PROPOSED WASKADA UNIT NO. 24

Application for Enhanced Oil Recovery Waterflood Project

Lower Amaranth Formation

Lower Amaranth A (03 29A)

Waskada Field, Manitoba

September 10, 2019
Tundra Oil and Gas Limited

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INTRODUCTION

The Waskada Oil Field is located in Townships 1 and 2, Ranges 23-26 W1 (Figure 1). The Waskada Lower Amaranth Oil pool was discovered in June 1980 when Omega Hydrocarbons recompleted a former Mississippian producer in the stratigraphically higher Lower Member of the Amaranth Formation. Secondary recovery through waterflood has been initiated throughout much of the pool. Tundra Oil and Gas (Tundra) currently operates Waskada Lower Amaranth Units 1-8 and Units 13-23.

In the northern part of the Waskada field, potential exists for incremental production and reserves from a Waterflood EOR project in the Lower Amaranth oil reservoirs. The following represents an application by Tundra to establish Waskada Unit No. 24 (NW/4 Section 9-2-25W1, LSDs 9-12 Section 15-2-25W1, LSDs 1-10 Section 16-2-25W1 and LSDs 1-10 Section 17-2-25W1) and implement a Secondary Waterflood EOR scheme within the Lower Amaranth Formation as outlined on Figure 2.

The proposed project area falls within the existing designated 03-29A Lower Amaranth A Pool of the Waskada Oilfield (Figure 3).

SUMMARY

1. The proposed Waskada Unit No. 24 will include 10 horizontal wells and 19 vertical wells within 28 Legal Sub Divisions (LSD) of the Lower Amaranth producing reservoir. The project is located north of Waskada Unit No. 8, Waskada Unit No. 16 and Waskada Unit No. 17 (Figure 2).

2. Total Net Original Oil in Place (OOIP) in Waskada Unit No. 24 has been calculated to be **3,103.0** e^3m^3 (19,518 Mbbl) for an average of **110.8 net e^3m^3** (697.0 Mbbl) OOIP per 40 acre LSD based on a 0.5 md cutoff for the Green to Red Sands.

3. Cumulative allocated production to the end of May 2019 from the 29 wells within the proposed Waskada Unit No. 24 project area was **164.0** e^3m^3 (1,031 Mbbl) of oil, and **229.4** e^3m^3 (1,443 Mbbl) of water, representing a **5.3%** Recovery Factor (RF) of the Net OOIP.

4. The production from the proposed Waskada Unit No. 24 peaked in July 2012 at 67.5 m^3 (OPD) as shown in Figure 4. As of May 2019, production was 7.16 m^3 OPD, 50.1 m^3 of water per day (WPD) and an 87.5% watercut.

5. In July 2012, production averaged 4.8 m^3 OPD per well in Waskada Unit No. 24. As of May 2019, average per well production has declined to 0.89 m^3 OPD. Decline analysis of the group primary production data forecasts total oil to continue declining at an annual rate of approximately **20%** in the project area.

6. Estimated Ultimate Recovery (EUR) of Primary Proved Producing oil reserves in the proposed Waskada Unit No. 24 project area has been calculated to be **283.0** e^3m^3 (**1,779** Mbbl), with **119.0** e^3m^3 (**748** Mbbl) remaining as of the end of May 2019.

7. Ultimate oil recovery of the proposed Waskada Unit No. 24 OOIP, under the current Primary Production method, is forecasted to be **9.1%.**

8. Estimated Ultimate Recovery (EUR) of proved oil reserves under Secondary WF EOR for the proposed Waskada Unit No. 24 has been calculated to be **382.0** e^3m^3 (**2,402** Mbbl), with **218.0** e^3m^3 (**1,371** Mbbl) remaining. An incremental **99.0** e^3m^3 (623 Mbbl) of proved oil reserves, or **3.2%**, are forecasted to be recovered under the proposed Unitization and Secondary EOR production vs the existing Primary Production method.

9. Total RF under Secondary WF in the proposed Waskada Unit No. 24 is estimated to be **12.3%.**

10. Based on the waterflood response in the adjacent main portion of the Waskada field, the Lower Amaranth Formation in the proposed project area is believed to be a suitable reservoir for WF EOR operations.

11. Existing horizontal wells, with multi-stage hydraulic fractures will be converted to injection to provide waterflood support to existing horizontal/vertical producing wells (Figure 5) within the proposed Waskada Unit No. 24 to complete waterflood patterns.

GEOLOGY

Stratigraphy:

The Triassic aged Lower Amaranth formation is the oil producing reservoir that is the subject of this unit application. The stratigraphy of the reservoir section for the proposed unit is shown on the structural cross section attached as Appendix 1. The section runs W to E approximately through the mid-point of the proposed unit. The Lower Amaranth is bounded on top by the Amaranth Evaporite and by the Mississippian Unconformity at the base.

The producing sequence in descending order consists of the Lower Amaranth A Unit, Lower Amaranth Green Sand, Lower Amaranth Blue Sand, Lower Amaranth Purple Sand, Lower Amaranth Brown Sand, Lower Amaranth Red Sand, and the Lower Amaranth Lower Sand. The reservoir units are primarily represented by the Green, Blue, Purple, Brown, and Red Sands. The Upper portion of the Lower Amaranth A unit is considered tight, and represents the top seal for the reservoir.

Sedimentology:

The Lower Amaranth reservoir units (top of Green through to base of Red Sand) comprise interlaminated shale, siltstone, and fine-grained sandstone. The laminations tend to be range from > 1 cm up to 20 cm in thickness, often show signs of scouring at the base of each laminae, and tend to fine upwards. There are anhydrite beds capping each sub unit within the producing sequence; these anhydrite layers are generally correlatable over the entire Pierson / Waskada / Goodlands area. These anhydrite layers are the basis for the stratigraphic framework that is being used to describe the reservoir within the proposed unit.

The units within the producing sequence have very similar characteristics. Color tends to vary with grain size in that the finer grained material tends to be brick red, while the courser grained material generally tends to be grey to light brown. All of the sub-units have a varying component of anhydrite cement, which will appear as mm sized nodules in heavily cemented areas. Finally, well rounded, floating, course, frosted quartz grains are common throughout the entire productive interval.

Lower Amaranth reservoir is interpreted as having been deposited in an arid tidal flat (Sabkha) setting. The stratigraphic divisions (Green, Blue, Purple, Brown, Red, and Lower Sands) are interpreted as representing individual evaporitic cycles, each exhibiting relatively higher depositional energy at the base, grading into very low energy towards the top.

Since each cycle is bound by an erosive surface on the top and bottom, there can be lateral variability in sediment preservation within each cycle. Occasional preservation of high angled cross stratification suggests periods of very high energy during deposition which are interpreted as channel deposits, which help support a tidal flat setting depositional model.

The Upper portion of the Upper Amaranth A unit is made up of brick red shale that is generally not bedded and does not tend to exhibit any sedimentary structures. It is a low permeability zone that represents the top seal to the Lower Amaranth reservoir.

The Lower Sand portion of the Lower Amaranth (immediately beneath the Red Sand), has a lot of the same characteristics as the productive interval, but tends to have much less effective porosity due to abundant anhydrite cement.

Structure:

Structure contour maps are provided for the top and base of the reservoir interval (Appendices 2 and 3). The reservoir units dip to the southwest, which is consistent with regional dip. Structural mapping based on well control does not indicate the presence of large scale structural features that would indicate an increased risk of faulting within the proposed unit boundary.

Reservoir Continuity:

There are limited barriers to reservoir continuity that are apparent from the data available. Available data from well logs do not show any apparent lateral facies changes within the proposed unit that would result in significant lateral permeability barriers. An Isopach map of the reservoir interval (Appendix 4) shows that the reservoir thickness remains consistent at about 10.5 meters.

Also, as mentioned above, there are no indications of any structural features that could set up any lateral permeability barriers within the proposed unit. The lack of lateral permeability barriers suggests this pool is well suited for secondary oil recovery.

Reservoir Quality:

Net pay determination within the proposed unit was done by using a sonic porosity cut off. There are a number of steps that were undertaken in order to determine net pay from sonic log data:

- Core data from the entire Waskada / Goodlands area (Appendix 5) was used to determine a relationship between porosity and permeability. Based on a best fit line through the available core analysis it was determined that a core porosity of 10% represents 0.5 md of permeability (Appendix 6).
- Sonic porosity was calculated for wells in which digital sonic data was available (Appendix 7) using the following formula:

$$Sonic\ Porosity = \frac{Dt - Dtmatrix}{Dtwater - Dtmatrix}$$

Where

Dt = Sonic travel time (ms/m)

Dt_{matrix} = Sonic travel time of the rock matrix (198 ms/m)

Dt_{water} = Sonic travel time of the formation water (681 ms/m)

- In order to translate this relationship to well logs, a comparison between sonic porosity and core porosity was undertaken. A total of 52 wells were found in the Waskada / Goodlands area that had digital sonic curves along with core analysis over the Lower Amaranth reservoir interval (Appendix 8). Sonic Porosity from logs was compared to core porosity from core analysis (Appendix 9), and the data suggests that there is a good relationship between porosity from core and porosity from Sonic data.

From this relationship, a sonic log porosity cut of 10% was used as a pay determination for each logged well. In this way, the porosity / permeability relationship as determined from core can be translated into wells where there is log data available. In turn, this increases the control points for OOIP determination, which increases the resolution of OOIP mapping.

OOIP Estimates

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 1.17 and 40% respectively. The initial oil formation volume factor was derived from a PVT taken from the 8-26-1-26W1, which is representative of the fluid characteristics in the reservoir. Sw determination was set at 40% which is consistent with historic unit applications in the Waskada / Goodlands area.

Average sonic porosity for the proposed Unit area has been included as Appendix 10.

Phi * h maps were created from sonic porosity log data (Appendix 11). 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 Lower Amaranth within the proposed unit has been calculated to be **3,103 e^3m^3** (19,518 Mbbls).

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

Historical Production

A historical group production history plot for the proposed Waskada Unit No. 24 is shown as Figure 4. Oil production commenced from the proposed Unit area in November 1982 and peaked in July 2012 at 67.5 m^3 (OPD) as shown in Figure 4. As of May 2019, production was 7.16 m^3 OPD, 50.1 m^3 of water per day (WPD) and an 87.5% watercut.

From peak production in July 2012 to date, oil production is declining at an annual rate of approximately **20%** under the current Primary Production method.

The remainder of the field's production and decline rates indicate the need for pressure restoration and maintenance. Waterflooding is deemed to be the most efficient means of secondary recovery to introduce energy back into the system and provide a real sweep between wells.

UNITIZATION

Unitization and implementation of a Waterflood EOR project is forecasted to increase overall recovery of OOIP from the proposed project area.

Unit Name

Tundra proposes that the official name of the new Unit shall be Waskada Unit No. 24.

Unit Operator

Tundra Oil and Gas Limited (Tundra) will be the Operator of record for Waskada Unit No. 24.

Unitized Zone

The Unitized zone to be waterflooded in Waskada Unit No. 24 will be the Lower Amaranth formation.

Unit Wells

The 10 horizontal wells and 19 vertical wells to be included in the proposed Waskada Unit No. 24 are outlined in Table 3.

Unit Lands

The Waskada Unit No. 24 will consist of 28 LSDs as follows:

(NW/4 Section 9 of Township 2, Range 25, W1M
LSDs 9-12 Section 15 of Township 2, Range 25, W1M
LSDs 1-10 Section 16 of Township 2, Range 25, W1M
LSDs 1-10 Section 17 of Township 2, Range 25, W1M

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

Tract Factors

The proposed Waskada Unit No. 24 will consist of 28 Tracts based on the 40 acre LSDs containing the existing 10 horizontal and 19 vertical wells.

The Tract Factor contribution for each of the LSD's within the proposed Waskada Unit No. 24 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)

- Last twelve (12) months production to date for the LSD as distributed by the LSD specific PA % in the applicable producing horizontal or vertical well.

- Tract Factor by LSD = Fifty percent (50%) of the product of Remaining Gross OOIP by LSD as a % of total proposed Unit Remaining Gross OOIP, and fifty percent (50%) of the product of the Last 12 Months Production as a % of total proposed Unit Last 12 Months Production.

Tract Factor calculations for all individual LSDs based on the above methodology are outlined within Table 2. In the past, multiple methods of assigning tract participation factors have been used in the Waskada area. Tundra believes that the above given method provides the most equitable assignment of tract participation factors to all mineral owners, given the geological, reservoir and well completion risks associated with waterflooding horizontal to horizontal wellbores in Lower Amaranth formation.

Working Interest Owners

Table 1 outlines the working interest (WI) for each recommended Tract within the proposed Waskada Unit No. 24. Tundra Oil and Gas Limited holds a 100% WI ownership in all the proposed Tracts.

Tundra Oil and Gas Limited will have a 100% WI in the proposed Waskada Unit No. 24.

WATERFLOOD EOR DEVELOPMENT

Technical Studies

The waterflood performance predictions for the proposed Waskada Unit No. 24 Lower Amaranth project are based on internal engineering assessments, as well as empirically observed waterflood performance in nearby Waskada Units 16 and 17, which employed a vertical to vertical waterflood. They are further rooted in the early results from nearby Waskada Unit 19, a horizontal to horizontal waterflood in the Lower Amaranth, which Tundra has operated for the last 3 years. Utilizing project area specific reservoir and geological parameters, a Black oil simulation model using Exodus software was created by Tundra to evaluate the potential waterflood response using horizontal injectors to flood horizontal producers, which is the configuration that Tundra proposes in Waskada Unit No. 24. While the model was created using geological and historical production data from Waskada Unit 19, in Section 34-1-25W1, the results observed in the model were similar to those observed empirically in Waskada Units 16 and 17, and deemed representative of what Tundra would expect in Waskada Unit No. 24.

Horizontal Injection Wells and EOR Development

Primary production from the original vertical/horizontal producing wells in the proposed Waskada Unit No. 24 has declined significantly from peak rate indicating a need for secondary pressure support. Through the process of developing similar waterfloods, Tundra has measured a significant variation in reservoir pressure depletion by the existing primary producing wells. Placing new horizontal wells immediately on water injection in areas without significant reservoir pressure depletion has been problematic in similar low permeability formations, and has a negative impact on the ultimate total recovery of oil.

Tundra's plan includes drilling up to 12 new wells to fully complete development in the area and then converting 10 horizontal oil producing wells to Water Injection Wells (WIW), as shown in Figure 5. The conversions would include a mix of newly drilled and historic producing oil wells. This development plan allows for approximately 30 acre spacing between offset injection wells. Alternative injection configurations may be considered depending on results from offset waterflood areas in the Lower Amaranth formation, within the Waskada field. These changes could result in the conversion of more or less wells to injection than what is shown in Figure 5. New horizontal wells will be drilled if they are deemed to be essential to improving recovery in the unit. Some of the new drills may be horizontal injection wells.

If new injection wells are drilled in this area, Tundra believes an initial period of producing all new horizontal wells prior to placing them on permanent water injection is essential and all Unit mineral owners will benefit.

Tundra will continue to monitor reservoir pressure, fluid production and decline rates in each pattern to determine when the well will be converted to water injection.

Reserves Recovery Profiles and Production Forecasts

The primary waterflood performance predictions for the proposed Waskada Unit No. 24 are based on oil production decline curve analysis. The secondary predictions are based primarily on internal engineering analysis performed by the Tundra reservoir engineering group, utilizing an Exodus simulation model generated in Waskada Unit No. 19 (described previously), and simulating horizontal injectors offsetting horizontal producers for waterflood development. These results were then compared and contrasted to empirically observed data in Waskada Unit No. 16 and No. 17 to ensure proper calibration of data and results.

Primary Production Forecast

Cumulative allocated production in the Waskada Unit No. 24 project area, to the end of May 2019 from 29 wells was **164.0** e^3m^3 (1,031 Mbbl) of oil, and **229.4** e^3m^3 (1,443 Mbbl) of water, representing a **5.3%** Recovery Factor (RF) of the Net OOIP.

Ultimate Primary Proved Producing oil reserves recovery for Waskada Unit No. 24 has been estimated to be **283.0** e^3m^3, or a **9.1**% Recovery Factor (RF) of OOIP. Remaining Producing Primary Reserves has been estimated to be **119.0** e^3m^3 to the end of May 2019.

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

Upon completion of primary drilling, Tundra proposes to implement an initial phase which consists of 4-6 horizontal conversions throughout 2021-2022 to test the efficiency of the Waskada Unit No. 24 Waterflood. Tundra will continue to convert existing wells and drill new wells as needed in the following years. Observed waterflood response will affect the timing and pattern of future conversions and new wells drilled.

Criteria for Conversion to Water Injection Well

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.

- Measure reservoir pressures 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 Waskada Unit No. 24 project to be developed equitably, efficiently, and moves to 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 reserves.

Secondary EOR Production Forecast

The proposed project oil production profile under Secondary Waterflood has been developed based on the response observed to date in Waskada Unit 16, 17 and 19, as well as internal Black Oil Simulation model of Section 34-1-25W1 in Waskada 19, which simulates a horizontal to horizontal waterflood. (Figure 6).

Secondary Waterflood plots of the expected oil production forecast over time and the expected oil production vs. cumulative oil are plotted in Figure 9, respectively. Total Secondary EUR for the proposed Waskada Unit No. 24 is estimated to be **382.0** e^3m^3 with **218.0** e^3m^3 remaining representing a total secondary recovery factor of **12.3%** for the proposed Unit area. An incremental **99.0** e^3m^3 of oil, or a **3.2%** recovery factor, are forecasted to be recovered under the proposed Unitization and Secondary EOR production scheme vs. the existing Primary Production method.

Estimated Fracture Pressure

Completion data from the existing producing wells within the project area indicate an actual fracture pressure gradient range of 17.0 to 18.0 kPa/m true vertical depth (TVD).

WATERFLOOD OPERATING STRATEGY

Water Source

The injection water for the proposed Waskada Unit No. 24 will be supplied from the injection plant and associated water source well at 15-21-1-25W1. At the 15-21-1-25W1 injection facility, Swan River source water from 103/02-28-001-25W1/02 is delivered to the 15-21 battery, where it is filtered and pumped up to injection system pressure. A diagram of the injection system at 15-21-1-25W1 is shown in Figure 10.

Based on past experience, Tundra does not believe that the produced water can be cleaned to the required specifications feasibly. Therefore, Tundra plans to use source water from a Swan River well as a source supply for Waskada Unit No. 24.

A mixture of produced waters from the Lower Amaranth has been extensively tested for compatibility with 100/05-09-002-25W1 source Swan River water, by a highly qualified third party, prior to implementation by Tundra. The water from 100/05-09 is sourced from the same formation as the 103/02-28 well described above. All potential mixture ratios between the two waters, under a range of temperatures, have been simulated and evaluated for scaling and precipitate producing tendencies. Testing of multiple scale inhibitors has also been conducted and minimum inhibition concentration requirements for the source water volume determined. At present, continuous scale inhibitor application is maintained into the source water stream out of the Waskada injection water facility. Review and monitoring of the source water scale inhibition system is also part of an existing routine maintenance program.

Injection Wells

New water injection wells for the proposed Waskada Unit No. 24 will be cleaned out and configured downhole for injection as shown in Figure 11. The horizontal injection well will be stimulated by multiple hydraulic fracture treatments to obtain suitable injection. Tundra has extensive experience with horizontal fracturing in the area, and all jobs are rigorously programmed and monitored during execution. This helps ensure optimum placement of each fracture stage to prevent, or minimize, the potential for out-of-zone fracture growth and thereby limit the potential for future out-of-zone injection.

The new water injection wells will be placed on injection after the pre-production period and approval to inject. Wellhead injection pressures will be maintained below the least value of either:

- the area specific known and calculated fracture gradient, or
- the licensed surface injection Maximum Allowable 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 are surface equipped with injection volume metering and rate/pressure control. 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 Waskada Unit No. 24 horizontal water injection well rate is forecasted to average 10 - 30 m^3 WPD, based on expected reservoir permeability and pressure.

Reservoir Pressure

No representative initial pressure surveys are available for the proposed Waskada Unit No. 24 project area in the Lower Amaranth producing zone. The extremely long shut-in and build-up times required to obtain a possible representative reservoir pressures were economically prohibitive at the time of drilling these locations.

Reservoir Pressure Management during Waterflood

Tundra expects it will take 2-4 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 1.25 to 2.00 within the patterns during the fill up period. As the cumulative VRR approaches 1, target reservoir operating pressure for waterflood operations will be 75-90% of original reservoir pressure.

Waterflood Surveillance and Optimization

Waskada Unit No. 24 EOR response and waterflood surveillance will consist of the following:

- Regular production well rate and WCT 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 Waskada Unit No. 24 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 Waskada Unit No. 24.

On Going Reservoir Pressure Surveys

Any pressures taken during the operation of the proposed unit will be reported within the Annual Progress Reports for Waskada Unit No. 24 as per Section 73 of the Drilling and Production Regulation.

Economic Limits

Under the current Primary recovery method, existing wells within the proposed Waskada Unit No. 24 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 cut off 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 Waskada Unit No. 24 waterflood operation will utilize the existing Tundra operated source well supply and water plant (WP) facilities located at 15-9-2-25 W1M Battery. 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 12.

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 Waskada Unit No. 24. 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 Waskada Unit No. 24 Application.

Waskada Unit No. 24 Unitization, and execution of the formal Waskada Unit No. 24 Agreement by affected Mineral Owners, is expected during Q2 2019. Copies of same will be forwarded to the Petroleum Branch, when available, to complete the Waskada Unit No. 24 Application.

Should the Petroleum Branch have further questions or require more information, please contact Paul [redacted] at 403.910.1660 or by email at paul.khangura@tundraoilandgas.com.

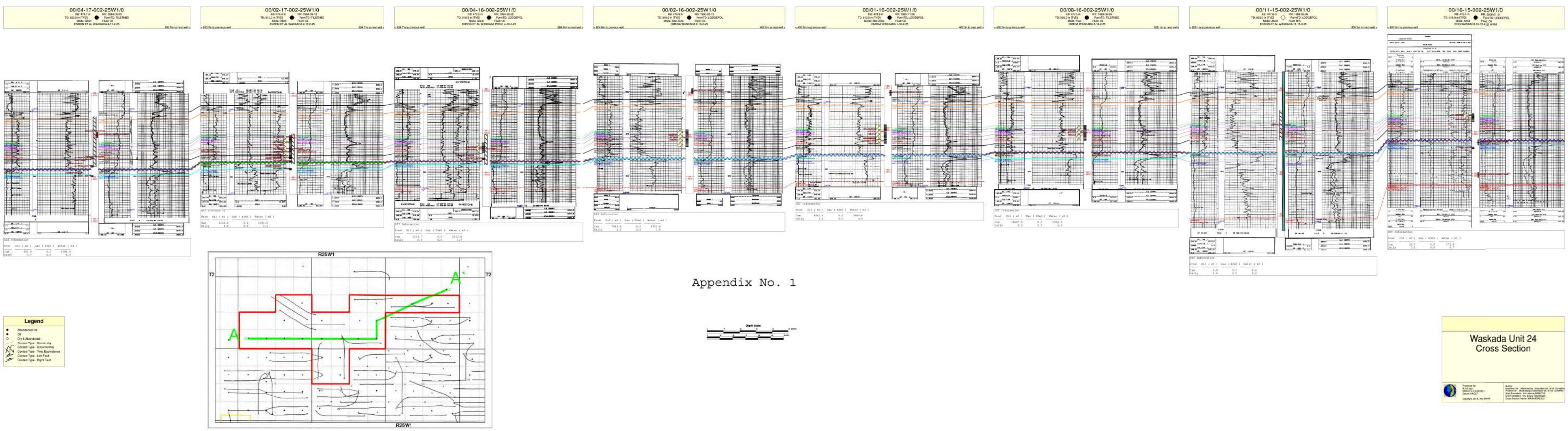
TUNDRA OIL & GAS LIMITED
Original Signed by Paul [redacted], September 10, 2019, in Calgary, AB

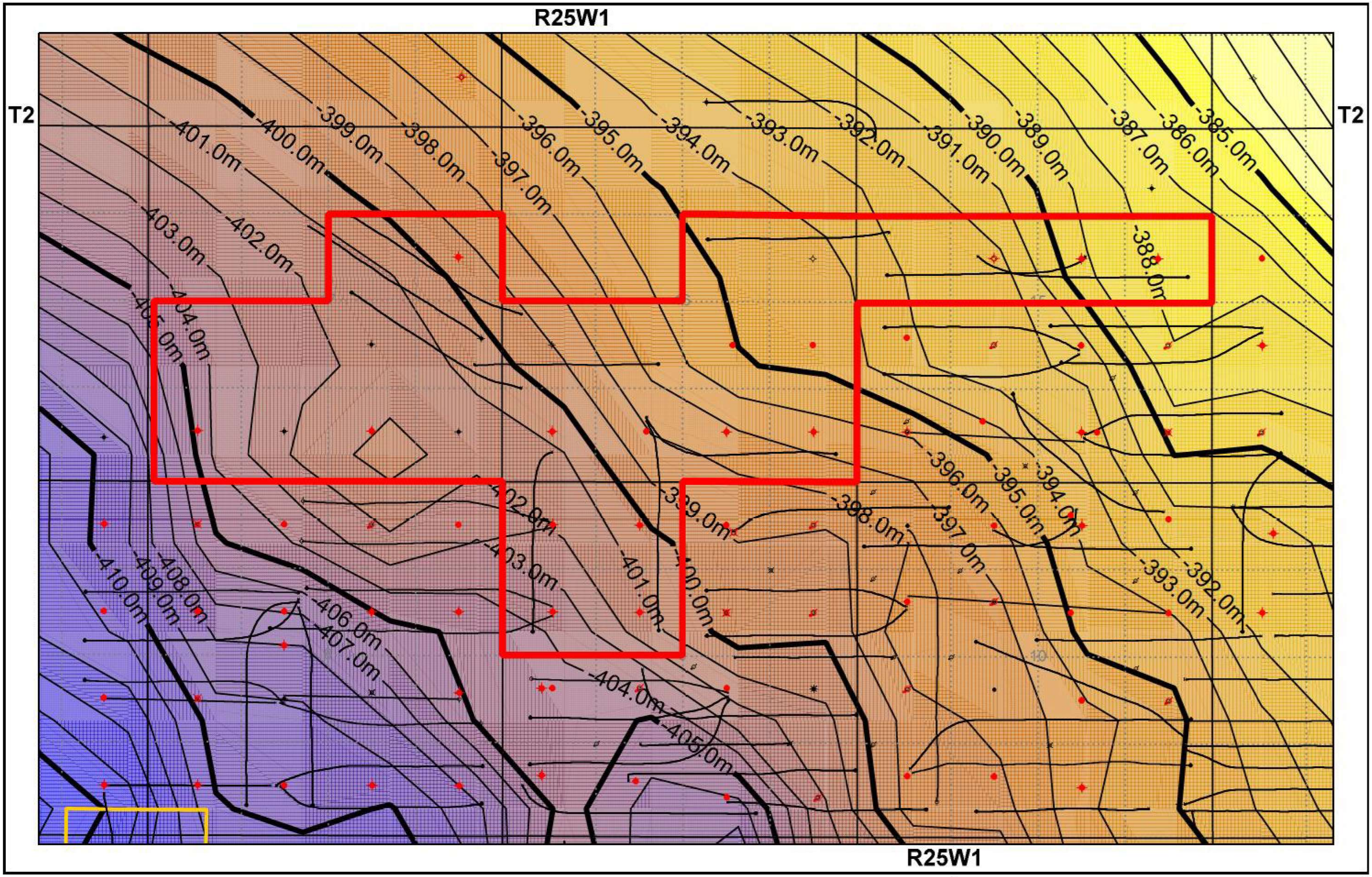
Proposed Waskada Unit No. 24

Application for Enhanced Oil Recovery Waterflood Project

List of Appendices

Appendix No. 1

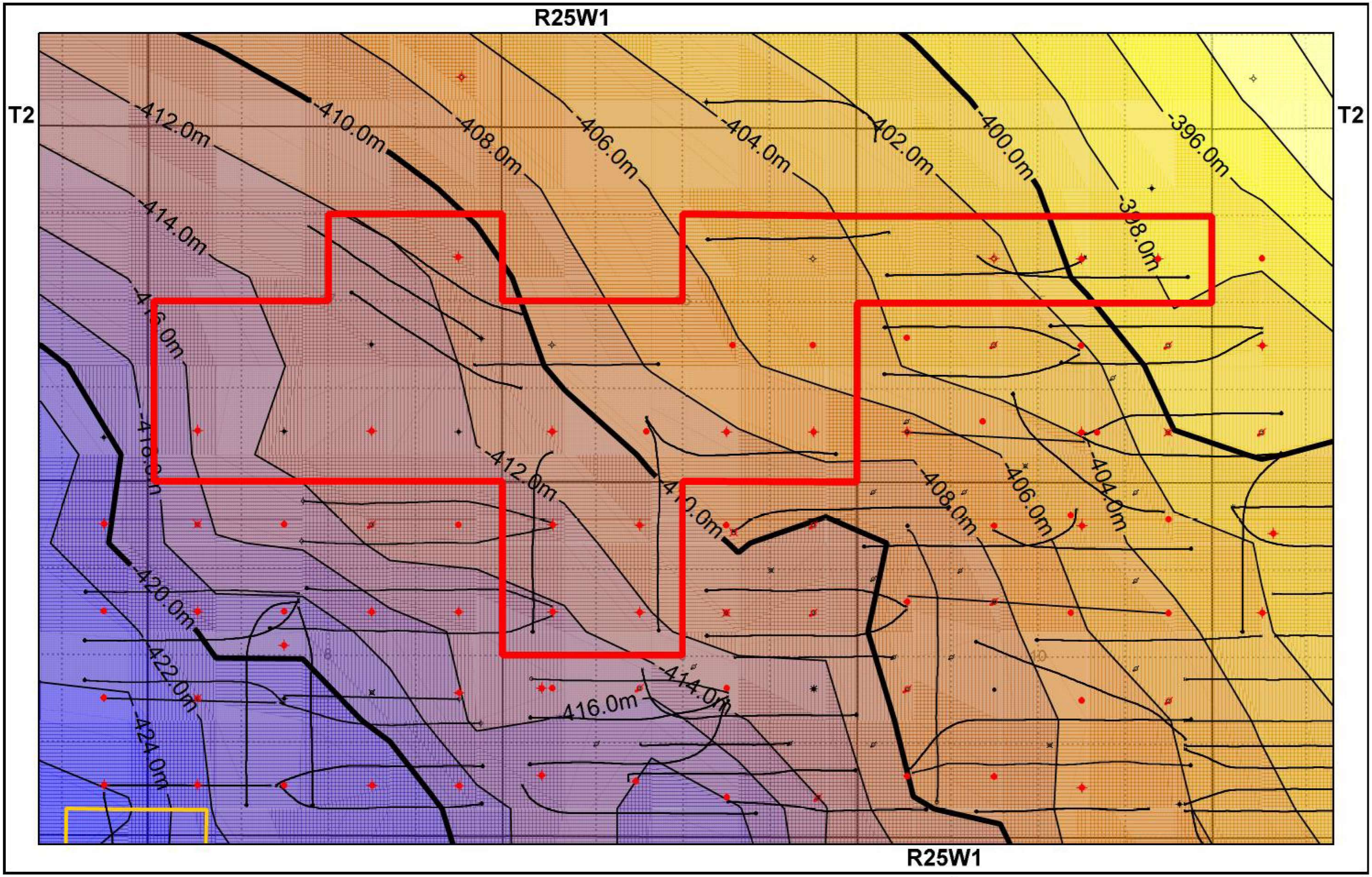




Waskada Unit 24 Application

Appendix No. 2

Waskada Unit 24 Application
Green Sand Structure (Top of Reservoir)
December 05, 2018



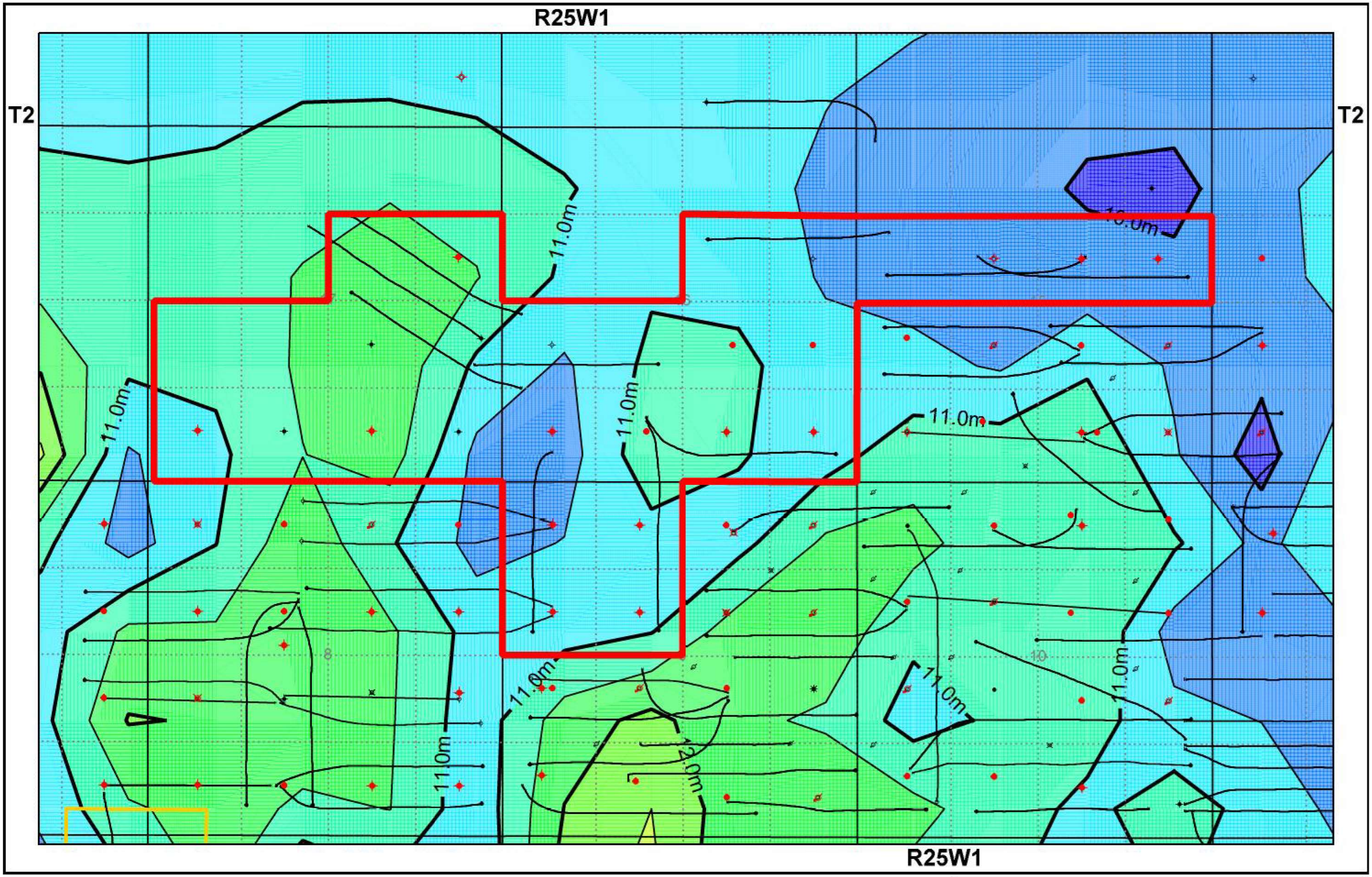
Waskada Unit 24 Application

Appendix No. 3

Waskada Unit 24 Application

Lower Sand Structure
(Base of Reservoir)

December 05, 2018



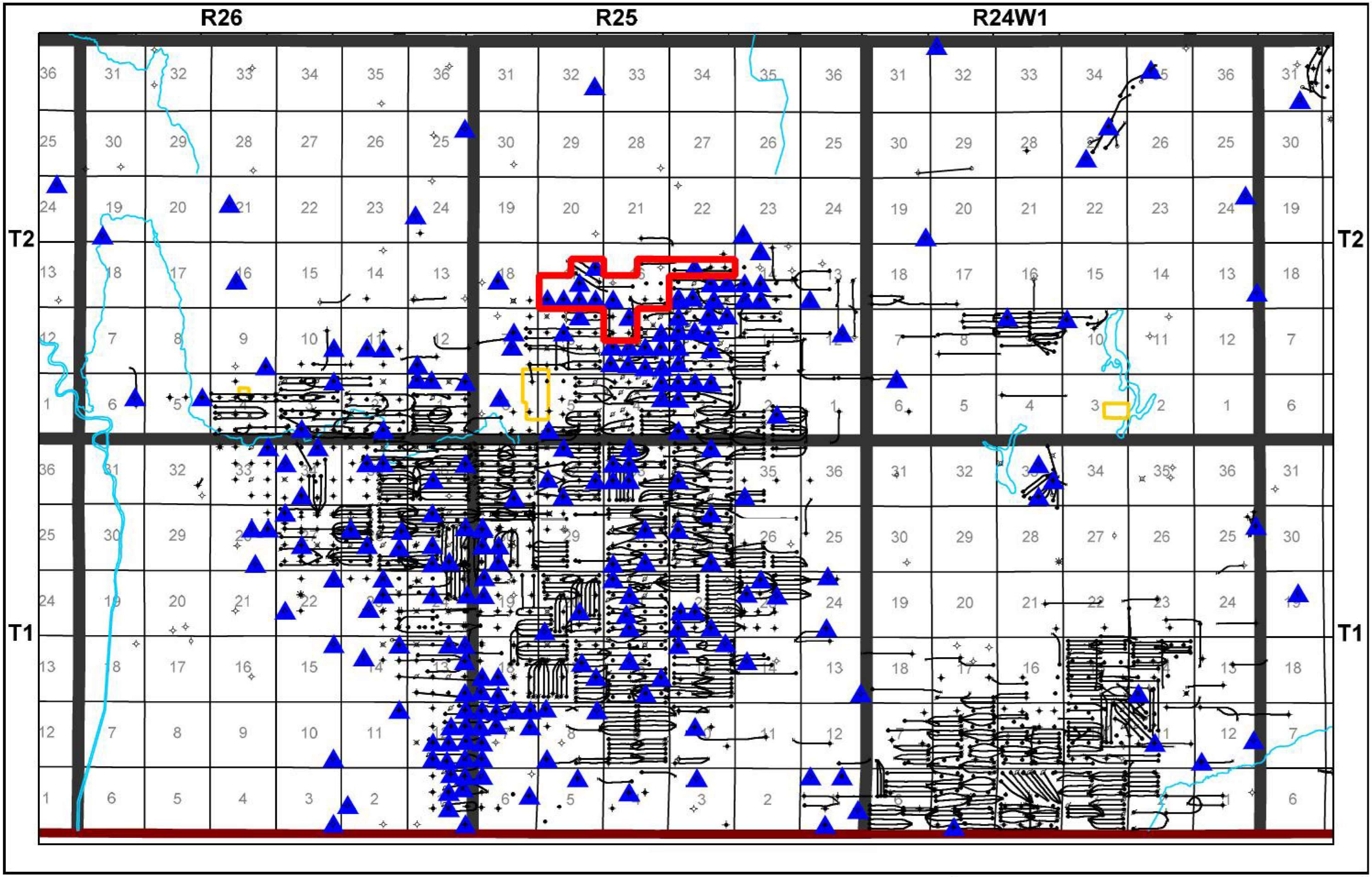
Waskada Unit 24 Application

Appendix No. 4

Waskada Unit 24 Application

Reservoir Isopach
(Green to Lower Sand)

December 05, 2018



Waskada Unit 24 Application

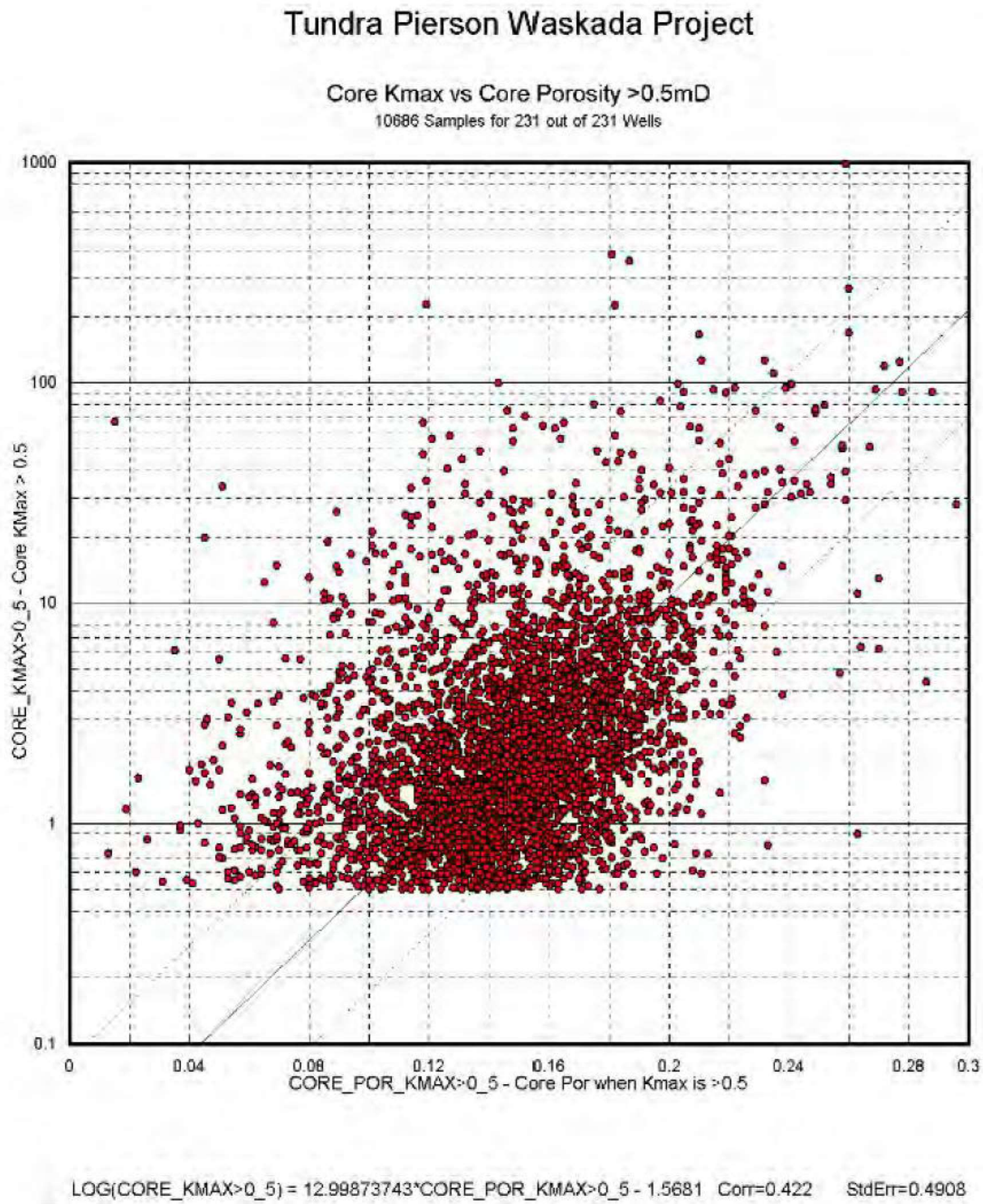
Appendix No. 5

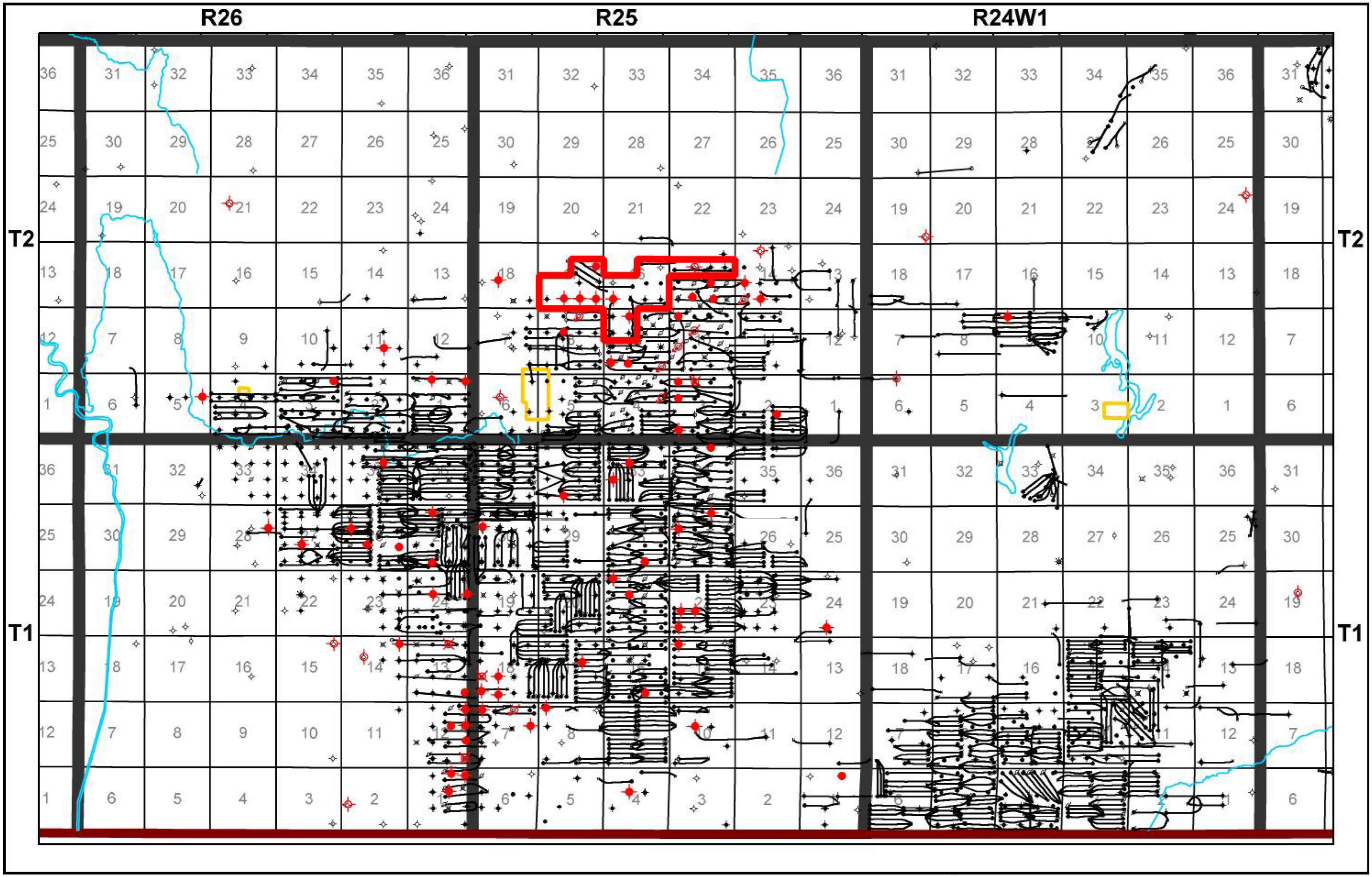
Waskada Unit 24 Application

Wells with Core Analysis

December 05, 2018

Appendix No. 6





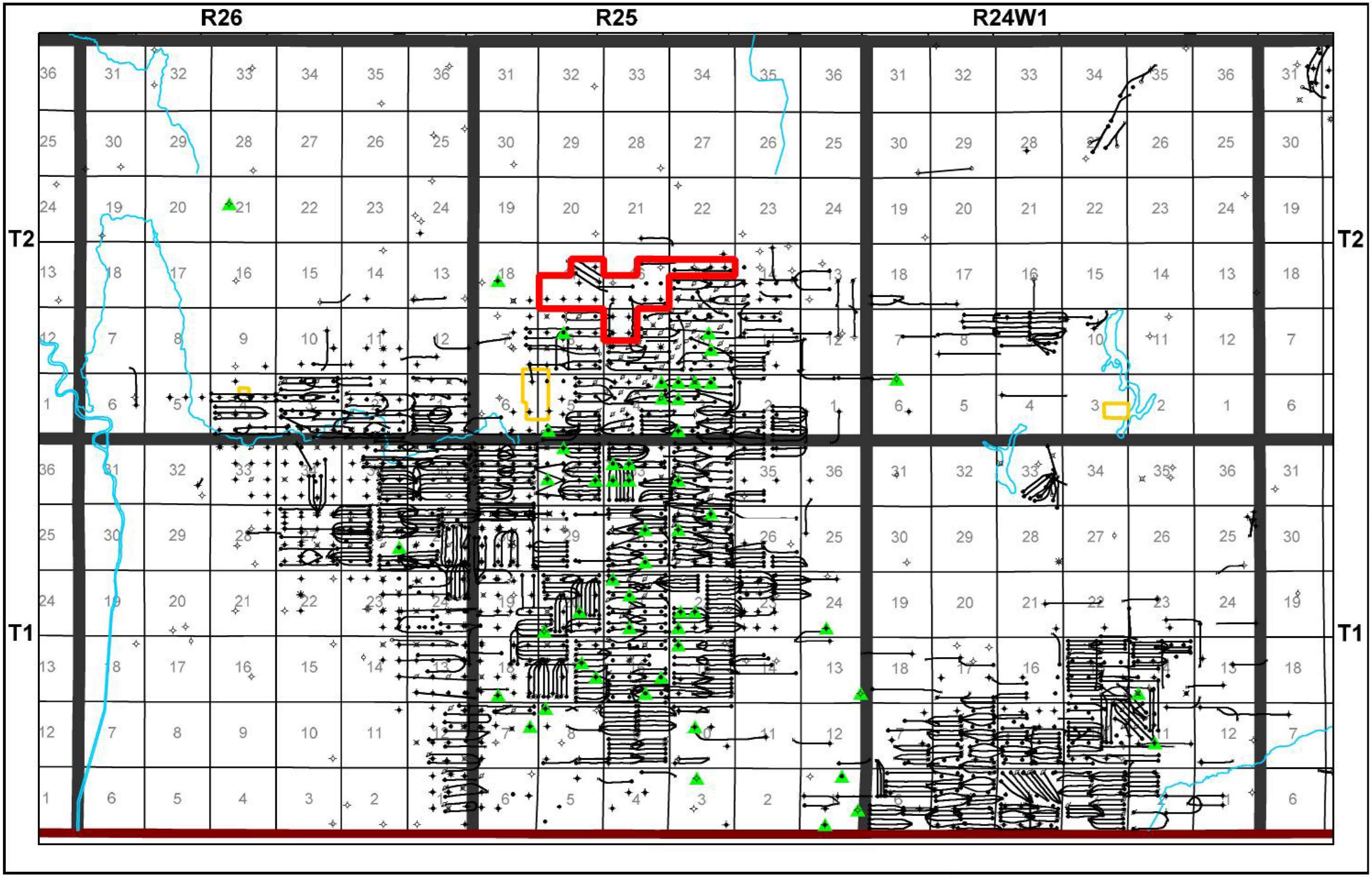
Waskada Unit 24 Application

Appendix No. 7

Waskada Unit 24 Application

Wells with Digital Sonic Logs

December 05, 2018



Waskada Unit 24 Application

Appendix No. 8

Waskada Unit 24 Application

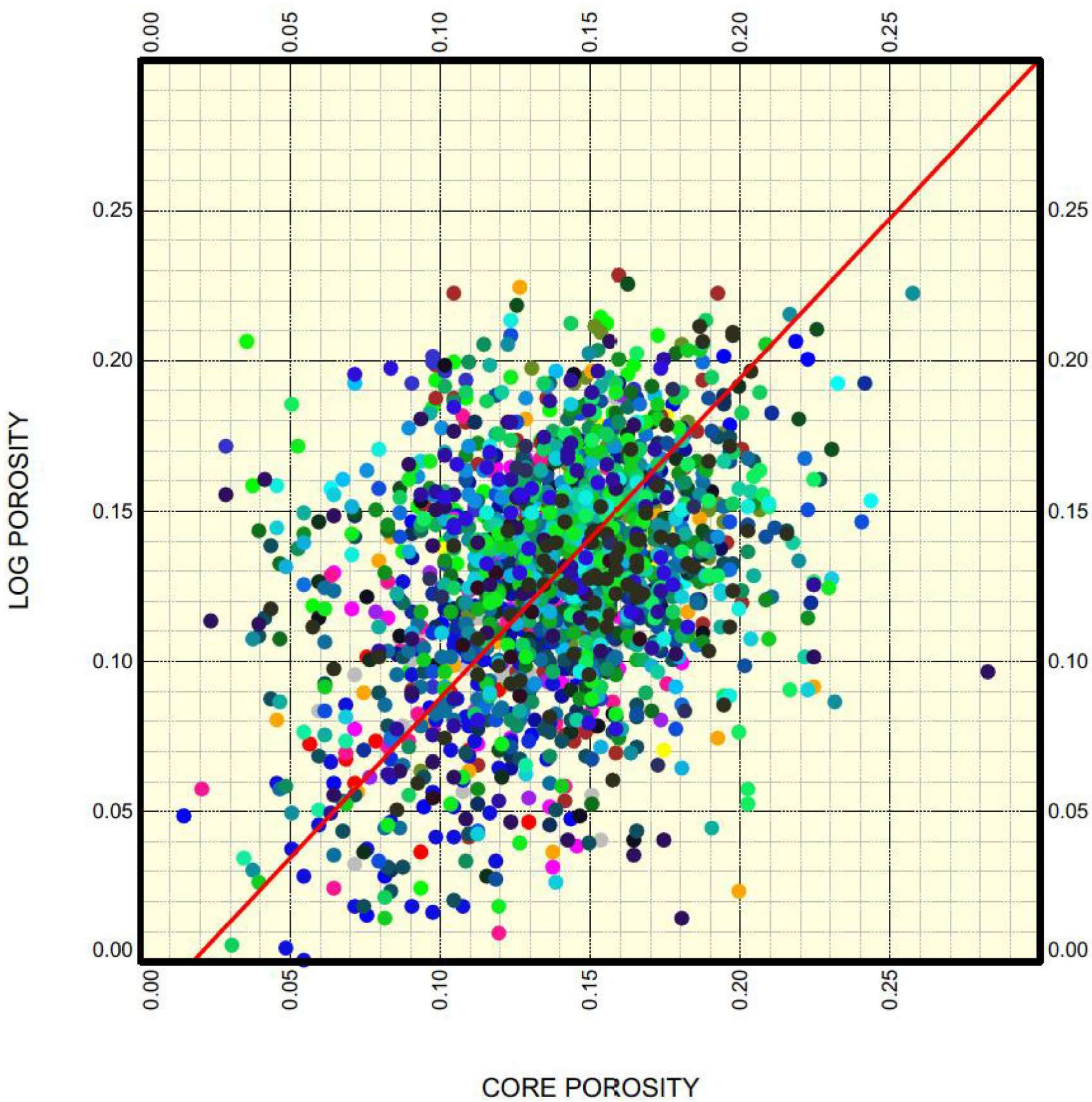
Wells with Digital Sonic Logs and Core Analysis

December 05, 2018

Log Porosity vs Core Porosity Crossplot

Well: 52 Wells

Appendix No. 9



Wells:

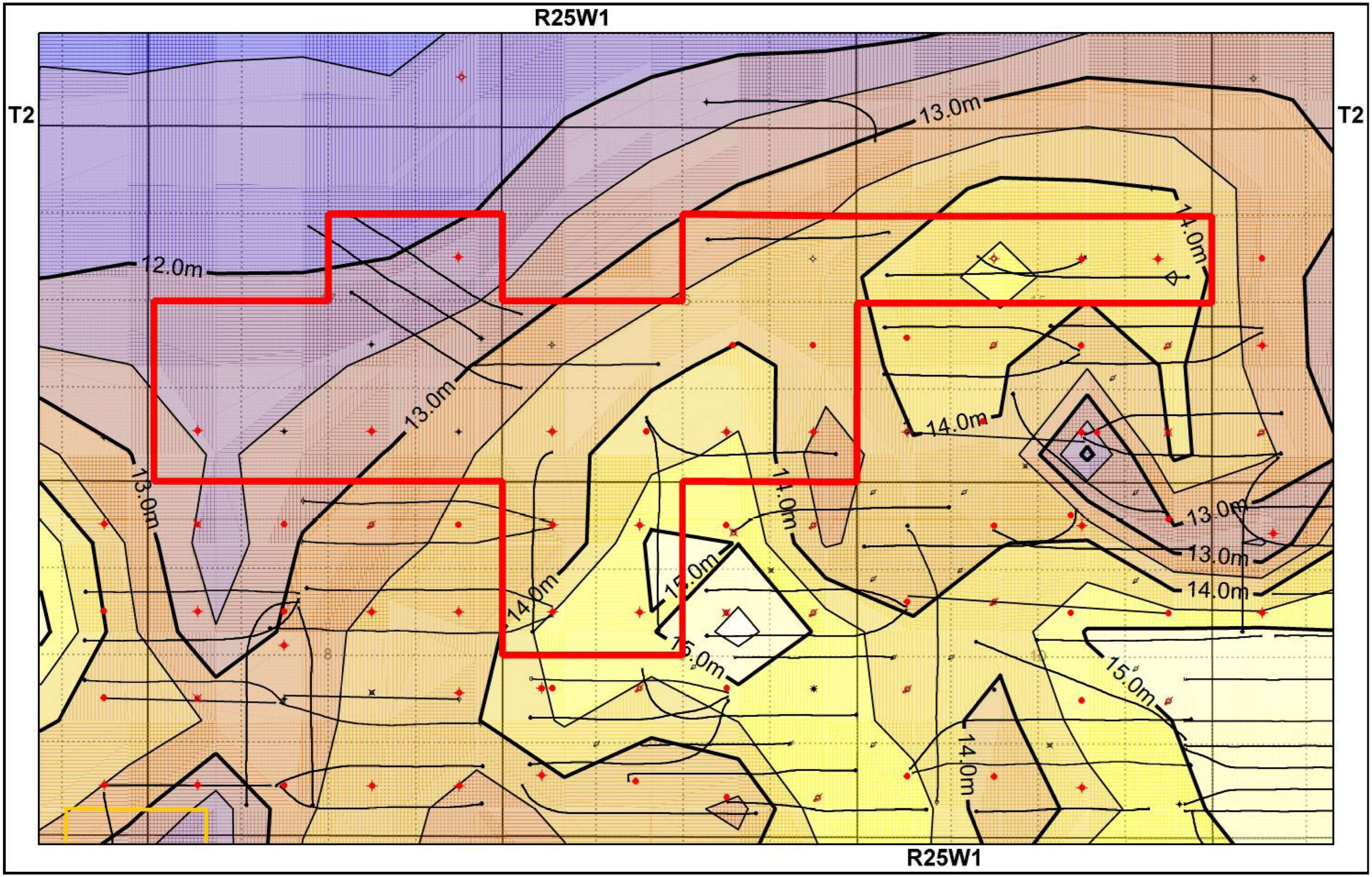
100011300125W100	100021600125W100	100022800125W100	100030100125W100	100031800125W100
100032100125W100	100032400125W100	100040300225W100	100040500225W100	100041400124W100
100042000125W100	100042200125W100	100052200125W100	100053200125W100	100053300125W100
100053400125W100	100061100124W100	100061800225W100	100062200125W100	100063300125W100
100071000225W100	100072000125W100	100080100125W100	100081600125W100	100081700125W100
100082600126W100	100083200125W100	100090400225W100	100090700125W100	100101000225W100
100101700125W100	100102800125W100	100110800225W100	100111000125W100	100112100125W100
100112100226W100	100113300125W100	100120300225W100	100122700125W100	100123300125W100
100130300225W100	100130800125W100	100131500125W100	100132100125W100	100140300125W100
100140300225W100	100140600224W100	100143200125W100	100150100125W100	100150300225W100
100152700125W100	100160400225W100			

Intervals: U-GREEN_SAND U-BLUE_SAND U-PURPLE_SAND U-BROWN_SAND U-RED_SAND U-LWR_SAND

Functions:

test: Regression Logs: CORE.POROSITY, PHIE, CC: 0.329356

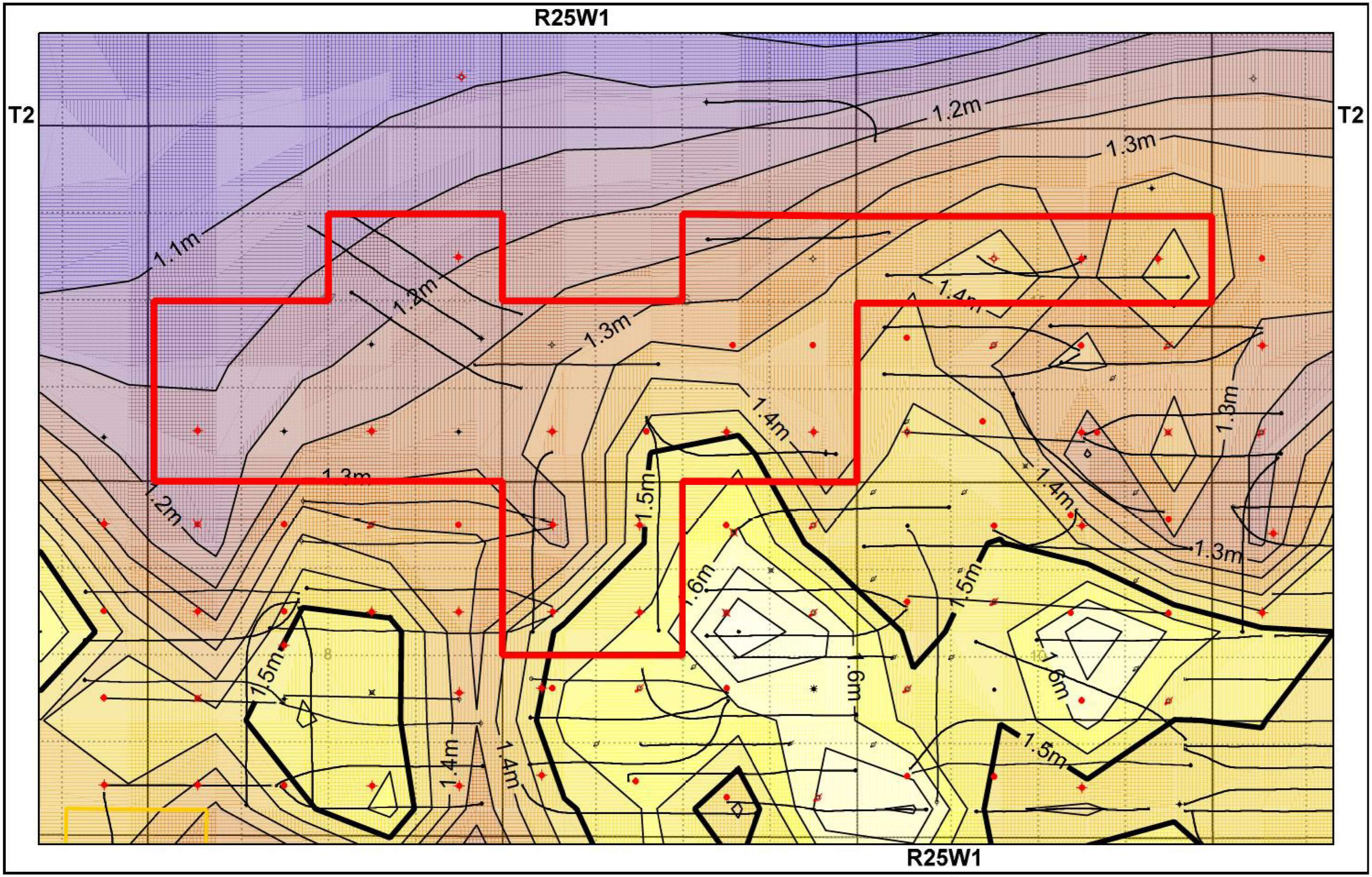
PHIE = (-0.0186548 + 1.06436*(POROSITY))



Waskada Unit 24 Application

Appendix No. 10

Waskada Unit 24 Application
Mean Reservoir Porosity From Sonic Logs
December 05, 2018



Waskada Unit 24 Application

Appendix No. 11

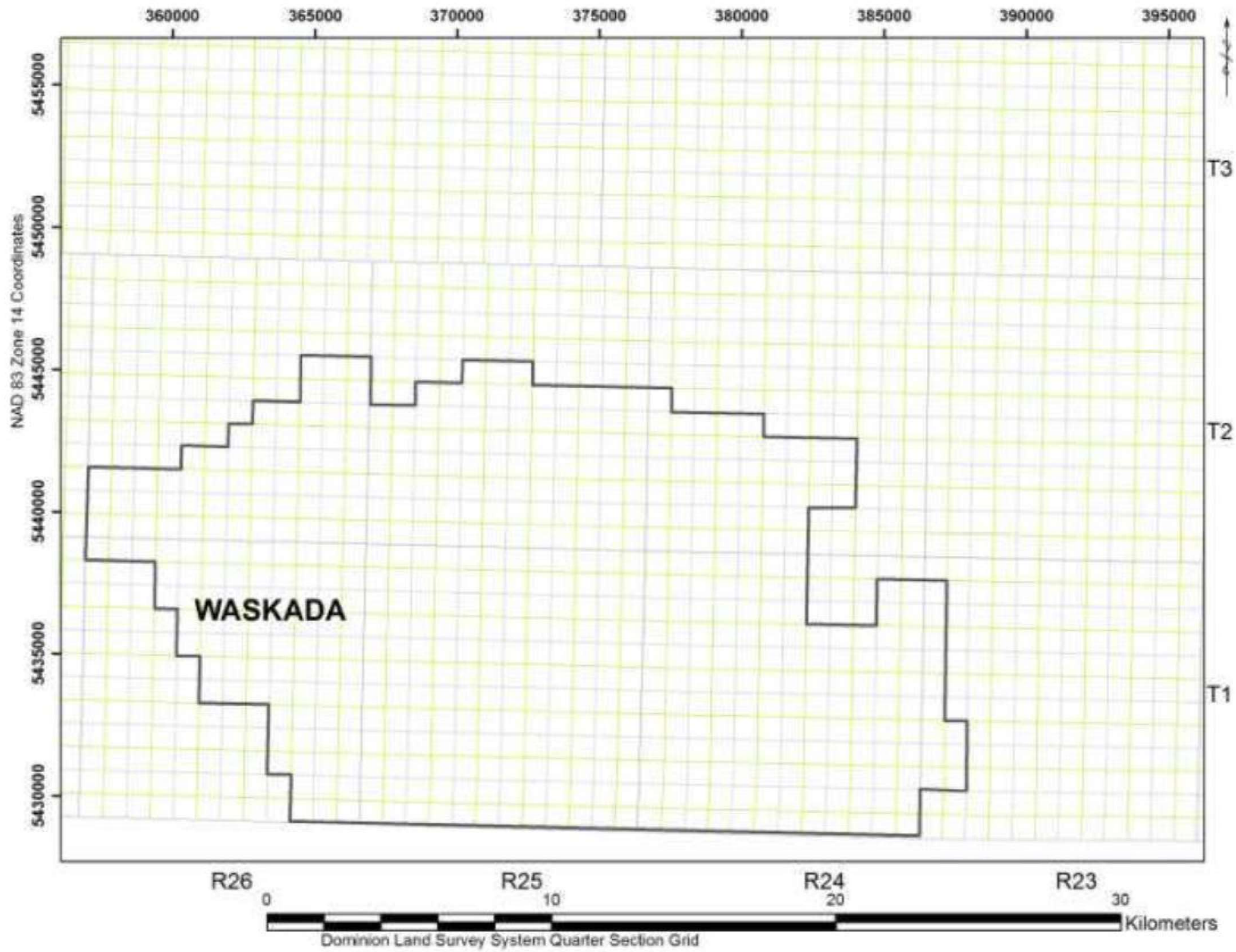
Waskada Unit 24 Application
Phi*h at 10% cut off
December 05, 2018

Proposed Waskada Unit No. 24

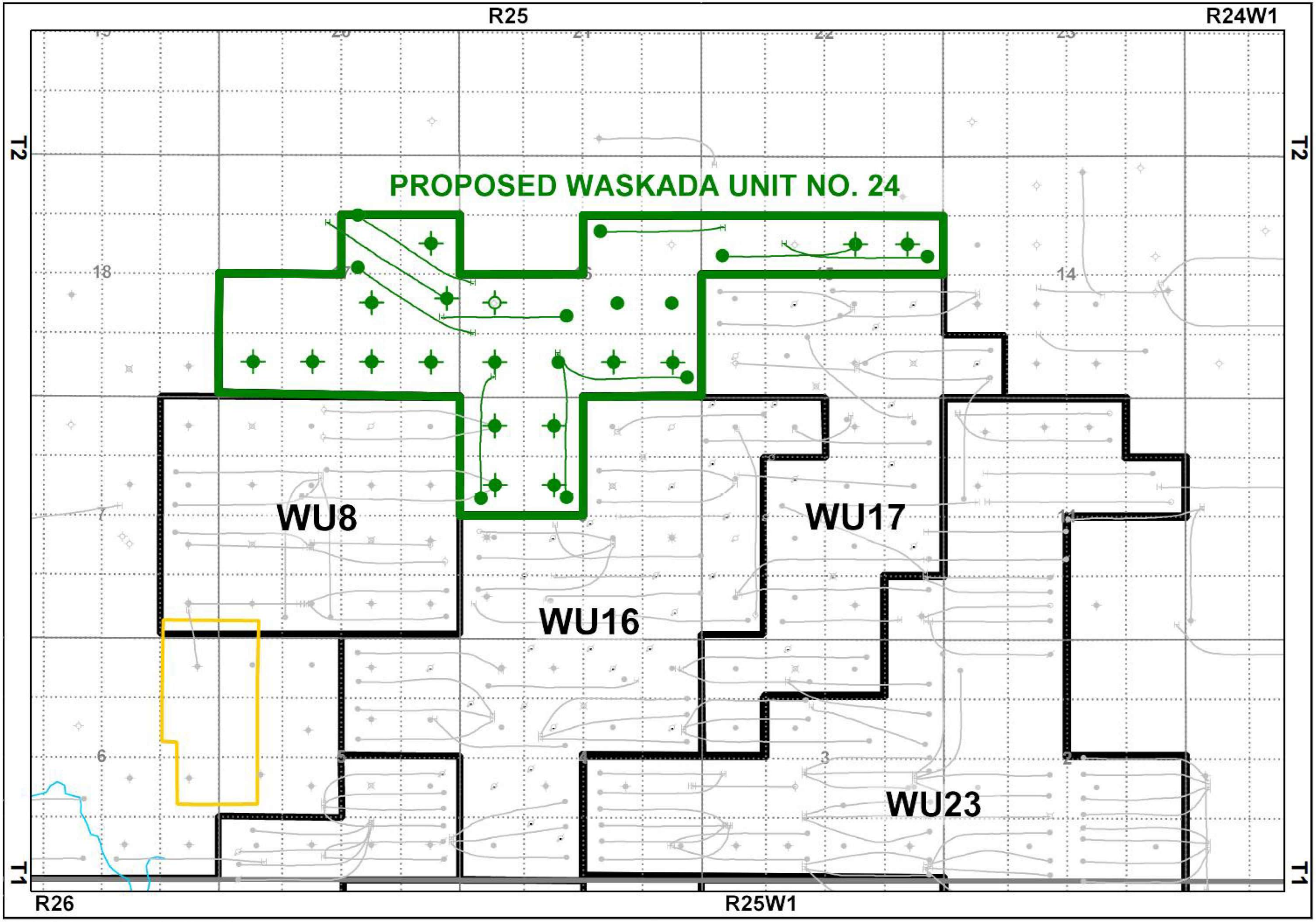
Application for Enhanced Oil Recovery Waterflood Project

List of Figures

Figure No. 1

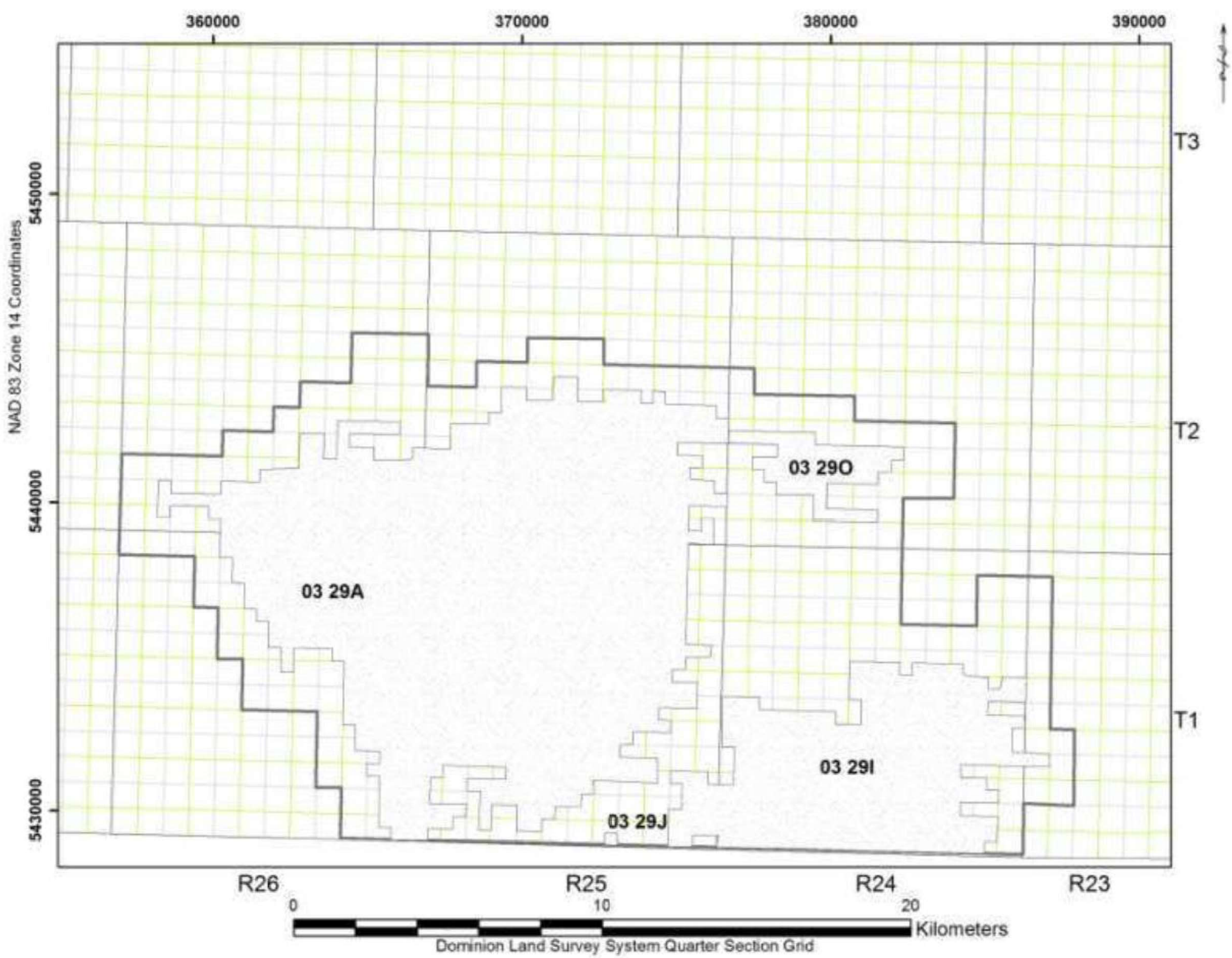


Waskada Field (03)



WASKADA LOWER AMARANTH UNITS

Figure No. 3



Waskada Lower Amaranth Pools (03 29A, I, J, K & O)

Well Information as of 8/9/2019 - Group Well Report

Figure 4

Production Graph

Group:	waskada unit no. 24 well list.lwell	On Prod:	1982-11 to 2019-05	Cum Oil:	164000.2 m3
# of Wells:	29	Prod Form:	AMRNTHL; AMRNTH	Cum Gas:	0.0 E3m3
Fluid:	Oil	Field:	WASKADA (MB3)	Cum Wtr:	229431.3 m3
Mode:	Abandoned Zone; Producing; Abandoned; Pumping	Pool Code:	MB000329A; MB000300	Cum Inj Oil:	0.0 m3
		Unit Code:		Cum Inj Gas:	0.0 E3m3
				Cum Inj Wtr:	0.0 m3

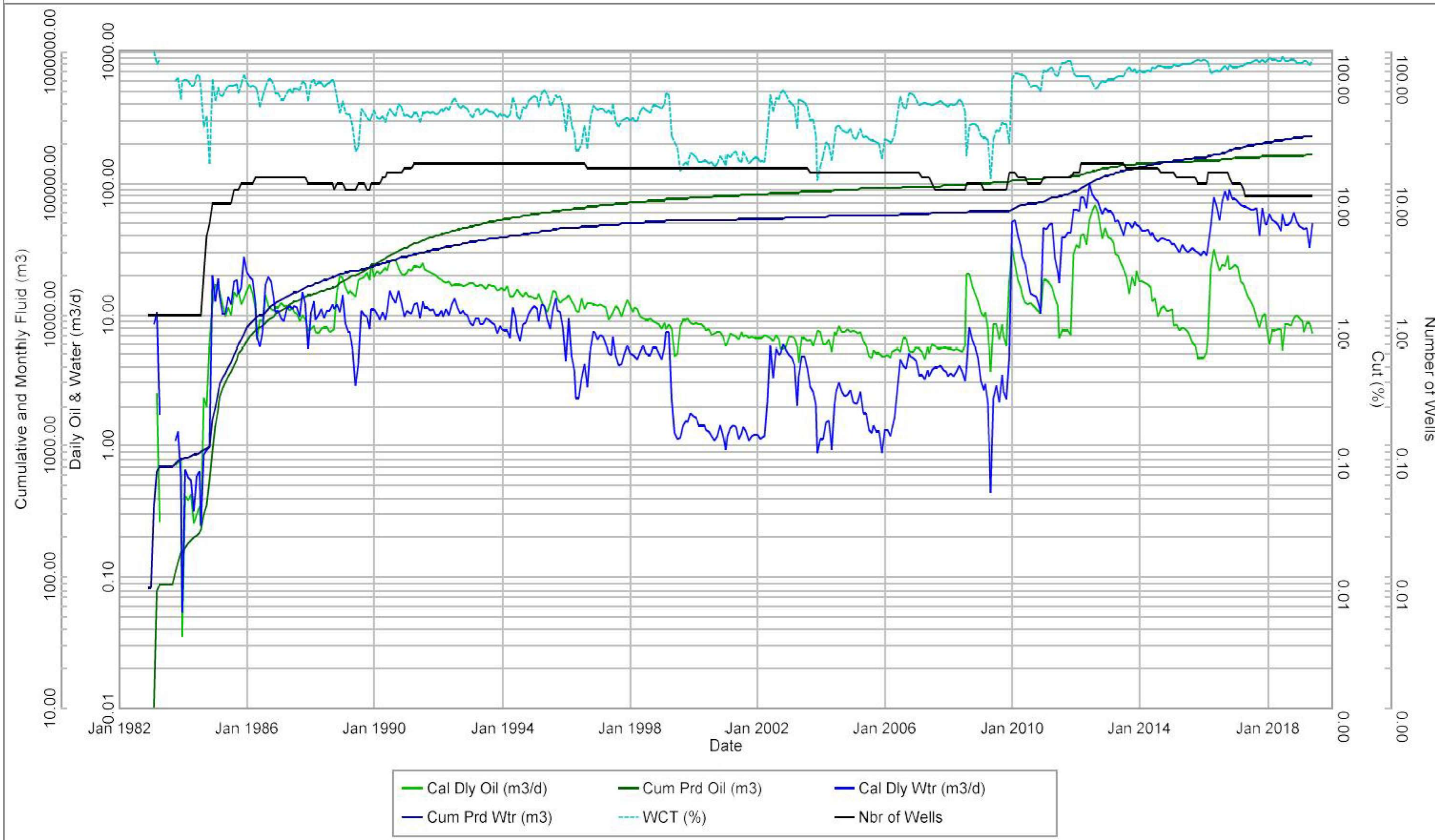
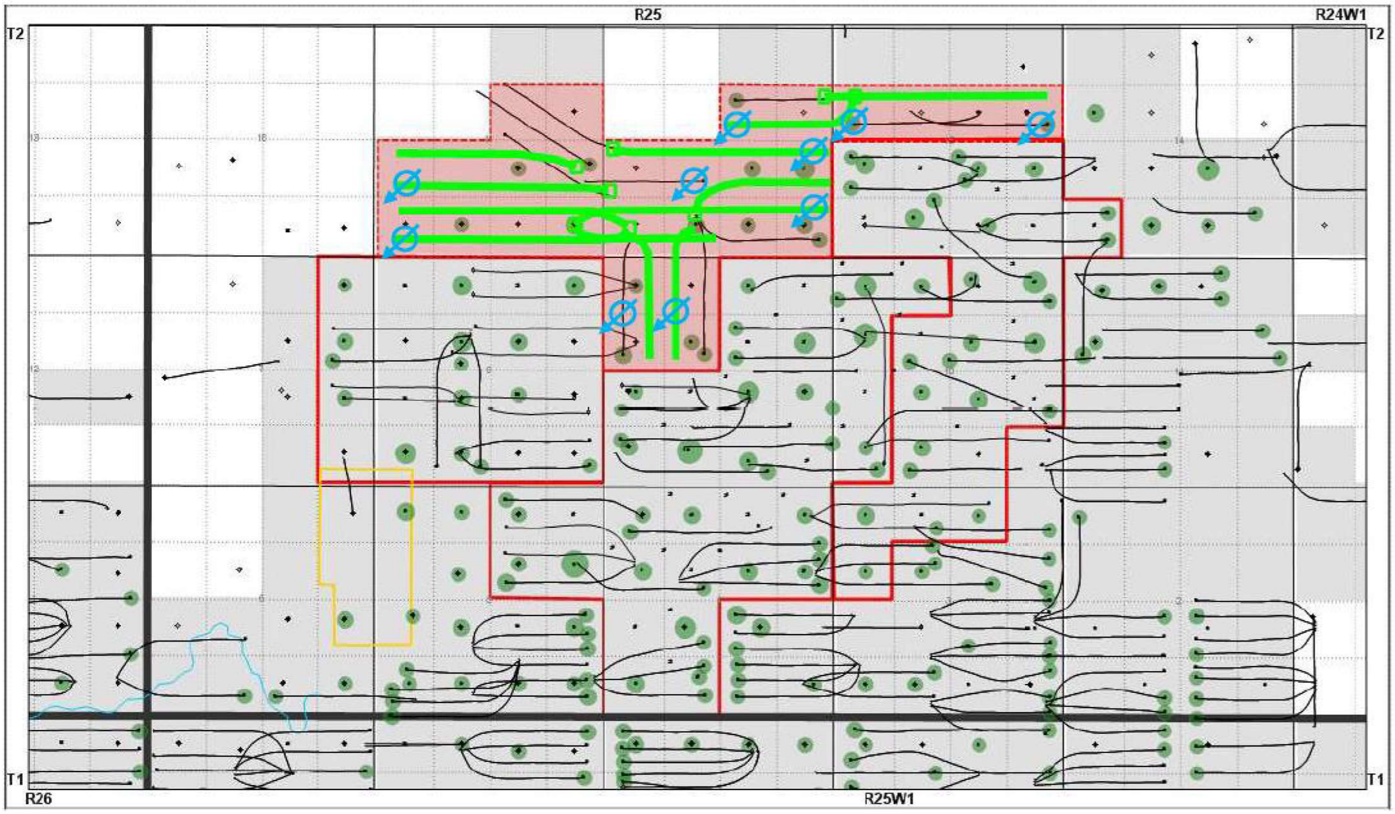


Figure 5

Development Plan



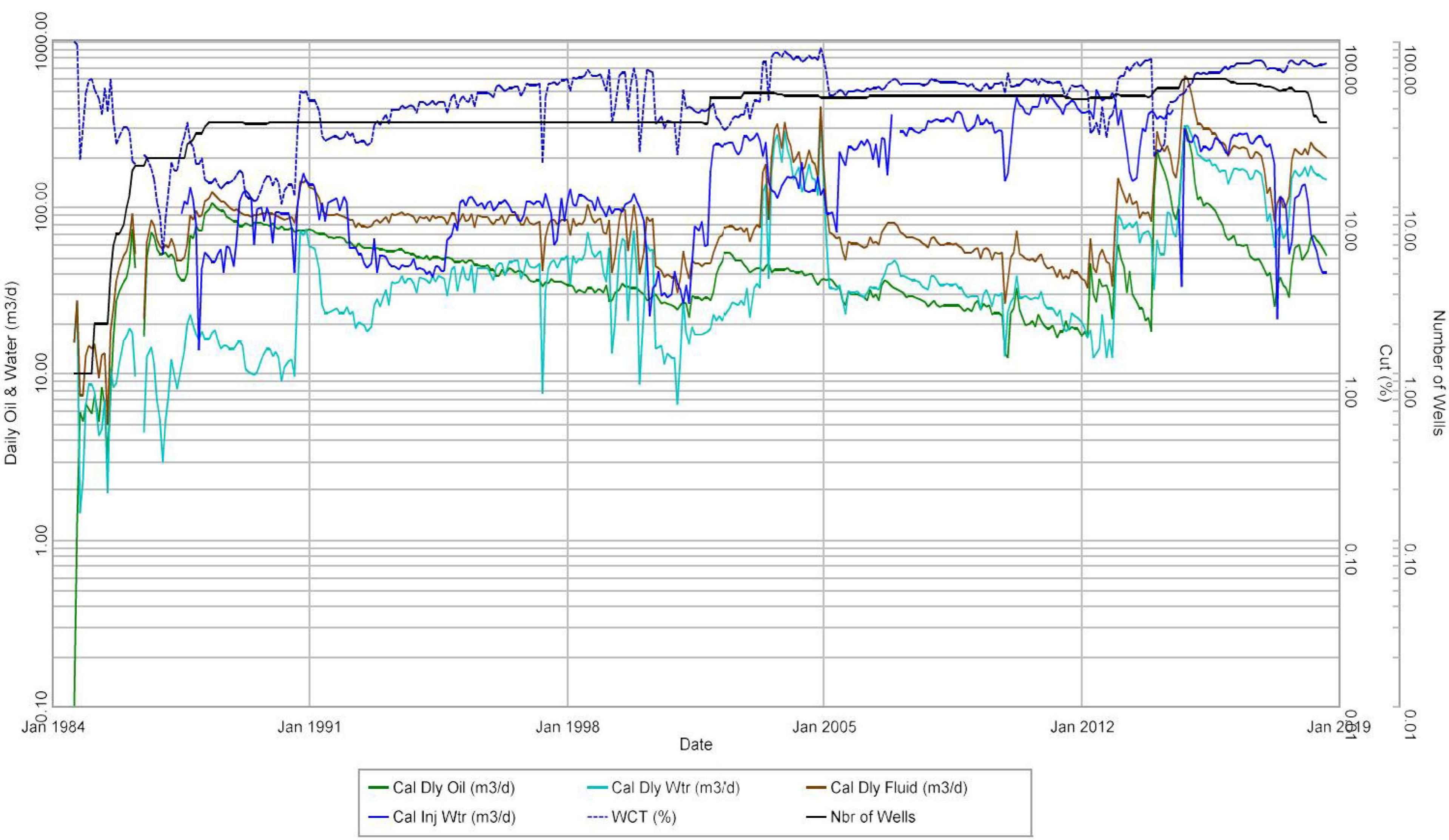
- Proposed development includes 12 total wells.
  - 6 full mile wells.
  - 6 half mile wells.
  - Produce First Injectors

Well Information as of 11/7/2018 - Group Well Report

Production Graph

Figure No. 6a

Group:	waskada unit no. 16 well list.lwell	On Prod:	1984-07 to 2018-08	Cum Oil:	593583.3 m3
# of Wells:	76	Prod Form:	AMRNTHL	Cum Gas:	2579.0 E3m3
Fluid:	Water Injection; Oil	Field:	WASKADA (MB3)	Cum Wtr:	672395.5 m3
Mode:	Injection; Producing; Abandoned Zone; Abandoned; Pumping...	Pool Code:	MB000329A	Cum Inj Oil:	0.0 m3
		Unit Code:	329A16	Cum Inj Gas:	0.0 E3m3
				Cum Inj Wtr:	2013771.3 m3



Well Information as of 11/7/2018 - Group Well Report

Figure No. 6b

Production Graph

Group:	waskada unit no. 17 well list.lwell	On Prod:	1982-12 to 2018-08	Cum Oil:	340983.5 m3
# of Wells:	51	Prod Form:	AMRNTHL	Cum Gas:	1579.8 E3m3
Fluid:	Oil; Water Injection	Field:	WASKADA (MB3)	Cum Wtr:	274576.7 m3
Mode:	Producing; Pumping; Abandoned; Injection; Abandoned Zone...	Pool Code:	MB000329A	Cum Inj Oil:	0.0 m3
		Unit Code:	329A17	Cum Inj Gas:	0.0 E3m3
				Cum Inj Wtr:	708459.7 m3

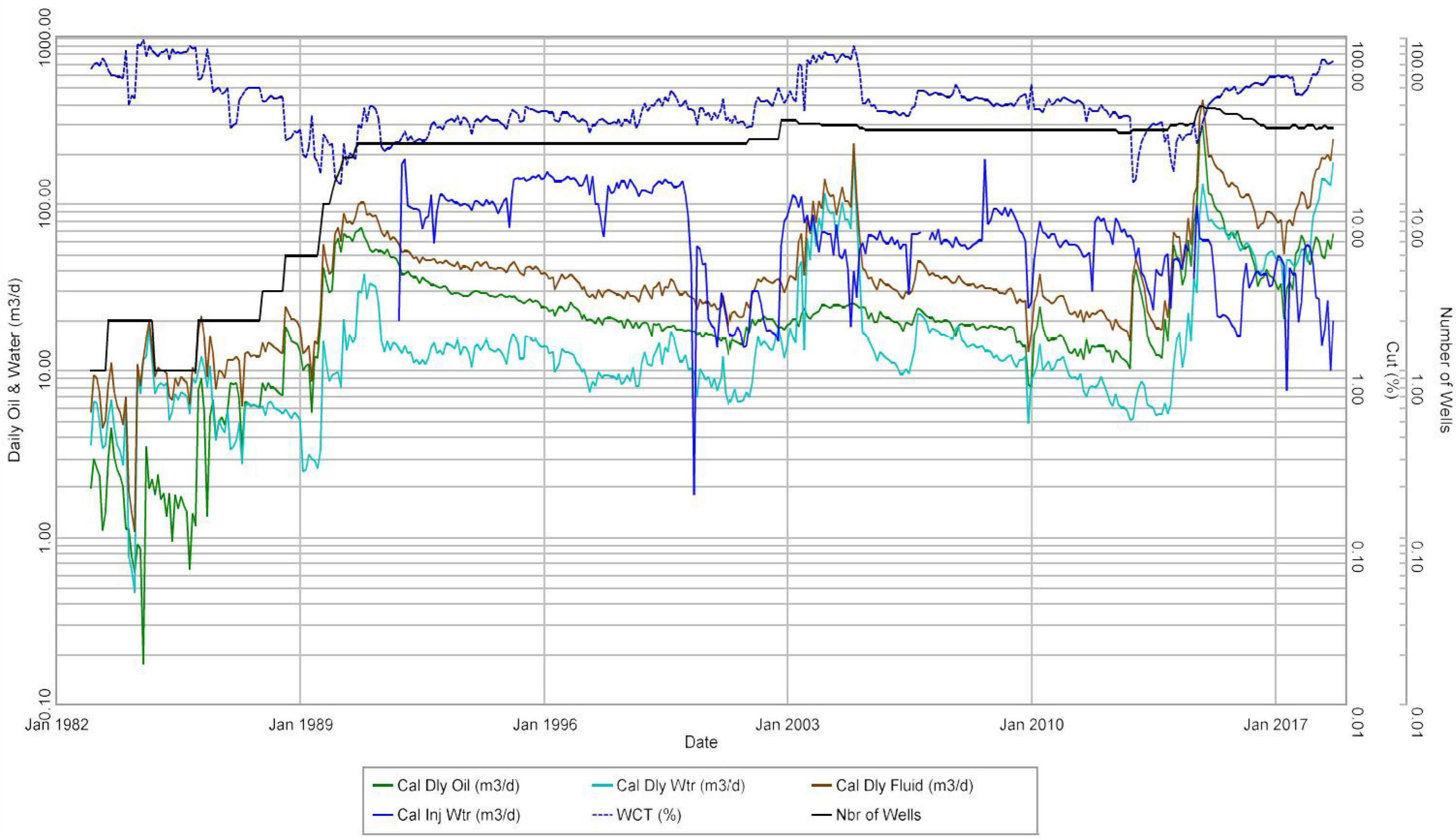
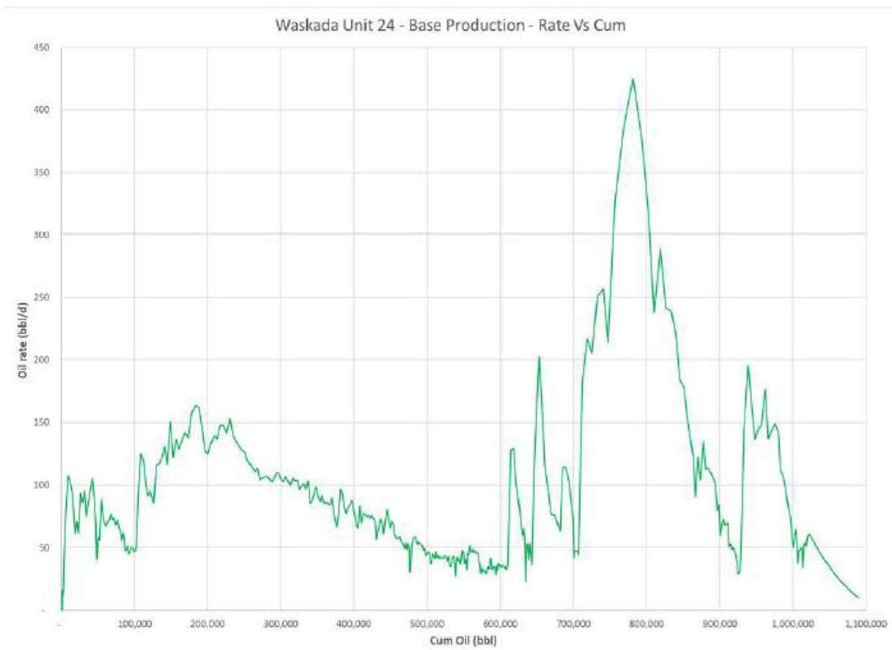


Figure No. 7

Base Forecast



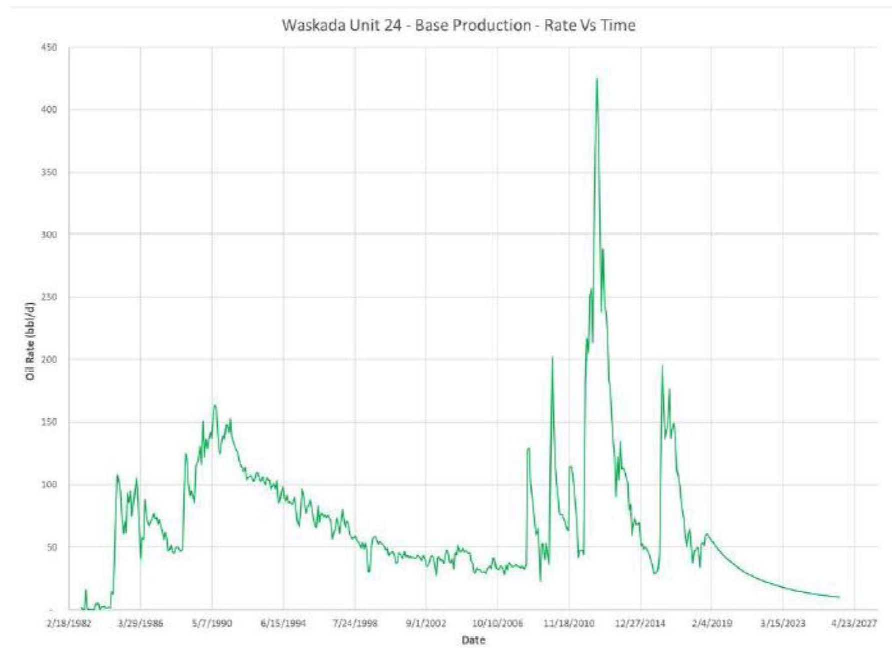
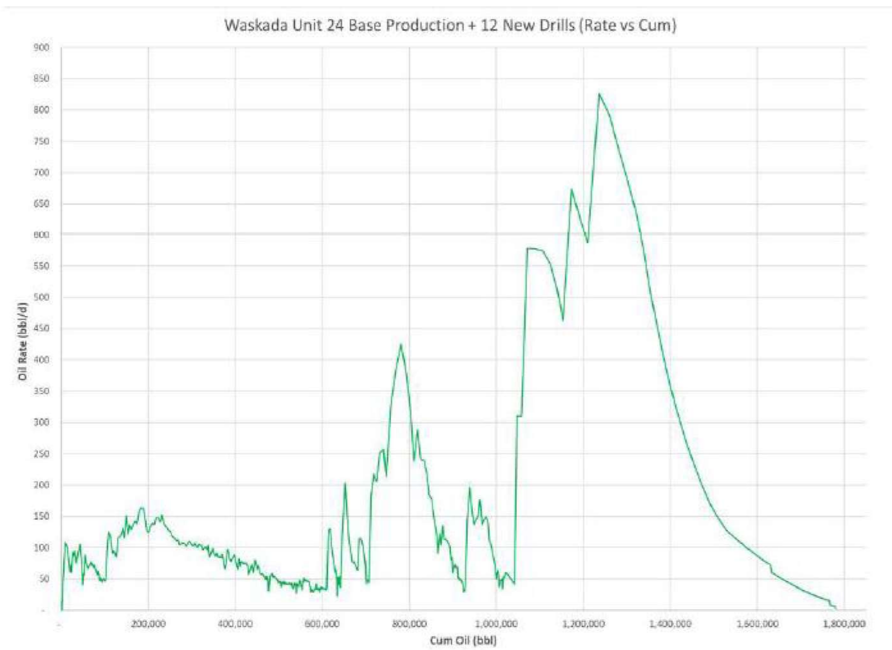


Figure No. 8

Base Forecast + 12 New Drills



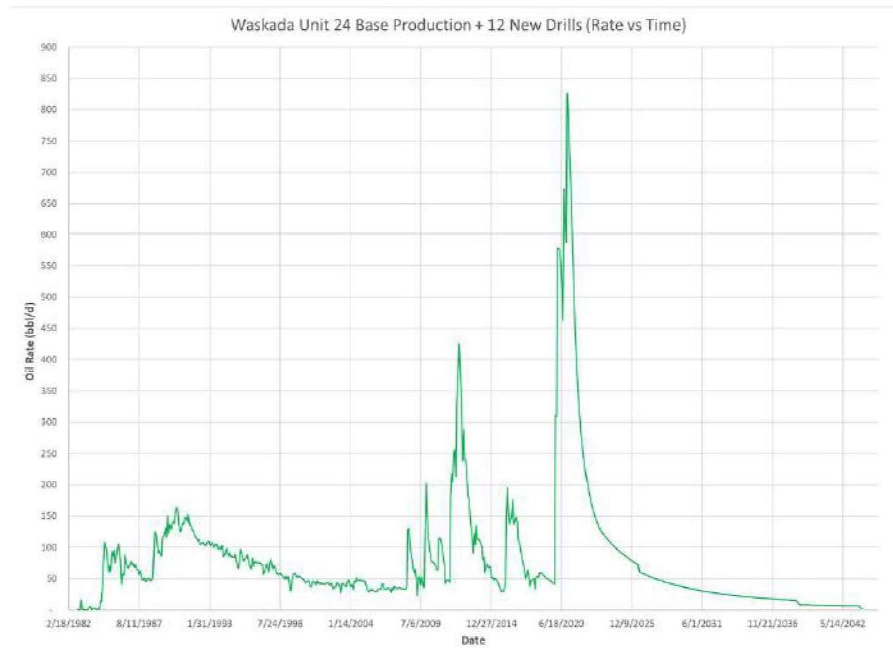
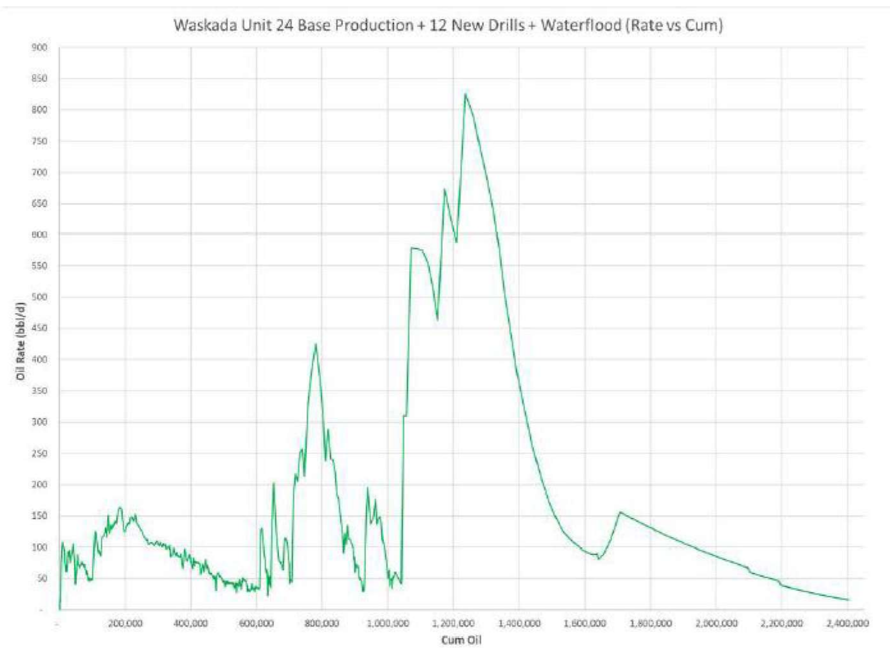
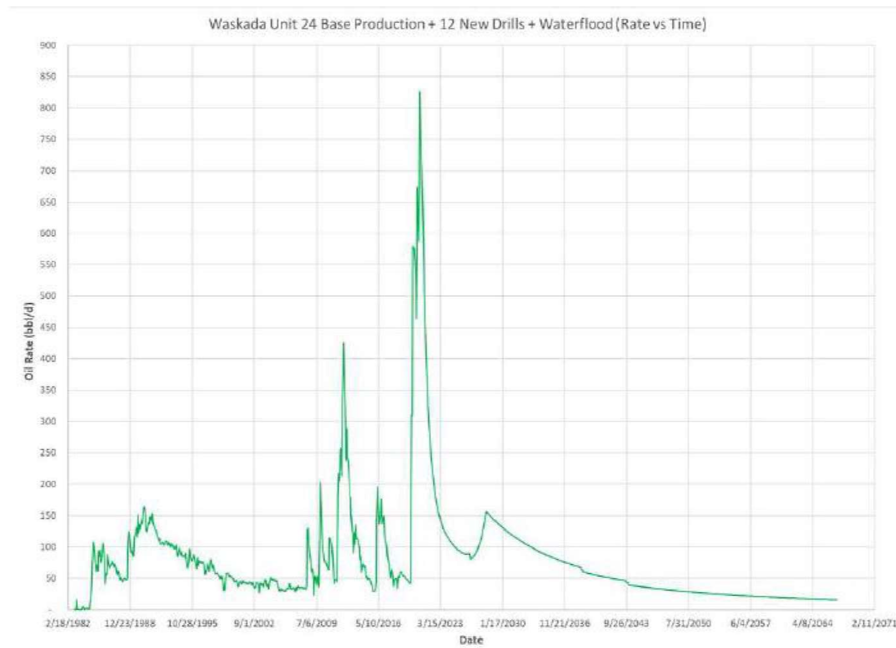
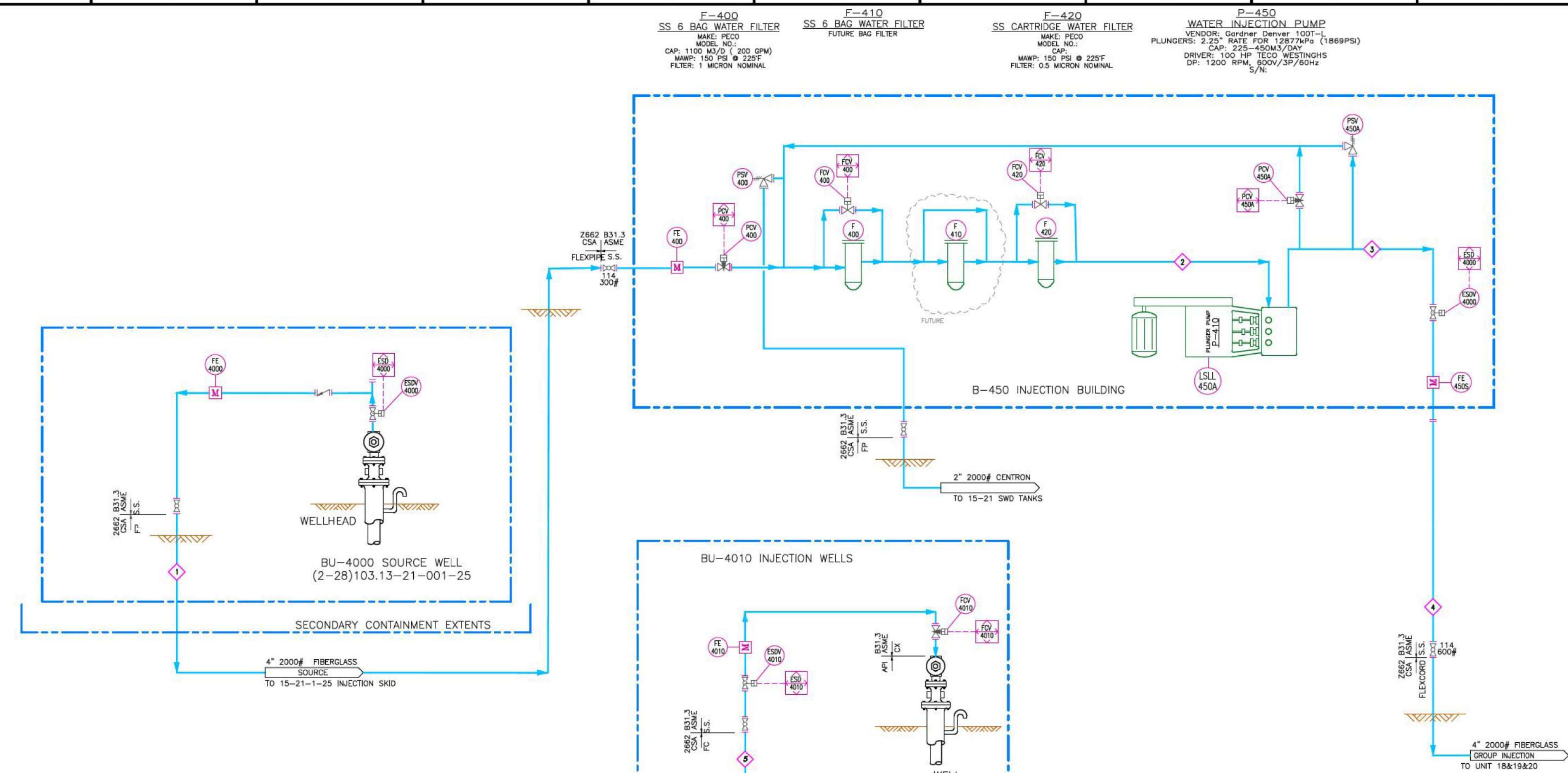


Figure No. 9

Base Forecast + 12 New Drills + Waterflood Forecast







STREAM NUMBER	1		2		3		4		5	
COMPONENT	OPER.	DESIGN	OPER.	DESIGN	OPER.	DESIGN	OPER.	DESIGN	OPER.	DESIGN
OIL m^3/DAY	–	–	–	–	–	–	–	–	–	–
WATER m^3/DAY	300	1600	300	1600	300	1600	300	1600	20	30
PROD. EMULSION m^3/DAY	–	–	–	–	–	–	–	–	–	–
PROD. GAS $10^3 m^3$/DAY	–	–	–	–	–	–	–	–	–	–
PRESSURE kPa	2000	5098	100	1963	5000	14895	5000	14895	5000	14895
TEMPERATURE °C	10	37	10	37	10	37	10	37	10	37
LINE SIZE in.	4		4		4		4		3	

REV	DESCRIPTION	BY	DATE	CHK	APP
1	ISSUED FOR REVIEW	YQ	17MAR2017		

REFERENCE DRAWING: –

NOTES:

Figure No. 10

TUNDRA OIL & GAS PARTNERSHIP

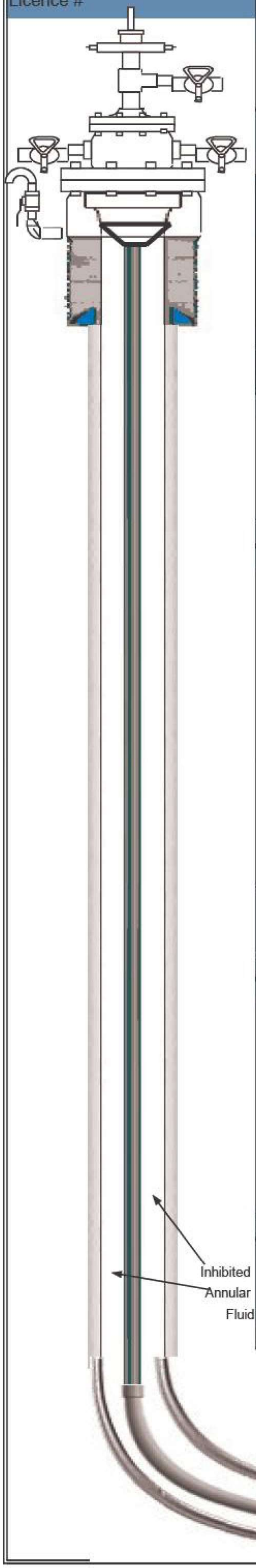
PROCESS FLOW DIAGRAM
15–21–1–25 W1M

PROCESS FLOW DIAGRAM 1 OF 1
PILOT WATER INJECTION

DRAWN BY: YQ | SCALE: NTS | AFE: | DRAWING NUMBER: 15–21–001–25W1–PFD–001 | REV NO: 1

Figure No. 11

Licence #



Tundra Oil & Gas

WELLBORE SCHEMATIC

WELL NAME:	WASKADA UNIT 24 HZNTL Cemented Liner	**DATE:**	5/5/2016
LOCATION:		**Prepared by:**	GP

MEASUREMENTS ARE IN METERS / DEPTHS ARE MEASURED IN DEPTH KB UNLESS OTHERWISE NOTED

ELEVATIONS					WELLHEAD DESCRIPTION		
KB EL	**GRD EL**	**KB to GRD**	**KB to SCF**	**KB to TH**	**Make / Type**	**Size / Rating**	
470.46	466.80	3.7	3.77	2.7	Metra	11"x 8 5/8"	3000 psi

CASING	O.D. mm	WEIGHT kg/m	GRADE	I.D. mm	LANDED DEPTH	TVD	TOP
SURFACE	219.1	35.72	J-55	205.66	172.0	172.0	0
PRODUCTION	139.7	25.3	E-80	124.3	1717.0	909.5	0
LINER	N/A						

K.O.P.	591.0	**REMARKS** 5.5" Monobore well. Both strings cemented to surface.
PBTD	1700.0 Est	

FORMATION	PERFORATIONS INTERVAL	TVD	REMARKS
Lower Amarath	1151.9-1650.0	909.0	16 Stages - Baker Frac Ports
			16 x 5T Fracs x 1.0m3/min x 100-800 conc

WELLBORE EQUIPMENT

No. joints	DESCRIPTION	LENGTH	DEPTH KB
1	73mm ENC Re-Entry "Mule shoe"	0.13	3.04
1	73mm ENC Pup Joint	1.24	4.28
1	73mm ENC Tryton TX-8 "DG" mechanical set packer	2.17	6.45
1	73mm ENC Tryton RH-Release on-off barrel	0.55	7.00
Est 119 jnts	73mm TK-99 IC Tubing or 73mm Polycoer Lined Tubing	1138.7	1145.70
1	73mm ENC EUE tubing nipple	0.1	1145.80
1	73mm Weatherford split bushing coated tubing hanger	0.21	1146.01
			1146.01
	Subtract 1.0m from bottom of packer to COE	-1.00	1145.01
			1145.01
			1145.01
			1145.01
			1145.01
			1145.01
			1145.01

WEIGHT OF TBG STRING (daN)	9,321	**TOTAL TUBING STRING**	1142.1	
TENSION / COMPRESSION (+/- daN)	6,000	**KB to THF**	2.7	
LANDED STRING WEIGHT	15,321	**STRETCH/ COMPRESSION m**	0.21	1145.01

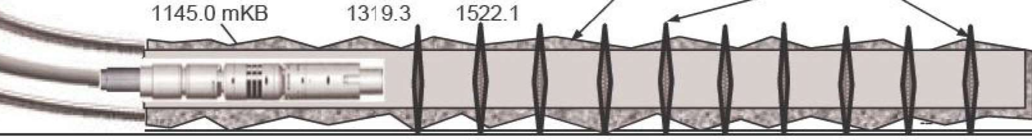
ROD STRING

No. RODS	SIZE	DESCRIPTION	GRADE	NEW / USED	LENGTH	DEPTH KB
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

BOTTOM HOLE PUMP

DESCRIPTION:				**PUMP No.**	
BARREL TYPE:		**PLUNGER TYPE:**		**MAX. STROKE:**	
BALLS/SEATS:		**PULL ROD:**		**FISH NECK:**	
COMMENTS:					

TOP OF	1151.9	1353.1	1555.9
Baker Frac	1185.7	1386.9	1589.7
Ports	1219.6	1420.7	1623.4
	1252.0	1454.5	1650.0
PKR COE	1285.6	1488.3	
1145.0 mKB	1319.3	1522.1	



Waskada Unit No. 24

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 15-21-2-25 Water Plant – Composite Flex Cord
- New High Pressure Pipeline to Unit 24 injection wells is a combination of:
  - 2000 psi high pressure Fiberglass
  - 2000 psi high pressure Flex-Cord
  - 600# ANSI carbon steel - internally coated

Facilities

- 15-21-2-25 Water Plant and New Injection Pump Station
  - Plant piping – 600 ANSI schedule 80 316 Stainless steel pipe
  - Filtration – 316 Stainless steel vessels
  - Pumping – Ceramic plungers, stainless steel disc 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 12

** subject to final design and engineering

Proposed Waskada Unit No. 24

Application for Enhanced Oil Recovery Waterflood Project

List of Tables

TABLE NO. 2: TRACT FACTOR CALCULATIONS FOR WASKADA UNIT NO. 24

TRACT FACTORS BASED ON OIL-IN-PLACE (OOIP) - CUMULATIVE PRODUCTION & LAST 12 MONTHS OF PRODUCTION TO MAY 2019

LS-SE	Tract	OOIP (m3)	HZ Wells Cum Alloc Prod (m3)	Vert Wells Cum Prodn (m3)	Sum Hz + Vert Alloc Cum Prodn	OOIP - Cum	OOIP-Cum by LSD/Total OOIP	Last 12 Months Alloc Hz Prod (m3)	Last 12 Months Vert Prod (m3)	Sum Hz + Vert Alloc Last 12 Months Prod (m3)	Alloc Last 12 Months Prod by LSD/Total Prod	50% OOIP-Cum + 50% Last 12 Months Prod Tract Factor	Tract
11-09	11-09-02-25W1	127,300	2,979.5	6,266.0	9,245.5	118,054	0.04016227566	461.3	0.0	461.3	0.15148040805	0.09582134186	11-09-02-25W1
12-09	12-09-02-25W1	121,568	5,932.5	1,782.1	7,714.6	113,853	0.03873322464	139.8	0.0	139.8	0.04591523793	0.04232423129	12-09-02-25W1
13-09	13-09-02-25W1	110,973	5,756.8	5,496.6	11,253.4	99,720	0.03392491605	135.7	0.0	135.7	0.04455501033	0.03923996319	13-09-02-25W1
14-09	14-09-02-25W1	122,473	3,170.9	765.4	3,936.3	118,536	0.04032639003	490.9	0.0	490.9	0.16120841370	0.10076740187	14-09-02-25W1
09-15	09-15-02-25W1	114,271	4,271.7	1,510.6	5,782.3	108,488	0.03690796032	33.3	0.0	33.3	0.01095118154	0.02392957093	09-15-02-25W1
10-15	10-15-02-25W1	112,412	4,208.1	867.7	5,075.8	107,336	0.03651605066	32.9	0.0	32.9	0.01078794889	0.02365199978	10-15-02-25W1
11-15	11-15-02-25W1	116,743	3,429.1	0.0	3,429.1	113,314	0.03854959970	83.4	0.0	83.4	0.02738617404	0.03296788687	11-15-02-25W1
12-15	12-15-02-25W1	114,940	3,491.1	0.0	3,491.1	111,449	0.03791515894	84.9	0.0	84.9	0.02788113189	0.03289814541	12-15-02-25W1
01-16	01-16-02-25W1	117,679	3,337.9	9,362.1	12,700.0	104,979	0.03571418607	593.2	0.0	593.2	0.19480512431	0.11525965519	01-16-02-25W1
02-16	02-16-02-25W1	124,069	3,225.2	7,869.6	11,094.8	112,974	0.03843409424	573.2	0.0	573.2	0.18822390498	0.11332899960	02-16-02-25W1
03-16	03-16-02-25W1	118,749	0.0	8,617.6	8,617.6	110,132	0.03746705197	0.0	110.5	110.5	0.03628661500	0.03687683348	03-16-02-25W1
04-16	04-16-02-25W1	109,278	0.0	1,111.7	1,111.7	108,167	0.03679856317	0.0	0.0	0.0	0.00000000000	0.01839928158	04-16-02-25W1
05-16	05-16-02-25W1	106,909	1,727.8	0.0	1,727.8	105,182	0.03578306568	19.5	0.0	19.5	0.00638836858	0.02108571713	05-16-02-25W1
06-16	06-16-02-25W1	112,768	1,656.0	0.0	1,656.0	111,112	0.03780060918	18.6	0.0	18.6	0.00612312492	0.02196186705	06-16-02-25W1
07-16	07-16-02-25W1	113,774	0.0	12,458.7	12,458.7	101,316	0.03446788998	0.0	268.0	268.0	0.08800735584	0.06123762291	07-16-02-25W1
08-16	08-16-02-25W1	115,480	0.0	19,807.8	19,807.8	95,673	0.03254807028	0.0	0.0	0.0	0.00000000000	0.01627403514	08-16-02-25W1
09-16	09-16-02-25W1	112,002	3,827.1	0.0	3,827.1	108,175	0.03680130257	0.0	0.0	0.0	0.00000000000	0.01840065128	09-16-02-25W1
10-16	10-16-02-25W1	109,344	3,827.1	0.0	3,827.1	105,516	0.03589695314	0.0	0.0	0.0	0.00000000000	0.01794847657	10-16-02-25W1
01-17	01-17-02-25W1	107,355	723.8	11,530.2	12,254.0	95,101	0.03235345218	0.0	0.0	0.0	0.00000000000	0.01617672609	01-17-02-25W1
02-17	02-17-02-25W1	107,522	0.0	1,100.5	1,100.5	106,421	0.03620470232	0.0	0.0	0.0	0.00000000000	0.01810235116	02-17-02-25W1
03-17	03-17-02-25W1	106,407	0.0	4,477.0	4,477.0	101,930	0.03467685227	0.0	0.0	0.0	0.00000000000	0.01733842614	03-17-02-25W1
04-17	04-17-02-25W1	99,191	0.0	402.8	402.8	98,788	0.03360785651	0.0	0.0	0.0	0.00000000000	0.01680392826	04-17-02-25W1
05-17	05-17-02-25W1	97,334	0.0	0.0	0.0	97,334	0.03311314362	0.0	0.0	0.0	0.00000000000	0.01655657180	05-17-02-25W1
06-17	06-17-02-25W1	100,709	0.0	0.0	0.0	100,709	0.03426142940	0.0	0.0	0.0	0.00000000000	0.01713071470	06-17-02-25W1
07-17	07-17-02-25W1	102,792	1,732.0	7,434.8	9,166.8	93,625	0.03185141980	0.0	0.0	0.0	0.00000000000	0.01592570990	07-17-02-25W1
08-17	08-17-02-25W1	103,262	2,169.1	0.0	2,169.1	101,093	0.03439213913	0.0	0.0	0.0	0.00000000000	0.01719606957	08-17-02-25W1
09-17	09-17-02-25W1	98,952	1,450.7	3,743.7	5,194.4	93,758	0.03189659958	0.0	0.0	0.0	0.00000000000	0.01594829979	09-17-02-25W1
10-17	10-17-02-25W1	98,801	2,108.5	0.0	2,108.5	96,693	0.03289504291	0.0	0.0	0.0	0.00000000000	0.01644752146	10-17-02-25W1
		3,103,055	**59,025**	**104,605**	**163,630**	**2,939,425**	**1.00000000000**	**2,666.7**	**378.5**	**3,045.2**	**1.00000000000**	**1.00000000000**	

Table No. 3: Waskada Unit No. 24 Well List

UWI	License Number	Type	Pool Name	Producing Zone	Mode	On Prod Date	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 (%)
100/11-09-002-25W1/0	003544	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned Zone	7/17/1985	Dec-2008	0.02	0.60	6,266.0	0.18	5.60	25850.1	90.32
100/12-09-002-25W1/0	003186	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	8/1/1984	Jul-1996	0.12	3.80	1,782.1	0.01	0.20	665.6	5.00
100/13-09-002-25W1/0	003545	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned Zone	7/10/1985	Jul-2003	0.00	0.00	5,496.6	0.15	4.50	1142.4	100.00
100/14-09-002-25W1/0	002873	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	11/24/1982	Aug-1989	0.04	1.20	765.4	0.30	9.40	2111.7	88.68
100/09-15-002-25W1/0	004248	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned Zone	11/28/1990	May-2007	0.06	2.00	1,510.6	0.03	0.90	489.6	31.03
100/10-15-002-25W1/0	003848	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned Zone	3/27/1986	Jun-2007	0.10	3.10	867.7	0.01	0.30	136.1	8.82
100/01-16-002-25W1/0	003749	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned Zone	11/29/1985	Sep-2016	0.00	0.00	9,362.1	0.53	16.00	3860.6	100.00
100/02-16-002-25W1/0	004179	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned Zone	5/25/1990	Mar-2017	0.15	4.70	7,869.6	0.00	0.00	9755.4	0.00
100/03-16-002-25W1/0	004263	Vertical	LOWER AMARANTH A	AMRNTHL	Producing	3/17/1991	May-2019	0.26	8.10	8,617.6	0.00	0.10	871.5	1.22
100/04-16-002-25W1/0	003419	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	10/14/1984	Dec-1988	0.18	5.60	1,111.7	0.42	13.10	2112.0	70.05
100/05-16-002-25W1/0	003524	Vertical	UNDEFINED POOL	AMRNTHL	Abandoned	10/27/1985	Oct-1985	0.00	0.00	-	0.45	13.90	13.9	100.00
100/07-16-002-25W1/0	004112	Vertical	LOWER AMARANTH A	AMRNTHL	Pumping	6/22/1989	May-2019	0.69	21.30	12,458.7	0.01	0.40	653.4	1.84
100/08-16-002-25W1/0	004098	Vertical	LOWER AMARANTH A	AMRNTHL	Producing	10/12/1988	Jun-2013	0.01	0.40	19,807.8	0.00	0.10	1380.3	20.00
100/01-17-002-25W1/0	003407	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned Zone	9/30/1984	Jul-2014	0.02	0.70	11,530.2	0.00	0.10	1494.2	12.50
100/02-17-002-25W1/0	003408	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	11/11/1984	Aug-1988	0.33	10.30	1,100.5	0.33	10.30	1391.9	50.00
100/03-17-002-25W1/0	003409	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	9/29/1984	Jan-2007	0.05	1.70	4,477.0	0.25	7.90	3416.5	82.29
100/04-17-002-25W1/0	003405	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	11/26/1984	Oct-1987	0.01	0.20	402.8	0.86	26.60	4556.4	99.25
100/07-17-002-25W1/0	004145	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned Zone	11/7/1989	May-2010	0.00	0.10	7,434.8	0.00	0.00	845.4	0.00
100/09-17-002-25W1/0	004183	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned Zone	3/23/1990	Jan-2010	0.10	3.10	3,743.7	0.05	1.40	1618.7	31.11
										164,000.2			229,431.3	
										1,031.5 Mbbl			1,443.1 Mbbl	

Table No. 4: OOIP Calculation

Tract	OOIP (m3)	OOIP (bbls)	Phih
11-9-2-25W1	127,300	800,690	1.5305
12-9-2-25W1	121,568	764,640	1.4616
13-9-2-25W1	110,973	698,000	1.3342
14-9-2-25W1	122,473	770,330	1.4724
9-15-2-25W1	114,271	718,740	1.3784
10-15-2-25W1	112,412	707,050	1.3562
11-15-2-25W1	116,743	734,290	1.4087
12-15-2-25W1	114,940	722,950	1.3871
1-16-2-25W1	117,679	740,180	1.4209
2-16-2-25W1	124,069	780,370	1.4976
3-16-2-25W1	118,749	746,910	1.4330
4-16-2-25W1	109,278	687,340	1.3183
5-16-2-25W1	106,909	672,440	1.2905
6-16-2-25W1	112,768	709,290	1.3616
7-16-2-25W1	113,774	715,620	1.3742
8-16-2-25W1	115,480	726,350	1.3952
9-16-2-25W1	112,002	704,470	1.3540
10-16-2-25W1	109,344	687,750	1.3215
1-17-2-25W1	107,355	675,240	1.2952
2-17-2-25W1	107,522	676,290	1.2964
3-17-2-25W1	106,407	669,280	1.2822
4-17-2-25W1	99,191	623,890	1.1944
5-17-2-25W1	97,334	612,210	1.1725
6-17-2-25W1	100,709	633,440	1.2139
7-17-2-25W1	102,792	646,540	1.2398
8-17-2-25W1	103,262	649,500	1.2463
9-17-2-25W1	98,952	622,390	1.1947
10-17-2-25W1	98,801	621,440	1.1921
	3,103,055	**19,517,630**	

Sw = 40%
Porosity = 10%
Bo = 1.17