

**DALY UNIT NO. 11**

**WATERFLOOD EOR PROJECT**

**ANNUAL REPORT FOR 2016**

**April 27, 2017**

**Tundra Oil and Gas Partnership**

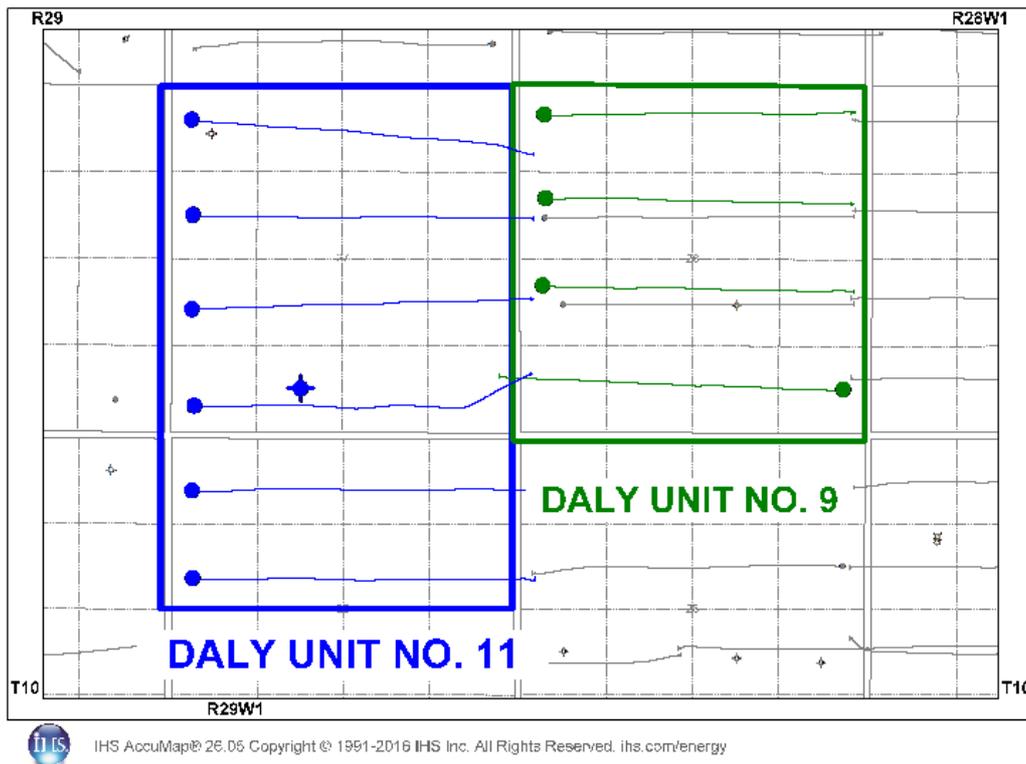
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## INTRODUCTION

Daly Unit No. 11 Enhanced Oil Recovery (EOR) Waterflood Project was approved on September 1, 2015 with Tundra Oil and Gas (Tundra) as Operator. The EOR project area, outlined in blue in Figure 1, contains 1 abandoned vertical well and 6 producing horizontal in 24 LSDs in Township 10, Range 29W1. Well list and well status is available in Appendix A.

**Figure 1: Daly Unit No. 11 Area Outline**



In accordance with Section 73 of the Manitoba Drilling and Production Regulation, Tundra submits the following 2016 Annual Progress Report for Daly Unit No. 11.

## DISCUSSION

### Production History

For the wells included in Daly Unit No. 11, production started in September 1996 with the 00/03-27-010-29W1/2 vertical well. Oil production peaked at 91.89 m<sup>3</sup>/d in May 2012. In 2016, the average production for the unit was 11.19 m<sup>3</sup>/d of oil and 63.55 m<sup>3</sup>/d of water and the average WOR was 5.88 m<sup>3</sup>/m<sup>3</sup>. There is currently no water injection in Daly Unit No. 11. The rates and WOR are presented in Figure 2.

Figure 2: Daly Unit No. 11 Production/Injection Rates and WOR vs. Time

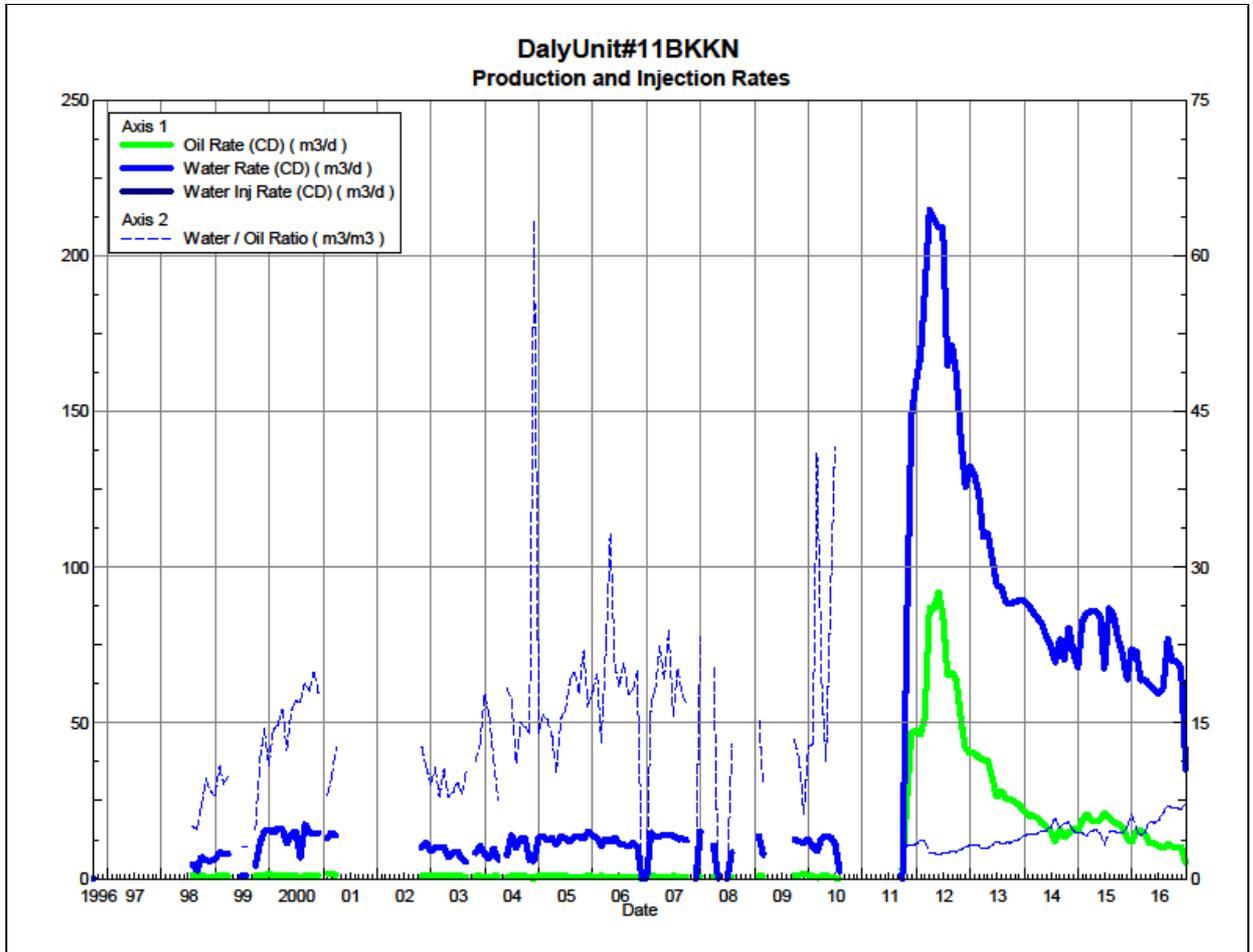
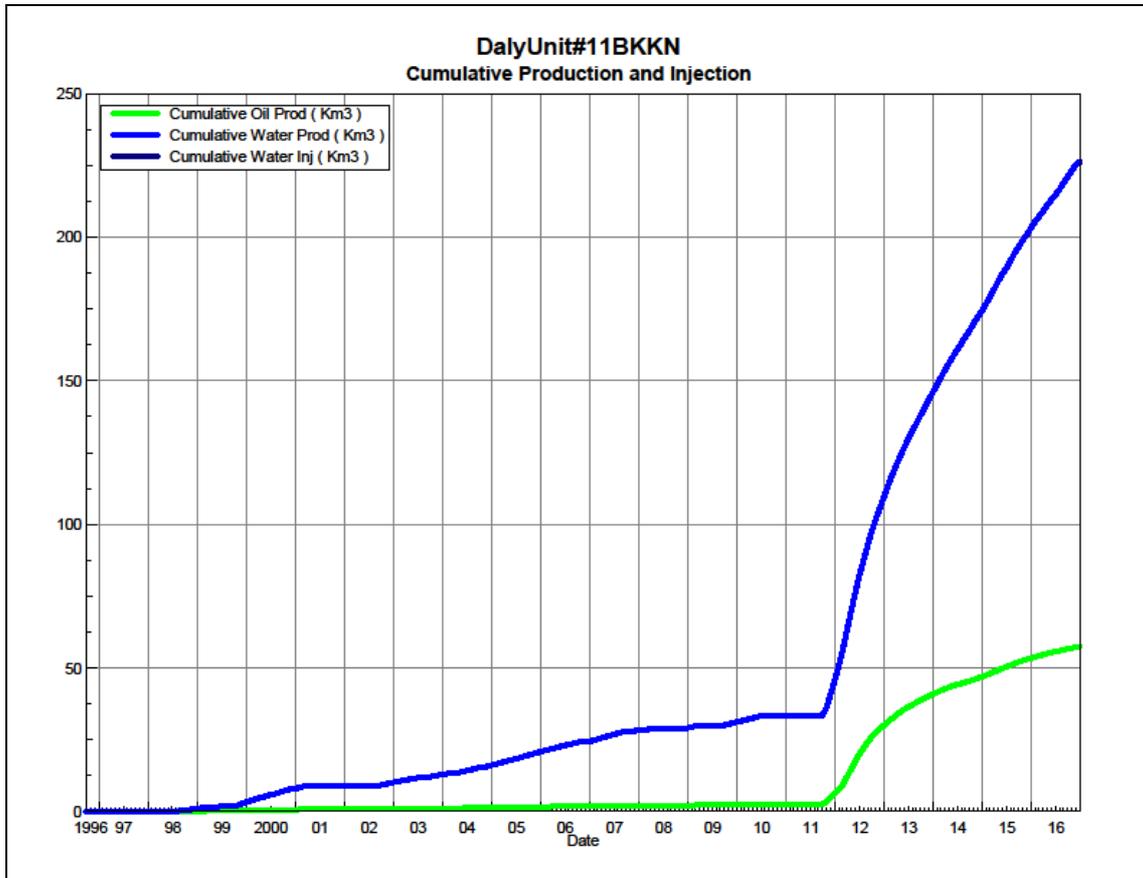


Figure 3 shows the cumulative production for Daly Unit No. 11 to the end of December 2016 as 57.41 e<sup>3</sup>m<sup>3</sup> of oil and 226.30 e<sup>3</sup>m<sup>3</sup> of water, representing a 6.8% recovery factor of the OOIP.

**Figure 3: Daly Unit No. 11 Cumulative Oil, Water and Water Injected vs. Time**



### **Waterflood History**

Daly Unit No. 11 is still in the development phase at the end of 2016. In December 2016, the 00/12-27 location had a cleanout workover done and is expected to be converted to an injector in 2017, completing an effective 40 acre line drive waterflood pattern in the north half of the unit. In 2017/2018, Tundra is planning to drill 3 produce first horizontal injectors between the horizontal producers in the south half of the unit, creating three (3) 20 acre line drive waterflood patterns.

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

## **Waterflood EOR Operating Strategy and Performance**

### **Water Source and Quality**

Injection water for Daly Unit No. 11 will be supplied from the Jurassic source water well at 100/02-25-010-29W1 (00/02-25). Tundra received approval from the Petroleum Branch in March 2013 to use the 00/02-25 well as a source water well for waterflood operations. Jurassic-sourced water will be pumped from the 00/02-25 source well to the Daly 12-24-10-29 battery, where it will be filtered and then pumped up to injection system pressure.

### **Injection Wellhead Pressures**

No wellhead injection pressure is available for Daly Unit No. 11.

### **Reservoir Pressure**

Where practical, Tundra is committed to collecting pressure data from newly drilled wells. For Daly Unit No. 11, no reservoir pressure measurements were taken in 2016.

### **Well Servicing**

Table 1 lists the maintenance that was required in Daly Unit No. 11 in 2016.

**Table 1: Service and Maintenance in Daly Unit No. 11**

100.05-27-010-29W1.00	Pump Change	12/9/2016
100.12-27-010-29W1.00	Cemented Liner Cleanout	12/23/2016
100.13-22-010-29W1.00	Rod Failure	7/29/2016

### **Waterflood Performance Discussion**

At the end of 2016, there is currently no water injection in Daly Unit No. 11, therefore, there is no waterflood analysis that can be done at this time.

## **List of Appendices**

Appendix A: Well Name and Well Status

**APPENDIX A**

<i>UWI</i>	<i>Surface Hole Location</i>	<i>License Number</i>	<i>Type</i>	<i>Status</i>
100/12-22-010-29W1/0	100/12-23-010-29W1/0	008121	Horizontal	Capable of OIL Prod
100/13-22-010-29W1/0	100/13-23-010-29W1/0	008122	Horizontal	Capable of OIL Prod
100/03-27-010-29W1/2	100/03-27-010-29W1/2	003835	Vertical	Abandoned
100/04-27-010-29W1/0	100/04-26-010-29W1/0	008116	Horizontal	Capable of OIL Prod
100/05-27-010-29W1/0	100/05-26-010-29W1/0	008090	Horizontal	Capable of OIL Prod
100/12-27-010-29W1/0	100/12-26-010-29W1/0	008444	Horizontal	Capable of OIL Prod
102/13-27-010-29W1/0	102/13-26-010-29W1/0	008445	Horizontal	Capable of OIL Prod