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ANNUAL TECHNICAL REPORT  
EL28900 FOR PERIOD ENDING  
4<sup>TH</sup> MARCH 2016

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| 2<sup>nd</sup> May 2016



Titleholder:	Tellus Holdings Ltd
Operator:	Tellus Holdings Ltd
Tenements:	EL28900 Eastern Railroad
Project Name:	Chandler Project
Report Title:	Annual Technical Report for EL28900 "Eastern Railroad", Chandler Project for the period 5 March 2015 to 4 March 2016
Author:	Jaime Livesey
Target Commodity:	Halite (Sodium chloride)
Date of Report:	2 May 2016
Datum/zone:	GDA94 / zone 53
250K map sheet:	SG5302 Rodinga
100K map sheet:	5648 Charlotte
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## EXECUTIVE SUMMARY

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The Chandler Project consists of six exploration licenses held by Tellus Holdings Ltd (“Tellus”), located in the Amadeus Basin, approximately 130km south of Alice Springs. This annual report relates to one of the exploration licences; EL28900 Eastern Railroad for the reporting period ending 4th March 2016.

The Chandler Project is targeting subsurface salt deposits to assess potential evaporitic mineralisation within the Amadeus Basin. Two known salt units are present in the Chandler project area, namely the Chandler Formation and the deeper Gillen Salt Member.

Exploration activities to date indicate a significant thickness of massive to semi massive halite exists within the Chandler Formation at a depth of approximately 700-1000m.

During the reporting period Tellus completed a water investigation program, including reconnaissance of existing bores and drilling program on nearby tenement EL29018. Water sample collection and wireline logging were completed. The results from this drilling program were used to reinterpret seismic over the project area and assist in mine planning studies.

Ongoing environmental studies include hydrology, hydrogeology and ecology. Feasibility studies aimed at mine planning and surface infrastructure are also continuing for proposed development of MLA30612.



## 1 INTRODUCTION

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The Chandler Project is located in the Amadeus Basin, approximately 130km south of Alice Springs. This annual report relates to granted exploration licence EL28900 Eastern Railroad exploration licence, which is one of six licences held by Tellus which are collectively referred to as the Chandler Project.

## 2 PROJECT DESCRIPTION

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The Chandler Project is targeting subsurface salt deposits to assess potential evaporitic mineralisation within the Amadeus Basin. Two known salt units are present in the Chandler project area, namely the Chandler Formation and the deeper Gillen Salt Member. Exploration activities by Tellus over the Chandler Project have included initial assessment of open file geochemical and geophysical data, detailed review of petroleum well data, seismic interpretation and modelling, geochemical analysis and mineralogical investigation of core samples from previously drilled petroleum wells and from two drillholes completed by Tellus in 2013-2014. Ongoing environmental studies include hydrology, hydrogeology and ecology. Feasibility studies aimed at mine planning and surface infrastructure are also continuing for proposed development of MLA30612.

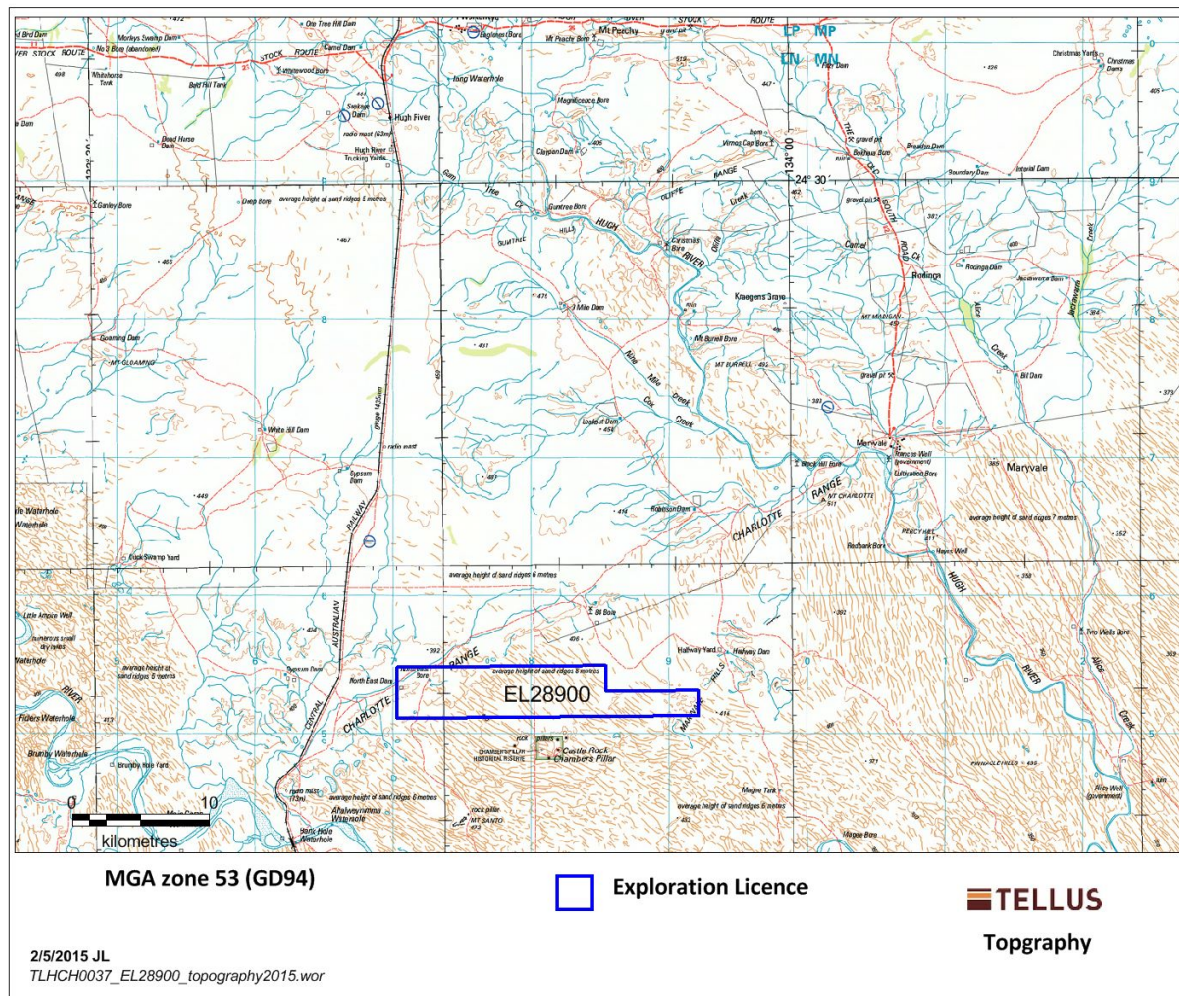
## 3 LOCATION

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The tenement is located in the southern part of the Northern Territory. Alice Springs is the nearest major town, situated approximately 130km north of EL28900. The area can be accessed via graded roads and station tracks (figure 1). The Central Australian Railway runs to the west of EL28900. The tenement lies within 1:250,000 sheet area Rodinga SG5302 1:100000 sheet area Charlotte (5648).



**Figure 1: Project Location and Topography**



## 4 TENURE

Exploration licence EL28900 “Eastern Railroad” was granted to Tellus on the 5th March 2012 for a 6 year term (Table 1).

**Table 1: Details of Exploration Licence EL28900 held by Tellus Holdings**

TENURE	NAME	STATUS	EFFECTIVE_DATE	EXPIRY_DATE	AREA_SQKM	SUBBLOCKS
EL28900	Eastern Railroad	Grant	5/03/2012	4/03/2018	99.75	22



## 5 REGIONAL GEOLOGY

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The Amadeus Basin is an asymmetrical, east-west trending, intracratonic depression covering 155000 sq km of central Australia (Figure 2).

The oldest elements of the Amadeus Basin are Neo-Proterozoic units having a very restricted known extent. These units consist of clastic sedimentary rocks and basalts along the south western margin of the basin (Mount Harris Basalt, Bloods Range Beds, Dixon Range Beds) and an unnamed succession of sedimentary rocks, basalt and dacite near Kintore in the north-west. The units have been interpreted as a rift sequence marking the opening of the Amadeus Basin (Lindsay and Korsch, 1989).

The fluvio-volcanic rift sediments are unconformably overlain by epeirogenic clastics of the Heavitree / Dean quartzites, followed by carbonates and evaporites of the Bitter Springs Formation. The Bitter springs Formation is terminated by an erosional surface upon which shallow marine and glaciogene sediments of the Inindia Beds and its equivalents in the northern Amadeus Basin were deposited. An unconformity surface within the Bitter springs Formation at or near the top of the Gillen Member has wide extent and can be used as a seismic marker.

The top of the Inindia Beds is marked by a flooding surface upon which deeper water pelagic and turbiditic sediments accumulated. This deeper marine sequence is known as the Winnall beds in the south and the Pertatataka Formation in the north. It shallows upward into shallow marine and fluvial clastics in the south west and oolitic platform carbonates of the Julie Formation in the north. The Inindia Beds are thickest in the west and centre of the basin and are absent from the eastern margin of the basin.

The Late Proterozoic phase of deposition was terminated in the south by the Petermann Ranges Orogeny, a period of mountain building, recumbent folding and northward overthrusting (Wells et al. 1970). Molasse sediments were shed north and north-east from uplifted areas and accumulated in a foreland style basin immediately before the rising orogen (Mt Currie Conglomerate, Ayers Rock Arkose), bypassed the middle and eastern fringes of the basin, and accumulated as a prograding deltaic sequence in the north (Arumbera Sandstone).

The Petermann Ranges Orogeny shaped the framework of the Palaeozoic basin, and a northern trough initiated at this time persisted through most of the Palaeozoic. The southern central and south eastern parts of the basin remained uplifted. Palaeozoic sequences in these areas are generally thin with common significant breaks in accumulation.

During the early Cambrian, continental sedimentation persisted in the north-west (Cleland Sandstone), while shallow marine shales, carbonates and evaporites were deposited in the north-east (Shannon, Giles Creek and Chandler Formations). A widespread transgressive cycle in the Late Cambrian resulted in the deposition of the Goyder Formation.



Two transgressive cycles during the Ordovician resulted in the alternating deposition of tidal flat/barrier bar sands and deeper marine, euxinic muds and silts (Pacoota Sandstone, Horn valley Siltstone, Stairway sandstone, Stokes Siltstone). These sediments form the source-reservoir-seal sequence of the Mereenie and Palm valley hydrocarbon fields in the north-western Amadeus Basin. Of this Larapinta Group, only the Stairway Sandstone persists into the centre and southeast of the basin.

Marine deposition was terminated by the Late Ordovician Rodingan Movement. Uplift of the north-eastern basin resulted in the erosion of up to 3000m of Cambro-Ordovician sediments. This area became the source region for the Early Devonian Carmichael and Mereenie Sandstone. Arid climatic conditions prevailed with sediments transported by both aeolian and fluvial action into a shallow sea transgressing from the west.

Major uplift of the Arunta block along the present northern margin of the basin commenced in the Middle Devonian. Continental deposition continued as thick molasse sediments accumulated south of the uplifted area. High depositional loading at this time contributed to movement of the Bitter Springs Formation and Chandler Formation evaporites.

A lacustrine siltstone (Parke Siltstone) was laid down conformably on the Mereenie Sandstone, and after uplift, coarser sediments were deposited (Hermannsburg Sandstone, Brewer Conglomerate). These three units, comprising the Pertnjara Group, thin and become finer grained to the south.

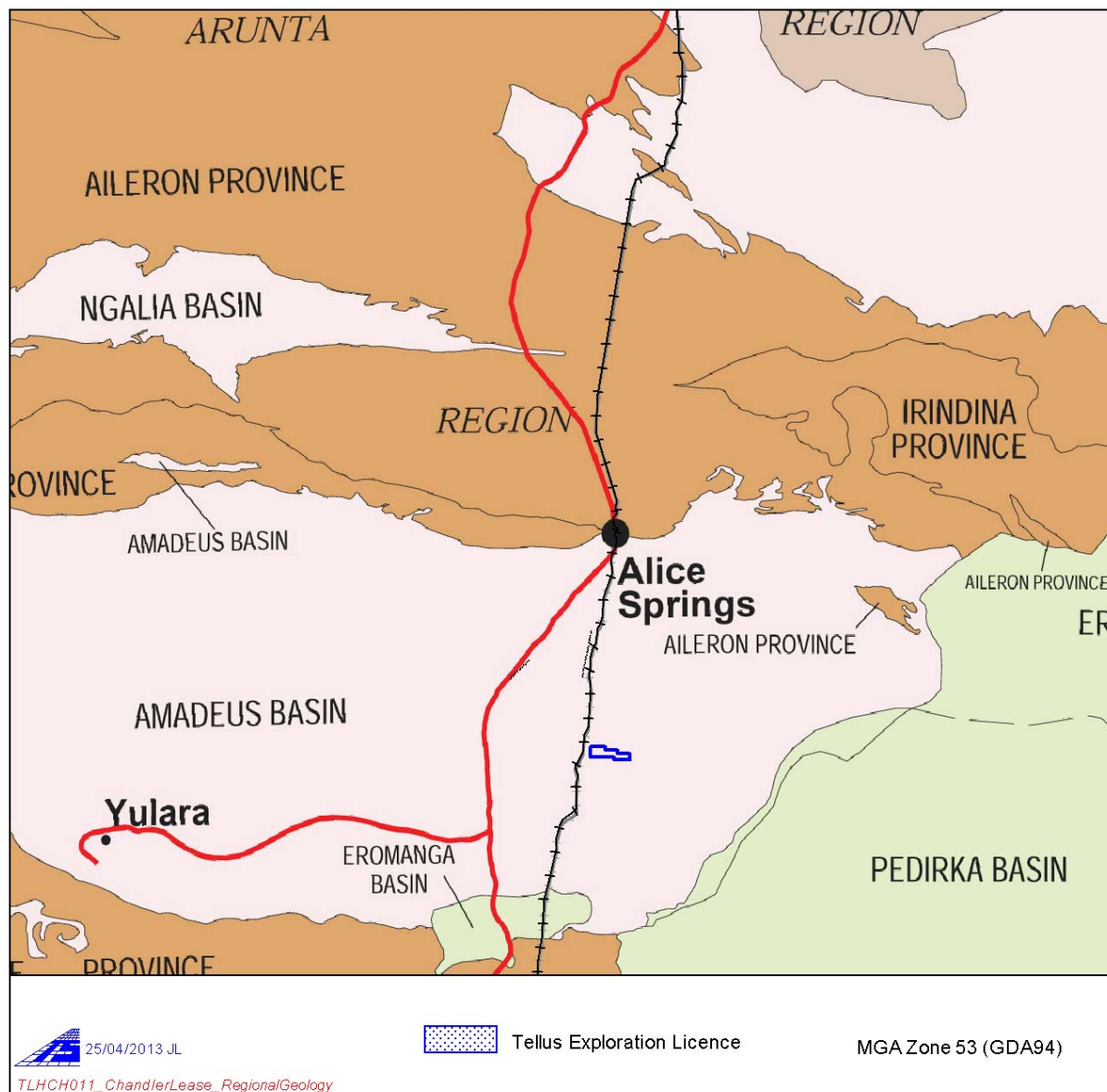
Uplift of the Musgrave Province and deformation of the southern Amadeus sequence culminated in the Early-Middle Devonian Finke Movement (Polly Conglomerate), after which fluvial sands of the Langra Formation and estuarine silts of the Horseshoe Bend Shale accumulated. These sediments comprise the Finke Group, which is the southern time equivalent of the Pertnjara Group, although the former sequence fines upward in contrast.

Regional deposition was terminated in the Late Devonian-Early Carboniferous by the Alice Springs Orogeny. Some earlier structures were reactivated during this period of deformation. Substantial uplift of the basement Arunta block along the current northern margin initiated movement of thrust sheets in the Alice Springs and Altunga regions, and resulted in significant structuring of the basin. North over south thrusting and reverse faulting is typical of Alice Springs orogeny deformation.





Figure 2: Geological Regions of Northern Territory (adapted from NTGS, 2006)



## 6 LOCAL GEOLOGY

The project area overlies 1:250K map sheet Rodinga. Majority of the area lies within the Rodinga mapsheet, which was geologically mapped in 1964 by the Bureau of Mineral Resources. Surface geology is shown in figure 3 and stratigraphy is included as figure 4.



The stratigraphy within the Charlotte area has been well defined from drilling of petroleum wells Mt Charlotte 1 and Magee 1, the generalised local stratigraphy is given in Table 2 and published stratigraphic correlation across the Southern Amadeus basin is shown in figure 5.

**Figure 3: Local Geology over EL28900**

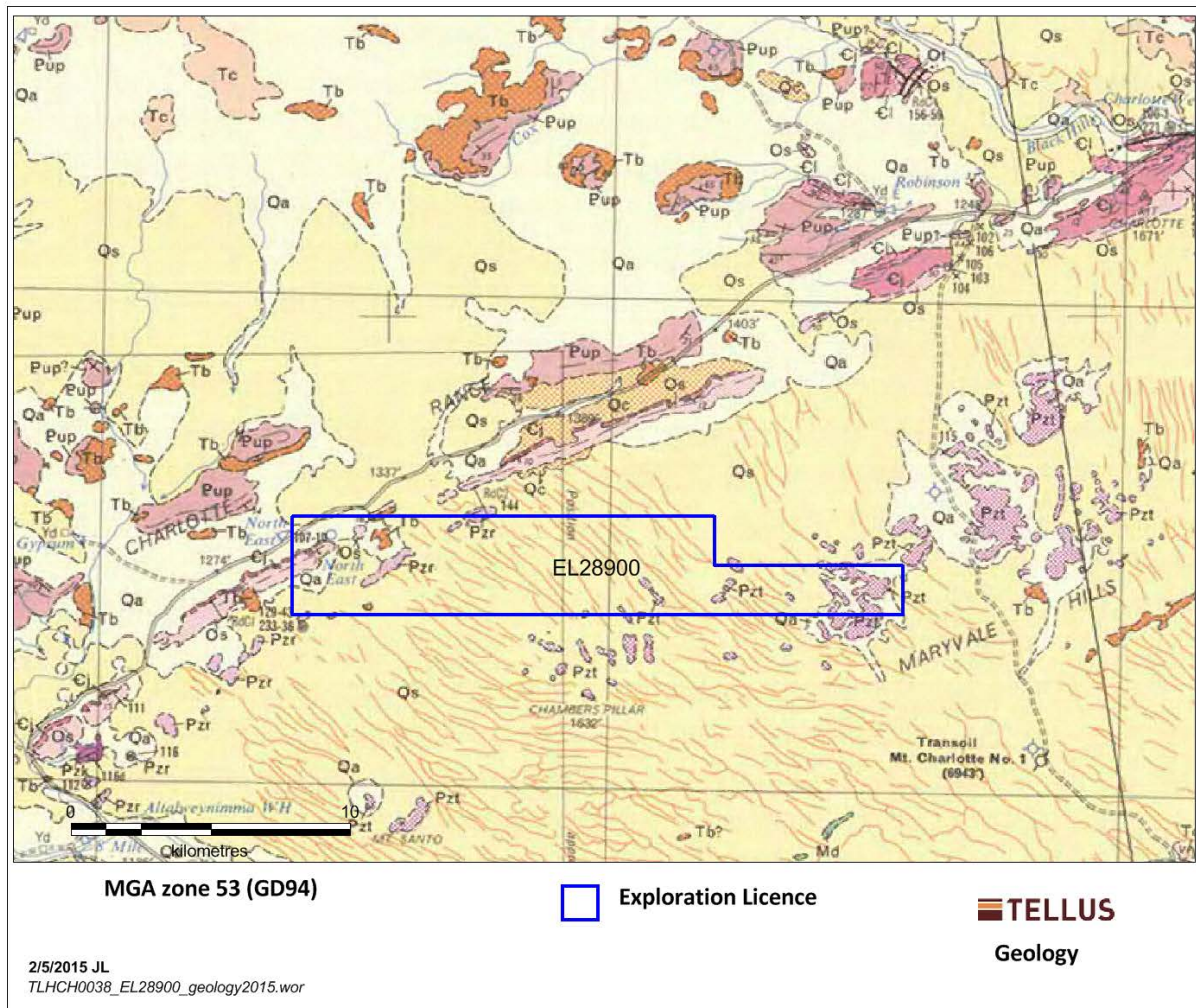




Figure 4: Stratigraphy (from Rodinga SG5302 1:250K map sheet)

QUATERNARY	Undifferentiated	Q	Alluvium, sand, travertine, gypsum, conglomerate (section only)
		Qs	Alluvial gravel, sand and silt
		Qs	Aeolian sand
		Qt	Travertine
		Qg	Gypsum
		Qc	Conglomerate
TERTIARY	Undifferentiated	T	Sandstone, calcareous silty sandstone, conglomerate, limestone (section and rock relationship diagram only)
		Tl	Chalcedonic limestone, siltstone and calcareous sandstone containing freshwater gastropods
		Tc	Conglomerate
		Tb	Silcrete (grey billy)
		Te	Laterite, ferricrete
		Ts	Sandstone, siltstone, conglomerate, clay and some lignite
CRETACEOUS	Rumbalara Shale	Kr	Fossiliferous shale, siltstone, porcellanite, sandstone
JURASSIC ?	De Souza Sandstone	Md	Sandstone, pebbly sandstone, conglomerate and siltstone
DEVONIAN TO CARBONIFEROUS	Finnia Group	Pzt	Sandstone, pebbly sandstone, minor claystone
		Pth	Red-brown biotite shale, grey-green calcareous siltstone
		Pto	Sandstone, pebbly sandstone, conglomerate, siltstone (section only)
		Pzo	Sandstone, pebbly sandstone, conglomerate and siltstone
		Pvb	Coarse conglomerate
		Pzr	Red-brown sandstone, pebbly sandstone, minor siltstone
SILURIAN? TO CARBONIFEROUS	Perthshire Group	Pvk	Siltstone, calcareous siltstone and fine silty sandstone interbeds
		Pz	Sandstone, pebbly sandstone
		Pzm	White cross-bedded sandstone
SILURIAN? TO DEVONIAN	Larapinta Group	C-Ql	Fossiliferous sandstone, siltstone, shale, limestone
		Ol	Siltstone, shale, fossiliferous limestone
		Os	Fossiliferous sandstone, silty sandstone, siltstone and limestone; some phosphatic
		Ob	Fossiliferous siltstone, shale and limestone
		C-Op	Fossiliferous sandstone and silty sandstone
CAMBRIAN TO ORDOVICIAN	Larapinta Group	Cp	Sandstone, siltstone, shale, dolomite, limestone
		Cg	Fossiliferous silty sandstone, siltstone and limestone
		Cl	Fossiliferous limestone, shale and dolomite
		Cs	Fossiliferous siltstone, shale and limestone
		Cx	Fossiliferous dolomite, limestone, siltstone, and shale
		Cf	Limestone and dolomite with chert laminae
		Ct	Pink fossiliferous glauconitic dolomite, minor shale and siltstone
		Ca	Red-brown sandstone, conglomeratic sandstone, siltstone; trace fossils
		Pzp	Siltstone and shale with lenses of sandstone, dolomite, limestone and conglomerate
		Pzpt	Conglomeratic sandstone
CAMBRIAN	Perthshire Group	Puj	Dolomite, limestone, lenses of calcareous sandstone
		Pul	Siltstone, shale and fine-grained thin-bedded sandstone
		Pvl	Conglomerate, siltstone, sandstone, dolomite
		Pum	Cross-laminated sandstone, calcarenite, siltstone
		Pvr	Algal dolomite, limestone and siltstone
		Pvc	Conglomeratic siltstone, sandstone, conglomerate, minor dolomite with red chert
		Pvb	Dolomite, limestone, siltstone, sandstone, shale; some volcanics
PROTEROZOIC	Perthshire Group	Pzp	Siltstone and shale with lenses of sandstone, dolomite, limestone and conglomerate
		Pzpt	Conglomeratic sandstone
		Puj	Dolomite, limestone, lenses of calcareous sandstone
		Pul	Siltstone, shale and fine-grained thin-bedded sandstone
		Pvl	Conglomerate, siltstone, sandstone, dolomite
		Pum	Cross-laminated sandstone, calcarenite, siltstone
		Pvr	Algal dolomite, limestone and siltstone
		Pvc	Conglomeratic siltstone, sandstone, conglomerate, minor dolomite with red chert
		Pvb	Dolomite, limestone, siltstone, sandstone, shale; some volcanics
		Pvb	Dolomite, limestone, siltstone, sandstone, shale; some volcanics

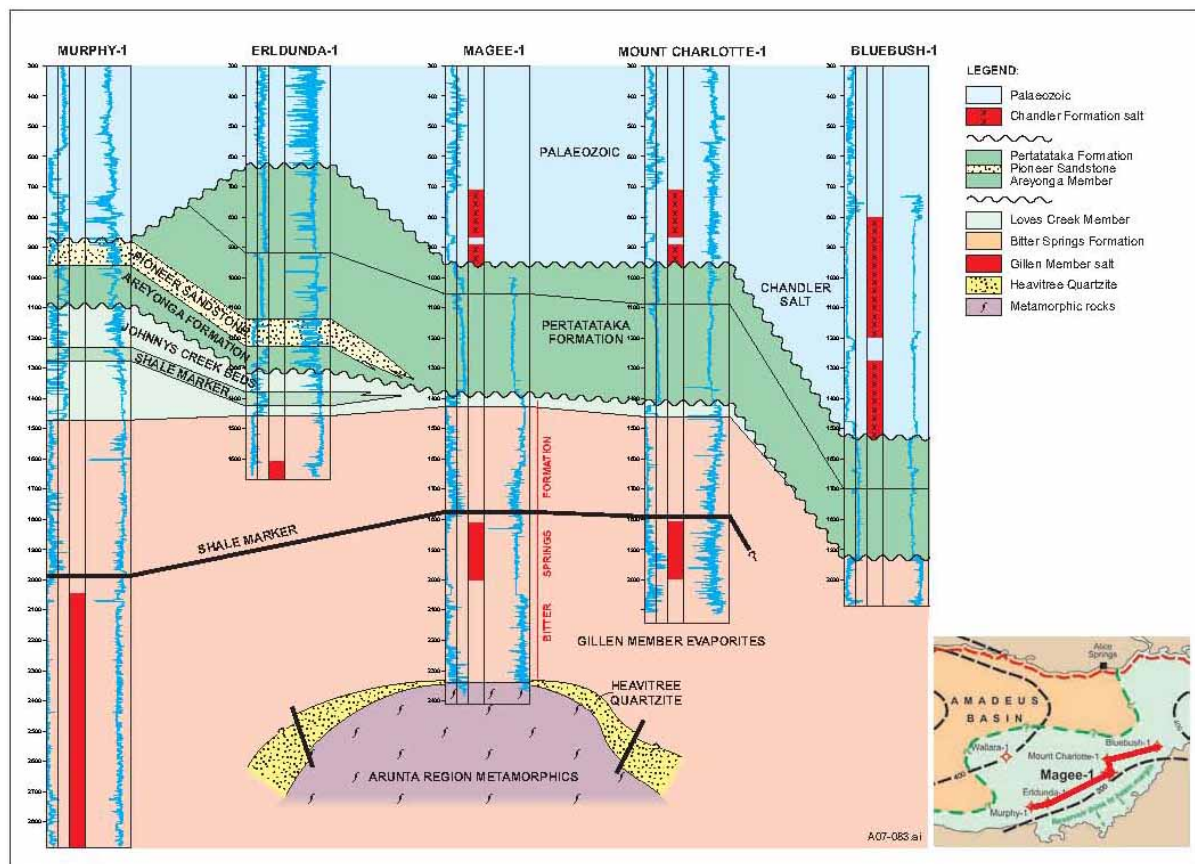




**Table 2: Generalised stratigraphy for the Charlotte Project area**

AGE		STRATIGRAPHY		
Cainozoic	Quaternary		undifferentiated	
	Tertiary		undifferentiated	
Palaeozoic	Devonian		Santo Sandstone	
		Finke Group		
		Pertnjara Group	Pertnjara Formation	
	Ordovician	Larapinta Group	Stairway Sandstone	
	Cambrian	Pertaoorrt Group	Jay Creek Limestone	
			Chandler Formation	
			Arumbera Formation	
Precambrian	Upper Proterozoic		Winnall Beds	Pertatataka Formation
			Bitter Springs Formation	Loves Creek Member
				Gillen Member
				Upper Gillen
				Gillen Salt
				Lower Gillen
	Middle Proterozoic		Heavitree Quartzite	
		Musgrave Block	Arunta Complex	

**Figure 5: Correlation between wells (from Young and Ambrose, 2007)**





## **7 EXPLORATION ACTIVITIES CONDUCTED DURING 2012-2013**

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### **7.1 Mine Management Plan for Exploration Operations**

Tellus completed the requirements for the Mine Management Plan (“MMP”) for exploration operations for the Chandler Project. The MMP was approved in August 2012 for proposed seismic and drilling over target areas within the Bluebush sub-project (EL27971) and within the Charlotte sub-project (EL27972 and EL29018).

### **7.2 Exploration Agreement with Central Land Council on behalf of Traditional Owners**

Tellus has signed an exploration agreement with traditional owners, through the Central Land Council (“CLC”). Tellus was granted sacred site clearance certificate from the CLC for exploration activities including track clearing and drilling.

### **7.3 Prefeasibility Study**

Tellus completed a prefeasibility study for the Chandler Salt Project. The definitive feasibility study commenced during 2013 to look at all aspects of the project, such as; best mining method, logistics, costs and technical aspects of the project.

### **7.4 Onsite Geological and Geotechnical Assessment**

A site visit was conducted on 25th to 26th February 2013 by Duncan van der Merwe and Joe Luxford from Tellus and John Braybrooke from Douglas Partners Pty Ltd. The aim of the visit was to assess the geology and ground conditions to assist with drill planning.

As part of the on-going studies for the project Douglas Partners completed a brief report describing the likely geotechnical properties of the rock formations in the area of the Charlotte Range and Maryvale Hills, Southeast Amadeus Basin, Northern Territory.

### **7.5 Chandler Seismic Review**

Tellus commissioned RPS Group Canada to review available open file 2D seismic data to assess salt extent and thickness of the Chandler Formation, within the Tellus project area.

RPS concluded that;

- Average Chandler Isopach 200m – 250m thick.
- Calculated Chandler Isopach ranges from 0m - 380m thick.
- Chandler formation flat lying with an average dip of less than one degree regionally.



## 8 EXPLORATION ACTIVITIES CONDUCTED 2013-2014

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### 8.1 Drilling program on adjacent tenement EL29018

To confirm the depth and thickness of the Chandler salt Formation over the project area, two deep diamond drillholes (CH001A, CH003) were completed on adjoining tenement EL29018 (Figure 6). The locations were selected based on combination of factors included proximity to existing seismic lines, interpreted depth and thickness of Chandler Formation. The drilling program took place from November 2013 to January 2014. The Chandler Formation was intersected in both drillholes, with high recovery of core achieved. Samples have been sent for chemical and mineralogical analysis, results pending.

### 8.2 Wireline Survey

A downhole wireline survey was run on drillhole CH001A, with data collected from the depth interval 316m – 1089m. The following down hole acquisition took place;

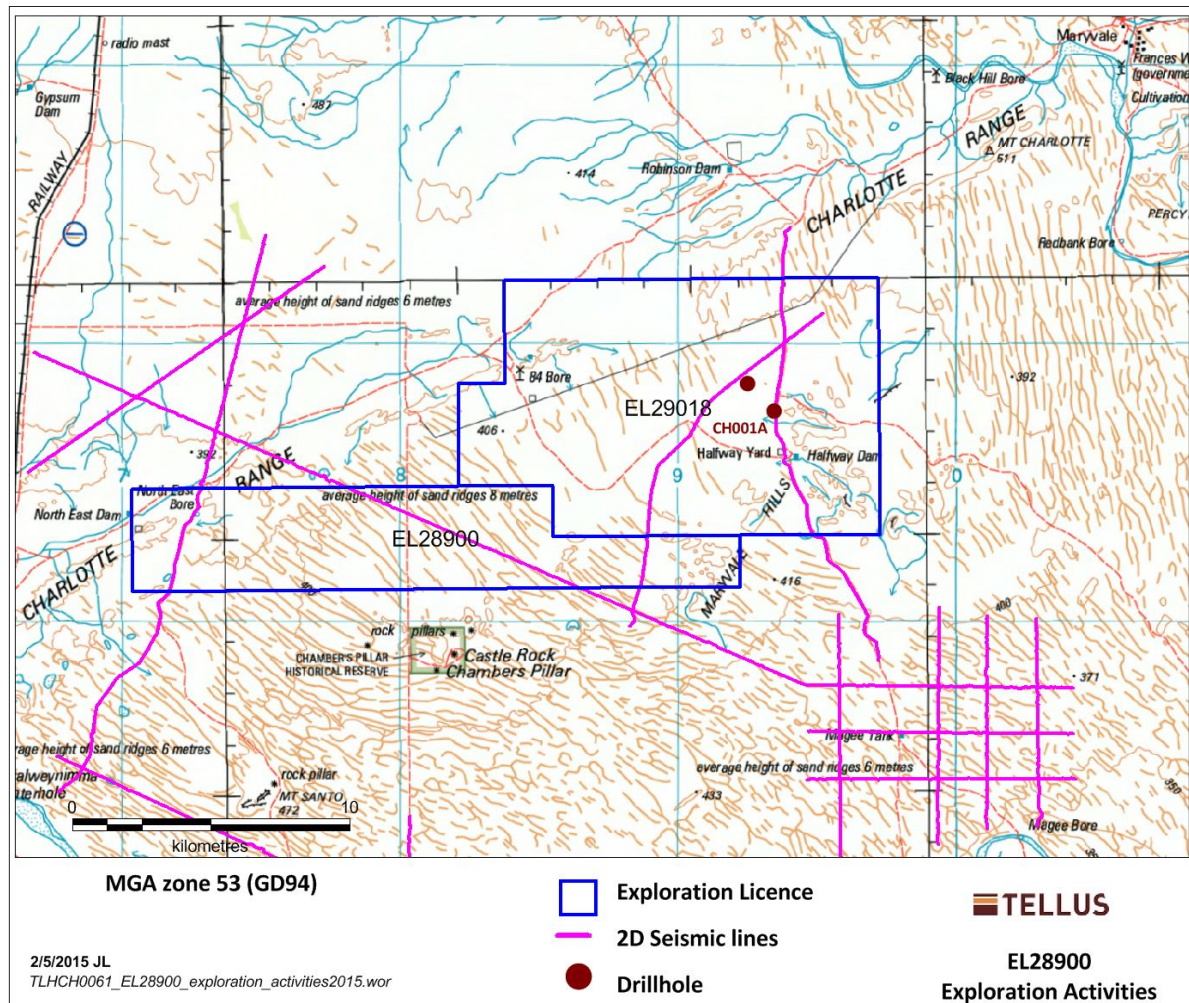
- Multi Survey Tool
- Natural Gamma (g)
- Spontaneous Potential (SP)
- 16"N and 42'Resistivity
- Point Resistance
- Mag Deviation/Gyro
- Temperature
- Full Wave Sonic
- Magnetic Susceptibility/Conductivity
- Acoustic Televiewer

The full wave sonic data will be used to tie the drillhole to the seismic survey lines. The time - depth relationship will be calculated for intersected marker beds, which will be used to convert the seismic from time domain to depth domain.

Three seismic lines fall with EL28900 (Figure 6) and are part of the Chandler Project seismic model. Interpreted horizons and marker beds on the seismic will be reconverted from time to depth using the newly acquired drillhole and wireline data. The interpretive geological model over the project area will then be updated and refined.



Figure 6: Exploration Activities



## 9 EXPLORATION ACTIVITIES CONDUCTED 2014-2015

### 9.1 Seismic review and modelling

Two seismic lines fall with EL28900 (Figure 6) and are part of the Chandler Project seismic model.

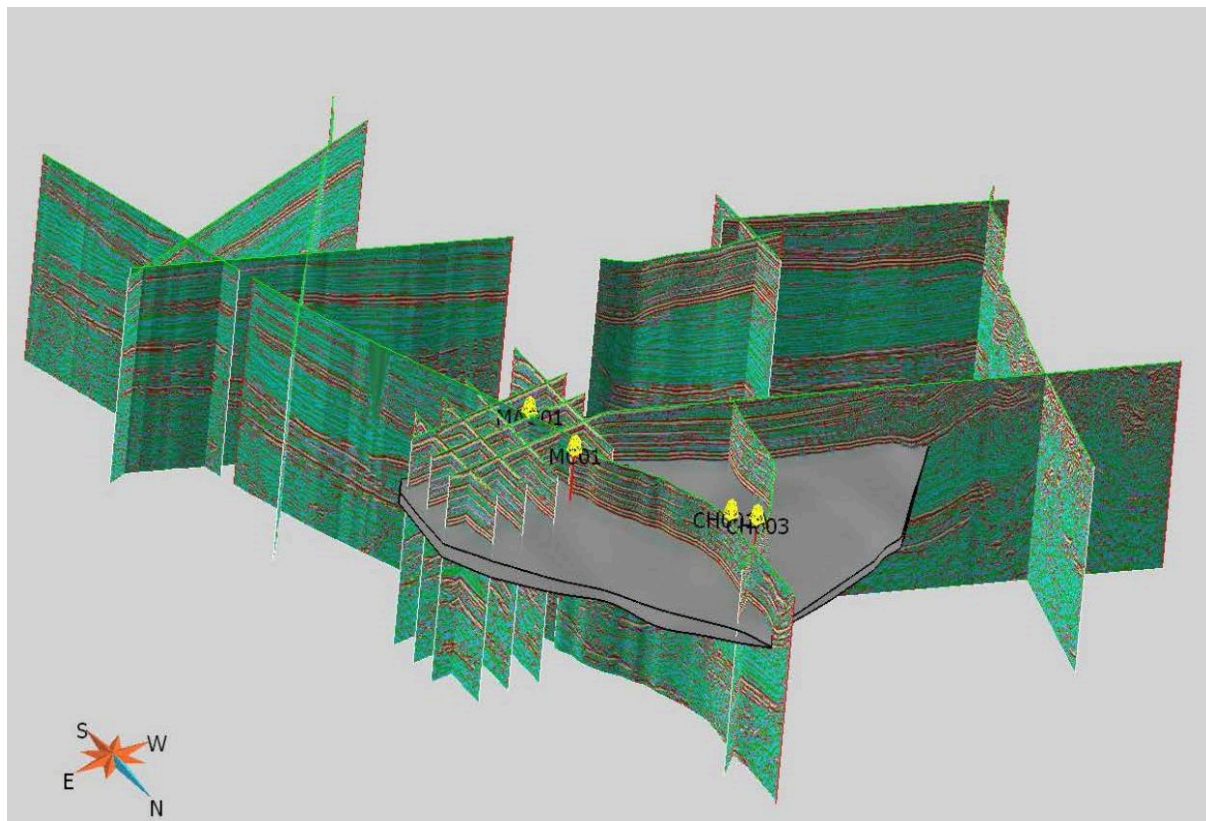
RPS Canada reviewed the newly acquired drillhole and wireline data. The full wave sonic data was used to tie the drillhole to the seismic survey lines. The time - depth relationship was calculated for intersected marker beds and used to convert the seismic from time domain to depth domain.

The interpretive geological model over the project area has been updated and refined (Figure 7).





Figure 7: seismic modelling of Chandler Formation extent



## 10 EXPLORATION ACTIVITIES CONDUCTED DURING CURRENT REPORTING PERIOD

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### 10.1 Environmental Studies

Tellus are completing environmental studies to support the Environmental Impact Statement (EIS) for the Chandler Facility within MLA30612.

#### 10.1.1 Water Investigation

A regional water investigation program commenced, Ride Consulting conducted a review of historic and existing water bores across the project and greater regional area. Areas along the Maryvale hills and Charlotte Range (within EL28900) were assessed for water potential.

Water investigation drill locations were selected on adjoining EL29018 as phase 1 target locations.





### **10.1.2 Land type mapping**

The greater project area (including the eastern part of EL28900, within Maryvale Station) was assessed by Low Ecological Services in conjunction with habitat assessment for flora and fauna studies.

## **10.2 Seismic review and modelling**

Two seismic lines fall with EL28900 (Figure 6) and are part of the Chandler Project seismic model.

Endeavour Geophysics reviewed the newly acquired drillhole and wireline data from the water investigation program. The full wave sonic data was used to tie the drillhole to the seismic survey lines. The time - depth relationship was calculated for intersected marker beds and used to convert the seismic from time domain to depth domain.

The interpretive geological model over the project area has been updated and refined (Appendix 1).

# **11 PROPOSED EXPLORATION**

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Tellus have updated the prefeasibility study for the Chandler Project, which will progress to bankable feasibility during 2016. EIS studies for Chandler Project are continuing. A water investigation program is underway in conjunction with geotechnical drilling as part of the feasibility studies.



## 12 REFERENCES

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*Northern Territory Geological Survey, March 2006. Geological Regions of the Northern Territory map sheet.*

*Wakelin-King, G. and Austin L., 1992. EP 38, Well Completion Report Magee 1 Northern Territory. Pacific Oil & Gas. Limited, Report no. 304715. NTGS Open File Petroleum Report PR1992-0121*

*Young IF, Ambrose GJ, 2007. Petroleum geology of the southeastern Amadeus Basin: the search for sub-salt hydrocarbons. In Munson TJ and Ambrose GL (editors) 'Proceedings of the Central Australian Basin Symposium, Alice Springs, Northern Territory, 16/18 August 2005'. NTGS Special Publication 2, 183-204*



## APPENDIX 1

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ENDEAVOUR GEOPHYSICS

# **SEISMIC INTERPRETATION CHANDLER**

## **MODEL SNAPSHOTS**

## **TELLUS HOLDINGS**

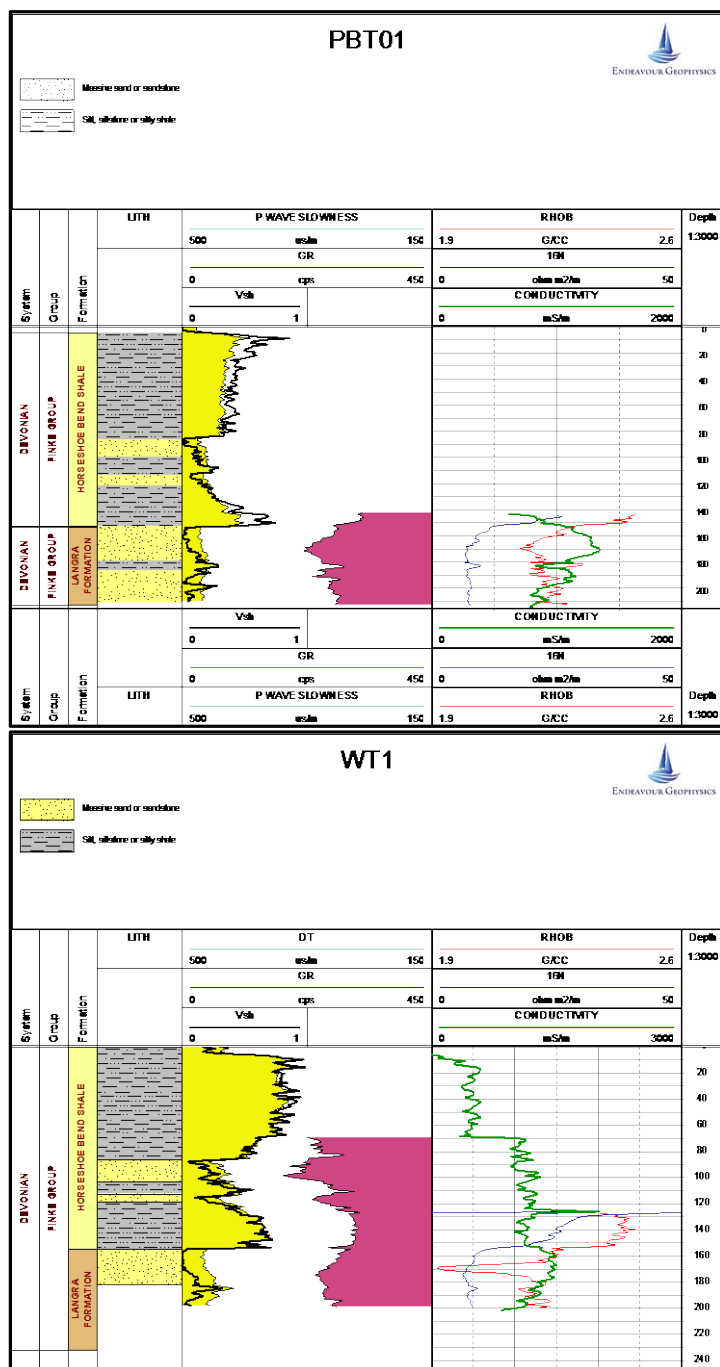
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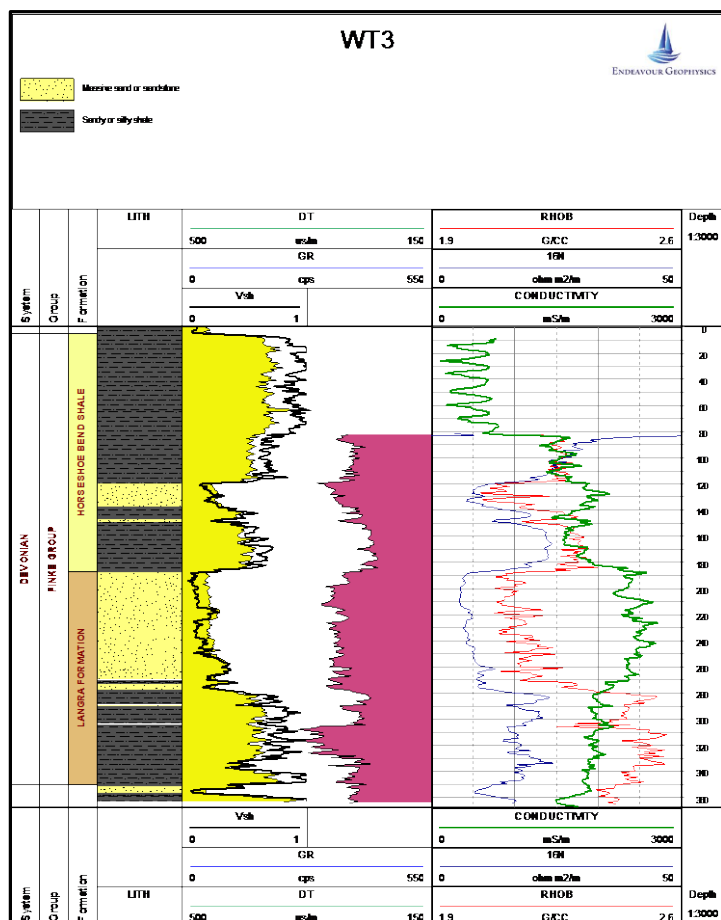
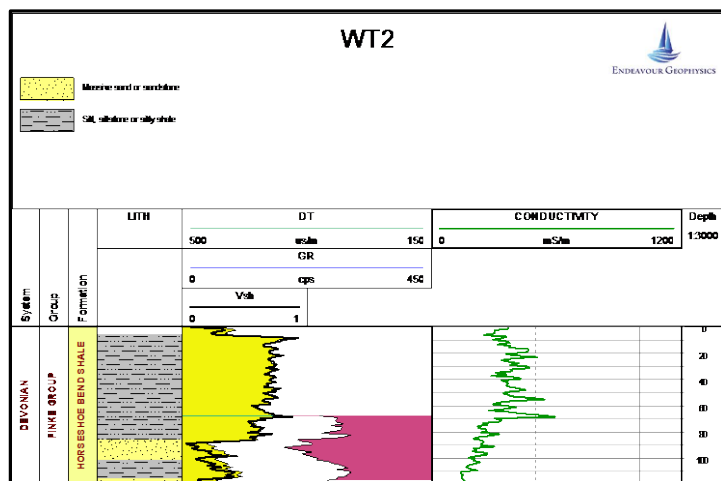
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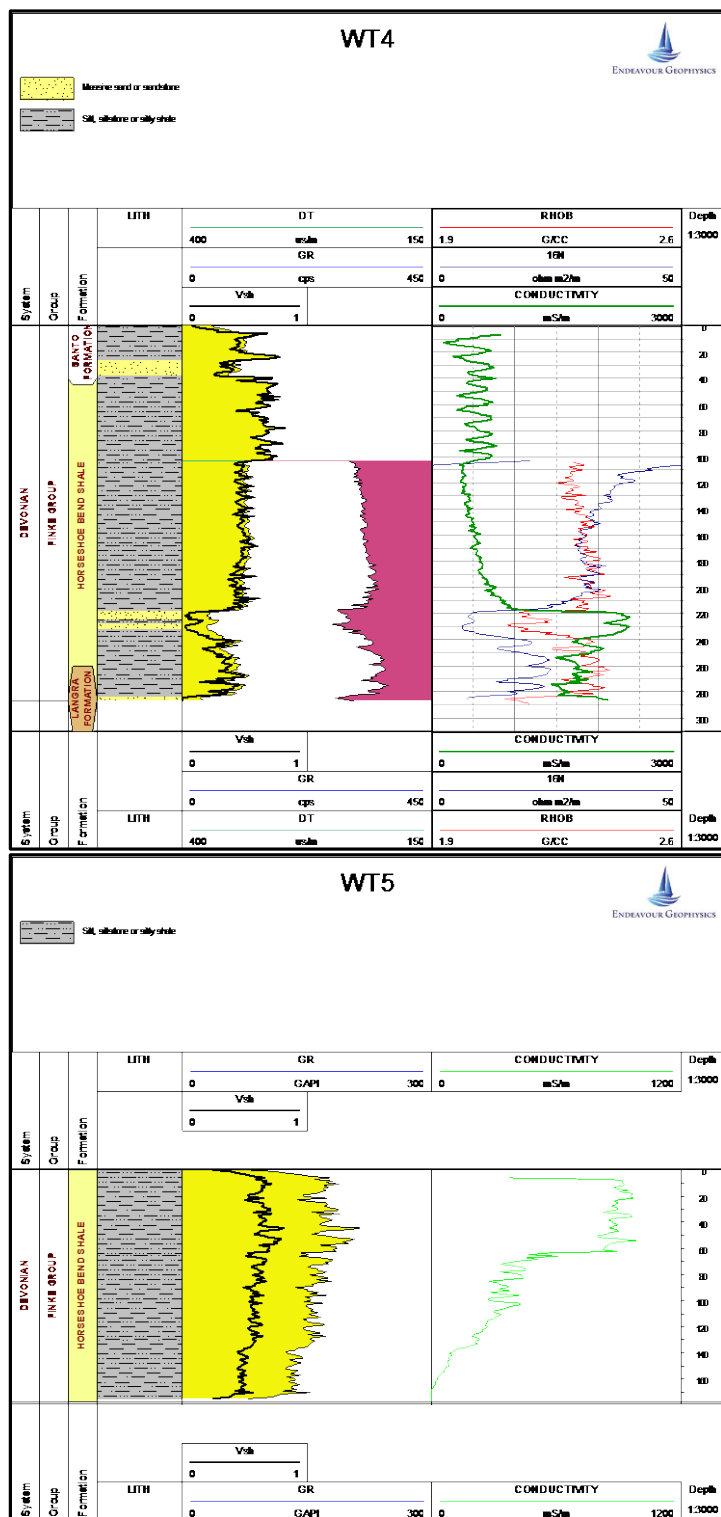
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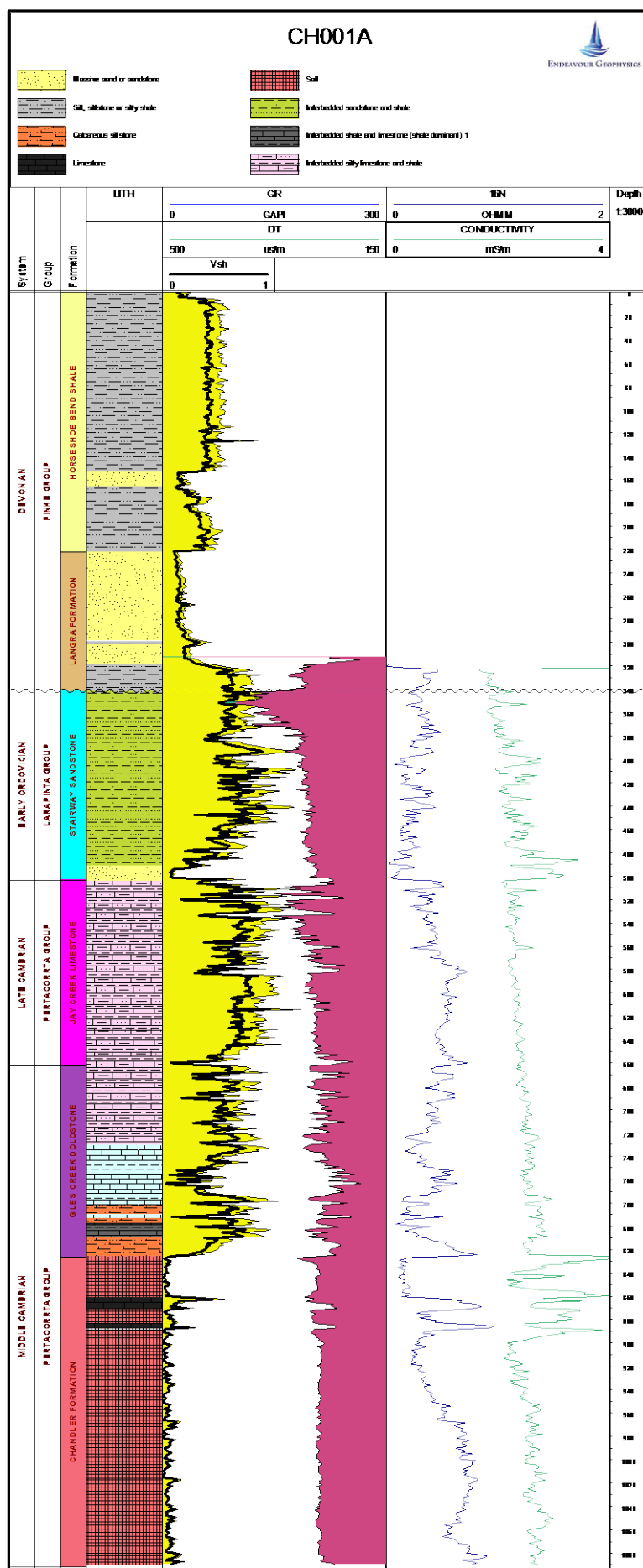
# 1. LOG INTERPRETATION

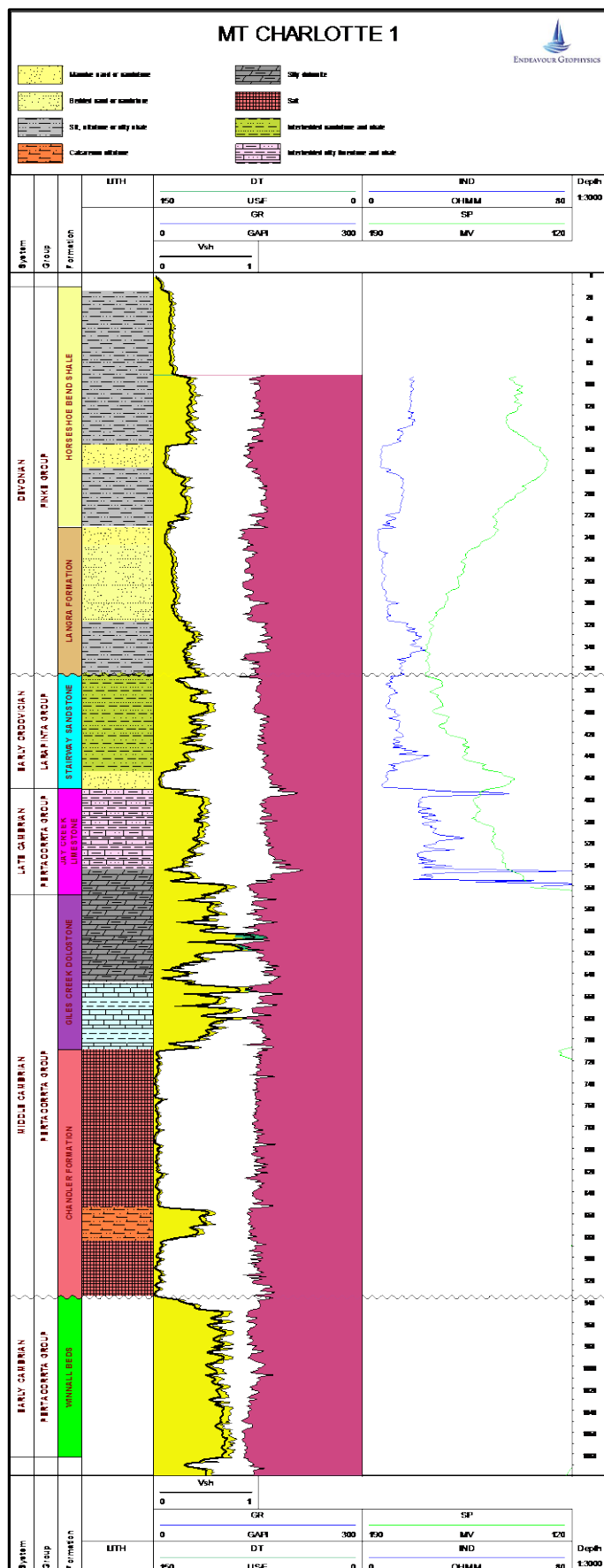


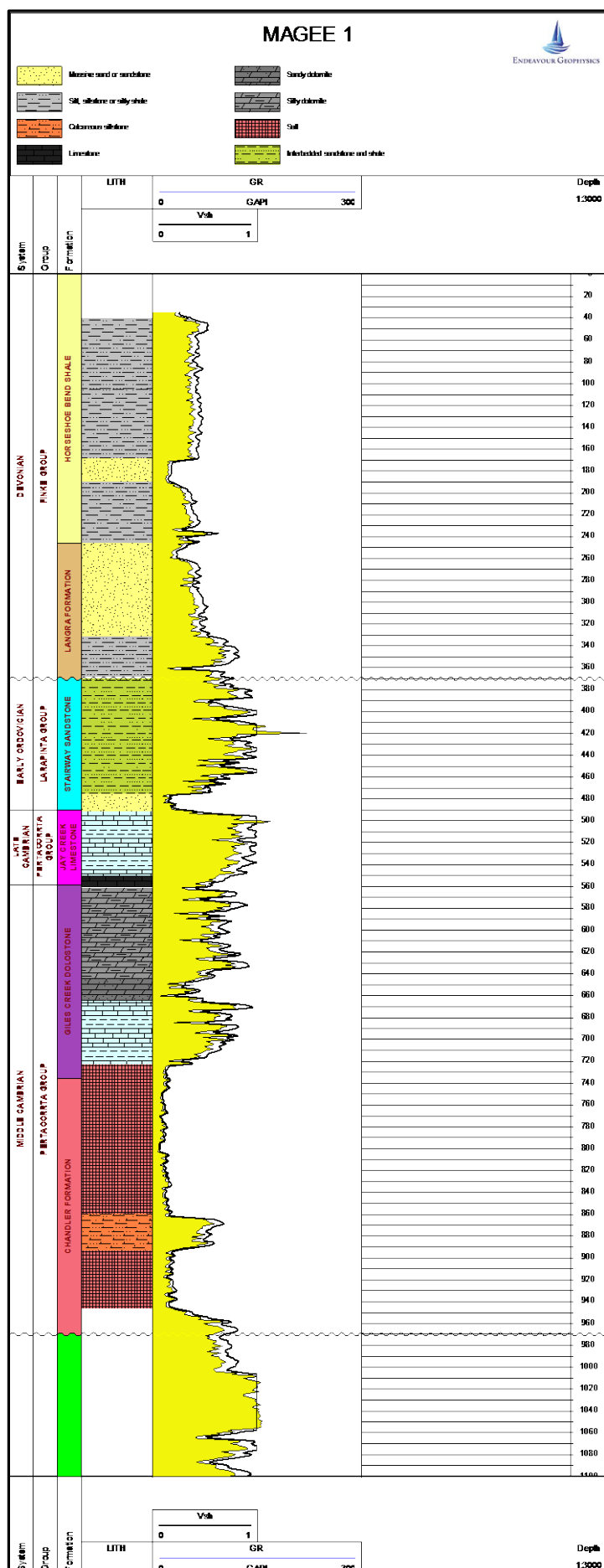






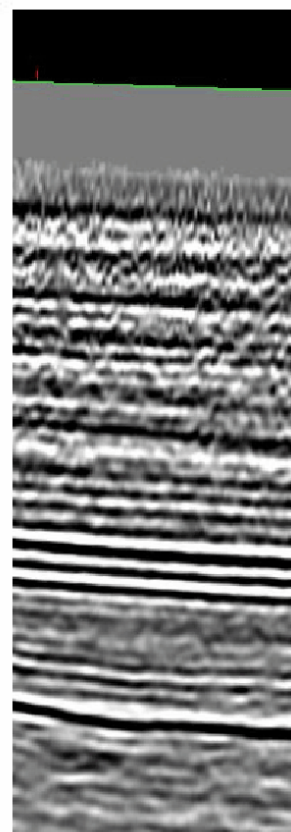
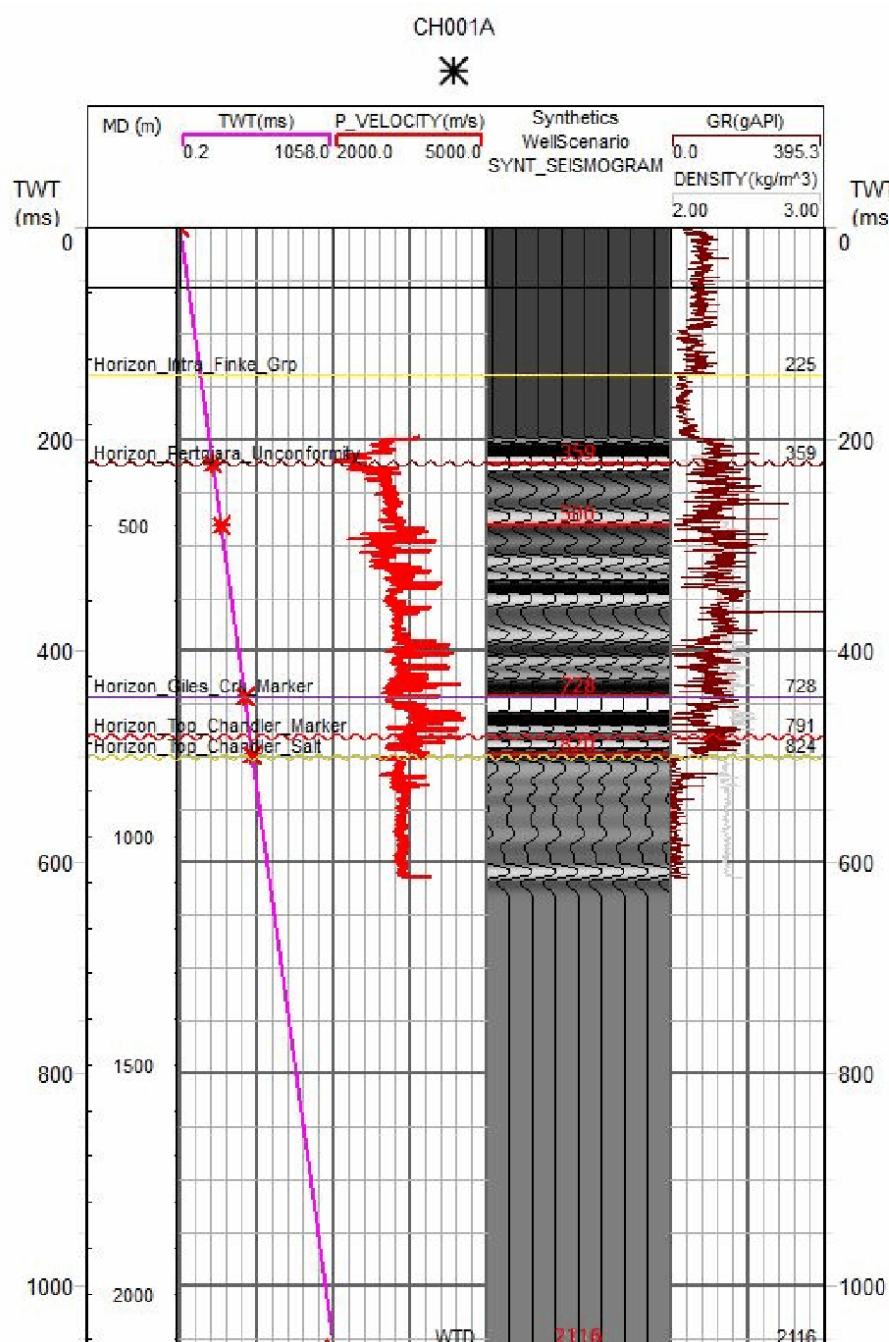




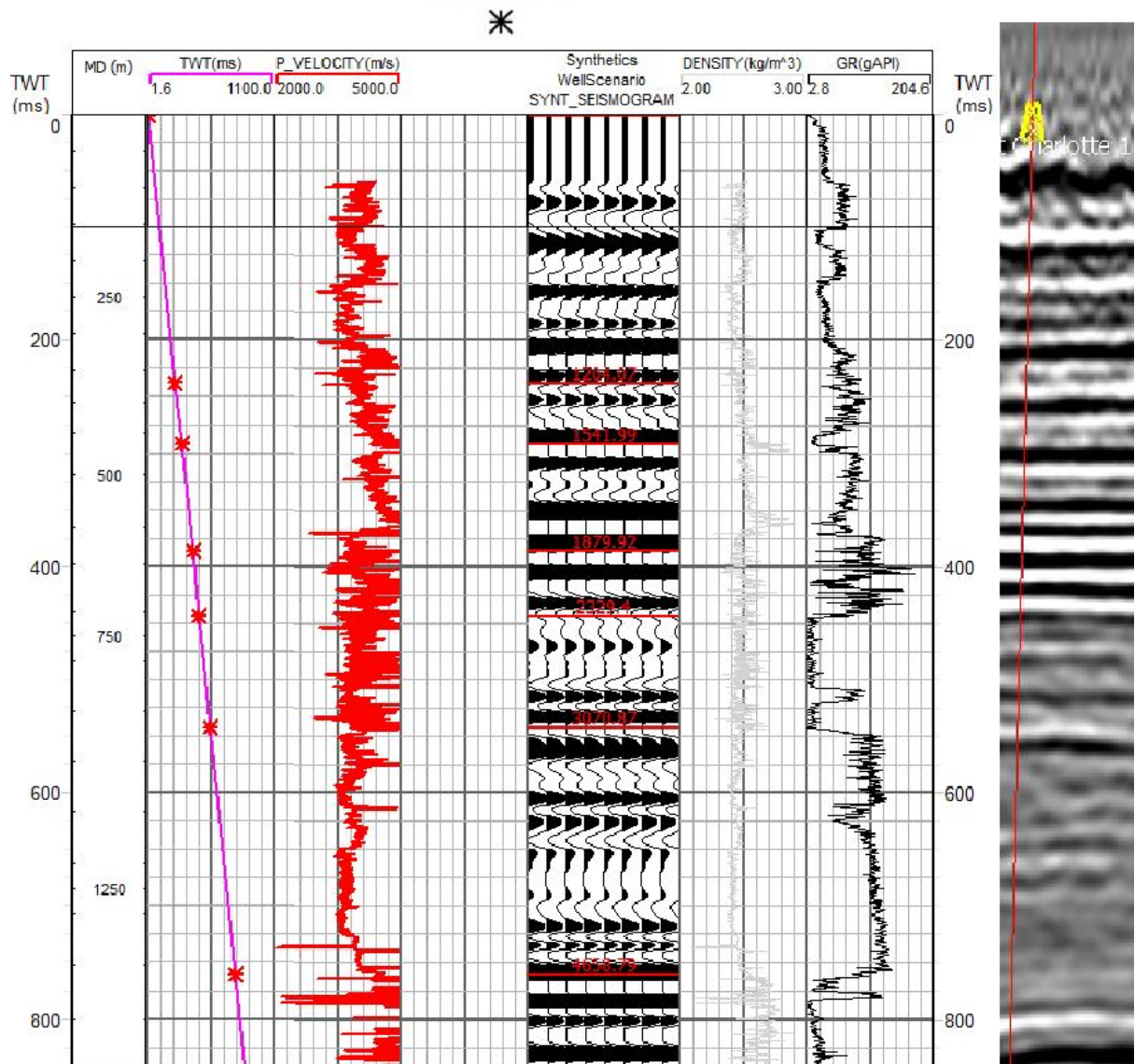


## 2. SYNTHETIC LOG – CORRELATION WITH SEISMIC DATA

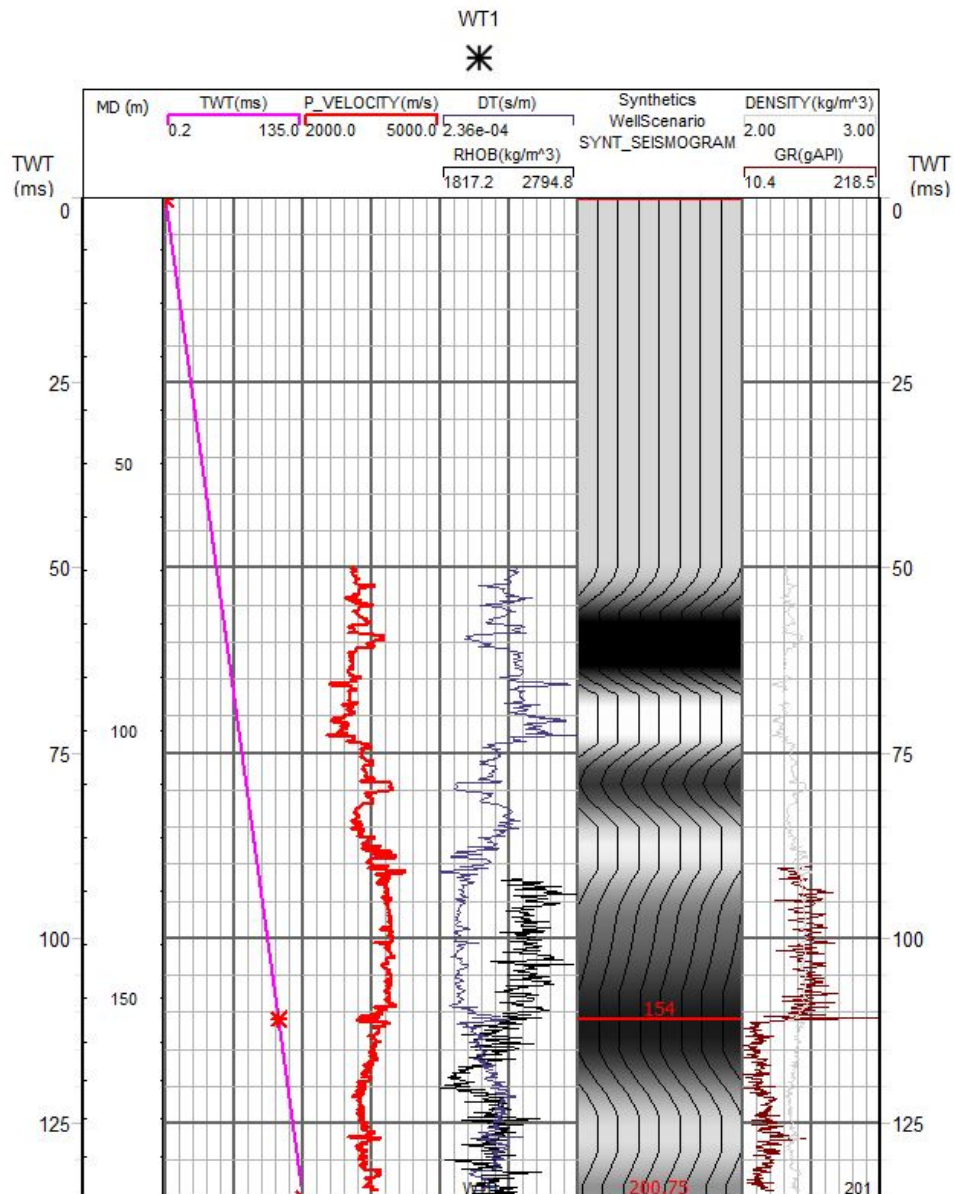
### 2.1.CH001A



## 2.2. MT CHARLOTTE 1

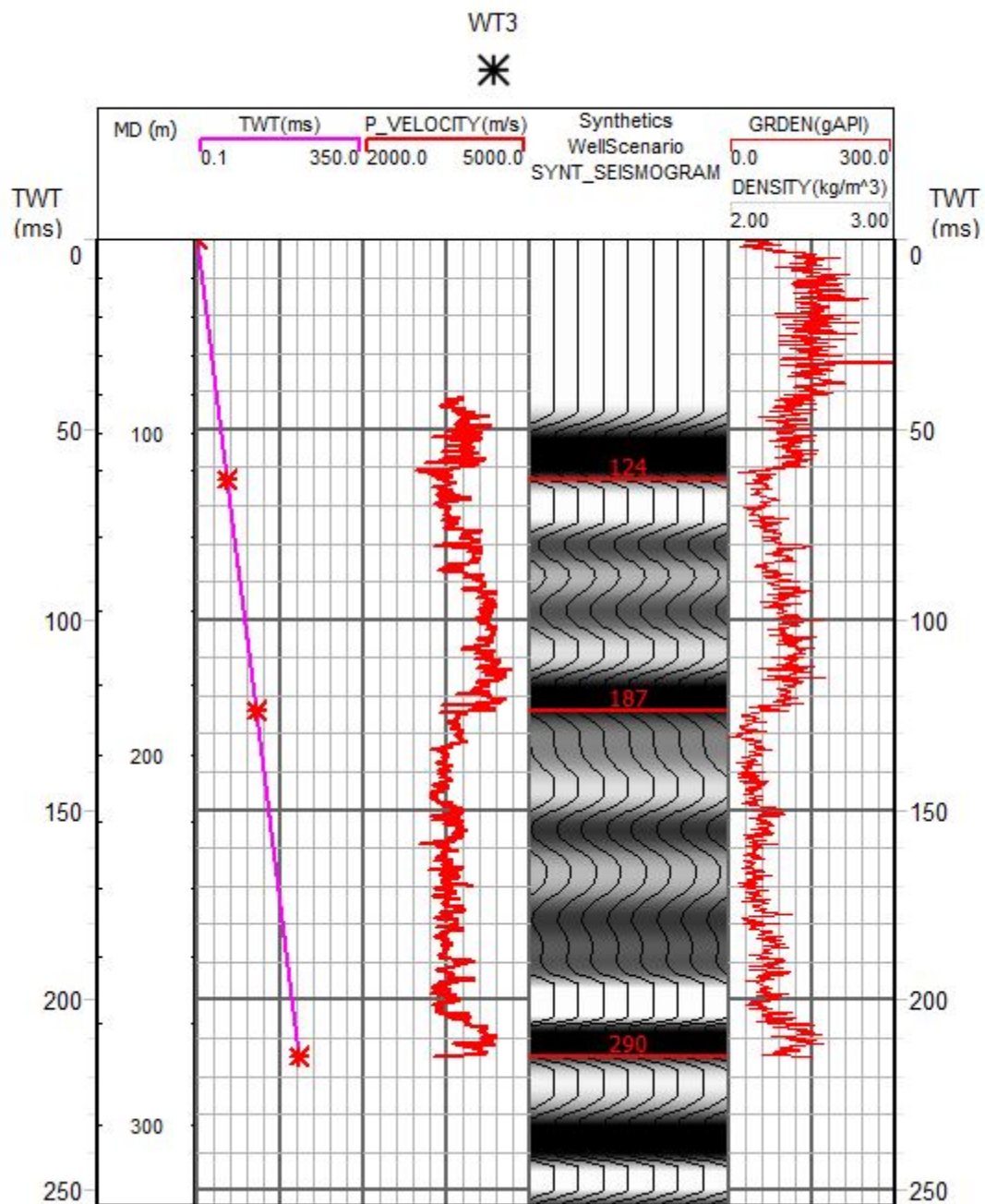


## 2.3. WT1

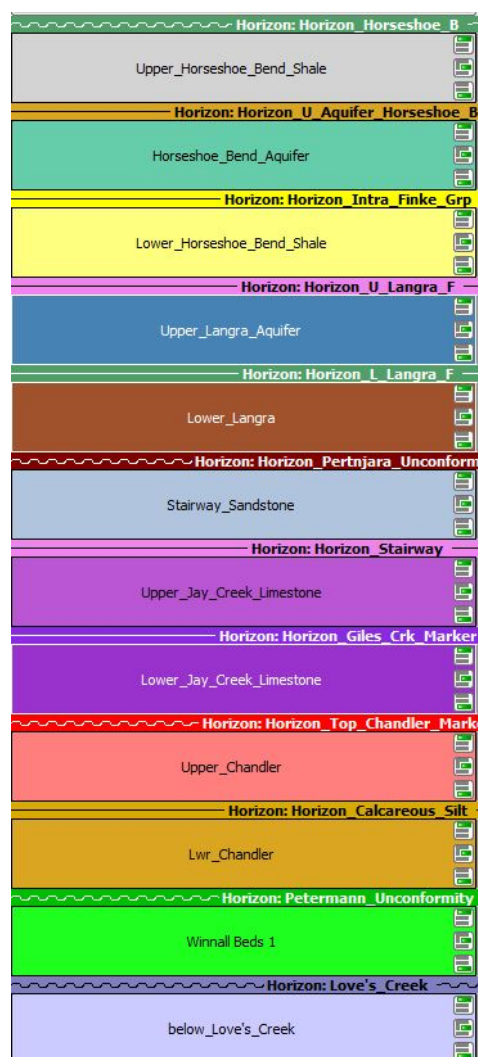




## 2.4. WT3



### 3. STRATIGRAPHY KEY



### 4. SEISMIC INTERPRETATION – RESULTS

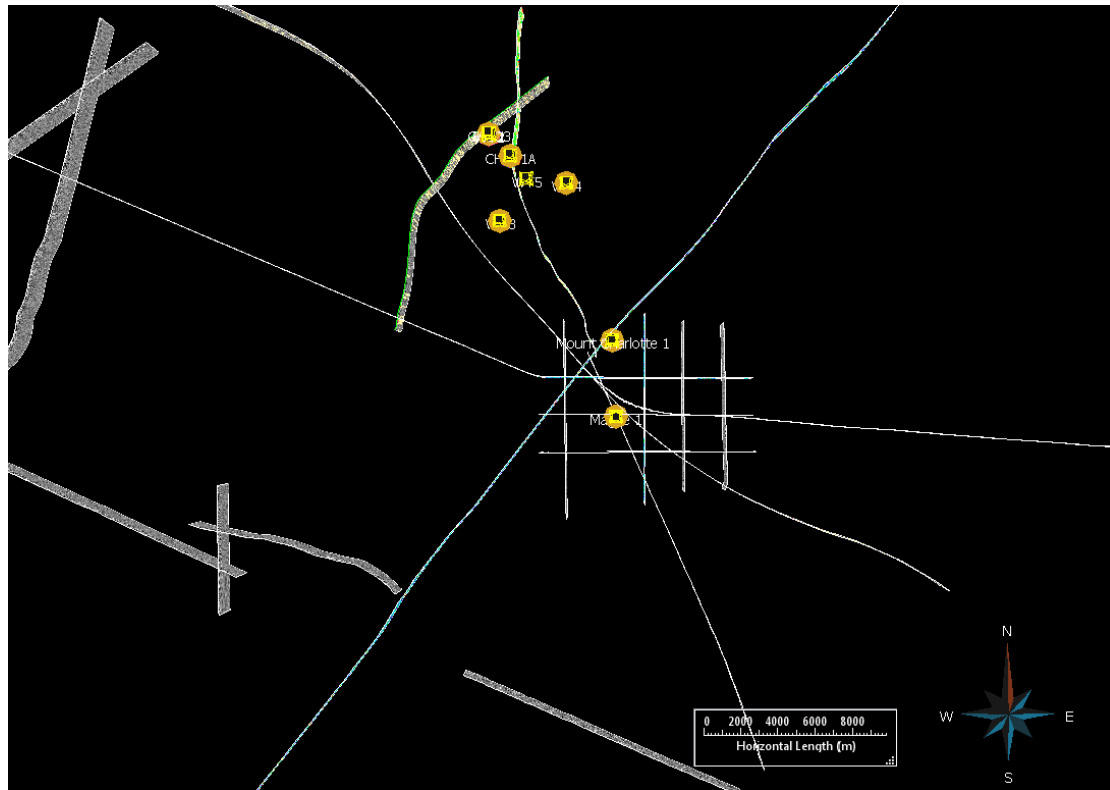
#### 4.1. VELOCITY MODEL

Using a seismic datum of -378m, the following values were used :-

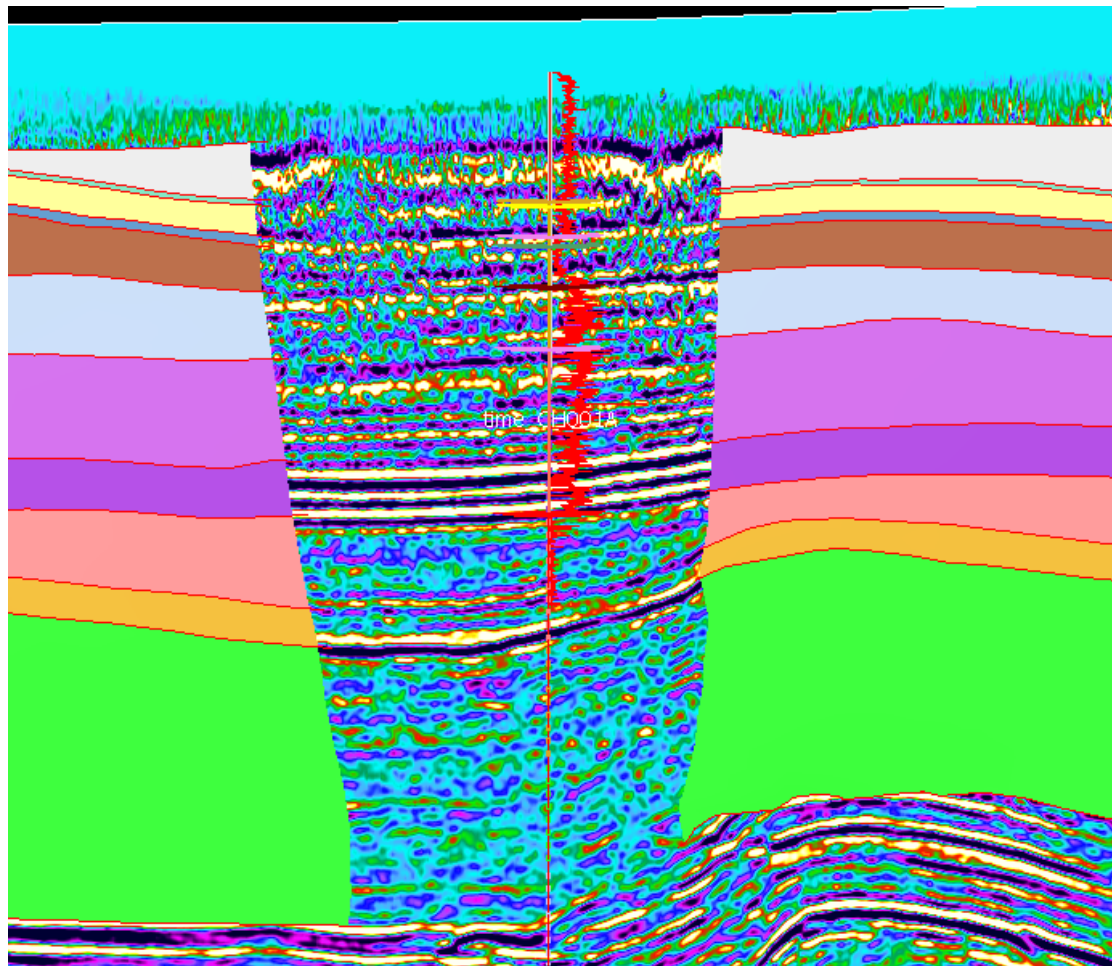
Surface -> Lwr Horseshoe Bend	2027m/s
Lwr Horseshoe Bend	3291m/s
Langra Formation	4046m/s
Stairway Formation	4370m/s
Jay Creek	3272m/s
Chandler Formation	4750m/s
Winnell Beds	4440m/s
Basement	4200m/s



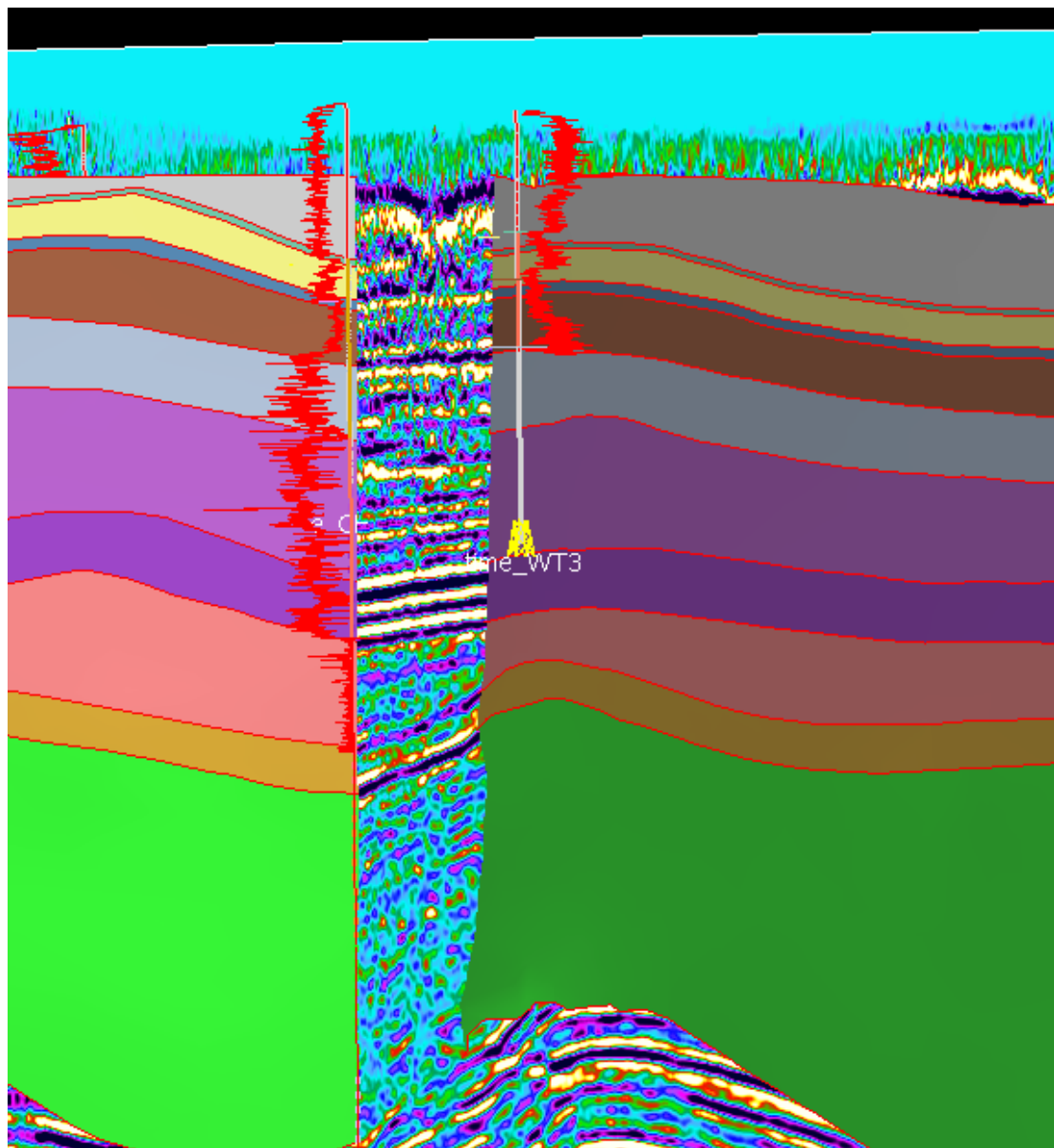
## 4.2. SEISMIC DATASET



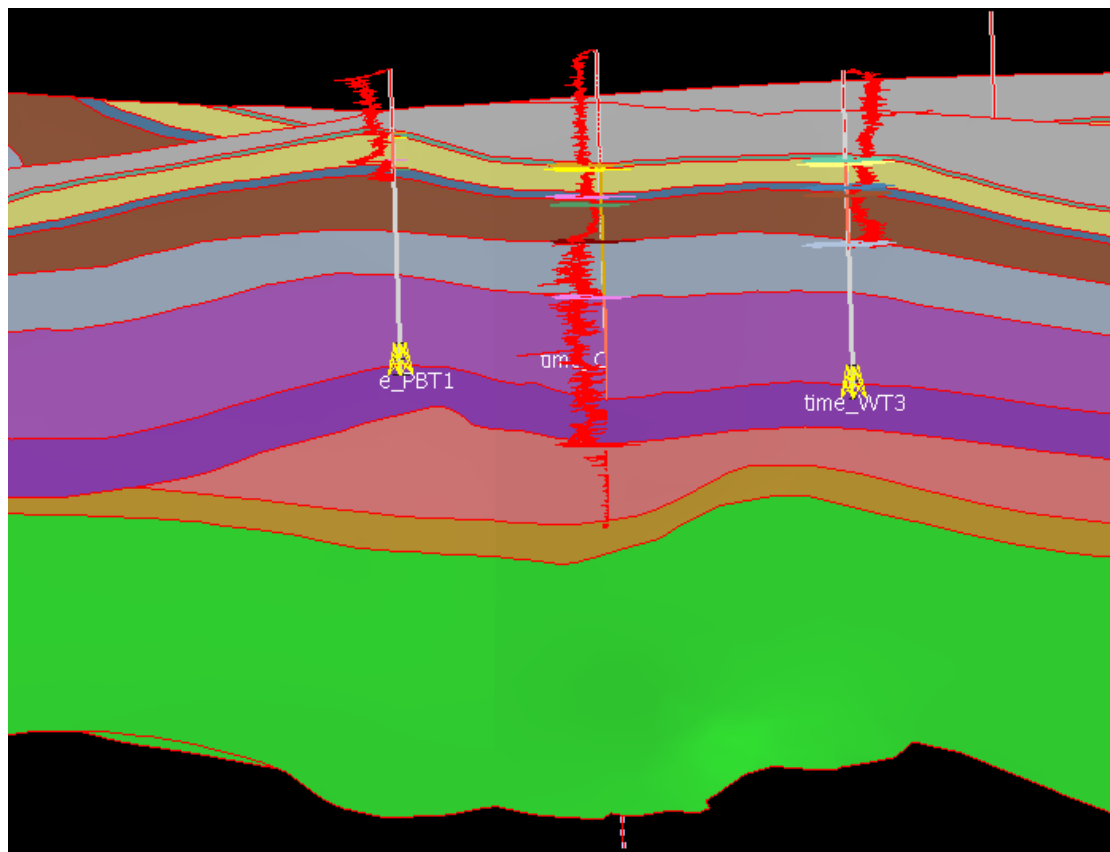
## 4.3. 3D VIEWS



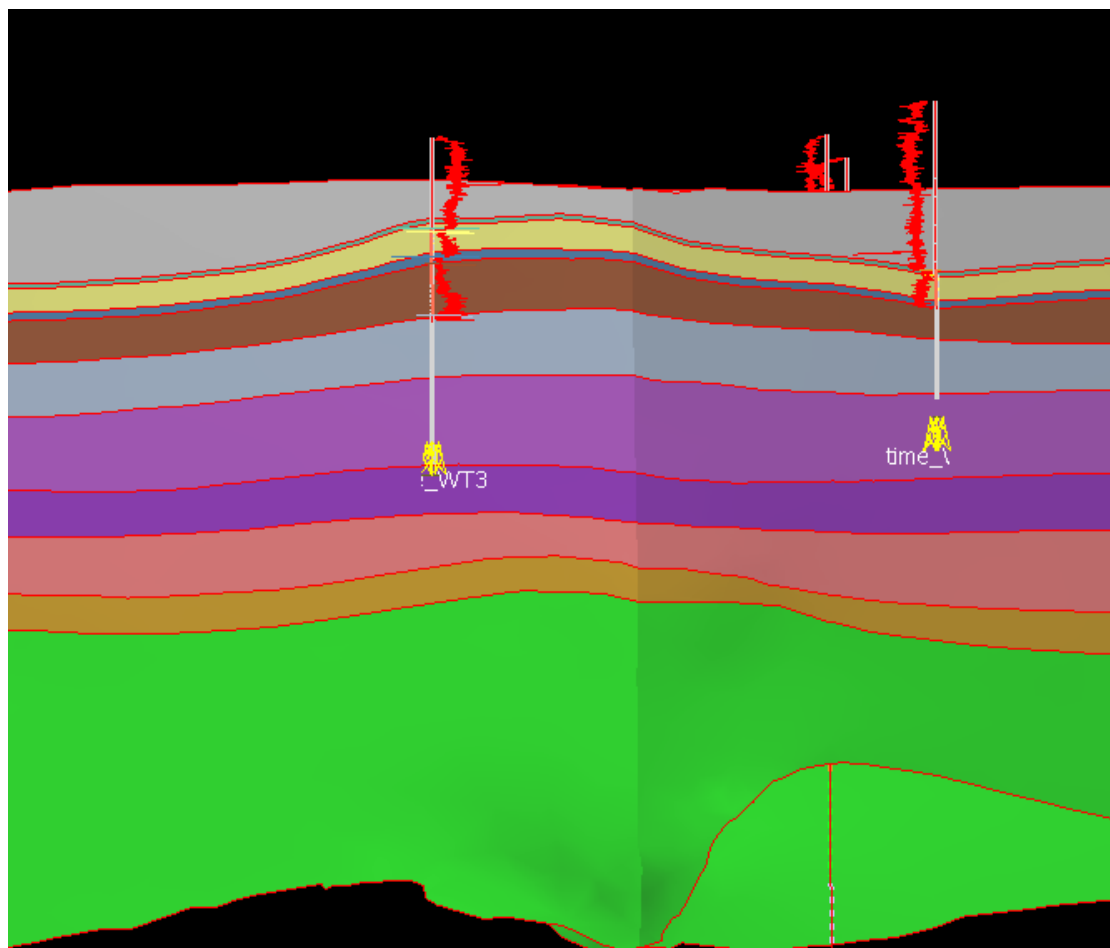
At CH001A: Displayed red log is the gamma log. Vertical Exaggeration x 10



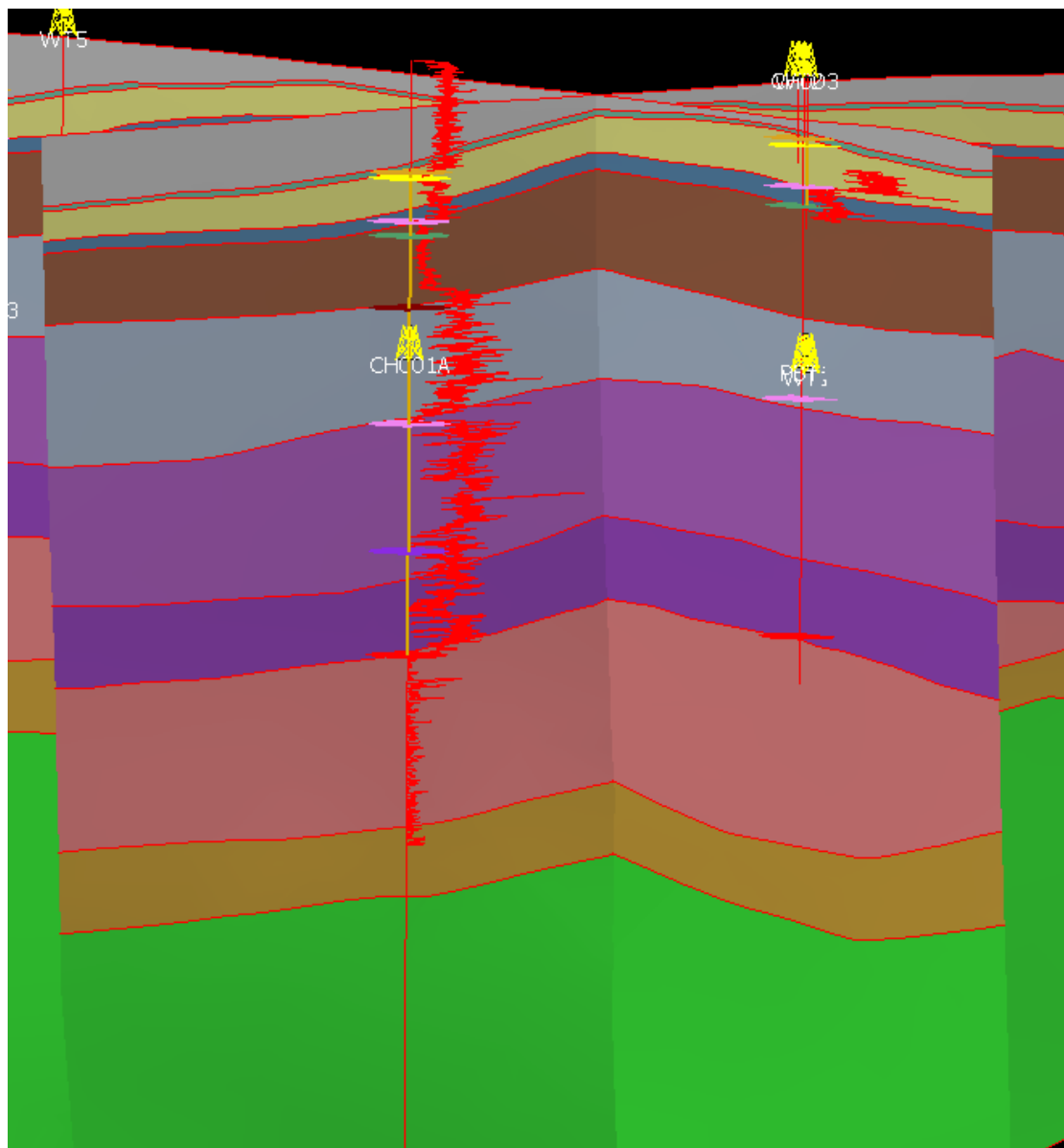
Sections through CH001A and WT3: Displayed red log is the gamma log. Vertical Exaggeration x 10

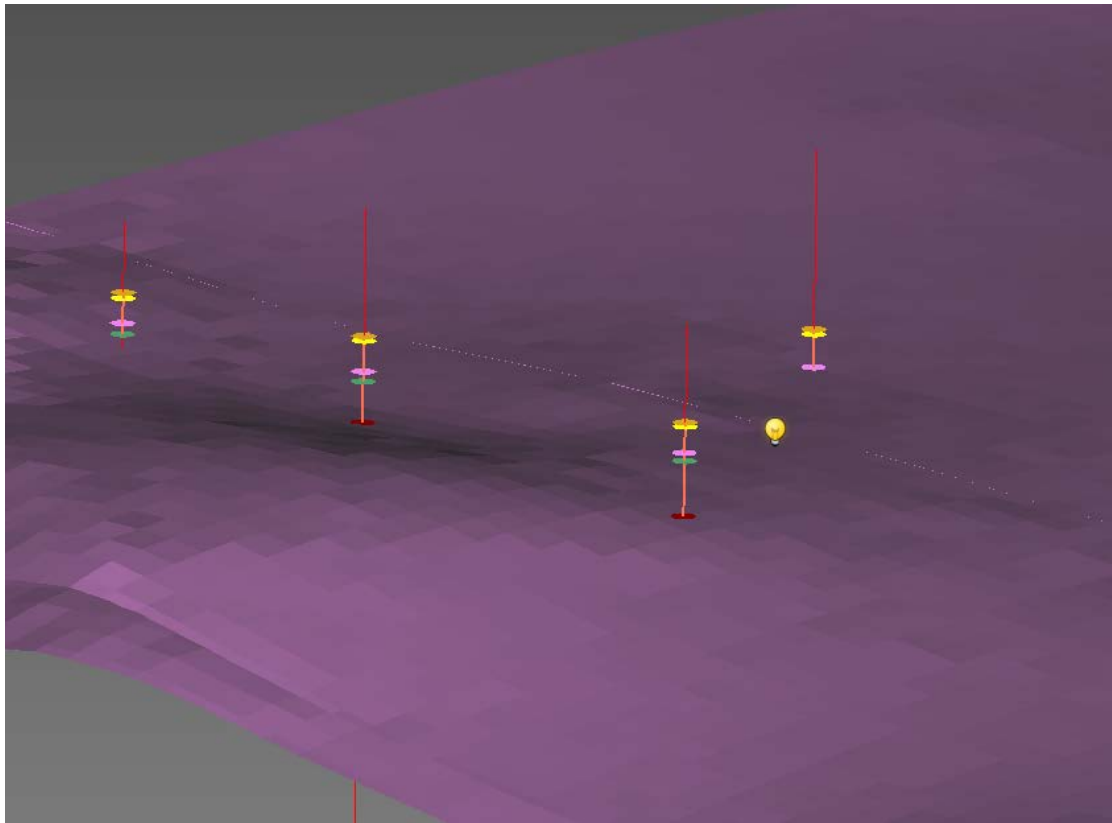


PB1, CH001A and WT3

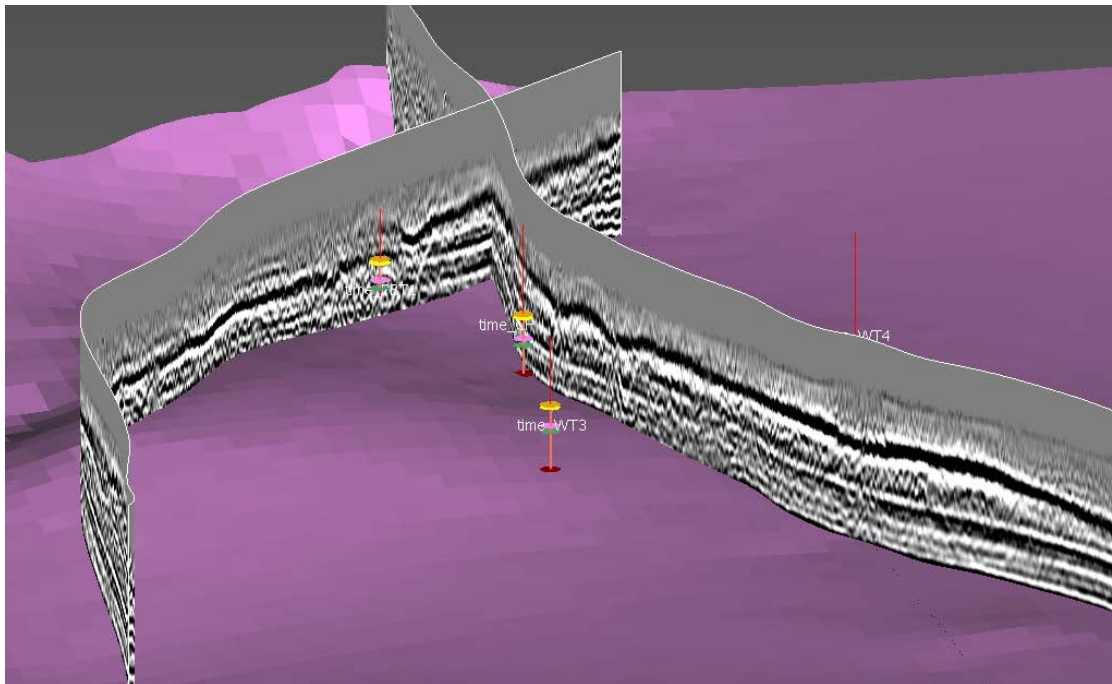


## WT3 and WT4

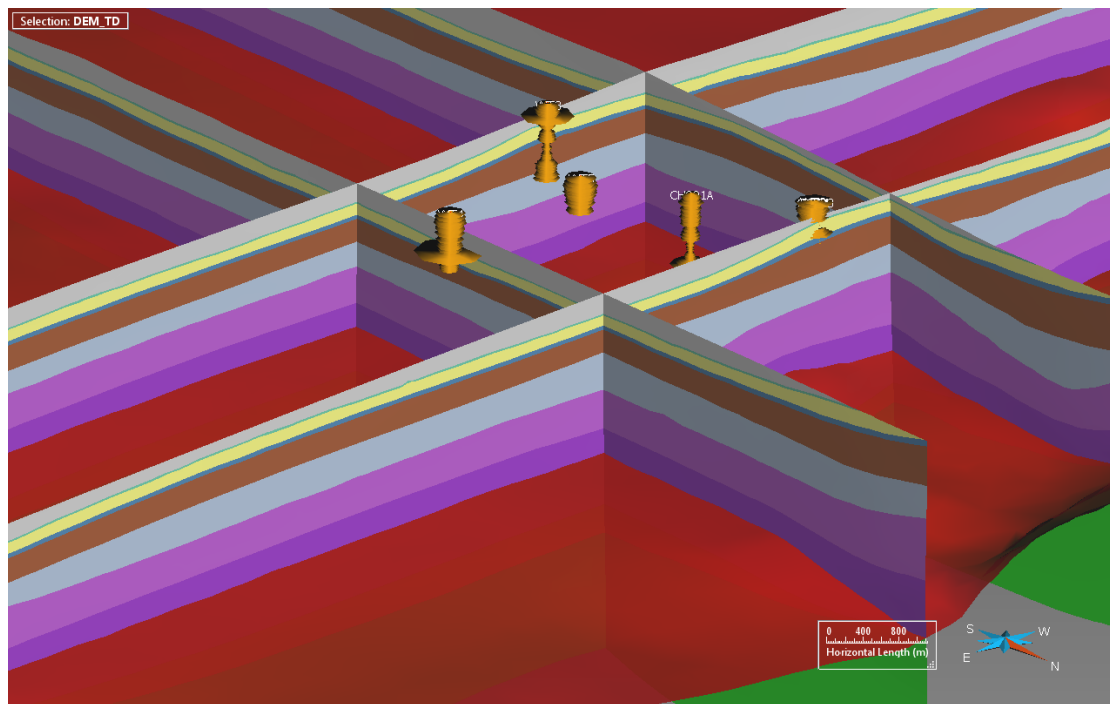




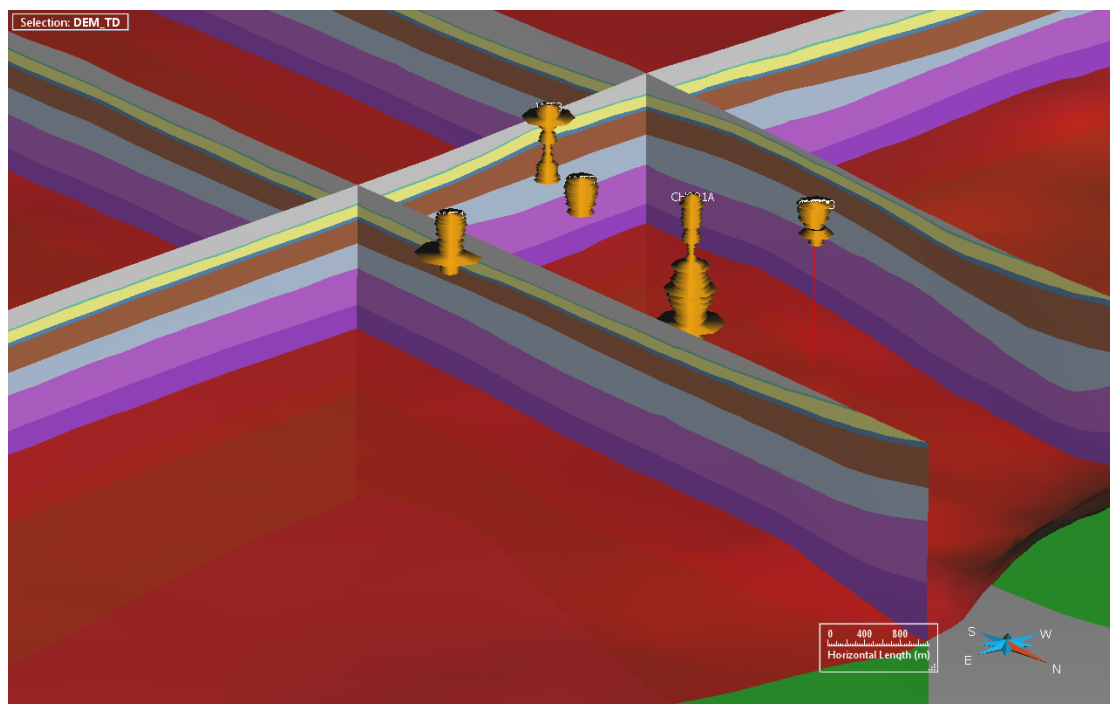
Stairway Sandstone looking NE at the well field. Vertical Exaggeration x 5.



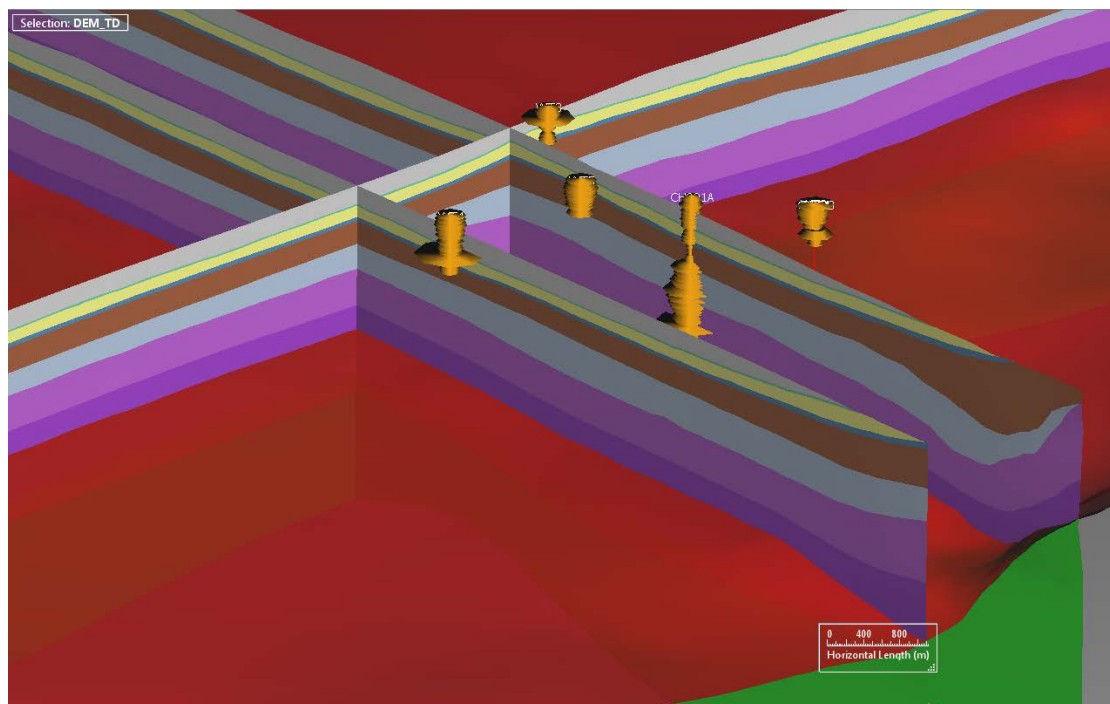
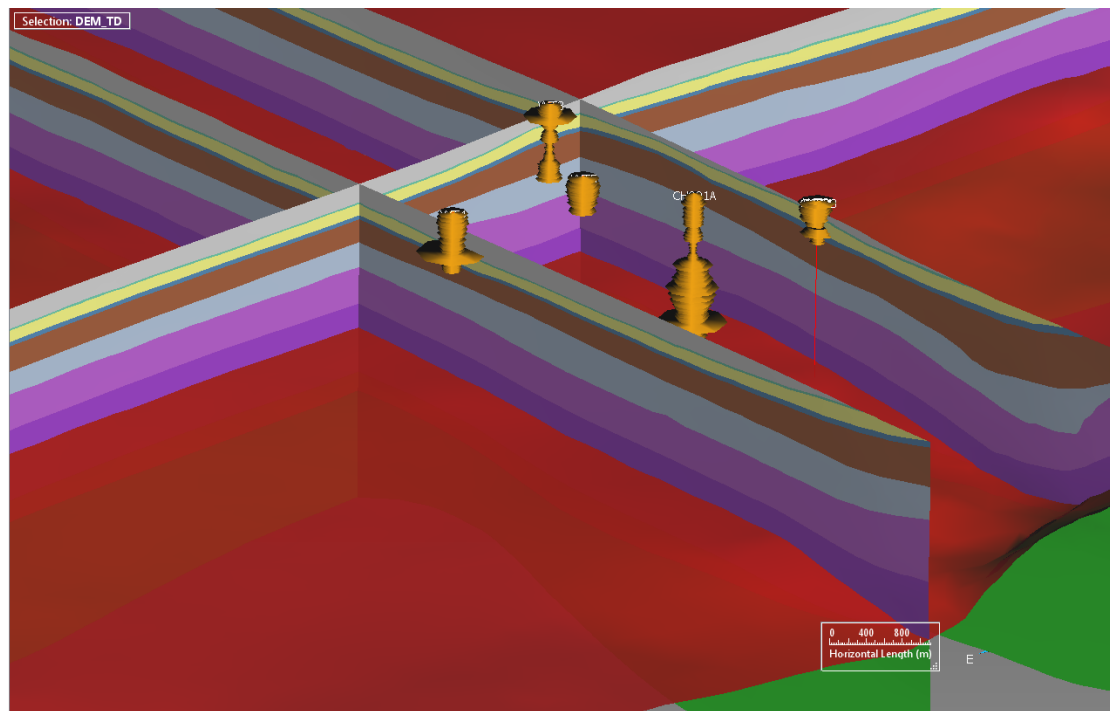
Stairway Sandstone looking NNE at the well field. Vertical Exaggeration x 5.



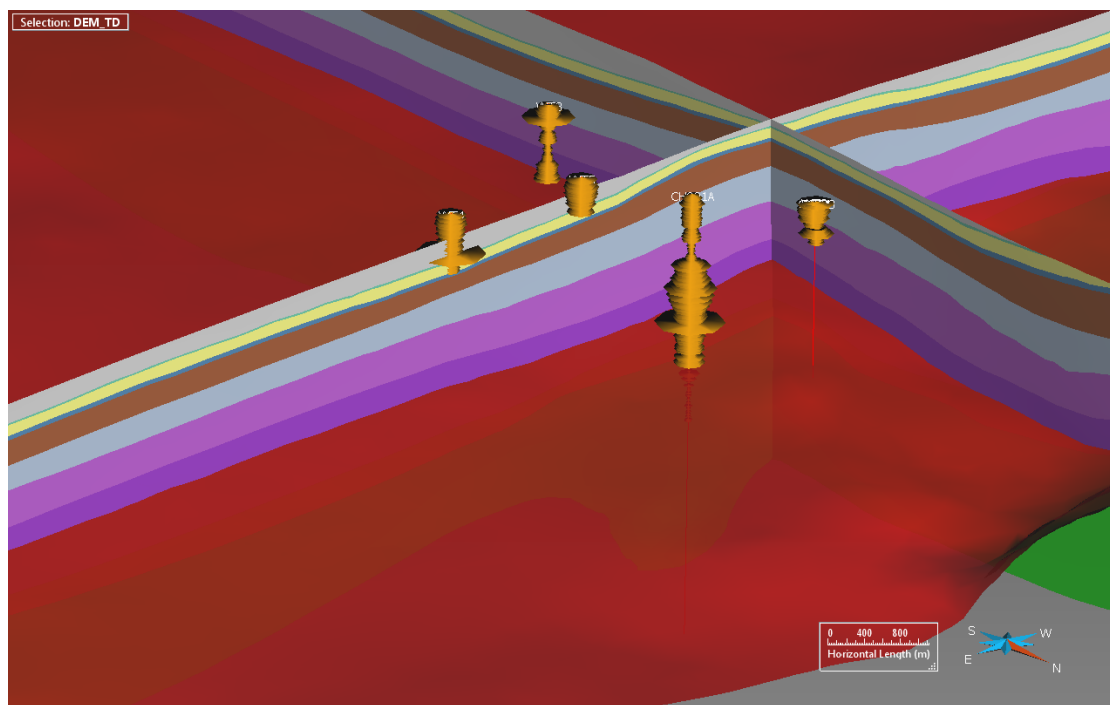
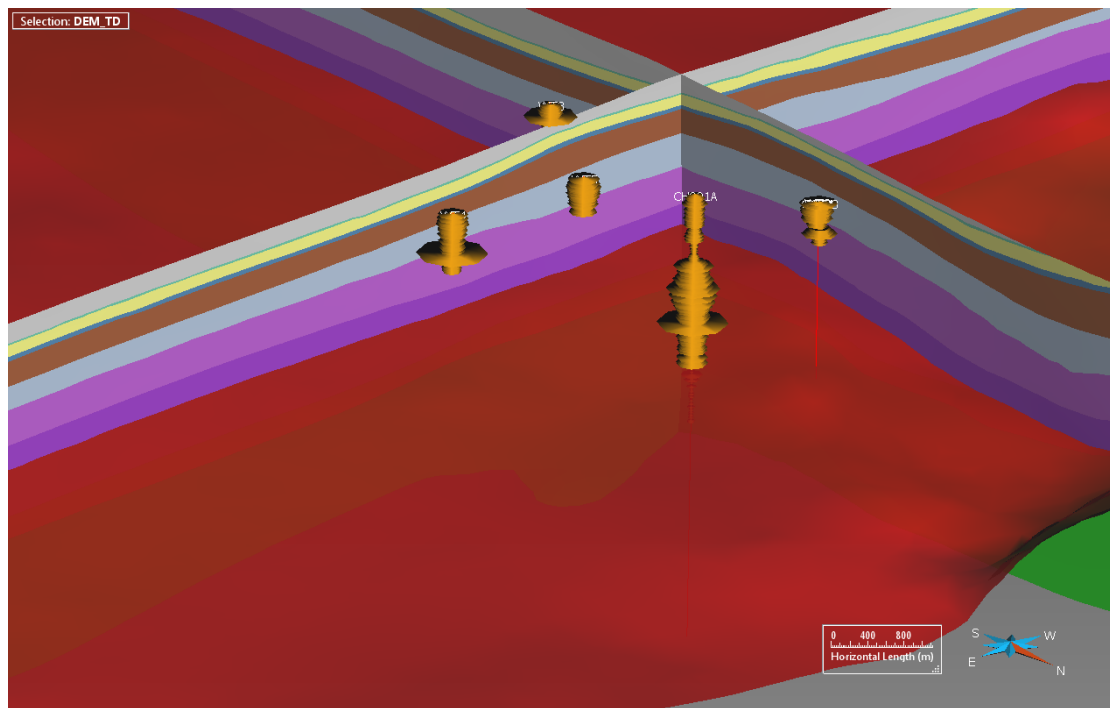
3D Section to the top of the Chandler formation (Red). 5x VE. Gamma Log response is shown at each borehole (orange).

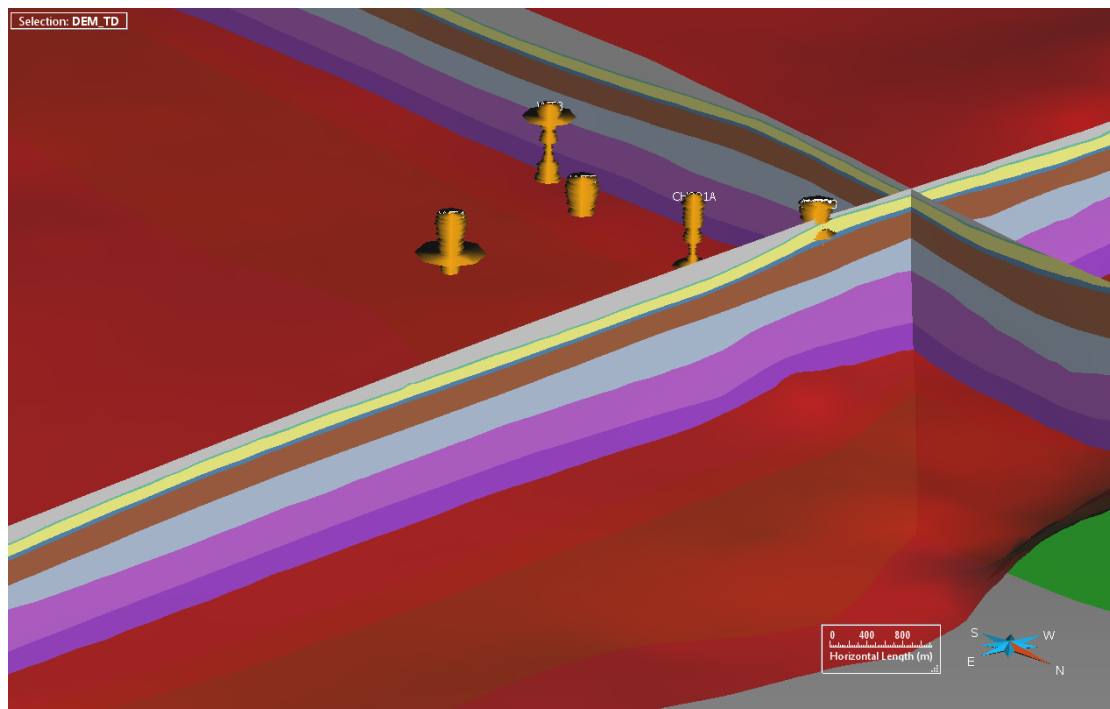
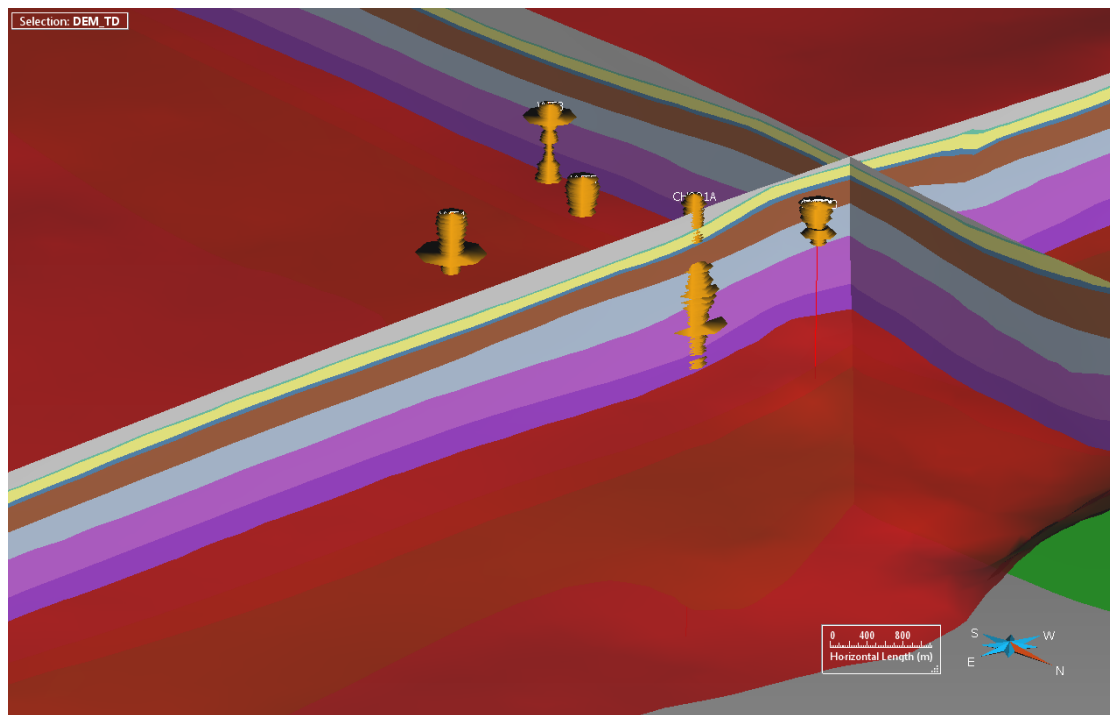


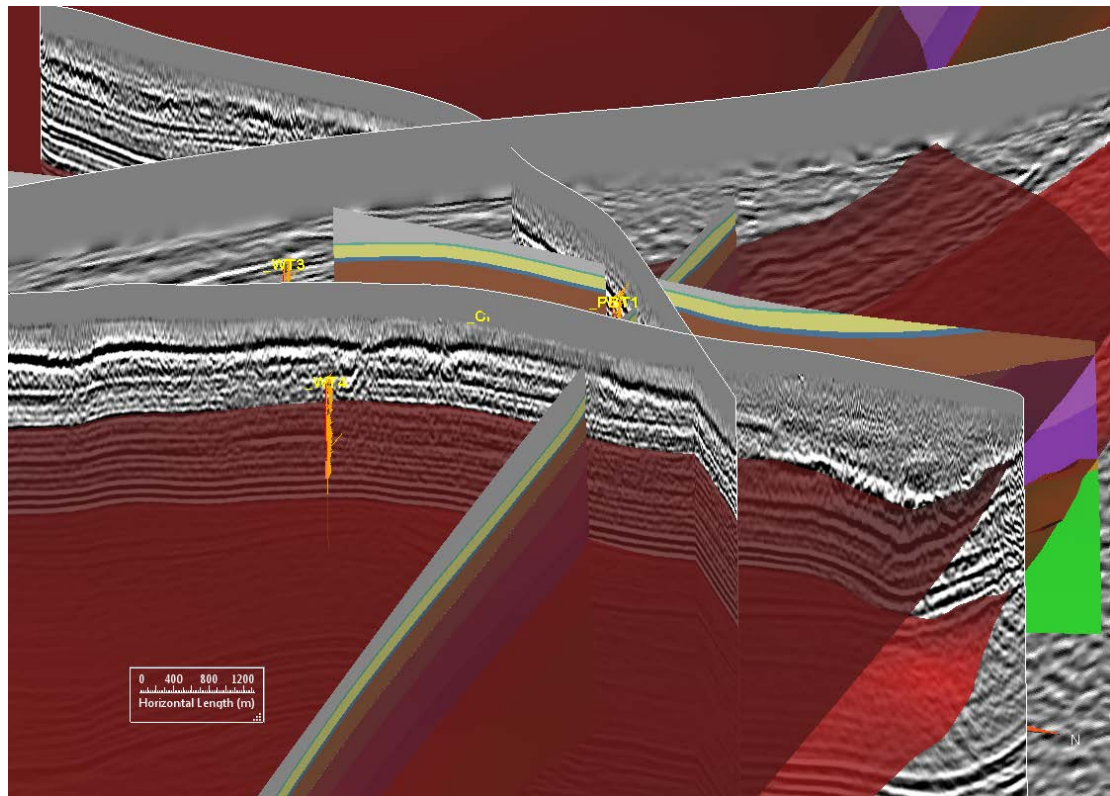




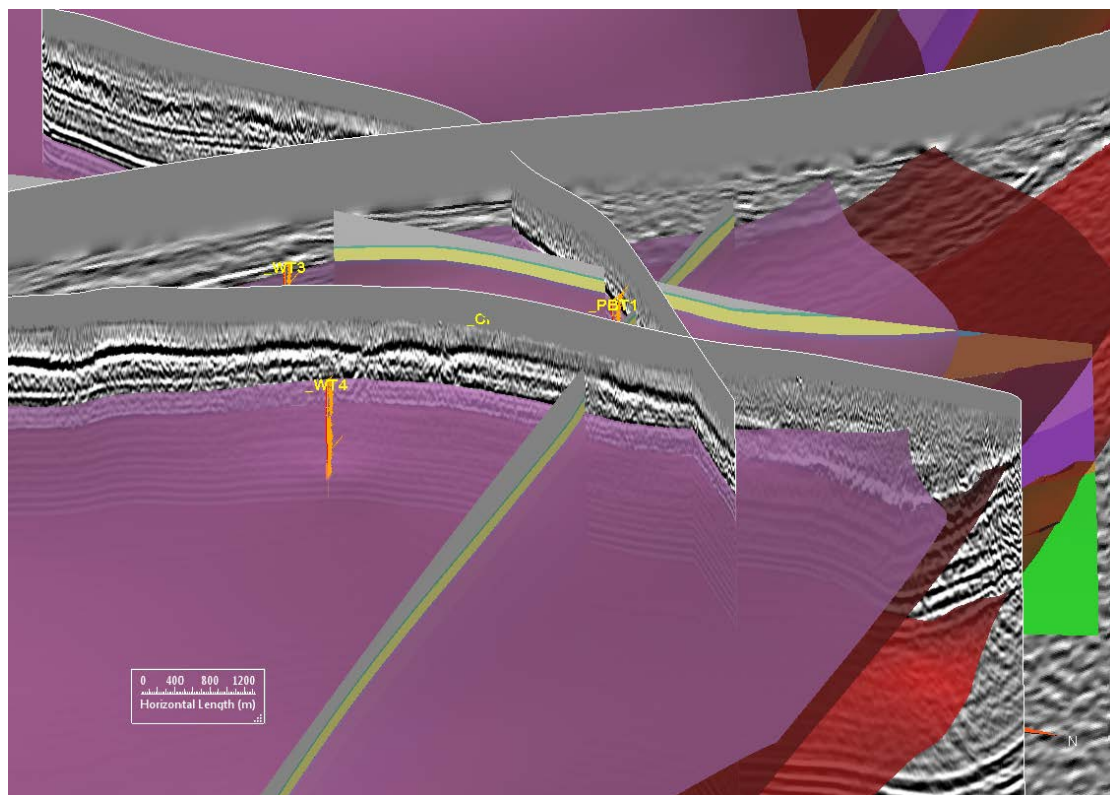




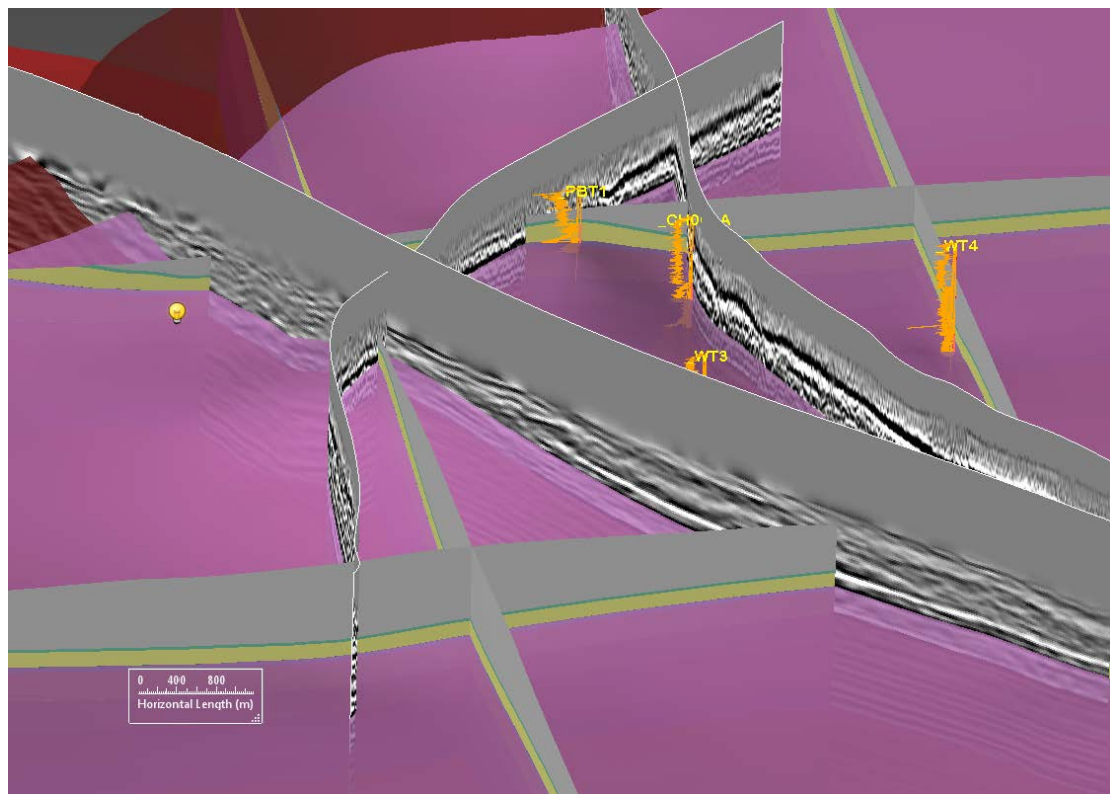




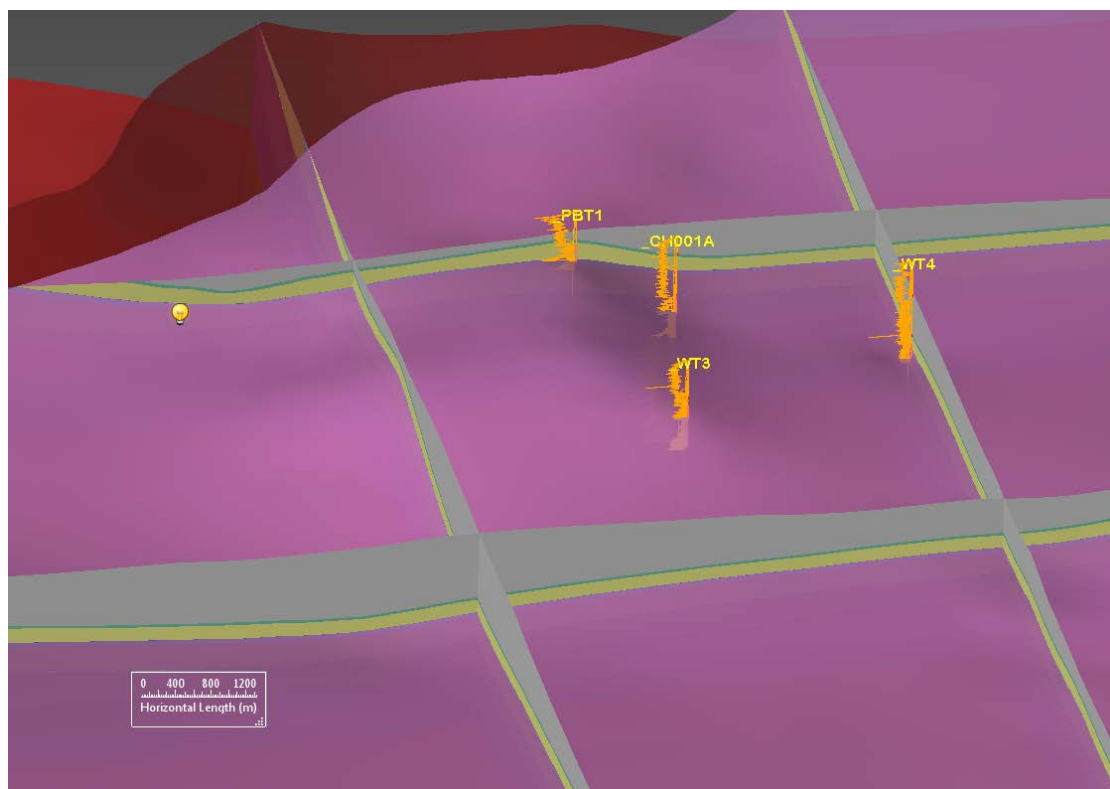
Brown transparent layer = Top of Stairway Sandstone. Red transparent layer = Top Chandler Formation



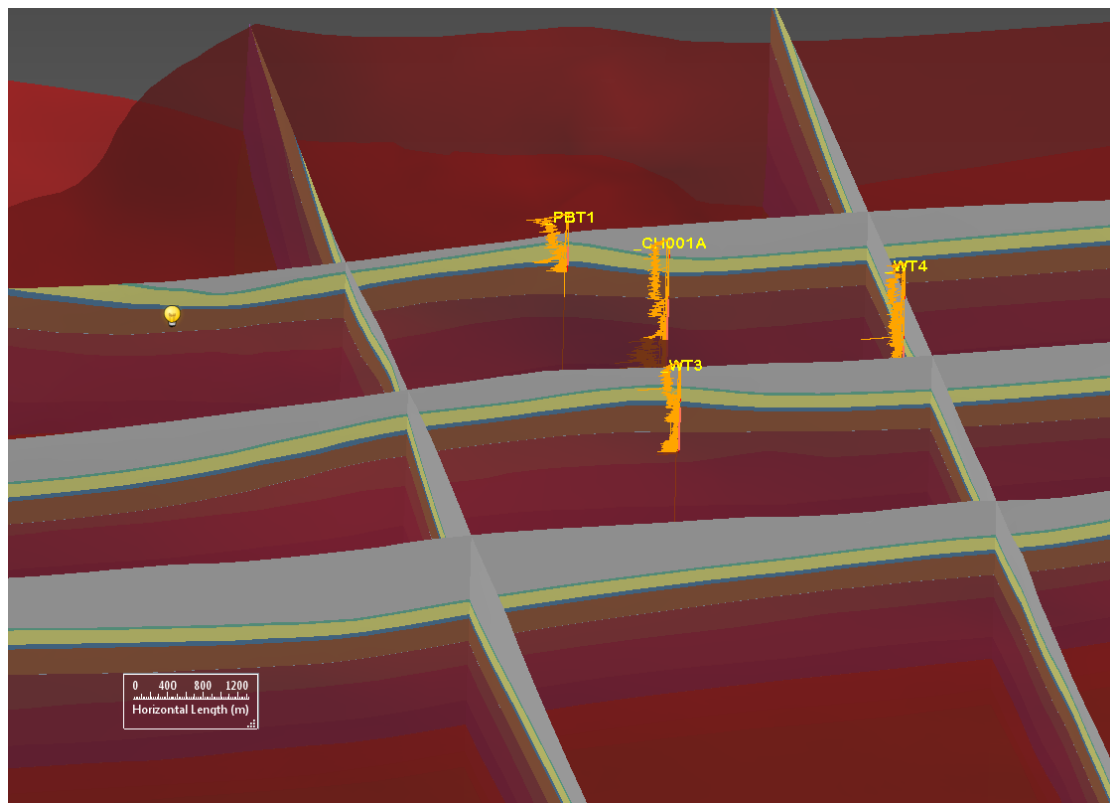
Pink Transparent Layer = Top of Langra Formation



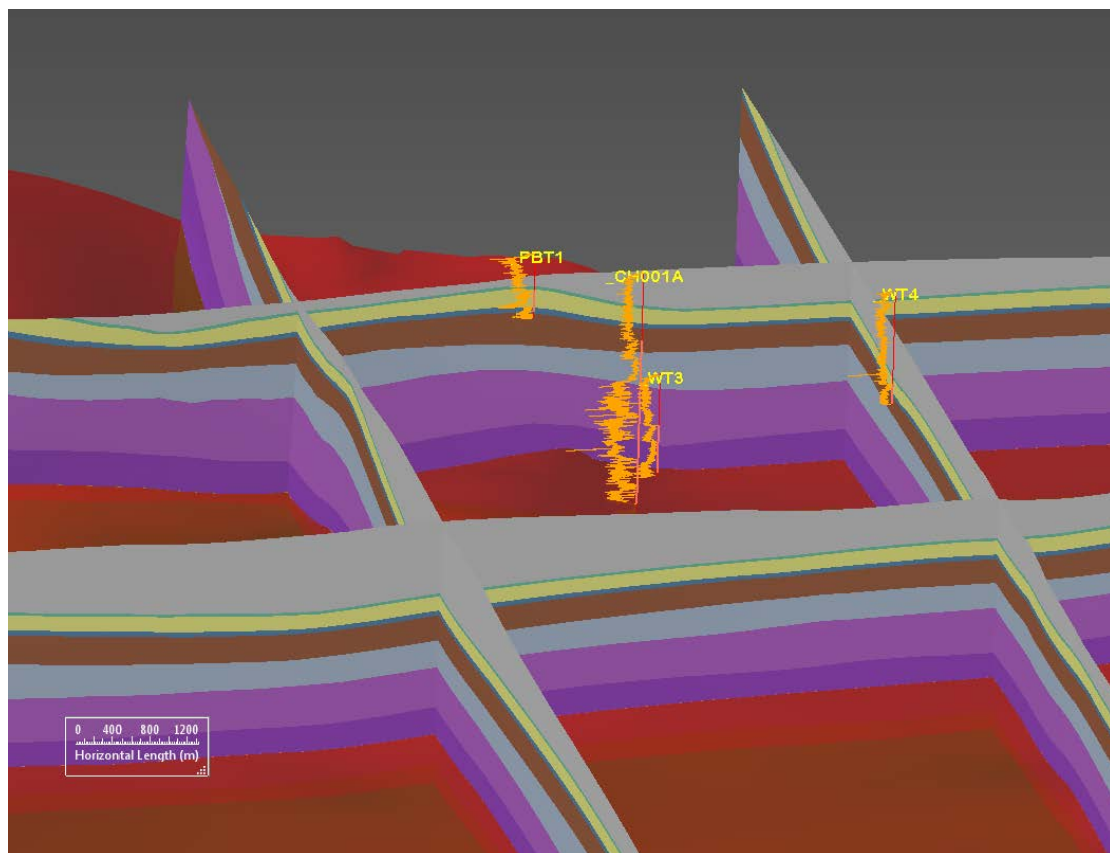
Looking North



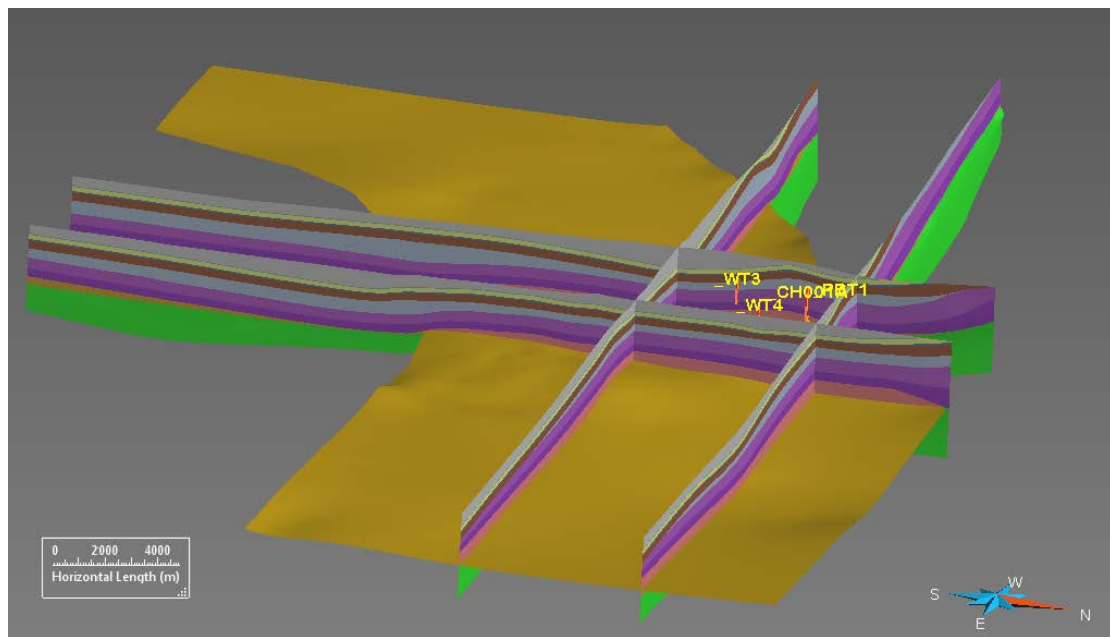




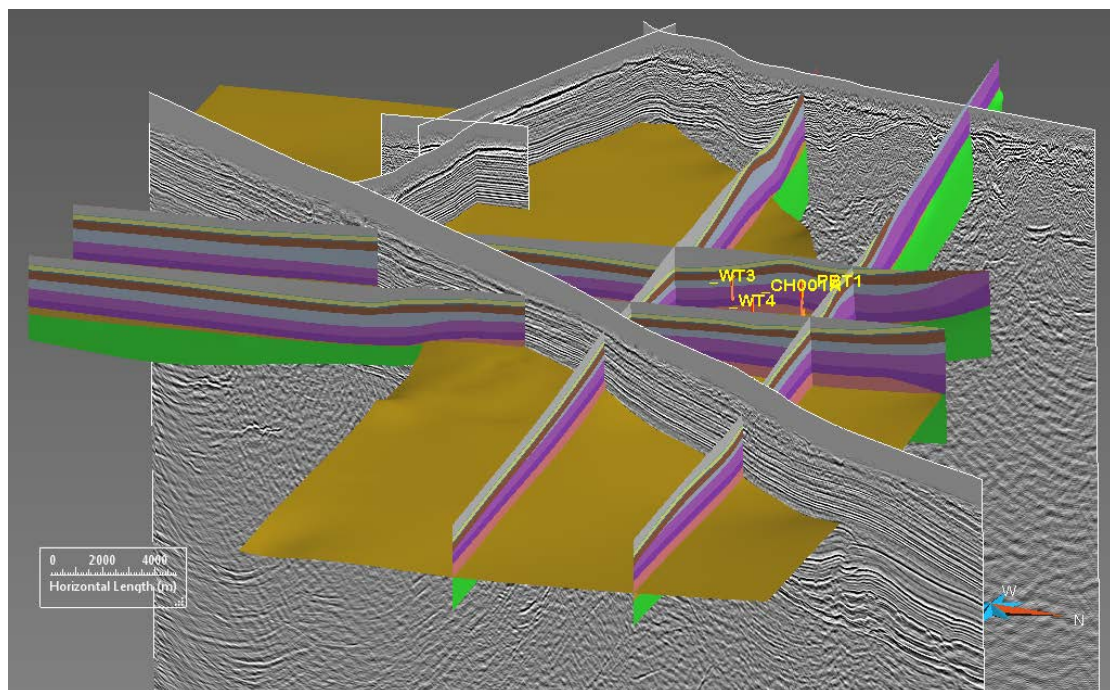
Brown layer = top of Stairway Sandstone



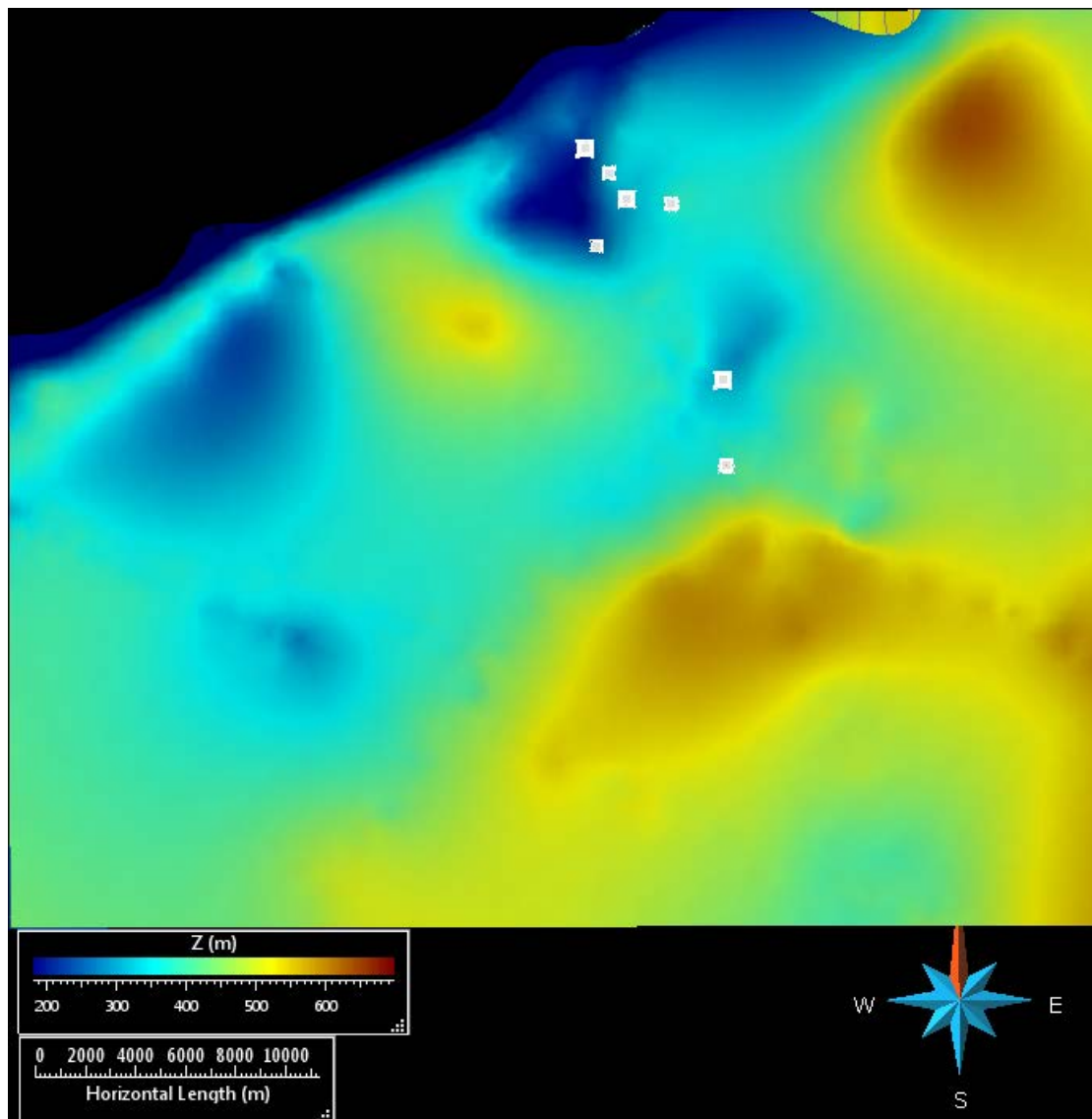
Red layer = Top of Chandler Formation



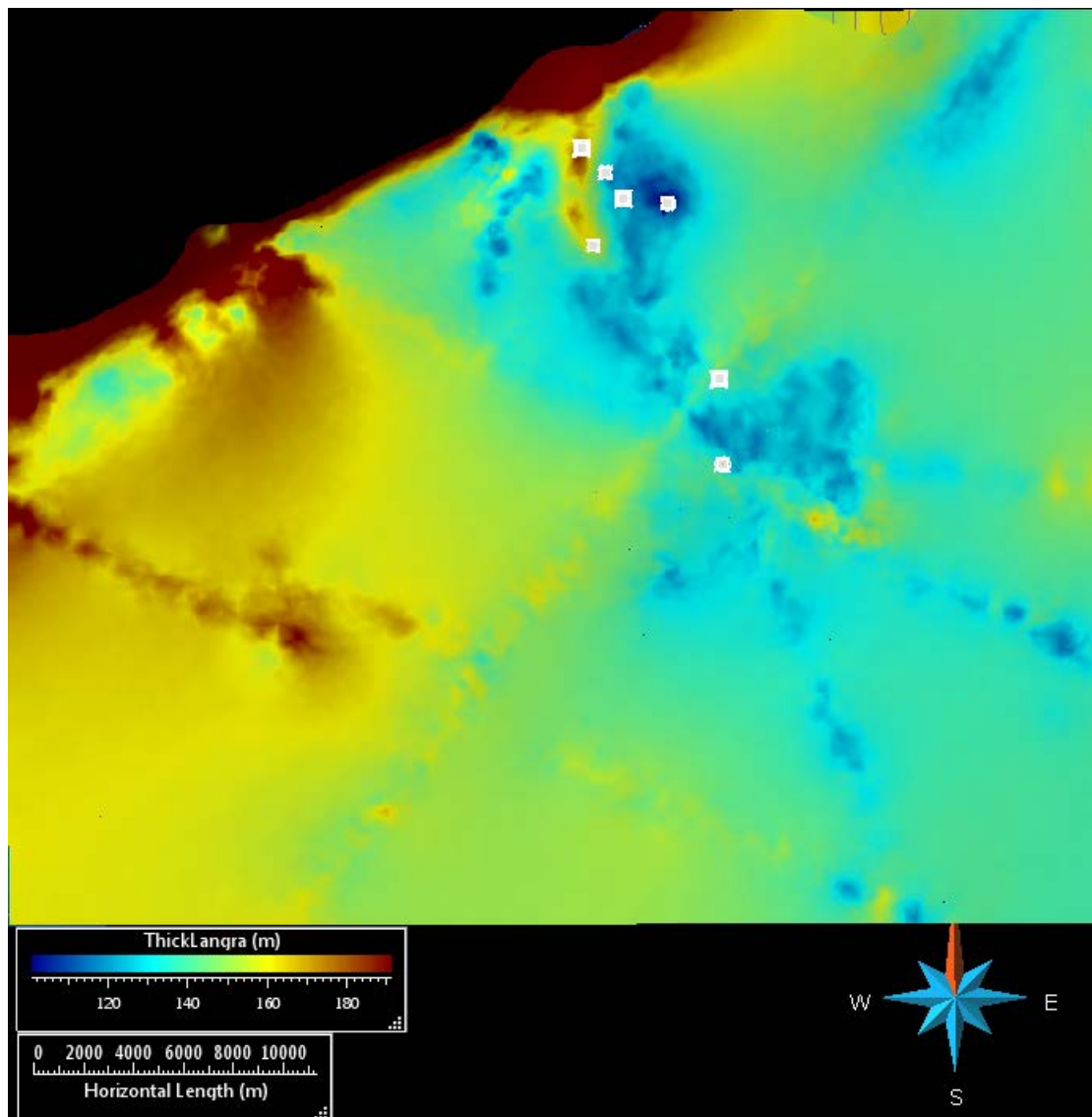
Chandler Salt – base surface



## 5. ISOPACH

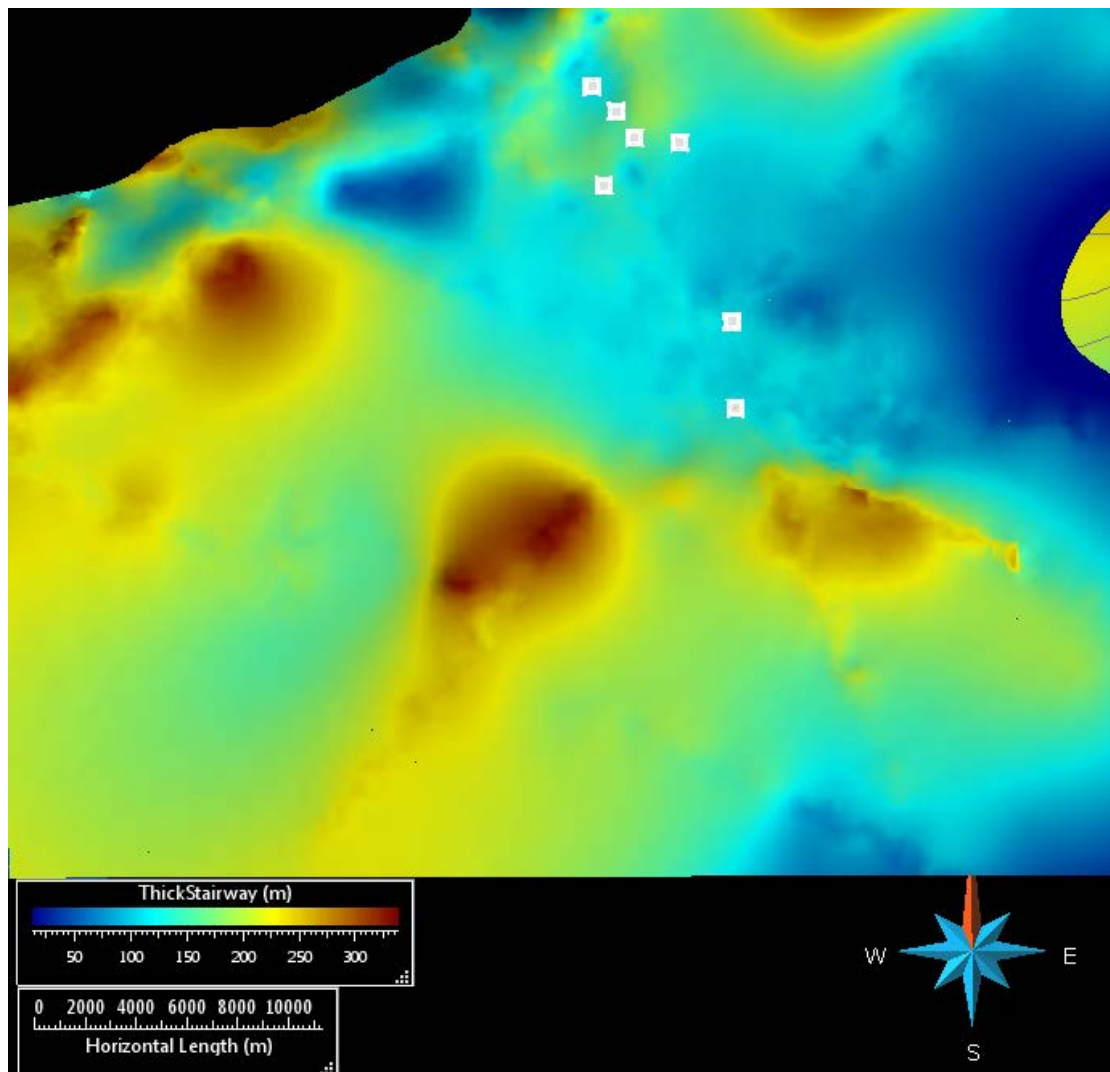


Depth to base of Horseshoe Bend Shale

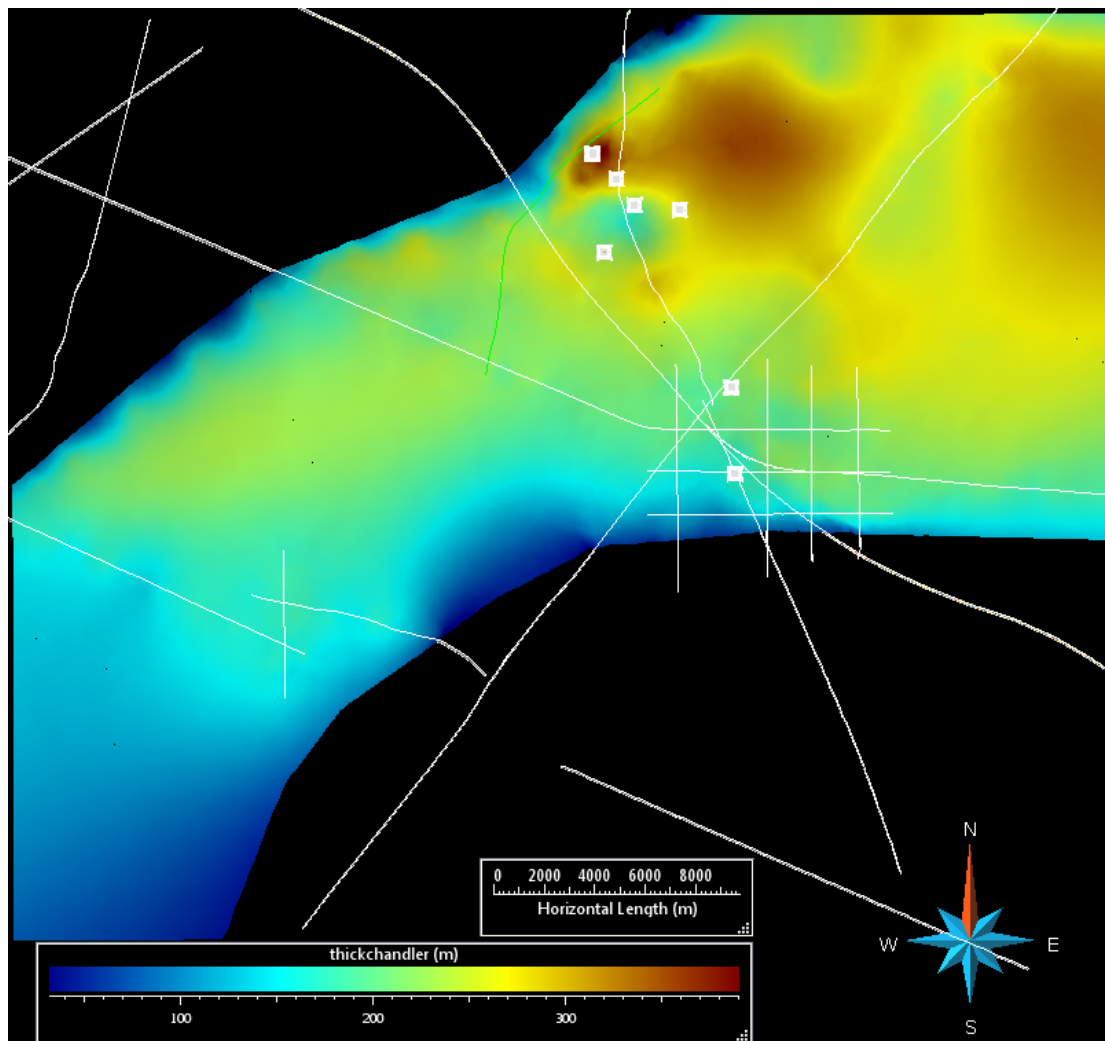


Thickness of Langra Formation





Thickness of Stairway Sandstone



Thickness of Chandler Formation