



# TUNDRA OIL & GAS

## PROPOSED EAST MANSON UNIT NO. 10

### Application for Enhanced Oil Recovery (EOR) Project and Voluntary Unitization

#### Bakken Formation

#### Bakken-Torquay B Pool (17-62B)

#### Manson Area, Manitoba

This application includes forward looking statements. Statements other than statements of historical fact are forward-looking statements. Words such as “believe”, “will”, “may”, “may have”, “would”, “estimate”, “continues”, “anticipates”, “intends”, “plans”, “expects”, “budget”, “scheduled”, “forecasts”, and similar words identify estimates and forward-looking statements. Forward-looking statements are not guarantees and involve known and unknown risks, and uncertainties, including, but not limited to commodity price, price of purchased goods and services, global economic situation, quantity of oil and natural gas reserves, results of waterflood, individual well results, legal, political and environmental changes which may cause the actual results to vary materially from forecast.

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## **INTRODUCTION**

The Manson Field is located in Townships 12-14 Ranges 27-29 WPM (Figure 1 – “Manson Field Boundary”). Within the Manson Field, Bakken-Torquay pools have been developed with the drilling of horizontal wells on primary recovery of reserves at various inter well spacings. There are 9 approved Units utilizing secondary recovery methods in the Bakken formation within the Manson Field Boundary.

Potential exists for incremental reserves to be recovered through an Enhanced Oil Recovery Waterflood Scheme in the Bakken formation through unitization (referred to as “Secondary Recovery”) within a project area comprised of the SE ¼ of Section 09-013-28W1 and LSD’s 15,16 of Section 04-013-28W1 (Figure 2 – Proposed East Manson Unit No. 10 Boundary referred to as the “Application Area”).

The Application Area proposed for unitization is within the existing designated pool (“Figure 3 – Bakken-Three Forks Manson Pool Map”). Tundra is operator of the lands within the Application Area currently comprised of 6 producing horizontal wells. A well list including recent production statistics of the existing wells is attached as Table 1 – “Well List and Status”. Tundra’s contemplated development includes the drilling of two additional wells with the potential of converting one of the wells to water injection, with the other being a producer, pending results of the waterflood and conditions as circumstances unfold. The Future Unit Development Plan is laid out below and may include two additional injectors subject to results of the waterflood and technical discretion of the unit operator taking into consideration factors such as production performance and associated economics among others.

Tundra seeks to initiate Secondary Recovery of the pool within the Application Area. If this application is approved by the Manitoba Petroleum Branch (the “Crown”), the proposed name for the unit would be East Manson Unit No. 10 which follows East Manson Unit No. 9 in sequence.

Tundra submits this application to establish East Manson Unit No. 10 and implement an Enhanced Oil Recovery (EOR) Project by way of Secondary Recovery within the Bakken formation.

## SUMMARY

1. The Application Area contains 6 producing horizontal wells held by Tundra 100% of which 4.5 fall fully within the proposed Application Area and produce from the Bakken formation (the “Wells”). The Application Area is situated between East Manson Unit No. 2 and East Manson Unit No. 8, and South of East Manson Unit No. 5 (Figure 2 – “Proposed East Manson Unit No. 10 Boundary”).
2. Total Net Original Oil in Place (OOIP) in the Application Area has been calculated to be 359.7 E<sup>3</sup>m<sup>3</sup> (2262.5 Mbbl) for an average of 59.95 net E<sup>3</sup>m<sup>3</sup> (377.1 Mbbl) OOIP per 40 acre LSD. OOIP values were determined using a permeability cutoff of 0.5 mD using petrophysical analysis.
3. Cumulative production to the end of February 2024 from the Wells was 48.8 E<sup>3</sup>m<sup>3</sup> (307.0 Mbbl) of oil, and 117.9 E<sup>3</sup>m<sup>3</sup> (741.3 Mbbl) of water, representing a 13.6% Recovery Factor (RF) of the Net OOIP.
4. Estimated Ultimate Recovery (EUR) based on primary recovery of production and reserves from the Wells has been calculated to be 83.2 E<sup>3</sup>m<sup>3</sup> (523.5 Mbbl), with 34.4 E<sup>3</sup>m<sup>3</sup> (216.5 Mbbl) remaining as of the end of February 2024.
5. Ultimate OOIP recovery within the Application Area under primary recovery is forecasted to be 23.1%.
6. Figure 4 – “East Manson Unit No. 10 Historic Production” shows gross production from the Wells within the Application Area peaked in December 2011 at 30.2 m<sup>3</sup> of oil per day (OPD). As of February 2024, gross production from the Wells was 13.0 m<sup>3</sup> OPD, 57.8 m<sup>3</sup> of water per day (WPD) with an 81.7% watercut (WCT).
7. As of February 2024, average per well production has declined to 2.1 m<sup>3</sup> OPD per well. Decline analysis of the wells grouped together within the Application Area forecasts total oil production to continue declining at an annual rate of approximately 9.4% in aggregate under primary recovery.
8. The EUR of oil reserves under the implementation of Secondary Recovery within the Application Area has been calculated to be 131.0 E<sup>3</sup>m<sup>3</sup> (824.0 Mbbl), with 82.2 E<sup>3</sup>m<sup>3</sup> (517.1 Mbbl) remaining. An incremental 47.8 E<sup>3</sup>m<sup>3</sup> (300.5 Mbbl) in oil reserves, or 13.3%, are forecasted to be recovered under Secondary Recovery.
9. Total recovery factor under Secondary Recovery in the Application Area could be as high as 36.4% based on internal estimates.
10. Based on waterflood response in the adjacent units within the Manson Field, the Three Forks and Middle Bakken Formation in the proposed Application Area are believed to be analogous and therefore suitable reservoirs for secondary recovery based on proximity.
11. The strategy for development is expected to include the drilling of additional open hole horizontal wells in addition to existing open hole horizontal wells that could be converted to injection wells within the Application Area with the goal of setting up a 20-acre line drive waterflood congruent with existing developments in the Manson Field (Figure 13 – “Horizontal Injector Downhole Diagram – OH”)

## **ENHANCED OIL RECOVERY (EOR) PROJECT APPLICATION**

### **GEOLOGY**

#### **Stratigraphy**

The Middle Bakken formation within the proposed Application Area can be seen on the cross section in Appendix 1. The Middle Bakken is conformably overlain by the Upper Bakken Shale, which is in turn overlain by the Basal Limestone unit of the Mississippian Lodgepole formation.

The Middle Bakken unconformably overlies the Devonian 'Torquay' or Devonian 'Three Forks Group', which is locally divided into the Lyleton C, Lyleton B, and Lyleton Shale formations (from oldest to youngest). The Bakken – Lyleton unconformity is angular, where the top Lyleton units wedge, or thin and subcrop, towards the northeast. The Lyleton formation is underlain by the Devonian Birdbear formation.

#### **Sedimentology**

The Middle Bakken within the Application Area has two main units: The Upper Middle Bakken and the Lower Middle Bakken.

The Upper Middle Bakken is composed of a very fine-grained dolomitic quartz siltstone that is bioturbated and has abundant small brachiopod fossils. It is considered non-reservoir in the area (supported by a lack of oil staining and poor porosity and permeability in core) and is interpreted to represent a lower shoreface to offshore transition facies within a restricted marine seaway. The Upper Middle Bakken gradationally overlies the Lower Middle Bakken.

The Lower Middle Bakken is the main reservoir section; composed of fine to very fine-grained quartz sandstone with minor amounts of dolomite, feldspar, and clays. In core it often has very thin low angle to horizontal laminae, with ripples, and sometimes some small rip up clasts of the underlying Lyleton at the base. The Lower Middle Bakken is thought to have been deposited in a foreshore facies within a restricted marine seaway locally with evidence of intertidal point bar and channel thalweg depositional environments. The reservoir quality of the underlying Lyleton, along with where on the foreshore the Bakken was deposited, influences the reservoir quality of the Middle Bakken greatly – resulting in a large range of reservoir quality within the Manson field.

#### **Structure**

Structure within the Application Area is generally consistent with southwest regional dip with bias towards a local low to the west. Please refer to Appendix 2 for Top Middle Bakken Subsea Structure map.

## Reservoir

The Middle Bakken reservoir within the Application Area is continuous and of good quality. Net pay thickness ranges around 3m, shown in Appendix 3. Net oil pay is defined by logs with a limestone density porosity greater than 12% and resistivity higher than 3 ohm meters. While there are no vertical wells within the proposed unit, the surrounding well control gives insight into the net pay, porosity, and permeability trends within the proposed unit boundary. Appendix 4 and 5 show Phi\*H and K\*H maps, respectively. Phi.h is the average porosity of the reservoir multiplied by the pay height in vertical wells. K.h is the summation of the permeability multiplied by the pay height of the reservoir in vertical wells.

## Original Oil in Place (OOIP)

The OOIP within the Application Area is calculated to be 2.27 million barrels of oil as shown in Table 2 – OOIP Calculation. The OOIP was calculated LSD by LSD estimating the net pay based on the surrounding vertical well logs. Sw was averaged for all LSD's at 0.23, porosity at 17.5% and the Boi used was 1.08. OOIP values were calculated using the following volumetric equation:

$$OOIP = \frac{Area * Net Pay * Porosity * (1 - Water Saturation)}{Initial Formation Volume Factor of Oil}$$

where

|       |   |
|-------|---|
| OOIP  | = Original Oil in Place by LSD (Mbbbl, or m3)         |
| A     | = Area (40 acres, or 16.187 hectares, per LSD)        |
| h * Ø | = Net Pay * Porosity, or Phi * h (ft, or m)           |
| Bo    | = Formation Volume Factor of Oil (stb/rb, or sm3/rm3) |
| Sw    | = Water Saturation (decimal)                          |

## Historical Production:

A historical group production history plot for the Wells contained within the Application Area is shown as Figure 4 - East Manson Unit No. 10 Historic Production. Oil production commenced from Wells within the Application Area in November 2011 and peaked during December 2011 at 30.2 m<sup>3</sup> OPD. As of February 2024, gross production from the Wells was 13.0 m<sup>3</sup> of OPD, 57.8 m<sup>3</sup> of WPD and a 81.7% WCT.

Oil production from the Wells within the Application Area is currently declining at an annual rate of approximately 9.4% under the current primary recovery method.

The production rates from the Wells within the Application Area indicate the need for pressure restoration and maintenance, and Secondary Recovery by way of waterflood is reasonably believed to be the most efficient means of re-introducing energy back into the reservoir system to provide areal sweep between wells that is anticipated to increase the reserves and potentially the associated production rates.

### **Technical Studies:**

The waterflood performance predictions for the proposed East Manson Unit No. 10 are based on internal engineering assessments. Internal reviews included analysis of available open-hole logs; core data; petrophysics; seismic; drilling information; completion information; and production information. These parameters were reviewed to develop a suite of geological maps and establish reservoir parameters to support the calculation of the proposed East Manson Unit No. 10 OOIP (Table 3 – Rock Fluid Parameters).

If approved by the Crown, unitization and the pursuit of Secondary Recovery is anticipated to increase the estimated ultimate oil recovery. Analogous waterflood projects in the Manson Field (Figure 5 – “East Manson Unit No. 8 Production Profile”) suggests implementation of Secondary Recovery can lead to incremental oil being recovered from the Bakken-Three Forks formation.

As Tundra has a direct comparison of waterflood performance from existing units within the Manson Field, a simulation model for the proposed East Manson Unit No. 10 has not been included in this application.

### **Future Unit Development Plan:**

Primary recovery from existing horizontal wells in the Application Area has declined significantly from the peak rate indicating a need for additional pressure support under Secondary Recovery. To increase pressure support of the reservoir, subject to approval of this application, Tundra will drill an injection well, noted as injector, and a producing well, noted as producer (see Figure 6 - "East Manson Unit No. 10 Development Plan") Tundra may further evaluate an opportunity to convert two additional Horizontal Wells two injections both of which are noted as “potential future injector conversion” also in Figure 6 – “East Manson Unit No. 10 Development Plan”. If results are in line with expectations, the development strategy could deliver a 20-acre spaced waterflood pattern between the wells within the Application Area. The additional drilling and injection conversions are subject to results of the waterflood and technical discretion of the unit operator taking into consideration factors such as production performance and associated economics among others.

### **Reserve Recovery Profile and Production Forecast:**

The waterflood performance predictions for the proposed East Manson Unit No. 10 is based on oil production decline curve analysis, and the Secondary Recovery predictions are based on internal engineering analysis performed by the Tundra reservoir engineering group.

### **Primary recovery Production Forecast:**

Cumulative production to February 2024, from the 4.5 net producing wells within the Application Area was 48.8 E<sup>3</sup>m<sup>3</sup> of oil, and 117.9 E<sup>3</sup>m<sup>3</sup> of water, representing a 13.6% Recovery Factor (RF) of the calculated Net OOIP.

Ultimate Primary Proved Producing oil reserves recovery for the Application Area have been estimated to be 83.2 E<sup>3</sup>m<sup>3</sup>, or a 23.1% RF of OOIP. The remaining producing primary reserves have been estimated to be 34.4 E<sup>3</sup>m<sup>3</sup> to February 29, 2024. The expected production decline and forecasted cumulative oil recovery under primary recovery is shown in Figures 7 and 8.

### **Timing for Conversion of Horizontal Wells to Water Injection:**

Tundra anticipates drilling and converting to injection a new well within the SE of Section 9. The water injection conversion schedule for the balance of well(s) in the Application Area is subject to knowledge gained from previous conversions and results.

### **Criteria for Conversion to Water Injection Well:**

Tundra currently anticipates converting three wells to injection within the Application Area as demonstrated in Figure 6 – “East Manson Unit No. 10 Development Plan”.

To assess timing of horizontal well conversion from primary production to water injection service, Tundra will monitor the following parameters:

- Measured reservoir pressures at start of and/or through primary production
- Fluid production rates and changes in decline rate
- Any observed production interference effects with adjacent vertical and horizontal wells
- Pattern mass balance and/or oil recovery factor estimates
- Reservoir pressure relative to bubble point pressure

Monitoring these parameters will enable the proposed East Manson Unit No. 10 to be developed efficiently and provide the greatest chance the waterflood will sweep oil from the reservoir with pressure support for the mutual benefit of Tundra and the mineral owners.

### **Secondary EOR Production Forecast:**

The proposed East Manson Unit No. 10 is planned to have 20 acre spacing which is consistent with previous units in the Manson Field. The oil production profile for the proposed East Manson Unit No. 10 under secondary recovery has been developed based on predictions derived from conventional internal engineering analysis performed by the Tundra reservoir engineering group.

Secondary waterflood plots of the potential oil production forecast over time and the potential oil production vs. cumulative oil are plotted in Figures 9 and 10, respectively. Total primary plus secondary EUR within the Application Area is estimated to be 131.0 E<sup>3</sup>m<sup>3</sup> with 82.2 E<sup>3</sup>m<sup>3</sup> remaining representing a total recovery factor of 36.4%. An incremental 47.8 E<sup>3</sup>m<sup>3</sup> of oil is forecasted to be recovered within the Application Area which represents an incremental 13.3% estimated by Secondary Recovery relative to the existing primary production method based on current information and estimates that could vary.

### **Estimated Fracture Gradient:**

Completion data from the existing producing wells within the project area indicate a fracture pressure gradient range of 18.0-20.0 kPa/m true vertical depth (TVD). Tundra expects the fracture gradient encountered during completion of the proposed horizontal injection well will be somewhat lower than these values due to expected reservoir pressure depletion.



## **Waterflood Operating Strategy**

### **Water Source**

Injection water for the proposed East Manson Unit No. 10 is anticipated to be sourced from either: producing Bakken horizontal wells or the 11-10-013-28W1 Jurassic water source well. Bakken-sourced water can be pumped to and filtered at the Manson 16-04-013-28 battery, where it will be distributed to the injection system. Jurassic-source water can be produced from the 11-10-013-28 Water Source well and filtered at the injection wellheads. Diagrams of the anticipated water injection system are illustrated in Figure 11 and Figure 12 and will not involve the injection of fresh water.

Tundra does not foresee injectivity issues when using Bakken produced or Jurassic sourced water for the waterflood operations in the proposed East Manson Unit No. 10.

### **Injection Wells**

The water injection wells for the proposed East Manson Unit No. 10 could be re-configured for downhole injection after approval for waterflood has been received. The horizontal injection wells are anticipated to be completed with an open hole design. An example of the downhole configuration can be seen in Figure 13 (Horizontal Injector Downhole Diagram – OH).

The water injection wells can be placed on injection after the approval to inject has been received from the Crown. Wellhead injection pressures should be maintained below the least value of either:

1. The area specific known and calculated fracture gradient, or
2. The licensed surface injection Maximum Operating Pressure (MOP)

Tundra has a thorough understanding of area fracture gradients. A management program will be utilized to set and routinely review injection target rates and pressures vs. surface MOP and the known area formation fracture pressures.

All new water injection wells will be surface equipped with injection volume metering. An operating procedure for monitoring water injection volumes and meter balancing can be utilized to monitor measurement of the entire system and associated integrity.

The proposed East Manson Unit No. 10 horizontal water injection well rate is forecasted to average 10 – 40 m<sup>3</sup> WPD, based on expected reservoir permeability and pressure.

## **Reservoir Pressure Management during Waterflood**

Tundra has representative initial pressure surveys available for the horizontal producing wells within the proposed East Manson Unit No. 10 project area in the Bakken formation (Appendix 6).

Upon injection, a 1–2-year reservoir re-pressurization period due to cumulative primary production voidage and pressure depletion is possible but it could be longer or shorter. Initial monthly Voidage Replacement Ratio (VRR) is expected to be approximately 1.2 to 2.0 within the unit during the re-pressurization period. As the cumulative VRR approaches 1.0, target reservoir operating pressure for waterflood operations is forecasted to be 75-90% of original reservoir pressure.

## **Waterflood Surveillance and Optimization**

EOR response and waterflood surveillance within the Application Area will consist of the following:

- Regular production well rate and watercut testing
- Daily water injection rate and pressure monitoring vs target rates
- Water injection rate/pressure/time vs. cumulative injection plot
- Reservoir pressure surveys as required to establish pressure trends
- Pattern VRR
- Potential use of chemical tracers to track water injector/producer responses
- Use of some or all of: Water Oil Ratio (WOR) trends, Log WOR vs Cum Oil, Hydrocarbon Pore Volumes Injected, Conformance Plots

The above surveillance methods should contribute to an ever-increasing understanding of reservoir performance and provide data to continually control and optimize the waterflood operation which should significantly reduce the potential for undesired water channeling.

## **Economic Life**

Under the current primary recovery method, existing wells within the Application Area will be deemed uneconomic when the net oil price revenue stream becomes less than the producing operating costs. With positive oil production response under the proposed secondary recovery method, the economic life could be extended into the future.

## **Water Injection Facilities**

The waterflood operation will utilize either filtered produced water from Tundra operated Bakken producing wells or the 11-10-013-28W1 Jurassic sourced water. Injection wells will be connected to the existing high pressure water pipeline system supplying other Tundra-operated waterflood units.

A complete description of all planned system design and operational practices to prevent corrosion related failures is shown in Figure 14 (Planned Corrosion Control). All surface facilities and wellheads will have cathodic protection to prevent corrosion. All injection flowlines will be made of fiberglass so corrosion should not be an issue. Injectors will have a packer set above the Middle Bakken formation, and the annulus between the tubing and casing will be filled with inhibited fluid.

## **VOLUNTARY UNITIZATION APPLICATION**

As noted previously, the Application Area is not yet unitized. However, unitization will permit the implementation of Secondary Recovery within the Application Area which is forecasted to increase overall recovery of OOIP to 36.2%. The basis for unitization is to develop the Application Area in an effective manner that will permit waterflooding. Unitization, and the implementation of an Enhanced Oil Recovery (EOR) Project, should increase the recoverable reserves via Secondary Recovery with pressure support. Additional drilling and water injection conversions to build and maintain reservoir pressure, at the discretion of the unit operator, should increase oil production and associated life of the reserves.

An approved unit is required by the Crown to permit the conversion of wells to water injection, initiate a waterflood and pursue Secondary Recovery through the execution of a formal Unit Agreement.

### **Proposed Unit Name:**

Tundra proposes the official name of the new unit covering the Application Area to permit secondary recovery be East Manson Unit No. 10.

### **Proposed effective date:**

The proposed effective date is August 1, 2024, subject to Crown and mineral owner approvals.

### **Description of the unitized zone:**

The unitized zone to be waterflooded shall be the Bakken / Three Forks formation.

### **Working interest owners & proposed operator for the unit:**

Table 4 – Tract Participation outlines the working interest owners for the corresponding tract within Application Area. Tundra holds a 100% working interest ownership in all the proposed tracts and will therefore hold a 100% working interest ownership in the proposed East Manson Unit No. 10. The proposed unit operator will be Tundra.

### **Proposed tract breakdown within the Application Area:**

There is proposed to be six (6) tracts broken down as follows:

- 01-09-013-28W1
- 02-09-013-28W1
- 07-09-013-28W1
- 08-09-013-28W1
- 15-04-013-28W1
- 16-04-013-28W1

The lands included in the 40 acre tracts are outlined in Table 4 – Tract Participation.

### **Tract factor calculation & methodology:**

East Manson Unit No. 10 is proposed to consist of 6 tracts based on remaining OOIP using maps created internally by Tundra, as of May 2024, with the production from the horizontal wells being divided according to the existing production allocation agreements. The calculation of the tract factors is outlined in Table 5 – Tract Factor Calculation and has been rounded off to nine (9) decimal places.

The Tract Factor contribution for each of the tracts within the Application Area was calculated as follows:

- Gross OOIP by LSD, minus cumulative production to February 29, 2024, for the LSD as distributed by the LSD specific Production Allocation (PA) % in the applicable producing horizontal or vertical well (to yield Remaining Gross OOIP)

Tract Factor formula and associated tract factor calculations for all individual LSD's based on the above methodology are outlined in Table 5 – Tract Factor Calculation and included in spreadsheet format in the digital submission.

### **NOTIFICATION OF MINERAL AND SURFACE OWNERS**

Tundra shall notify all surface and mineral owners of its intention to submit an application to form a new unit which will be known as East Manson Unit No. 10. Copies of the Notices, and proof of service, to all surface and mineral owners will be forwarded to the Crown, when available, to complete the East Manson Unit No. 10 application requirements.

Unitization and execution of the formal East Manson Unit No. 10 Unit Agreement by the freehold mineral owners shall occur once the Crown has reviewed the tract factors and approved this Unit Application. The fully executed Unit Agreement will be forwarded to the Crown and complete the formation of East Manson Unit No. 10.

Should the Crown have further questions or require more information, please contact:

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**Yours truly,**

**TUNDRA OIL & GAS LIMITED**

Stuart McColl, P.Eng., Senior Exploitation Engineer

**Proposed East Manson Unit No. 10**  
**Application for Enhanced Oil Recovery Waterflood Project**

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Figure 1: Manson Field Boundary

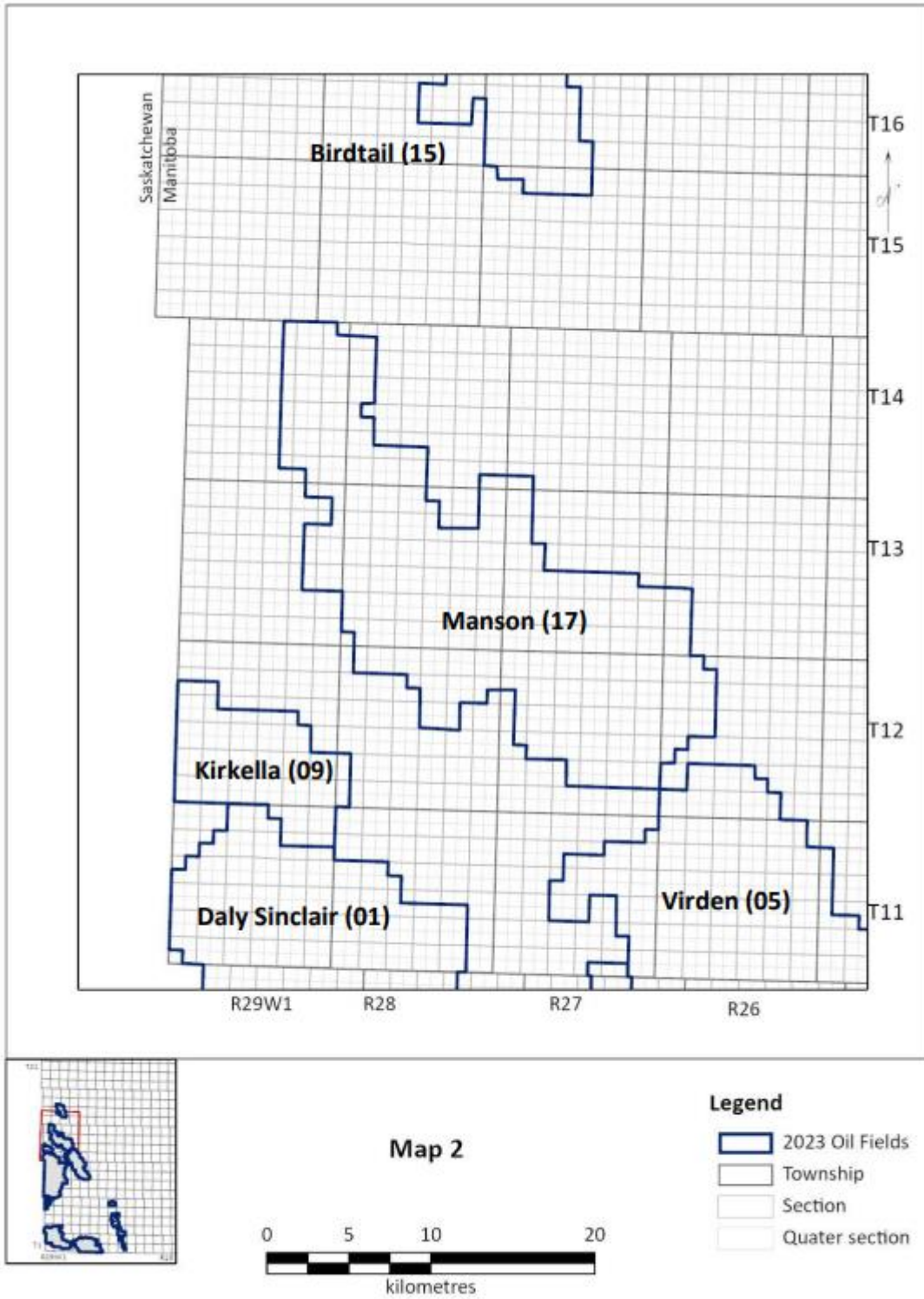
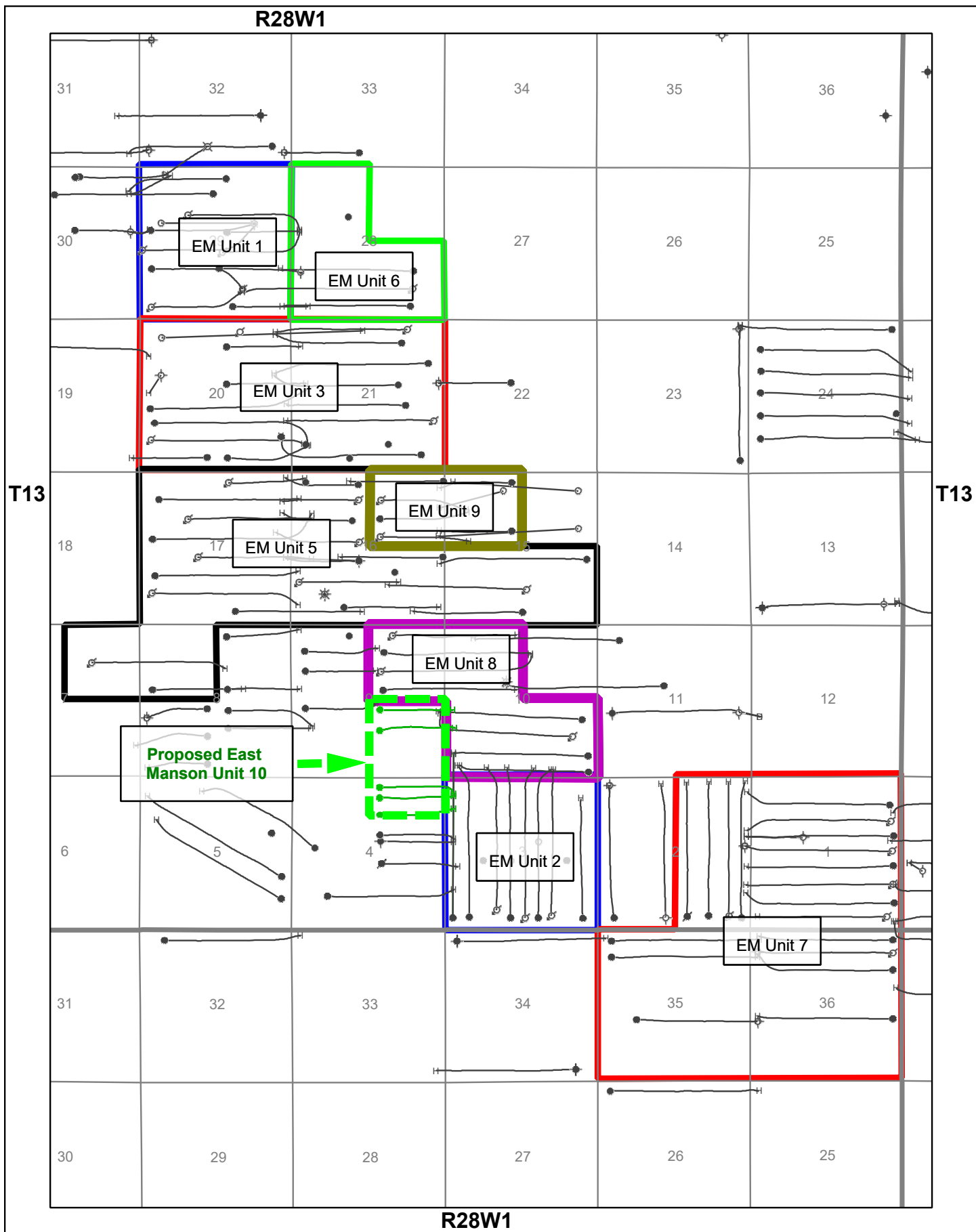


Figure 2 - Proposed East Manson Unit No. 10 Boundary



Datum: NAD27 Projection: Stereographic DLS Version AB: ATS 2.6, BC: PRB 2.0, SK: STS 2.5, MB: MLI07

Figure 3: Bakken-Three Forks Manson Pool Map

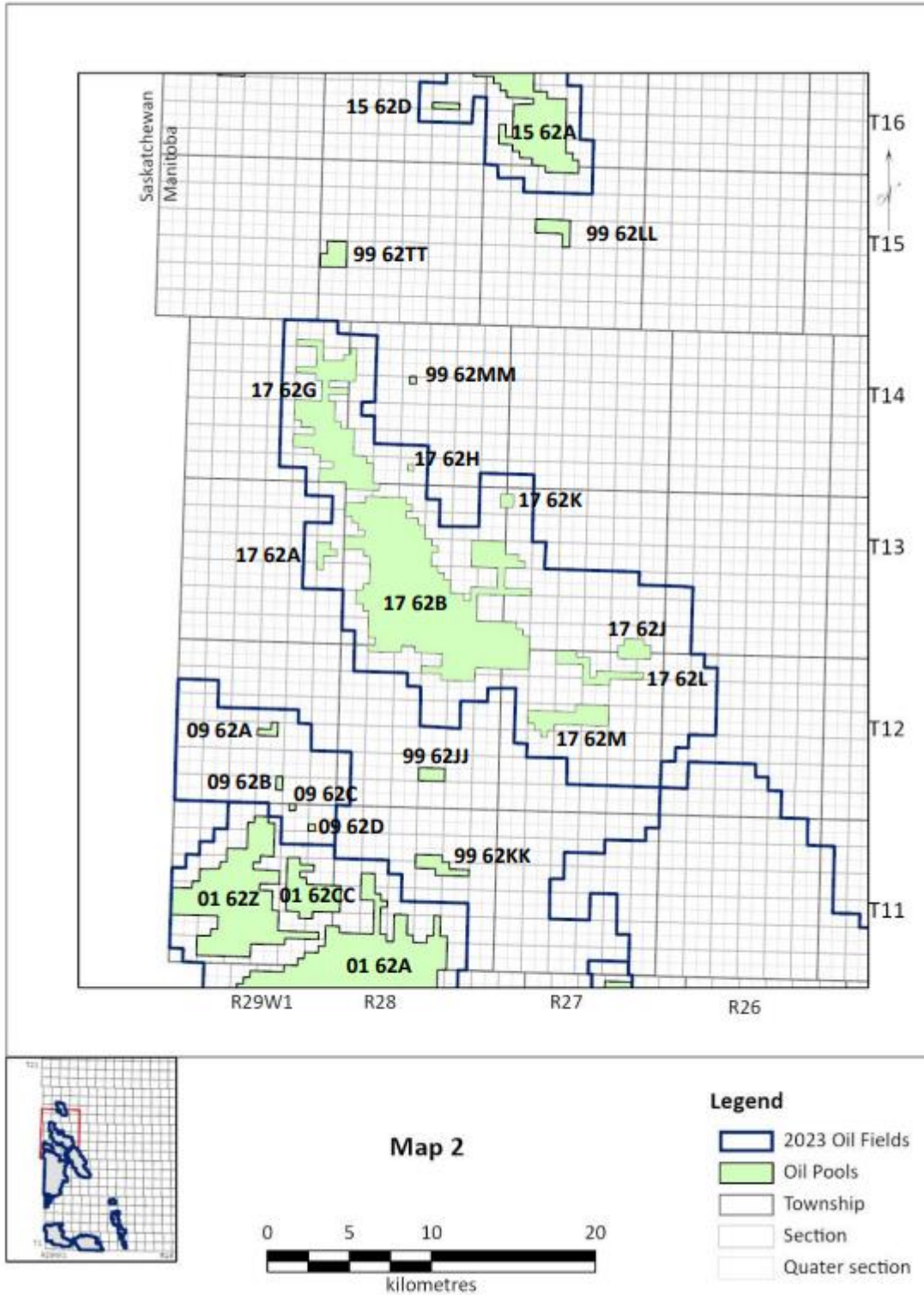




Figure 4 - East Manson Unit No. 10 Historic Production

Well Information as of 4/24/2024 - Group Well Report

Production Graph

|             |                      |            |                                   |              |             |
|-------------|----------------------|------------|-----------------------------------|--------------|-------------|
| Group:      | Manson Unit 10.lwell | On Prod:   | 2011-09 to 2024-02                | Cum Oil:     | 55021.7 m3  |
| # of Wells: | 6                    | Prod Form: | BAKKEN; THREEFK; BAKKENU; BAKKENM | Cum Gas:     | 5.4 E3m3    |
| Fluid:      | Oil                  | Field:     | MANSON (MB17)                     | Cum Wtr:     | 142467.3 m3 |
| Mode:       | Pumping              | Pool Code: | MB001762B                         | Cum Inj Oil: | 0.0 m3      |
|             |                      | Unit Code: |                                   | Cum Inj Gas: | 0.0 E3m3    |
|             |                      |            |                                   | Cum Inj Wtr: | 0.0 m3      |

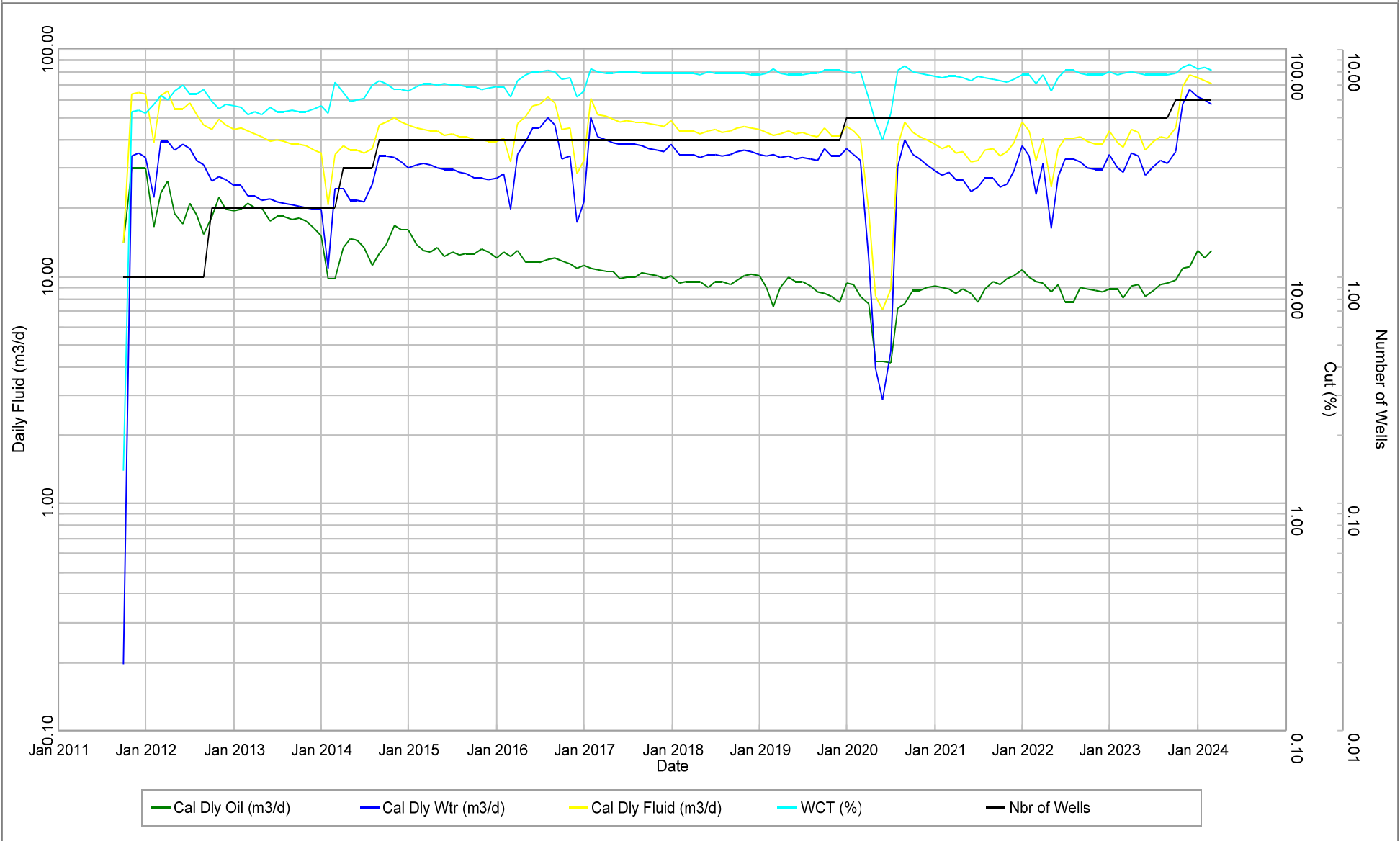


Figure 5 - East Manson Unit No. 8 Production Profile

Unit EAST MANSON UNIT NO. 8 Information as of 4/24/2024

Production Graph

|             |                               |            |                    |              |             |
|-------------|-------------------------------|------------|--------------------|--------------|-------------|
| Group:      | EAST MANSON UNIT NO. 8        | On Prod:   | 2011-03 to 2024-02 | Cum Oil:     | 174101.7 m3 |
| # of Wells: | 8                             | Prod Form: | BAKKEN; BAKKENM    | Cum Gas:     | 0.0 E3m3    |
| Fluid:      | Oil; Water Injection          | Field:     | MANSON (MB17)      | Cum Wtr:     | 18064.6 m3  |
| Mode:       | Pumping; Injection; Abandoned | Pool Code: | MB001762B          | Cum Inj Oil: | 0.0 m3      |
|             |                               | Unit Code: | 1762B8             | Cum Inj Gas: | 0.0 E3m3    |
|             |                               |            |                    | Cum Inj Wtr: | 55224.1 m3  |

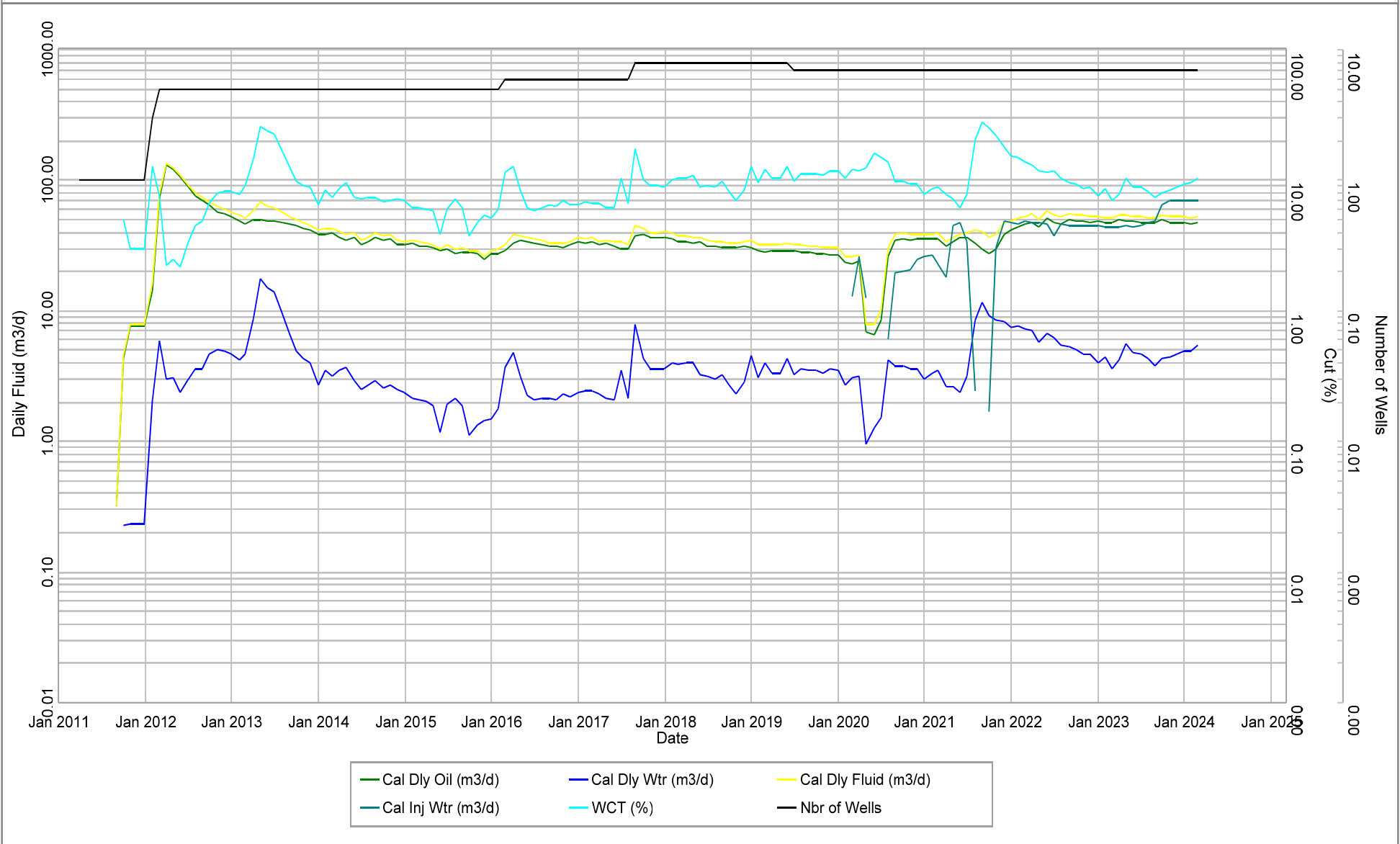
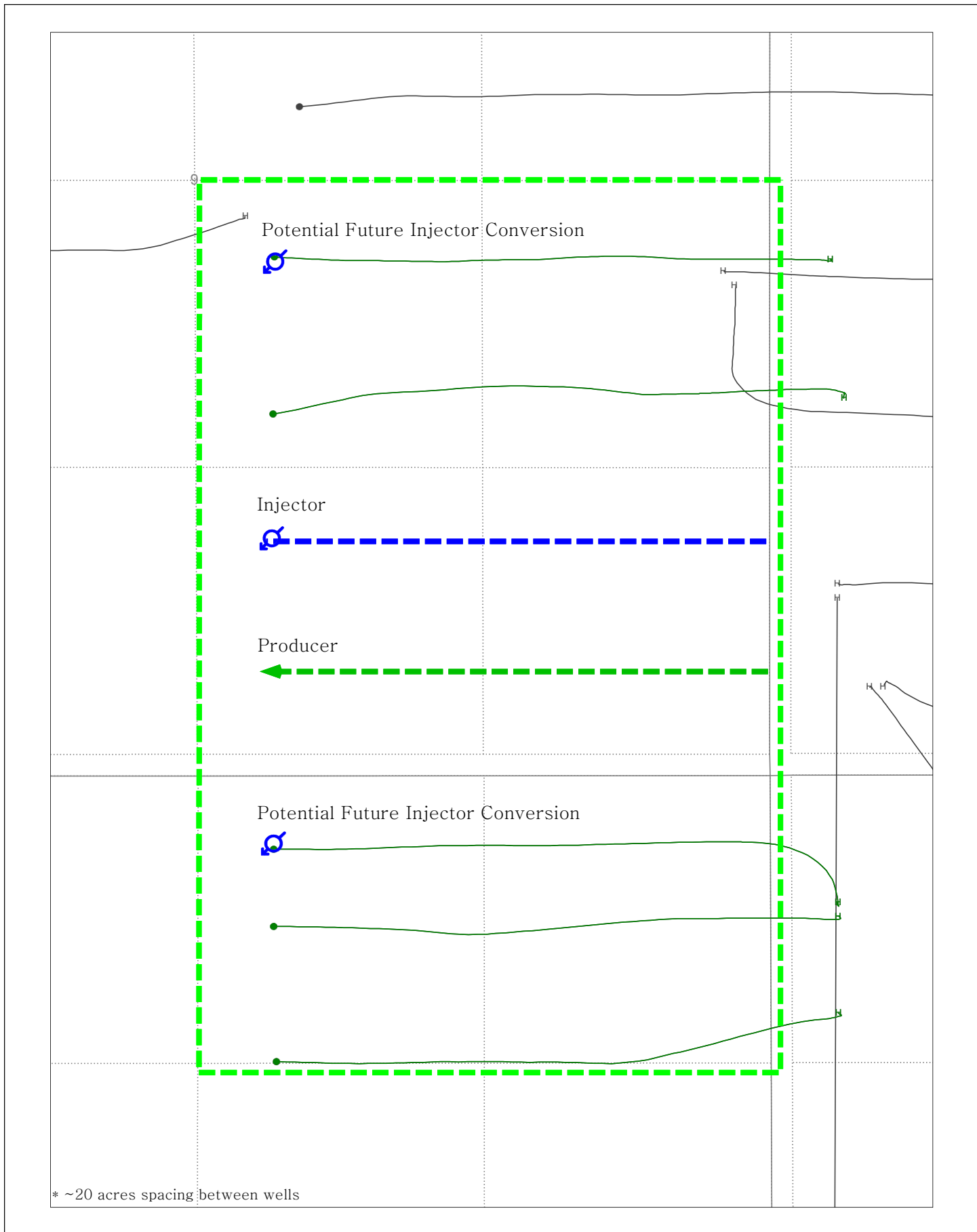


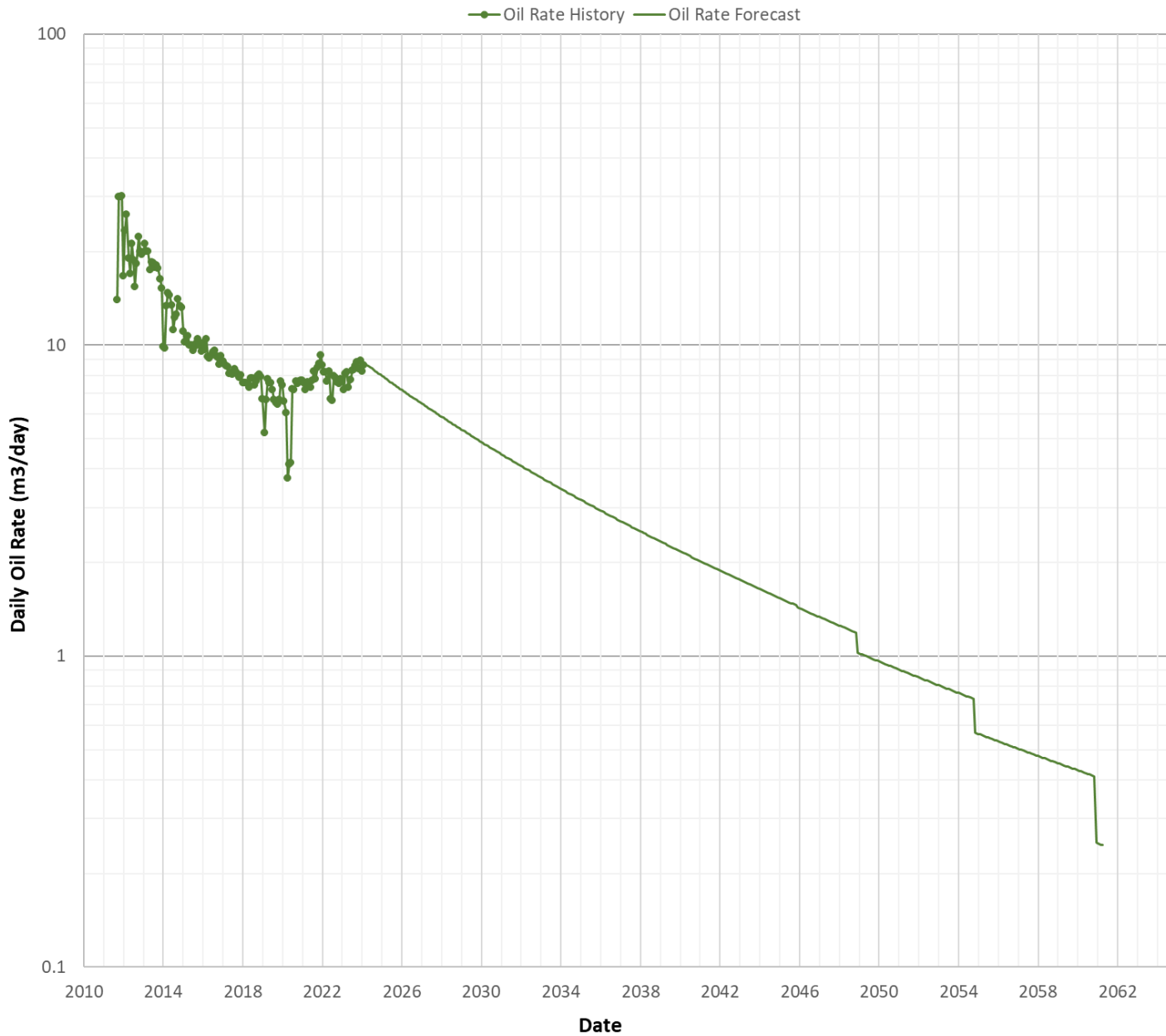
Figure 6 - East Manson Unit No. 10 Development Plan



Datum: NAD27 Projection: Stereographic DLS Version AB: ATS 2.6, BC: PRB 2.0, SK: STS 2.5, MB: MLI07



Figure 7: East Manson Unit No. 10 - Forecasted Primary Production - Rate-Time



| Volume Summary |                |         |
|----------------|----------------|---------|
| Oil            | Cum (m3)       | 48,801  |
|                | Rem Rec (m3)   | 34,428  |
|                | Ult Rec (m3)   | 83,229  |
| Gas            | Cum (E3m3)     | 5       |
|                | Rem Rec (E3m3) | 0       |
|                | Ult Rec (E3m3) | 5       |
| Water          | Cum (m3)       | 117,873 |
|                | Rem Rec (m3)   | 106,956 |
|                | Ult Rec (m3)   | 224,829 |
| Field          | Cum (m3)       | 0       |
|                | Rem Rec (m3)   | 0       |
|                | Ult Rec (m3)   | 0       |
| NGL            | Cum (m3)       | 0       |
|                | Rem Rec (m3)   | 0       |
|                | Ult Rec (m3)   | 0       |

| Forecast and Indicators @ Eff Date |            |
|------------------------------------|------------|
| Product                            | Oil        |
| Forecast Start                     | 2024/03/01 |
| Forecast End                       | 2062/02/01 |
| Presentation                       | Unit Plots |
| Initial Rate (m3/d)                | 8.71       |
| Final Rate (m3/d)                  | 0.16       |
| Ult Rec (m3)                       | 83,229.09  |
| Cum (m3)                           | 48,801.07  |
| Rem Rec (m3)                       | 34,428.02  |
| Res Life (yrs)                     | 37.92      |
| RLI Full Year (yrs)                | 1.81       |
| Res Half Life (yrs)                | 20.27      |

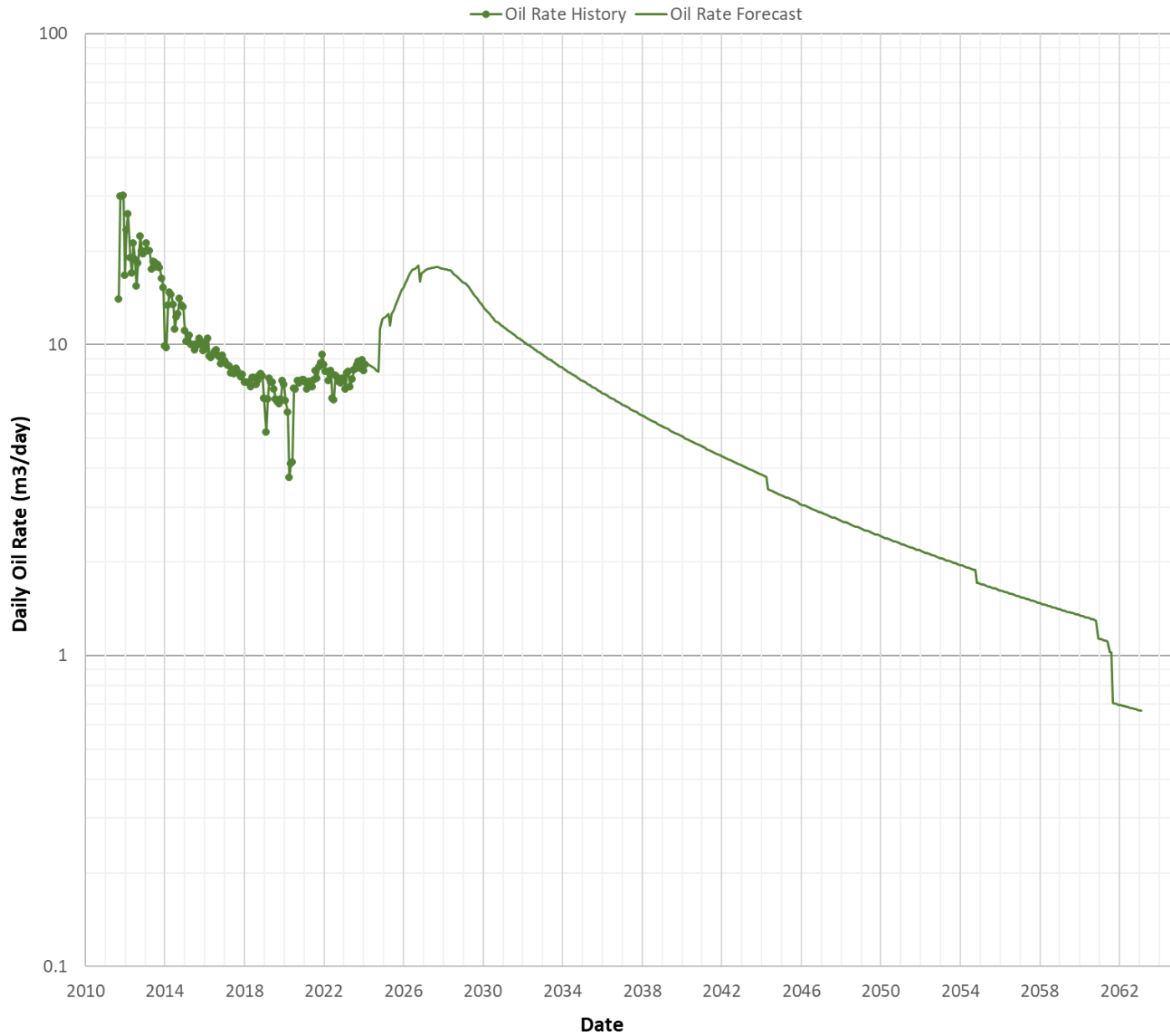
Figure 8: East Manson Unit No. 10 - Forecasted Primary Production - Rate-Cumulative Oil



| Volume Summary |                |         |
|----------------|----------------|---------|
| Oil            | Cum (m3)       | 48,801  |
|                | Rem Rec (m3)   | 34,428  |
|                | Ult Rec (m3)   | 83,229  |
| Gas            | Cum (E3m3)     | 5       |
|                | Rem Rec (E3m3) | 0       |
|                | Ult Rec (E3m3) | 5       |
| Water          | Cum (m3)       | 117,873 |
|                | Rem Rec (m3)   | 106,956 |
|                | Ult Rec (m3)   | 224,829 |
| Field          | Cum (m3)       | 0       |
|                | Rem Rec (m3)   | 0       |
|                | Ult Rec (m3)   | 0       |
| NGL            | Cum (m3)       | 0       |
|                | Rem Rec (m3)   | 0       |
|                | Ult Rec (m3)   | 0       |

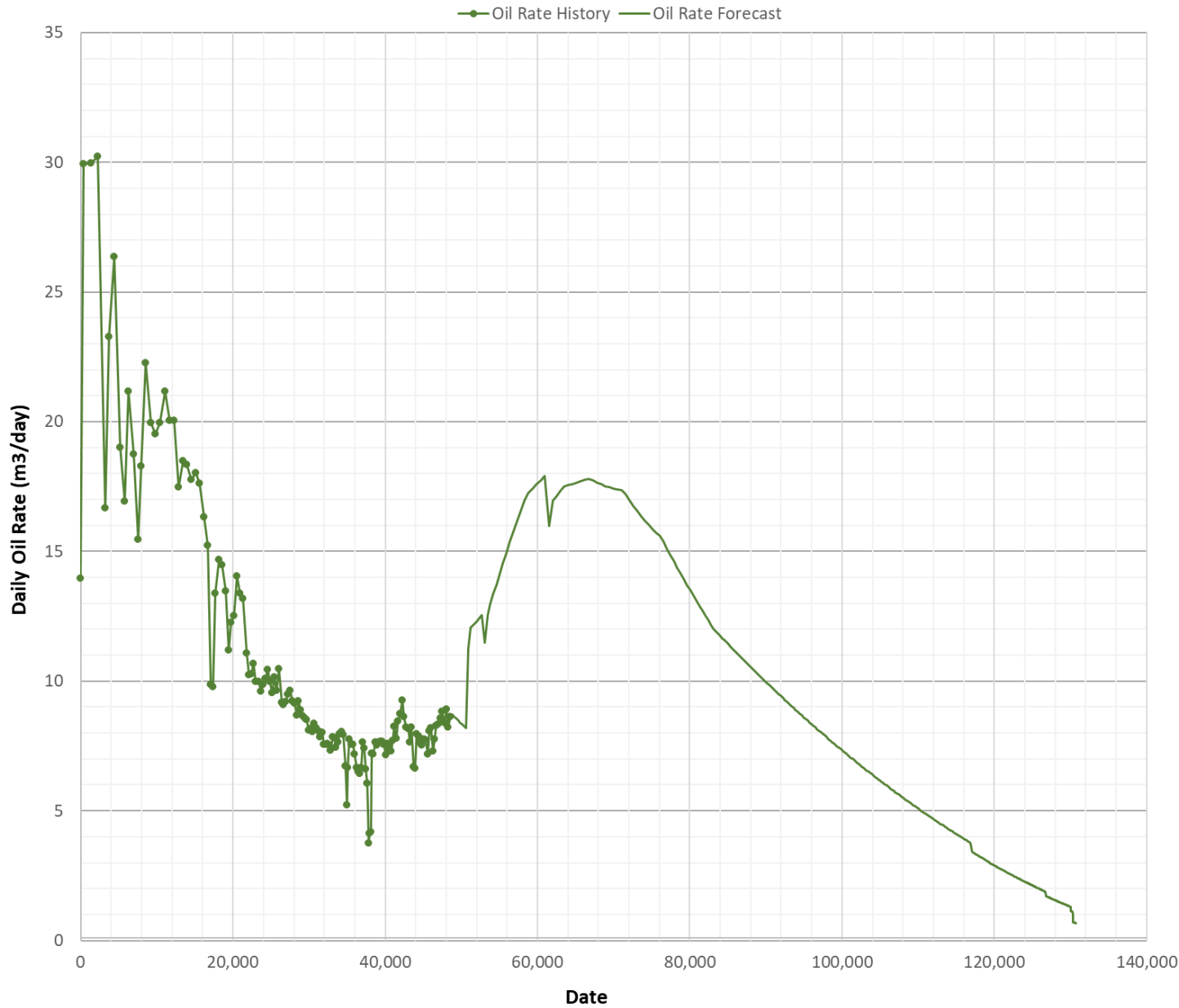
| Forecast and Indicators @ Eff Date |            |
|------------------------------------|------------|
| Product                            | Oil        |
| Forecast Start                     | 2024/03/01 |
| Forecast End                       | 2062/02/01 |
| Presentation                       | Unit Plots |
| Initial Rate (m3/d)                | 8.71       |
| Final Rate (m3/d)                  | 0.16       |
| Ult Rec (m3)                       | 83,229.09  |
| Cum (m3)                           | 48,801.07  |
| Rem Rec (m3)                       | 34,428.02  |
| Res Life (yrs)                     | 37.92      |
| RLI Full Year (yrs)                | 1.81       |
| Res Half Life (yrs)                | 20.27      |

Figure 9: East Manson Unit No. 10 - Forecasted Waterflood Production - Rate-Time



| Volume Summary                     |                |         |
|------------------------------------|----------------|---------|
| Oil                                | Cum (m3)       | 48,801  |
|                                    | Rem Rec (m3)   | 82,208  |
|                                    | Ult Rec (m3)   | 131,009 |
| Gas                                | Cum (E3m3)     | 5       |
|                                    | Rem Rec (E3m3) | 0       |
|                                    | Ult Rec (E3m3) | 5       |
| Water                              | Cum (m3)       | 117,873 |
|                                    | Rem Rec (m3)   | 159,326 |
|                                    | Ult Rec (m3)   | 277,198 |
| Field                              | Cum (m3)       | 0       |
|                                    | Rem Rec (m3)   | 0       |
|                                    | Ult Rec (m3)   | 0       |
| NGL                                | Cum (m3)       | 0       |
|                                    | Rem Rec (m3)   | 0       |
|                                    | Ult Rec (m3)   | 0       |
| Forecast and Indicators @ Eff Date |                |         |
| Product                            | Oil            |         |
| Forecast Start                     | 2024/03/01     |         |
| Forecast End                       | 2064/05/01     |         |
| Presentation                       | Unit Plots     |         |
| Initial Rate (m3/d)                | 8.71           |         |
| Final Rate (m3/d)                  | 0.32           |         |
| Ult Rec (m3)                       | 131,009.38     |         |
| Cum (m3)                           | 48,801.07      |         |
| Rem Rec (m3)                       | 82,208.31      |         |
| Res Life (yrs)                     | 40.17          |         |
| RLI Full Year (yrs)                | 3.73           |         |
| Res Half Life (yrs)                | 20.59          |         |

Figure 10: East Manson Unit No. 10 - Forecasted Waterflood Production - Rate-Cumulative Oil

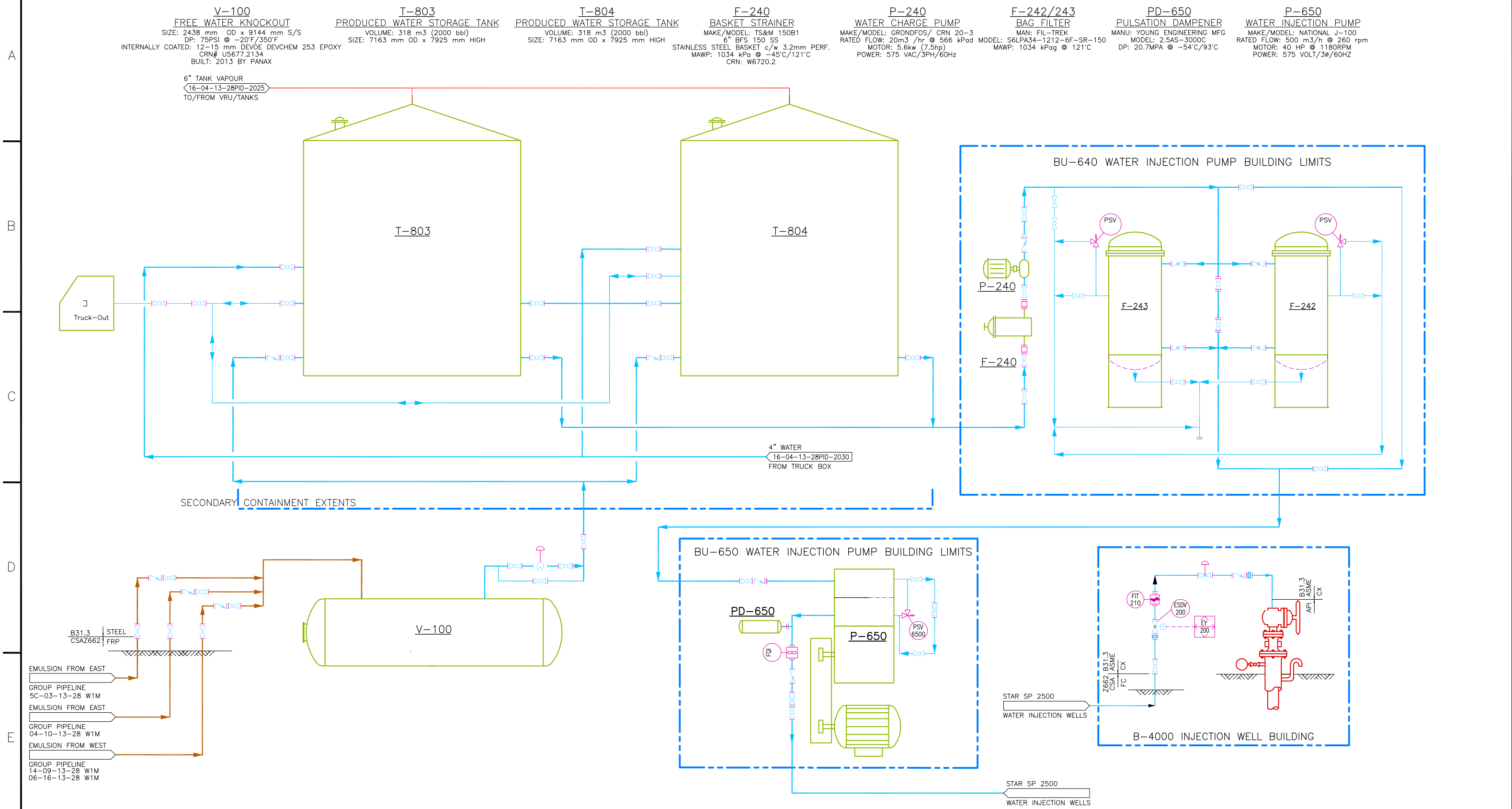


| Volume Summary |                |         |
|----------------|----------------|---------|
| Oil            | Cum (m3)       | 48,801  |
|                | Rem Rec (m3)   | 82,208  |
|                | Ult Rec (m3)   | 131,009 |
| Gas            | Cum (E3m3)     | 5       |
|                | Rem Rec (E3m3) | 0       |
|                | Ult Rec (E3m3) | 5       |
| Water          | Cum (m3)       | 117,873 |
|                | Rem Rec (m3)   | 159,326 |
|                | Ult Rec (m3)   | 277,198 |
| Field          | Cum (m3)       | 0       |
|                | Rem Rec (m3)   | 0       |
|                | Ult Rec (m3)   | 0       |
| NGL            | Cum (m3)       | 0       |
|                | Rem Rec (m3)   | 0       |
|                | Ult Rec (m3)   | 0       |

| Forecast and Indicators @ Eff Date |            |
|------------------------------------|------------|
| Product                            | Oil        |
| Forecast Start                     | 2024/03/01 |
| Forecast End                       | 2064/05/01 |
| Presentation                       | Unit Plots |
| Initial Rate (m3/d)                | 8.71       |
| Final Rate (m3/d)                  | 0.32       |
| Ult Rec (m3)                       | 131,009.38 |
| Cum (m3)                           | 48,801.07  |
| Rem Rec (m3)                       | 82,208.31  |
| Res Life (yrs)                     | 40.17      |
| RLI Full Year (yrs)                | 3.73       |
| Res Half Life (yrs)                | 20.59      |

**Figure 11 - Produced Water Injection System**



| REV | DESCRIPTION             | BY | DATE      | CHK | APP |
|-----|-------------------------|----|-----------|-----|-----|
| 0   | ISSUED FOR CONSTRUCTION | FM | 07MAR2024 |     |     |

| REFERENCE DRAWING |
|-------------------|
|                   |

**NOTES**  
 1. THIEF HATCHES c/w ELECTRICAL BONDING CABLE.

**TUNDRA OIL & GAS**

DRAWN BY: FM  
 SCALE: NTS

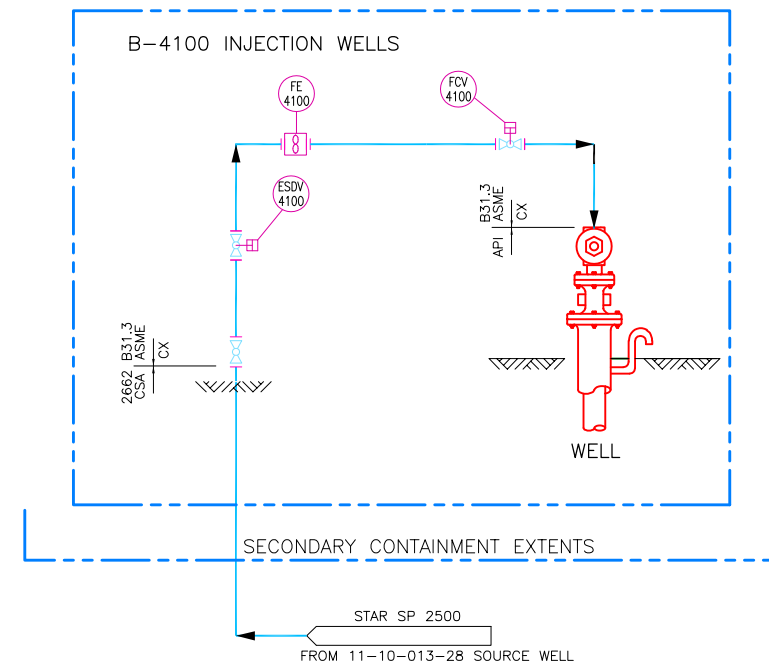
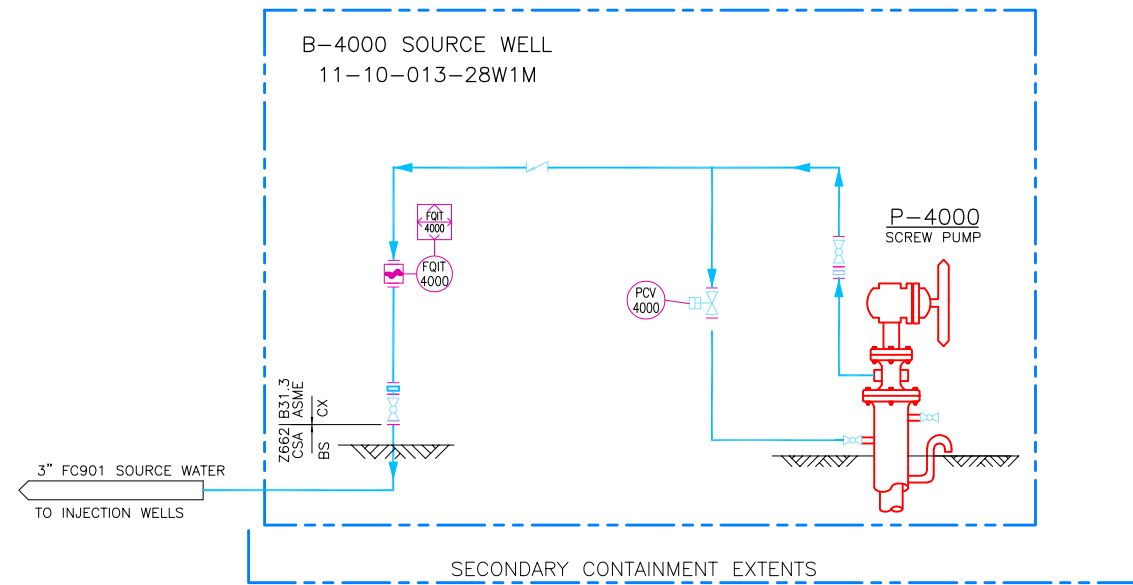
**ELKHORN OIL BATTERY**  
 16-04-013-28 W1M

PROCESS FLOW DIAGRAM – PRODUCED WATER INJECTION SYSTEM

AFE:      DRAWING NUMBER:      REV NO:  
 PRODUCED WATERFLOOD      0



**Figure 12 - Jurassic Sourced Water Injection System**



| REV | DESCRIPTION             | BY | DATE      | CHK | APP | REFERENCE DRAWING |
|-----|-------------------------|----|-----------|-----|-----|-------------------|
| 0   | ISSUED FOR CONSTRUCTION | FM | 07MAR2024 | -   | -   | -                 |

NOTES:

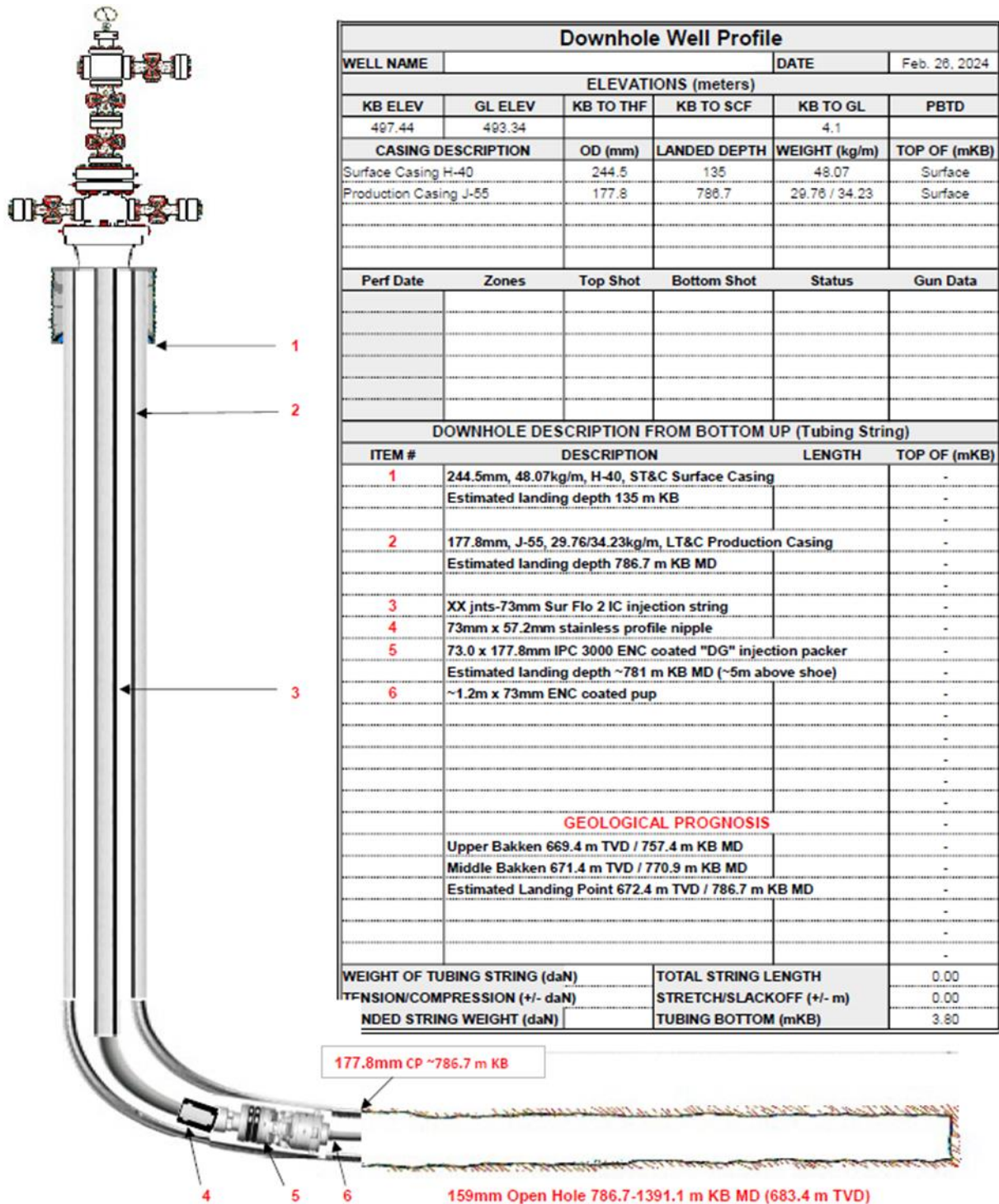
**TUNDRA OIL & GAS LIMITED**

ELKHORN SOURCE WELL  
11-10-013-28W1M

PROCESS FLOW DIAGRAM – SOURCE WATER INJECTION SYSTEM

DRAWN BY: FM      SCALE: NTS      AFE:      DRAWING NUMBER: SOURCE WATERFLOOD      REV NO: 0

Figure 13: Horizontal Injector Downhole Diagram – OH



## East Manson Unit No. 10

### EOR Waterflood Project

#### Planned Corrosion Control Program \*\*

##### Source Well

- Continuous downhole corrosion inhibition
- Continuous surface corrosion inhibitor injection
- Downhole iron control injection
- Corrosion resistant valves and internally coated surface piping

##### Pipelines

- New High Pressure Pipeline to Unit 10 injection wells – 2000 psi high pressure Fiberglass

##### Injection Wellhead/Surface Piping

- Corrosion resistant valves and stainless steel and/or internally coated steel surface piping

##### Injection Well

- Casing cathodic protection where required
- Wetted surfaces coated downhole packer
- Corrosion inhibited water in the annulus between tubing/casing
- Internally coated tubing surface to packer
- Surface freeze protection of annular fluid
- Corrosion resistant master valve
- Corrosion resistant pipeline valve
- Injection wells with cased holes will have continuous downhole corrosion inhibition

##### Producing Wells

- Casing cathodic protection where required
- Downhole batch corrosion inhibition as required
- Downhole iron chelator injection as required

**Figure 14 - Planned Corrosion Control**

**Proposed East Manson Unit No. 10**  
**Application for Enhanced Oil Recovery Waterflood Project**

**List of Tables**

|         |                          |
|---------|--------------------------|
| Table 1 | Well List and Status     |
| Table 2 | OOIP Calculation         |
| Table 3 | Rock Fluid Parameters    |
| Table 4 | Tract Participation      |
| Table 5 | Tract Factor Calculation |

**TABLE NO. 1 - EAST MANSON UNIT NO. 10 WELL LIST AND STATUS AS OF FEBRUARY 29, 2024 ACCUMAP DATA**

| <i>UWI</i>            | <i>License Number</i> | <i>Type</i> | <i>Pool Name</i>     | <i>Producing Zone</i> | <i>Mode</i> | <i>On Production Date</i> | <i>Last Production Date</i> | <i>Gross Cal Dly Oil (m3/d)</i> | <i>Gross Monthly Oil (m3)</i> | <i>Gross Cum Prd Oil (m3)</i> | <i>Gross Cal Dly Water (m3/d)</i> | <i>Gross Monthly Water (m3)</i> | <i>Gross Cum Prd Water (m3)</i> | <i>WCT (%)</i> |
|-----------------------|-----------------------|-------------|----------------------|-----------------------|-------------|---------------------------|-----------------------------|---------------------------------|-------------------------------|-------------------------------|-----------------------------------|---------------------------------|---------------------------------|----------------|
| 102/04-03-013-28W1/00 | 011997                | Horizontal  | BAKKEN-THREE FORKS B | BAKKEN                | Pumping     | 9/25/2023                 | 2/29/2024                   | 3.51                            | 101.70                        | 378.00                        | 27.95                             | 810.60                          | 4702.60                         | 88.85          |
| 102/10-04-013-28W1/00 | 009938                | Horizontal  | BAKKEN-THREE FORKS B | THREEFK,BAKKEN        | Pumping     | 8/17/2014                 | 2/28/2024                   | 1.96                            | 56.90                         | 11613.70                      | 11.90                             | 345.00                          | 39979.20                        | 85.84          |
| 100/15-04-013-28W1/00 | 008712                | Horizontal  | BAKKEN-THREE FORKS B | BAKKENU               | Pumping     | 9/19/2012                 | 2/29/2024                   | 1.54                            | 44.60                         | 13941.80                      | 2.86                              | 82.90                           | 2245.00                         | 65.02          |
| 102/15-04-013-28W1/00 | 011318                | Horizontal  | BAKKEN-THREE FORKS B | BAKKENM               | Pumping     | 12/1/2019                 | 2/29/2024                   | 1.37                            | 39.70                         | 2617.70                       | 0.03                              | 0.90                            | 277.80                          | 2.22           |
| 100/07-09-013-28W1/00 | 008119                | Horizontal  | BAKKEN-THREE FORKS B | BAKKEN                | Pumping     | 9/14/2011                 | 2/29/2024                   | 1.81                            | 52.50                         | 17584.80                      | 14.97                             | 434.10                          | 93985.20                        | 89.21          |
| 102/07-09-013-28W1/00 | 009651                | Horizontal  | BAKKEN-THREE FORKS B | BAKKENU,THREEFK       | Pumping     | 3/8/2014                  | 2/29/2024                   | 2.77                            | 80.40                         | 8885.70                       | 0.07                              | 2.00                            | 1277.50                         | 2.43           |

55021.70 m3

## TABLE NO. 2: OOIP CALCULATION

New

| LSD           | isopach (m) | Area (m2)  | OOIP (m3) | OOIP (bbls) |
|---------------|-------------|------------|-----------|-------------|
| 15-04-13-28W1 | 3.0         | 162638.082 | 60,876    | 382,900     |
| 16-04-13-28W1 | 2.9         | 162494.141 | 58,795    | 369,809     |
| 01-09-13-28W1 | 2.9         | 163125.249 | 59,023    | 371,245     |
| 02-09-13-28W1 | 3.0         | 163203.376 | 61,088    | 384,231     |
| 07-09-13-28W1 | 3.0         | 162961.554 | 60,997    | 383,662     |
| 08-09-13-28W1 | 2.9         | 162883.424 | 58,936    | 370,695     |

Total                      **359,716**                      **2,262,542**

|             |              |
|-------------|--------------|
| <b>Por:</b> | <b>0.175</b> |
| <b>Sw:</b>  | <b>0.23</b>  |
| <b>Boi</b>  | <b>1.08</b>  |

### Table No. 3

#### Proposed East Manson Unit 10

#### BAKKEN FORMATION ROCK & FLUID PARAMETERS

|                                 |                      |                                    | Source Well        |
|---------------------------------|----------------------|------------------------------------|--------------------|
| Formation Pressure              | 4770 kPa             | Initial Average Reservoir Pressure | 100/15-04-013-28W1 |
| Formation Temperature           | 29 C                 |                                    | 100/15-04-013-28W1 |
| Saturation Pressure             | Not available        | Bubble Point                       | N/A                |
| GOR                             | Not available        | Gas Oil Ratio                      | N/A                |
| API Oil Gravity                 | 38.12                |                                    | 100/11-10-013-28W1 |
| Swi (fraction)                  | 0.23                 | Initial Water Saturation           | 100/07-16-013-28W1 |
| Produced Water Specific Gravity | 1.04                 |                                    | 100/07-09-013-28W1 |
| Produced Water pH               | 7.7                  |                                    | 100/07-09-013-28W1 |
| Produced Water TDS              | 59,276               |                                    | 100/07-09-013-28W1 |
| Wettability                     | Moderately water-wet |                                    | 100/07-16-013-28W1 |

**TABLE NO. 4: TRACT PARTICIPATION FOR PROPOSED EAST MANSON UNIT NO. 10**

| Working Interest |                  |                          |           | Royalty Interest               |               | Tract Participation:<br>OOIP less Cumulative Production |
|------------------|------------------|--------------------------|-----------|--------------------------------|---------------|---|
| Tract No.        | Land Description | Owner                    | Share (%) | Owner                          | Share (%)     |   |
| 1                | 15-04-13-28W1    | Tundra Oil & Gas Limited | 100%      | Minister of Finance - Manitoba | 100%          | 16.030808890%   |
| 2                | 16-04-13-28W1    | Tundra Oil & Gas Limited | 100%      | Minister of Finance - Manitoba | 100%          | 15.277335055%   |
| 3                | 01-09-13-28W1    | Tundra Oil & Gas Limited | 100%      | Minister of Finance - Manitoba | 0.012478822%  | 18.983034981%   |
|                  |                  |                          |           | 6281215 Manitoba Ltd.          | 99.987521178% |   |
| 4                | 02-09-13-28W1    | Tundra Oil & Gas Limited | 100%      | 6281215 Manitoba Ltd.          | 100%          | 19.519614550%   |
| 5                | 07-09-13-28W1    | Tundra Oil & Gas Limited | 100%      | 6281215 Manitoba Ltd.          | 100%          | 15.406413888%   |
| 6                | 08-09-13-28W1    | Tundra Oil & Gas Limited | 100%      | Minister of Finance - Manitoba | 0.012478822%  | 14.782792636%   |
|                  |                  |                          |           | 6281215 Manitoba Ltd.          | 99.987521178% |   |

100.000000000%



**TABLE NO. 5: TRACT FACTOR CALCULATIONS FOR EAST MANSON UNIT NO. 10**

TRACT FACTOR BASED ON OIL-IN-PLACE (OOIP) - CUMULATIVE PRODUCTION TO FEBRUARY 2024

| LSD-SE | Tract         | OOIP (m3)      | HZ Wells Alloc Cum Prodn (m3) | Vert Wells Cum Prodn (m3) | Sum Hz + Vert Alloc Cum Prodn | OOIP - Cum Prodn (m3) | Tract Factor (%)      | Tract         |
|--------|---------------|----------------|-------------------------------|---------------------------|-------------------------------|-----------------------|-----------------------|---------------|
| 15-04  | 15-04-13-28W1 | 60,876         | 11034.61178                   | 0                         | 11034.61178                   | 49,842                | 16.030808890%         | 15-04-13-28W1 |
| 16-04  | 16-04-13-28W1 | 58,795         | 11295.95992                   | 0                         | 11295.95992                   | 47,499                | 15.277335055%         | 16-04-13-28W1 |
| 01-09  | 01-09-13-28W1 | 59,023         | 2.84315724                    | 0                         | 2.84315724                    | 59,021                | 18.983034981%         | 01-09-13-28W1 |
| 02-09  | 02-09-13-28W1 | 61,088         | 399.0852424                   | 0                         | 399.0852424                   | 60,689                | 19.519614550%         | 02-09-13-28W1 |
| 07-09  | 07-09-13-28W1 | 60,997         | 13097.00881                   | 0                         | 13097.00881                   | 47,900                | 15.406413888%         | 07-09-13-28W1 |
| 08-09  | 08-09-13-28W1 | 58,936         | 12974.40595                   | 0                         | 12974.40595                   | 45,961                | 14.782792636%         | 08-09-13-28W1 |
|        | <b>m3</b>     | <b>359,716</b> |                               |                           | <b>48803.91486</b>            | <b>310,912</b>        | <b>100.000000000%</b> |               |

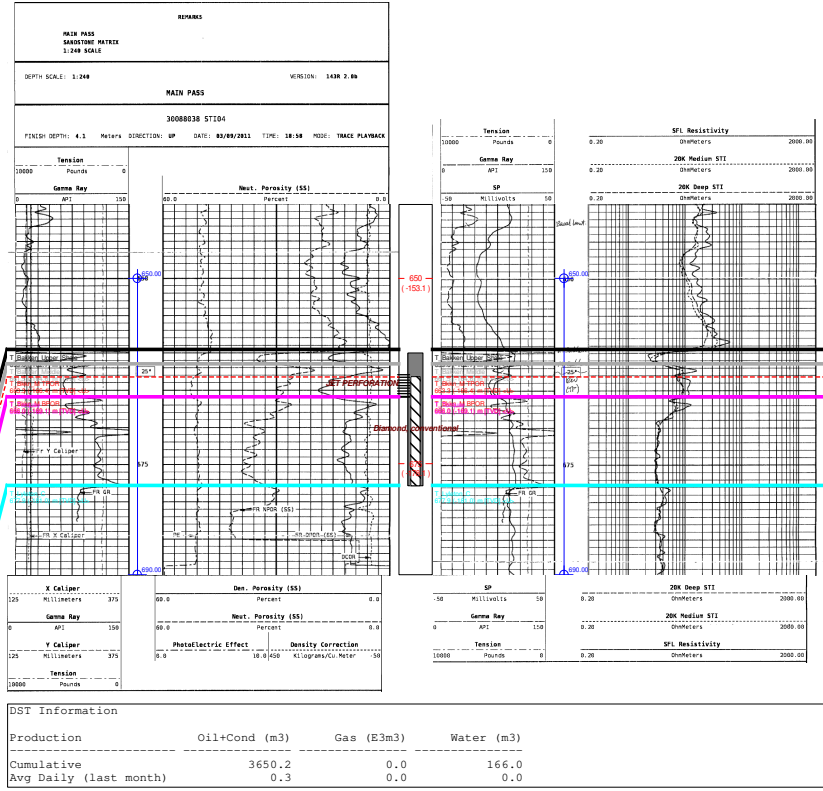
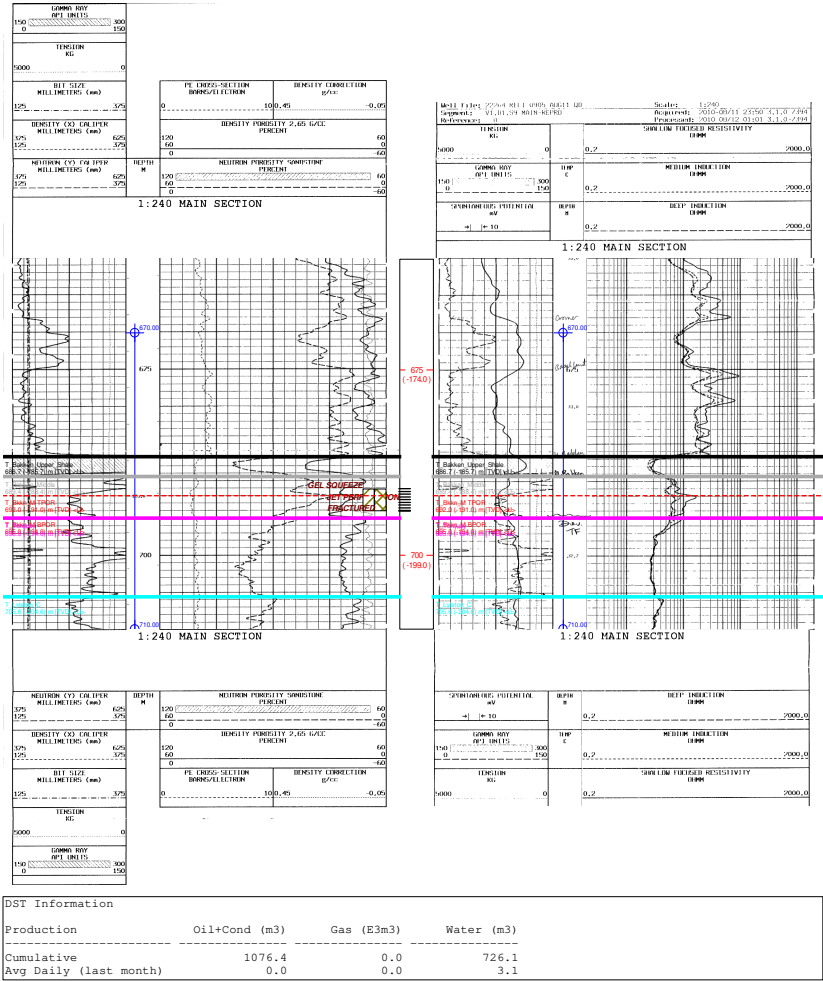
**Proposed East Manson Unit No. 10**  
**Application for Enhanced Oil Recovery Waterflood Project**

**List of Appendices**

|            |   |
|------------|---|
| Appendix 1 | East Manson Unit No. 10 Cross Section Through Unit Area |
| Appendix 2 | East Manson Unit No. 10 Middle Bakken Structure         |
| Appendix 3 | East Manson Unit No. 10 Middle Bakken Net Pay           |
| Appendix 4 | East Manson Unit No. 10 Middle Bakken $\Phi^*H$         |
| Appendix 5 | East Manson Unit No. 10 Middle Bakken $k^*H$            |
| Appendix 6 | East Manson Unit No. 10 Initial Pressure                |

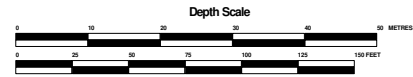
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 007442  
 3004.5m to next well

00/11-10-013-28W1/00  
 KB: 496.9 m RR: 2011-03-10  
 TD: 700.0 m [TVD] FormTD: BIRDBEAR  
 Mode: Abandoned Fluid: Oil  
 007936  
 3004.5m to previous well



**Legend**

- Oil
- Abandoned Oil
- Contact Type - Conformity
- - - Contact Type - Unconformity
- ~ ~ ~ Contact Type - Time Equivalence
- /// Contact Type - Left Fault
- \\ Contact Type - Right Fault



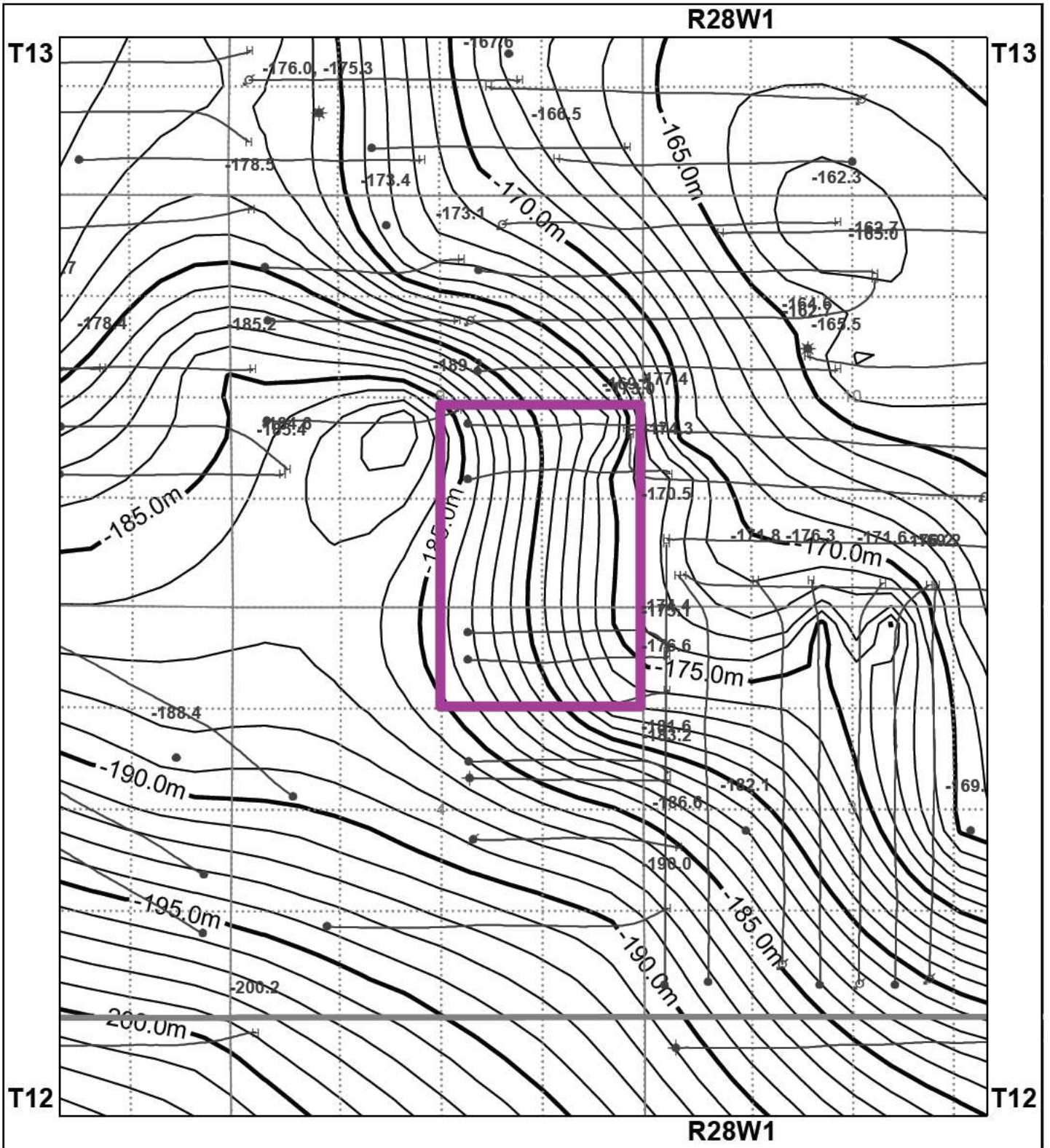
**APPENDIX 1**

Manson Unit 10  
 Cross Section Through Unit Area

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 © 2023 S&P Global. All rights reserved.

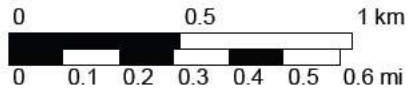
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 End Formation: 20m below T. Blkn. M  
 Cross Section Name: MANSONAA



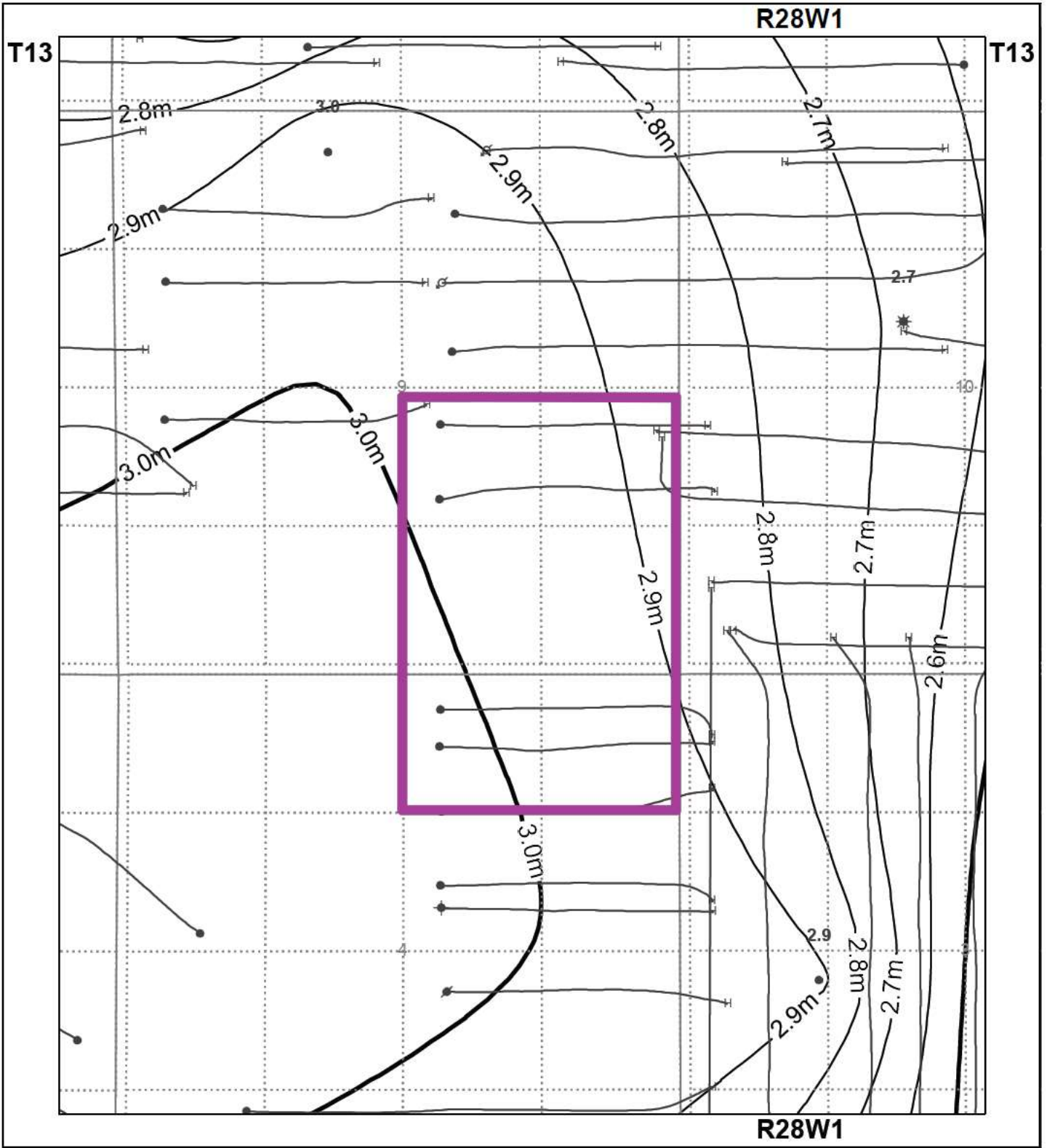
**APPENDIX 2**  
 East Manson Unit 10 Middle Bakken Structure (mSS)  
 1 February, 2024  
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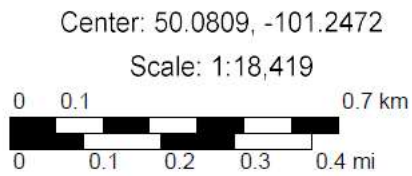
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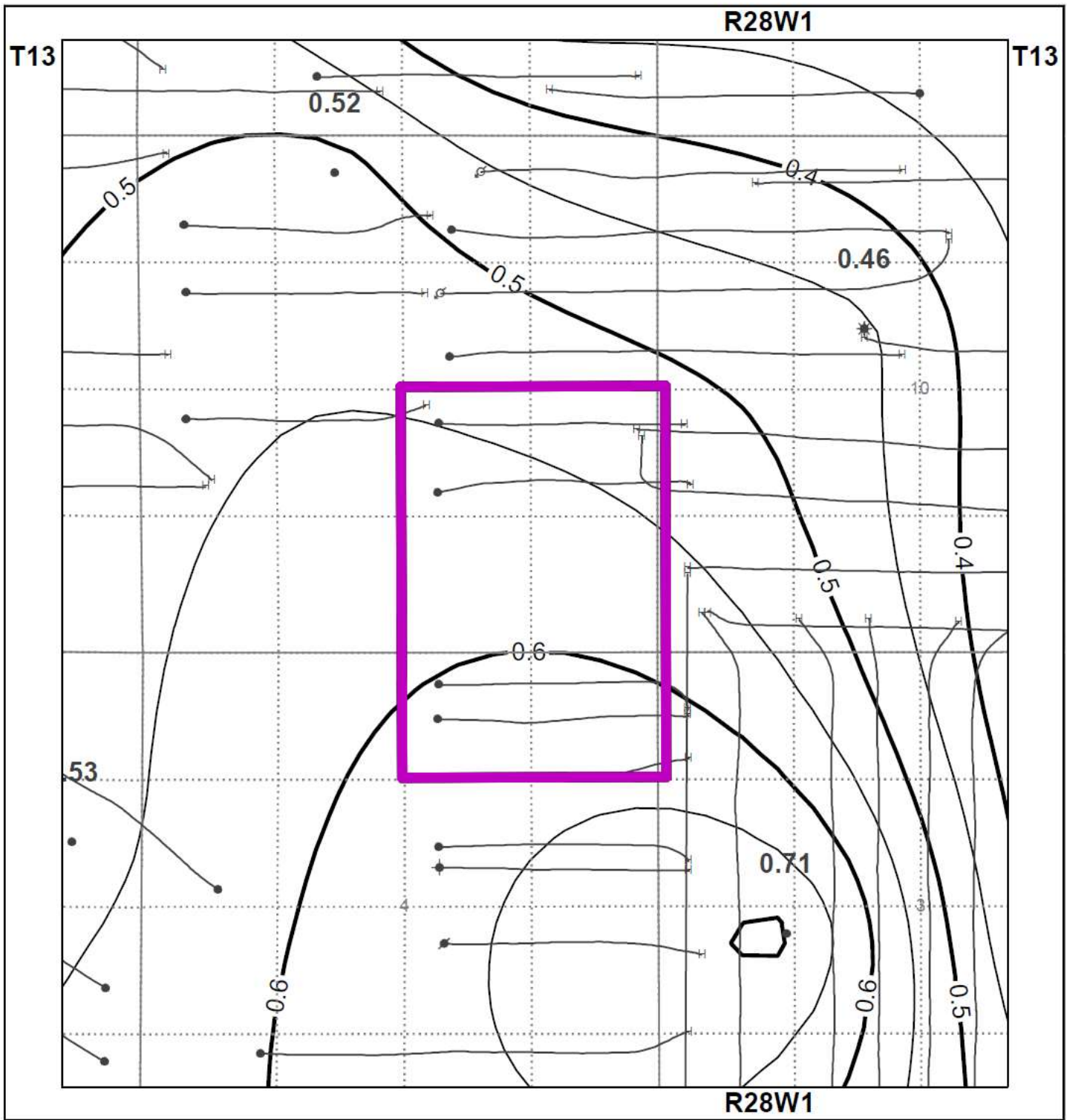




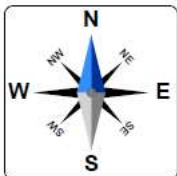
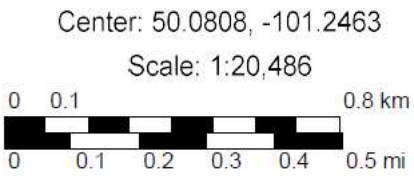


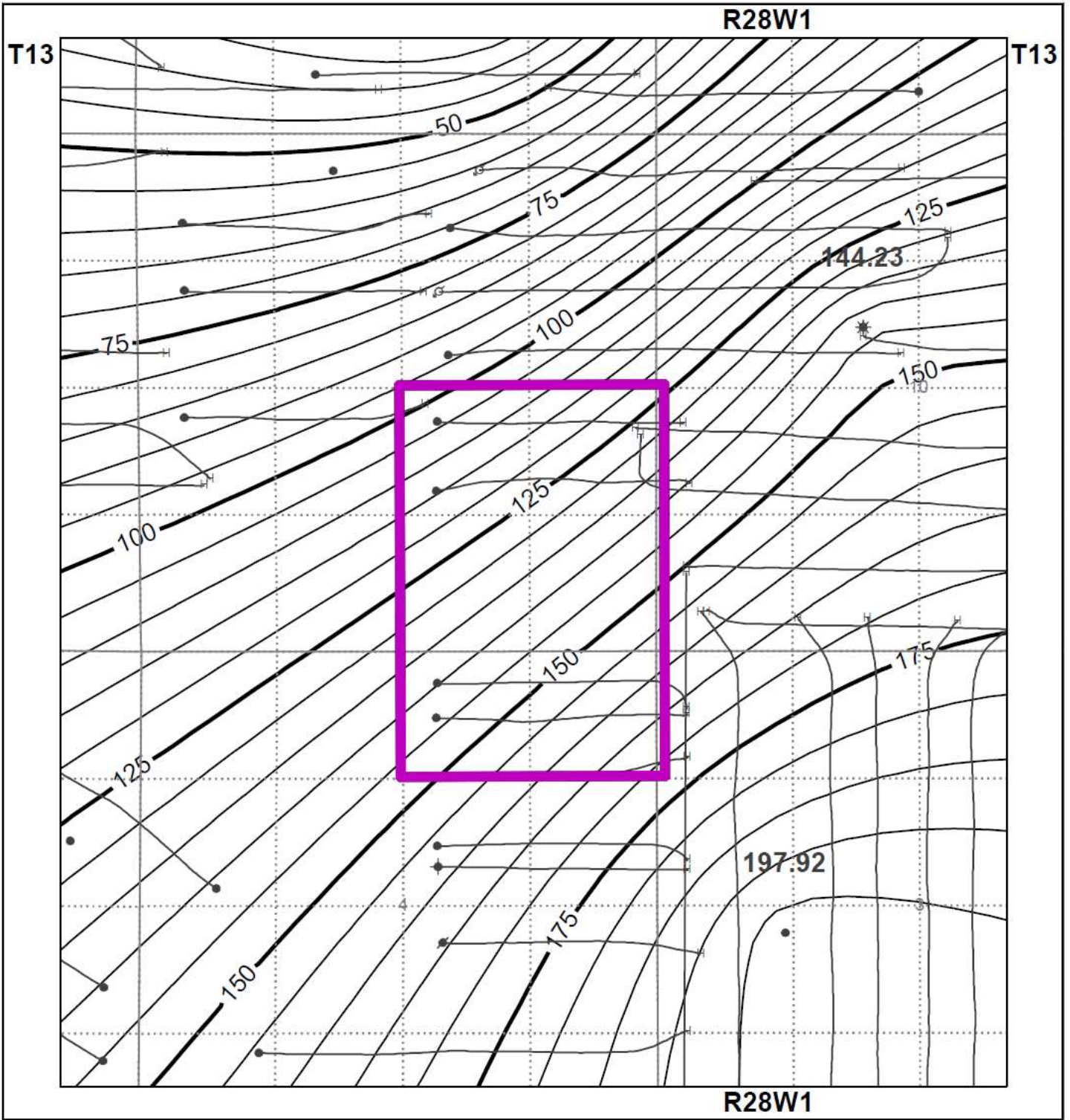
|   |
|---|
| <b>APPENDIX 3</b>                             |
| East Manson Unit 10 Middle Bakken Net Pay (m) |
| 1 February, 2024                              |
| M:\AccuMap\North Man.accumap                  |





|   |
|---|
| <b>APPENDIX 4</b>                             |
| East Manson Unit 10 Middle Bakken Phi*H (%*m) |
| 6 March, 2024                                 |
| M:\AccuMap\North Man.accumap                  |

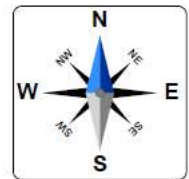
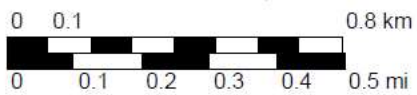




**APPENDIX 5**  
 East Manson Unit 10 Middle Bakken k\*H  
 (mD\*m)

Center: 50.0808, -101.2463

Scale: 1:20,486



## Appendix 6

### East Manson Unit No. 10 - Initial Pressure Summary

| Location             | Test Date                  | Final Pressure (kPa) |
|----------------------|----------------------------|----------------------|
| 100/10-09-013-28W1/0 | Dec 14, 2011 - Jan 8, 2012 | 4770.0               |
| 100/15-04-013-28W1/0 | Aug 31, 2012 - Sep 7, 2012 | 4771.6               |
| 102/10-04-013-28W1/0 | Jul 26, 2014 - Aug 7, 2014 | 3026.8               |
| 102/15-04-013-28W1/0 | Nov 1, 2018 - Nov 12, 2019 | 1826.0               |