



Growth, Enterprise and Trade

Petroleum Branch

360-1395 Ellice Ave , Winnipeg, Manitoba, Canada R3G 3P2

T 204-945-6577 F 204-945-0586

www.manitoba.ca

October 3, 2019

Mr. Eric [REDACTED]
Tundra Oil and Gas Limited
[REDACTED]
Calgary, AB [REDACTED]

Dear Mr. Nelson,

RE: East Manson Unit No. 8 – Waterflood Order & Third Tier EOR Factor

With reference to our letter dated November 1, 2017, please find attached Waterflood Order No.77 which applies to the unit. Tundra is reminded that separate conversion applications are required for any existing horizontals to be converted to injectors within this new Unit.

The Waterflood order requires Tundra to conduct annual pressure surveys and submit an annual progress report. Tundra is reminded that the 2019 report is to be submitted to the Director within 60 days after the end of the calendar year.

East Manson Unit No. 8 will qualify for a Third Tier EOR Factor (TTEF). The Branch has calculated a proposed TTEF of 0.5199 to apply to all tracts in the unit. Table 1 shows the TTEF calculation. The TTEF is based on summed estimates of remaining primary recoverable reserves and incremental EOR recoverable reserves for unit. Please provide the Branch with any comments on the proposed TTEF by November 3, 2019.

If you have any questions in respect of the approvals or the TTEF calculations please contact Leo [REDACTED] at (204) 945-6570.

Yours truly,

[REDACTED]
Peter [REDACTED]
Director

Cc: Administration, Winnipeg
Virden Office

Table 1. Third Tier EOR Factor Calculation

East Manson Unit #8	
Unit	East Manson Unit No. 8
Operator	Tundra Oil & Gas Limited
LSDs	16
Effective Date of Third EOR Production	October 1, 2019
Cumulative Unit Production to August 31, 2019 (m ³)	111,617.0
Primary Recoverable Reserves (m ³)	171,992.0
Incremental EOR Rec. Reserves (IERR) (m ³)	65,377.0
Total Remaining Rec. Reserves (TRES) (m ³)	125,752.0
Third Tier EOR Factor (TTEF)	0.5199



**Minister of
Growth, Enterprise and Trade**

Legislative Building
WINNIPEG, MANITOBA, CANADA
R3C 0V8

MINISTERIAL ORDER

**Subsection 116(2)
THE OIL AND GAS ACT**


WATERFLOOD ORDER NO. 77

**Pertaining to Waterflood Operations
in East Manson Unit No. 8**

- 1.0 The Unit Operator shall conduct waterflood operations by injecting water into the Manson Bakken - Torquay Pool underlying East Manson Unit No. 8 ("the Unit") through the wells listed in Schedule A. The Director may approve the conversion of additional wells in the Unit to water injection.
- 1.1 Every injection well shall be completed as approved under Section 47 of the Drilling and Production Regulation ("the Regulation").
- 1.2 The maximum wellhead pressure at which water may be injected is 5 700 kPa.
- 1.3 The Director may, from time to time, establish a maximum or minimum rate at which water may be injected into a well.
- 1.4 The annulus of each injection well shall be pressure tested in accordance with Section 50 of the Regulation.
- 2.0 The Unit Operator shall conduct an annual survey to determine the level and distribution of reservoir pressure in the Unit. A summary of the results of any pressure surveys conducted during the year are to be included in the annual waterflood progress report required under Section 73 of the Regulation.
- 2.1 The frequency of pressure surveys may be reduced where the Director is satisfied that more frequent surveys will not assist the Unit Operator in monitoring the effectiveness of the waterflood.
- 2.2 The Unit Operator is responsible for monitoring the effectiveness of the waterflood and for collecting such reservoir data and other information as is necessary to evaluate and optimize waterflood performance.

- 2.3 The Unit Operator shall advise the Petroleum Branch of the suspension of water injection at any well, any indication of channelling or breakthrough of injected water to a producing well or out of zone and any other detrimental effects that may be attributable to the waterflood operations.
- 3.0 The Unit Operator shall file a report of production or injection for each well in the Unit in accordance with Section 120 of the Regulation.
- 4.0 The Unit Operator shall file an annual waterflood progress report in accordance with Section 73 of the Regulation.
- 5.0 Only Lodgepole formation and / or Bakken formation source waters are approved to be injected into the Unit. Any other source of water must be approved by the Petroleum Branch prior to injection.

Oct 14/2019
Date



Director of Petroleum for
Minister Growth, Enterprise and Trade

SCHEDULE A

WATERFLOOD ORDER NO. 77

EAST MANSON UNIT NO. 8

WATER INJECTION WELL(S)

WELL NAME	LSD	SEC	TWP	RGE
East Manson Unit No. 8 Prov. HZNTL WIW	08	10	13	28