PROPOSED EAST MANSON UNIT NO. 8

Application for Enhanced Oil Recovery Waterflood Project

Bakken Formation

Bakken-Three Forks A Pool (01 62B)

Manson, Manitoba

May 31st, 2017
Tundra Oil and Gas Partnership

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INTRODUCTION

The Manson Oilfield is located in Townships 12-14 Ranges 27-29 WPM (Figure 1). Within the Manson oilfield, Bakken reservoirs have been developed mainly with Horizontal producing wells on Primary Production and various well spacing settings. Horizontal producing wells have recently been drilled by Tundra Oil and Gas Partnership (Tundra) in the Manson field.

Within the area, potential exists for incremental production and reserves from a Waterflood EOR project in the Middle Bakken and Three Forks oil reservoirs. The following represents an application by Tundra to establish East Manson Unit No. 8 (NE ¼ of Section 09-013-28W1 and the S ½ & NW ¼ of section 10-013-28W1) and implement a Secondary Waterflood EOR scheme within the Middle Bakken and Three Forks formations, as outlined in Figure 2.

The proposed project area falls within the existing designated 01-62B Bakken-Three Forks Pool of the Manson Oilfield (Figure 3).

SUMMARY

1. The proposed East Manson Unit No. 8 includes 5 producing horizontal wells and 1 producing vertical well, within 16 Legal Sub Divisions (LSD) of the Middle Bakken/Three Forks producing reservoir. The project is located north of East Manson Unit No. 2 and southeast of East Manson Unit No. 5 (Figure 2).

2. Total Net Original Oil in Place (OOIP) in East Manson Unit No. 8 has been calculated to be 1,005.8 E^3m^3 (6,326.5 Mbbl) for an average of 62.9 net E^3m^3 (395.4 Mmbl) OOIP per 40 acre LSD. After petro physical analysis, OOIP values were determined using a permeability cutoff of 0.5 mD.

3. Cumulative production to the end of February 2017 from the 6 wells within the proposed East Manson Unit No. 8 project area was 82.5 E^3m^3 (519.1 Mbbl) of oil, and 7.1 E^3m^3 (45.0 Mbbl) of water, representing an 8.2% Recovery Factor (RF) of the Net OOIP.

4. Estimated Ultimate Recovery (EUR) of producing oil reserves in the proposed East Manson Unit No. 8 project area has been calculated to be 166.3 E^3m^3 (1,046.0 Mbbl), with 83.8 E^3m^3 (526.9 Mbbl) remaining as of the end of February 2017.

5. Ultimate oil recovery of the proposed East Manson Unit No. 8 OOIP, under the current Primary Production method, is forecasted to be 16.5%.

6. Figure 4 shows the production from the East Manson Unit No. 8 which peaked in March 2012 at 130.3 m^3 of oil per day (OPD). As of February 2017, production was 33.8 m^3 OPD, 2.4 m^3 of water per day (WPD) and a 6.7% watercut.

7. In March 2012, production averaged 26.1 m^3 OPD per well in East Manson Unit 8. As of February 2017, average per well production has declined to 5.6 m^3 OPD per well. Decline analysis of the group primary production data forecasts total oil to continue declining at an annual rate of approximately 17.6% in the project area.

8. The EUR of oil reserves under the implementation for Secondary WF EOR for the proposed East Manson Unit No. 8 has been calculated to be 252.7 E^3m^3 (1,505.0 Mbbl), with 156.8 E^3m^3 (985.9 Mbbl) remaining. The previous metrics include Primary production from two future Horizontal Produce-First Injectors (PFI), which are forecasted to add 7.8 E^3m^3 (49.0 Mbbl) or 0.8% of RF. An incremental 65.2 E^3m^3 (410.0 Mbbl) in oil reserves, or 7.3%, are forecasted to be recovered under the proposed Secondary EOR production vs the existing Primary Production method.

9. Total RF under Secondary WF in the proposed East Manson Unit No. 8 is estimated to be 23.8%.

10. Based on waterflood response in the adjacent main portion of the Manson field, the Three Forks and Middle Bakken Formations in the proposed project area are believed to be suitable reservoirs for WF EOR operations.

11. Future open hole horizontal wells (Figure 13) will be converted to injection wells within the proposed East Manson Unit No. 8 setting up a 20 acre line drive waterflood.

RESERVOIR PROPERTIES AND TECHNICAL DISCUSSION

The proposed East Manson No. 8 project area is located within Township 13, Range 28 W1 of the Manson oil field. The proposed East Manson No. 8 currently consists of 5 producing horizontal wells and 1 producing vertical well within an area covering the NE ¼ of Section 09-013-28W1, and the S ½ & NW ¼ of section 10-013-28W1 (Figure 2). A project area well list complete with recent production statistics is attached as Table 3.

Tundra believes that the waterflood response in the adjacent Units of the Manson field demonstrates potential for incremental production and reserves from a WF EOR project in the subject Middle Bakken and/or Three Forks oil reservoirs.

GEOLOGICAL DESCRIPTION

Stratigraphy

The Mississippian Middle Bakken Formation at the proposed East Manson Unit 8 can be seen on the type log 100/11-10-13-28W1 in Appendix 1 from 661.4 – 666.5m TVD. 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 north east. The Lyleton formation is underlain by the Devonian Birdbear formation. Please refer to Appendix 2: Cross Section A – A'.

Sedimentology

The Middle Bakken at East Manson Unit 8 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 unit; 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 – which is why there is such a large range of reservoir quality within the Manson field. The range of reservoir quality is apparent in Appendices 4, 5, and 6, which show a large range in the Middle Bakken net pay, Phi.h, and K.h respectively.

Structure

East Manson Unit 8 is located on the top to down dip edge of a localized structural high. The Middle Bakken dips towards the west–southwest. In the northeast portion of the unit (northwest and southeast quarter of section 10-13-28W1), the top Middle Bakken is at -164.5 meters subsea structure, and it dips down to the southwest portion of the unit (northeast 9 and southwest 10-13-28W1) to -173.5 meters subsea. Please refer to Appendix 3 for Top Middle Bakken Subsea Structure map.

Reservoir

The Middle Bakken reservoir within the proposed East Manson Unit 8 is interpreted to be of excellent quality. This is supported by the prolific primary production from the wells within the proposed unit.

While section 10 and northeast section 9 only have one vertical well (11-10-13-28W1), the surrounding well control gives insight into the net pay, porosity, and permeability trends within the proposed Unit 8 boundary. Please refer to Appendix 4: Middle Bakken Net Pay. The Middle Bakken net oil pay within the unit is interpreted to range between 1 meter on the very east-northeast portion of the unit; to 3.5 to 4 meters on the west-southwest side of the unit. Net oil pay is defined by logs with a limestone density porosity greater than 12%, resistivity higher than 3 ohm.m, and Sw less than 0.6 (petrophysically defined but once again supported by the low water production in the unit to date).

Appendix 5 shows the Phi.h trends within the proposed Unit 8. Phi.h is the average porosity of the reservoir (derived from logs and core analysis) multiplied by the pay height in vertical wells. The Phi.h ranges from 0.1 in the northeastern edge of the unit to 0.8 (plus) in the west – southwestern portion of the unit.

Appendix 6 shows the K.h trends within the proposed unit 8. K.h is the summation of the permeability (mainly derived from core analysis but can be derived petrophysically in the absence of core) multiplied by the pay height of the reservoir in vertical wells. The K.h ranges from around 3 milliDarcy meters in the northeastern edge and increases to 160 mD.m (or perhaps as high as 180 mD.m) in the southwestern edge of the unit.

Original Oil in Place (OOIP)

OOIP values were calculated using the following volumetric equation:

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

or

$$OOIP(m3) = \frac{A * h * \emptyset * (1 - Sw)}{Bo} * \frac{10{,}000m2}{ha}$$

or

$$OOIP(Mbbl) = \frac{A * h * \emptyset * (1 - Sw)}{Bo} * 3.28084\frac{ft}{m} * 7{,}758.367\frac{bbl}{acre * ft} * \frac{1Mbbl}{1{,}000bbl}$$

where

OOIP	= Original Oil in Place by LSD (Mbbl, or m3)
A	= Area (40acres, 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)

For the purposes of this unit application, Bo and Sw were held constant at 1.1018 and 40% respectively. The initial oil formation volume factor was adopted from a PVT taken from the 11-10-013-28W1, thought to be representative of the fluid characteristics in the reservoir. Sw determination was set at 40% based on analysis of production history in the area.

Phi * h maps were created from sonic porosity log data (Appendix 10). The average phi * h value within each LSD was calculated using IHS Petra software, this provided the final input into the OOIP calculation.

Total volumetric OOIP for the Bakken formation within the proposed unit has been calculated to be 1,005,831 m^3 (6,326,486 bbls).

Tabulated parameters for each LSD from the calculations can be found in Table 4.

Original Oil in Place (OOIP) calculations and geologic summary were prepared by Jennifer Tremblay and reviewed by Bill Ward, P. Geol. (Senior Geologist at Tundra Oil and Gas).

Historical Production

A historical group production history plot for the proposed East Manson No. 8 is shown as Figure 4. Oil production commenced from the proposed Unit area in March 2011 and peaked during March 2012 at 130.3 m^3 OPD. As of February 2017, production was 33.8 m^3 of OPD, 2.4 m^3 of WPD and a 6.7% WCT.

Oil production is currently declining at an annual rate of approximately 17.6% under the current Primary Production method.

The field's production rate indicates the need for pressure restoration and maintenance, and waterflooding is deemed to be the most efficient means of re-introducing energy back into the reservoir system and to provide areal sweep between wells.

UNITIZATION

Unitization and implementation of a Waterflood EOR project is forecasted to increase overall recovery of OOIP to 23.8%. The basis for unitization is to develop the lands in an effective manner that will be conducive to waterflooding. Unitizing will enable the reservoir to have the greatest recovery possible by allowing the development of additional drilling and injector conversions over time, in order to maintain reservoir pressure and increase oil production.

Unit Name

Tundra proposes that the official name of the new Unit covering the NE ¼ of Section 09-013-28W1, and the S ½ & NW ¼ of section 10-013-28W1 shall be East Manson No. 8.

Unit Operator

Tundra will be the Operator of record for East Manson No. 8.

Unitized Zone

The Unitized zone(s) to be waterflooded in the East Manson No. 8 will be the Middle Bakken and Three Forks formations.

Unit Wells

The 5 horizontal wells and 1 vertical well to be included in the proposed East Manson No. 8 are outlined in Table 3.

Unit Lands

East Manson No. 8 will consist of 16 LSD as follows:

- NE ¼ of Section 09 of Township 13, Range 28, W1M
- NW ¼ & S ½ of Section 10 of Township 13, Range 28, W1M

The lands included in the 40 acre tracts are outlined in Table 1.

Tract Factors

The proposed East Manson No. 8 will consist of 16 Tracts based on the 40 acre LSD's containing the existing 5 horizontal producing wells and 1 producing vertical well.

The Tract Factor contribution for each of the LSD's within the proposed East Manson No. 8 was calculated as follows:

- Gross OOIP by LSD, minus cumulative production to date 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 by LSD = the product of Remaining Gross OOIP by LSD as a % of total proposed Unit Remaining Gross OOIP

Tract Factor calculations for all individual LSD's based on the above methodology are outlined in Table 2.

Working Interest Owners

Table 1 outlines the working interest (WI) for each recommended Tract within the proposed East Manson No. 8. Tundra holds a 100% WI ownership in all the proposed Tracts. Tundra will have a 100% WI in the proposed East Manson No. 8.

WATERFLOOD EOR DEVELOPMENT

Technical Studies

The waterflood performance predictions for the proposed East Manson No. 8 are based on internal engineering assessments. Internal reviews included analysis of available open-hole logs; core data; petro-physics; 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 No. 8 OOIP (Table 5).

Unitizing the proposed East Manson No. 8 will provide an extremely equitable means of maximizing ultimate oil recovery in the project area. Analog WF projects in the Manson field (Figure 5) have proven that the implementation WF Secondary EOR in the proposed Unit is a feasible method to get the most oil out of the Bakken-Three Forks reservoir.

As Tundra has a direct comparison of waterflood performance in the existing Manson Units, Tundra does not feel it is crucial to construct a simulation model for this area.

Pre-Injection Production of New Horizontal Injection Wells

Primary production from the horizontal producing wells in the proposed East Manson No. 8 has declined significantly from peak rate indicating a need for secondary pressure support. It is planned that two future Horizontal Wells will be drilled, and converted to injection upon approval as shown in Figure 6, but ultimately the final candidates for injection conversion will be chosen based on production performance post Unit approval. This will result in an effective 20 acre line drive waterflood pattern within East Manson No. 8.

Since the proposed horizontal injection wells are yet to be drilled, there will be a need for an additional pre-production period within this unit. But again the timing of conversion will be based on production performance post Unit approval. It is Tundra's desire to have the final injection conversion candidates on injection as soon as fluid production and pressure in wellbores drop to acceptable levels. Tundra monitors reservoir pressure, fluid production and decline rates in each pattern to determine the best time for each well to be converted to water injection.

Reserves Recovery Profiles and Production Forecasts

The waterflood performance predictions for the proposed East Manson No. 8 are based on oil production decline curve analysis, and the secondary waterflood predictions are based on internal engineering analysis performed by the Tundra reservoir engineering group.

Primary Production Forecast:

Cumulative production to the end February 2017 from the 6 wells within the proposed East Manson No. 8 project area was 82.5 E^3m^3 of oil, and 7.1 E^3m^3 of water, representing a 8.2% Recovery Factor (RF) of the calculated Net OOIP.

Ultimate Primary Proved Producing oil reserves recovery for East Manson No. 8 has been estimated to be 166.3 E^3m^3, or a 16.5% RF of OOIP. Remaining Producing Primary Reserves has been estimated to be 83.8 E^3m^3 to the end of February 2017. The expected production decline and forecasted cumulative oil recovery under continued Primary Production is shown in Figures 7 and 8.

Pre-Production Schedule / Timing for Conversion of Horizontal Wells to Water Injection:

Tundra will plan an injection conversion schedule to allow for the most expeditious development of the waterflood within the proposed East Manson No. 8 while maximizing knowledge gained for further reservoir characterization.

Criteria for Conversion to Water Injection Well:

Two water injection wells are likely required for this proposed unit as shown in Figure 6.

Tundra will monitor the following parameters to assess the best timing for each individual horizontal well to be converted from primary production to water injection service.

- Measured reservoir pressures at start of and/or through primary production
- Fluid production rates and any 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

The above schedule allows for the proposed East Manson No. 8 to be developed equitably, efficiently, and moves the project to the best condition for the start of waterflood as quickly as possible. It also provides the Unit Operator flexibility to manage the reservoir conditions and response to help ensure maximum ultimate recovery of OOIP.

Secondary EOR Production Forecast:

East Manson No. 8 will be the eighth horizontal line drive at 20 acre spacing in the Manson Field. The proposed project oil production profile under secondary recovery has been developed based on predictions derived from conventional internal engineering analysis performed by the Tundra reservoir engineering group and therefore Tundra does not believe a 20 acres WF simulation is necessary for the project area.

Secondary Waterflood plots of the expected oil production forecast over time and the expected oil production v. cumulative oil are plotted in Figures 9 and 10, respectively. Total Primary plus Secondary EUR for the proposed East Manson No. 8 is estimated to be 252.7 E^3m^3 with 157.8 E^3m^3 remaining representing a total recovery factor of 23.8% for the proposed Unit area. This includes Primary production from two future Horizontal Produce-First Injectors (PFI), which are forecasted to add 7.8 E^3m^3 (49.0 Mbbl) or 0.8% of Primary Reserves. An incremental 65.2 E^3m^3 of oil, or an incremental 6.5% secondary recovery factor, are forecasted to be recovered under the proposed Unitization and water flood scheme vs. the existing Primary Production method.

Estimated Fracture Gradient

Completion data from the existing producing wells within the project area indicate a fracture pressure gradient range of 18.0 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 No. 8 will likely be sourced from a producing Bakken horizontal well. Tundra will request approval from the Petroleum Branch to convert a producing well as a source water well for waterflood operations. Bakken-sourced water will be pumped to the Manson 14-10-13-28 site, where it will be distributed to the injection system. It is likely that a new filtration plant will be installed at the Manson 14-10 site in order to filter the source water. A diagram of the Manson 14-10 water injection system and new pipeline connection to the project area injection wells is shown as Figure 11.

Tundra does not foresee any injectivity issues when using Bakken produced water for the waterflood operations in the proposed East Manson Unit No. 8.

Injection Wells

The water injection wells for the proposed East Manson No. 8 are yet to be drilled, and once they have a pre-injection production period, there will be plans to re-configure the wells for downhole injection after approval for waterflood has been received (Figure 12). The future horizontal injection wells will be drilled with an open hole completion design (Figure 13). Tundra has extensive experience with horizontal open hole drilling in the area, and all jobs are rigorously programmed and monitored during execution.
The water injection wells will be placed on injection after the approval to inject has been received from the Petroleum Branch. Wellhead injection pressures will 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, however, rate/pressure programmable logic control (PLC) is likely to not be included in the facility plan, and instead, the waterflood process would be controlled manually. An operating procedure for monitoring water injection volumes and meter balancing will also be utilized to monitor the entire system measurement and integrity on a daily basis.

The proposed East Manson No. 8 horizontal water injection well rate is forecasted to average 10 – 40 m3 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 No. 8 project area in the Bakken formation. (Appendix 7) Tundra will make all attempts to capture a reservoir pressure survey in the proposed horizontal injection wells during the completion of the wells and prior to injection or production.

Tundra expects it will take 1-2 years to re-pressurize the reservoir due to cumulative primary production voidage and pressure depletion. Initial monthly Voidage Replacement Ratio (VRR) is expected to be approximately 1.2 to 2.0 within the unit during the fill up period. As the cumulative VRR approaches 1.0, target reservoir operating pressure for waterflood operations will be 75-90% of original reservoir pressure.

Waterflood Surveillance and Optimization

East Manson No. 8 EOR response and waterflood surveillance will consist of the following:

- Regular production well rate and watercut testing
- Daily water injection rate and pressure monitoring vs target
- 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 will provide an ever increasing understanding of reservoir performance, and provide data to continually control and optimize the East Manson No. 8 waterflood operation. Controlling the waterflood operation will significantly reduce or eliminate the potential for out-of-zone injection, undesired channeling or water breakthrough, or out-of-Unit migration. The monitoring and surveillance will also provide early indicators of any such issues so that waterflood operations may be altered to maximize ultimate secondary reserves recovery from the proposed East Manson No. 8.

On Going Reservoir Pressure Surveys

For each new open hole horizontal injection well, a measured reservoir pressure will be obtained prior to water injection. These pressures will be reported within the Annual Progress Reports for East Manson No. 8 as per Section 73 of the Drilling and Production Regulation.

Economic Limits

Under the current Primary recovery method, existing wells within the proposed East Manson No. 8 will be deemed uneconomic when the net oil rate and net oil price revenue stream becomes less than the current producing operating costs. With any positive oil production response under the proposed Secondary recovery method, the economic limit will be significantly pushed out into the future. The actual economic cutoff point will then again be a function of net oil price, the magnitude and duration of production rate response to the waterflood, and then current operating costs. Waterflood projects generally become uneconomic to operate when Water Oil Ratios (WOR's) exceed 100.

WATER INJECTION FACILITIES

The East Manson No. 8 waterflood operation will either utilize a Tundra operated Bakken producing well as a water source well, or use produced water from several producing wells in the Manson area for re-injection. A new water plant (WP) will be constructed at the Manson 14-10-13-28W1 site (Figure 11).

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

NOTIFICATION OF MINERAL AND SURFACE RIGHTS OWNERS

Tundra is in the process of notifying all mineral rights and surface rights owners of this proposed EOR project and formation of East Manson No. 8. Copies of the notices and proof of service, to all surface and mineral rights owners will be forwarded to the Petroleum Branch when available to complete the East Manson No. 8 Application.

East Manson No. 8 Unitization, and execution of the formal East Manson No. 8 Agreement by affected Mineral Owners, is expected during Q4 2017. Copies of same will be forwarded to the Petroleum Branch, when available, to complete the East Manson No. 8 Application.

Should the Petroleum Branch have further questions or require more information, please contact Allan [redacted] at (403) 513-1023 or by email at allan.bertram@tundraoilandgas.com

TUNDRA OIL & GAS PARTNERSHIP

Original Signed by Allan [redacted]

Proposed East Manson Unit No. 8

Application for Enhanced Oil Recovery Waterflood Project

List of Figures

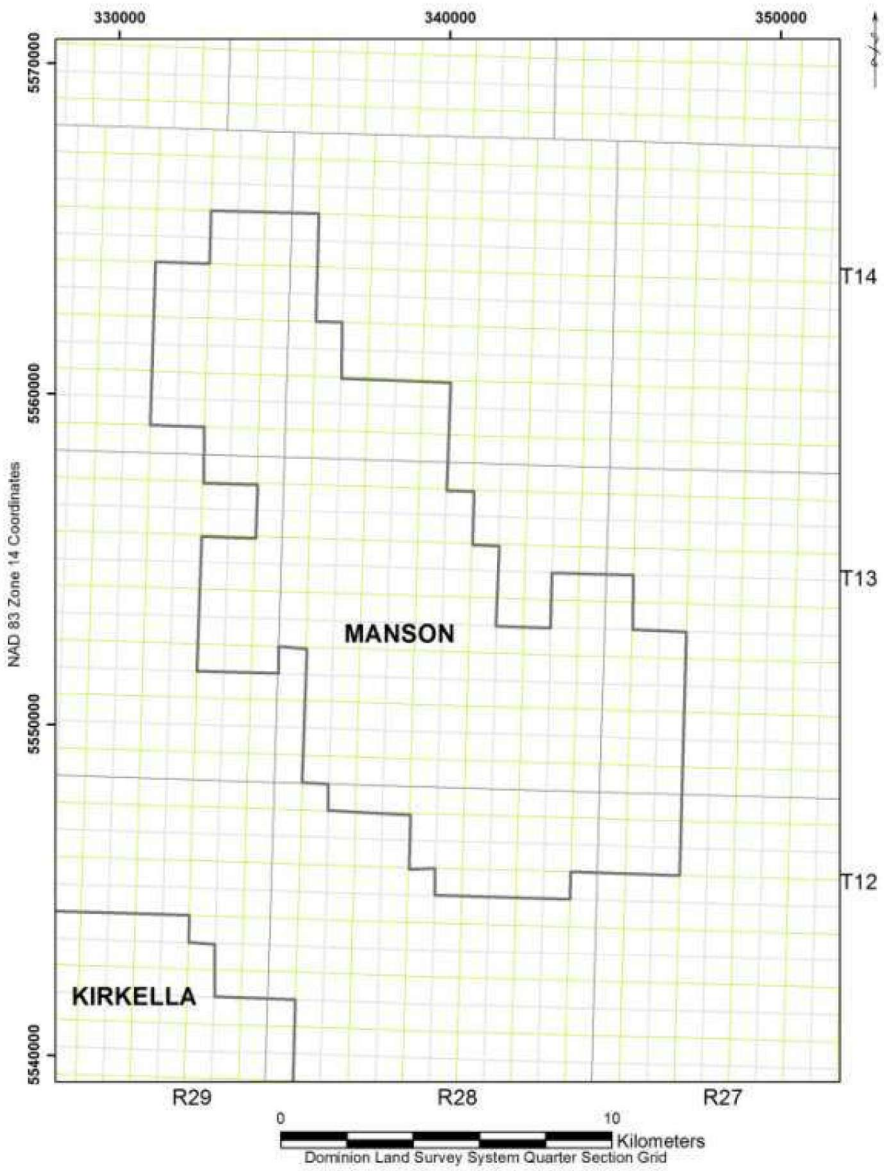


Figure 11 - Manson Field (17)

Figure 1

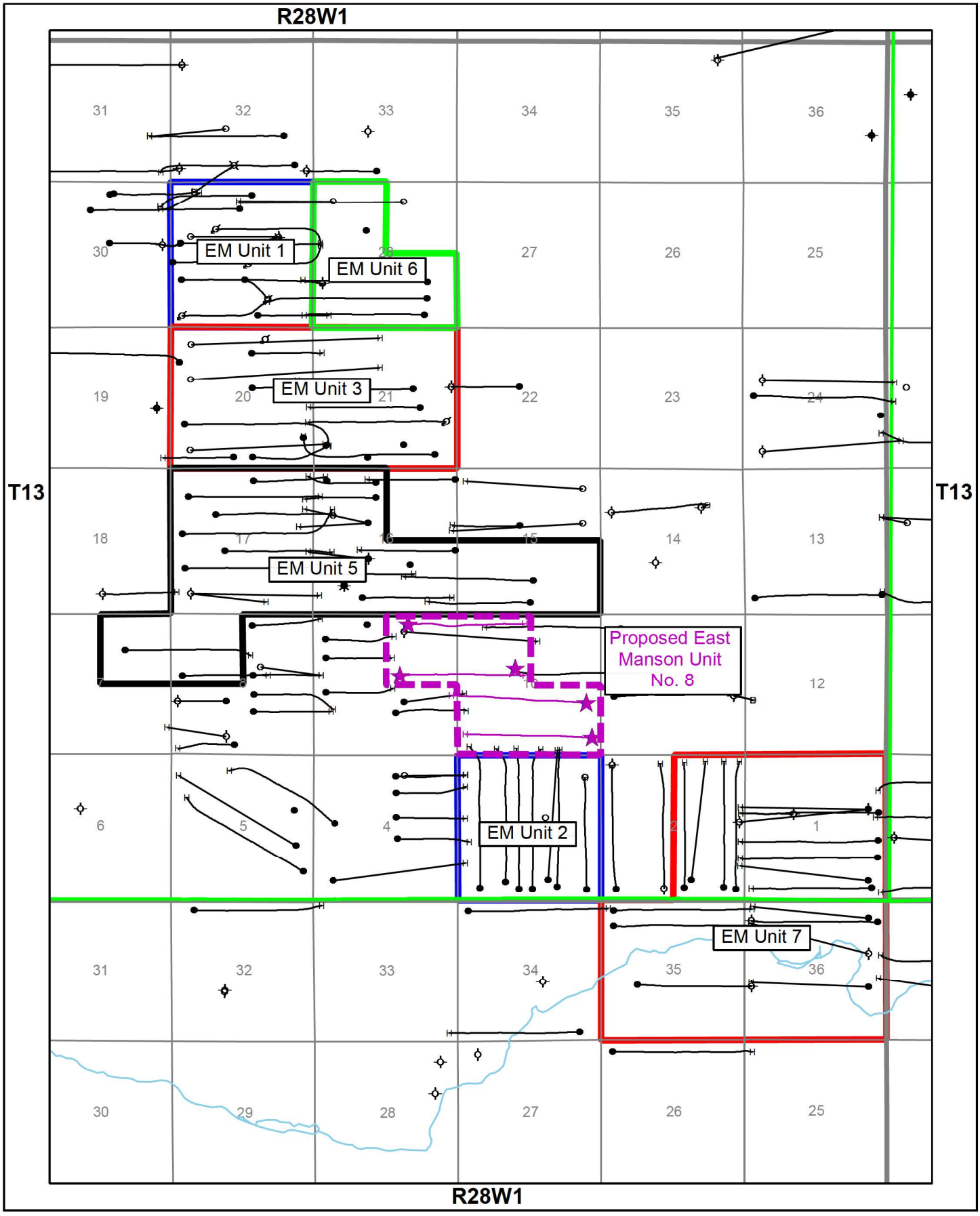


Figure 2

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

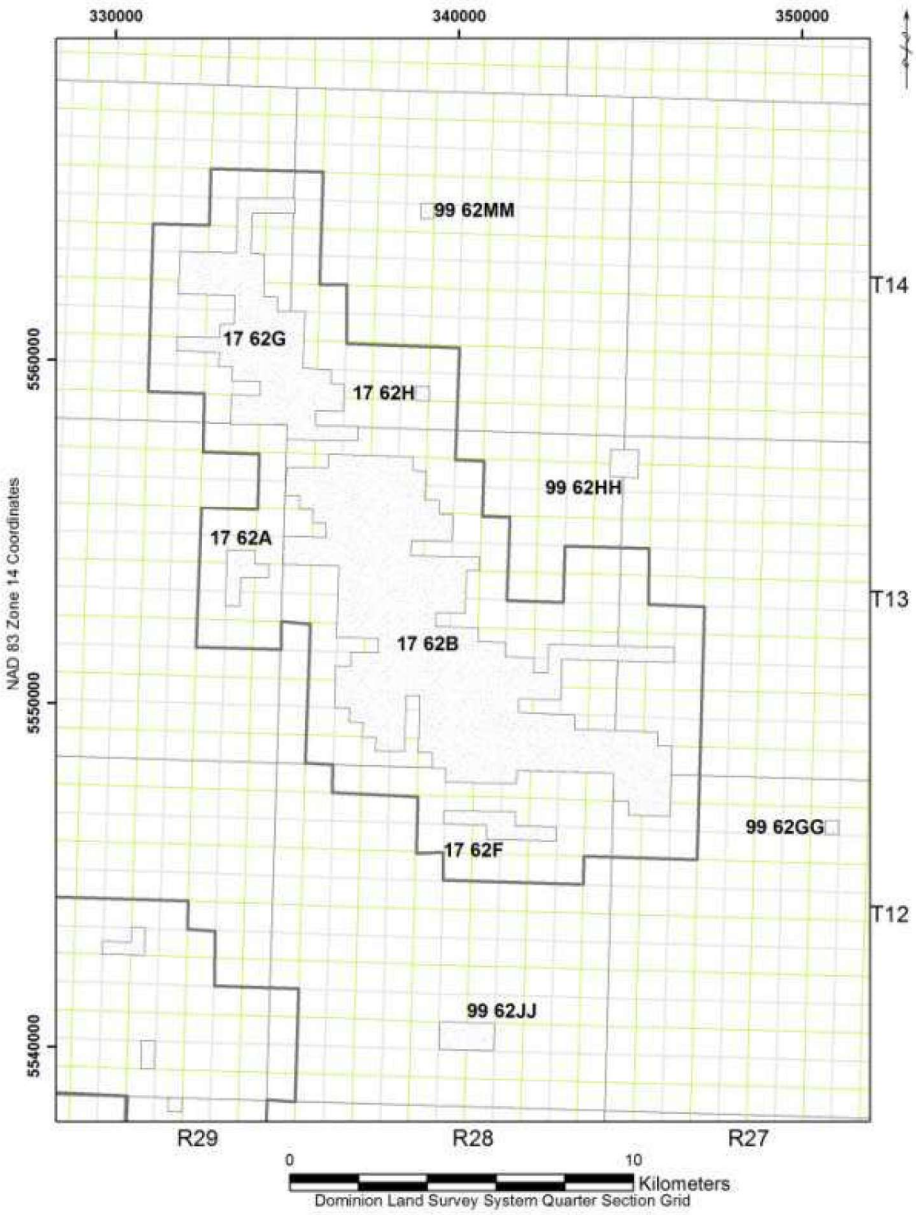


Figure 41 - Manson & Other Areas Bakken-Torquay Pools
(17 62A, B, F, G, H & 99 62GG, HH, JJ & MM)

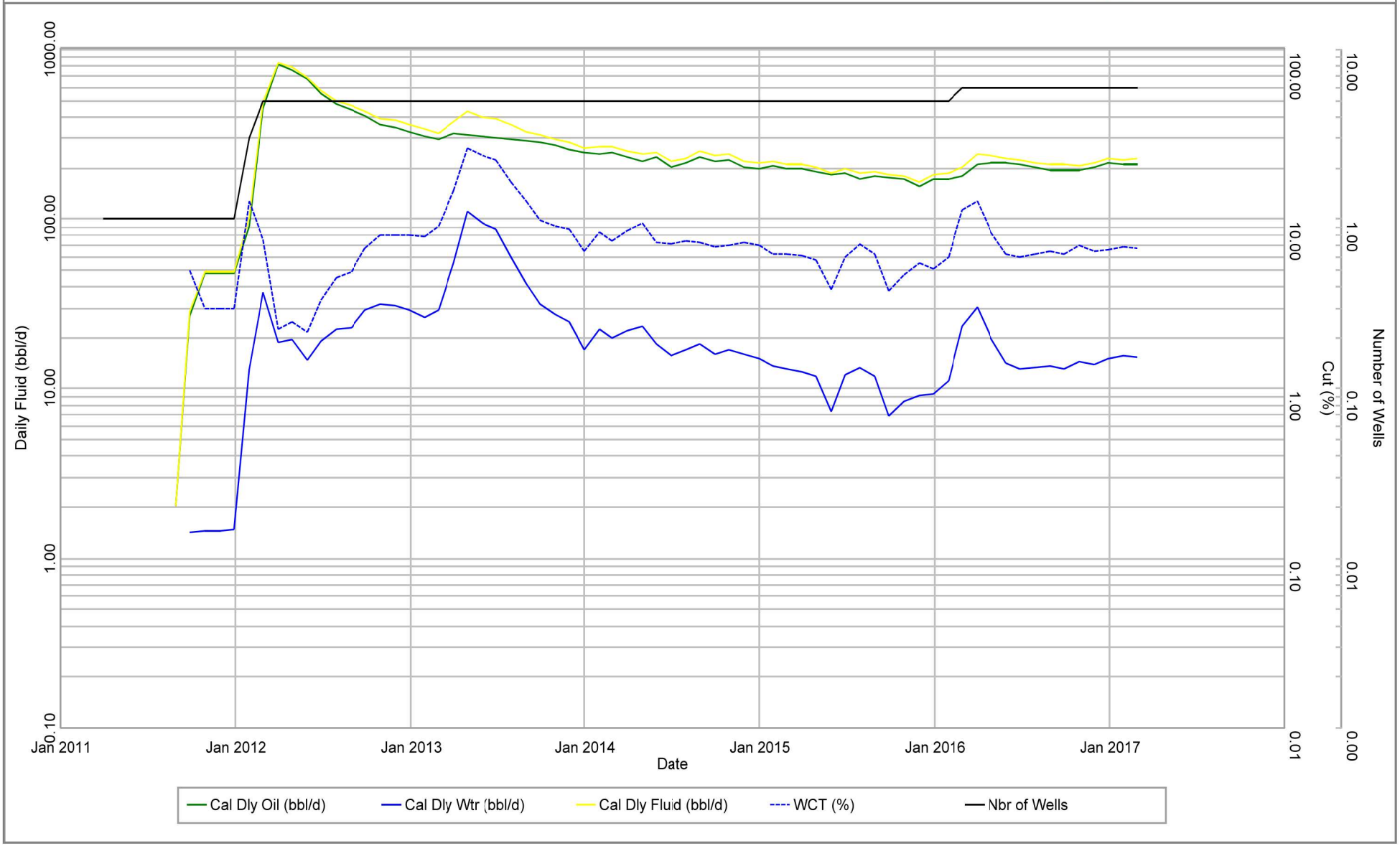
Figure 3

Well Information as of 4/20/2017 - Group Well Report

Production Graph

Figure 4

Group:	proposed east manson unit no. 8.lwell	**On Prod:**	2011-03 to 2017-02	**Cum Oil:**	519068.0 bbl
# of Wells:	6	**Prod Form:**	BAKKEN; THREEFK	**Cum Gas:**	0.0 mcf
Fluid:	Oil	**Field:**	MANSON (MB17)	**Cum Wtr:**	45003.5 bbl
Mode:	Producing	**Pool Code:**	MB001762B	**Cum Inj Oil:**	0.0 bbl
		Unit Code:		**Cum Inj Gas:**	0.0 mcf
				Cum Inj Wtr:	0.0 bbl



Production Graph

Figure 5

Group:	10 wells	**On Prod:**	2012-10 to 2017-01	**Cum Oil:**	357396.0 bbl
# of Wells:	10	**Prod Form:**	TORQUAY; THREEFK; BAKKEN; BAKKENM	**Cum Gas:**	0.0 mcf
Fluid:	Oil; Water Injection	**Field:**	MANSON (17); MANITOBA OTHER AREAS (99)	**Cum Wtr:**	332629.1 bbl
Mode:	Producing; Injection; Canceled	**Pool Code:**	62G	**Cum Inj Oil:**	0.0 bbl
		Unit Code:	176200	**Cum Inj Gas:**	0.0 mcf
				Cum Inj Wtr:	297248.7 bbl

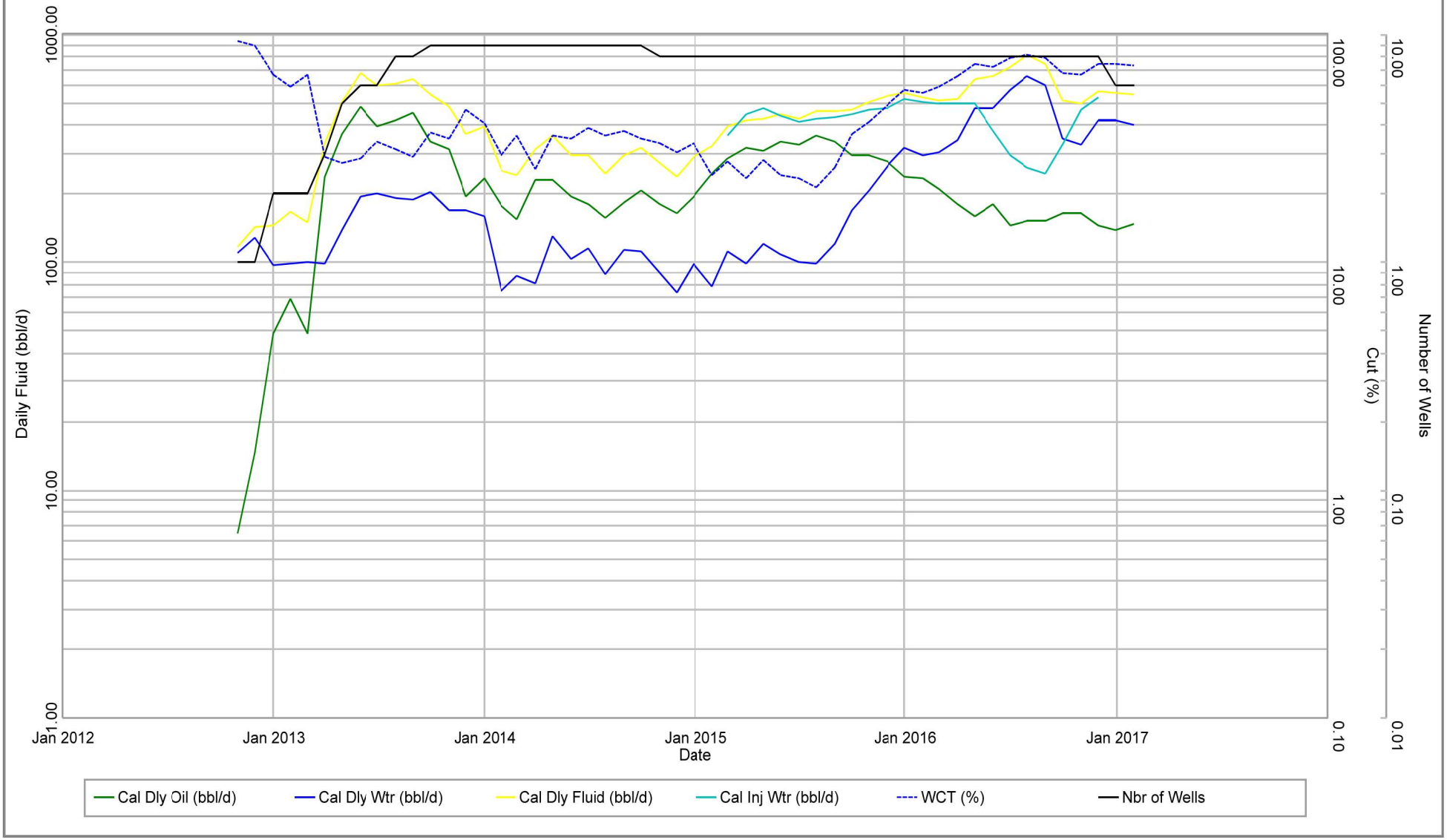
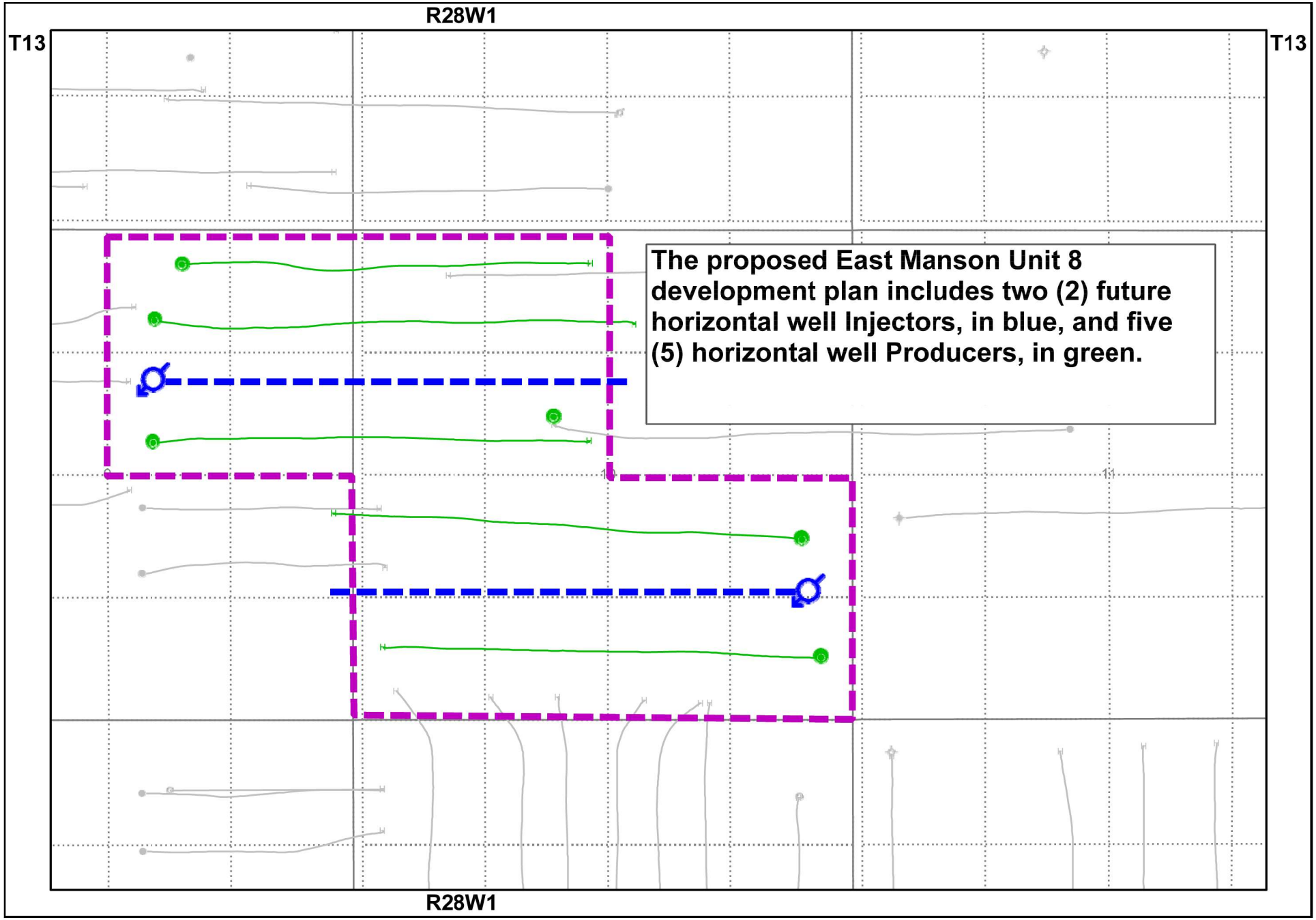


Figure 6



Map Title

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

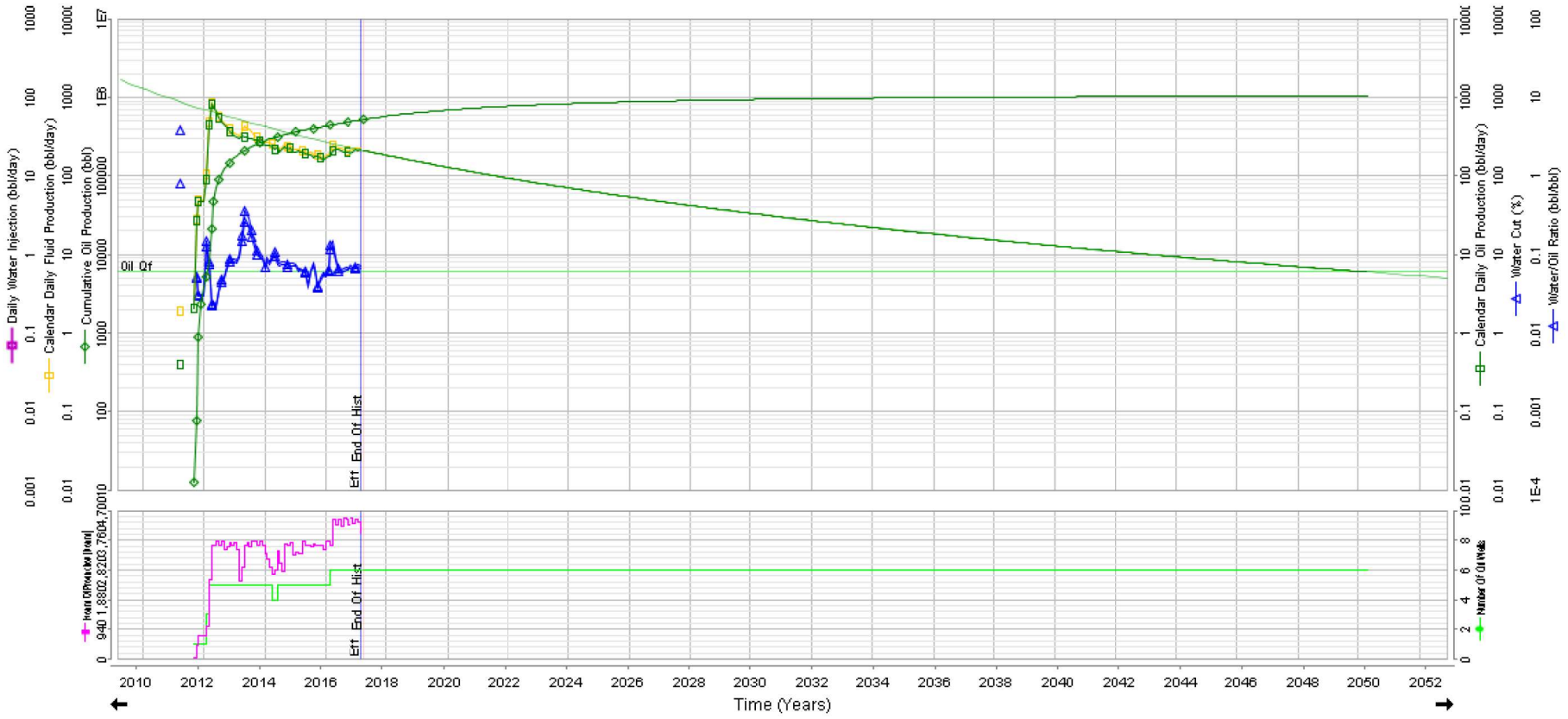
PRODUCTION AND FORECAST

Effective March 01, 2017

Operator: TUNDRA OIL & GAS LIMITED
Province: Manitoba
Field: multi zone (6)
Pool: multi zone (6)
Unit: multi zone (6)
Status: Oil Prod

Manson Unit 8
Proposed East Manson Unit No. 8
Base

Figure 7- Manson Unit 8 Base Forecast - Rate vs. Time



Oil Cum	(bbl)	519,068	Gas Cum	(Mcf)	0	Water Cum	(bbl)	44,984	FCond Cum	(bbl)	0
Oil Rem Rec	(bbl)	526,932	Gas Rem Rec	(Mcf)	0	Water Rem Rec	(bbl)	0	FCond Rem Rec	(bbl)	0
Oil Ult Rec	(bbl)	1,046,000	Gas Ult Rec	(Mcf)	0	Water Ult Rec	(bbl)	44,984	FCond Ult Rec	(bbl)	0
Forecast Start (T0)		03/01/2017	Calculation Type		Undefined	Est Cum Prod	(bbl)	519,068	Decline Exp		0.300
Forecast End (Tf)		03/28/2050	OVIP (Volumetric)	(bbl)	0	Remaining Rec	(bbl)	526,932	Initial Decline (De)		17.6
Initial Rate (qi)	(bbl/day)	210.7	Rec Factor (Volumetric)		0.000	Gas Surface Loss		0.0	Reserve Life Index		7.46
Final Rate (qf)	(bbl/day)	6.0	Ult Recoverable	(bbl)	1,046,000	Gas Total Sales	(Mcf)	0	Reserve Half Life		5.22

Report Time: Wed, 31 May 2017 15:05
Economic Case: Tundra 2017 Econ Deck /
Hierarchy: Reserves
DB: WORKING_AD : Mosaic10 Version: 2016.2.3

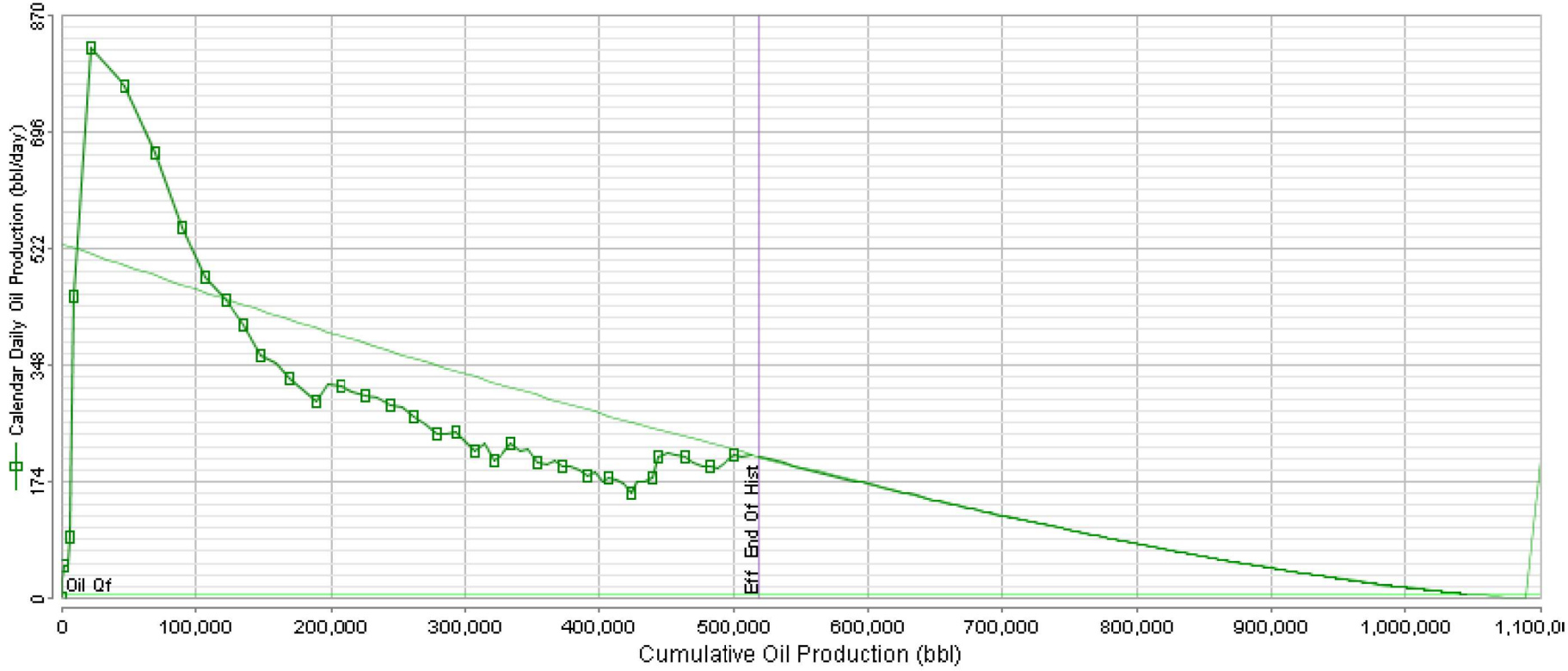
PRODUCTION AND FORECAST

Effective March 01, 2017

Operator: TUNDRA OIL & GAS LIMITED
Province: Manitoba
Field: multi zone (6)
Pool: multi zone (6)
Unit: multi zone (6)
Status: Oil Prod

Manson Unit 8
Proposed East Manson Unit No. 8
Base

Figure 8 - Manson Unit 8 Base Forecast - Rate vs. Cumulative Oil



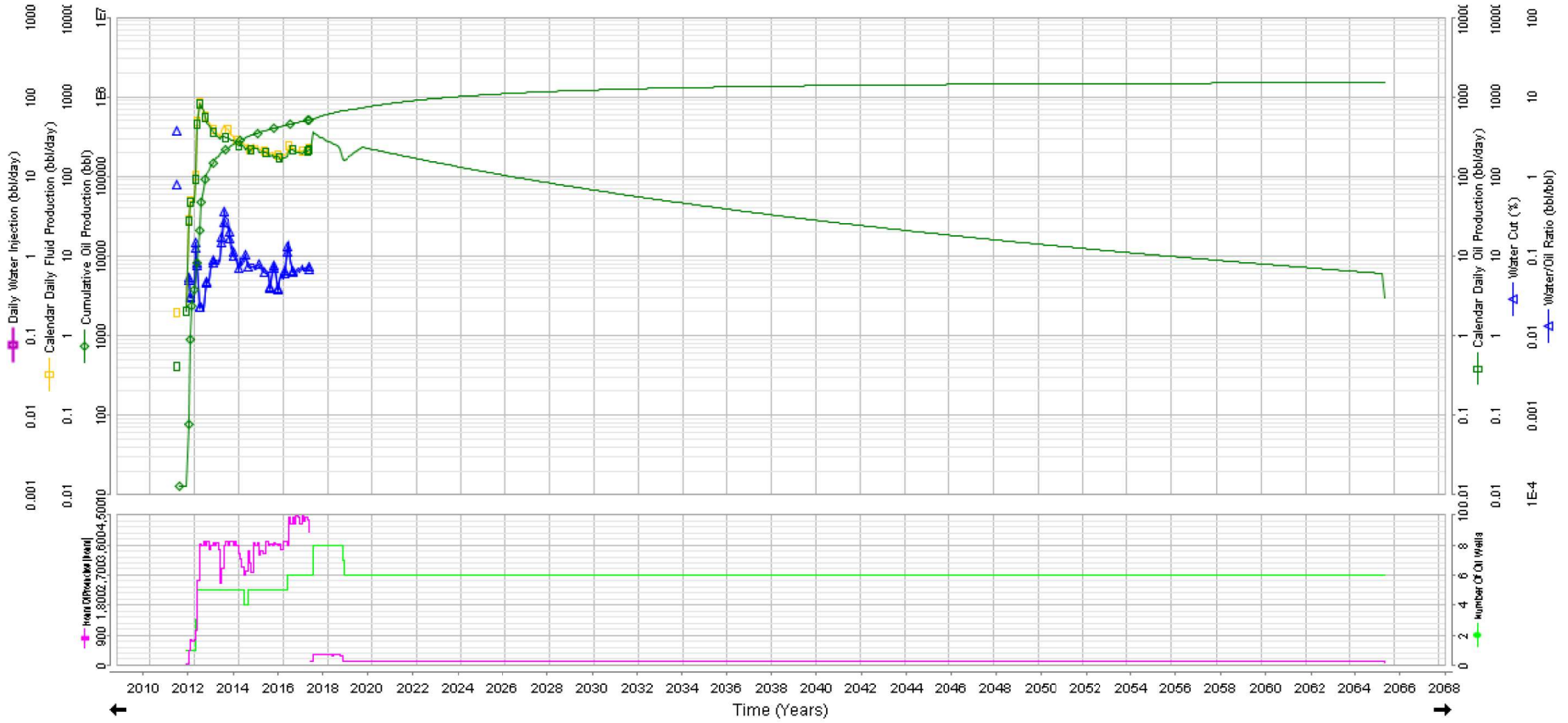
Oil Cum	(bbl)	519,068	Gas Cum	(Mcf)	0	Water Cum	(bbl)	44,984	FCond Cum	(bbl)	0
Oil Rem Rec	(bbl)	526,932	Gas Rem Rec	(Mcf)	0	Water Rem Rec	(bbl)	0	FCond Rem Rec	(bbl)	0
Oil Ult Rec	(bbl)	1,046,000	Gas Ult Rec	(Mcf)	0	Water Ult Rec	(bbl)	44,984	FCond Ult Rec	(bbl)	0
Forecast Start (T0)		03/01/2017	Calculation Type		Undefined	Est Cum Prod	(bbl)	519,068	Decline Exp		0.300
Forecast End (Tf)		03/28/2050	OVIP (Volumetric)	(bbl)	0	Remaining Rec	(bbl)	526,932	Initial Decline (De)		17.6
Initial Rate (qi)	(bbl/day)	210.7	Rec Factor (Volumetric)		0.000	Gas Surface Loss		0.0	Reserve Life Index		7.46
Final Rate (qf)	(bbl/day)	6.0	Ult Recoverable	(bbl)	1,046,000	Gas Total Sales	(Mcf)	0	Reserve Half Life		5.22

Report Time: Wed, 31 May 2017 15:05
Economic Case: Tundra 2017 Econ Deck /
Hierarchy: Reserves
DB: WORKING_AD : Mosaic10 Version: 2016.2.3

CONSOLIDATED PRODUCTION AND FORECAST

Effective March 01, 2017
Selection: Current selection from current workbench list
Type:
Category: Base + Growth 1

Figure 9 - Manson Unit 8 Base + Growth Forecast - Rate vs. Time



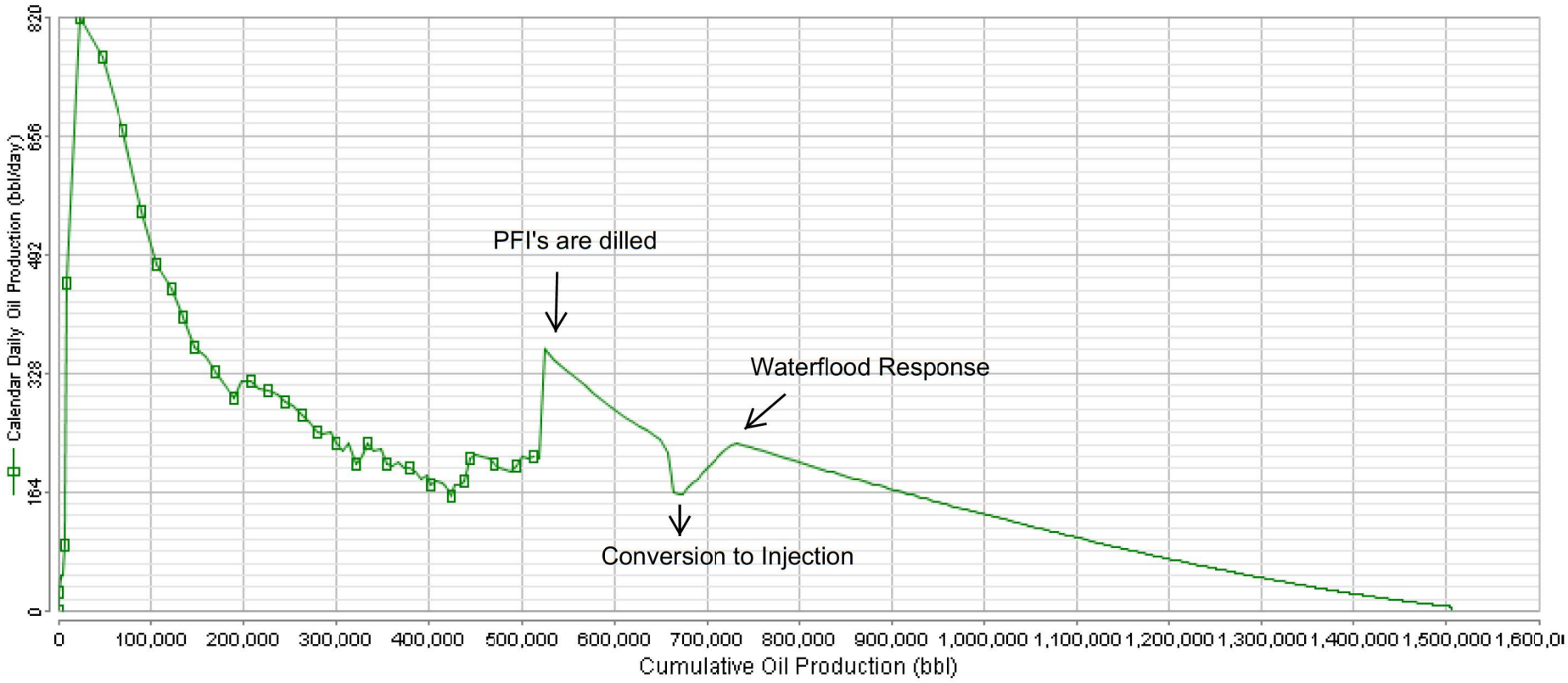
Cum Oil (bbl)	519,068	Cum Gas (Mcf)	0	Cum Water (bbl)	44,984	Cum Cond (bbl)	0
Forecast Start	2017/03/01	Calculation Type		Est. Cum Prod (bbl)	519,068	Decline Exponent	
Forecast End	2065/07/31	OVIP (bbl)		Remaining (bbl)	985,932	Intial Decline (%/yr)	-279.8
Initial Rate (bbl/day)	1,264.1	Recovery Factor		Surface Loss		Life Index	9.75
Final Rate (bbl/day)	222.3	Ult. Recoverable (bbl)	1,505,000	Total Sales (Mcf)		Half Life (years)	6.92

Report Time: Wed, 31 May 2017 15:04
Economic Case: Tundra 2017 Econ Deck /
Hierarchy: Reserves
DB: WORKING_AD : Mosaic10 Version: 2016.2.3

CONSOLIDATED PRODUCTION AND FORECAST

Effective March 01, 2017
Selection: Current selection from current workbench list
Type:
Category: Base + Growth 1

Figure 10 - Manson Unit 8 Base + Growth Forecast - Rate vs. Cumulative Oil



Cum Oil	(bbl)	519,068	Cum Gas	(Mcf)	0	Cum Water	(bbl)	44,984	Cum Cond (bbl)	0
Forecast Start		2017/03/01	Calculation Type			Est. Cum Prod	(bbl)	519,068	Decline Exponent	
Forecast End		2065/07/31	OVIP	(bbl)		Remaining	(bbl)	985,932	Intial Decline (%/yr)	-27.8
Initial Rate	(bbl/day)	1,264.1	Recovery Factor			Surface Loss			Life Index	9.75
Final Rate	(bbl/day)	222.3	Ult. Recoverable	(bbl)	1,505,000	Total Sales	(Mcf)		Half Life (years)	6.92

Report Time: Wed, 31 May 2017 15:04
Economic Case: Tundra 2017 Econ Deck /
Hierarchy: Reserves
DB: WORKING_AD : Mosaic10 Version: 2016.2.3

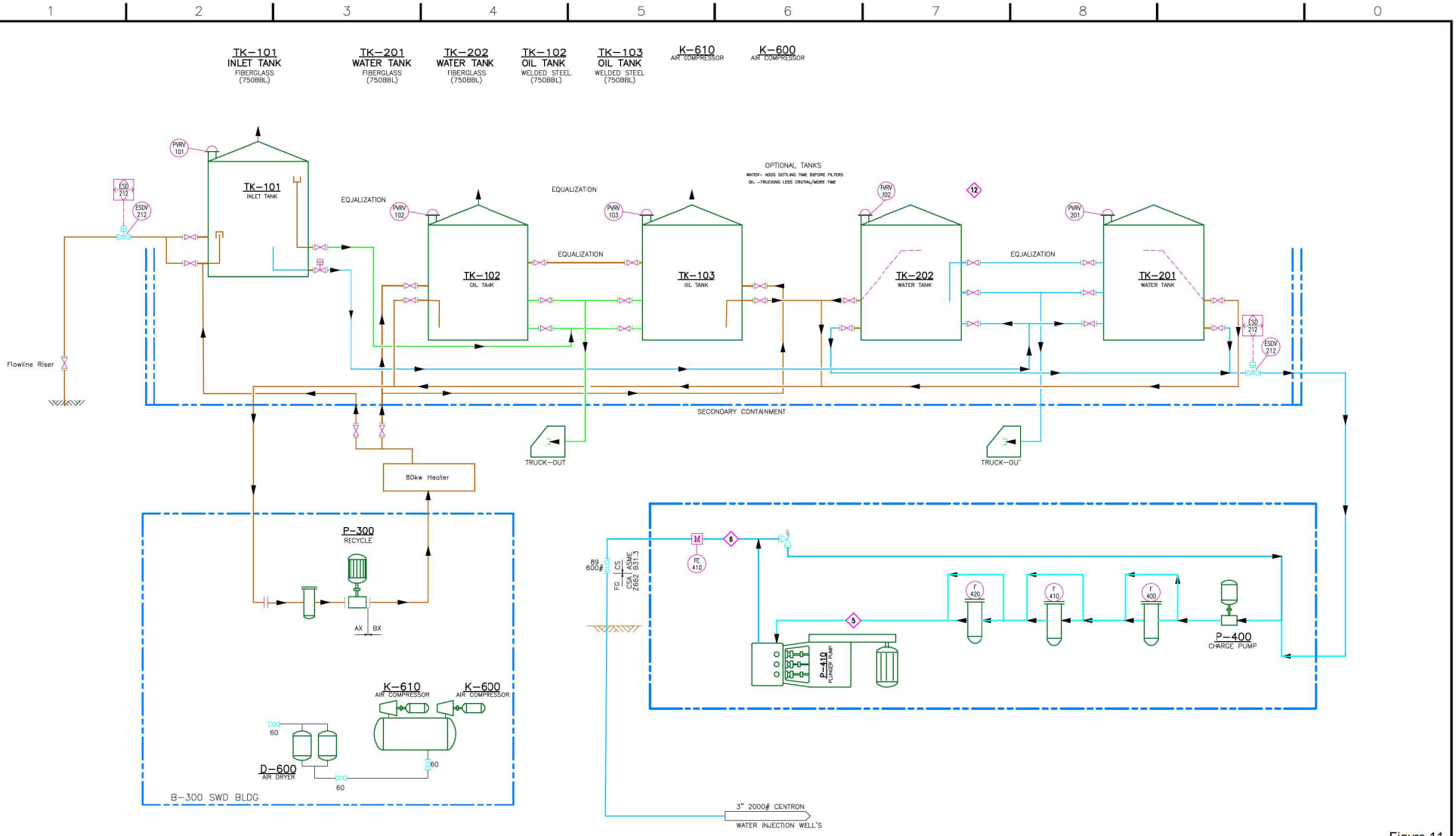


Figure 11

REV	DESCRIPTION	BY	DATE	CHK	APP
0	ISSUED FOR REVIEW	BE	15MARCH2016	LP	JA

REFERENCE DRAWING: –

NOTES:

TUNDRA OIL & GAS PARTNERSHIP

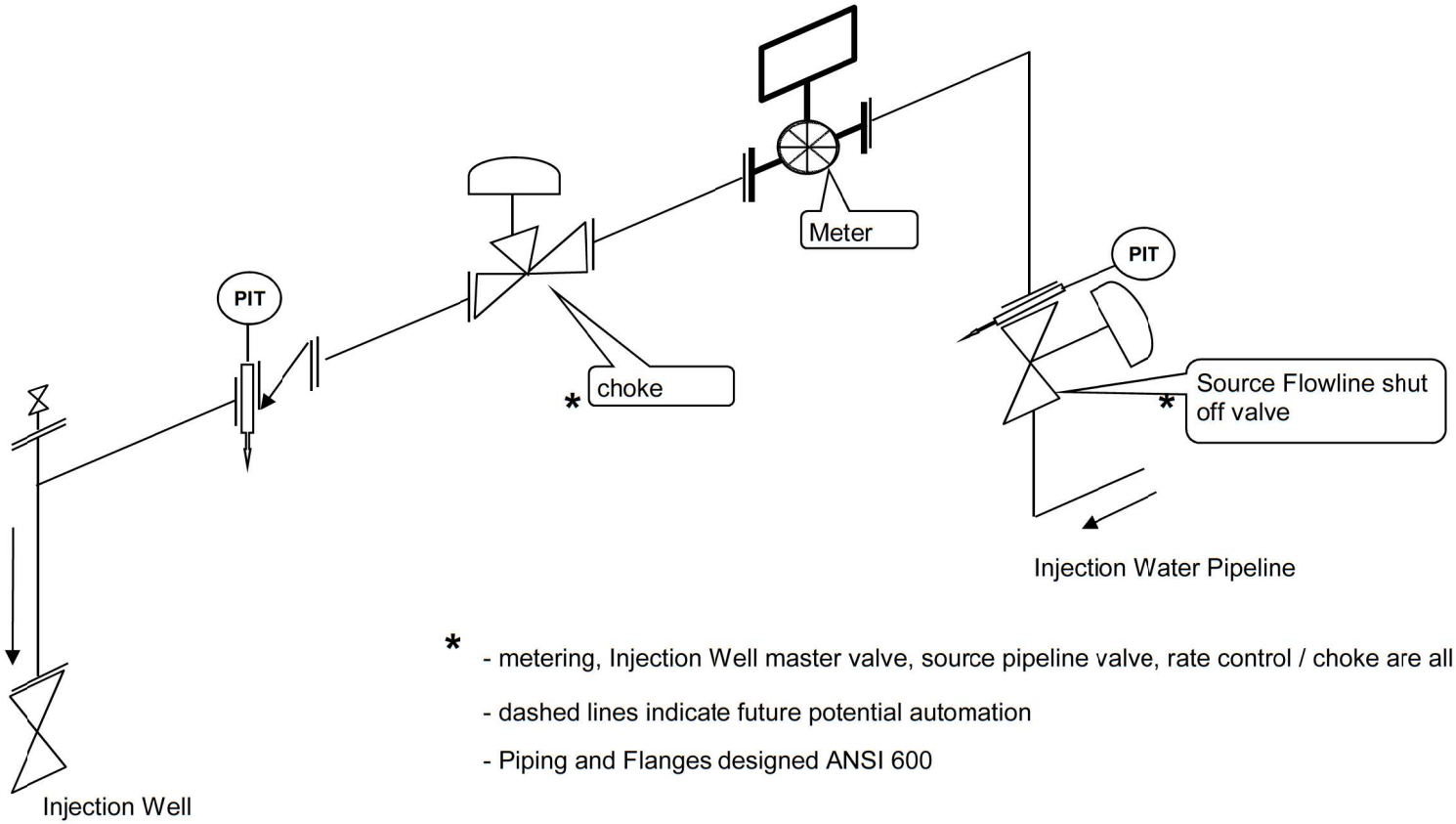
MANSON
14-10-13-28 W1M

PROCESS FLOW DIAGRAM

DRAWN BY:	SCALE:	AFE:	DRAWING NUMBER:	REV NO:
BE	NTS	02C1????FC	14-10-13-28W1M-PFD-1005	0

East Manson Unit No. 8

Proposed Injection Well Surface Piping P&ID



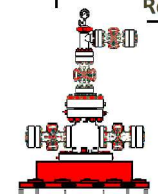
* - metering, Injection Well master valve, source pipeline valve, rate control / choke are all standard

- dashed lines indicate future potential automation
- Piping and Flanges designed ANSI 600

Figure 13 Horizontal Down-Hole Diagram

Date:

Company:	Tundra Oil & Gas	**Prepared For:**	Manitoba Petroleum Branch	**Field:**	Tundra Manson
Rep.:	BH	**Phone Number:**	1-204-748-3095	**Location:**	102.01-10-013-28



Tubular	Size (mm)	Weight (kg/m)	Grade	Thread Type	Depth (m)
Surface Casing	244.50	48.06	H-40	ST&C	~140 m KB
Intermediate	177.80	34.23 & 29.76	J-55	ST&C	~803.5 m KB
Injection Tubing	73.00	9.67	J-55	ST&C	~798.5 m KB
Openhole	159.00	n/a	n/a	n/a	~2229 m KB

Item #	Description	ID (mm)	OD (mm)	Length (m)	Top Depth (m)
1	Surface Casing				
2	Intermediate Casing				
3	Injection Tubing				
4	177.8 mm Nickel Coated HRP Packer Proposed setting depth @ ~798.5 m KB				
5	73 mm Perf Pup Equipped with a Pump Out Plug				
				Total Depth:	~2229 m KB
Notes:	*Set into 8 daN Compression*				

Rev. No.: 1
Rev. Date: June 20/08
102.01-10-013-28 WIW Downhole Diagram

East Manson Unit No. 8

EOR Waterflood Project

Planned Corrosion Control Program **

Source Well

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

Pipelines

- Source well to 14-10-13-28 Battery – Fiberglass
- New High Pressure Pipeline to Unit 8 injection wells – 2000 psi high pressure Fiberglass

Facilities

- 14-10-13-28 Water Plant and New Injection Pump Station
    - Plant piping – 600 ANSI schedule 80 pipe, Fiberglass or Internally coated
    - Filtration – Stainless steel bodies and PVC piping
    - Pumping – Ceramic plungers, stainless steel disc valves
    - Tanks – Fiberglass shell, corrosion resistant valves

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

Producing Wells

- Casing cathodic protection where required
- Downhole batch corrosion inhibition as required
- Downhole scale inhibitor injection as required

Figure 14

** subject to final design and engineering

Proposed East Manson Unit No. 8

Application for Enhanced Oil Recovery Waterflood Project

List of Tables

TABLE NO. 1: TRACT PARTICIPATION FOR PROPOSED EAST MANSON UNIT No. 8

Working Interest				Royalty Interest		Tract Participation
Tract No.	Land Description	Owner	Share (%)	Owner	Share (%)	
1	09-09-013-28W1M	Tundra Oil and Gas	100%	Minister of Finance	100%	8.238334662%
2	10-09-013-28W1M	Tundra Oil and Gas	100%	4610032 Manitoba Ltd.	50%	7.291256987%
				1598000 Alberta Ltd.	50%	
3	15-09-013-28W1M	Tundra Oil and Gas	100%	4610032 Manitoba Ltd.	50%	6.060206647%
				1598000 Alberta Ltd.	50%	
4	16-09-013-28W1M	Tundra Oil and Gas	100%	Minister of Finance	100%	5.986876986%
5	01-10-013-28W1M	Tundra Oil and Gas	100%	Minister of Finance	100%	4.290149851%
6	02-10-013-28W1M	Tundra Oil and Gas	100%	Minister of Finance	100%	5.530833050%
7	03-10-013-28W1M	Tundra Oil and Gas	100%	Minister of Finance	100%	6.908980265%
8	04-10-013-28W1M	Tundra Oil and Gas	100%	Minister of Finance	100%	8.278742440%
9	05-10-013-28W1M	Tundra Oil and Gas	100%	Minister of Finance	100%	8.482811913%
10	06-10-013-28W1M	Tundra Oil and Gas	100%	Minister of Finance	100%	6.996231237%
11	07-10-013-28W1M	Tundra Oil and Gas	100%	Minister of Finance	100%	5.211108916%
12	08-10-013-28W1M	Tundra Oil and Gas	100%	Minister of Finance	100%	3.485749971%
13	11-10-013-28W1M	Tundra Oil and Gas	100%	1598000 Alberta Ltd.	100%	5.122968353%
14	12-10-013-28W1M	Tundra Oil and Gas	100%	Minister of Finance	100%	6.862448657%
15	13-10-013-28W1M	Tundra Oil and Gas	100%	Minister of Finance	100%	5.591637882%
16	14-10-013-28W1M	Tundra Oil and Gas	100%	4610032 Manitoba Ltd.	100%	5.661662183%
						100.000000000%

TABLE NO. 2: TRACT FACTOR CALCULATIONS FOR EAST MANSON UNIT No. 8

TRACT FACTORS BASED ON OIL-IN-PLACE (OOIP) MINUS CUMULATIVE PRODUCTION TO FEBRUARY 2017

LS-SE	Tract	*OOIP (m3)*	HZ Wells Alloc Prod (m3)	Vert Wells Cum Prodn (m3)	Sum Hz + Vert Alloc Cum Prodn	OOIP - Cum Prodn	Tract Factor	Tract
09-09	09-09-013-28W1M	86,758	10,690.0	0.0	10,690.0	76,068	8.238334662%	09-09-013-28W1M
10-09	10-09-013-28W1M	75,914	8,590.0	0.0	8,590.0	67,324	7.291256987%	10-09-013-28W1M
15-09	15-09-013-28W1M	57,336	1,379.3	0.0	1,379.3	55,957	6.060206647%	15-09-013-28W1M
16-09	16-09-013-28W1M	57,336	2,056.4	0.0	2,056.4	55,280	5.986876986%	16-09-013-28W1M
01-10	01-10-013-28W1M	44,794	5,180.8	0.0	5,180.8	39,613	4.290149851%	01-10-013-28W1M
02-10	02-10-013-28W1M	56,582	5,512.8	0.0	5,512.8	51,069	5.530833050%	02-10-013-28W1M
03-10	03-10-013-28W1M	69,312	5,518.6	0.0	5,518.6	63,794	6.908980265%	03-10-013-28W1M
04-10	04-10-013-28W1M	79,214	2,772.7	0.0	2,772.7	76,441	8.278742440%	04-10-013-28W1M
05-10	05-10-013-28W1M	82,420	4,094.7	0.0	4,094.7	78,326	8.482811913%	05-10-013-28W1M
06-10	06-10-013-28W1M	69,312	4,713.0	0.0	4,713.0	64,599	6.996231237%	06-10-013-28W1M
07-10	07-10-013-28W1M	52,809	4,692.9	0.0	4,692.9	48,117	5.211108916%	07-10-013-28W1M
08-10	08-10-013-28W1M	35,835	3,649.4	0.0	3,649.4	32,186	3.485749971%	08-10-013-28W1M
11-10	11-10-013-28W1M	61,391	10,640.6	3,447.6	14,088.2	47,303	5.122968353%	11-10-013-28W1M
12-10	12-10-013-28W1M	69,312	5,948.2	0.0	5,948.2	63,364	6.862448657%	12-10-013-28W1M
13-10	13-10-013-28W1M	53,752	2,122.3	0.0	2,122.3	51,630	5.591637882%	13-10-013-28W1M
14-10	14-10-013-28W1M	53,752	1,475.7	0.0	1,475.7	52,277	5.661662183%	14-10-013-28W1M
	m3	**1,005,831**			**82,485**	**923,346**	**100.000000000%**	
	Mbbl	**6,326,487**						

TABLE NO. 3: EAST MANSON UNIT No. 8

UWI	*License Number*	*Type*	*Pool Name*	*Producing Zone*	*Mode*	*On Prod Date*	*Last Prod Date*	Cal Dly Oil (m3/d)	Monthly Oil (m3)	Cum Prd Oil (m3)	Cal Dly Water (m3/d)	Monthly Water (m3)	Cum Prd Water (m3)	WCT (%)
100/10-09-013-28W1/0	008427	Horizontal	BAKKEN-THREE FORKS B	BAKKEN	Producing	1/1/2012	2/28/2017	10.8	303.1	35763.1	0.6	15.9	1650.0	4.98
100/15-09-013-28W1/0	008428	Horizontal	BAKKEN-THREE FORKS B	BAKKEN	Producing	1/1/2012	2/28/2017	0.4	11.5	3718.6	0.3	7.0	3049.7	37.84
102/15-09-013-28W1/0	010501	Horizontal	BAKKEN-THREE FORKS B	BAKKEN	Producing	2/1/2016	2/28/2017	10.7	298.3	3420.9	0.6	15.6	278.5	4.97
100/01-10-013-28W1/0	008553	Horizontal	BAKKEN-THREE FORKS B	BAKKEN	Producing	2/1/2012	2/28/2017	6.1	169.5	18984.9	0.7	20.9	1224.5	10.98
100/08-10-013-28W1/0	008546	Horizontal	BAKKEN-THREE FORKS B	BAKKEN	Producing	2/1/2012	2/28/2017	5.4	151.5	17150.0	0.3	8.0	871.3	5.02
100/11-10-013-28W1/0	007936	Vertical	BAKKEN-THREE FORKS B	BAKKEN	Producing	3/1/2011	2/28/2017	0.4	11.5	3447.6	0.0	0.3	77.5	2.54
										82,485.1 m3			**7,151.5 m3**	

TABLE NO. 4: OOIP FOR EAST MANSON UNIT No. 8

UWI	MBKKN	Total OOIP GLJ cut offs (m3)	MB Phi-h	SW MBKKN
	0.5 md	0.5 md	0.5 md	
09-09-013-28W1M	86,758	86,758	0.23000	0.4
10-09-013-28W1M	75,914	75,914	0.23000	0.4
15-09-013-28W1M	57,336	57,336	0.19000	0.4
16-09-013-28W1M	57,336	57,336	0.19000	0.4
01-10-013-28W1M	44,794	44,794	0.19000	0.4
02-10-013-28W1M	56,582	56,582	0.20000	0.4
03-10-013-28W1M	69,312	69,312	0.21000	0.4
04-10-013-28W1M	79,214	79,214	0.21000	0.4
05-10-013-28W1M	82,420	82,420	0.23000	0.4
06-10-013-28W1M	69,312	69,312	0.21000	0.4
07-10-013-28W1M	52,809	52,809	0.20000	0.4
08-10-013-28W1M	35,835	35,835	0.19000	0.4
11-10-013-28W1M	61,391	61,391	0.21000	0.4
12-10-013-28W1M	69,312	69,312	0.21000	0.4
13-10-013-28W1M	53,752	53,752	0.19000	0.4
14-10-013-28W1M	53,752	53,752	0.19000	0.4
		1,005,831	**m3**	
		6,326,487	**Bbl**	

Table No. 5

Proposed East Manson Unit 8

LOWER AMARANTH FORMATION ROCK & FLUID PARAMETERS

Formation Pressure	4800 kPa	Initial Average Reservoir Pressure
Formation Temperature	29 C	
Saturation Pressure	Not available	Bubble Point
GOR	Not available	Gas Oil Ratio
API Oil Gravity	35.92	
Swi (fraction)	0.34	Initial Water Saturation
Produced Water Specific Gravity	1.08	
Produced Water pH	7.2 - 8.3	
Produced Water TDS	58,000	
Wettability	Moderately water-wet	

Proposed East Manson Unit No. 8

Application for Enhanced Oil Recovery Waterflood Project

List of Appendices

Appendix 1	Type Log
Appendix 2	Structural Cross Section
Appendix 3	Middle Bakken Subsea Structure
Appendix 4	Middle Bakken Net Pay
Appendix 5	Middle Bakken Phi.h
Appendix 6	Middle Bakken K.h
Appendix 7	Manson Unit 8 Initial Reservoir Pressure Summary

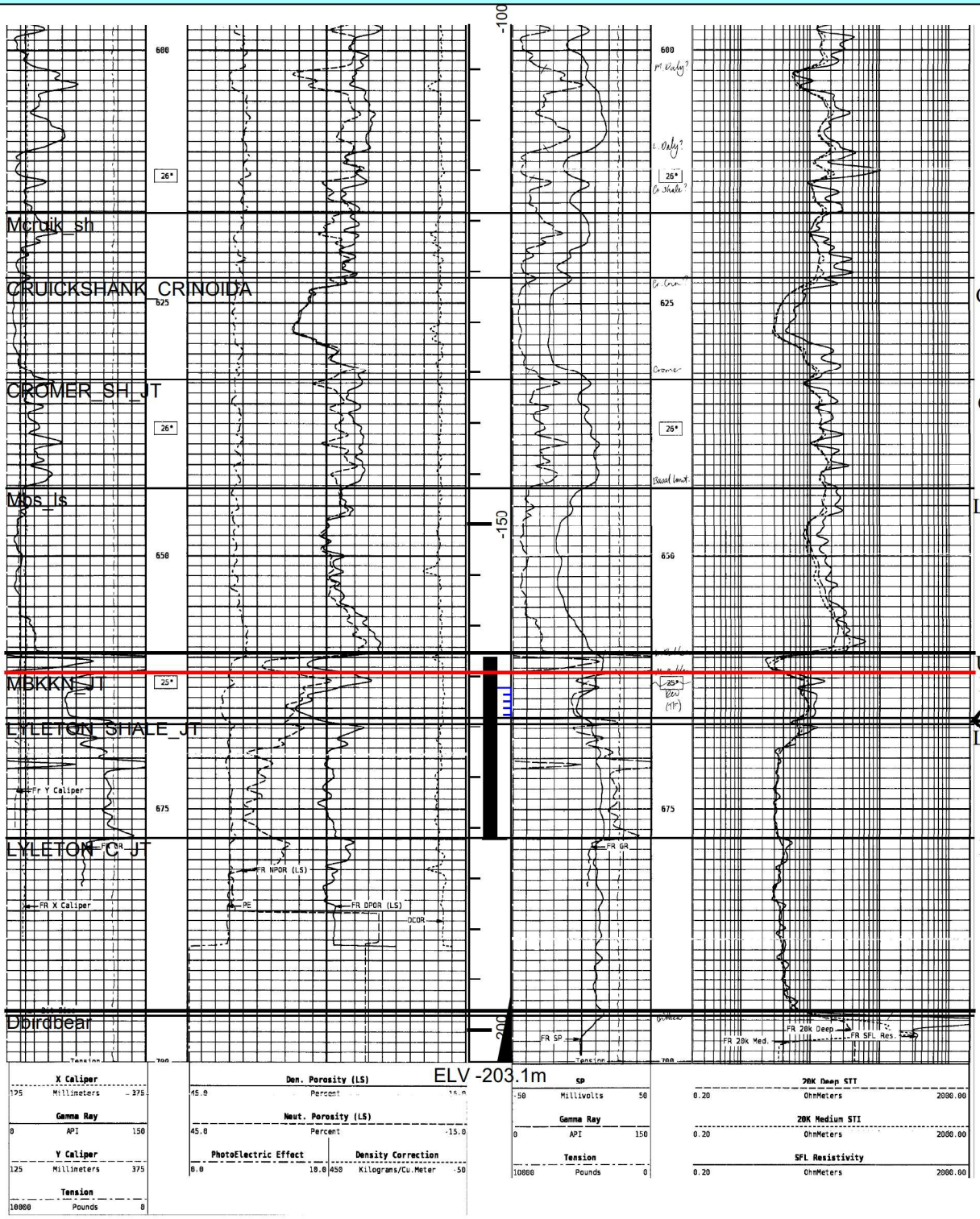
100/11-10-013-28W1/00

A

7936 ● +496.9

A'

Appendix No. 1



ELV -203.1m

X Caliper			Den. Porosity (LS)			SP			20K Deep STT		
125	Millimeters	375	45.0	Percent	-15.0	-50	Millivolts	50	0.20	OhmMeters	2000.00
Gamma Ray			Neut. Porosity (LS)			Gamma Ray			20K Medium STI		
0	API	150	45.0	Percent	-15.0	0	API	150	0.20	OhmMeters	2000.00
Y Caliper			PhotoElectric Effect	Density Correction		Tension			SFL Resistivity		
125	Millimeters	375	0.0	10.0 450	Kilograms/Cu.Meter -50	10000	Pounds	0	0.20	OhmMeters	2000.00
Tension											
10000	Pounds	0									

UWID: 100/11-10-013-28W1/00
Well Name: TUNDRA EAST MANSON

CURR OPER: Tundra O&G Prtnshp [00006] LIC#: 7936
ORIG OPER: Tundra O&G Prtnshp [~655] Date: 2011/02/24

GOVT KB: 496.9m GL: 493.4m MD: TVD: 700.0m
PROJ DPTH: 742.0m PROJ FM@TD: Dbirdbear
FM@TD: Dbdbr_Ubf
PLUG BK: 699.4m

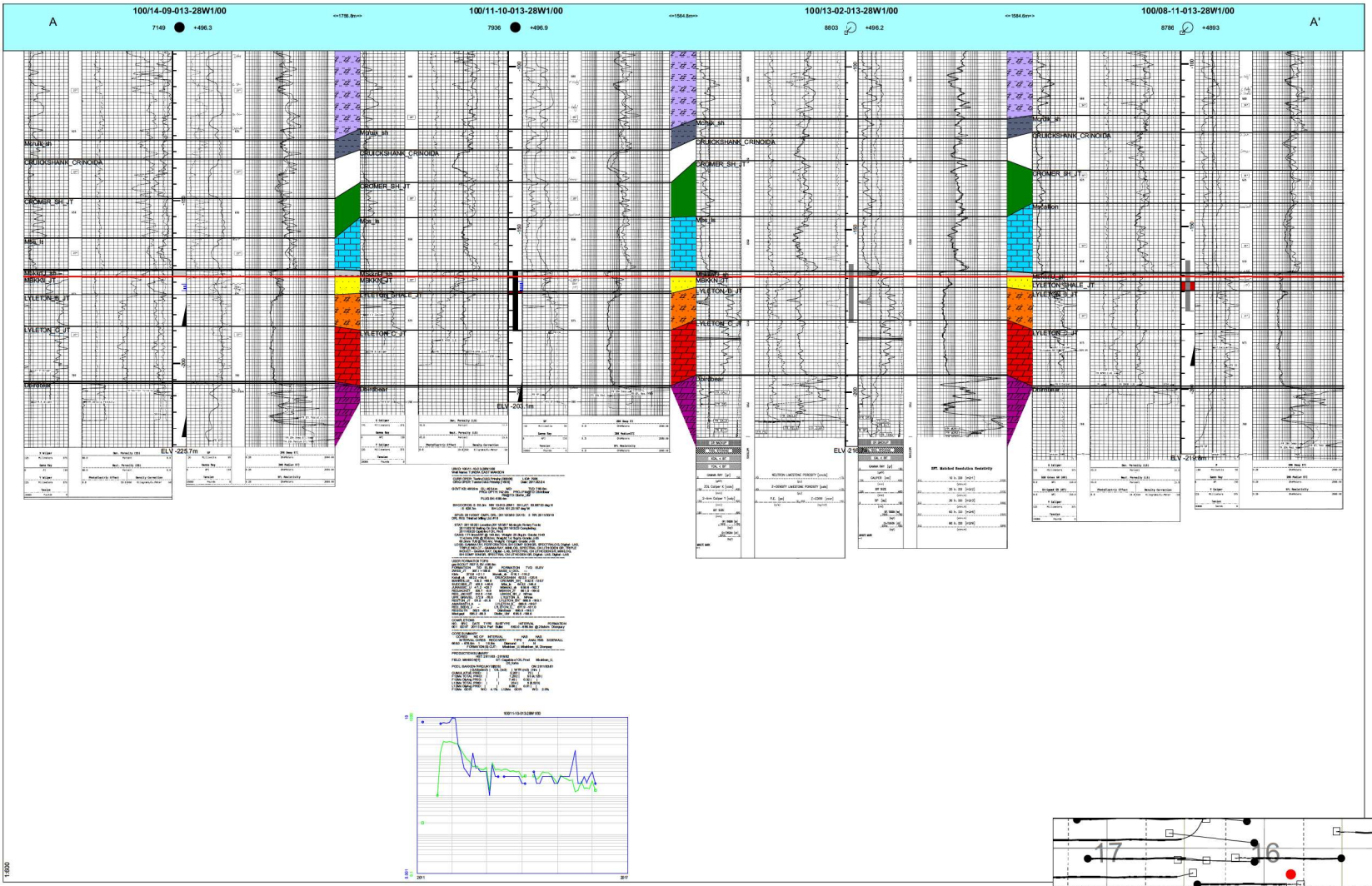
BH COORDS: S 615.3m NW 10-013-28W1 BH LAT: 50.08753 deg N
: E 628.7m BH LON: 101.23157 deg W

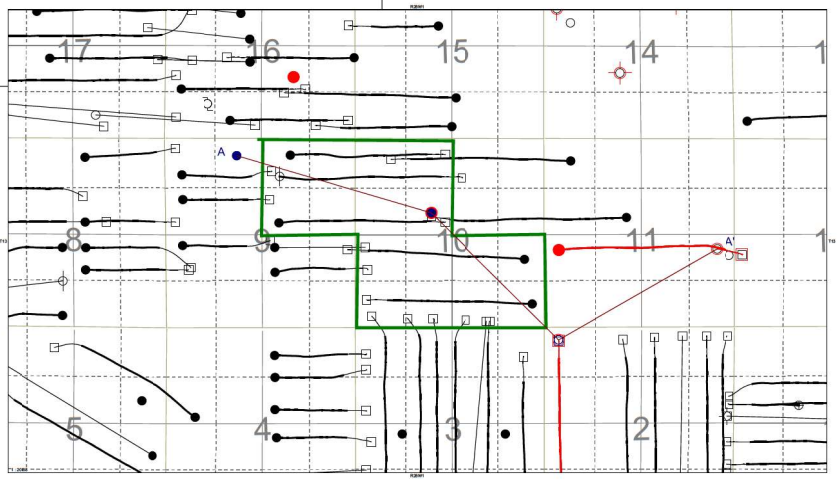
SPUD: 2011/03/07 CMPL DRL: 2011/03/09 DAYS: 3 RR: 2011/03/10
DRL RIG: Trinidad Drilling Ltd. #10

STAT: 2011/02/24 Location;2011/03/07 Moving in Rotary Tools;
2011/03/10 Waiting On Srvc Rig;2011/03/23 Completing;
2011/03/25 Capable of OIL Prod
CASG: 177.8mm SRF @ 140.0m; Weight: 25.3kg/m Grade: H-40
114.3mm PRD @ 700.0m; Weight: 14.1kg/m Grade: J-55
60.3mm TUB @ 768.4m; Weight: 7.0kg/m Grade: J-55
LOGS: GAMMA RAY, PERFORATION, BH COMP SON/GR, SPECTRALOG, Digital - LAS,
TRIPLE INDUCT - GAMMA RAY, MINILOG, SPECTRAL CN LITHODEN GR, TRIPLE
INDUCT - GAMMA RAY, Digital - LAS, SPECTRAL CN LITHODEN GR, MINILOG,
BH COMP SON/GR, SPECTRAL CN LITHODEN GR, Digital - LAS, Digital - LAS

USER FORMATION TOPS
geoSCOUT REF ELEV: 496.9m

FORMATION	TVD	ELEV	FORMATION	TVD	ELEV
2WSS_JT	207.3	+189.6	BASE_U_DOL		

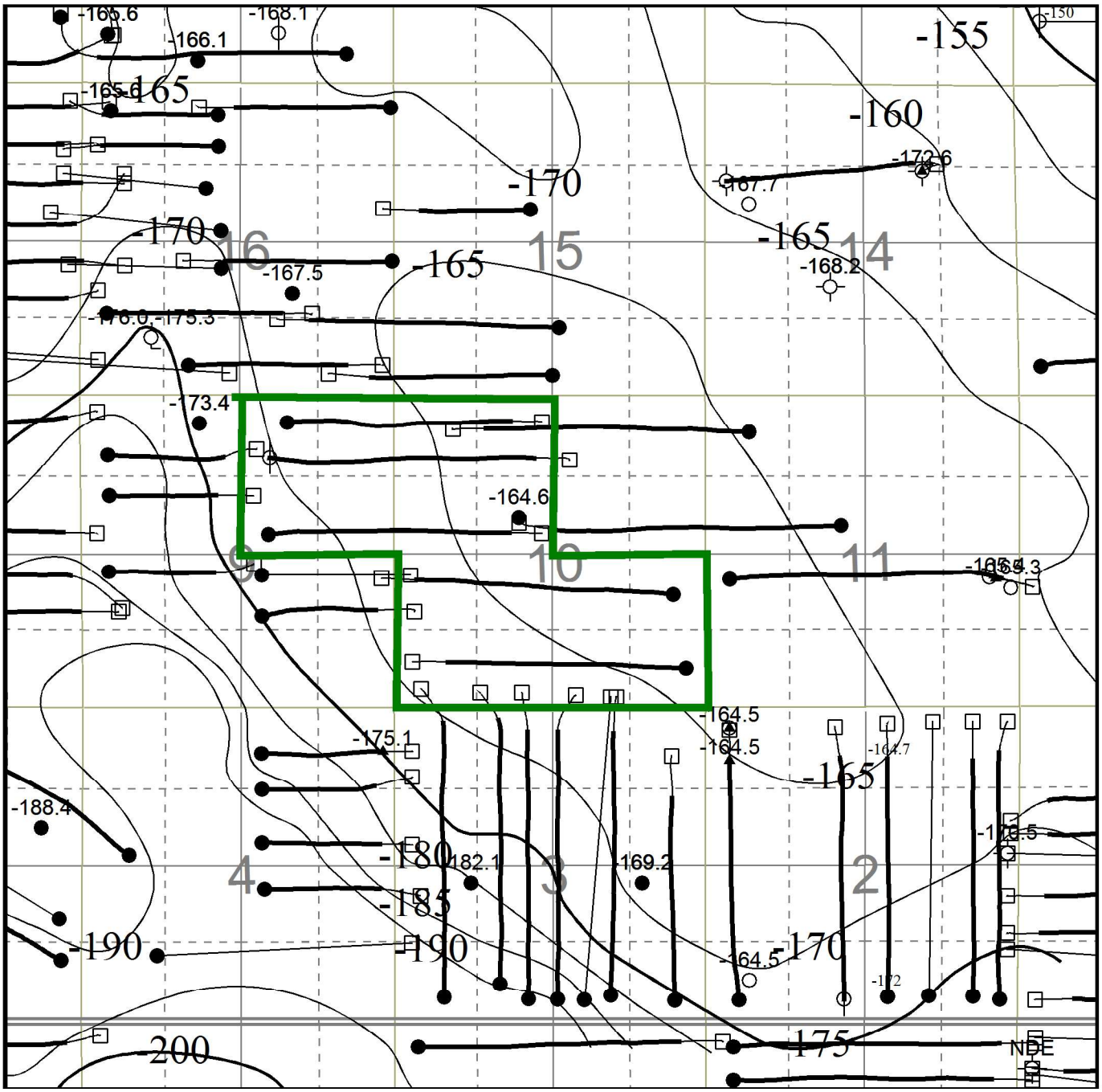




Apperdix No. 2

Tundra Oil and Gas Ltd		
Manson Unit 8 Application Cross Section A - A'		
Licensed to: Tundra Oil and Gas Ltd		
geoSCOUT	Date : 2016/05/09	By : J Tremblay
	Datum : MIDKKN_JT	Scale = 1:600
	Interval : From CRUCKSHANK_CRINOIDA to Dinobear	

R28W1



R28W1

Kilometres

0 0,5 1 1,5

0 0.5 1

Miles

Datum: NAD 27 Spheroid: Clarke 1866

Projection: 6 degrees TM (Transverse Mercator)

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East Manson Unit 8 Application

Appendix 3: Middle Bakken Subsea Structure 5 m contour interval

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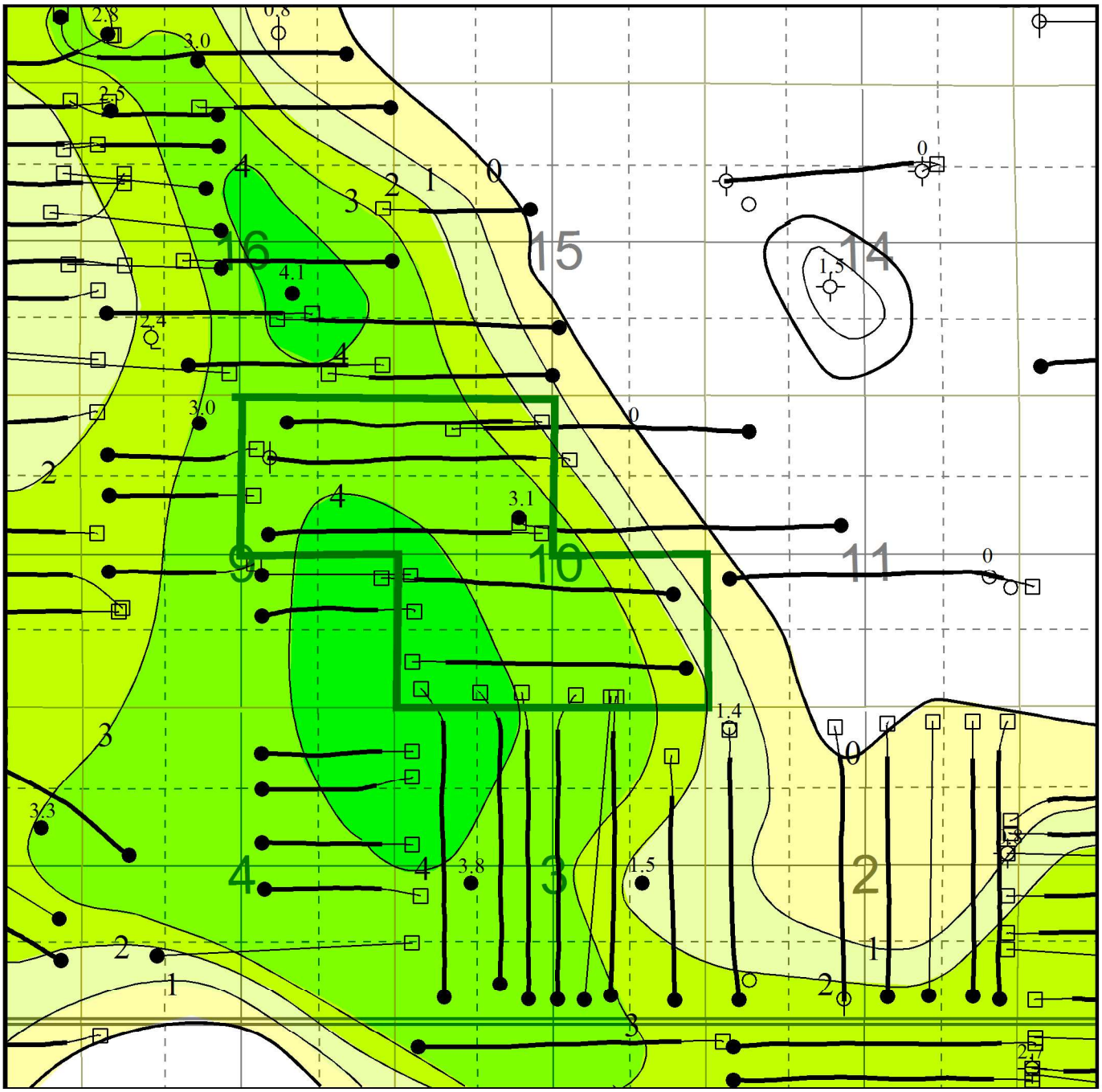
geoSCOUT www.geologic.com

By : J Tremblay	Date : 2016/05/19
Scale = 1:32000	Project : NW Exploration 2016

R28W1



R28W1

Kilometres

0 0.5 1 1.5

0 0.5 1

Miles

Datum: NAD 27 Spheroid: Clarke 1866

Projection: 6 degrees TM (Transverse Mercator)

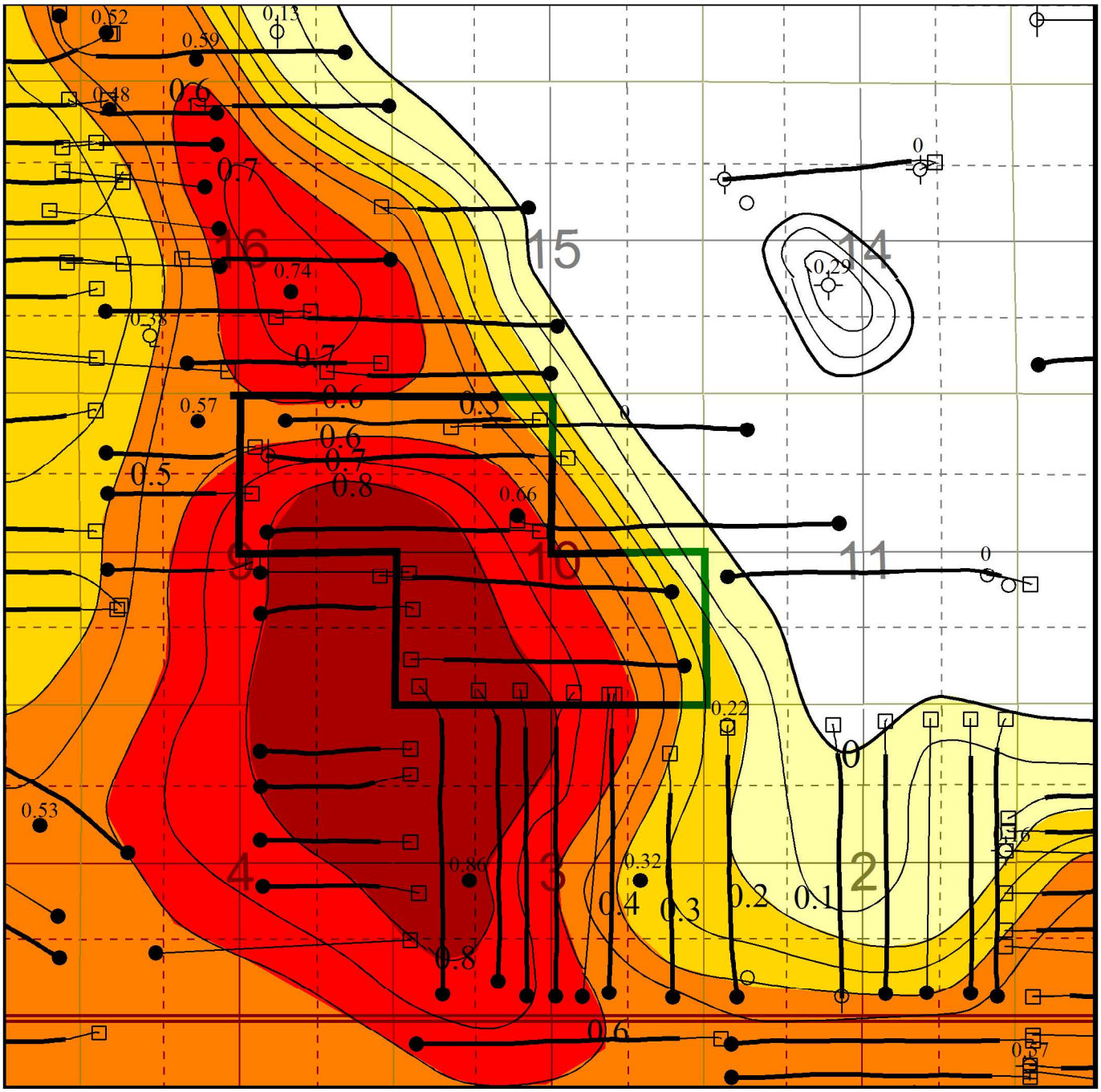
Tundra Oil and Gas Ltd

East Manson Unit 8 Application
Appendix 4: Middle Bakken Net Oil Pay
1 m contour interval

Licensed to : Tundra Oil and Gas Ltd

geoSCOUT www.geologic.com	By : J Tremblay		Date : 2016/05/19
	Scale = 1:32000		Project : NW Exploration 2016
	Por > 12%	Res > 3 ohm.m	Sw > 0.6

R28W1



T13 T13

T12 T12

R28W1

Kilometres

0 0.5 1 1.5

0 0.5 1

Miles

Datum: NAD 27 Spheroid: Clarke 1866

Projection: 6 degrees TM (Transverse Mercator)

Tundra Oil and Gas Ltd

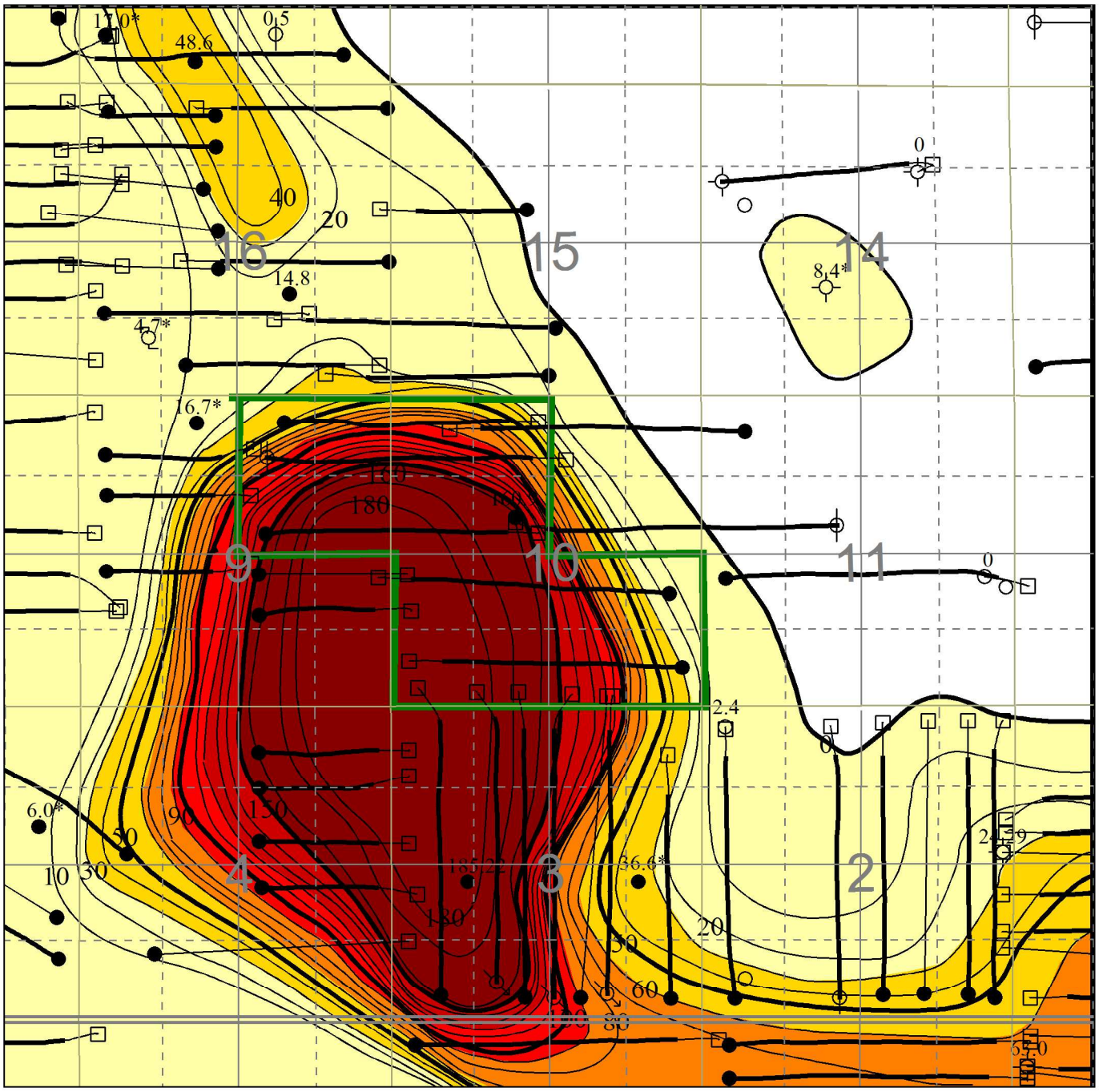
East Manson Unit 8 Application Appendix 5 Middle Bakken Phi.h 0.1 (unit).m contour interval

Licensed to : Tundra Oil and Gas Ltd

geoSCOUT www.geologic.com

By : J Tremblay	Date : 2016/05/19
Scale = 1:32000	Project : NW Exploration 2016

R28W1



R28W1

Kilometres

0 0.5 1 1.5

0 0.5 1

Miles

Datum: NAD 27 Spheroid: Clarke 1866

Projection: 6 degrees TM (Transverse Mercator)

Tundra Oil and Gas Ltd

East Manson Unit 8 Application

Appendix 6: Middle Bakken Kmax.h (mD.m)

10m contour interval; core data honored over pphys

Licensed to : Tundra Oil and Gas Ltd

geoSCOUT www.geologic.com

By : J Tremblay	Date : 2016/05/24
Scale = 1:32000	Project : NW Exploration Gigantic

Appendix 7

Manson Unit 8 - Initial Pressure Summary

Location	Test Date	Final Pressure (kPaa)
100/10-09-013-28W1/0	Dec 14, 2011 - Jan 8, 2012	4770.0
100/15-09-013-28W1/0	Dec 20, 2011 - Jan 12, 2012	4658.7
100/01-10-013-28W1/0	Feb 7 - Feb 15, 2012	5475.2
100/08-10-013-28W1/0	Feb 1 - Feb 10, 2012	4962.8