PROPOSED WASKADA UNIT NO. 22

Application for Enhanced Oil Recovery Waterflood Project

Lower Amaranth Formation

Lower Amaranth A (03 29A)

Waskada Field, Manitoba

December 21st, 2016

Tundra Oil and Gas Partnership

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 Unit 1, 2, 3, 4, 5, 6, 7, 8, 13, 14, 15, 16, 17, 18 and 19.

In the southeastern 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. 22 (LSDs 1-2, 5-16 Sec 9, Sec 15, LSDs 1-6, 8-9 Sec 16, LSDs 1-10, 15-16 Sec 17, LSDs 1-2, 7-10 Sec 20, LSDs 1, 7-9, 16 Sec 21, Sec 22, NW/4 Sec 23, LSDs 3-4 Sec 26-001-25W1) 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. 22 will include 131 horizontal wells and 16 of the 33 vertical wells (17 of the vertical wells are abandoned) within 83 Legal Sub Divisions (LSD) of the Lower Amaranth producing reservoir. The project is located east of Waskada Unit No. 7 and south of Waskada Unit No. 18 and Waskada Unit No. 19 (Figure 2).

2. Total Net Original Oil in Place (OOIP) in Waskada Unit No. 22 has been calculated to be **9,903** e^3m^3 (62,290 Mbbl) for an average of **119.3 net e^3m^3 (**750.5 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 September 2016 from the 164 wells within the proposed Waskada Unit No. 22 project area was **733.3** e^3m^3 (4,612 Mbbl) of oil, and **2,528.1** e^3m^3 (15,901 Mbbl) of water, representing a **7.4%** Recovery Factor (RF) of the Net OOIP.

4. The production from the Waskada Unit No. 22 peaked in November 2013 at 696.3 m^3 (OPD) as shown in Figure 4. As of September 2016, production was 83.9 m^3 OPD, 582.1 m^3 of water per day (WPD) and an 87.4% watercut.

5. In November 2013, production averaged 5.0 m^3 OPD per well in Waskada Unit No. 22. As of September 2016, average per well production has declined to 0.93 m^3 OPD. Decline analysis of the group primary production data forecasts total oil to continue declining at an annual rate of approximately **36.4%** in the project area.

6. Estimated Ultimate Recovery (EUR) of Primary Proved Producing oil reserves in the proposed Waskada Unit No. 22 project area has been calculated to be **833.8** e^3m^3 (**5,242** Mbbl), with **107.6** e^3m^3 (**677** Mbbl) remaining as of the end of September 2016.

7. Ultimate oil recovery of the proposed Waskada Unit No. 22 OOIP, under the current Primary Production method, is forecasted to be **8.4%.**

8. Estimated Ultimate Recovery (EUR) of proved oil reserves under Secondary WF EOR for the proposed Waskada Unit No. 22 has been calculated to be **1,125.7** e^3m^3 **(7,080** Mbbl), with **392.4** e^3m^3 (**2,468** Mbbl) remaining. An incremental **284.8** e^3m^3 **(1,791** Mbbl) of proved oil reserves, or **2.9%**, 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. 22 is estimated to be **11.3%**.

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. 22 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 SW to NE 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.

Stratigraphic nomenclature has been modeled after previous operator's (EOG Resources) conventions. 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 10.0 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 adopted from a PVT taken from the 8-26-1-26W1, thought to be representative of the fluid characteristics in the reservoir. Sw determination was set at 40% based analysis of capillary pressure data from six different locations in the Waskada / Goodlands area (6-21-1-25W1, 7-28-1-25W1, 13-10-1-24W1, 15-1-1-25W1, and 14-14-2-25W1).

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 9,903,423 m^3 (62,290,660 bbls).

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. 22 is shown as Figure 4. Oil production commenced from the proposed Unit area in November 1982 and peaked during November 2013 at 696.3 m^3 OPD. As of September 2016, production was 83.9 m^3 OPD, 582.1 m^3 of water per day (WPD) and an 87.4% watercut.

From peak production in November 2013 to date, oil production is declining at an annual rate of approximately **36.4%** 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. 22.

Unit Operator

Tundra Oil and Gas Partnership (Tundra) will be the Operator of record for Waskada Unit No. 22.

Unitized Zone

The Unitized zone(s) to be waterflooded in the Waskada Unit No. 22 will be the Lower Amaranth formation.

Unit Wells

The 131 horizontal wells and 16 vertical wells to be included in the proposed Waskada Unit No. 22 are outlined in Table 3.

Unit Lands

The Waskada Unit No. 22 will consist of 83 LSDs as follows:

LSDs 1-2, 5-16 Section 9 of Township 1, Range 25, W1M
Section 15 of Township 1, Range 25, W1M
LSDs 1-6, 8-9 Section 16 of Township 1, Range 25, W1M
LSDs 1-10, 15-16 Section 17 of Township 1, Range 25, W1M
LSDs 1-2, 7-10 Section 20 of Township 1, Range 25, W1M
LSDs 1, 7-9, 16 Section 21 of Township 1, Range 25, W1M
Section 22 of Township 1, Range 25, W1M
NW/4 Section 23 of Township 1, Range 25, W1M
LSDs 3-4 Section 26 of Township 1, Range 25, W1M

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

Tract Factors

The proposed Waskada Unit No. 22 will consist of 83 Tracts based on the 40 acre LSDs containing the existing 131 horizontal and 16 vertical wells.

The Tract Factor contribution for each of the LSD's within the proposed Waskada Unit No. 22 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. 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. 22. Tundra Oil and Gas Partnership holds a 100% WI ownership in all the proposed Tracts.

Tundra Oil and Gas Partnership will have a 100% WI in the proposed Waskada Unit No. 22.

WATERFLOOD EOR DEVELOPMENT

Technical Studies

The waterflood performance predictions for the proposed Waskada Unit No. 22 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. 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. 22. 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. 22.

Horizontal Injection Wells and EOR Development

Primary production from the original vertical/horizontal producing wells in the proposed Waskada Unit No. 22 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 converting up to 47 horizontal oil producing wells to Water Injection Wells (WIW) as shown in Figure 5. This conversion scheme would allow for approximately 30 acre spacing between offsetting injection wells. Alternative injection configurations may be considered depending on results from offset pilot areas in the Lower Amaranth formation, within the Waskada field. These changes could results in the conversion of more or less wells to injection than what is shown in figure 5. Additionally, new horizontal injectors may be considered to be drilled if they are deemed to be essential to improving recovery in the unit.

Additional horizontal injectors may be drilled as results dictate. 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 may be beneficial and all Unit mineral owners will benefit.

Tundra will continue to monitors 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. 22 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 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 16 and 17 to ensure proper calibration of data and results.

Primary Production Forecast

Cumulative allocated production in the Waskada Unit No. 22 project area, to the end of September 2016 from 164 wells, was **733.3** e^3m^3 of oil and **2,528.1** e^3m^3 of water for a recovery factor of **7.4%** of the calculated Net OOIP.

Ultimate Primary Proved Producing oil reserves recovery for Waskada Unit No. 22 has been estimated to be **833.8** e^3m^3, or an **8.4**% Recovery Factor (RF) of OOIP. Remaining Producing Primary Reserves has been estimated to be **107.6** e^3m^3 to the end of September 2016.

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 proposes to implement a waterflood which consists of up to 47 horizontal injector conversions throughout 2018-2022. Tundra plans to convert 12 wells to water injection in 2018 to test efficiency of flooding the proposed area. Future conversion timing and location will be predicated on the initial well results.

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. 22 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 and 17, 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 Figures 7 and 8, respectively. Total Secondary EUR for the proposed Waskada Unit No. 22 is estimated to be **1,125.7** e^3m^3 with **392.4** e^3m^3 remaining representing a total secondary recovery factor of **11.3%** for the proposed Unit area. An incremental **284.8** e^3m^3 of oil, or

a **2.9%** 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. 22 will be supplied from the existing Waskada 15-9-2-25W1 Battery source and injection water system. All existing injection water is obtained from the Swan River formation in the 100/05-09-002-25W1 and 100/10-09-002-25W1 licensed water source wells. Swan River water from the two source wells is pumped to the main Waskada Units Water Plant at 15-9-2-25W1, filtered, and pumped up to injection system pressure. A diagram of the Waskada water injection system and new pipeline connection to the proposed Waskada Unit No. 22 project area injection wells is shown as Figure 9.

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 formation well as a source supply for Waskada Unit No. 22.

A mixture of produced waters from the Lower Amaranth has been extensively tested for compatibility with 100/05-09 source Swan River water, by a highly qualified third party, prior to implementation by Tundra. 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. 22 will 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. 22 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. 22 project area in the Lower Amaranth producing zone. Tundra assumed operatorship of these properties in 2015 and has been unable to recover any pressure surveys from the original operators.

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. 22 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. 22 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. 22.

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. 22 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. 22 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. 22 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. 22. 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. 22 Application.

Waskada Unit No. 22 Unitization, and execution of the formal Waskada Unit No. 22 Agreement by affected Mineral Owners, is expected during Q1 2017. Copies of same will be forwarded to the Petroleum Branch, when available, to complete the Waskada Unit No. 22 Application.

Should the Petroleum Branch have further questions or require more information, please contact Evan Gillespie at 403.910.1661 or by email at evan.gillespie@tundraoilandgas.com.

TUNDRA OIL & GAS PARTNERSHIP

Original Signed by Evan Gillespie, December 21st, 2016, in Calgary, AB

Proposed Waskada Unit No. 22

Application for Enhanced Oil Recovery Waterflood Project

List of Figures

Figure No. 1

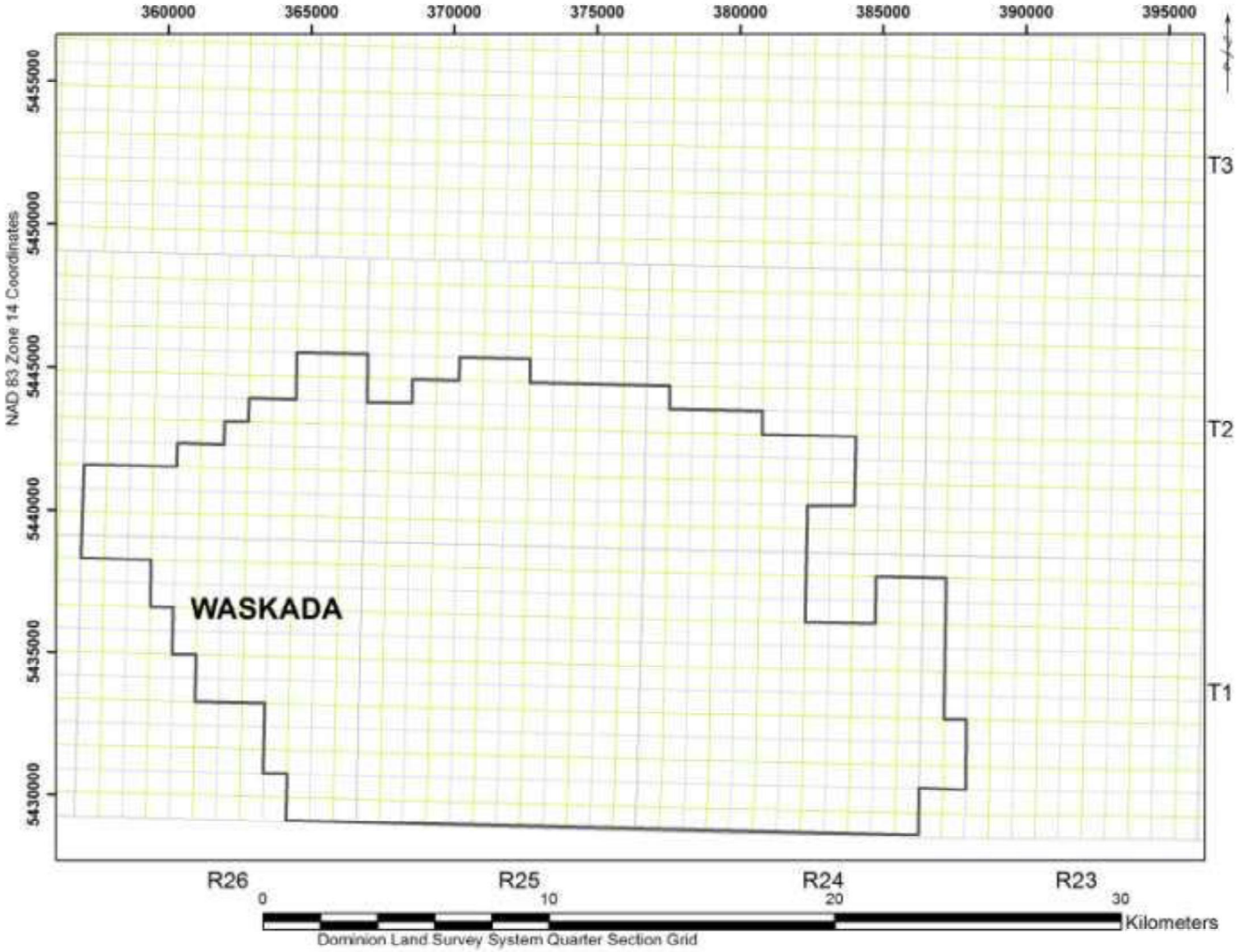
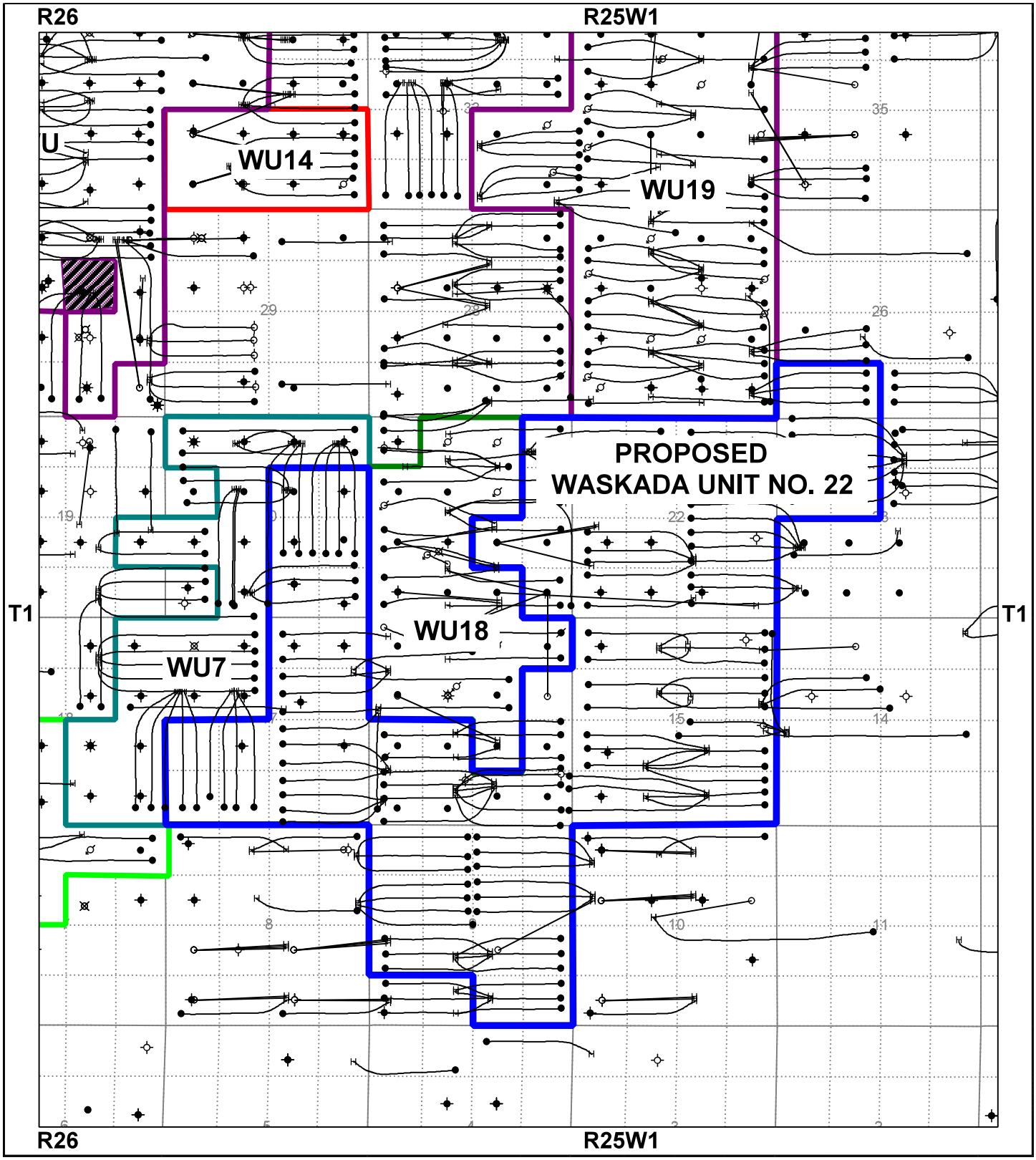


Figure 4 - Waskada Field (03)



Well Legend

Abandoned Gas	Canceled	Heavy Oil	Service or Drain	Suspended Oil & Gas
Abandoned Heavy Oil	Drilling	Injection	Suspended	
Abandoned Oil	Dry & Abandoned	Location	Suspended Gas	
Abandoned Oil & Gas	Gas	Oil	Suspended Heavy Oil	
Abandoned Service	Gas Injection	Oil & Gas	Suspended Oil	

Proposed Waskada Unit No. 22 Area

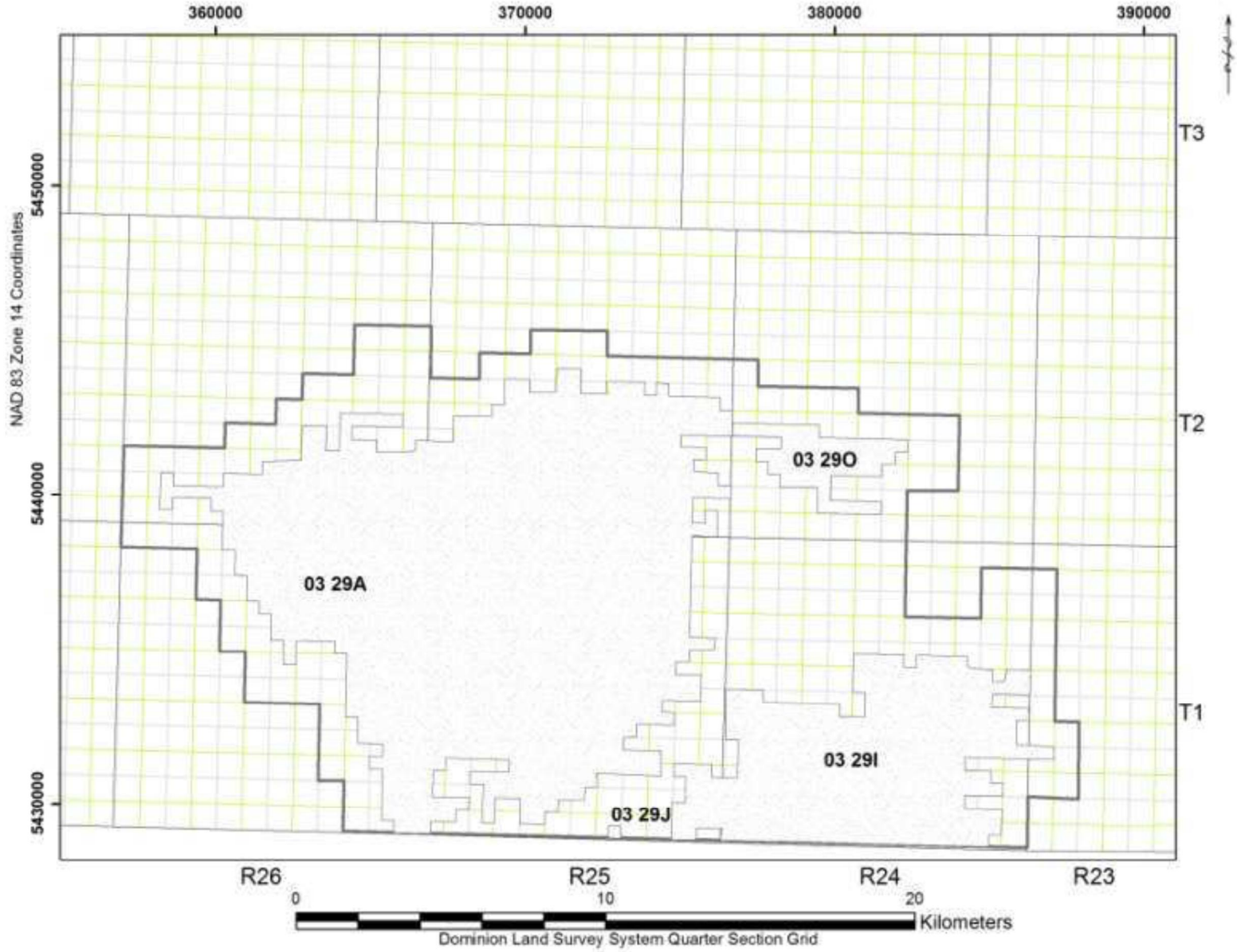


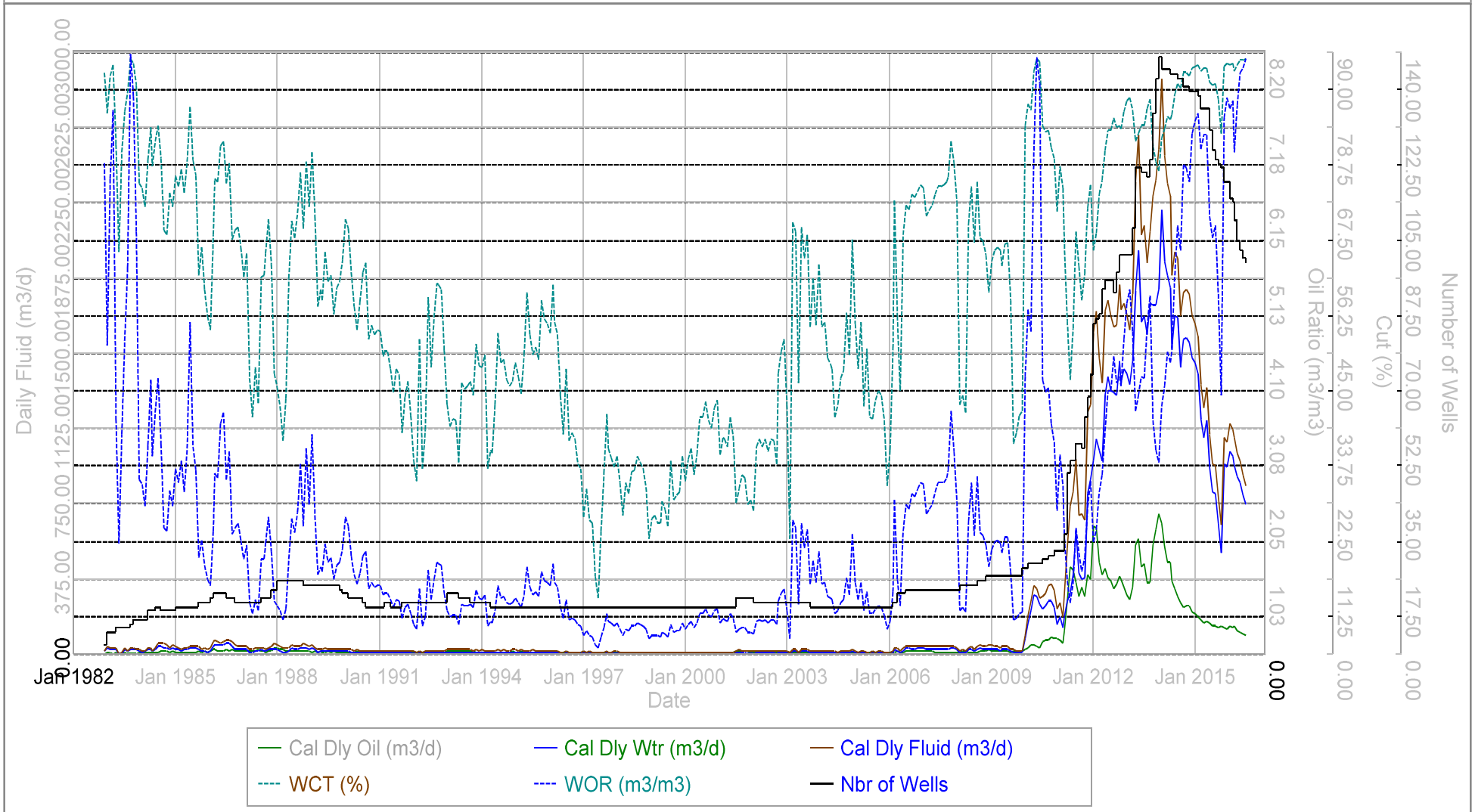
Figure 18 - Waskada Lower Amaranth Pools (03 29A, I, J, K & O)

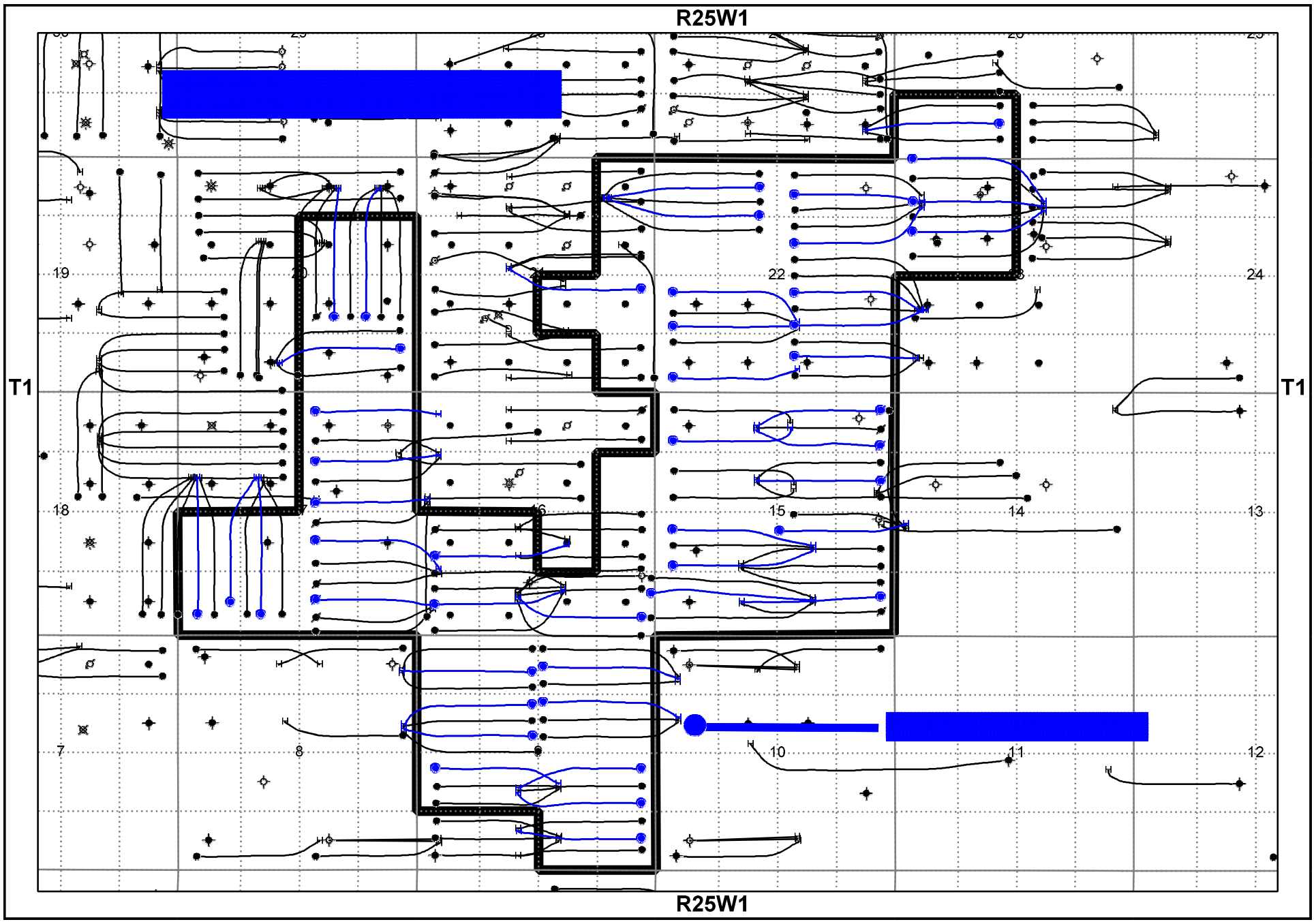
Well Information as of 9/9/2016 - Group Well Report

Figure No. 4

Production Graph

Group:	proposed wu22 well list.lwell	**On Prod:**	1982-11 to 2016-06	**Cum Oil:**	755193.2 m3
# of Wells:	164	**Prod Form:**	AMRNTHL; AMRNTH	**Cum Gas:**	31525.7 E3m3
Fluid:	Oil	**Field:**	WASKADA (3)	**Cum Wtr:**	2584149.8 m3
Mode:	Producing; Abandoned Zone; Abandoned; Pumping; Suspended...	**Pool Code:**	29A	**Cum Inj Oil:**	0.0 m3
		Unit Code:	329A07	**Cum Inj Gas:**	0.0 E3m3
				Cum Inj Wtr:	0.0 m3

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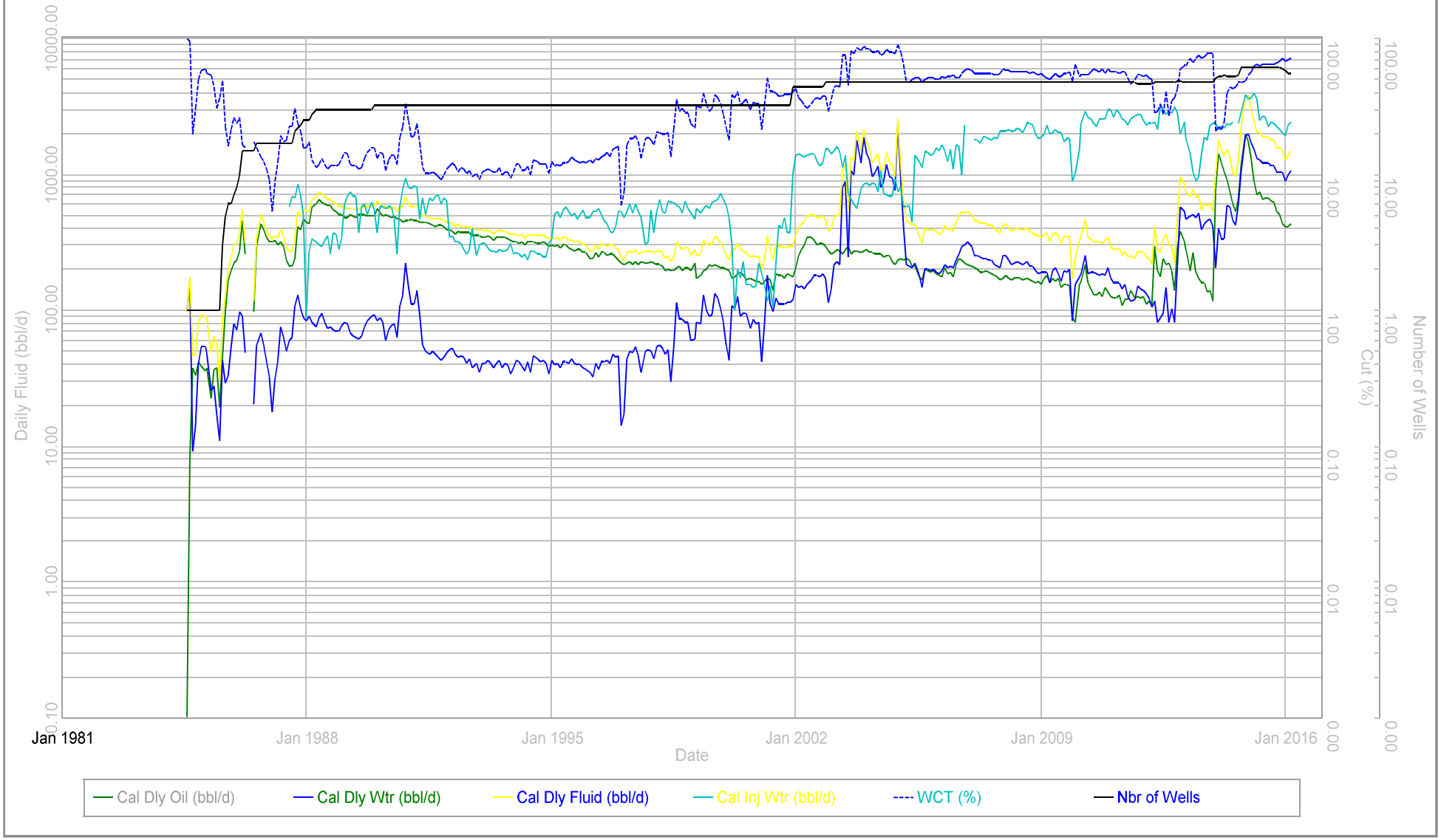
14
13
7
8
9
10
11
12

Figure No. 6a

Production Graph

Group:	waskada unit 16.lwell	**On Prod:**	1984-07 to 2016-02	**Cum Oil:**	3465556.3 bbl
# of Wells:	69	**Prod Form:**	AMRNTHL; WINNPGS	**Cum Gas:**	82515.8 mcf
Fluid:	Oil; Water Injection; Salt Water	**Field:**	WASKADA (3)	**Cum Wtr:**	2757403.3 bbl
Mode:	Producing; Injection; Abandoned Zone; Pumping; Disposal	**Pool Code:**	29A; 76	**Cum Inj Oil:**	0.0 bbl
		Unit Code:	329A16; 329A17	**Cum Inj Gas:**	0.0 mcf
				Cum Inj Wtr:	12076238.9 bbl



 Datum: NAD27™

Printed on 5/31/2016 11:39:10 AM

Well Information as of 5/5/2016 - Group Well Report

Figure No. 6b

Production Graph

Group:	waskada unit 17.lwell	**On Prod:**	1986-01 to 2016-02	**Cum Oil:**	1773342.0 bbl
# of Wells:	41	**Prod Form:**	AMRNTHL	**Cum Gas:**	43298.8 mcf
Fluid:	Oil; Water Injection	**Field:**	WASKADA (3)	**Cum Wtr:**	1188394.0 bbl
Mode:	Producing; Pumping; Injection; Abandoned Zone	**Pool Code:**	29A	**Cum Inj Oil:**	0.0 bbl
		Unit Code:	329A17	**Cum Inj Gas:**	0.0 mcf
				Cum Inj Wtr:	3763584.7 bbl

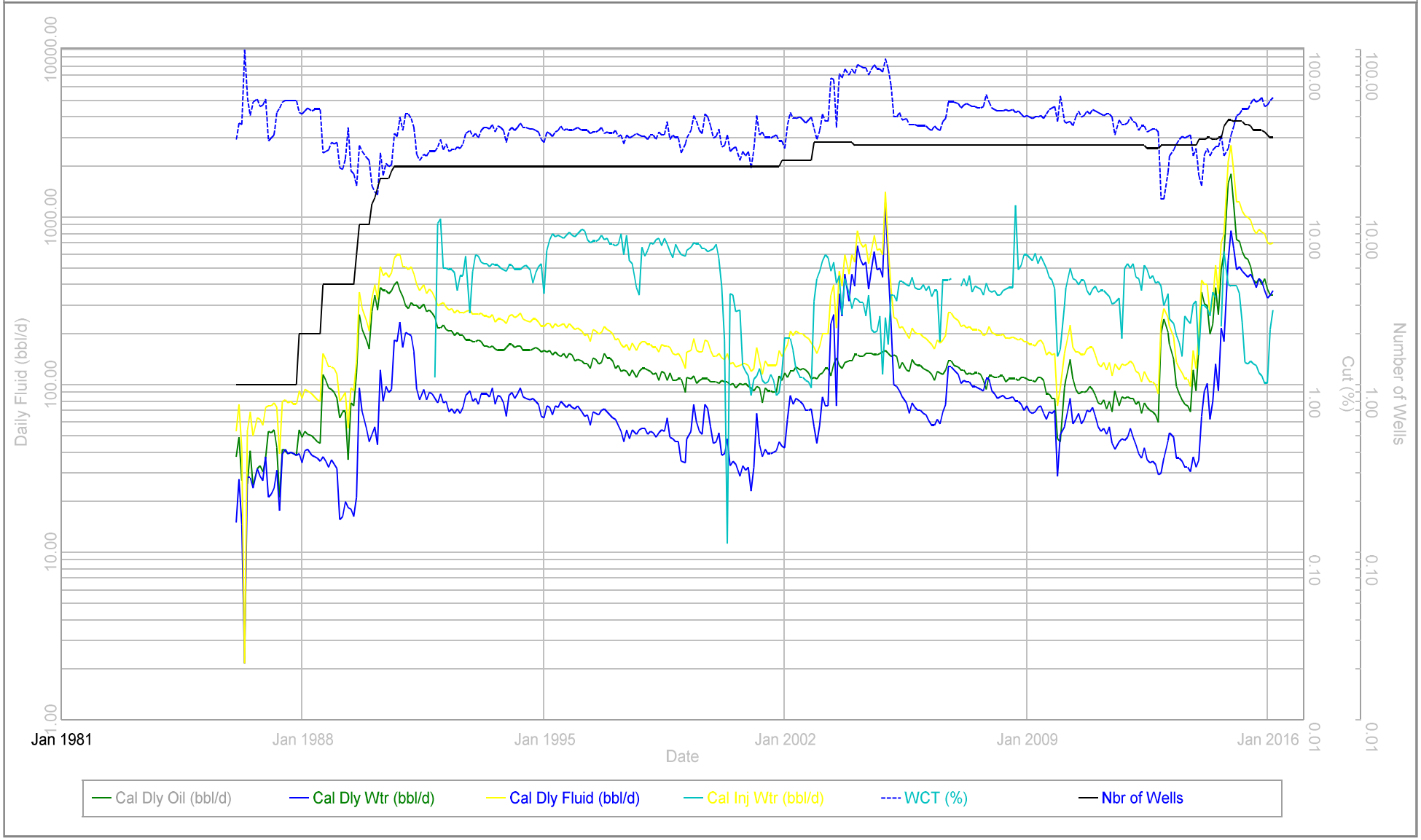


Figure No. 7

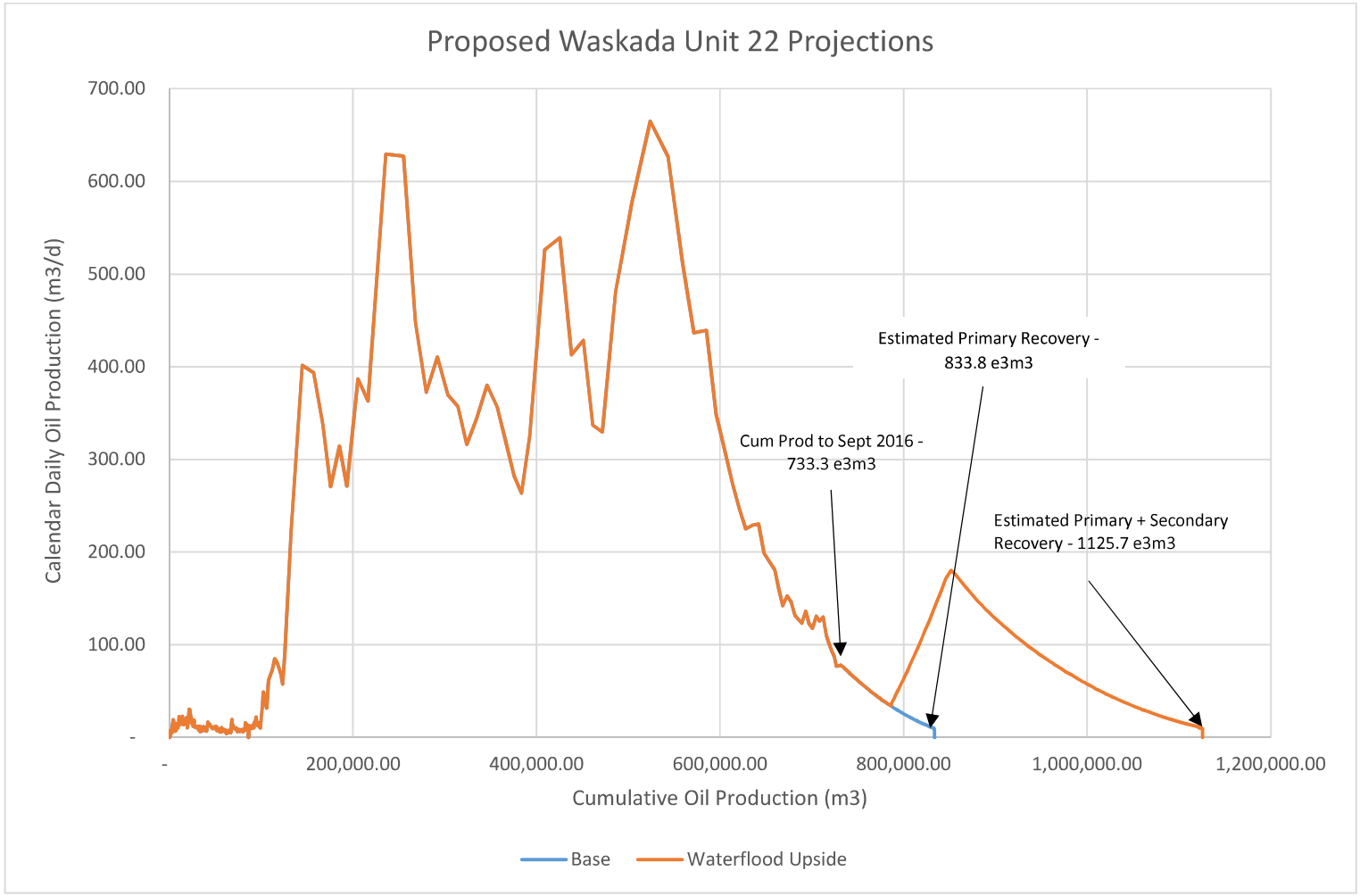
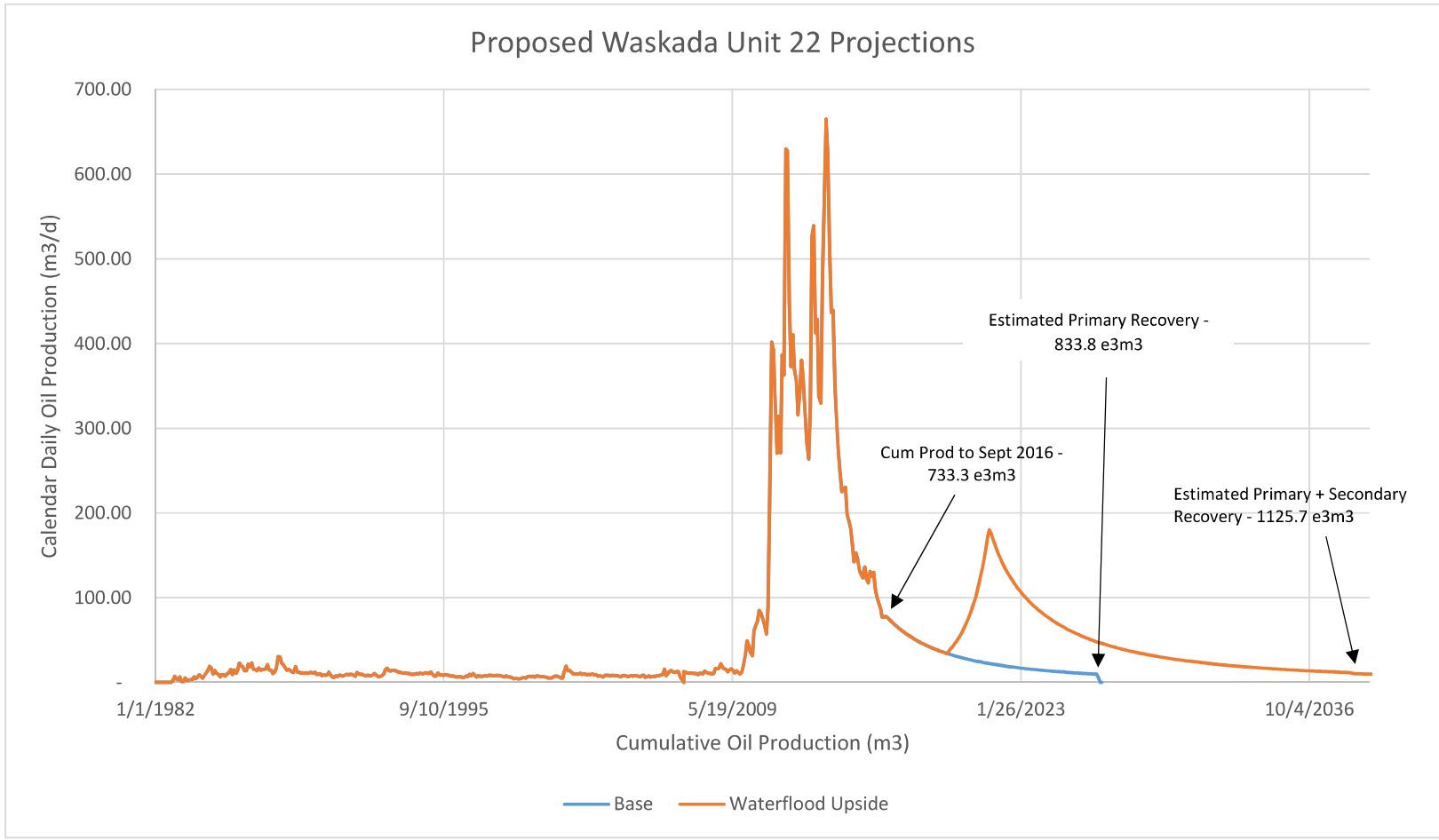

Proposed Waskada Unit 22 Projections
Calendar Daily Oil Production (m3/d)
700.00
600.00
500.00
400.00
300.00
200.00
100.00
-
-
200,000.00
400,000.00
600,000.00
800,000.00
1,000,000.00
1,200,000.00
Cumulative Oil Production (m3)
Estimated Primary Recovery - 833.8 e3m3
Cum Prod to Sept 2016 - 733.3 e3m3
Estimated Primary + Secondary Recovery - 1125.7 e3m3
Base
Waterflood Upside

Figure No. 8


Proposed Waskada Unit 22 Projections
700.00
600.00
500.00
400.00
300.00
200.00
100.00
-
Calendar Daily Oil Production (m3/d)
1/1/1982
9/10/1995
5/19/2009
1/26/2023
10/4/2036
Cumulative Oil Production (m3)
Estimated Primary Recovery - 833.8 e3m3
Cum Prod to Sept 2016 - 733.3 e3m3
Estimated Primary + Secondary Recovery - 1125.7 e3m3
Base
Waterflood Upside

P-530	M-530	BH-550/555	F-540	F-545	P-505 (P5)	F-500	P-510 (P6)	M-510	P-520 (P7)	M-520	V-565	M-560
CHARGE PUMP	PUMP MOTOR	BUILDING HEATER	WATER FILTER	WATER FILTER	WATER CHARGE PUMP	WATER FILTER	WATER DISPOSAL PUMP	PUMP MOTOR	WATER INJECTION PUMP	PUMP MOTOR	AIR RECEIVER	MOTOR
PEERLESS	BALDOR HP: 5 RPM: 3450	RUFFNECK FX4 ELECTRIC	JL FLUID STABILIZERS INC. MAWP: 1379 kPa @ 121°C/-29°C CRN: M-5439.23 S/N: JL9584	GRAND VALLEY DESIGN INC. MAWP: 1034 kPa @ 204°C/-29°C CRN: L3309.23 S/N: 126	VIKING PUMP OF CANDA INC. S/N: 030717	JL FILTRATION INC. MAWP: 1034 kPa @ 260°C/-29°C CRN: T1478.2134 S/N: JL2006-054	NATIONAL OILWELL MODEL: 100T-4L PUMP #: 10520 S/N: 212720 INPUT: 100HP @ 450 RPM MAX. OUTPUT: 90HP @ 450 RPM	TECO-WESTINGHOUSE HP: 75 HZ: 60, 6# VOLTS: 575 AMP: 69 S/N: K07394290001	NATIONAL OILWELL Model: A-336 TRIPLEX MAX. OUTPUT: 540m3/d @ 2550PSI 6"x2.25" Plunger	TOSHIBA INTERNATIONAL CORP. MODEL: B0754LFJ3OMHD01 HP: 75 VOLTS: 575 HZ: 60 RPM: 1775 S/N: 98090337	QUINCY MODEL: K-2 HP: 1/2 HZ: 60, 3# VOLTS: 575 SPEED: 1800 RPM		C-560 I/A COMPRESSOR

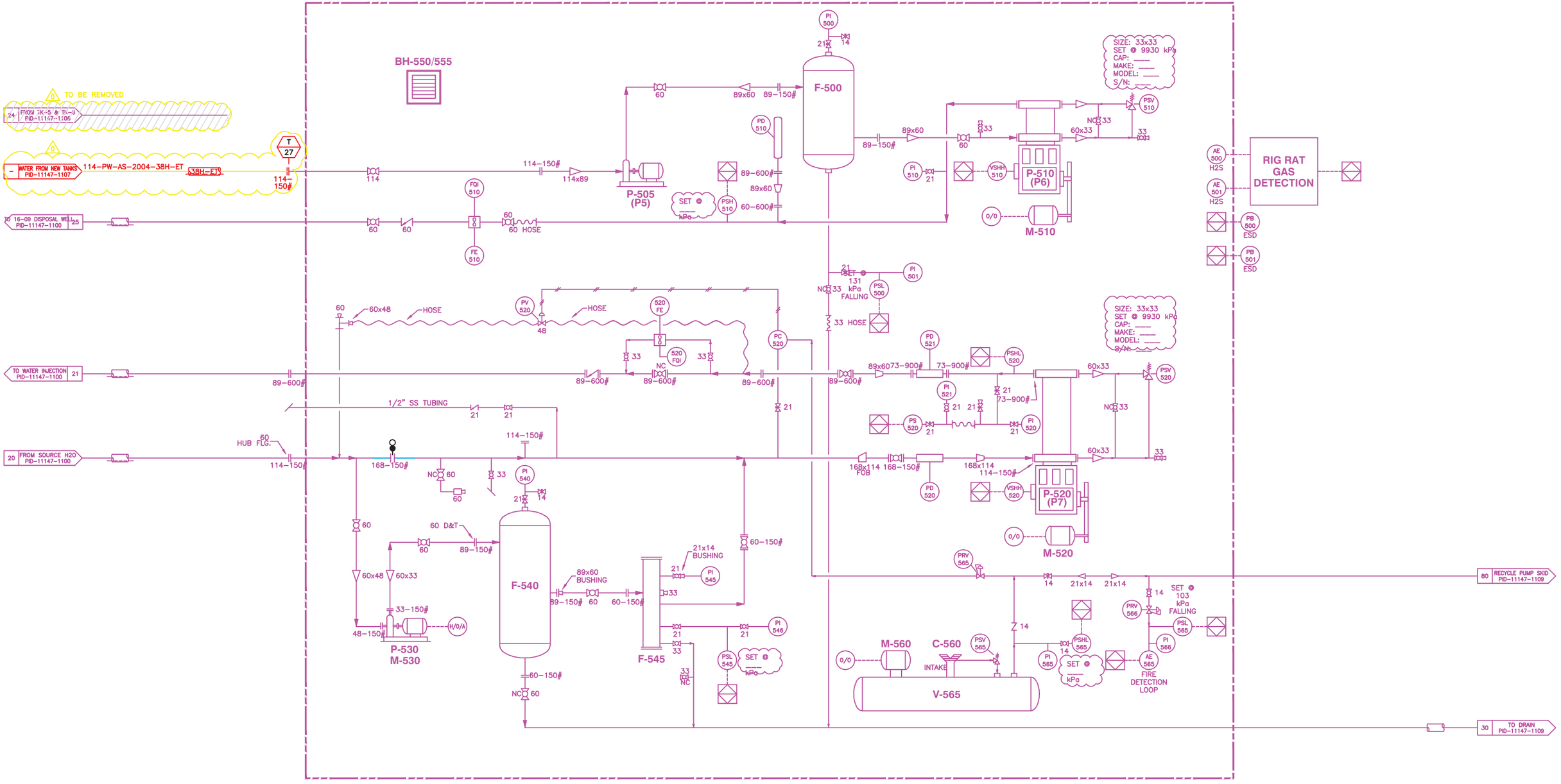


Figure No. 9

XREF: 11147PIDMSTR.DWG
Q:\11147\PID\L1147-1108.DWG
PLOTTED: JUN 25, 2012 10:06 AM

No.	Revision	By	Date	Chk.	E.Chk	E.App	Client
0	2011 ADDITIONS - ISSUED FOR CONSTRUCTION (GLE #11147)	AMP	12-02-28	CDK			
B	2011 ADDITIONS - ISSUED FOR REVIEW (GLE # 11147)	AMP	12-02-06	CDK			
A	2011 ADDITIONS - AS BUILT (GLE # 11147)	STK	11-10-14	MBG			

Stamps

Engineering Record		
RFE		
Client		
Approved		
Eng. Check		
Date		
Eng. By		
	IFC	AB

eegresources
GAS LIQUIDS ENGINEERING

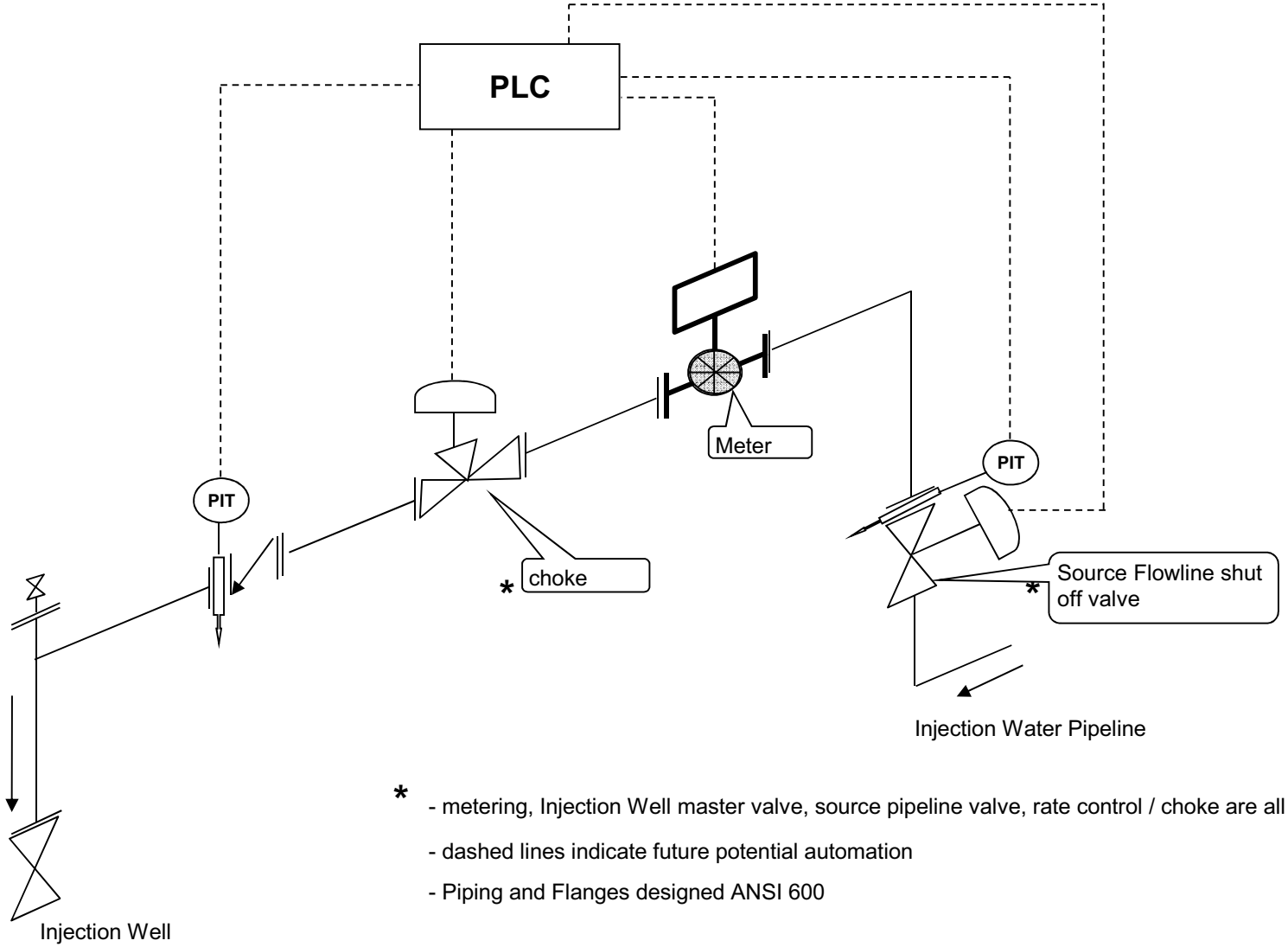
WASKADA 15-09 BATTERY

PROCESS & INSTRUMENTATION DIAGRAM
WATER INJECTION BUILDING
LSD 15-09-002-25 W1M

Scale	Size	Drawing Number	Rev.
NONE	D	PID-11147-1108	0

Waskada Unit No. 22

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 No. 11

Licence # 8772

Tundra Oil & Gas

WELLBORE SCHEMATIC

WELL NAME: WASKADA UNIT 22 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
PBTD	1700.0 Est

REMARKS 5.5" Monobore well. Both strings cemented to surface.

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

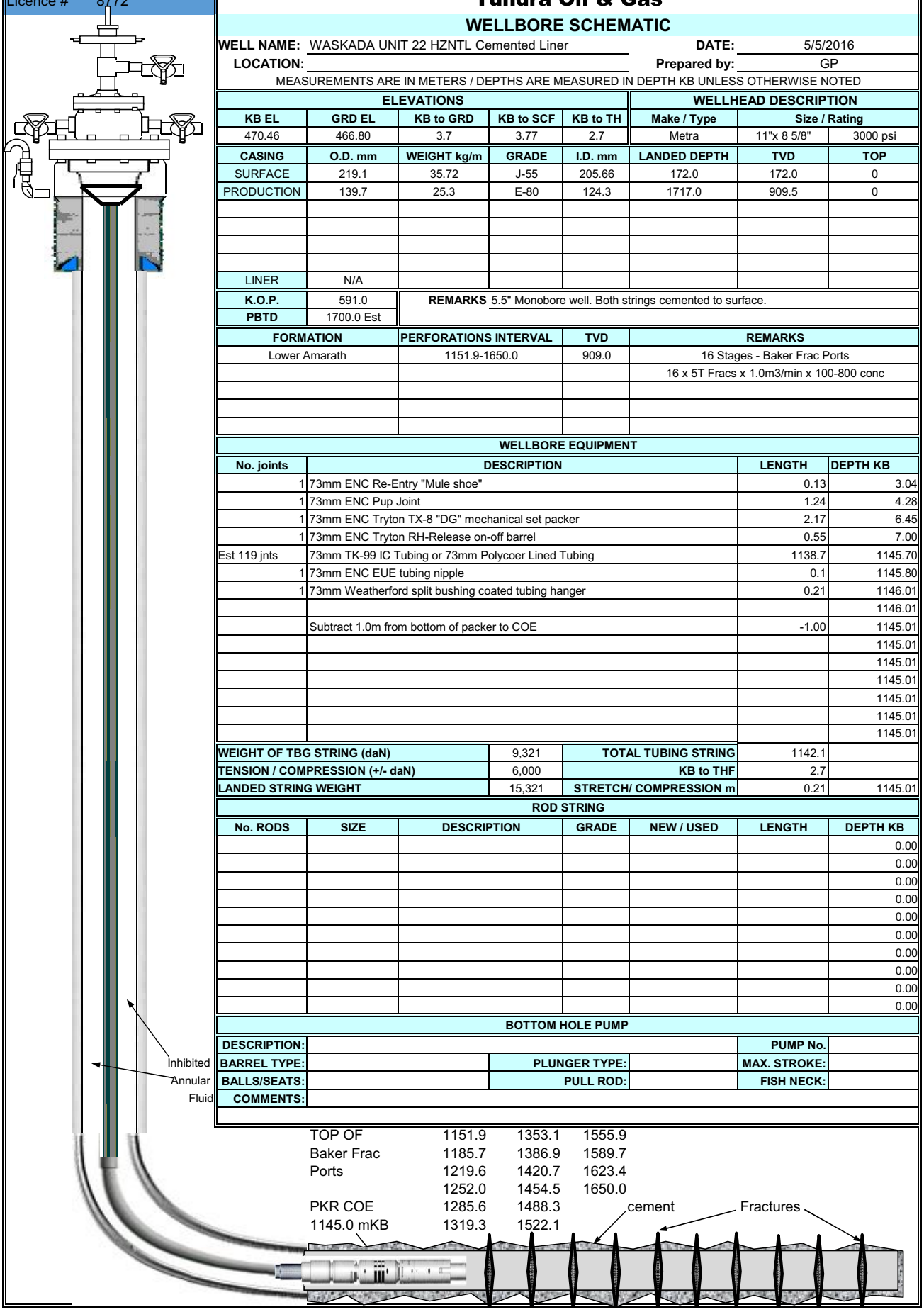
WEIGHT OF TBG STRING (daN)	9,321	TOTAL TUBING STRING	1142.1
TENSION / COMPRESSION (+/- daN)	6,000	KB to THF	2.7
LANDED STRING WEIGHT	15,321	STRETCH/ COMPRESSION m	0.21

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:					



Waskada Unit No. 22

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 15-9-2-25 Water Plant – Fiberglass
- New High Pressure Pipeline to Unit 20 injection wells – 2000 psi high pressure Fiberglass

Facilities

- 15-9-2-25 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 12

** subject to final design and engineering

Proposed Waskada Unit No. 22

Application for Enhanced Oil Recovery Waterflood Project

List of Tables

TABLE NO. 2: TRACT FACTOR CALCULATIONS FOR WASKADA UNIT NO. 22

TRACT FACTORS BASED ON OIL-IN-PLACE (OOIP) - CUMULATIVE PRODUCTION & LAST 12 MONTHS OF PRODUCTION TO SEPTEMBER 2016

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)	Alloct Last 12 Months Prod by LSD/Total Prod	50% OOIP-Cum + 50% Last 12 Months Prod Tract Factor	Tract
01-09	01-09-001-25W1M	109,701	7,961.7	0.0	7,961.7	101,740	0.01109472829	388.8	0.0	388.8	0.01319670000	0.01214571415	01-09-001-25W1M
02-09	02-09-001-25W1M	107,083	8,055.7	0.0	8,055.7	99,027	0.01079892501	396.6	0.0	396.6	0.01346346154	0.01213119327	02-09-001-25W1M
05-09	05-09-001-25W1M	108,450	5,288.1	0.0	5,288.1	103,162	0.01124983955	0.0	0.0	0.0	0.00000000000	0.00562491977	05-09-001-25W1M
06-09	06-09-001-25W1M	109,235	5,202.3	0.0	5,202.3	104,033	0.01134484496	0.0	0.0	0.0	0.00000000000	0.00567242248	06-09-001-25W1M
07-09	07-09-001-25W1M	110,917	5,935.4	0.0	5,935.4	104,982	0.01144832488	0.0	0.0	0.0	0.00000000000	0.00572416244	07-09-001-25W1M
08-09	08-09-001-25W1M	113,714	6,391.0	0.0	6,391.0	107,323	0.01170360942	0.0	0.0	0.0	0.00000000000	0.00585180471	08-09-001-25W1M
09-09	09-09-001-25W1M	116,401	6,527.1	0.0	6,527.1	109,874	0.01198177509	0.0	0.0	0.0	0.00000000000	0.00599088754	09-09-001-25W1M
10-09	10-09-001-25W1M	112,824	7,737.2	0.0	7,737.2	105,087	0.01145971872	0.0	0.0	0.0	0.00000000000	0.00572985936	10-09-001-25W1M
11-09	11-09-001-25W1M	111,835	10,001.7	0.0	10,001.7	101,833	0.01110493071	0.0	0.0	0.0	0.00000000000	0.00555246536	11-09-001-25W1M
12-09	12-09-001-25W1M	111,261	8,861.9	0.0	8,861.9	102,399	0.01116663886	458.8	0.0	458.8	0.01557348242	0.01337006064	12-09-001-25W1M
13-09	13-09-001-25W1M	114,592	10,686.9	0.0	10,686.9	103,905	0.01133085350	372.5	0.0	372.5	0.01264353724	0.01198719537	13-09-001-25W1M
14-09	14-09-001-25W1M	114,789	12,023.4	0.0	12,023.4	102,765	0.01120660571	401.1	0.0	401.1	0.01361570517	0.01241115544	14-09-001-25W1M
15-09	15-09-001-25W1M	113,070	9,464.0	0.0	9,464.0	103,606	0.01129828113	298.0	0.0	298.0	0.01011461840	0.01070644977	15-09-001-25W1M
16-09	16-09-001-25W1M	116,873	8,128.9	0.0	8,128.9	108,744	0.01185859426	272.2	0.0	272.2	0.00923979780	0.01054919603	16-09-001-25W1M
01-15	01-15-001-25W1M	115,248	3,957.6	0.0	3,957.6	111,291	0.01213628075	0.0	0.0	0.0	0.00000000000	0.00606814037	01-15-001-25W1M
02-15	02-15-001-25W1M	117,358	6,803.4	0.0	6,803.4	110,555	0.01205601572	0.0	0.0	0.0	0.00000000000	0.00602800786	02-15-001-25W1M
03-15	03-15-001-25W1M	119,350	12,596.3	0.0	12,596.3	106,754	0.01164154550	0.0	0.0	0.0	0.00000000000	0.00582077275	03-15-001-25W1M
04-15	04-15-001-25W1M	120,260	8,556.7	2,704.5	11,261.2	108,998	0.01188630973	0.0	0.0	0.0	0.00000000000	0.00594315486	04-15-001-25W1M
05-15	05-15-001-25W1M	120,867	7,013.4	170.9	7,184.3	113,683	0.01239712196	213.3	0.0	213.3	0.00723973021	0.00981842609	05-15-001-25W1M
06-15	06-15-001-25W1M	120,039	12,190.4	0.0	12,190.4	107,848	0.01176087680	0.0	0.0	0.0	0.00000000000	0.00588043840	06-15-001-25W1M
07-15	07-15-001-25W1M	119,369	11,800.3	0.0	11,800.3	107,569	0.01173042878	0.0	0.0	0.0	0.00000000000	0.00586521439	07-15-001-25W1M
08-15	08-15-001-25W1M	117,792	5,843.1	0.0	5,843.1	111,949	0.01220807077	0.0	0.0	0.0	0.00000000000	0.00610403539	08-15-001-25W1M
09-15	09-15-001-25W1M	119,500	7,580.9	0.0	7,580.9	111,919	0.01220477400	235.6	0.0	235.6	0.00799674247	0.01010075823	09-15-001-25W1M
10-15	10-15-001-25W1M	120,005	6,761.3	0.0	6,761.3	113,244	0.01234928022	196.1	0.0	196.1	0.00665674875	0.00950301448	10-15-001-25W1M
11-15	11-15-001-25W1M	120,870	6,992.1	0.0	6,992.1	113,878	0.01241842948	559.1	0.0	559.1	0.01897871945	0.01569857446	11-15-001-25W1M
12-15	12-15-001-25W1M	123,276	6,992.1	0.0	6,992.1	116,283	0.01268074757	559.1	0.0	559.1	0.01897871945	0.01582973351	12-15-001-25W1M
13-15	13-15-001-25W1M	121,290	5,646.4	531.5	6,177.9	115,112	0.01255298999	391.2	0.0	391.2	0.01327830026	0.01291564512	13-15-001-25W1M
14-15	14-15-001-25W1M	119,546	7,771.3	0.0	7,771.3	111,774	0.01218904060	563.7	0.0	563.7	0.01913316763	0.01566110412	14-15-001-25W1M
15-15	15-15-001-25W1M	120,220	4,243.3	0.0	4,243.3	115,977	0.01264727931	150.0	0.0	150.0	0.00509169819	0.00886948875	15-15-001-25W1M
16-15	16-15-001-25W1M	121,213	5,334.5	0.0	5,334.5	115,879	0.01263664184	202.6	0.0	202.6	0.00687790768	0.00975727476	16-15-001-25W1M
01-16	01-16-001-25W1M	118,770	7,000.2	1,121.7	8,121.9	110,648	0.01206619764	0.0	0.0	0.0	0.00000000000	0.00603309882	01-16-001-25W1M
02-16	02-16-001-25W1M	113,862	4,880.1	6,715.0	11,595.1	102,267	0.01115222818	0.0	0.0	0.0	0.00000000000	0.00557611409	02-16-001-25W1M
03-16	03-16-001-25W1M	118,684	7,319.9	3,771.5	11,091.4	107,593	0.01173301108	585.0	0.0	585.0	0.01985836679	0.01579568893	03-16-001-25W1M
04-16	04-16-001-25W1M	118,937	8,859.9	5,538.5	14,398.4	104,538	0.01139994392	805.9	0.0	805.9	0.02735748350	0.01937871371	04-16-001-25W1M
05-16	05-16-001-25W1M	124,678	7,467.5	5,135.6	12,603.1	112,075	0.01222178045	0.0	0.0	0.0	0.00000000000	0.00611089023	05-16-001-25W1M
06-16	06-16-001-25W1M	121,037	6,429.5	6,453.0	12,882.5	108,155	0.01179428224	0.0	0.0	0.0	0.00000000000	0.00589714112	06-16-001-25W1M
08-16	08-16-001-25W1M	126,458	7,268.9	4,677.0	11,945.9	114,513	0.01248763423	0.0	0.0	0.0	0.00000000000	0.00624381711	08-16-001-25W1M
09-16	09-16-001-25W1M	127,811	1,955.7	0.0	1,955.7	125,856	0.01372461502	42.8	0.0	42.8	0.00145268318	0.00758864910	09-16-001-25W1M
01-17	01-17-001-25W1M	118,091	5,163.4	0.0	5,163.4	112,928	0.01231478872	0.0	0.0	0.0	0.00000000000	0.00615739436	01-17-001-25W1M
02-17	02-17-001-25W1M	117,498	4,969.7	0.0	4,969.7	112,528	0.01227124638	0.0	0.0	0.0	0.00000000000	0.00613562319	02-17-001-25W1M
03-17	03-17-001-25W1M	118,736	4,896.6	0.0	4,896.6	113,840	0.01241427544	0.0	0.0	0.0	0.00000000000	0.00620713772	03-17-001-25W1M
04-17	04-17-001-25W1M	116,698	4,678.8	0.0	4,678.8	112,019	0.01221575257	0.0	0.0	0.0	0.00000000000	0.00610787628	04-17-001-25W1M
05-17	05-17-001-25W1M	122,134	4,952.1	0.0	4,952.1	117,182	0.01277872134	0.0	0.0	0.0	0.00000000000	0.00638936067	05-17-001-25W1M
06-17	06-17-001-25W1M	124,811	4,799.5	2,786.6	7,586.1	117,225	0.01278345437	0.0	0.0	0.0	0.00000000000	0.00639172718	06-17-001-25W1M
07-17	07-17-001-25W1M	121,088	4,948.6	0.0	4,948.6	116,139	0.01266502950	0.0	0.0	0.0	0.00000000000	0.00633251475	07-17-001-25W1M
08-17	08-17-001-25W1M	120,999	5,236.5	1,839.5	7,076.0	113,923	0.01242331911	0.0	0.0	0.0	0.00000000000	0.00621165956	08-17-001-25W1M
09-17	09-17-001-25W1M	123,926	5,641.6	0.0	5,641.6	118,284	0.01289892858	0.0	0.0	0.0	0.00000000000	0.00644946429	09-17-001-25W1M
10-17	10-17-001-25W1M	123,252	5,641.6	1,902.2	7,543.8	115,708	0.01261798159	0.0	0.0	0.0	0.00000000000	0.00630899080	10-17-001-25W1M

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)	Alloct Last 12 Months Prod by LSD/Total Prod	50% OOIP-Cum + 50% Last 12 Months Prod Tract Factor	Tract
15-17	15-17-001-25W1M	131,994	4,097.3	1,732.2	5,829.5	126,165	0.01375832463	0.0	0.0	0.0	0.00000000000	0.00687916232	15-17-001-25W1M
16-17	16-17-001-25W1M	124,851	4,097.3	2,719.9	6,817.2	118,034	0.01287163667	0.0	0.0	0.0	0.00000000000	0.00643581833	16-17-001-25W1M
01-20	01-20-001-25W1M	127,641	5,442.4	3,398.5	8,840.9	118,800	0.01295522826	351.9	0.0	351.9	0.01194450889	0.01244986858	01-20-001-25W1M
02-20	02-20-001-25W1M	132,893	6,001.2	992.0	6,993.2	125,900	0.01372938270	0.0	0.0	0.0	0.00000000000	0.00686469135	02-20-001-25W1M
07-20	07-20-001-25W1M	124,280	17,439.7	3,444.7	20,884.4	103,396	0.01127536238	0.0	0.0	0.0	0.00000000000	0.00563768119	07-20-001-25W1M
08-20	08-20-001-25W1M	125,148	16,744.6	10,938.2	27,682.8	97,466	0.01062866111	538.0	0.0	538.0	0.01826287538	0.01444576824	08-20-001-25W1M
09-20	09-20-001-25W1M	120,826	15,327.7	3,318.0	18,645.7	102,180	0.01114274205	481.4	0.0	481.4	0.01634071036	0.01374172621	09-20-001-25W1M
10-20	10-20-001-25W1M	122,924	16,114.3	9,138.0	25,252.3	97,672	0.01065114740	0.0	0.0	0.0	0.00000000000	0.00532557370	10-20-001-25W1M
01-21	01-21-001-25W1M	122,077	5,508.1	2,113.2	7,621.3	114,455	0.01248140384	672.7	0.0	672.7	0.02283454387	0.01765797385	01-21-001-25W1M
07-21	07-21-001-25W1M	118,873	5,272.1	5,922.8	11,194.9	107,678	0.01174234964	480.4	16.3	496.7	0.01685867409	0.01430051187	07-21-001-25W1M
08-21	08-21-001-25W1M	117,045	6,682.5	2,126.1	8,808.6	108,236	0.01180320197	639.3	0.0	639.3	0.02170177257	0.01675248727	08-21-001-25W1M
09-21	09-21-001-25W1M	112,132	3,195.5	5,782.3	8,977.8	103,154	0.01124901273	368.3	21.9	390.2	0.01324362669	0.01224631971	09-21-001-25W1M
16-21	16-21-001-25W1M	114,266	5,223.2	7,253.6	12,476.8	101,789	0.01110011792	637.0	35.3	672.3	0.02282210695	0.01696111244	16-21-001-25W1M
01-22	01-22-001-25W1M	121,535	3,946.1	0.0	3,946.1	117,589	0.01282307300	0.0	0.0	0.0	0.00000000000	0.00641153650	01-22-001-25W1M
02-22	02-22-001-25W1M	119,800	3,796.9	0.0	3,796.9	116,003	0.01265018601	0.0	0.0	0.0	0.00000000000	0.00632509300	02-22-001-25W1M
03-22	03-22-001-25W1M	117,881	6,459.4	172.8	6,632.2	111,249	0.01213172734	1,031.8	0.0	1,031.8	0.03502346108	0.02357759421	03-22-001-25W1M
04-22	04-22-001-25W1M	116,010	7,459.4	82.3	7,541.7	108,468	0.01182848841	1,167.1	0.0	1,167.1	0.03961565548	0.02572207194	04-22-001-25W1M
05-22	05-22-001-25W1M	118,188	8,238.4	3,543.8	11,782.2	106,406	0.01160357735	1,263.5	0.0	1,263.5	0.04289044019	0.02724700877	05-22-001-25W1M
06-22	06-22-001-25W1M	119,606	7,114.3	471.0	7,585.3	112,021	0.01221590236	1,126.4	0.0	1,126.4	0.03823488822	0.02522539529	06-22-001-25W1M
07-22	07-22-001-25W1M	120,148	7,063.6	0.0	7,063.6	113,085	0.01233191660	282.4	0.0	282.4	0.00958733589	0.01095962625	07-22-001-25W1M
08-22	08-22-001-25W1M	121,565	7,178.7	0.0	7,178.7	114,386	0.01247384984	286.6	0.0	286.6	0.00972874155	0.01110129569	08-22-001-25W1M
09-22	09-22-001-25W1M	121,430	10,356.3	0.0	10,356.3	111,073	0.01211259326	1,067.7	0.0	1,067.7	0.03624152077	0.02417705701	09-22-001-25W1M
10-22	10-22-001-25W1M	119,503	10,124.9	0.0	10,124.9	109,378	0.01192769223	1,056.4	0.0	1,056.4	0.03585890756	0.02389329990	10-22-001-25W1M
11-22	11-22-001-25W1M	118,751	4,002.7	0.0	4,002.7	114,748	0.01251331500	163.3	0.0	163.3	0.00554212037	0.00902771768	11-22-001-25W1M
12-22	12-22-001-25W1M	116,531	4,068.2	0.0	4,068.2	112,463	0.01226413680	171.5	0.0	171.5	0.00582271765	0.00904342723	12-22-001-25W1M
13-22	13-22-001-25W1M	117,571	12,545.3	0.0	12,545.3	105,026	0.01145309613	1,467.3	0.0	1,467.3	0.04980838563	0.03063074088	13-22-001-25W1M
14-22	14-22-001-25W1M	119,528	12,485.3	0.0	12,485.3	107,043	0.01167306684	1,457.0	0.0	1,457.0	0.04945580010	0.03056443347	14-22-001-25W1M
15-22	15-22-001-25W1M	120,401	9,466.4	0.0	9,466.4	110,935	0.01209745649	1,721.1	0.0	1,721.1	0.05842379273	0.03526062461	15-22-001-25W1M
16-22	16-22-001-25W1M	121,055	9,860.3	0.0	9,860.3	111,194	0.01212576205	1,782.4	0.0	1,782.4	0.06050388599	0.03631482402	16-22-001-25W1M
11-23	11-23-001-25W1M	126,980	8,191.9	1,615.6	9,807.5	117,172	0.01277769330	859.2	0.0	859.2	0.02916634420	0.02097201875	11-23-001-25W1M
12-23	12-23-001-25W1M	123,479	8,692.3	2,358.0	11,050.3	112,429	0.01226038945	909.3	0.0	909.3	0.03086660806	0.02156349876	12-23-001-25W1M
13-23	13-23-001-25W1M	122,191	10,513.5	0.0	10,513.5	111,678	0.01217849934	1,168.9	0.0	1,168.9	0.03967736231	0.02592793083	13-23-001-25W1M
14-23	14-23-001-25W1M	124,177	10,302.1	1,483.0	11,785.1	112,392	0.01225637062	1,142.9	0.0	1,142.9	0.03879564330	0.02552600696	14-23-001-25W1M
03-26	03-26-001-25W1M	118,612	6,757.6	0.0	6,757.6	111,855	0.01219780899	0.0	0.0	0.0	0.00000000000	0.00609890450	03-26-001-25W1M
04-26	04-26-001-25W1M	119,112	7,162.1	0.0	7,162.1	111,950	0.01220813381	0.0	0.0	0.0	0.00000000000	0.00610406691	04-26-001-25W1M
		9,903,423	**621,390**	**111,954**	**733,344**	**9,170,079**	**1.00000000000**	**29,386.2**	**73.5**	**29,459.7**	**1.00000000000**	**1.00000000000**	

Table No. 3: Waskada Unit No. 22

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)*	*Cal Dly Gas (E3m3/d)*	*Monthly Gas (E3m3)*	*Cum Prd Gas (E3m3)*	*WCT (%)*
100/01-09-001-25W1/0	007282	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	8/24/2010	Sep-2016	0.7	22.2	7785.8	2.9	87.2	13024.5	0.0	0.8	204.9	79.71
102/01-09-001-25W1/0	008012	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/28/2011	Sep-2016	0.1	4.2	4432.2	9.5	283.7	26368.8	0.0	0.9	222.4	98.54
103/01-09-001-25W1/0	008013	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/28/2011	Sep-2016	0.5	14.2	4829.2	9.6	286.9	21807.7	0.0	0.9	562.4	95.28
100/05-09-001-25W1/0	007791	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	2/17/2011	Sep-2016	0.8	22.7	5714.8	1.2	34.8	6080.6	0.0	0.8	219.1	60.52
102/05-09-001-25W1/0	008017	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/22/2011	May-2015	0.0	0.4	2665.2	10.2	314.9	66230.4	0.0	0.0	254.9	99.87
103/05-09-001-25W1/0	008018	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/21/2011	Apr-2015	0.1	1.6	2097.9	26.8	803.2	71174.6	0.0	0.1	121.1	99.80
100/08-09-001-25W1/0	008019	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/26/2011	Sep-2016	0.8	25.1	6483.1	4.1	124.2	9707.4	0.0	0.8	362.0	83.19
102/08-09-001-25W1/0	008020	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/26/2011	Jul-2013	0.0	1.5	592.7	19.0	589.2	43251.7	0.0	0.5	80.7	99.75
103/08-09-001-25W1/0	008021	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/23/2011	Apr-2015	0.0	1.1	4172.2	21.7	651.7	62049.5	0.0	0.1	345.5	99.83
100/10-09-001-25W1/0	008251	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	12/2/2011	Apr-2015	0.0	0.4	897.7	20.6	619.0	58409.4	0.0	0.0	104.4	99.94
102/10-09-001-25W1/0	008252	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	11/24/2011	Sep-2016	0.2	5.2	7151.7	11.8	354.2	26706.5	0.0	0.9	639.9	98.55
103/10-09-001-25W1/0	008253	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	11/24/2011	Jul-2016	0.0	1.4	6676.0	0.3	10.4	4144.1	0.0	0.8	859.9	88.14
100/11-09-001-25W1/0	008254	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	12/19/2011	Sep-2016	0.4	12.5	5786.6	5.6	167.5	12751.8	0.0	0.8	472.1	93.06
102/11-09-001-25W1/0	008255	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	12/16/2011	Sep-2016	0.8	22.6	4000.5	1.1	34.2	4756.3	0.0	0.9	282.3	60.21
103/11-09-001-25W1/0	008256	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	12/19/2011	Sep-2016	0.3	9.7	7449.0	1.0	30.7	7173.2	0.0	0.9	732.4	75.99
104/11-09-001-25W1/0	009573	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	11/29/2013	Sep-2016	0.1	2.2	1175.4	0.3	9.5	1700.1	0.0	0.9	10.4	81.20
100/14-09-001-25W1/0	008257	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	12/14/2011	Jun-2016	0.0	0.0	6400.8	0.1	3.5	6641.2	0.0	0.9	508.4	100.00
102/14-09-001-25W1/0	008258	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	12/14/2011	Sep-2016	0.0	1.3	7329.3	0.0	0.9	4929.9	0.0	0.9	654.0	40.91
103/14-09-001-25W1/0	008259	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	12/14/2011	Sep-2016	0.6	19.2	8728.7	0.6	17.3	3256.0	0.0	0.9	666.7	47.40
100/15-09-001-25W1/0	008260	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	12/2/2011	Sep-2016	0.8	24.3	5868.1	0.7	21.3	3296.9	0.0	0.8	628.8	46.71
102/15-09-001-25W1/0	008261	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	11/30/2011	Sep-2016	0.1	1.9	4352.9	6.3	188.7	9695.3	0.0	0.9	334.8	99.00
103/15-09-001-25W1/0	008262	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	12/6/2011	Nov-2015	0.0	0.0	5374.0	3.6	108.8	23185.9	0.0	0.8	460.0	100.00
100/16-09-001-25W1/0	009524	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/26/2013	Sep-2016	0.5	15.2	1794.7	4.0	119.5	5336.4	0.0	0.8	17.0	88.72
100/01-15-001-25W1/0	007714	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/24/2011	Sep-2016	0.0	1.4	5026.2	2.6	76.5	21083.9	0.0	0.8	467.8	98.20
102/01-15-001-25W1/0	008147	Horizontal	LOWER AMARANTH A	AMRNTHL	Suspended	10/5/2011	Apr-2015	0.0	0.4	2017.9	13.2	395.9	52827.0	0.0	0.0	460.5	99.90
103/01-15-001-25W1/0	008148	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	10/4/2011	Sep-2016	1.5	46.1	6383.8	6.0	180.4	13618.0	0.0	0.9	585.9	79.65
102/05-15-001-25W1/0	007715	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	4/1/2011	Sep-2016	0.0	0.4	7784.7	4.8	143.0	23102.5	0.0	0.8	649.1	99.72
103/05-15-001-25W1/0	007716	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/29/2011	Sep-2016	0.1	3.5	6688.2	0.6	19.3	8091.4	0.0	0.9	657.2	84.65
104/05-15-001-25W1/0	007717	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/28/2011	Sep-2016	0.3	8.3	7276.6	2.0	59.5	9170.8	0.0	0.9	718.4	87.76
100/07-15-001-25W1/0	007258	Horizontal	LOWER AMARANTH A	AMRNTH	Producing	6/8/2010	May-2015	0.0	0.2	9442.9	0.1	1.8	27912.5	0.0	0.0	239.9	90.00
102/07-15-001-25W1/2	009463	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/7/2013	Jan-2016	0.1	4.4	1136.4	3.1	95.8	2871.7	0.0	0.0	6.7	95.61
100/08-15-001-25W1/0	007718	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/24/2011	Feb-2014	0.2	5.1	1916.1	60.5	1693.7	65442.1	0.1	1.9	102.8	99.70
102/08-15-001-25W1/0	007719	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/24/2011	Sep-2016	0.0	1.3	3729.7	2.7	80.9	7822.8	0.0	0.9	287.5	98.42
100/09-15-001-25W1/0	007732	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/30/2011	Sep-2016	0.3	10.0	4984.3	2.9	88.2	8805.5	0.0	0.8	393.1	89.82
102/09-15-001-25W1/0	007733	Horizontal	LOWER AMARANTH A	AMRNTHL	Suspended	3/30/2011	Nov-2015	0.3	8.7	4238.1	9.0	269.3	20956.8	0.0	0.8	304.7	96.87
103/09-15-001-25W1/0	007734	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/31/2011	Sep-2016	0.8	25.4	4911.1	0.9	26.7	3753.6	0.0	0.9	331.7	51.25
100/12-15-001-25W1/0	007872	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	6/11/2011	Sep-2016	0.4	11.4	6249.9	0.2	7.2	3419.7	0.0	0.8	16.2	38.71
102/12-15-001-25W1/0	007873	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	6/5/2011	Sep-2016	1.1	31.7	6375.2	1.4	42.6	5264.9	0.0	0.9	18.0	57.34
102/13-15-001-25W1/0	007874	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	6/11/2011	Sep-2016	0.8	23.9	6969.2	1.6	48.6	8092.4	0.0	0.8	14.4	67.03
103/13-15-001-25W1/0	007875	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	6/5/2011	Sep-2016	1.3	37.6	7808.2	1.9	55.6	7961.6	0.0	0.9	15.3	59.66
102/16-15-001-25W1/0	008156	Horizontal	LOWER AMARANTH A	AMRNTHL	Suspended	12/28/2011	Dec-2015	0.2	7.5	2590.6	0.8	26.1	1837.8	0.0	0.8	138.2	77.68
103/16-15-001-25W1/0	008157	Horizontal	LOWER AMARANTH A	AMRNTHL	Suspended	12/30/2011	Feb-2016	0.1	1.9	1995.7	0.3	8.6	2183.7	0.0	0.8	137.6	81.90
104/16-15-001-25W1/0	008158	Horizontal	LOWER AMARANTH A	AMRNTHL	Suspended	12/30/2011	Jun-2016	0.2	7.3	2740.0	2.8	85.1	8881.6	0.0	0.8	163.2	92.10
105/16-15-001-25W1/0	009464	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/7/2013	Sep-2016	0.2	7.1	2430.4	2.1	63.4	3588.3	0.0	0.9	14.1	89.93

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)	Cal Dly Gas (E3m3/d)	Monthly Gas (E3m3)	Cum Prd Gas (E3m3)	WCT (%)
100/01-16-001-25W1/0	005653	Vertical	LOWER AMARANTH A	AMRNTHL	Producing	1/23/2006	Mar-2012	0.1	1.8	1121.7	0.1	1.9	23100.3	0.0	0.1	0.1	51.35
102/01-16-001-25W1/0	007735	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	10/16/2011	Apr-2015	0.0	1.0	2867.5	24.1	722.2	83395.9	0.0	0.0	1754.4	99.86
103/01-16-001-25W1/0	007736	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	10/16/2011	Sep-2016	0.4	11.2	8623.7	9.5	284.6	37485.1	0.0	0.9	843.6	96.21
104/01-16-001-25W1/0	007737	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	10/15/2011	Sep-2016	1.9	56.9	8725.0	6.6	199.3	14727.5	0.0	0.9	780.6	77.79
105/01-16-001-25W1/0	008609	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	8/17/2012	Sep-2016	0.5	16.4	4443.2	1.0	31.4	6062.4	0.0	0.8	129.4	65.69
106/01-16-001-25W1/0	008622	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	8/16/2012	Sep-2016	0.3	8.2	4688.4	0.2	7.2	2660.5	0.0	0.9	147.3	46.75
107/01-16-001-25W1/3	008715	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	8/16/2012	Apr-2013	0.0	0.0	56.1	32.1	963.3	5023.6	0.0	0.0	0.0	100.00
100/02-16-001-25W1/0	002898	Vertical	LOWER AMARANTH A	AMRNTHL	Producing	12/15/1982	Jun-2012	0.0	0.0	6715.0	0.0	1.0	2714.7	0.0	0.0	0.0	100.00
100/03-16-001-25W1/0	004020	Vertical	LOWER AMARANTH A	AMRNTHL	Producing	12/15/1987	Jun-2012	0.0	0.6	3771.5	0.0	0.0	997.5	0.0	0.0	0.0	0.00
100/04-16-001-25W1/0	003971	Vertical	LOWER AMARANTH A	AMRNTHL	Producing	10/11/1987	Jun-2012	0.0	0.1	5538.5	0.0	0.6	2284.3	0.0	0.0	0.0	85.71
102/04-16-001-25W1/0	008623	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	8/13/2012	Sep-2016	0.3	8.7	4523.2	0.2	6.5	2654.6	0.0	0.9	101.0	42.76
103/04-16-001-25W1/0	008624	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	8/13/2012	Sep-2016	1.1	33.1	4182.5	1.2	35.9	1815.4	0.0	0.9	64.3	52.03
104/04-16-001-25W1/0	008625	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	8/13/2012	Sep-2016	3.1	93.8	7677.2	26.6	797.6	44974.4	0.0	0.9	310.2	89.48
105/04-16-001-25W1/0	009440	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/23/2013	Sep-2016	1.6	49.4	4145.1	4.4	132.6	7928.4	0.0	0.8	27.0	72.86
106/04-16-001-25W1/0	009505	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	11/17/2013	Sep-2016	1.0	31.1	2638.2	9.0	270.6	12556.4	0.0	0.9	23.3	89.69
100/05-16-001-25W1/0	004288	Vertical	LOWER AMARANTH A	AMRNTHL	Pumping	8/3/1991	Dec-2014	0.0	0.2	5135.6	0.0	0.7	997.9	0.0	0.0	0.0	77.78
102/05-16-001-25W1/0	006984	Horizontal	LOWER AMARANTH A	AMRNTHL	Suspended	11/18/2009	Jul-2011	0.0	1.1	3803.9	4.2	130.2	53745.1	0.0	0.4	109.6	99.16
103/05-16-001-25W1/0	006985	Horizontal	LOWER AMARANTH A	AMRNTH	Producing	11/3/2009	May-2015	0.3	8.9	5444.6	21.4	664.9	119321.8	0.0	0.3	277.2	98.68
100/06-16-001-25W1/0	004252	Vertical	LOWER AMARANTH A	AMRNTHL	Pumping	2/17/1991	Feb-2011	0.3	8.4	6453.0	0.0	0.0	408.9	0.0	0.0	0.0	0.00
100/08-16-001-25W1/0	004943	Vertical	LOWER AMARANTH A	AMRNTHL	Producing	6/23/2001	Jan-2015	0.1	2.9	4677.0	0.0	0.9	2172.3	0.0	1.2	54.0	23.68
102/08-16-001-25W1/0	007567	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	2/8/2011	Sep-2016	1.0	28.7	4485.1	3.1	93.1	5040.3	0.0	0.8	420.7	76.44
103/08-16-001-25W1/0	007568	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	2/11/2011	Sep-2016	0.5	14.2	5633.7	6.7	201.7	17709.1	0.0	0.9	309.2	93.42
104/08-16-001-25W1/0	007569	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	2/10/2011	Sep-2016	0.4	11.1	7499.0	21.1	632.1	41671.1	0.0	0.9	475.9	98.27
100/02-17-001-25W1/0	007297	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/4/2011	Sep-2016	0.4	11.5	3393.7	0.8	23.8	8164.6	0.0	0.8	360.5	67.42
102/02-17-001-25W1/0	007298	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/4/2011	Nov-2013	0.1	1.9	1951.3	0.1	3.6	2335.0	0.0	0.6	229.3	65.45
103/02-17-001-25W1/0	007299	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/4/2011	Jun-2013	0.0	1.2	2861.7	0.1	3.2	3840.4	0.0	0.2	405.0	72.73
104/02-17-001-25W1/0	007300	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	10/16/2010	Apr-2016	0.1	3.0	4556.1	0.2	4.7	6521.2	0.0	0.8	452.0	61.04
100/03-17-001-25W1/0	008486	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	4/5/2012	Jun-2015	0.1	3.2	5345.2	0.3	7.9	11533.5	0.0	1.4	12.3	71.17
102/03-17-001-25W1/0	009067	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/14/2013	Sep-2016	0.2	7.0	3159.9	0.3	7.6	4675.7	0.0	0.0	25.3	52.05
103/03-17-001-25W1/0	009068	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/15/2013	Jul-2016	0.1	2.5	2492.1	0.1	1.9	3252.6	0.0	0.0	9.2	43.18
100/04-17-001-25W1/0	009079	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/25/2013	Sep-2016	0.2	6.3	3083.0	0.7	19.8	9880.3	0.0	0.0	30.3	75.86
102/04-17-001-25W1/0	009080	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/25/2013	Jan-2016	0.1	2.2	2039.5	0.3	8.2	8356.8	0.0	0.0	36.6	78.85
103/04-17-001-25W1/0	009081	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/13/2013	Aug-2015	0.0	1.4	2209.3	0.2	7.6	5878.2	0.0	0.1	22.6	84.44
100/07-17-001-25W1/0	007301	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/18/2011	Sep-2016	0.1	2.3	2167.9	0.0	1.0	2127.4	0.0	0.8	328.0	30.30
102/07-17-001-25W1/0	007302	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/18/2011	Jul-2015	0.2	5.4	3085.0	0.1	2.5	3146.8	0.0	0.2	532.5	31.65
103/07-17-001-25W1/0	007334	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/22/2011	May-2015	0.0	0.1	4175.2	0.0	0.7	2393.7	0.0	0.0	580.3	87.50
102/10-17-001-25W1/0	007335	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/22/2011	Sep-2014	0.1	2.5	2725.1	0.0	1.3	2071.0	0.0	0.0	552.6	34.21
103/10-17-001-25W1/0	007337	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	11/7/2011	Sep-2016	0.2	7.0	3467.4	0.4	10.9	1885.7	0.0	0.9	460.3	60.89
102/15-17-001-25W1/0	007162	Horizontal	LOWER AMARANTH A	AMRNTH	Producing	1/29/2010	Sep-2016	1.0	31.1	3828.9	1.1	34.0	3396.4	0.0	0.8	515.6	52.23
103/15-17-001-25W1/0	007338	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	4/16/2011	Jul-2014	0.1	3.3	3992.0	0.1	2.0	2096.4	0.0	0.0	476.1	37.74
104/15-17-001-25W1/0	007339	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	4/16/2011	Sep-2016	0.6	19.1	4739.4	0.7	21.0	3156.1	0.0	0.9	468.2	52.37
104/01-18-001-25W1/0	009077	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/25/2013	Nov-2015	0.2	7.1	2387.2	1.2	35.3	8228.6	0.0	0.0	25.2	83.25
102/01-20-001-25W1/0	009128	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	2/20/2013	Sep-2016	0.7	20.1	4521.2	0.0	0.7	1794.9	0.0	0.0	12.9	3.37
103/01-20-001-25W1/0	009129	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	2/20/2013	Sep-2016	0.7	19.6	4241.1	0.8	22.8	3697.6	0.0	0.0	40.7	53.77
102/03-20-001-25W1/0	008441	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/31/2012	Sep-2016	1.6	49.0	3882.9	84.5	2534.0	69423.8	0.0	0.0	38.9	98.10

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)	Cal Dly Gas (E3m3/d)	Monthly Gas (E3m3)	Cum Prd Gas (E3m3)	WCT (%)
102/07-20-001-25W1/0	008378	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	4/4/2012	Aug-2016	0.3	10.7	5543.1	126.7	3926.5	213519.2	0.0	0.0	97.3	99.73
103/07-20-001-25W1/0	008379	Horizontal	LOWER AMARANTH A	AMRNTHL	Suspended	4/11/2012	Mar-2016	0.3	8.5	8699.8	36.3	1125.7	108912.1	0.0	0.0	12.7	99.25
104/07-20-001-25W1/0	008380	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	4/1/2012	Sep-2016	0.2	6.0	15568.6	47.0	1410.0	141451.8	0.0	0.0	30.1	99.58
100/08-20-001-25W1/0	003550	Vertical	LOWER AMARANTH A	AMRNTHL	Producing	8/7/1985	Nov-2013	0.2	6.9	10938.2	0.3	8.8	2163.3	0.0	0.0	0.0	56.05
102/08-20-001-25W1/0	008423	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/22/2012	Sep-2016	0.7	21.1	15808.5	5.2	157.2	15887.9	0.0	0.0	71.0	88.17
103/08-20-001-25W1/0	008424	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/22/2012	Sep-2016	1.6	46.6	11725.5	27.3	818.4	60315.9	0.0	0.0	28.3	94.61
104/08-20-001-25W1/0	008425	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/22/2012	Apr-2016	0.6	19.0	4333.6	28.4	851.5	80626.0	0.0	0.0	1.9	97.82
105/08-20-001-25W1/0	009131	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	2/20/2013	Sep-2016	0.4	12.6	4857.0	0.3	8.2	3224.2	0.0	0.0	16.3	39.42
100/10-20-001-25W1/0	003332	Vertical	LOWER AMARANTH A	AMRNTHL	Producing	12/8/1984	Nov-2013	0.1	2.4	9138.0	1.0	31.4	27311.6	0.0	0.0	0.8	92.90
100/01-21-001-25W1/0	005632	Vertical	LOWER AMARANTH A	AMRNTHL	Producing	3/3/2006	Jun-2015	0.0	1.2	2113.2	0.0	0.5	1029.9	0.0	0.1	34.3	29.41
102/01-21-001-25W1/0	008324	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/8/2013	Sep-2016	1.0	29.9	4952.4	0.3	10.2	1977.7	0.0	0.8	66.3	25.44
103/01-21-001-25W1/0	008325	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/18/2013	Sep-2016	0.3	8.2	3351.7	0.0	0.3	1868.8	0.0	0.9	69.7	3.53
104/01-21-001-25W1/0	009526	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	11/30/2013	Sep-2016	1.3	39.0	4206.6	20.0	599.8	24863.3	0.0	0.0	0.0	93.89
100/07-21-001-25W1/0	004325	Vertical	LOWER AMARANTH A	AMRNTHL	Pumping	12/17/1992	Feb-2016	0.1	1.8	5922.8	0.0	1.0	1488.7	0.0	0.9	149.9	35.71
100/08-21-001-25W1/0	005633	Vertical	LOWER AMARANTH A	AMRNTHL	Producing	3/2/2006	May-2014	0.1	2.2	2126.1	0.1	1.7	1361.8	0.0	0.0	202.0	43.59
102/08-21-001-25W1/0	008326	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/18/2013	Sep-2016	0.5	15.3	5400.9	0.3	9.7	2791.1	0.0	0.8	76.2	38.80
103/08-21-001-25W1/0	008568	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	8/25/2013	Sep-2016	1.0	30.6	5327.7	0.5	14.1	1780.7	0.0	0.9	184.6	31.54
100/09-21-001-25W1/0	004944	Vertical	LOWER AMARANTH A	AMRNTHL	Producing	6/22/2001	Nov-2015	0.4	12.7	5782.3	0.1	2.6	2517.2	0.0	0.9	70.0	16.99
102/09-21-001-25W1/0	008327	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	8/24/2013	Sep-2016	1.3	38.8	4620.4	0.4	13.3	1864.3	0.0	0.8	185.0	25.53
103/09-21-001-25W1/0	008328	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	8/30/2013	Sep-2016	0.2	6.2	2078.3	0.1	3.4	15863.2	0.0	0.9	136.8	35.42
100/16-21-001-25W1/0	004327	Vertical	LOWER AMARANTH A	AMRNTHL	Pumping	12/20/1992	Jan-2016	0.0	1.4	7253.6	0.0	0.2	999.2	0.0	0.0	63.6	12.50
102/16-21-001-25W1/0	008329	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	8/18/2013	Sep-2016	0.9	27.2	4179.8	7.2	216.4	12307.1	0.0	0.8	300.3	88.83
103/16-21-001-25W1/0	008330	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	8/24/2013	Sep-2016	3.8	115.1	6069.8	1.6	46.6	2146.5	0.0	0.9	337.8	28.82
102/02-22-001-25W1/0	009082	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	2/11/2013	Jan-2016	0.4	13.9	3230.1	1.1	35.0	5902.0	0.0	0.0	9.2	71.57
103/02-22-001-25W1/0	009083	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	2/11/2013	Sep-2016	0.8	23.3	3198.6	4.8	145.3	8740.0	0.0	0.0	6.4	86.18
104/02-22-001-25W1/0	009084	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	2/14/2013	Jan-2015	0.1	2.7	1335.9	3.1	94.6	14986.5	0.0	0.0	0.0	97.23
102/04-22-001-25W1/0	008785	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/11/2012	Sep-2016	2.0	59.0	9270.5	9.0	270.5	24480.2	0.0	0.8	117.2	82.09
103/04-22-001-25W1/0	009506	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	11/26/2013	Sep-2016	2.2	64.7	3198.8	37.0	1110.5	42914.3	0.0	0.9	91.0	94.49
102/05-22-001-25W1/0	009507	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	11/25/2013	Sep-2016	1.6	46.5	4886.7	23.8	715.3	35285.4	0.0	0.8	214.0	93.90
103/05-22-001-25W1/0	009508	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	10/21/2013	Sep-2016	1.5	43.7	4772.9	10.6	319.3	20732.5	0.0	0.9	230.8	87.96
104/05-22-001-25W1/0	009509	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	10/21/2013	Sep-2016	1.3	40.2	5459.9	1.1	32.1	3801.3	0.0	0.9	199.2	44.40
100/07-22-001-25W1/0	009119	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/22/2013	Sep-2016	0.8	22.8	5229.9	7.6	227.6	15993.7	0.0	0.0	16.0	90.89
102/07-22-001-25W1/0	009120	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/22/2013	Sep-2016	1.1	32.4	4705.0	1.4	41.2	4063.7	0.0	0.0	19.5	55.98
103/07-22-001-25W1/0	009121	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/22/2013	Jul-2016	0.0	0.6	3856.0	1.0	30.8	11632.4	0.0	0.0	10.7	98.09
104/07-22-001-25W1/0	009122	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/23/2013	Sep-2016	0.2	4.6	2892.7	12.9	387.0	17590.2	0.0	0.0	0.0	98.83
100/10-22-001-25W1/0	009123	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/13/2013	Sep-2016	1.3	38.1	6993.9	3.6	106.5	5269.9	0.0	0.0	14.8	73.65
102/10-22-001-25W1/0	009124	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/13/2013	Sep-2016	5.9	177.4	5315.6	4.7	139.7	1886.7	0.0	0.0	10.7	44.06
103/10-22-001-25W1/0	009125	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/23/2013	Sep-2016	0.2	6.0	5694.3	12.9	385.9	23430.9	0.0	0.0	6.7	98.47
100/11-22-001-25W1/0	007913	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	11/17/2011	Sep-2016	0.1	1.8	11729.4	6.3	190.2	24881.6	0.0	0.0	13.7	99.06
100/14-22-001-25W1/0	007914	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	1/17/2012	Aug-2016	0.1	3.8	6293.7	8.8	273.5	27906.8	0.0	0.0	22.5	98.63
102/14-22-001-25W1/0	009216	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/6/2013	Sep-2016	2.7	82.3	5500.4	11.2	335.0	13011.0	0.0	0.0	21.9	80.28
103/14-22-001-25W1/0	009217	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/6/2013	Sep-2016	0.4	13.2	5246.3	0.9	26.1	2077.1	0.0	0.0	12.4	66.41
104/14-22-001-25W1/0	009218	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/6/2013	Sep-2016	0.7	22.2	4331.7	4.2	126.0	4199.5	0.0	0.0	16.1	85.02
100/15-22-001-25W1/0	008496	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	3/26/2012	Sep-2016	3.8	115.2	4879.7	47.0	1410.8	62989.2	0.0	0.0	24.3	92.45
102/15-22-001-25W1/0	009225	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/13/2013	Sep-2016	2.1	63.5	8061.1	1.1	33.1	3147.1	0.0	0.0	19.0	34.27

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)	Cal Dly Gas (E3m3/d)	Monthly Gas (E3m3)	Cum Prd Gas (E3m3)	WCT (%)
103/15-22-001-25W1/0	009226	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/13/2013	Sep-2016	1.0	31.2	6400.4	1.0	31.1	1689.4	0.0	0.0	13.1	49.92
102/12-23-001-25W1/0	006785	Vertical	LOWER AMARANTH A	AMRNTHL	Comingled	10/25/2008	Sep-2015	0.0	0.0	2358.0	0.1	1.9	756.3	0.0	0.0	0.0	100.00
103/12-23-001-25W1/0	009468	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	10/19/2013	Sep-2016	1.9	57.7	7452.8	0.5	16.2	2526.0	0.0	0.8	464.8	21.92
104/12-23-001-25W1/0	009469	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	10/19/2013	Sep-2016	1.1	31.7	5671.8	0.4	12.5	1702.5	0.0	0.9	314.6	28.28
105/12-23-001-25W1/0	009472	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	10/19/2013	Sep-2016	1.4	41.9	7892.7	0.7	20.4	2900.9	0.0	0.9	511.6	32.74
100/13-23-001-25W1/0	009470	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	10/19/2013	Sep-2016	1.5	45.6	4431.9	0.4	13.1	1520.1	0.0	0.8	224.5	22.32
102/13-23-001-25W1/0	009471	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	10/19/2013	Sep-2016	1.1	33.4	6978.6	0.2	6.4	1491.3	0.0	0.9	359.6	16.08
103/13-23-001-25W1/0	009473	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	10/19/2013	Sep-2016	2.2	64.5	7101.2	0.8	22.8	2211.3	0.0	0.9	412.7	26.12
100/03-26-001-25W1/0	008515	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/13/2012	Sep-2016	0.2	7.1	5468.3	0.2	5.6	1430.1	0.0	0.8	132.3	44.09
102/03-26-001-25W1/0	008516	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/14/2012	Jan-2015	0.0	0.9	3216.9	0.0	0.6	1948.8	0.0	1.1	25.7	40.00
103/03-26-001-25W1/0	008517	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	9/16/2012	Sep-2016	0.1	2.9	2263.7	0.2	5.9	2593.1	0.0	0.9	21.1	67.05
100/06-26-001-25W1/0	008404	Horizontal	LOWER AMARANTH A	AMRNTHL	Producing	2/22/2012	May-2015	0.1	2.7	2967.9	0.3	9.0	2568.8	0.0	0.1	89.2	76.92

These locations are abandoned and/or did not produce and will not be included in the Unit Well list.

100/04-15-001-25W1/0	005697	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned Zone	6/15/2006	Jul-2014	0.1	1.6	2704.5	0.0	0.7	841.9	0.0	0.0	0.0	30.43
100/05-15-001-25W1/0	002864	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	10/30/1982	Jun-1984	0.0	0.0	170.9	0.0	1.0	4594.6	0.0	0.0	0.0	100.00
100/13-15-001-25W1/0	003122	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	9/29/1983	Aug-1988	0.2	4.8	531.5	0.0	1.0	503.0	0.0	0.0	0.0	17.24
100/06-17-001-25W1/0	003764	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	1/9/1986	Mar-1993	0.1	3.6	2786.6	0.2	5.0	1765.6	0.0	0.0	0.0	58.14
100/08-17-001-25W1/0	002962	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	3/4/1983	Jun-1990	0.0	0.9	1839.5	0.0	0.8	1329.4	0.0	0.0	0.0	47.06
100/10-17-001-25W1/0	003259	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	5/15/1984	Oct-1989	0.2	6.1	1902.2	0.1	1.9	6790.0	0.0	0.0	0.0	23.75
100/15-17-001-25W1/0	002893	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	12/4/1982	May-1990	0.2	5.1	1732.2	0.4	12.4	1427.8	0.0	0.0	0.0	70.86
100/16-17-001-25W1/0	003766	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	12/22/1985	Feb-1994	0.1	3.9	2719.9	0.1	1.4	1095.2	0.0	0.0	0.0	26.42
100/01-20-001-25W1/0	003985	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	10/28/1987	Nov-2001	0.0	0.4	3398.5	0.2	6.4	7416.2	0.0	0.0	0.0	94.12
100/02-20-001-25W1/2	003969	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	1/15/1988	Jul-1993	0.0	1.0	992.0	0.0	0.4	448.3	0.0	0.0	0.0	28.57
100/07-20-001-25W1/0	002840	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	11/28/1982	Sep-1989	0.0	0.0	3444.7	0.5	13.8	13053.2	0.0	0.0	0.0	100.00
100/09-20-001-25W1/0	003073	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned Zone	8/25/1983	Mar-1991	0.2	5.3	3318.0	0.1	2.1	9545.2	0.0	0.0	0.0	28.38
100/03-22-001-25W1/0	002919	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	12/16/1982	May-1986	0.0	0.1	172.8	0.0	0.0	1149.2	0.0	0.0	0.0	0.00
100/04-22-001-25W1/0	003219	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	2/12/1984	Aug-1986	0.0	0.0	82.3	7.9	245.8	4047.1	0.0	0.0	0.0	100.00
100/05-22-001-25W1/0	003192	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	2/14/1984	Jul-2003	0.0	0.0	3543.8	5.6	173.8	9102.7	0.0	0.0	0.0	100.00
100/06-22-001-25W1/2	003099	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned	6/18/1987	Dec-1989	0.2	5.9	471.0	0.1	2.1	149.3	0.0	0.0	0.0	26.25
100/11-23-001-25W1/0	006704	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned Zone	7/7/2008	Jul-2012	0.0	0.5	1615.6	0.0	0.1	630.0	0.0	0.0	0.0	16.67
102/14-23-001-25W1/2	006551	Vertical	LOWER AMARANTH A	AMRNTHL	Abandoned Zone	1/28/2008	Sep-2015	0.0	0.5	1483.0	0.0	0.0	672.7	0.0	0.0	0.0	0.00
										762801.7			**2644764.5**				

Table No. 4: OOIP Calculation

Tract	OOIP (bbls)	OOIP (m3)	Phih
1-9-1-25W1	690,000	109,701	1.3209
2-9-1-25W1	673,530	107,083	1.2898
5-9-1-25W1	682,130	108,450	1.3074
6-9-1-25W1	687,070	109,235	1.3164
7-9-1-25W1	697,650	110,917	1.3363
8-9-1-25W1	715,240	113,714	1.3695
9-9-1-25W1	732,140	116,401	1.4022
10-9-1-25W1	709,640	112,824	1.3595
11-9-1-25W1	703,420	111,835	1.3481
12-9-1-25W1	699,810	111,261	1.3416
13-9-1-25W1	720,760	114,592	1.3820
14-9-1-25W1	722,000	114,789	1.3840
15-9-1-25W1	711,190	113,070	1.3628
16-9-1-25W1	735,110	116,873	1.4082
1-15-1-25W1	724,890	115,248	1.3813
2-15-1-25W1	738,160	117,358	1.4073
3-15-1-25W1	750,690	119,350	1.4319
4-15-1-25W1	756,410	120,260	1.4435
5-15-1-25W1	760,230	120,867	1.4506
6-15-1-25W1	755,020	120,039	1.4400
7-15-1-25W1	750,810	119,369	1.4312
8-15-1-25W1	740,890	117,792	1.4116
9-15-1-25W1	751,630	119,500	1.4319
10-15-1-25W1	754,810	120,005	1.4386
11-15-1-25W1	760,250	120,870	1.4497
12-15-1-25W1	775,380	123,276	1.4793
13-15-1-25W1	762,890	121,290	1.4552
14-15-1-25W1	751,920	119,546	1.4336
15-15-1-25W1	756,160	120,220	1.4410
16-15-1-25W1	762,410	121,213	1.4522
1-16-1-25W1	747,040	118,770	1.4313
2-16-1-25W1	716,170	113,862	1.3722
3-16-1-25W1	746,500	118,684	1.4304
4-16-1-25W1	748,090	118,937	1.4334
5-16-1-25W1	784,200	124,678	1.5035
6-16-1-25W1	761,300	121,037	1.4596
8-16-1-25W1	795,400	126,458	1.5249
9-16-1-25W1	803,910	127,811	1.5421
1-17-1-25W1	742,770	118,091	1.4259
2-17-1-25W1	739,040	117,498	1.4183
3-17-1-25W1	746,830	118,736	1.4328
4-17-1-25W1	734,010	116,698	1.4078
5-17-1-25W1	768,200	122,134	1.4730
6-17-1-25W1	785,040	124,811	1.5057
7-17-1-25W1	761,620	121,088	1.4613
8-17-1-25W1	761,060	120,999	1.4606
9-17-1-25W1	779,470	123,926	1.4956

Sw = 40%
Porosity = 10%
Bo = 1.17

Tract	OOIP (bbls)	OOIP (m3)	Phih
10-17-1-25W1	775,230	123,252	1.4870
15-17-1-25W1	830,220	131,994	1.5920
16-17-1-25W1	785,290	124,851	1.5063
1-20-1-25W1	802,840	127,641	1.5376
2-20-1-25W1	835,870	132,893	1.6013
7-20-1-25W1	781,700	124,280	1.4977
8-20-1-25W1	787,160	125,148	1.5077
9-20-1-25W1	759,970	120,826	1.4558
10-20-1-25W1	773,170	122,924	1.4816
1-21-1-25W1	767,840	122,077	1.4733
7-21-1-25W1	747,690	118,873	1.4341
8-21-1-25W1	736,190	117,045	1.4124
9-21-1-25W1	705,290	112,132	1.3530
16-21-1-25W1	718,710	114,266	1.3787
1-22-1-25W1	764,430	121,535	1.4576
2-22-1-25W1	753,520	119,800	1.4368
3-22-1-25W1	741,450	117,881	1.4138
4-22-1-25W1	729,680	116,010	1.3914
5-22-1-25W1	743,380	118,188	1.4172
6-22-1-25W1	752,300	119,606	1.4342
7-22-1-25W1	755,710	120,148	1.4407
8-22-1-25W1	764,620	121,565	1.4577
9-22-1-25W1	763,770	121,430	1.4557
10-22-1-25W1	751,650	119,503	1.4326
11-22-1-25W1	746,920	118,751	1.4236
12-22-1-25W1	732,960	116,531	1.3970
13-22-1-25W1	739,500	117,571	1.4092
14-22-1-25W1	751,810	119,528	1.4326
15-22-1-25W1	757,300	120,401	1.4431
16-22-1-25W1	761,410	121,055	1.4509
11-23-1-25W1	798,680	126,980	1.5339
12-23-1-25W1	776,660	123,479	1.4911
13-23-1-25W1	768,560	122,191	1.4765
14-23-1-25W1	781,050	124,177	1.5010
3-26-1-25W1	746,050	118,612	1.4341
4-26-1-25W1	749,190	119,112	1.4405
	62,290,660	**9,903,423**	

Table No. 5

Proposed Waskada Unit 22

LOWER AMARANTH FORMATION ROCK & FLUID PARAMETERS

Formation Pressure	8500 kPa	Initial Average Reservoir Pressure
Formation Temperature	45 C	
Saturation Pressure	4220 kPa	Bubble Point
GOR	20 - 50 m3/m3	Gas Oil Ratio
API Oil Gravity	37.2	
Swi (fraction)	0.40	Initial Water Saturation
Produced Water Specific Gravity	1.08	
Produced Water pH	7.1 - 7.3	
Produced Water TDS	180,000	
Wettability	Moderately oil-wet	

Proposed Waskada Unit No. 22

Application for Enhanced Oil Recovery Waterflood Project

List of Appendices

A	00/06-17-001-25W1/0 KB: 470.6 m RR: 1985-12-11 TD: 948.0 m [TVD] FormTD: TILSTNBD Mode: Abnd Fluid: Oil OMEGA PCP WASKADA 6-17-1-25 1254.8m to next well >

00/05-16-001-25W1/0 KB: 474.0 m RR: 1991-07-23 TD: 952.0 m [TVD] FormTD: LODGEPOL Mode: Pump Fluid: Oil EOG WASKADA PROV. 5-16-1-25 < 1254.8m to previous well 644.3m to next well >

00/03-16-001-25W1/0 KB: 471.2 m RR: 1987-11-26 TD: 942.0 m [TVD] FormTD: TILSTNBD Mode: Prod Fluid: Oil EOG WASKADA PROV. 3-16-1-25(WPM) < 644.3m to previous well 1360.4m to next well >

00/05-15-001-25W1/0 KB: 473.8 m RR: 1982-10-10 TD: 935.0 m [TVD] FormTD: TILSTNBD Mode: Abnd Fluid: Oil ROXY-ANDEX ET AL WASKADA 5-15-1-25 < 1360.4m to previous well 1725.9m to next well >

00/06-22-001-25W1/0 KB: 475.4 m RR: 1983-08-31 TD: 1225.0 m [TVD] FormTD: DUPEROW Mode: Abnd Fluid: Oil SASKO ET AL WASKADA 6-22-1-25 < 1725.9m to previous well 1704.1m to next well >

00/11-23-001-25W1/0 KB: 475.2 m RR: 2008-07-02 TD: 928.0 m [TVD] FormTD: TILSTNBD Mode: Prod Fluid: Oil LODGEPOLE ET AL WASKADA 11-23-1-25 (WPM) < 1704.1m to previous well	A'

DST Information (00/06-17-001-25W1/0)

Prod	Oil (m3)	Gas (E3m3)	Water (m3)
Cum	2786.6	0.0	1765.6
Daily	1.3	0.0	0.8

DST Information (00/05-16-001-25W1/0)

Prod	Oil (m3)	Gas (E3m3)	Water (m3)
Cum	5135.6	0.0	997.9
Daily	0.6	0.0	0.1

DST Information (00/03-16-001-25W1/0)

Prod	Oil (m3)	Gas (E3m3)	Water (m3)
Cum	3771.5	0.0	997.5
Daily	0.5	0.0	0.1

DST Information (00/05-15-001-25W1/0)

Prod	Oil (m3)	Gas (E3m3)	Water (m3)
Cum	170.9	0.0	4594.6
Daily	0.4	0.0	10.3

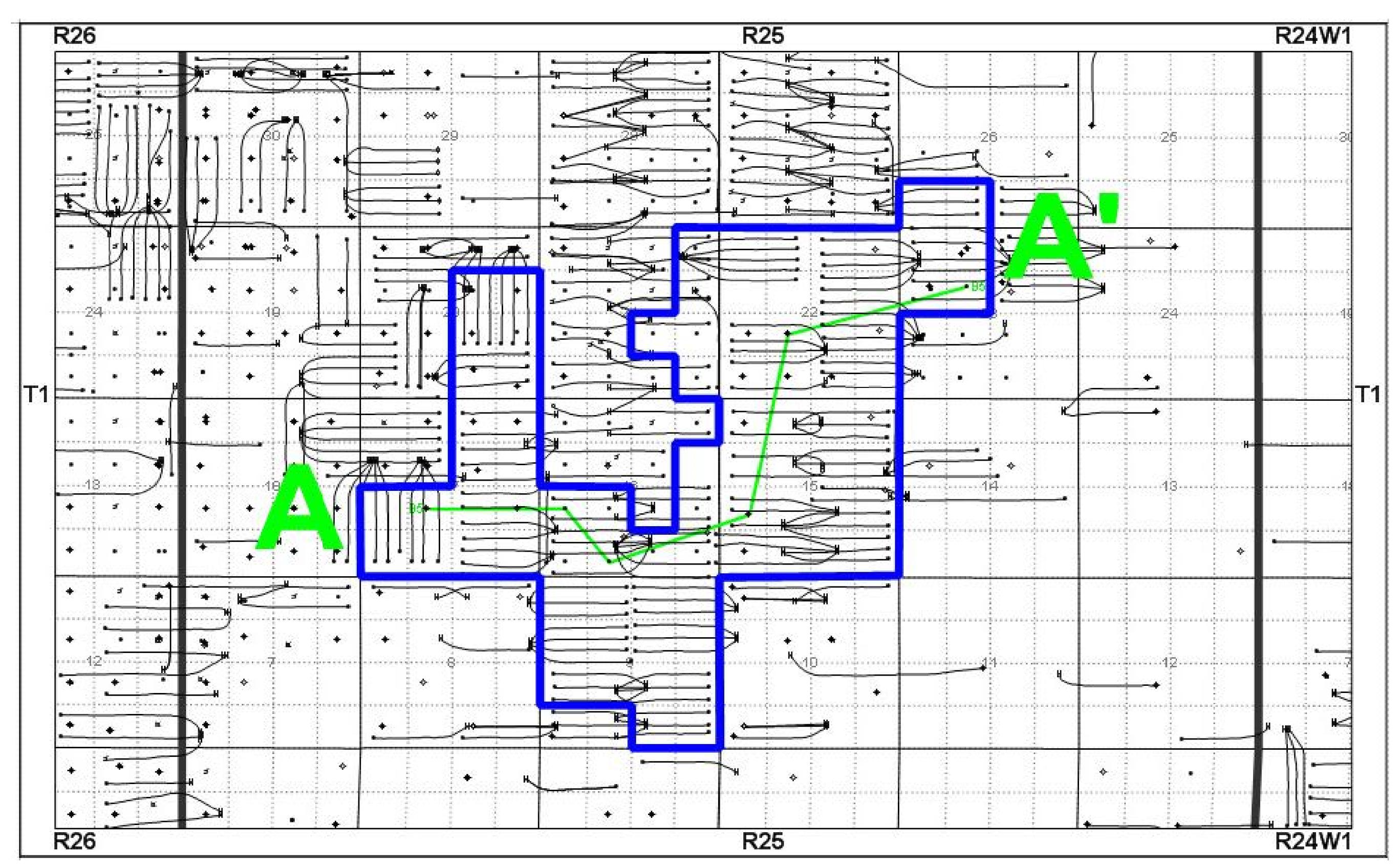
DST Information (00/06-22-001-25W1/0)

1. 910.0[TVD]-914.5[TVD] (TILSTNBD)
   Type: CONVENTIONAL DST
   VO: 5.0/30.0 SI: 60.0/90.0 min
   FP: 780.0/1046.0 kPa
   SIP: 8924.0/8961.0 kPa
   HP: 10082.0/10069.0 kPa
   "RECOVERY: 48M (157FT) OIL CUT MUD RECOVERY: 57M (187FT) OIL WATER: RW: .06 OHMM, SG: 1.096,CL: 82000
   OIL: API: 37.3,SULPHER: .9%"

Prod	Oil (m3)	Gas (E3m3)	Water (m3)
Cum	1170.1	0.0	4655.9
Daily	1.1	0.0	4.2

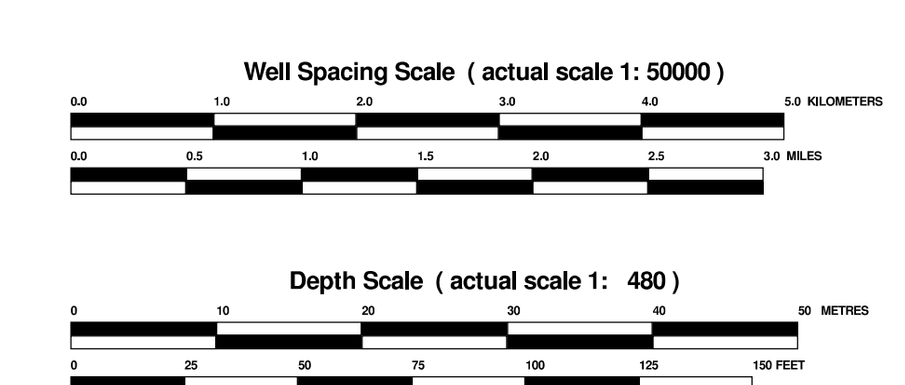
DST Information (00/11-23-001-25W1/0)

Prod	Oil (m3)	Gas (E3m3)	Water (m3)
Cum	1615.6	0.0	630.0
Daily	1.5	0.0	0.6



Legend

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

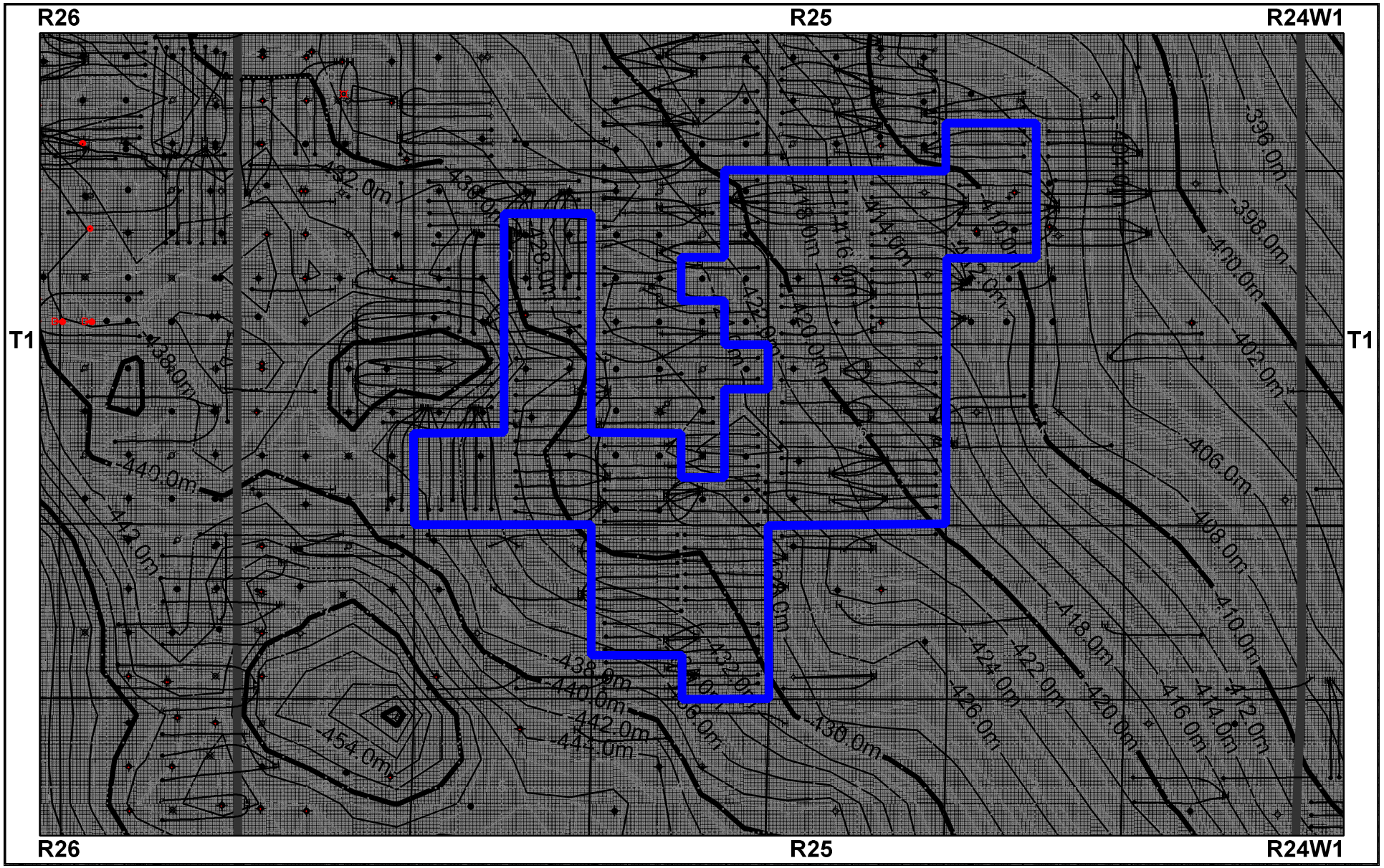


Tundra Oil and Gas

Structural Cross Section Through Waskada Unit 22

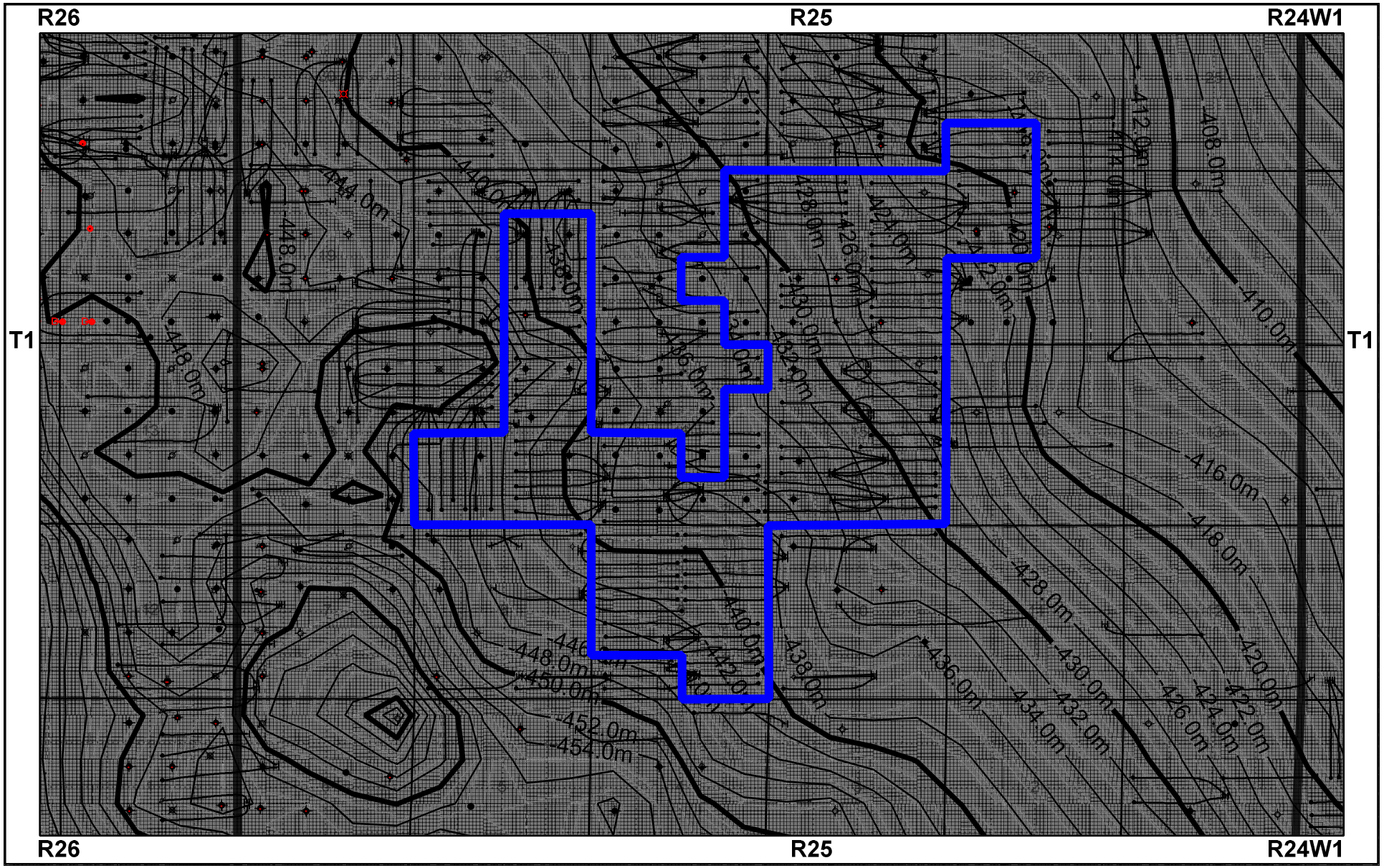
Produced by:
AccuLogs
Version 9.0.2.196906
Datum: NAD27

Author:
Modified On: Tuesday, November 22, 2016 05:10PM
Printed On: Tuesday, November 22, 2016 05:10PM
Start Formation: 5m. above AMRNTHL
End Formation: 5m. below U-MSSP
Cross Section Name: WASKADAB5B5



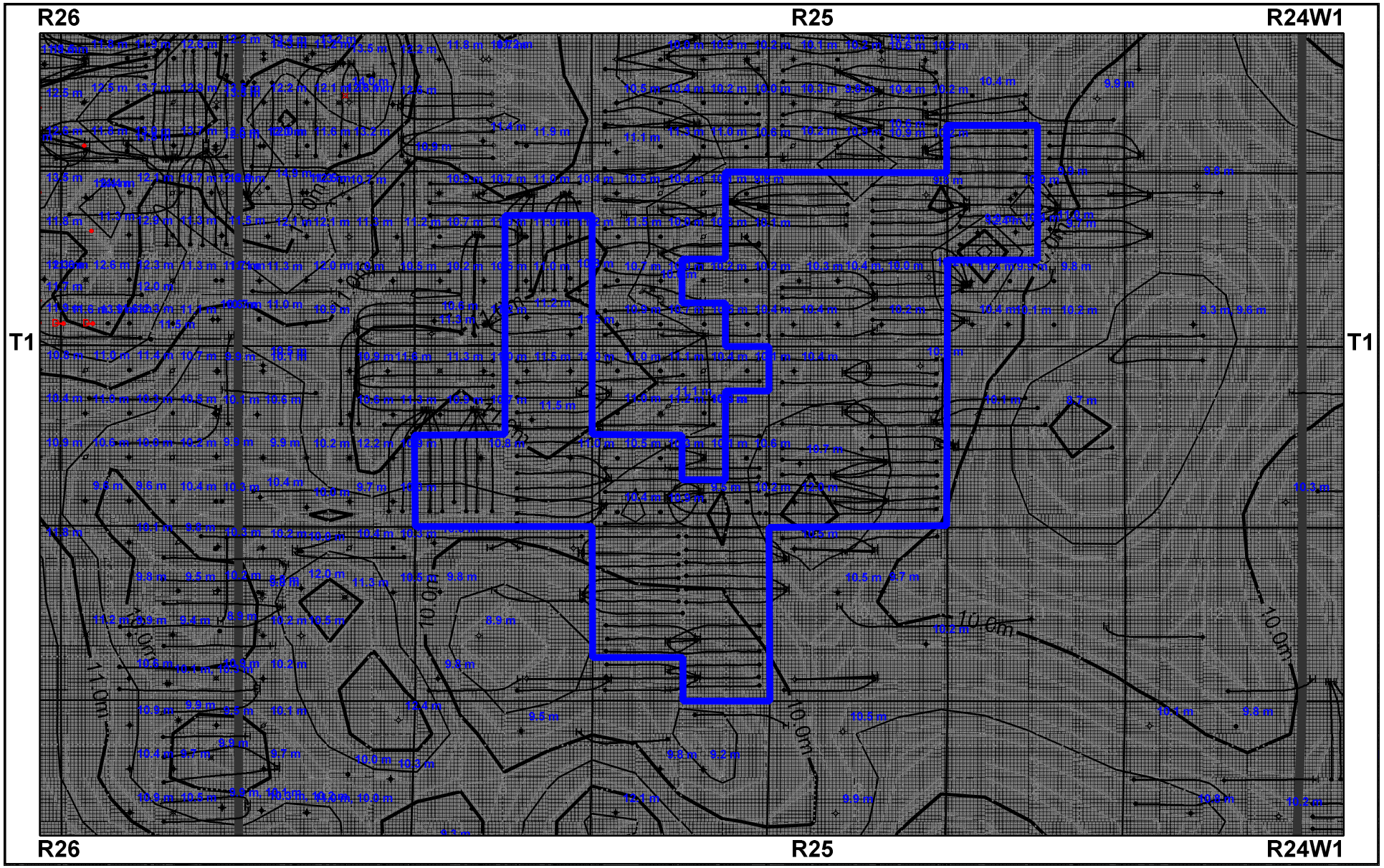
Waskada Unit 22 Application

Green Sand Structure (Top of Reservoir)



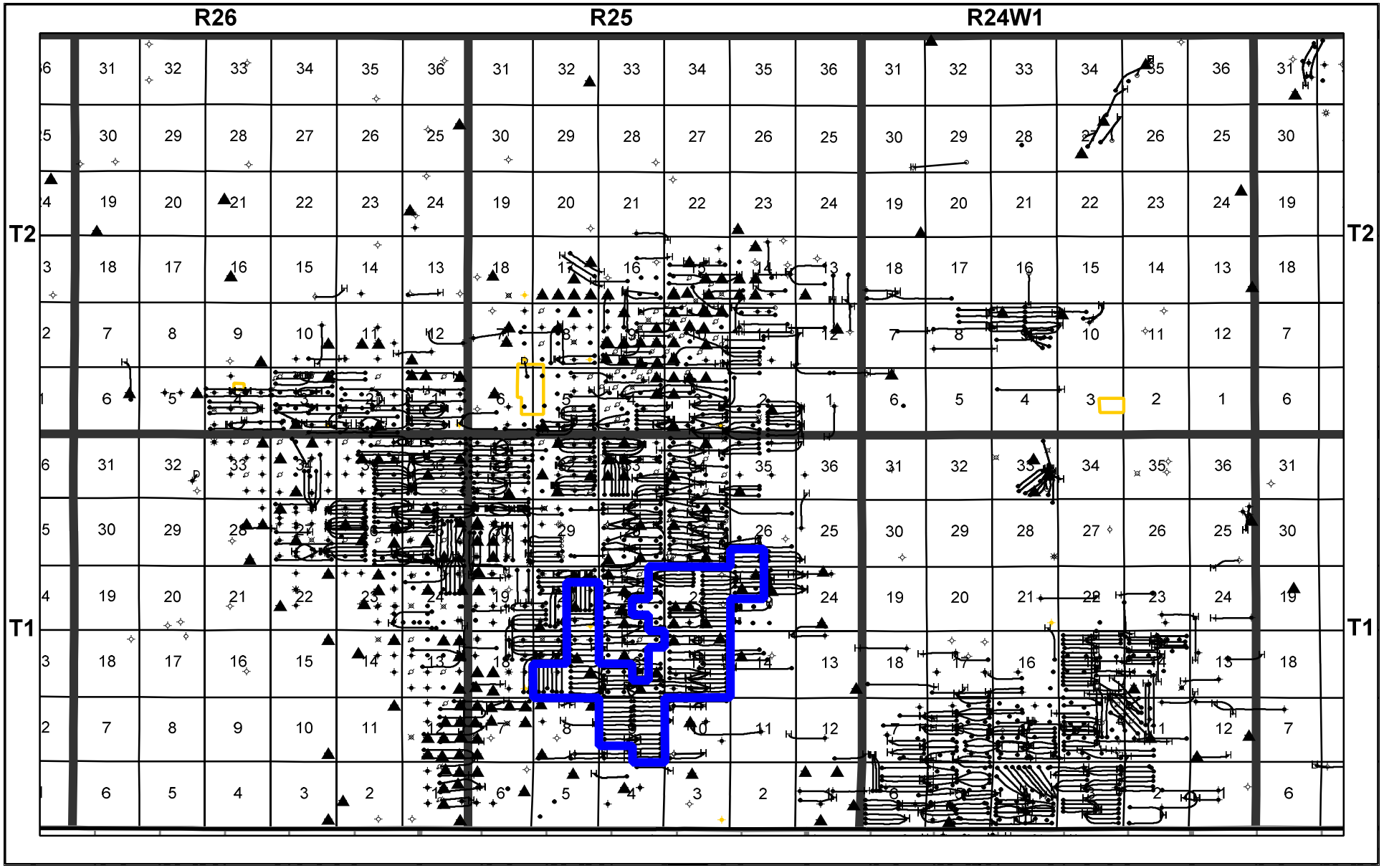
Waskada Unit 22 Application

Lower Sand Structure (Base of Reservoir)



Waskada Unit 22 Application

Reservoir Isopach (Green to Lower Sand Isopach)



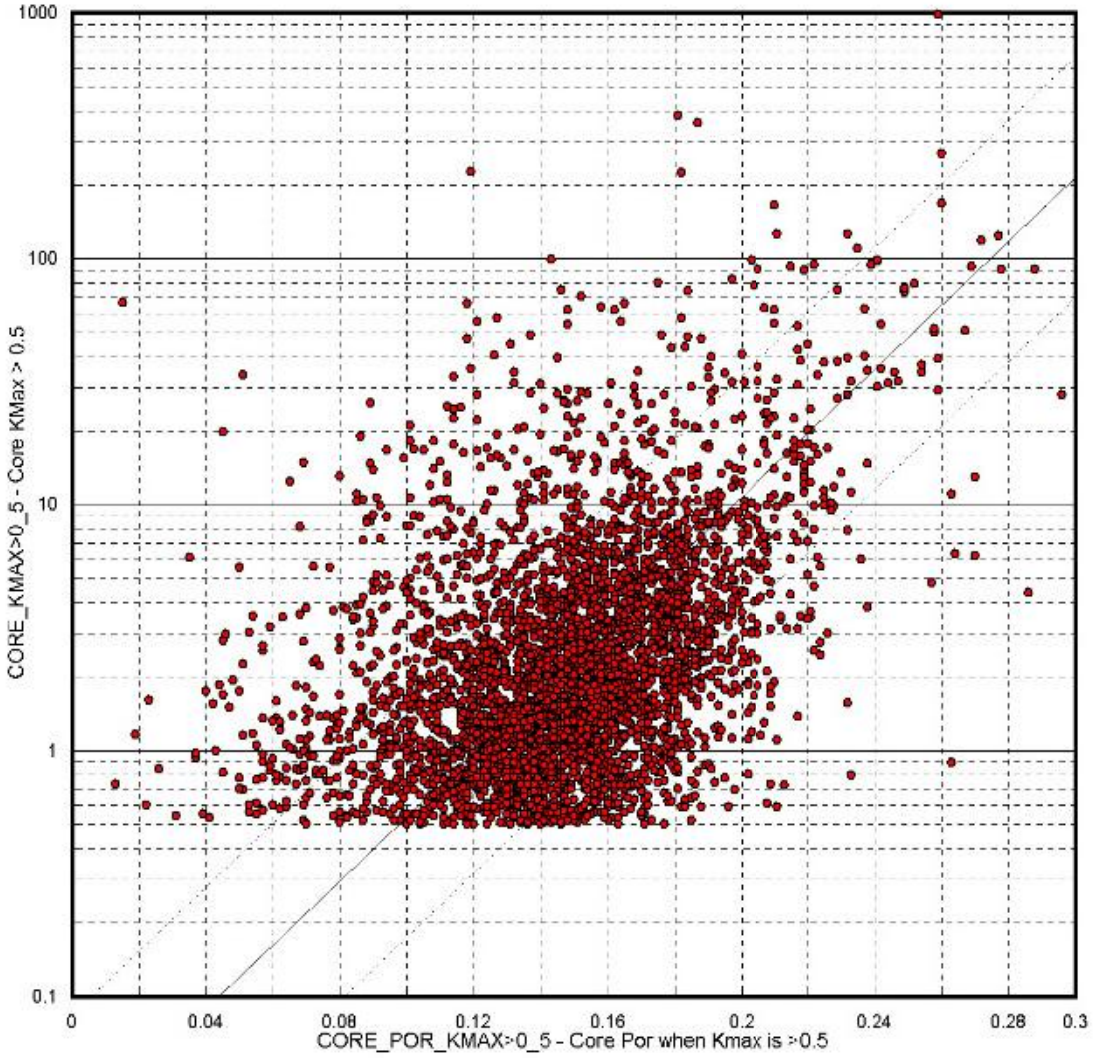
Waskada Unit 22 Application

Wells with Core Analysis Used to Create Core Perm vs Core Porosity Cross Plot

Tundra Pierson Waskada Project

Core Kmax vs Core Porosity >0.5mD

10686 Samples for 231 out of 231 Wells



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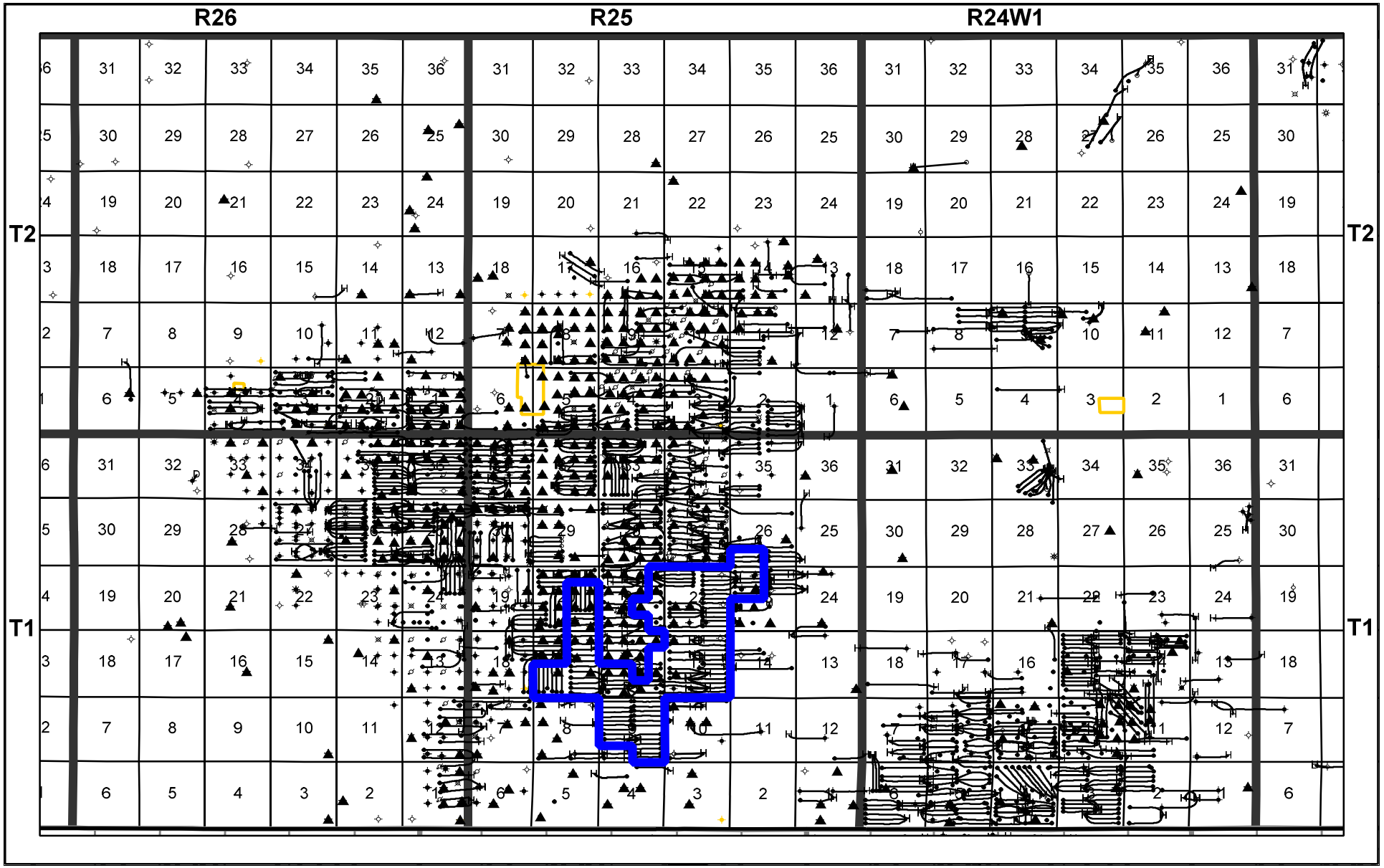
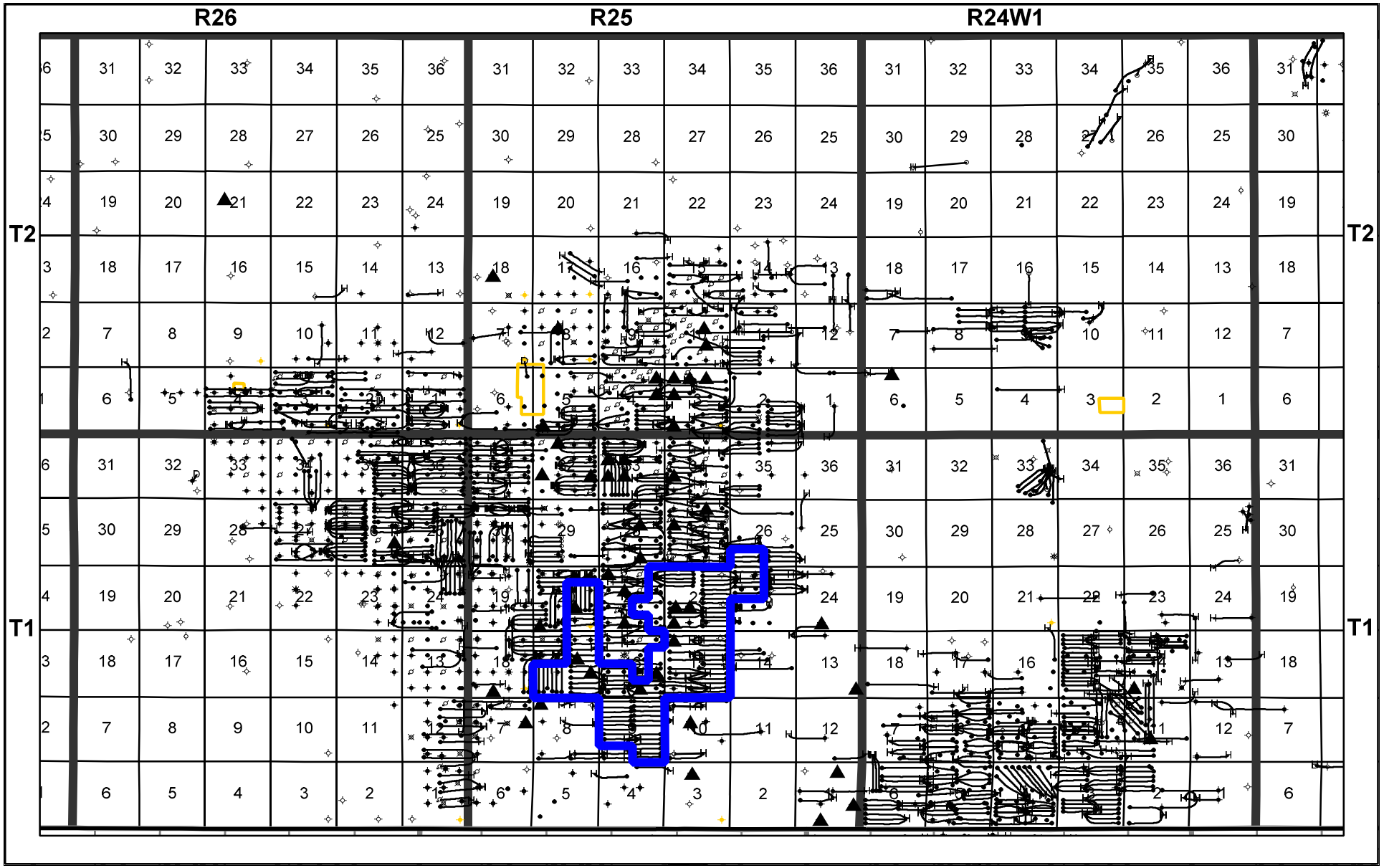


Waskada Unit 22 Application

Wells with Digital Sonic Logs

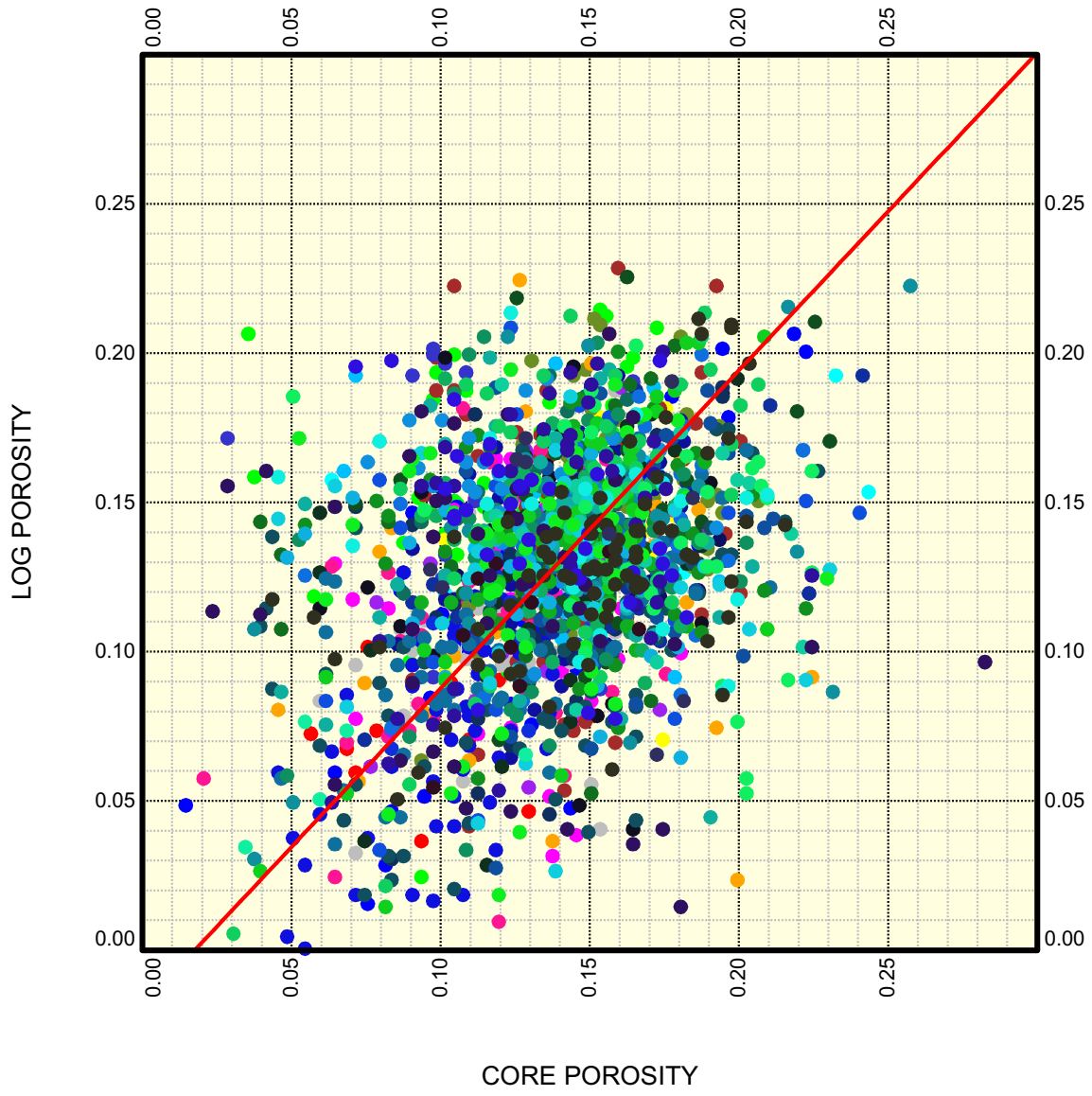


Waskada Unit 22 Application

Wells with Digital Sonic Logs and Core Analysis over the Lower Amaranth Reservoir Interval

Log Porosity vs Core Porosity Crossplot

Well: 52 Wells



Wells:

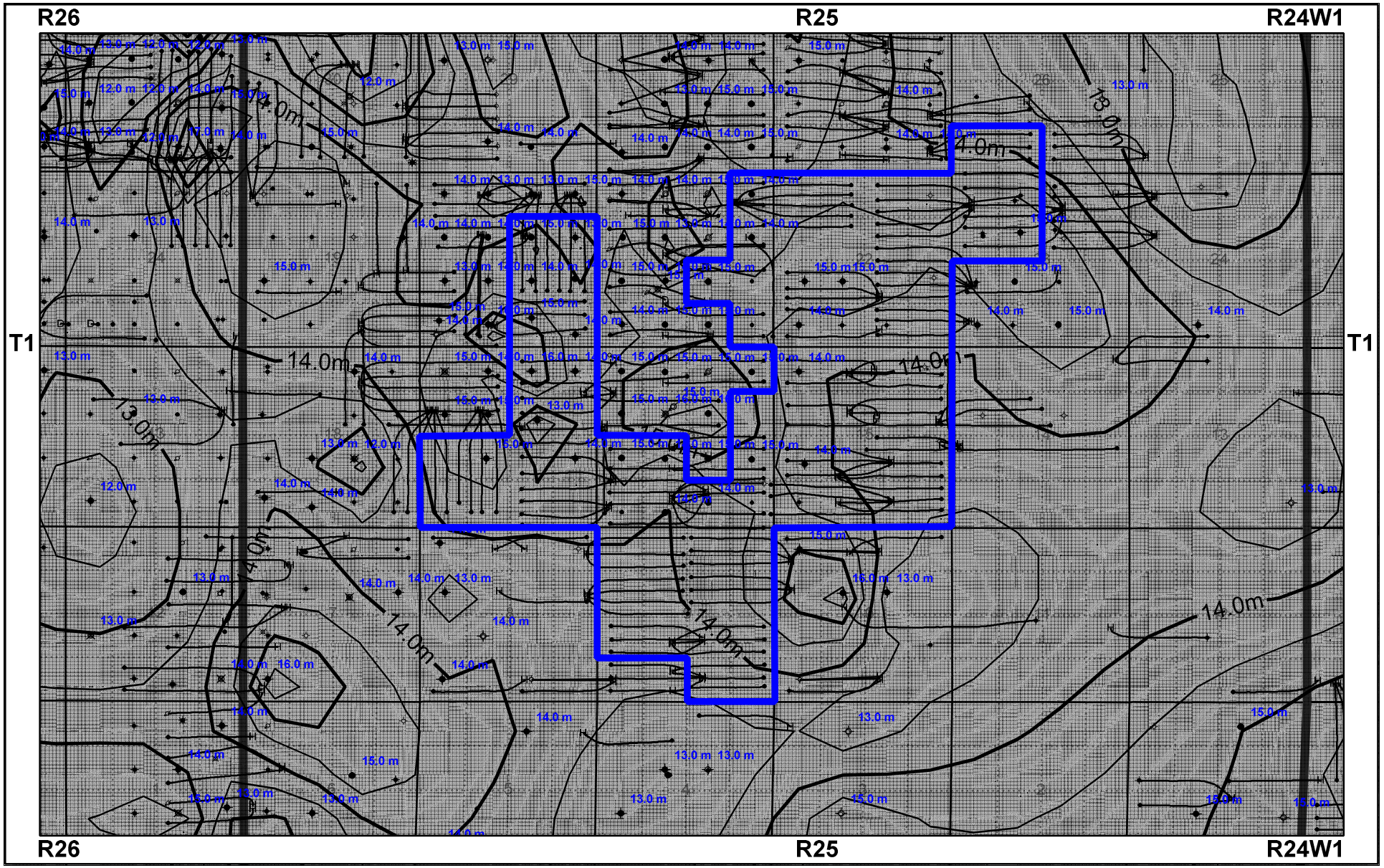
100011300125W100	100021600125W100	100022800125W100	100030100125W100	100031800125W100
100032100125W100	100032400125W100	100040300225W100	100040500225W100	100041400124W100
100042000125W100	100042200125W100	100052200125W100	100053200125W100	100053300125W100
100053400125W100	100061100124W100	100061800225W100	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:

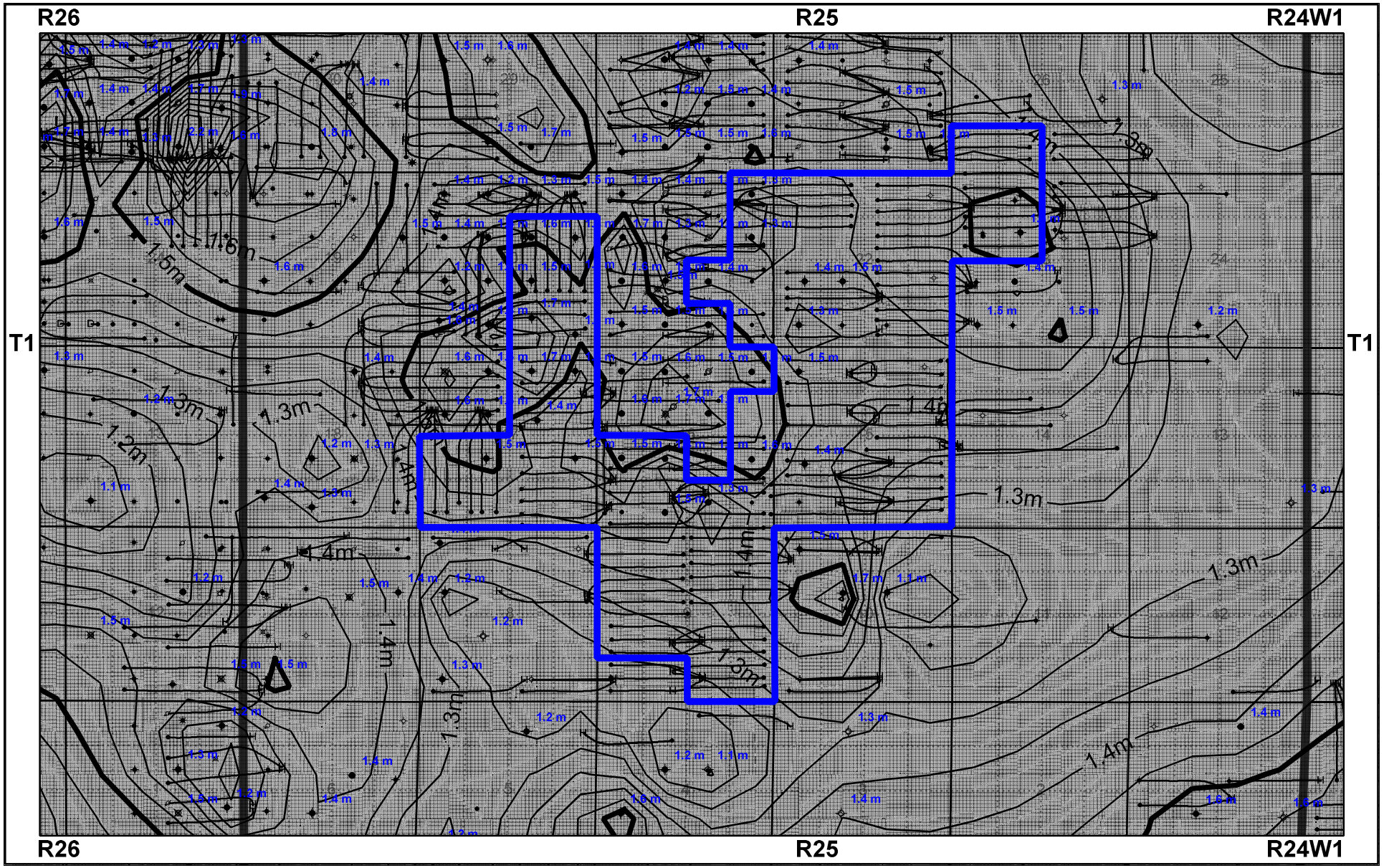
test: Regression Logs: CORE.POROSITY, PHIE, CC: 0.329356

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



Waskada Unit 22 Application

Mean Sonic Porosity from Top Green to Base Red Control Points in Red Values in Percent



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Phi*h at 10% cut off Top Green to Base Red Sand (Total Reservoir)