

CROMER UNIT NO. 3

Waterflood Progress Report 2020

Prepared for:

Manitoba Industry, Economic Development and Mines

Petroleum Branch

Prepared by:



TUNDRA OIL & GAS

Date: 2021-08-26

## Introduction

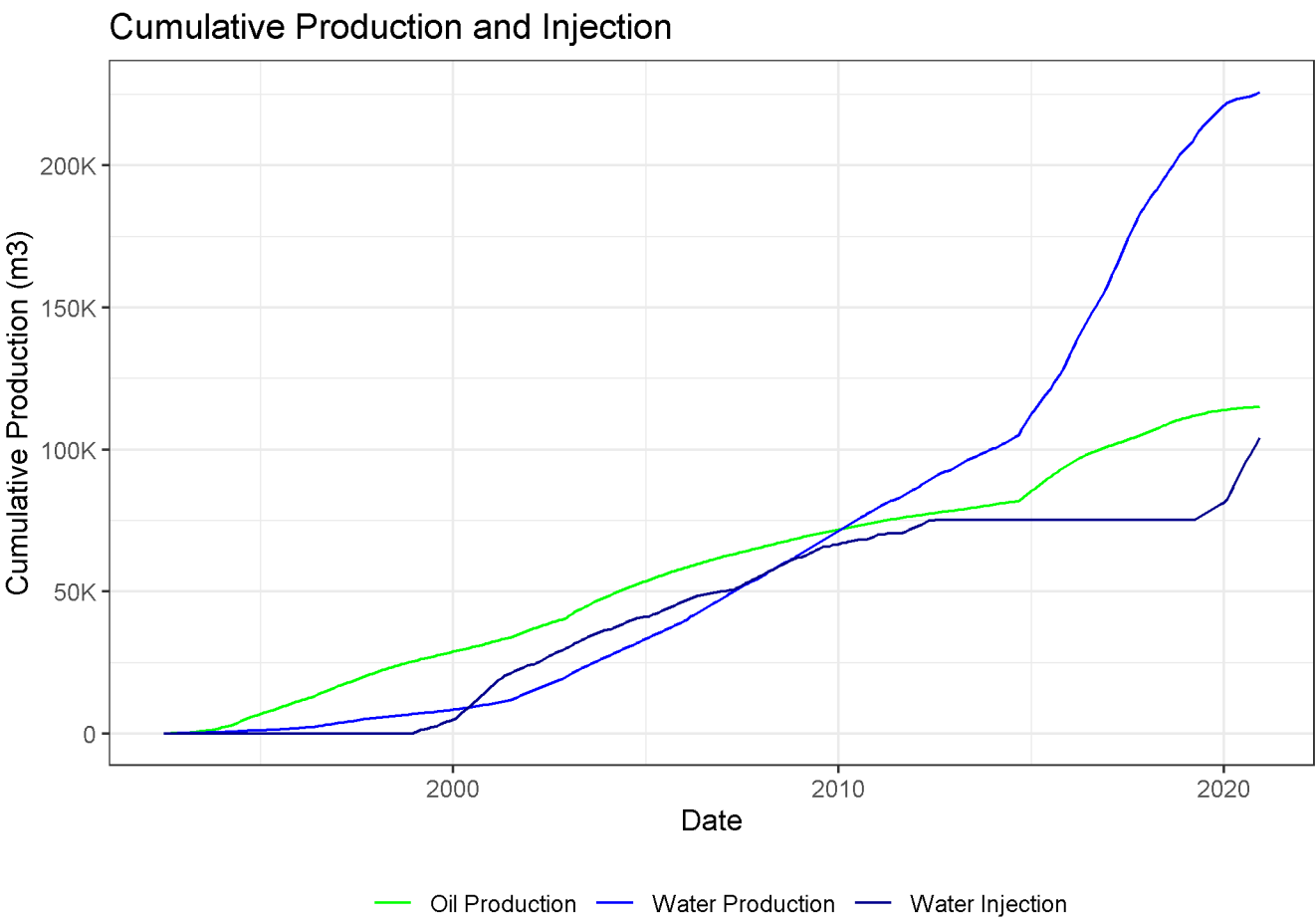
Cromer Unit No. 3 Enhanced Oil Recovery (EOR) Waterflood Project was approved on June 30, 2016. It succeeded as an expansion of the now cancelled Cromer Unit No. 1, which was approved under Waterflood Order No. 6 effective November 1, 1998 with Tundra Oil and Gas as Operator. The EOR project area contains wells in 38 LSDs in Township 9, Range 28W1. The Unit contains 26 wells. 16 producers, 2 injectors, and 8 abandoned/suspended/other.

## Monthly oil and water production rates, injection rate, GOR and WOR

| MONTH    | Cal Day Oil<br>m3/d | Cal Day Water<br>m3/d | Cal Day Injection<br>m3/d | WOR  | GOR |
|----------|---------------------|-----------------------|---------------------------|------|-----|
| JAN 2020 | 5.34                | 34.96                 | 17.18                     | 6.55 | 0   |
| FEB 2020 | 5.14                | 28.09                 | 39.03                     | 5.46 | 0   |
| MAR 2020 | 4.07                | 14.91                 | 68.16                     | 3.66 | 0   |
| APR 2020 | 4.63                | 14.58                 | 81.05                     | 3.15 | 0   |
| MAY 2020 | 4.77                | 14.09                 | 75.06                     | 2.95 | 0   |
| JUN 2020 | 3.14                | 7.10                  | 71.47                     | 2.26 | 0   |
| JUL 2020 | 2.37                | 7.96                  | 76.16                     | 3.36 | 0   |
| AUG 2020 | 2.29                | 9.32                  | 73.58                     | 4.07 | 0   |
| SEP 2020 | 2.30                | 10.09                 | 67.36                     | 4.39 | 0   |
| OCT 2020 | 3.64                | 14.44                 | 61.03                     | 3.97 | 0   |
| NOV 2020 | 5.02                | 15.84                 | 60.78                     | 3.16 | 0   |
| DEC 2020 | 5.11                | 15.73                 | 76.78                     | 3.08 | 0   |
| Average  | 3.98                | 15.59                 | 63.97                     |      |     |

Year summary of produced oil, gas, water and fluid injected

| Categories           | m3      |
|----------------------|---------|
| Oil Production       | 1,457   |
| Water Production     | 5,695   |
| Gas Production       | 0       |
| Water Injection      | 23,438  |
| Cumulative Oil       | 115,243 |
| Cumulative Water     | 225,800 |
| Cumulative Injection | 104,313 |



## Monthly Wellhead Pressure

All readings are in kPa

| UWI                   | JAN   | FEB   | MAR   | APR   | MAY   | JUN   | JUL   | AUG   | SEP   | OCT   | NOV   | DEC   | Average |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
| 102.04-23-009-28W1.00 |       | -83   | -95   | 166   | 624   | 1,365 | 2,140 | 2,798 | 2,958 | 2,959 | 3,044 | 3,904 | 1,798   |
| 103.14-13-009-28W1.00 | 2,978 | 3,312 | 4,103 | 4,522 | 4,520 | 4,735 | 4,858 | 4,963 | 4,920 | 4,948 | 4,893 | 5,194 | 4,496   |

## Monthly Injected Volumes

All Volumes are in m3

| UWI                   | JAN | FEB | MAR   | APR   | MAY   | JUN   | JUL   | AUG   | SEP   | OCT   | NOV   | DEC   | Total  |
|-----------------------|-----|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| 102.04-23-009-28W1.00 |     | 284 | 676   | 846   | 806   | 729   | 826   | 819   | 701   | 654   | 630   | 810   | 7,781  |
| 103.14-13-009-28W1.00 | 532 | 563 | 761   | 740   | 715   | 686   | 709   | 643   | 618   | 584   | 564   | 761   | 7,876  |
| Grand Total           | 532 | 847 | 1,437 | 1,586 | 1,521 | 1,415 | 1,535 | 1,462 | 1,319 | 1,238 | 1,194 | 1,571 | 15,657 |

## Voidage

All Volumes are in m3 Oil Formation Volume Factor (Rm3/Sm3) = 1.071

| MONTH    | Oil | Water | Injection | Cumulative<br>Oil | Cumulative<br>Water | Cumulative<br>Injection | VRR   | Cumulative<br>VRR |
|----------|-----|-------|-----------|-------------------|---------------------|-------------------------|-------|-------------------|
| JAN 2020 | 166 | 1,084 | 532       | 113,948           | 221,191             | 81,400                  | 0.422 | 0.237             |
| FEB 2020 | 149 | 814   | 1,132     | 114,097           | 222,005             | 82,532                  | 1.163 | 0.240             |
| MAR 2020 | 126 | 462   | 2,113     | 114,223           | 222,467             | 84,645                  | 3.540 | 0.245             |
| APR 2020 | 140 | 437   | 2,431     | 114,363           | 222,904             | 87,076                  | 4.142 | 0.252             |
| MAY 2020 | 148 | 437   | 2,327     | 114,511           | 223,341             | 89,403                  | 3.908 | 0.258             |
| JUN 2020 | 94  | 213   | 2,144     | 114,605           | 223,554             | 91,547                  | 6.835 | 0.264             |
| JUL 2020 | 74  | 247   | 2,361     | 114,679           | 223,801             | 93,908                  | 7.237 | 0.271             |
| AUG 2020 | 71  | 289   | 2,281     | 114,750           | 224,090             | 96,189                  | 6.249 | 0.277             |
| SEP 2020 | 69  | 303   | 2,021     | 114,819           | 224,393             | 98,210                  | 5.362 | 0.283             |
| OCT 2020 | 113 | 448   | 1,892     | 114,932           | 224,841             | 100,102                 | 3.325 | 0.288             |
| NOV 2020 | 150 | 475   | 1,823     | 115,082           | 225,316             | 101,925                 | 2.868 | 0.292             |
| DEC 2020 | 159 | 487   | 2,380     | 115,241           | 225,803             | 104,305                 | 3.621 | 0.299             |

## Workovers

| UWI | Date | Description |
|-----|------|-------------|
|-----|------|-------------|

## Well List

| UWI                   | Type       | Status         |
|-----------------------|------------|----------------|
| 100.16-11-009-28W1.02 | Vertical   | Pumping        |
| 100.11-13-009-28W1.00 | Horizontal | Producing      |
| 100.14-13-009-28W1.02 | Vertical   | Abandoned Zone |
| 102.14-13-009-28W1.00 | Horizontal | Producing      |
| 103.14-13-009-28W1.00 | Horizontal | Injection      |
| 100.02-14-009-28W1.02 | Vertical   | Producing      |
| 102.02-14-009-28W1.00 | Horizontal | Producing      |
| 102.06-14-009-28W1.02 | Vertical   | Commingled     |
| 100.10-14-009-28W1.00 | Vertical   | Commingled     |
| 100.11-14-009-28W1.00 | Vertical   | Injection      |
| 100.13-14-009-28W1.03 | Vertical   | Abandoned Zone |
| 100.14-14-009-28W1.00 | Vertical   | Commingled     |
| 100.01-23-009-28W1.00 | Horizontal | Producing      |
| 100.02-23-009-28W1.02 | Vertical   | Commingled     |
| 100.03-23-009-28W1.00 | Vertical   | Producing      |
| 100.04-23-009-28W1.03 | Vertical   | Commingled     |
| 102.04-23-009-28W1.00 | Horizontal | Injection      |
| 100.05-23-009-28W1.00 | Vertical   | Producing      |
| 100.06-23-009-28W1.02 | Vertical   | Commingled     |
| 100.07-23-009-28W1.02 | Vertical   | Pumping        |
| 100.10-23-009-28W1.02 | Vertical   | Producing      |
| 100.11-23-009-28W1.00 | Vertical   | Producing      |
| 100.12-23-009-28W1.00 | Vertical   | Pumping        |
| 100.13-23-009-28W1.00 | Vertical   | Pumping        |
| 100.14-23-009-28W1.00 | Vertical   | Pumping        |
| 100.15-23-009-28W1.02 | Vertical   | Producing      |