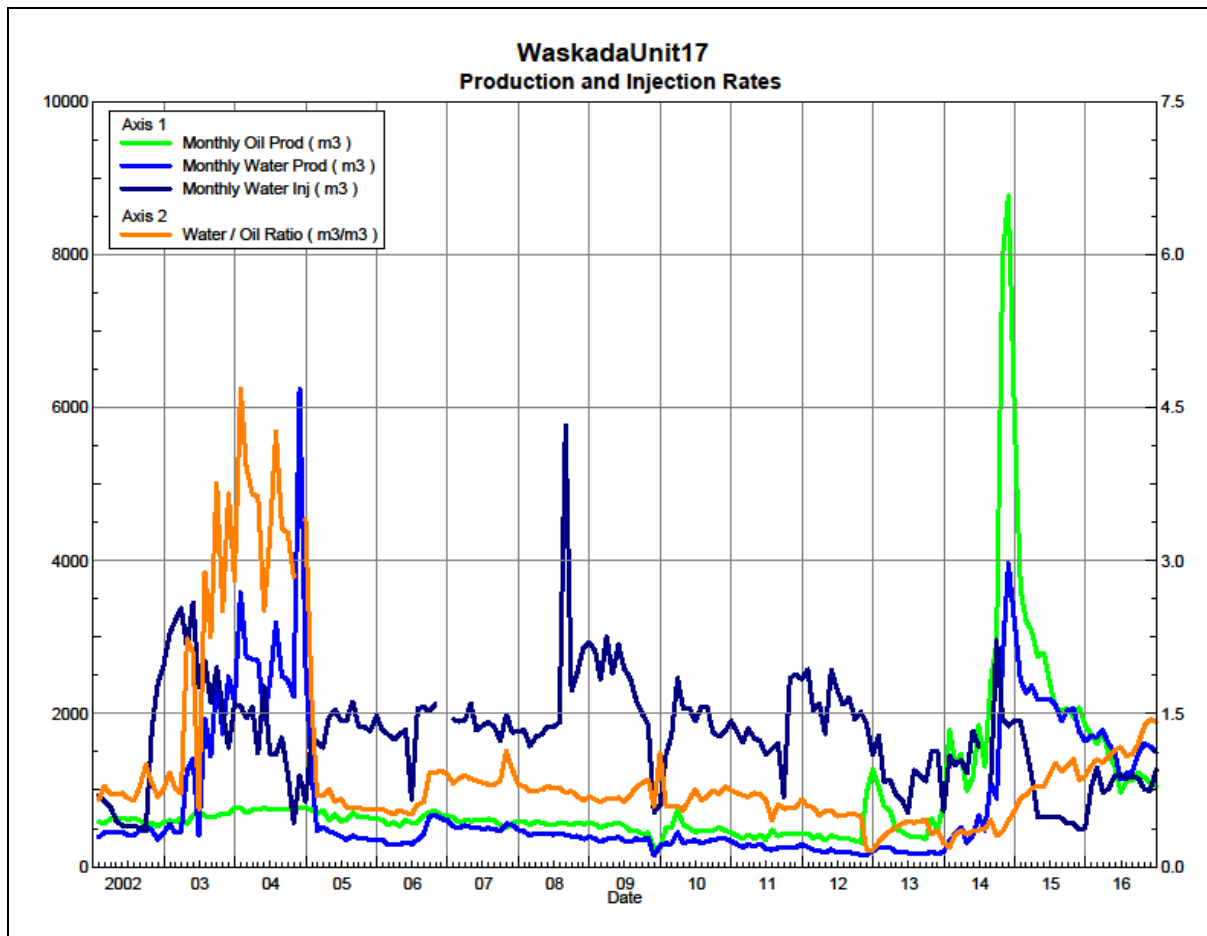
Any future revisions to the waterflood development or surveillance plan would be based on new production or performance response data, technical studies or observed reservoir behavior and reserves recovery interpretations.

## WATERFLOOD PERFORMANCE

From January 1 to December 31 in 2016, Waskada Unit No. 17 produced 33,667 m<sup>3</sup> of total fluids (15,625 m<sup>3</sup> oil, 18,042 m<sup>3</sup> water), and injected 10,006 m<sup>3</sup> of source water, giving an annual oil and water voidage replacement ratio (VRR) of 0.375 for this reporting period. The cumulative VRR since injection commenced in October 1991 is presently at 1.176. The cumulative VRR reached 1.0 in 1995 and has maintained values of 1.17 – 1.64 since 1997. Table 2 summarizes the yearly and cumulative VRR for Waskada Unit No. 17.

In 2011, the injection rate was increased from approximately 1500 m<sup>3</sup>/month in January to 2300 m<sup>3</sup>/month in March. This increase resulted in a small increase in produced volumes (Figure 4). The injection rate was also increased in 2002, which also had a positive effect on the oil production. The increase in production in 2012-14 can be attributed to the addition of 11 new producers (1 in 2012, 2 in 2013 and 8 in 2014).

**Figure 4. Waskada Unit No. 17 Production and Injection Rates From 2002-2016**



## **INJECTION WELLHEAD PRESSURES**

Individual injection pressure averages for 2016 can be found in **Table 5**.

## **RESERVOIR PRESSURE**

There have been no pressure surveys done on the reservoir.

Gas volumes from the field are measured at the 15-9-2-25W1M battery. There is no individual well gas volume measurement. It is not possible to separate out the gas production from only the wells in Unit 17, so the effectiveness of the pressure maintenance program cannot be evaluated on the GOR.

## **WELL SERVICING**

The following table summarizes the maintenance done on the Waskada Unit No. 17 wells in 2016:

| <b>UWI</b>            | <b>Date</b> | <b>Job</b>                           |
|-----------------------|-------------|--------------------------------------|
| 103.11-10-002-25W1.00 | 5-Aug-16    | Pump Change                          |
| 103.03-15-002-25W1.00 | 6-Jul-16    | Pump Change / Tubing reconfiguration |
| 100.05-15-002-25W1.00 | 10-Nov-16   | Pump Change                          |

## **CORROSION AND SCALE PREVENTION**

The facilities in Waskada Unit No. 17 are currently using cathodic protection and chemicals to protect against corrosion and scale. All facilities are monitored every 3 months to assess the corrosion and ensure that proper electrical current is being supplied. There have been no issues with corrosion or scale to date.

Biocide chemical is added to the injection water to prevent any sulfide producing bacteria from forming.

## **CONCLUSION**

The current pressure maintenance program is having a positive effect on oil production in Waskada Unit No. 17. Tundra will maintain the current pressure maintenance program, and continue to monitor production and pressure performance. Plans for future injection conversions and well interventions to optimize the waterflood are currently being reviewed.

TABLE NO. 1: WASKADA UNIT NO. 17 WELL SUMMARY

| UWI                  | Type       | Status         | On Prod Date | Cum Prd Oil (m3) | Cum Prd Water (m3) | Last Prod Date | On Inj Date | Cum Inj Water (m3) | Last Inj Date |
|----------------------|------------|----------------|--------------|------------------|--------------------|----------------|-------------|--------------------|---------------|
| 100/12-03-002-25W1/0 | Vertical   | Producing      | 12/18/1989   | 5569.2           | 9864.2             | 12/31/2016     |             | 0.0                |               |
| 100/13-03-002-25W1/0 | Vertical   | Pumping        | 7/19/1989    | 17655.0          | 1895.8             | 5/31/2016      |             | 0.0                |               |
| 100/14-03-002-25W1/0 | Vertical   | Abandoned      | 11/22/1989   | 1141.3           | 204.9              | 8/31/1991      | Oct-1991    | 68073.7            | 2/28/2005     |
| 102/14-03-002-25W1/0 | Vertical   | Injection      | N/A          | 0.0              | 0.0                |                | Oct-2002    | 5877.0             | 6/30/2015     |
| 103/14-03-002-25W1/0 | Horizontal | Producing      | 9/17/2014    | 6437.2           | 1567.8             | 12/31/2016     |             | 0.0                |               |
| 100/15-03-002-25W1/0 | Vertical   | Pumping        | 8/2/1990     | 4459.1           | 24893.5            | 12/31/2015     |             | 0.0                |               |
| 100/02-10-002-25W1/0 | Vertical   | Abandoned      | 7/8/1990     | 3438.1           | 6493.1             | 3/31/2003      |             | 0.0                |               |
| 1C0/02-10-002-25W1/0 | Vertical   | Injection      | N/A          | 0.0              | 0.0                |                | Oct-2002    | 5576.5             | 11/30/2014    |
| 100/03-10-002-25W1/0 | Vertical   | Producing      | 7/27/1989    | 13080.4          | 5266.3             | 12/31/2016     |             | 0.0                |               |
| 102/03-10-002-25W1/0 | Horizontal | Producing      | 11/8/2012    | 7330.4           | 1218.9             | 12/31/2016     |             | 0.0                |               |
| 100/06-10-002-25W1/0 | Vertical   | Producing      | 8/5/1989     | 9174.6           | 8747.4             | 12/31/2016     |             | 0.0                |               |
| 1C0/06-10-002-25W1/0 | Vertical   | Injection      | N/A          | 0.0              | 0.0                |                | Nov-2001    | 2519.7             | 6/30/2016     |
| 100/07-10-002-25W1/0 | Vertical   | Pumping        | 3/16/1990    | 17640.3          | 23382.7            | 12/31/2016     |             | 0.0                |               |
| 100/08-10-002-25W1/0 | Vertical   | Injection      | 7/12/1990    | 570.1            | 175.7              | 9/30/1991      | Oct-1991    | 64248.3            | 12/31/2016    |
| 103/08-10-002-25W1/0 | Horizontal | Producing      | 10/22/2014   | 9054.9           | 3135.6             | 12/31/2016     |             | 0.0                |               |
| 1C0/08-10-002-25W1/0 | Vertical   | Injection      | N/A          | 0.0              | 0.0                |                | Oct-2002    | 14966.9            | 12/31/2016    |
| 100/09-10-002-25W1/0 | Vertical   | Pumping        | 3/20/1990    | 21550.1          | 2757.0             | 8/31/2016      |             | 0.0                |               |
| 1C0/09-10-002-25W1/0 | Vertical   | Injection      | N/A          | 0.0              | 0.0                |                | Oct-2002    | 29996.2            | 12/31/2016    |
| 100/10-10-002-25W1/0 | Vertical   | Pumping        | 12/12/1989   | 13845.8          | 1659.8             | 5/31/2015      |             | 0.0                |               |
| 100/11-10-002-25W1/0 | Vertical   | Injection      | 7/8/1988     | 3313.7           | 96.5               | 10/31/1991     | Oct-1991    | 80302.2            | 12/31/2016    |
| 103/11-10-002-25W1/0 | Horizontal | Producing      | 3/24/2014    | 5603.8           | 2594.7             | 12/31/2016     |             | 0.0                |               |
| 104/11-10-002-25W1/0 | Horizontal | Producing      | 9/15/2014    | 8066.9           | 1549.2             | 12/31/2016     |             | 0.0                |               |
| 1C0/11-10-002-25W1/0 | Vertical   | Injection      | N/A          | 0.0              | 0.0                |                | Nov-2001    | 22209.7            | 11/30/2015    |
| 100/15-10-002-25W1/0 | Vertical   | Abandoned      | 12/9/1982    | 1737.6           | 7558.2             | 11/30/1989     |             | 0.0                |               |
| 102/15-10-002-25W1/0 | Vertical   | Pumping        | 11/26/1989   | 10947.4          | 7981.1             | 12/31/2016     |             | 0.0                |               |
| 100/16-10-002-25W1/0 | Vertical   | Pumping        | 12/15/1989   | 28981.7          | 7578.6             | 12/31/2016     |             | 0.0                |               |
| 103/16-10-002-25W1/0 | Horizontal | Producing      | 10/2/2014    | 4741.6           | 7288.4             | 12/31/2016     |             | 0.0                |               |
| 1C0/16-10-002-25W1/0 | Vertical   | Injection      | N/A          | 0.0              | 0.0                |                | Oct-2002    | 18413.3            | 12/31/2016    |
| 100/04-14-002-25W1/0 | Vertical   | Injection      | 8/11/1989    | 3943.6           | 927.8              | 4/30/2014      |             | 676.5              | 12/31/2016    |
| 102/04-14-002-25W1/0 | Horizontal | Producing      | 9/28/2014    | 6438.1           | 2408.5             | 12/31/2016     |             | 0.0                |               |
| 103/04-14-002-25W1/0 | Horizontal | Producing      | 9/29/2014    | 6230.3           | 1224.6             | 12/31/2016     |             | 0.0                |               |
| 100/01-15-002-25W1/0 | Vertical   | Abandoned Zone | 2/24/1990    | 1138.2           | 164.5              | 10/31/1991     | Oct-1991    | 77361.4            | 11/30/2003    |
| 100/02-15-002-25W1/0 | Vertical   | Abandoned      | 6/17/1983    | 521.9            | 1082.0             | 9/30/1984      |             | 0.0                |               |
| 102/02-15-002-25W1/0 | Vertical   | Producing      | 7/21/1990    | 6396.2           | 34777.1            | 5/31/2012      |             | 0.0                |               |
| 100/03-15-002-25W1/0 | Vertical   | Producing      | 7/9/1988     | 18324.5          | 3912.2             | 4/30/2014      |             | 0.0                |               |
| 103/03-15-002-25W1/0 | Horizontal | Producing      | 7/9/2014     | 6930.7           | 6285.7             | 12/31/2016     |             | 0.0                |               |
| 1A0/03-15-002-25W1/0 | Vertical   | Abandoned      | N/A          | 0.0              | 0.0                |                | Oct-2002    | 10933.0            | 12/31/2004    |
| 102/04-15-002-25W1/0 | Vertical   | Injection      | 11/8/1987    | 1727.0           | 90.8               | 8/31/1991      | Oct-1991    | 205775.3           | 3/31/2015     |
| 100/05-15-002-25W1/0 | Vertical   | Producing      | 1/10/1986    | 20163.8          | 13581.9            | 12/31/2016     |             | 0.0                |               |
| 102/05-15-002-25W1/0 | Horizontal | Producing      | 12/20/2013   | 4498.2           | 1911.6             | 12/31/2016     |             | 0.0                |               |
| 103/05-15-002-25W1/0 | Horizontal | Producing      | 9/29/2014    | 6327.3           | 21405.7            | 12/31/2016     |             | 0.0                |               |
| 100/06-15-002-25W1/0 | Vertical   | Injection      | 8/9/1989     | 1818.2           | 71.0               | 10/31/1991     | Oct-1991    | 71786.5            | 12/31/2016    |
| 100/07-15-002-25W1/0 | Vertical   | Pumping        | 12/19/1989   | 12699.1          | 1062.8             | 12/31/2016     |             | 0.0                |               |
| 103/07-15-002-25W1/0 | Horizontal | Producing      | 12/25/2013   | 5110.4           | 1123.3             | 12/31/2016     |             | 0.0                |               |
| 104/07-15-002-25W1/0 | Horizontal | Producing      | 10/24/2014   | 4870.9           | 2589.5             | 12/31/2016     |             | 0.0                |               |
| 1A0/07-15-002-25W1/0 | Vertical   | Injection      | N/A          | 0.0              | 0.0                |                | Oct-2002    | 7146.0             | 4/30/2016     |
| 100/08-15-002-25W1/0 | Vertical   | Injection      | 2/27/1990    | 10327.9          | 8226.2             | 12/31/2015     |             | 2369.6             | 12/31/2016    |
|                      |            |                |              | 311,805.5        | 226,754.6          |                |             | 688,231.8          |               |



**TABLE NO. 2 - VRR Calculations**

| Date | Monthly Oil Prod m3 | Cum Oil Prod Km3 | Monthly Water Prod m3 | Cum Water Prod Km3 | Water Oil Ratio m3/m3 | Monthly Water Inj m3 | Cum Water Inj Km3 | VRR   | Cum VRR |
|------|---------------------|------------------|-----------------------|--------------------|-----------------------|----------------------|-------------------|-------|---------|
| 1982 | 62                  | 0.061            | 112                   | 0.112              | 1.83                  |                      | 0.000             | 0.000 | 0.000   |
| 1983 | 886                 | 0.948            | 1,740                 | 1.852              | 1.96                  |                      | 0.000             | 0.000 | 0.000   |
| 1984 | 556                 | 1.504            | 2,966                 | 4.818              | 5.33                  |                      | 0.000             | 0.000 | 0.000   |
| 1985 | 527                 | 2.031            | 2,639                 | 7.457              | 5.01                  |                      | 0.000             | 0.000 | 0.000   |
| 1986 | 2,102               | 4.133            | 2,552                 | 10.009             | 1.21                  |                      | 0.000             | 0.000 | 0.000   |
| 1987 | 2,458               | 6.591            | 1,953                 | 11.962             | 0.79                  |                      | 0.000             | 0.000 | 0.000   |
| 1988 | 4,259               | 10.850           | 2,105                 | 14.067             | 0.49                  |                      | 0.000             | 0.000 | 0.000   |
| 1989 | 8,384               | 19.234           | 2,264                 | 16.331             | 0.27                  |                      | 0.000             | 0.000 | 0.000   |
| 1990 | 23,097              | 42.331           | 7,907                 | 24.238             | 0.34                  |                      | 0.000             | 0.000 | 0.000   |
| 1991 | 17,649              | 59.980           | 6,610                 | 30.848             | 0.37                  | 11,761               | 11.761            | 0.437 | 0.118   |
| 1992 | 12,763              | 72.743           | 4,577                 | 35.425             | 0.36                  | 33,425               | 45.186            | 1.736 | 0.379   |
| 1993 | 10,847              | 83.590           | 4,935                 | 40.360             | 0.45                  | 37,546               | 82.732            | 2.157 | 0.606   |
| 1994 | 10,528              | 94.118           | 4,945                 | 45.305             | 0.47                  | 36,033               | 118.764           | 2.113 | 0.774   |
| 1995 | 9,584               | 103.702          | 5,395                 | 50.700             | 0.56                  | 51,942               | 170.707           | 3.164 | 1.004   |
| 1996 | 8,654               | 112.355          | 4,506                 | 55.207             | 0.52                  | 52,252               | 222.959           | 3.614 | 1.209   |
| 1997 | 7,445               | 119.800          | 3,355                 | 58.562             | 0.45                  | 42,058               | 265.017           | 3.529 | 1.350   |
| 1998 | 7,070               | 126.870          | 3,521                 | 62.083             | 0.50                  | 46,808               | 311.825           | 4.017 | 1.499   |
| 1999 | 6,604               | 133.474          | 4,835                 | 66.918             | 0.73                  | 48,343               | 360.168           | 3.889 | 1.634   |
| 2000 | 6,121               | 139.595          | 3,447                 | 70.365             | 0.56                  | 15,666               | 375.834           | 1.494 | 1.628   |
| 2001 | 5,773               | 145.368          | 2,812                 | 73.177             | 0.49                  | 7,294                | 383.127           | 0.772 | 1.594   |
| 2002 | 7,114               | 152.483          | 5,299                 | 78.476             | 0.74                  | 12,558               | 395.685           | 0.932 | 1.559   |
| 2003 | 7,876               | 160.359          | 16,751                | 95.227             | 2.13                  | 31,446               | 427.130           | 1.218 | 1.527   |
| 2004 | 9,026               | 169.384          | 35,279                | 130.506            | 3.91                  | 18,431               | 445.561           | 0.404 | 1.370   |
| 2005 | 7,951               | 177.335          | 5,725                 | 136.231            | 0.72                  | 22,256               | 467.817           | 1.497 | 1.375   |
| 2006 | 7,468               | 184.803          | 5,180                 | 141.410            | 0.69                  | 17,884               | 485.701           | 1.299 | 1.372   |
| 2007 | 7,078               | 191.881          | 6,141                 | 147.551            | 0.87                  | 22,355               | 508.056           | 1.565 | 1.380   |
| 2008 | 6,787               | 198.668          | 5,002                 | 152.553            | 0.74                  | 28,727               | 536.783           | 2.243 | 1.409   |
| 2009 | 5,576               | 204.244          | 3,991                 | 156.544            | 0.72                  | 26,267               | 563.050           | 2.525 | 1.438   |
| 2010 | 6,141               | 210.385          | 4,094                 | 160.638            | 0.67                  | 22,960               | 586.010           | 2.058 | 1.456   |
| 2011 | 4,951               | 215.336          | 3,127                 | 163.765            | 0.63                  | 21,464               | 607.474           | 2.433 | 1.477   |
| 2012 | 6,001               | 221.337          | 2,352                 | 166.118            | 0.39                  | 24,965               | 632.439           | 2.698 | 1.503   |
| 2013 | 6,978               | 228.315          | 2,372                 | 168.490            | 0.34                  | 13,790               | 646.228           | 1.326 | 1.499   |
| 2014 | 37,908              | 266.220          | 15,052                | 183.542            | 0.40                  | 18,499               | 664.727           | 0.315 | 1.357   |
| 2015 | 29,958              | 296.180          | 25,171                | 208.713            | 0.84                  | 10,006               | 674.733           | 0.168 | 1.228   |
| 2016 | 15,625              | 311.806          | 18,042                | 226.755            | 1.15                  | 13,499               | 688.232           | 0.375 | 1.176   |

TABLE NO. 3

**Tundra Oil and Gas  
Waskada Unit No. 17  
2016 Injection Volumes**

| Well Location             | Date   | Hours On | H <sub>2</sub> O Inj<br>Cal-d avg<br>(m <sup>3</sup> /d) | Monthly<br>Injected H <sub>2</sub> O<br>(m <sup>3</sup> ) |
|---------------------------|--------|----------|--|---|
| <b>Unit No. 17 Total:</b> |        |          |  |   |
|                           | Jan-16 | 0        | 33.8   | 1,046   |
|                           | Feb-16 | 0        | 44.8   | 1,299   |
|                           | Mar-16 | 0        | 31.4   | 973   |
|                           | Apr-16 | 0        | 34.0   | 1,020   |
|                           | May-16 | 0        | 38.6   | 1,197   |
|                           | Jun-16 | 0        | 40.0   | 1,199   |
|                           | Jul-16 | 0        | 37.1   | 1,151   |
|                           | Aug-16 | 0        | 38.2   | 1,183   |
|                           | Sep-16 | 0        | 38.4   | 1,153   |
|                           | Oct-16 | 0        | 32.5   | 1,007   |
|                           | Nov-16 | 0        | 33.2   | 996   |
|                           | Dec-16 | 0        | 41.1   | 1,275   |
| <b>2016 Group Totals:</b> |        |          |  | <b>13,499</b>   |
| <b>Unit No. 17 Total:</b> |        |          |  |   |
|                           | 1982   | 0        | 0.0  | 0   |
|                           | 1983   | 0        | 0.0  | 0   |
|                           | 1984   | 0        | 0.0  | 0   |
|                           | 1985   | 0        | 0.0  | 0   |
|                           | 1986   | 0        | 0.0  | 0   |
|                           | 1987   | 0        | 0.0  | 0   |
|                           | 1988   | 0        | 0.0  | 0   |
|                           | 1989   | 0        | 0.0  | 0   |
|                           | 1990   | 0        | 0.0  | 0   |
|                           | 1991   | 0        | 32.2   | 11,761  |
|                           | 1992   | 0        | 91.6   | 33,425  |
|                           | 1993   | 0        | 102.9  | 37,546  |
|                           | 1994   | 0        | 98.7   | 36,033  |
|                           | 1995   | 0        | 142.3  | 51,942  |
|                           | 1996   | 0        | 143.2  | 52,252  |
|                           | 1997   | 0        | 115.2  | 42,058  |
|                           | 1998   | 0        | 128.2  | 46,808  |
|                           | 1999   | 0        | 132.4  | 48,343  |
|                           | 2000   | 0        | 42.9   | 15,666  |
|                           | 2001   | 0        | 20.0   | 7,294   |
|                           | 2002   | 0        | 34.4   | 12,558  |
|                           | 2003   | 0        | 86.2   | 31,446  |
|                           | 2004   | 0        | 50.5   | 18,431  |
|                           | 2005   | 0        | 61.0   | 22,256  |
|                           | 2006   | 0        | 49.0   | 17,884  |
|                           | 2007   | 0        | 61.2   | 22,355  |
|                           | 2008   | 0        | 78.7   | 28,727  |
|                           | 2009   | 0        | 72.0   | 26,267  |
|                           | 2010   | 0        | 62.9   | 22,960  |
|                           | 2011   | 0        | 58.8   | 21,464  |
|                           | 2012   | 0        | 68.2   | 24,964  |
|                           | 2013   | 0        | 37.8   | 13,790  |
|                           | 2014   | 0        | 55.4   | 18,499  |
|                           | 2015   | 0        | 27.6   | 10,006  |
|                           | 2016   | 0        | 36.9   | 13,499  |
| <b>Group Totals:</b>      |        |          |  | <b>688,231</b>  |

TABLE NO. 4

**Tundra Oil and Gas  
Waskada Unit No. 17  
2015 Production Volumes**

| Date   | Hours On | Oil Rate (CD)<br>m3/d | Monthly Oil Prod<br>m3 | Water Rate (CD)<br>m3/d | Monthly Water Prod<br>m3 | Water Oil Ratio<br>m3/m3 | Well Count |
|--------|----------|-----------------------|------------------------|-------------------------|--------------------------|--------------------------|------------|
| Jan-16 | 16,080   | 55.53                 | 1,721                  | 54.99                   | 1,705                    | 0.99                     | 22         |
| Feb-16 | 14,928   | 55.48                 | 1,609                  | 58.39                   | 1,693                    | 1.05                     | 21         |
| Mar-16 | 16,608   | 56.67                 | 1,757                  | 57.62                   | 1,786                    | 1.02                     | 22         |
| Apr-16 | 15,960   | 48.96                 | 1,469                  | 53.17                   | 1,595                    | 1.09                     | 22         |
| May-16 | 16,176   | 42.19                 | 1,308                  | 48.10                   | 1,491                    | 1.14                     | 22         |
| Jun-16 | 13,536   | 32.54                 | 976                    | 38.16                   | 1,145                    | 1.17                     | 19         |
| Jul-16 | 13,536   | 36.11                 | 1,119                  | 39.20                   | 1,215                    | 1.09                     | 18         |
| Aug-16 | 13,320   | 36.52                 | 1,132                  | 40.37                   | 1,252                    | 1.11                     | 18         |
| Sep-16 | 13,656   | 40.92                 | 1,228                  | 49.56                   | 1,487                    | 1.21                     | 19         |
| Oct-16 | 13,944   | 37.51                 | 1,163                  | 51.88                   | 1,608                    | 1.38                     | 19         |
| Nov-16 | 14,376   | 36.28                 | 1,088                  | 52.31                   | 1,569                    | 1.44                     | 20         |
| Dec-16 | 14,448   | 34.03                 | 1,055                  | 48.23                   | 1,495                    | 1.42                     | 19         |
|        | 176,568  |                       | 15,625                 |                         | 18,042                   |                          |            |

| Date | Hours On  | Oil Rate (CD)<br>m3/d | Monthly Oil Prod<br>m3 | Water Rate (CD)<br>m3/d | Monthly Water Prod<br>m3 | Water Oil Ratio<br>m3/m3 | Well Count |
|------|-----------|-----------------------|------------------------|-------------------------|--------------------------|--------------------------|------------|
| 1982 | 504       | 1.98                  | 62                     | 3.62                    | 112                      | 1.83                     | 1          |
| 1983 | 12,816    | 2.43                  | 886                    | 4.77                    | 1,740                    | 1.96                     | 2          |
| 1984 | 11,064    | 1.52                  | 556                    | 8.10                    | 2,966                    | 5.33                     | 2          |
| 1985 | 8,112     | 1.44                  | 527                    | 7.23                    | 2,639                    | 5.01                     | 1          |
| 1986 | 10,608    | 5.76                  | 2,102                  | 6.99                    | 2,552                    | 1.21                     | 2          |
| 1987 | 9,480     | 6.73                  | 2,458                  | 5.35                    | 1,953                    | 0.79                     | 3          |
| 1988 | 25,608    | 11.64                 | 4,259                  | 5.75                    | 2,105                    | 0.49                     | 5          |
| 1989 | 54,192    | 22.97                 | 8,384                  | 6.20                    | 2,264                    | 0.27                     | 15         |
| 1990 | 162,648   | 63.28                 | 23,097                 | 21.66                   | 7,907                    | 0.34                     | 23         |
| 1991 | 177,888   | 48.35                 | 17,649                 | 18.11                   | 6,610                    | 0.37                     | 23         |
| 1992 | 144,240   | 34.87                 | 12,763                 | 12.50                   | 4,577                    | 0.36                     | 17         |
| 1993 | 146,736   | 29.72                 | 10,847                 | 13.52                   | 4,935                    | 0.45                     | 17         |
| 1994 | 145,488   | 28.84                 | 10,528                 | 13.55                   | 4,945                    | 0.47                     | 17         |
| 1995 | 143,928   | 26.26                 | 9,584                  | 14.78                   | 5,395                    | 0.56                     | 17         |
| 1996 | 142,320   | 23.64                 | 8,654                  | 12.31                   | 4,506                    | 0.52                     | 17         |
| 1997 | 139,008   | 20.40                 | 7,445                  | 9.19                    | 3,355                    | 0.45                     | 17         |
| 1998 | 141,264   | 19.37                 | 7,070                  | 9.65                    | 3,521                    | 0.50                     | 17         |
| 1999 | 138,792   | 18.09                 | 6,604                  | 13.25                   | 4,835                    | 0.73                     | 17         |
| 2000 | 146,208   | 16.72                 | 6,121                  | 9.42                    | 3,447                    | 0.56                     | 17         |
| 2001 | 137,592   | 15.82                 | 5,773                  | 7.70                    | 2,812                    | 0.49                     | 17         |
| 2002 | 137,736   | 19.49                 | 7,114                  | 14.52                   | 5,299                    | 0.74                     | 17         |
| 2003 | 134,928   | 21.58                 | 7,876                  | 45.89                   | 16,751                   | 2.13                     | 17         |
| 2004 | 136,872   | 24.66                 | 9,026                  | 96.39                   | 35,279                   | 3.91                     | 17         |
| 2005 | 135,000   | 21.78                 | 7,951                  | 15.68                   | 5,725                    | 0.72                     | 17         |
| 2006 | 137,724   | 20.46                 | 7,468                  | 14.19                   | 5,180                    | 0.69                     | 17         |
| 2007 | 135,744   | 19.39                 | 7,078                  | 16.82                   | 6,141                    | 0.87                     | 17         |
| 2008 | 139,032   | 18.54                 | 6,787                  | 13.67                   | 5,002                    | 0.74                     | 17         |
| 2009 | 120,408   | 15.28                 | 5,576                  | 10.93                   | 3,991                    | 0.72                     | 17         |
| 2010 | 137,328   | 16.83                 | 6,141                  | 11.22                   | 4,095                    | 0.67                     | 17         |
| 2011 | 127,440   | 13.56                 | 4,951                  | 8.57                    | 3,127                    | 0.63                     | 17         |
| 2012 | 128,400   | 16.40                 | 6,001                  | 6.43                    | 2,352                    | 0.39                     | 16         |
| 2013 | 122,520   | 19.12                 | 6,978                  | 6.50                    | 2,372                    | 0.34                     | 18         |
| 2014 | 143,424   | 88.72                 | 32,384                 | 37.60                   | 13,722                   | 0.42                     | 26         |
| 2015 | 203,784   | 82.29                 | 29,958                 | 69.05                   | 25,171                   | 0.86                     | 23         |
| 2016 | 176,568   | 42.73                 | 15,625                 | 49.33                   | 18,042                   | 1.18                     | 20         |
|      | 4,015,404 |                       | 306,281                |                         | 225,425                  |                          |            |

**TABLE NO. 5 - Average Injection Pressures**

|      | 00/04-14 Inj          | 00/06-15 Inj          | 00/08-10 Inj          | 00/08-15 Inj          | 00/11-10 Inj          | 02/04-15 Inj          | 02/14-03 Inj          | A0/07-15 Inj          | C0/02-10 Inj          | C0/06-10 Inj          | C0/08-10 Inj          | C0/09-10 Inj          | C0/11-10 Inj          | C0/16-10 Inj          |
|------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Year | Inj Pressure<br>(kPa) | Inj Pressure<br>(kPa) | Inj Pressure<br>(kPa) | Inj Pressure<br>(kPa) | Inj Pressure<br>(kPa) | Inj Pressure<br>(kPa) | Inj Pressure<br>(kPa) | Inj Pressure<br>(kPa) | Inj Pressure<br>(kPa) | Inj Pressure<br>(kPa) | Inj Pressure<br>(kPa) | Inj Pressure<br>(kPa) | Inj Pressure<br>(kPa) | Inj Pressure<br>(kPa) |
| 2014 | 0.0                   | 5000.0                | 4500.0                | 0.0                   | 0.0                   | 2600.0                | 0.0                   | 0.0                   | 0.0                   | 5000.0                | 5000.0                | 3000.0                | 4546.9                | 5000.0                |
| 2015 | 0.0                   | 4654.4                | 4735.8                | 0.0                   | 3184.1                | 2241.4                | 3703.8                | 3802.7                | 0.0                   | 4890.1                | 4998.6                | 4213.0                | 4765.7                | 4885.7                |
| 2016 | 2227.7                | 4636.6                | 4933.5                | 754.4                 | 1738.9                | 2000.0                | 5000.0                | 4856.8                | 0.0                   | 4874.7                | 4992.2                | 4898.1                | 4900.0                | 4885.8                |