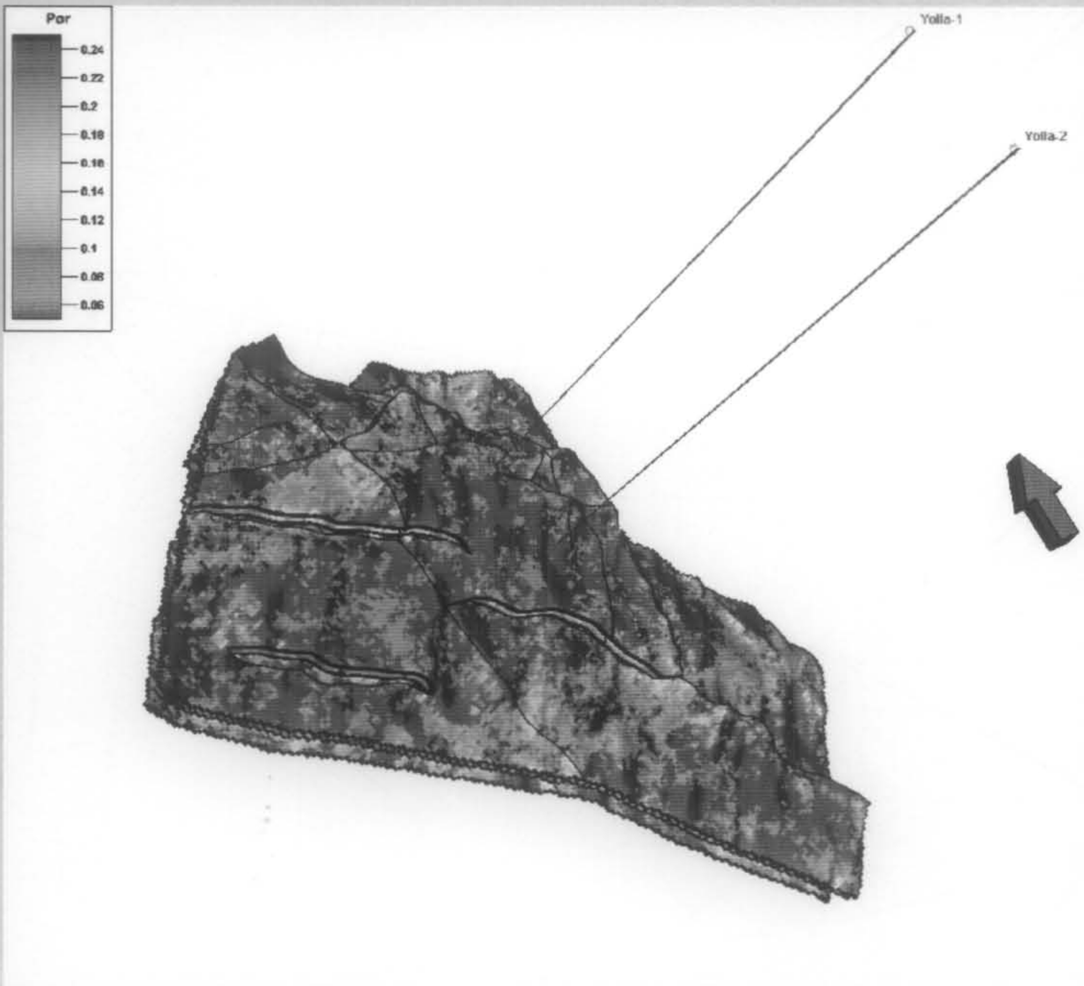
YOLLA GAS FIELD RESERVES REVIEW



Origin energy
delivering the goods

2001
Stuart Tye
Randall Taylor

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EXECUTIVE SUMMARY

- Reserves for the Yolla Field have been recalculated following the reprocessing of the Yolla 3D seismic survey. Gross rock volumes were calculated using the Petrel^{TM} 3D geological modeling software. Three fluid level cases were applied to 3 velocity models in order to capture the uncertainty within these calculations. Most other reservoir parameters were taken from the MHA (2000) report.

- OGIP was calculated probabilistically using REP reserves estimation software. All sub-totals and totals were probabilistically consolidated. Calculated OGIP and recoverable reserves are summarized in the table below:

bcf	P90	P50	P10	Mean
Yolla Main (OGIP)	342.0	448.0	569.0	452.0
Yolla Main (Recoverable)	239.0	314.0	399.0	316.0
Yolla North (OGIP)	31.1	50.6	76.4	52.5
Yolla North (Recoverable)	21.6	35.3	53.2	36.6
Total (OGIP)	**393**	**500**	**621**	**504**
Total (Recoverable)	**274.0**	**350.0**	**436.0**	**353.0**
Total (PJ)	**208.2**	**266.0**	**331.4**	**268.3**

- This estimate is within 4% of the estimate presented by MHA (2000).

1 INTRODUCTION

The Yolla Gas Field is located in T/RL1 in the Bass Basin, 120km offshore from Tasmania and 220km SSE of Melbourne in a water depth of 80m. The field is a large northwest-southeast trending anticlinal feature, which has been compartmentalised by major faults.

Two wells have been drilled in the Yolla Field. Yolla 1 was drilled in June 1985 and encountered gas in both the top of the Eastern View Coal Measures (EVCM) and also in the Intra-EVCM. Gas Pay was encountered in five separate zones within the latter interval and this has been the principal focus for potential appraisal and development.

A 3D seismic survey was acquired over the Yolla Field in 1994 with the aim of enabling more accurate depth mapping for the purpose of reserves estimation and appraisal/development planning. These data were subsequently reprocessed in early 2000. Updated depth maps were produced in December 2000 and January 2001 and form the basis for the latest reserves review contained herein.

The last reserves audit by Boral Energy Ltd was conducted in July 1999. This audit was undertaken as a result of discrepancies identified in the depth mapping used in previous reserves calculations. Subsequent to this work, in 2000, Malkewicz Hueni and Associates (MHA) was contracted by Origin Energy Resources Ltd to perform a review of reserves in the intra-EVCM reservoirs (2700 to 3000 m RT approximately). This study reviewed all core, log, DST, RFT, fluid property and petrophysical data and provided a probabilistic estimate of reserves for both the Yolla Main and Yolla North Blocks. Origin Energy subsequently adopted the gas reserve volumes calculated by MHA as the official booked reserves for the field.

The aim of this study is to provide an updated reserves estimate using maps produced from the latest reprocessed data. In order to allow comparison with the MHA (2000) review, the methodology contained in that report has been replicated as closely as possible.

2 YOLLA 3D INTERPRETATION AND DEPTH MAPPING

2.1 Time Structure Mapping

The reprocessed Yolla 3D Seismic Survey was loaded into Schlumberger's Geoframe software and interpreted using the IESX and Geoviz modules. Eight horizons were interpreted as shown in Figure 2.1 and Table 1. The upper horizons were used for the interval velocity depth conversion.

Horizon Interpreted	Seismic Character	Purpose
Water Bottom (WB)	Strong Peak	Interval velocity depth conversion
Lower Mid Miocene (LMM)	Strong Peak	Interval velocity depth conversion
Top Volcano (V)	Strong Peak	Interval velocity depth conversion
Base Volcano (BV)	Strong Peak	Interval velocity depth conversion
Near top EVCM	Strong Trough	Secondary target
Middle M.Diversus (MDIV)	Strong Peak	Used to constrain picks on deeper horizons
Top 2718 Sand	Weak Peak	Uppermost sand of the main reservoir section
Top 2809 Sand	Weak Peak	Most prominent event within main reservoir section

Table 1: Horizons interpreted as a part of the remapping of the Yolla Field.

2.2 Well Ties

Synthetic seismograms were generated with the "Geoframe Synthetic" software and used to tie the well data into the 3D grid. A composite traverse between the wells shows the final tie of the Gamma ray logs to the seismic data (Fig. 2.2).

Time Interpretation

Time structure maps were produced for all horizons shown in Table 1. Picks were interpreted on every 5^{th} inline and cross-lines were interpreted as required. Auto-tracking was used to fill in the remaining lines in the 3D grid. Time picks for the 2809 sand to the north of the field could not be made due to a deterioration in data quality, however this region is outside the area of the gas accumulation. Time maps for the main three target horizons are shown in Figures 2.3 to 2.5.

2.3 Dykes and Sills

The Yolla 3D region is intersected by a number of prominent dykes and several smaller ones that disrupt the stratigraphy. These features are prominent on the variance-cube time-slices, on which they can be seen to strike approximately N-S, (Fig. 2.6). The dykes are interpreted to be the primary source of the mid-Tertiary volcanism and also to be the source of a number of sills that have intruded the Eastern View Coal Measure sequence, (Fig. 2.1). Several smaller dykes are interpreted to intersect the fault block containing the gas reservoirs.

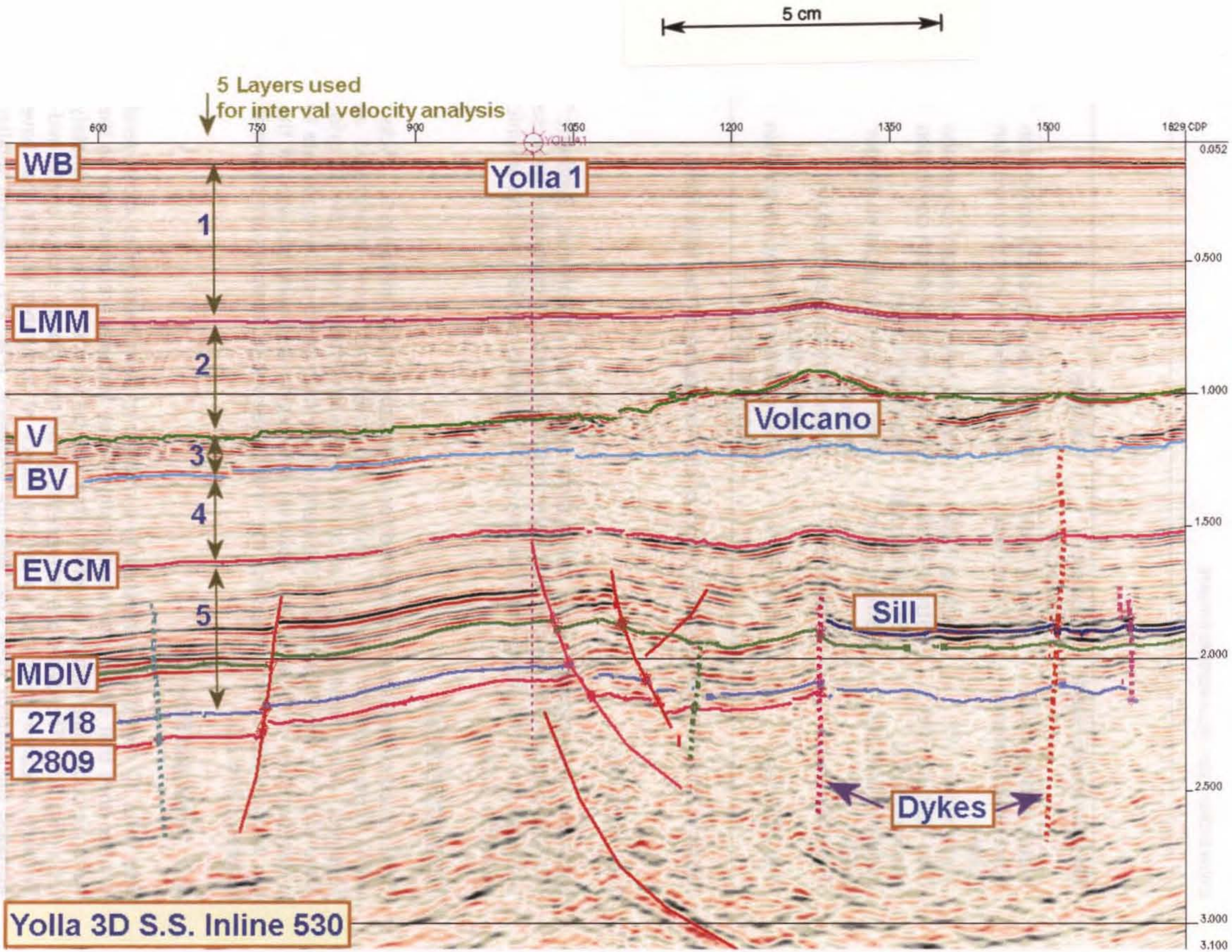
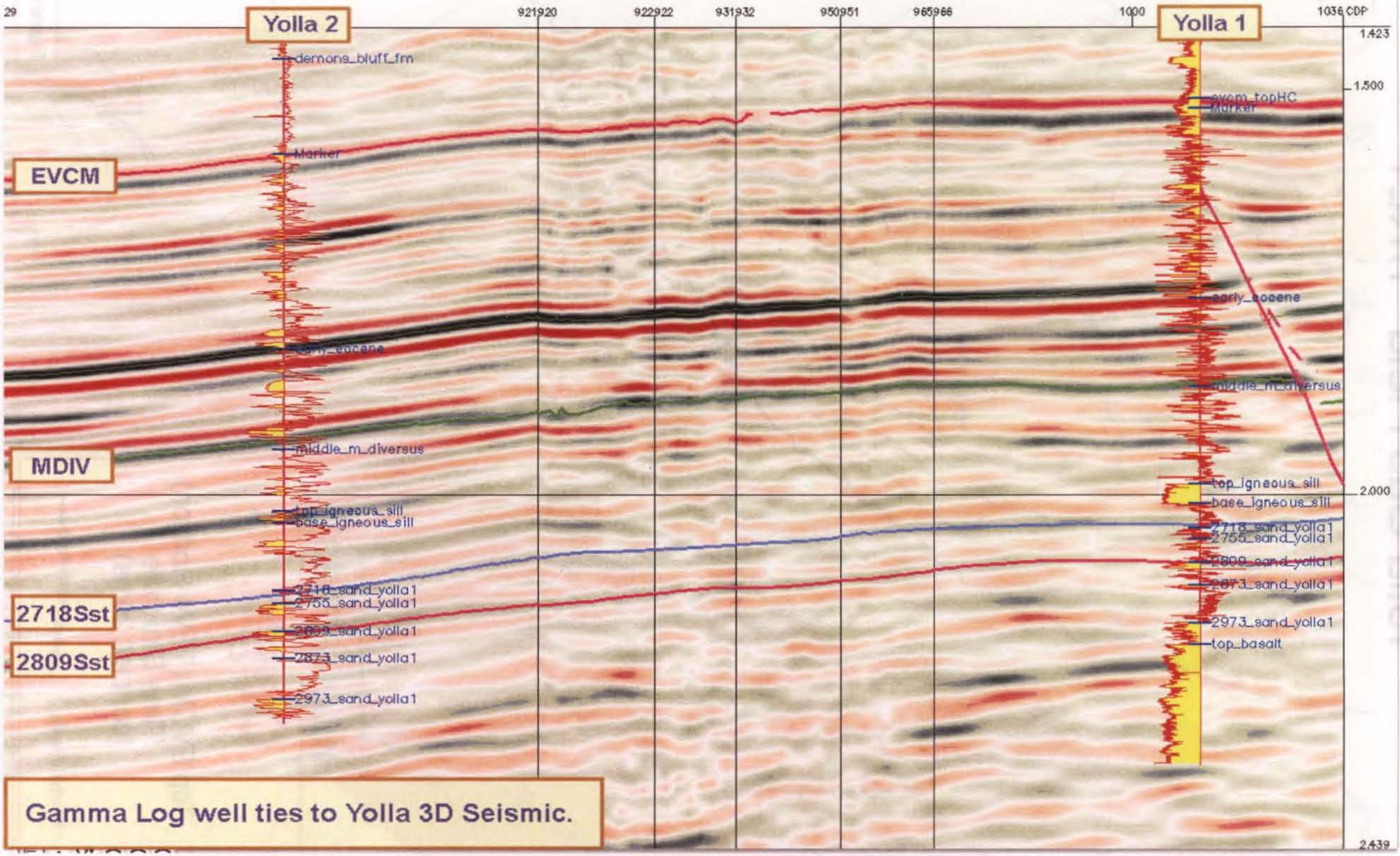


Figure 2.1

640608

640009

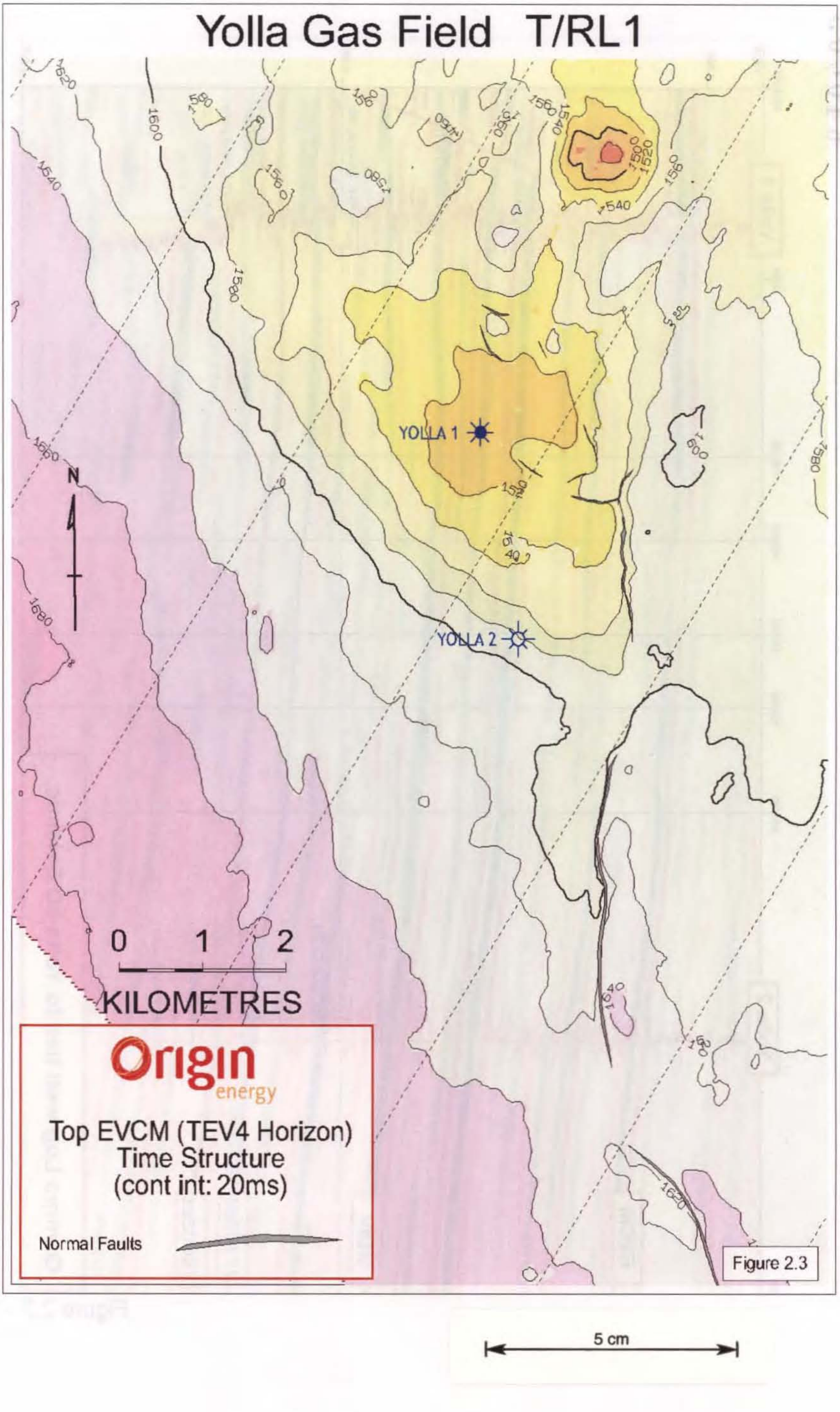


Gamma Log well ties to Yolla 3D Seismic.

Figure 2.2

5 cm

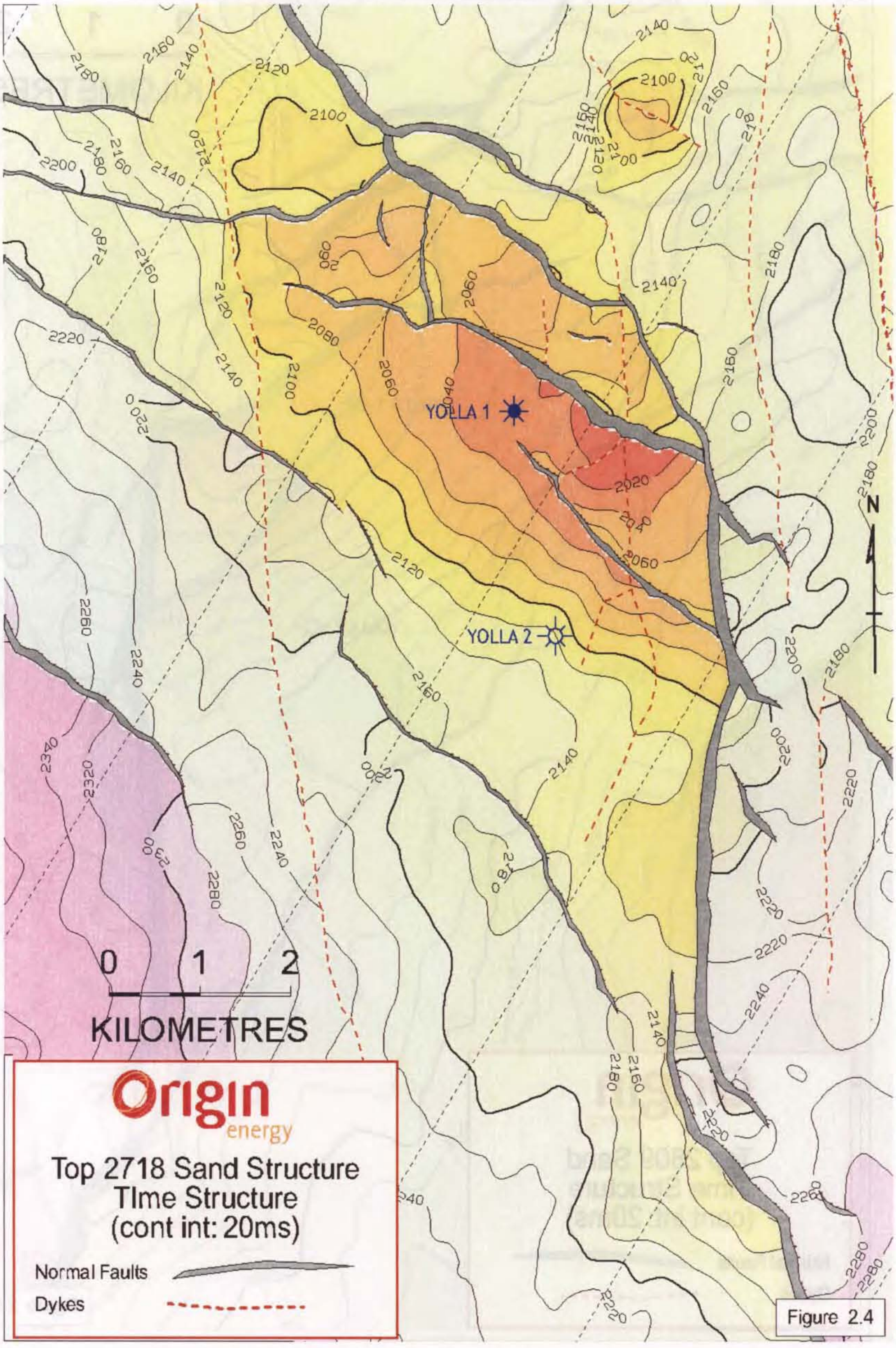
640010



Yolla Gas Field T/RL1
YOLLA 1
YOLLA 2
N
0 1 2
KILOMETRES
Origin energy
Top EVCM (TEV4 Horizon)
Time Structure
(cont int: 20ms)
Normal Faults
Figure 2.3

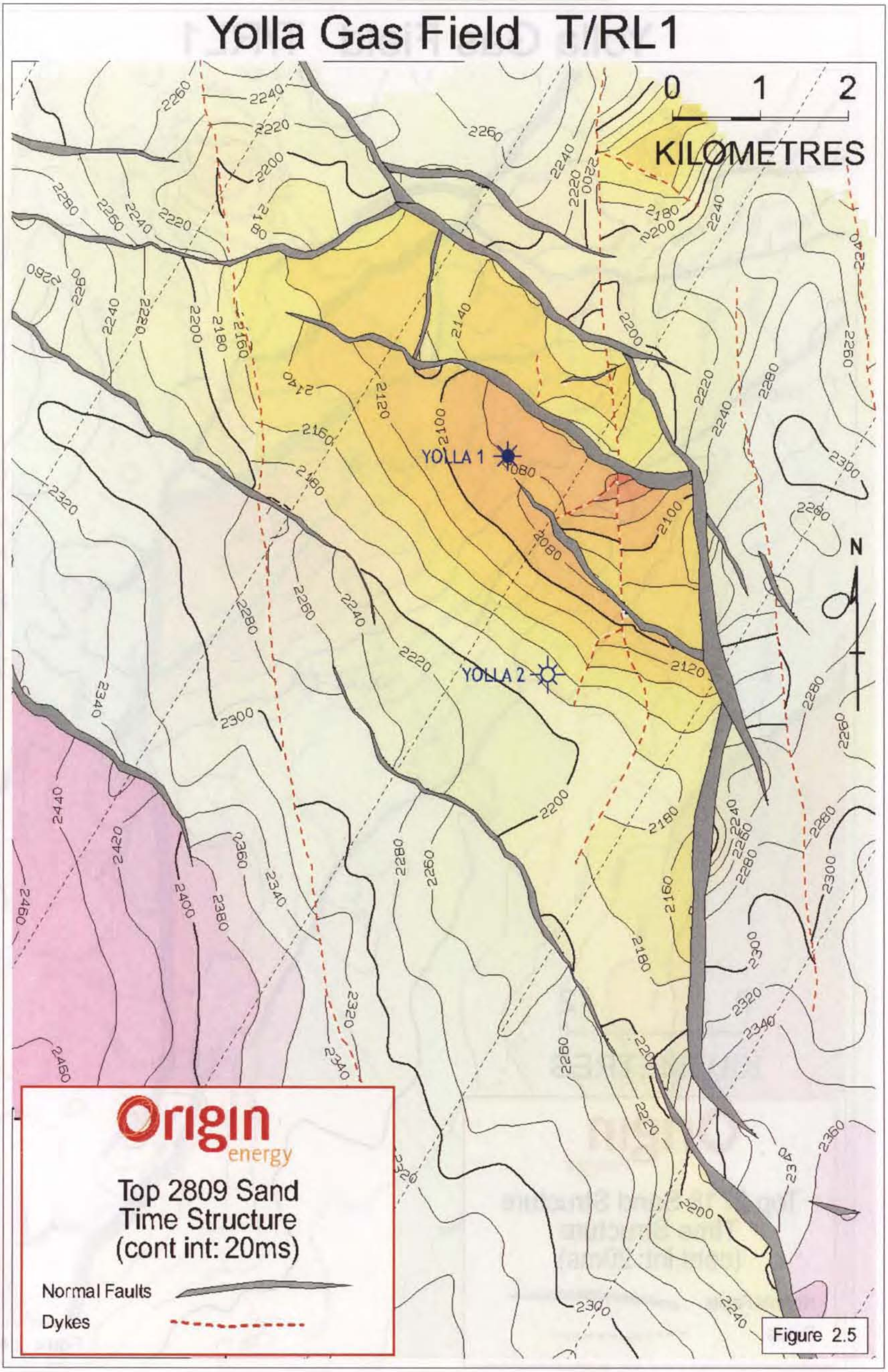
5 cm

Yolla Gas Field T/RL1



5 cm

5 cm


Yolla Gas Field T/RL1
0 1 2
KILOMETRES
N
YOLLA 1
YOLLA 2
Origin energy
Top 2809 Sand
Time Structure
(cont int: 20ms)
Normal Faults
Dykes
Figure 2.5

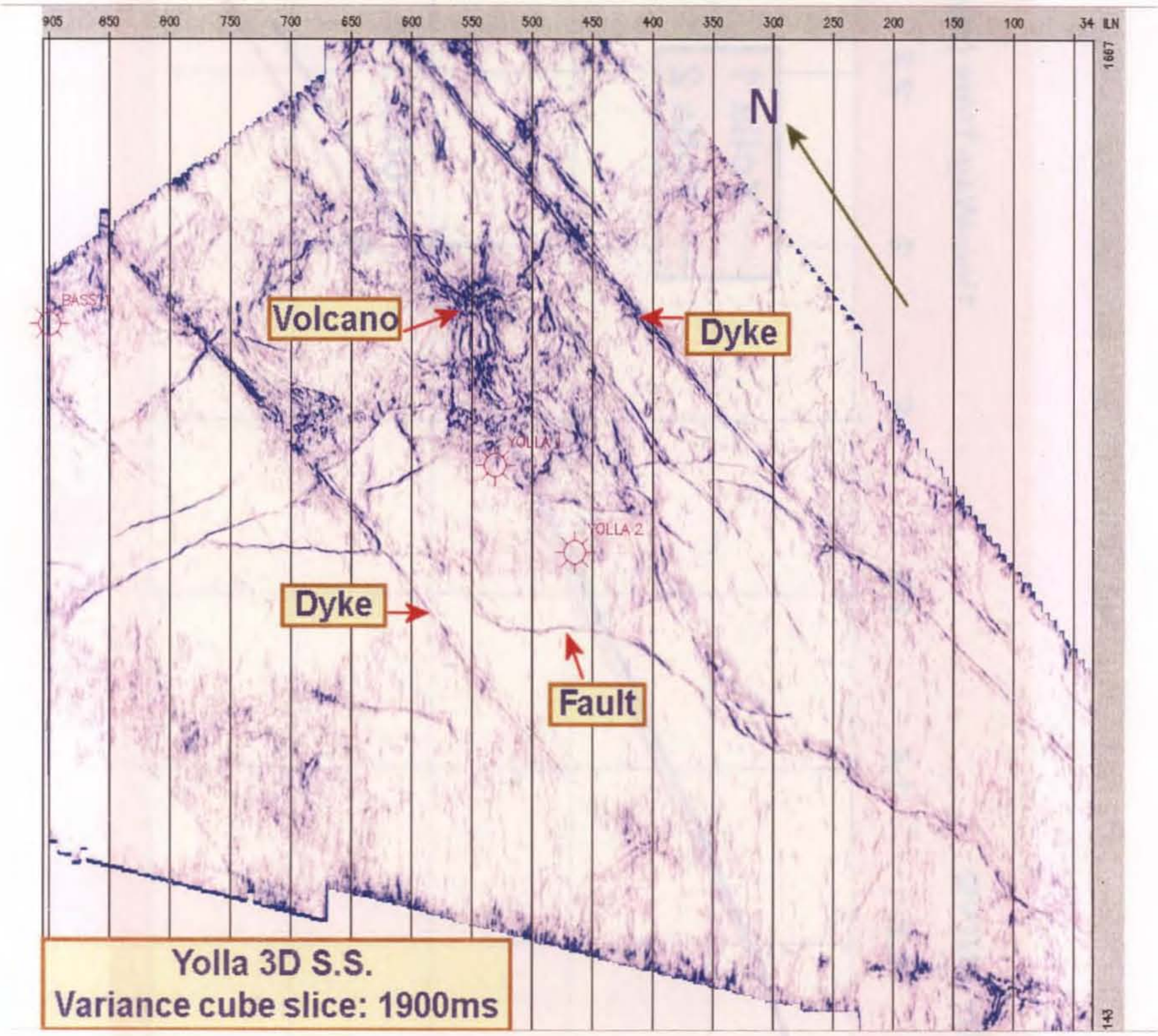
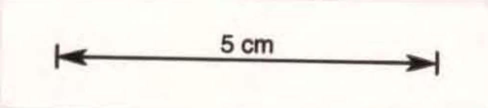

905
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
34
ILN
1667
143
N
BASS 1
Volcano
Dyke
YOLLA 1
YOLLA 2
Dyke
Fault
Yolla 3D S.S.
Variance cube slice: 1900ms

Figure 2.6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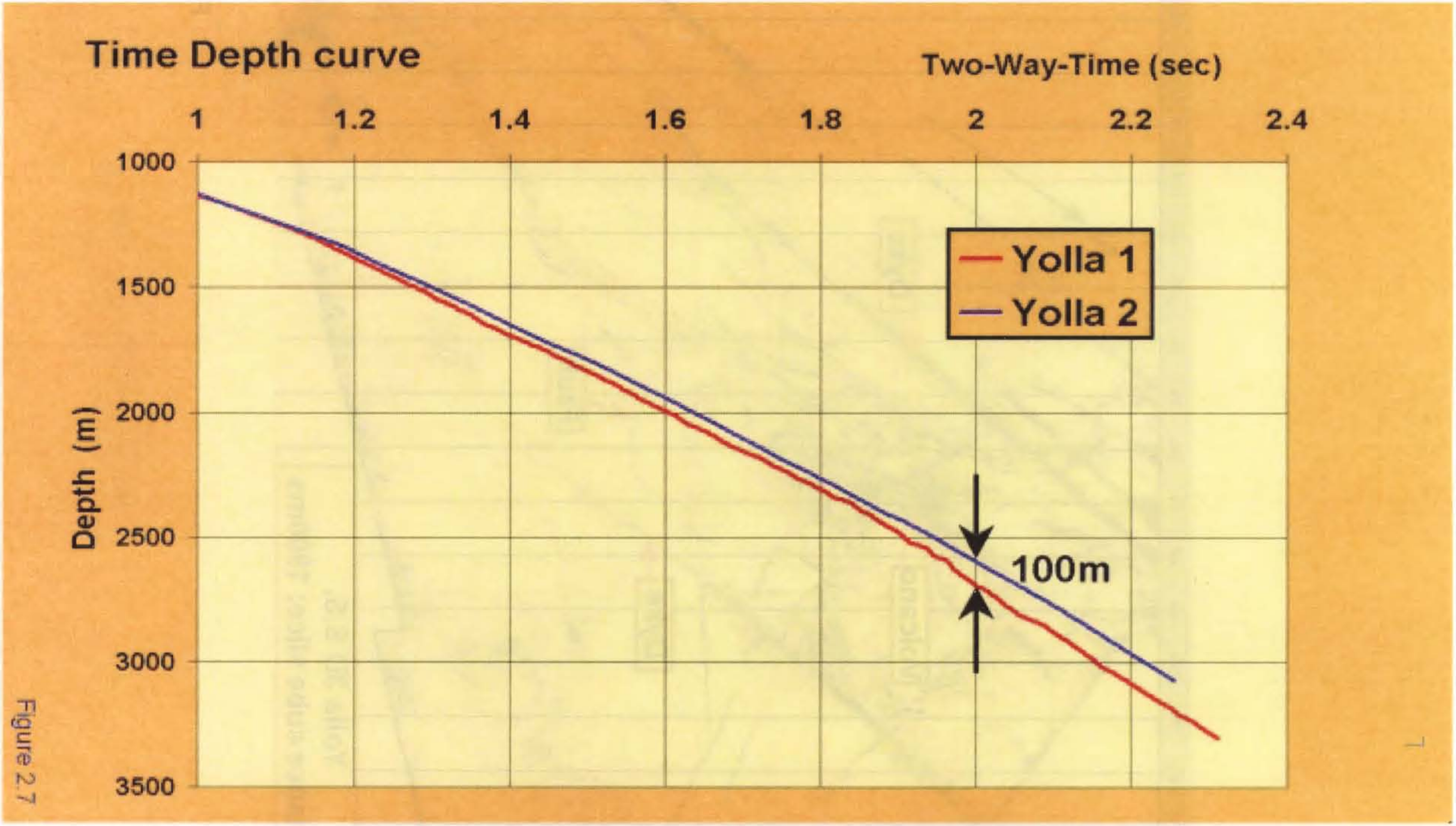
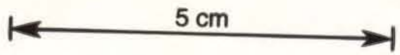

Time Depth curve
Two-Way-Time (sec)
1
1.2
1.4
1.6
1.8
2
2.2
2.4
1000
1500
2000
2500
3000
3500
Depth (m)
Yolla 1
Yolla 2
100m

Figure 2.7


5 cm

These may be partial barriers to the transmissibility of gas and have therefore been included in the interpretation and subsequent reservoir modelling.

Sub-Seismic Sills

While no major sills are currently recognized from the seismic to significantly effect the main reservoir section, the wells do contain a number of thin sills within the reservoir section, that are either below or close to the limits of seismic resolution. These thin sills have the potential to locally adversely modify the reservoir through the effects of heating. Further analyses such as Acoustic Impedance (AI) inversion of the seismic data is recommended to help avoid some of these features prior to the final well design. One such feature that needs further investigation may occur in the vicinity of the proposed Yolla 3 (section 5.1.1).

2.4 Depth Conversion Methodology

As shown in Figure 2.1 and 2.5, a volcano lies immediately adjacent to the Yolla Gas field. This feature, together with a number of dykes and sills has a major influence on seismic velocities over the structure. The time depth curves from the check-shot surveys of Yolla 1 and 2 show a strong divergence, indicating that the interval velocities are highly laterally-variant, (Fig. 2.7). It is for this reason, together with the sparse well control, that a horizon-based velocity analysis approach was taken to the depth conversion.

CMP gathers from 33 2D lines were extracted from the 3D survey and used for horizon based stacking and interval velocity analysis. Twenty in-lines and 13 cross-lines were extracted. The gathers had all pre-processing steps applied, up to but excluding DMO. They were loaded into Paradigm Geophysical's "Power2D" module to perform the analyses. Full details of the depth conversion methodology may be found in the Yolla 3D 2000 reprocessing interpretation report (Taylor, in prep). A brief explanation of the method used is included below.

Horizon based velocity analysis

Both Horizon Stacking Velocity Analysis (HSVA) and Interval Velocity Analysis (IVA) were used to derive velocity information for depth conversion. The HSVA velocities were used for an average velocity depth conversion and the IVA velocities were used for an interval velocity depth conversion.

HSVA is simply regular stacking velocity applied along an interpreted time horizon. It can be scaled to approximate average velocity. HSVA analysis was done for the EVCM and 2718 horizons.

IVA is akin to HSVA but computes the semblance for a range of velocities in a target layer defined by 2 interpreted horizons. It is a layer stripping process that builds up a velocity model for successive layers from the top down. Ray-tracing is used to account for non-hyperbolic move-out. Its ability to derive the velocity field for a given layer relies on the accuracy of the velocity field derived in the overlying section. The method employed was the coherency inversion technique, as implemented in Paradigm Geophysical's "Power2D" module.

IVA was applied to the 5 layers bounded by the horizons shown in Figure 2.1. This was done for each of the 33 2D lines extracted from the 3D survey. For each successive layer, the interval velocity semblances on all lines were interpreted simultaneously, to produce a consistent grid of velocity picks, before proceeding to analyse the next layer. This was an important step as it minimised any systematic line to line errors.

2.5 Depth Conversion

The main method of depth conversion was an interval velocity approach using map-migration to convert successive layers to depth. The maps produced using this technique were the P50 case for volumetric estimates, (Figs. 2.8 to 2.10). A vertical-stretch type interval velocity depth conversion was also produced, (ie interval velocities without map-migration). A third depth conversion using average velocities based on the HSVA velocity picks was also produced but is regarded as the least accurate because of a tendency to overly smooth velocities across the faults.

All velocity maps were calibrated to check-shot velocities in the wells. For the upper horizons the well Bass 1 was included together with Yolla 1 and 2. For each layer, the seismically derived velocities were scaled by a constant factor to approximately tie the check-shot velocities, then map-migrated to depth. A hand contoured mistie map was then used to flex the grids to exactly tie the wells.

The overall effect of the volcano on the velocity field can be seen by examining the final average velocity map produced by dividing the final depth conversion of the 2809 sand by the two-way-time map, (Fig. 2.11). It shows that the volcano has a large bearing on the velocities with the average velocity decreasing in a concentric manner away from the centre of the volcano. This is a reasonably plausible given the expected effect of volcanic activity and is therefore taken as support for the veracity of the depth conversion.

2.6 Depth Uncertainty

For each horizon, all methods of depth conversion produced fairly similar maps. The average velocity derived depth maps had a slightly larger closure at

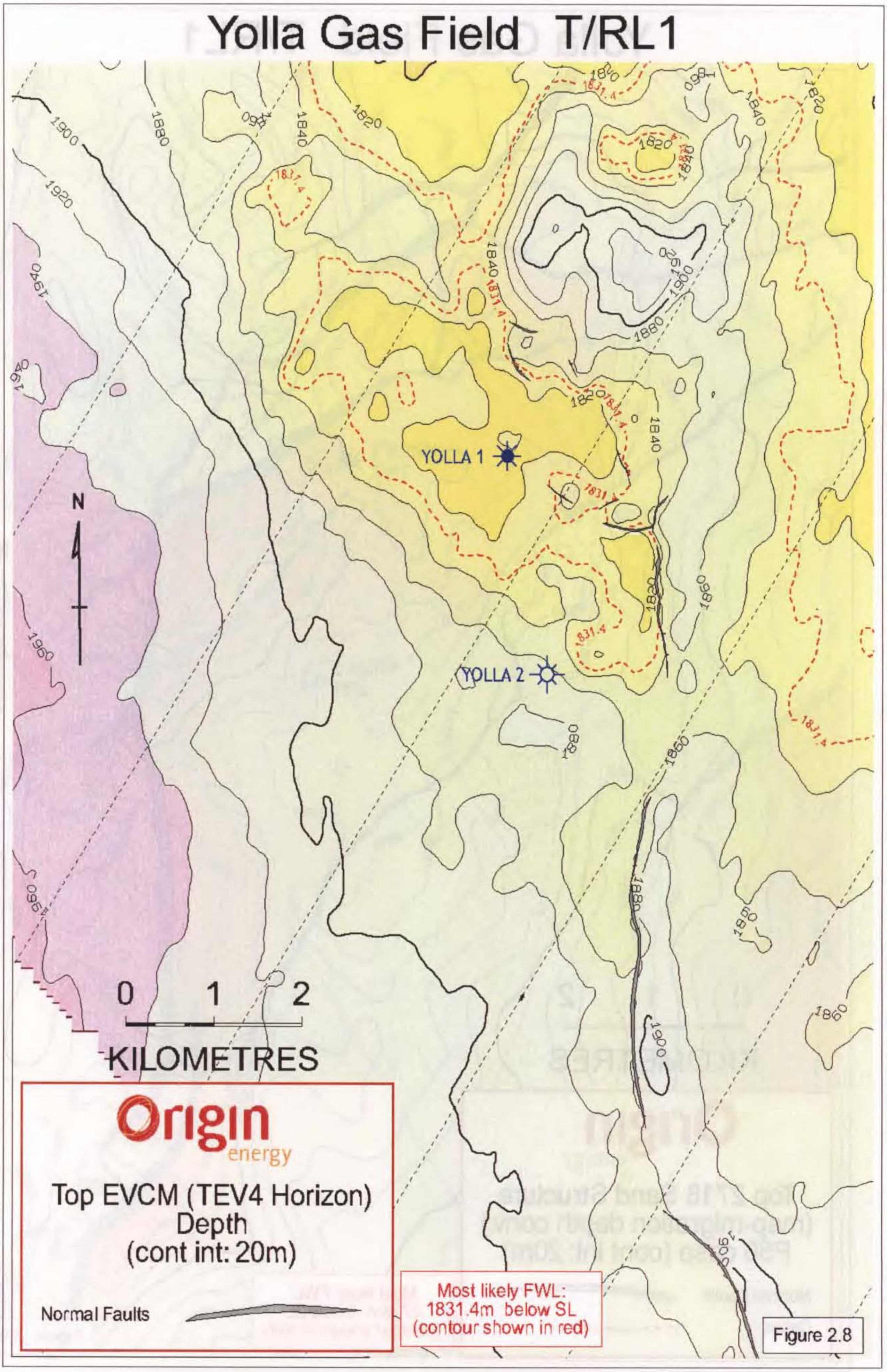
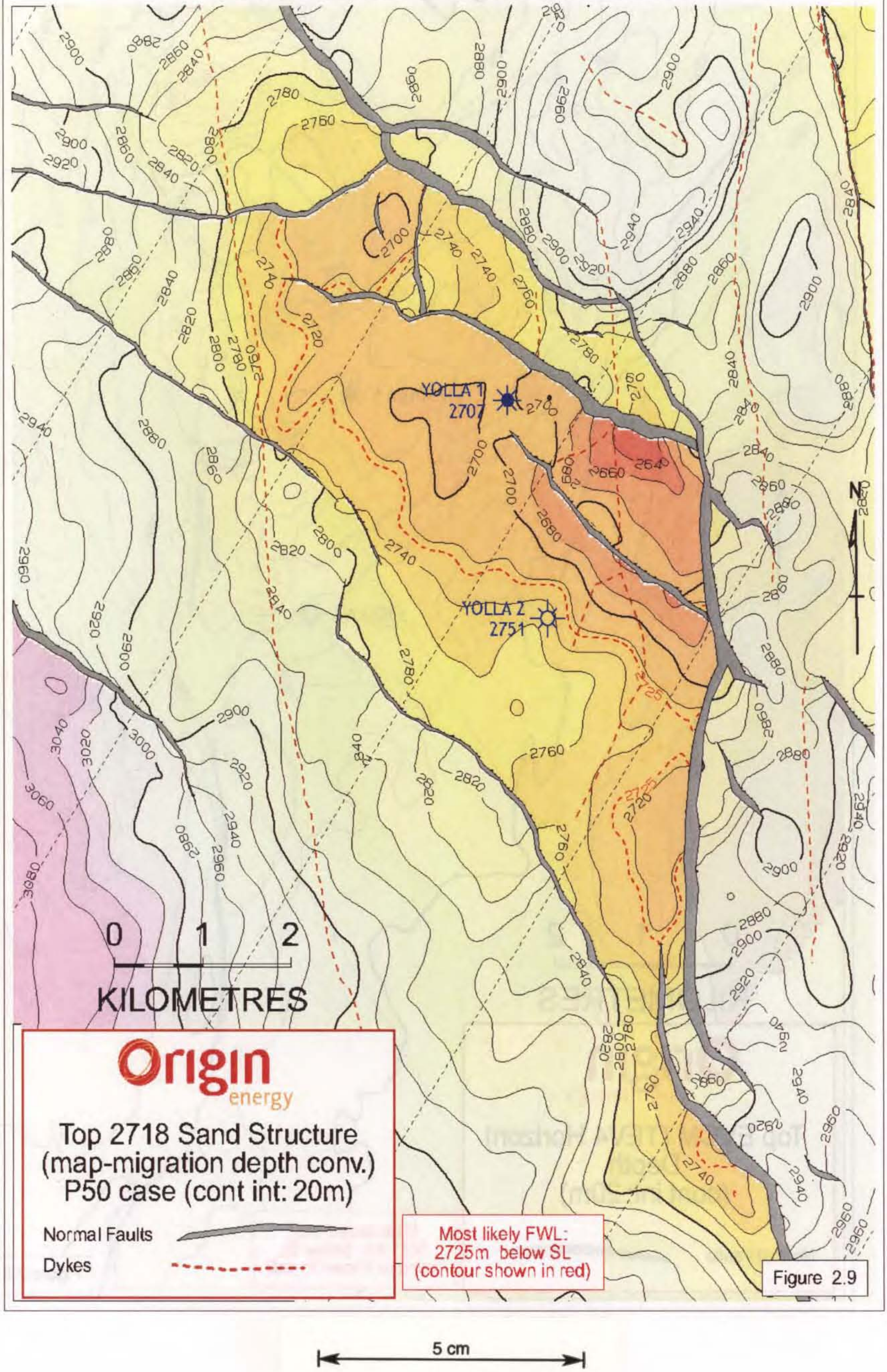
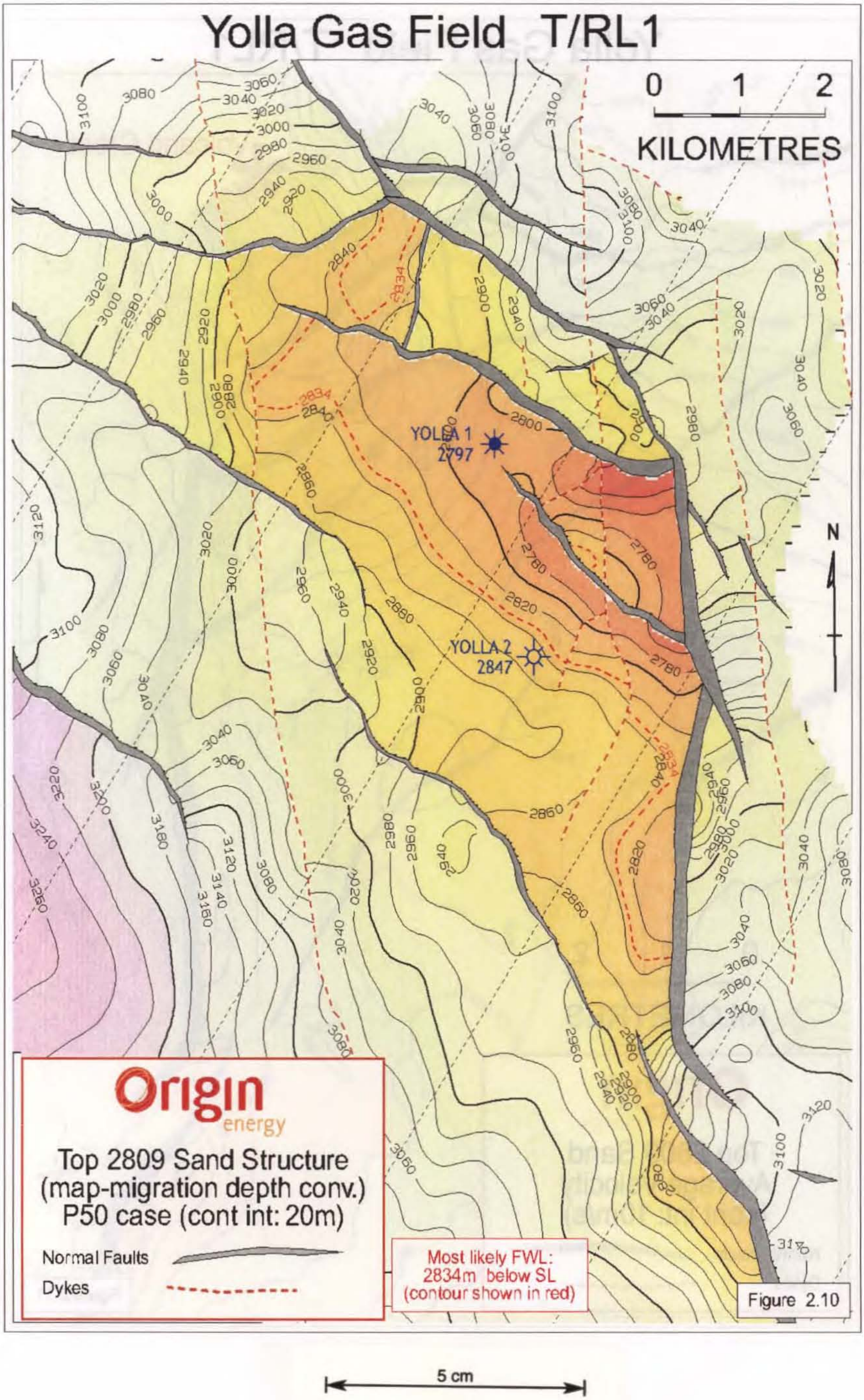


Figure 2.8

5 cm

Yolla Gas Field T/RL1




Yolla Gas Field T/RL1
0 1 2
KILOMETRES
N
YOLLA 1
2797
YOLLA 2
2847
Origin
energy
Top 2809 Sand Structure
(map-migration depth conv.)
P50 case (cont int: 20m)
Normal Faults
Dykes
Most likely FWL:
2834m below SL
(contour shown in red)
Figure 2.10
5 cm

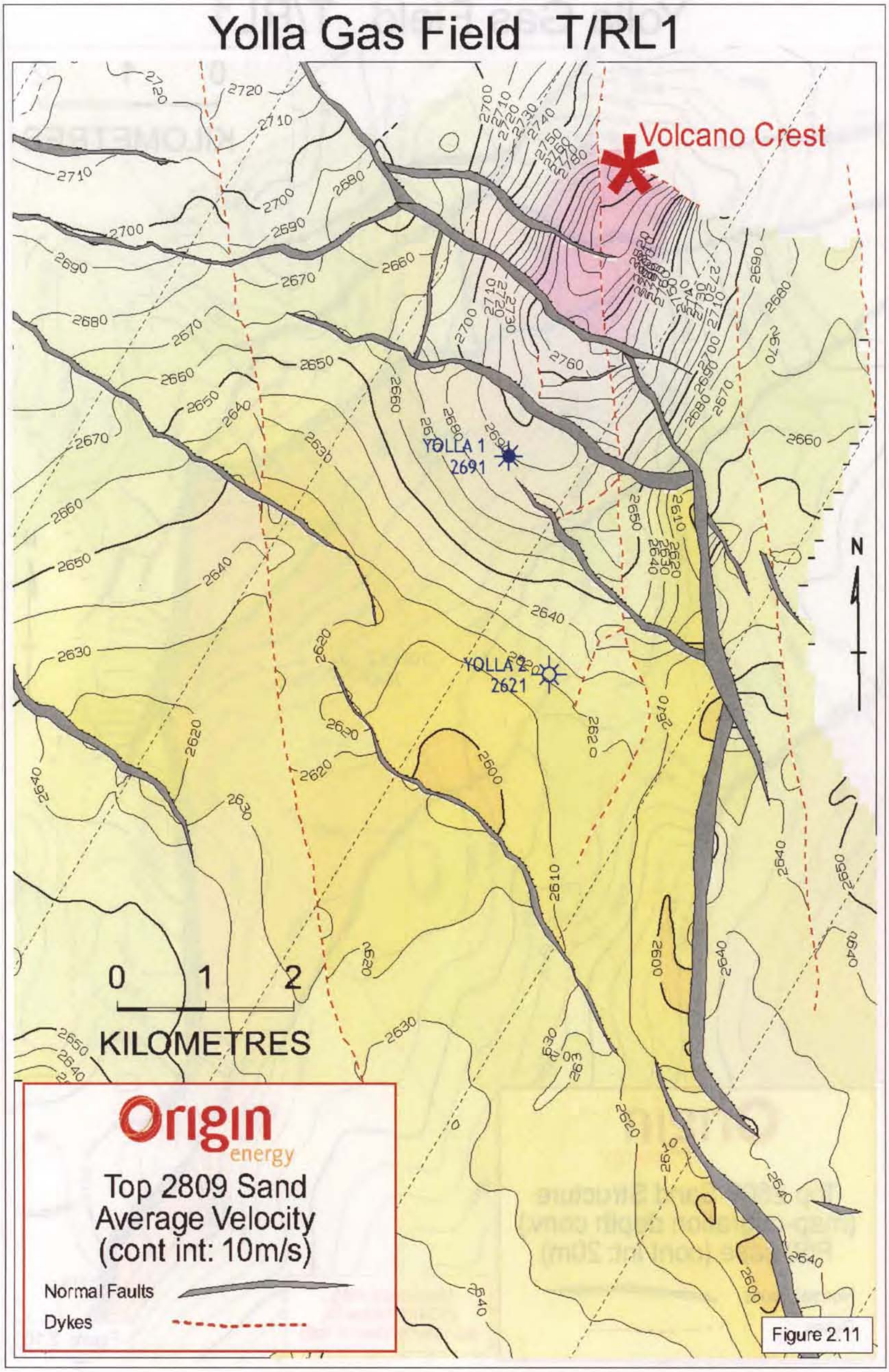


Figure 2.11

5 cm

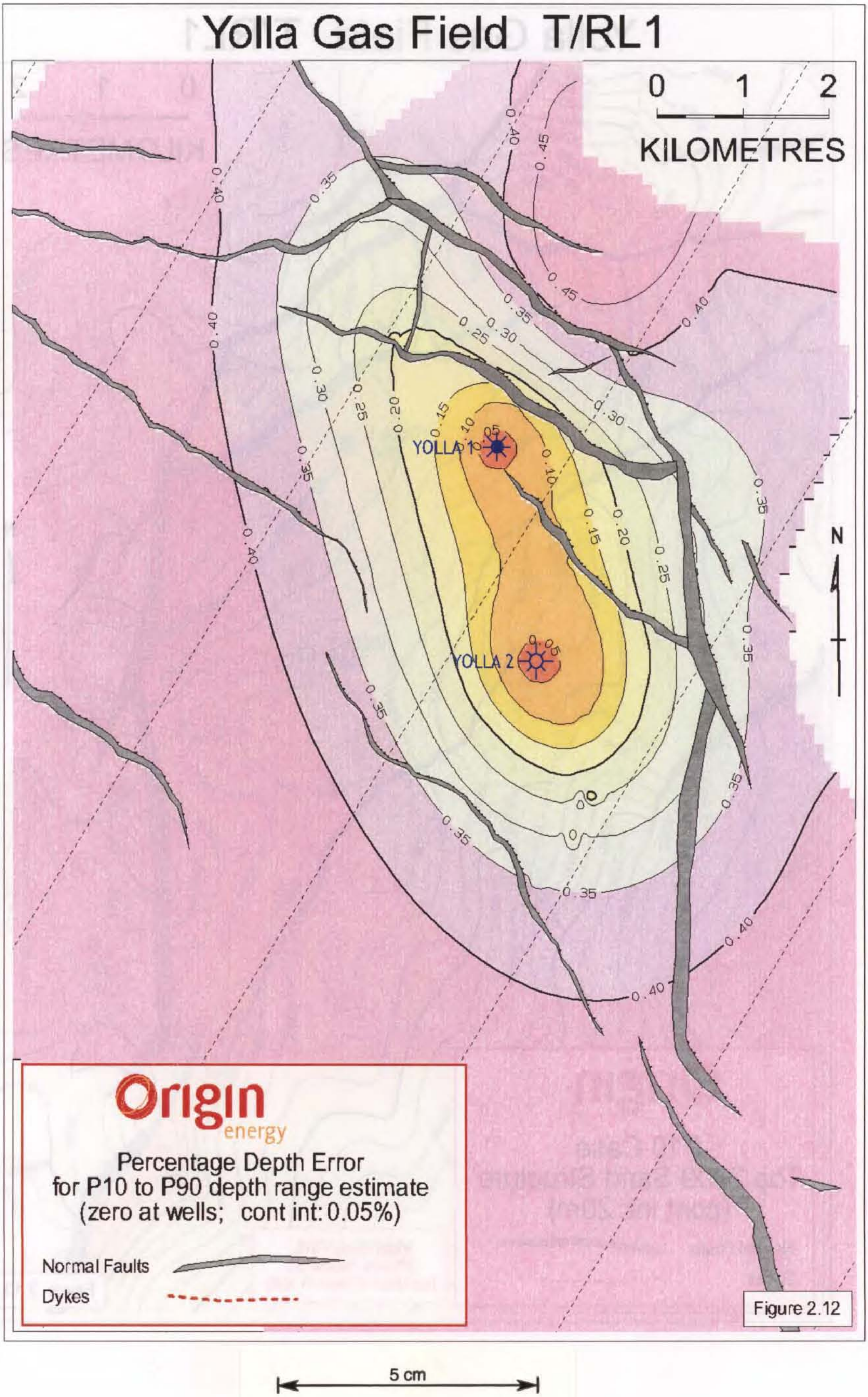

Yolla Gas Field T/RL1
0 1 2
KILOMETRES
N
0.40
0.45
0.35
0.30
0.25
0.20
0.15
0.10
0.05
YOLLA 1
YOLLA 2
Origin energy
Percentage Depth Error
for P10 to P90 depth range estimate
(zero at wells; cont int: 0.05%)
Normal Faults
Dykes
5 cm

Figure 2.12

Yolla Gas Field T/RL1

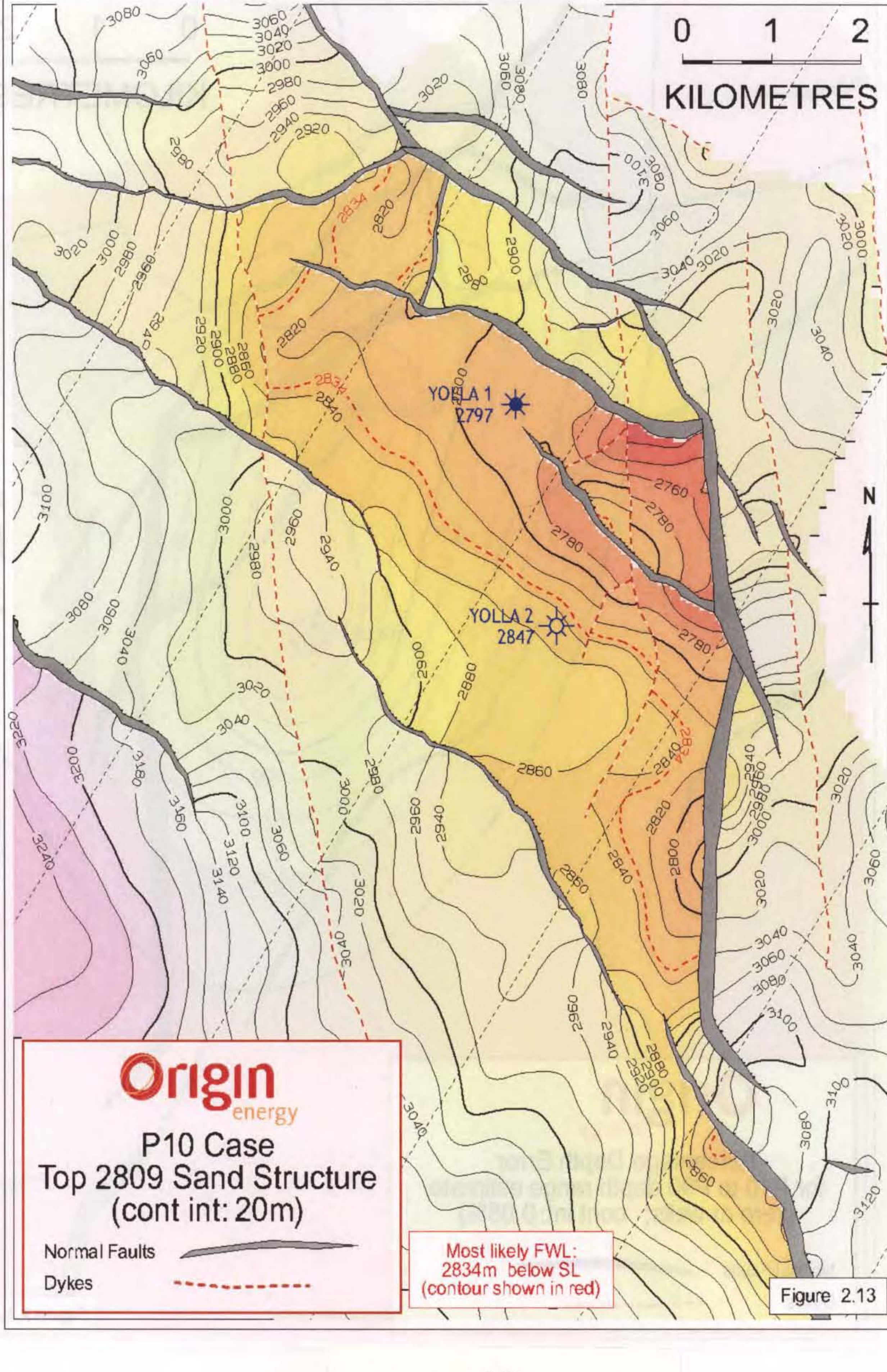
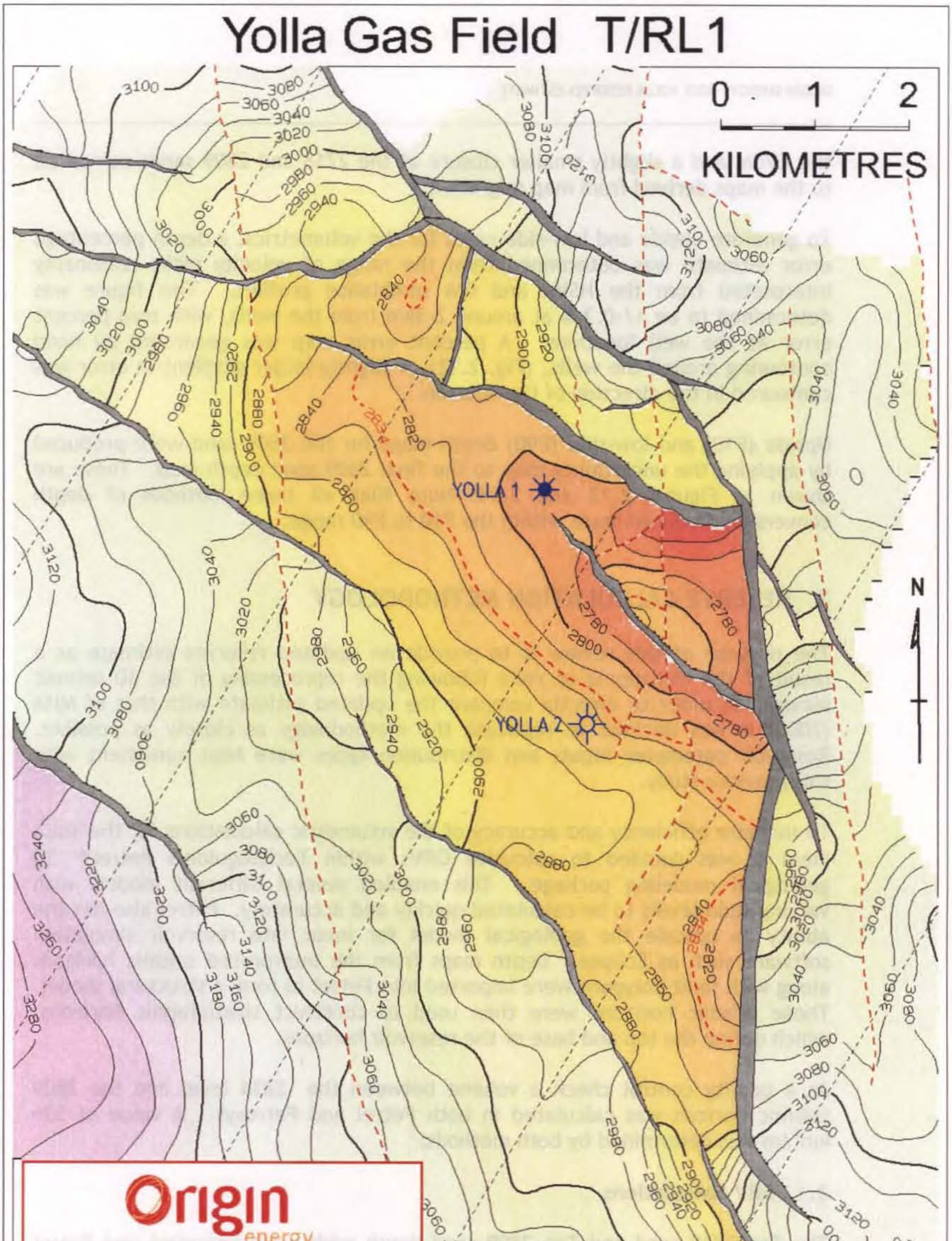


Figure 2.13

5 cm


Yolla Gas Field T/RL1
0 1 2
KILOMETRES
N
YOLLA 1
YOLLA 2
Origin energy
P90 Case
Top 2809 Sand Structure
(cont int: 20m)
Normal Faults
Dykes
Most likely FWL:
2834m below SL
(contour shown in red)
Figure 2.14

5 cm

the EVCM and a slightly smaller closure at the 2718 and 2809 sands compared to the maps derived from map migration.

To generate upside and low-side cases for the volumetrics, a depth percentage error estimate was determined from the range of velocity picks reasonably interpreted from the HSVA and IVA semblance profiles. This figure was determined to be +/-0.3 % at around 2-3km from the wells, with zero percent error at the well locations. A percent error map was generated by hand contouring around the wells, (Fig. 2.12). A slightly larger gradient in error was contoured in the direction of the volcano.

Upside (P10) and low-side (P90) depth maps for the 2809 sand were produced by applying the uncertainty map to the final 2809 sand depth map. These are shown as Figures 2.13 and 2.14. Note that all three methods of depth conversion produced maps within the P10 to P90 range.

3 RESERVE CALCULATION METHODOLOGY

The purpose of this review is to provide an updated reserves estimate as a result of the remapping of Yolla following the reprocessing of the 3D seismic survey. In order to directly compare the updated estimate with that of MHA (2000) it was decided to replicate the methodology as closely as possible. Reservoir parameter inputs and distribution types were kept consistent with this previous study.

To increase efficiency and accuracy of the volumetric calculations for the Yolla Field it was decided to calculate GRVs within Technoguide's Petrel™ 3D geological modeling package. This enabled several different models with varying fluid levels to be calculated quickly and accurately. Petrel also has the ability to upscale the geological model for input into reservoir simulation software such as Eclipse. Depth maps from the interpreted seismic horizons along with fault polygons were imported into Petrel to form a structural model. These seismic horizons were then used to construct stratigraphic horizons, which define the top and base of the reservoir horizons.

As a quality control check a volume between the -2834 level and the 2809 seismic horizon was calculated in both Petrel and Petrosys. A value of 336 km^2/m was determined by both methods.

3.1 GRV Calculations

The Top 2718 sand and Top 2809 sand depth grids were imported into Petrel from petrosys for 3D geological modeling. All other horizons were created as conformable surfaces to the 2809 sand and were tied to the respective well tops using a smoothing algorithm. Well tops used in this process are presented in Table 2.

Several different velocity models were used for depth conversion and GRVs were calculated for each case. The three models used to determine the GRV distribution used in the final probabilistic analysis are outlined below:

1. Main model: using best estimation of velocity field.
2. P10 model (see section 2.6):
3. P90 model (see section 2.6):

Gross rock volumes were calculated for each of these cases using a minimum, most likely and maximum fluid contact for each of the five reservoir intervals as interpreted by MHA (2000; Table 3). The 2844 and 2873 sands are interpreted as water-saturated and are therefore not included in the reserves estimation. The resultant GRVs are presented in Tables 4 and 5 for the Yolla Main and the Yolla North blocks respectively.

Stratigraphic Surface	Yolla-1(mSS)	Yolla-2 (mSS)
2718 Top	2706.9	2750.88
2718 Base	2717.9	2756.5
2755 Top	2735.4	2779.8
2755 Base	2756.8	2803.0
2809 Top	2797.9	2846.8
2809 Base	2819.9	2871.5
2844 Top	2828.9	2886.8
2844 Base	2839.9	2899.5
2873 Top	2859.9	2916.55
2873 Base	2870.4	2921.8
2952 Top	2940.9	2995.5
2952 Base	2942.9	2997.6
2973 Top	2962.3	3017.0
2973 Base	2984.9	3041.0

Table 2: Well Tops for Yolla-1 and Yolla-2.

Sand	LKG (Minimum)	Most Likely GWC	Maximum GWC
2718	2711	2727	2822
2755	2803	2834	2834
2809	2813	2834	2834
2952	2942.5	2997	3004.7
2973	2983.5	2997	3004.7

Table 3: Reservoir fluid contacts used in evaluation (from MHA 2000). Depths in mSS.

The final triangular GRV distribution was constructed by using the following methodology:

- Most likely GRV was calculated by using the most likely GWC in the main model
- Minimum GRV was calculated by using the minimum GWC in the P90 velocity model (section 2.6; Fig. 2.14)
- Maximum GRV was calculated using the maximum fluid level with the P10 velocity model (section 2.6; Fig. 2.13)

The only exception to this methodology was the 2755 sand where the maximum GRV was determined by using a stratigraphic model whereby the zone thickened proportionally to the interval between the 2718 and 2809 horizons. This stratigraphic model was applied to the maximum velocity model to calculate the maximum GRV.

	Max Velocity Model			Main Model			Min Velocity Model		
Sand	Min	ML	Max	Min	ML	Max	Min	ML	Max
2718	27.1			55.8	95.2	183.1			190.4
2755	222.6	358.8	358.8	331.7	456.7	456.7	427.9	480.0	580.4
2809	68.5	129.0	129.0	103.9	191.9	186.3	190.7	308.8	308.8
2952	5.7	21.6	23.9	8.7	30.2	34.3	16.7	41.5	43.8
2973	97.8	136.6	160.6	138.9	200.1	235.8	248.1	319.2	361.7

Table 4: GRV results for the Yolla Main Block using the 3 velocity models as outlined above. All results in millions m^3. ML: Most likely.

	Max Velocity Model			Main Model			Min Velocity Model		
Sand	Min	ML	Max	Min	ML	Max	Min	ML	Max
2718	4.8			5.4	13.8	50.4			50.3
2755	5.4	37.3	37.3	36.3	52.2	52.2	47.6	83.7	130.7
2809	0.0	0.0	0.0	0.0	3.0	3.0	6.1	33.7	33.7
2952	0.0	0.0	0.7	0.0	3.4	4.0	0.0	4.4	5.0
2973	0.0	0.0	0.0	0.0	2.5	8.4	13.5	32.9	40.9

Table 5: GRV results for the Yolla North Block using the 3 velocity models as outlined above. All results in millions m^3. ML: Most likely.

The final GRV distributions used in the probability distributions for the Yolla Main and Yolla North Blocks are presented in Table 5.

	Yolla Main			Yolla North		
	Min	ML	Max	Min	ML	Max
Sand	27.1	95.2	190.4	4.8	13.8	50.3
2718	222.6	456.7	580.4	5.4	52.2	130.7
2755	68.5	191.9	308.8	0.0	3.0	33.7
2809	5.7	30.2	43.8	0.0	3.4	5.0
2952	97.8	200.1	361.7	0.0	2.5	40.9

Table 6: GRV distributions used in Probabilistic reserves estimation.

3.2 Reservoir Parameters

Porosity, Net/gross and recovery factor distributions were taken directly from those used by MHA (2000). These distributions were based on independently calculated petrophysical analyses of Yolla-1 and Yolla-2. Water saturation and formation volume factor distributions were taken from those used in the July 1999 reserves estimate undertaken by Boral Energy. A negative 0.8 porosity correlation factor was applied to water saturation. All distributions used in the estimation were triangular. Reservoir parameter distributions for each sand interval are presented in Table 7 and Table 8 for the Yolla Main and Yolla North blocks respectively.

640028

Yolla Main				
			Distribution	
Sand	Parameter	Min	ML	Max
2718	GRV	27.1	95.2	190.4
	Porosity	11.5	12.3	21
	Net/Gross (%)	12	46.2	80
	Sw	20	35	50
	FVF	209	213	218
2755	GRV	222.6	456.7	580.4
	Porosity	11.5	15.7	21
	Net/Gross (%)	25	64.1	80
	Sw	15	20	40
	FVF	207	211	215
2809	GRV	68.5	191.9	308.8
	Porosity	11.5	16.5	22
	Net/Gross (%)	20	71.5	80
	Sw	15	30	50
	FVF	207	211	215
2952	GRV	5.7	30.2	43.8
	Porosity	11.5	13	15
	Net/Gross (%)	20	47.2	70
	Sw	15	30	45
	FVF	210	215	219
2973	GRV	97.8	200.1	361.7
	Porosity	11.5	15.3	17
	Net/Gross (%)	35	64.3	80
	Sw	15	25	35
	FVF	210	215	219
Recovery Factor		60	71	78

Table 7: Reservoir parameter distributions for the Yolla Main block.

Yolla North				
		Distribution		
Sand	Parameter	Min	ML	Max
2718	GRV	4.8	13.8	50.3
	Porosity	11.5	12.3	21
	Net/Gross (%)	12	46.2	80
	Sw	20	35	50
	FVF	209	213	218
2755	GRV	5.4	52.2	130.7
	Porosity	11.5	15.7	21
	Net/Gross (%)	25	64.1	80
	Sw	15	20	40
	FVF	207	211	215
2809	GRV	0.0	3.0	33.7
	Porosity	11.5	16.5	22
	Net/Gross (%)	20	71.5	80
	Sw	15	30	50
	FVF	207	211	215
2952	GRV	0.0	3.4	5.0
	Porosity	11.5	13	15
	Net/Gross (%)	20	47.2	70
	Sw	15	30	45
	FVF	210	215	219
2973	GRV	0.0	2.5	40.9
	Porosity	11.5	15.3	17
	Net/Gross (%)	35	64.3	80
	Sw	15	25	35
	FVF	210	215	219
Recovery Factor		60	71	78

Table 8: Reservoir parameter distributions for the Yolla North block.

4 RESERVES

Estimates of OGIP were calculated probabilistically using the triangular distributions for reservoir parameters as outlined above. A probabilistic estimate was provided for each sand interval. These estimates were then probabilistically consolidated to provide a final estimate for the Yolla Main and Yolla North blocks and also the total for The Yolla Main and Yolla North blocks combined. The REP™ package was used to calculate these reserves. The resultant REP summary sheets are presented in Appendix 1. A 0.76 conversion factor was used to convert recoverable gas to PJ. This factor takes into account both CO_2 and condensate removal for the final gas volume. Final OGIP and recoverable reserve estimates are presented in Tables 9 and 10.

OGIP (bcf)				
		Yolla Main Block		
SAND	P90	P50	P10	Mean
2718	14.2	30.8	57.5	33.8
2755	122.0	200.0	298.0	206.0
2809	45.8	87.3	145.0	91.7
2952	4.2	8.2	13.0	8.5
2973	67.4	107.0	160.0	111.0
Cons	***342.0***	***448.0***	***569.0***	***452.0***
		Yolla North Block		
SAND	P90	P50	P10	Mean
2718	2.7	6.5	13.5	7.5
2755	12.4	28.4	52.6	30.8
2809	1.3	4.9	12.0	5.9
2952	0.4	0.9	1.4	0.9
2973	1.6	6.3	14.6	7.3
Cons	***31.1***	***50.6***	***76.4***	***52.5***
Total	**393**	**500**	**621**	**504**

Table 9: Probabilistic OGIP estimate for the Yolla Field. All sub totals and totals have been probabilistically consolidated

Recoverable (bcf)				
		Yolla Main Block		
SAND	P90	P50	P10	Mean
2718	9.9	21.4	40.0	23.6
2755	84.5	139.0	208.0	144.0
2809	31.8	60.6	101.0	63.9
2952	2.9	5.7	9.1	5.9
2973	46.8	74.9	112.0	77.4
Consolidated	***239.0***	***314.0***	***399.0***	***316.0***
		Yolla North Block		
SAND	P90	P50	P10	Mean
2718	1.9	4.5	9.4	5.2
2755	8.6	19.9	36.7	21.5
2809	0.9	3.4	8.4	4.1
2952	0.3	0.6	1.0	0.6
2973	1.1	4.4	10.2	5.1
Consolidated	***21.6***	***35.3***	***53.2***	***36.6***
Total bcf	**274**	**350**	**436**	**353**
Total PJ	**208.2**	**266.0**	**331.4**	**268.3**

Table 10: Probabilistic recoverable reserves estimate for the Yolla Field. All sub totals and totals have been probabilistically consolidated. The final row shows the probabilistic distribution in PJs.

5 REFERENCES

Malkewicz-Hueni Associates 2000, Yolla Gas Field Reserves Review.

APPENDIX 1

Rep Reserves Estimation Sheets

Prospect/Field Recoverable Gas

LOGICOM

Country:	**AUSTRALIA**	Name:	**YOLLA MAIN**
State:	**Tasmania**	Segment:	**2718 SAND**
Block:	**T/RL1**	Classification:	**technical**

Input Data

Variable	Unit	Shape	min	P90	P50	P10	max	mode
GRV	mmcm	triang	27.1	60.4	102	151	190	95.2
Deg. of fill	%	single	100	100	100	100	100	100
Net-to-gross	%	triang	12.0	27.2	46.1	64.8	80.0	46.2
Porosity	%	triang	11.5	12.4	14.6	18.1	21.0	12.3
Sw	%	80% dependent on porosity;			limits 20.0 - 50.0; -ve sense			
FVF (1/Bg)	vol/vol	triang	209	211	213	216	218	213
Gas rec fac	%	single	100	100	100	100	100	100

Risk Factors

Play Chance:	**100**	Prospect Specific Chance:	**100**
Reservoir:	100	Trap:	100
Source:	100	Reservoir:	100
Regional Seal:	100	Seal:	100
		Migration:	100

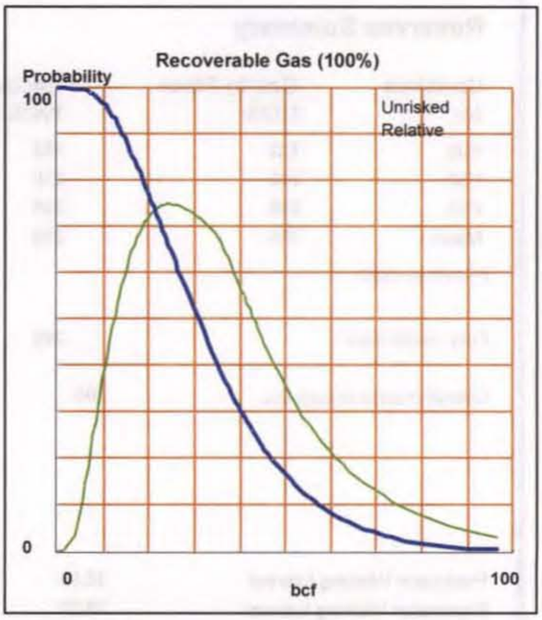
Geological Chance of Success: **100**

Economic Criteria

No economic minima applied

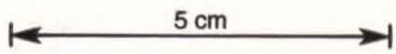
Reserves Summary

Unrisked bcf	**Gas-in-Place** 100%	**Recoverable Gas** 100%	Net Origin
P90:	**14.2**	**14.2**	**4.98**
P50:	**30.8**	**30.8**	**10.8**
P10:	**57.5**	**57.5**	**20.1**
Mean:	**33.8**	**33.8**	**11.8**
P-level at mean:			42.7
Fully risked mean:		**33.8**	**11.8**
Overall chance of success:		100	



Production Working Interest: **35.00**
Exploration Working Interest: **35.00**
Production Working Interest is used to calculate net volumes

Comments:



REP file: n:\bass\yolla\yolla 2000\yolla main rep sheets\yolla main 2718 — Author: USER
version: 4.20 — Date: 12/11/01

Prospect/Field Recoverable Gas

LOGICOM

Country:	**AUSTRALIA**	Name:	**YOLLA MAIN**
State:	**Tasmania**	Segment:	**2755 SAND**
Block:	**T/RL1**	Classification:	**technical**

Input Data

Variable	Unit	Shape	min	P90	P50	P10	max	mode
GRV	mmcm	triang	223	314	427	514	580	457
Deg. of fill	%	single	100	100	100	100	100	100
Net-to-gross	%	triang	25.0	39.7	57.8	70.6	80.0	64.1
Porosity	%	triang	11.5	13.5	16.0	18.8	21.0	15.7
Sw	%	80% dependent on porosity;			limits 15.0 - 40.0; -ve sense			
FVF (1/Bg)	vol/vol	triang	207	209	211	213	215	211
Gas rec fac	%	single	100	100	100	100	100	100

Risk Factors

Play Chance:	100	Prospect Specific Chance:	100
Reservoir:	100	Trap:	100
Source:	100	Reservoir:	100
Regional Seal:	100	Seal:	100
		Migration:	100

Geological Chance of Success: 100

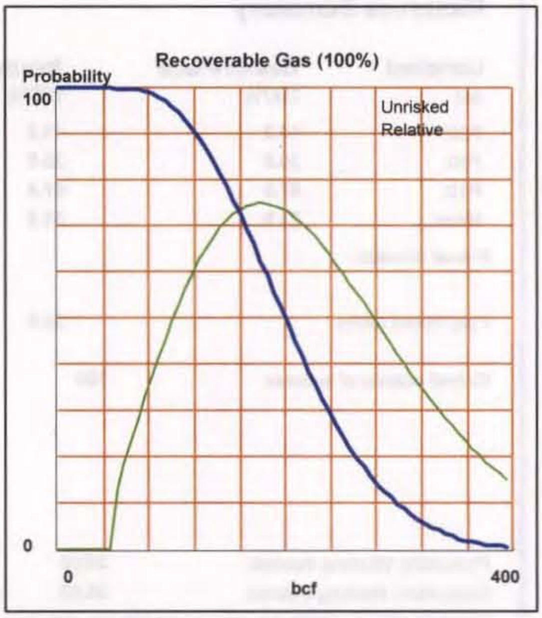
Economic Criteria

No economic minima applied

Reserves Summary

Unrisked bcf	Gas-in-Place 100%	Recoverable Gas 100%	Net Origin
P90:	**122**	**122**	**42.7**
P50:	**200**	**200**	**70.1**
P10:	**298**	**298**	**104**
Mean:	**206**	**206**	**72.1**
P-level at mean:			46.7
Fully risked mean:		**206**	**72.1**

Overall chance of success: **100**



min unrisked: 28.1 max unrisked 623

Production Working Interest: **35.00**
Exploration Working Interest: **35.00**
Production Working Interest is used to calculate net volumes

Comments:

5 cm

REP file:	n:\bass\yolla\yolla 2000\yolla main rep sheets\yolla main 2755.r	Author:	USER
version:	4.20	Date:	12/11/01

Prospect/Field Recoverable Gas

LOGICOM

Country:	AUSTRALIA	Name:	YOLLA MAIN
State:	Tasmania	Segment:	2809 SAND
Block:	T/RL1	Classification:	technical

Input Data

Variable	Unit	Shape	min	P90	P50	P10	max	mode
GRV	mmcm	triang	68.5	123	190	256	309	192
Deg. of fill	%	single	100	100	100	100	100	100
Net-to-gross	%	triang	20.0	37.6	59.3	72.9	80.0	71.5
Porosity	%	triang	11.5	13.8	16.6	19.6	22.0	16.5
Sw	%	80% dependent on porosity;			limits 15.0 - 50.0; -ve sense			
FVF (1/Bg)	vol/vol	triang	207	209	211	213	215	211
Gas rec fac	%	single	100	100	100	100	100	100

Risk Factors

Play Chance:	100	Prospect Specific Chance:	100
Reservoir:	100	Trap:	100
Source:	100	Reservoir:	100
Regional Seal:	100	Seal:	100
		Migration:	100

Geological Chance of Success: 100

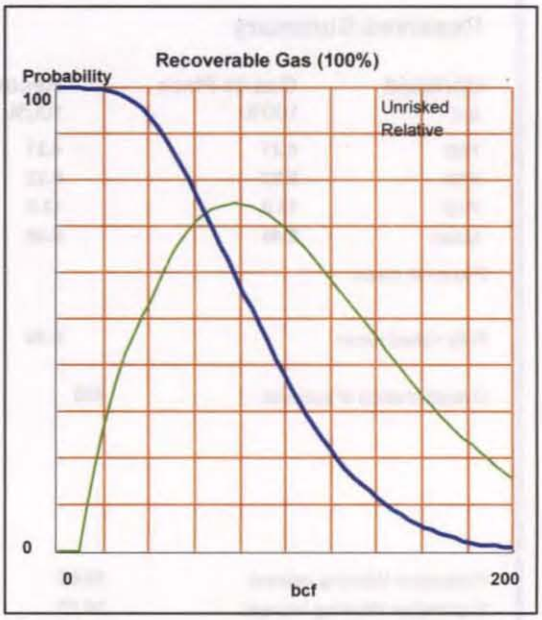
Economic Criteria

No economic minima applied

Reserves Summary

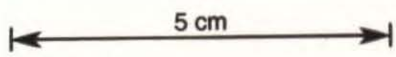
Unrisked	Gas-in-Place	Recoverable Gas	
bcf	100%	100%	Net Origin
P90:	45.8	45.8	16.0
P50:	87.3	87.3	30.5
P10:	145	145	50.6
Mean:	91.7	91.7	32.1
P-level at mean:			45.5
Fully risked mean:		91.7	32.1
Overall chance of success:		100	

Production Working Interest: 35.00
Exploration Working Interest: 35.00
Production Working Interest is used to calculate net volumes



min unrisked: 5.76 max unrisked: 347

Comments:



REP file:	n:\bass\yolla\yolla 2000\yolla main rep sheets\yolla main 2809.ı	Author:	USER
version:	4.20	Date:	12/11/01

Prospect/Field Recoverable Gas

LOGICOM

Country:	AUSTRALIA	Name:	YOLLA MAIN
State:	Tasmania	Segment:	2952 SAND
Block:	T/RL1	Classification:	technical

Input Data

Variable	Unit	Shape	min	P90	P50	P10	max	mode
GRV	mmcm	triang	5.70	15.4	27.3	36.6	43.8	30.2
Deg. of fill	%	single	100	100	100	100	100	100
Net-to-gross	%	triang	20.0	31.7	46.1	59.3	70.0	47.2
Porosity	%	triang	11.5	12.2	13.1	14.2	15.0	13.0
Sw	%	80% dependent on porosity;			limits 15.0 - 45.0; -ve sense			
FVF (1/Bg)	vol/vol	triang	210	212	215	217	219	215
Gas rec fac	%	single	100	100	100	100	100	100

Risk Factors

Play Chance:	100	Prospect Specific Chance:	100
Reservoir:	100	Trap:	100
Source:	100	Reservoir:	100
Regional Seal:	100	Seal:	100
		Migration:	100

Geological Chance of Success: 100

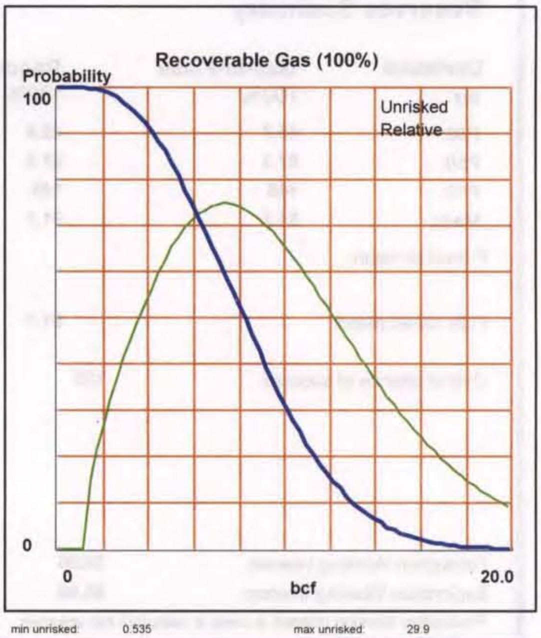
Economic Criteria

No economic minima applied

Reserves Summary

Unrisked bcf	Gas-in-Place 100%	Recoverable Gas 100%	Net Origin
P90:	4.21	4.21	1.47
P50:	8.22	8.22	2.88
P10:	13.0	13.0	4.55
Mean:	8.46	8.46	2.96
P-level at mean:			47.4
Fully risked mean:		8.46	2.96

Overall chance of success: 100



Production Working Interest: 35.00
Exploration Working Interest: 35.00
Production Working Interest is used to calculate net volumes

Comments:

5 cm

REP file:	n:\bass\yolla\yolla 2000\yolla main rep sheets\yolla main 2952.r	Author:	USER
version:	4.20	Date:	12/11/01

Prospect/Field Recoverable Gas

LOCICOM

Country:	**AUSTRALIA**	Name:	**YOLLA MAIN**
State:	**Tasmania**	Segment:	**2973 SAND**
Block:	**T/RL1**	Classification:	**technical**

Input Data

Variable	Unit	Shape	min	P90	P50	P10	max	mode
GRV	mmcm	triang	97.8	150	216	296	362	200
Deg. of fill	%	single	100	100	100	100	100	100
Net-to-gross	%	triang	35.0	46.5	60.7	71.6	80.0	64.3
Porosity	%	triang	11.5	12.9	14.7	16.0	17.0	15.3
Sw	%	80% dependent on porosity;			limits 15.0 - 35.0; -ve sense			
FVF (1/Bg)	vol/vol	triang	210	212	215	217	219	215
Gas rec fac	%	single	100	100	100	100	100	100

Risk Factors

Play Chance:	**100**	Prospect Specific Chance:	**100**
Reservoir:	100	Trap:	100
Source:	100	Reservoir:	100
Regional Seal:	100	Seal:	100
		Migration:	100

Geological Chance of Success: **100**

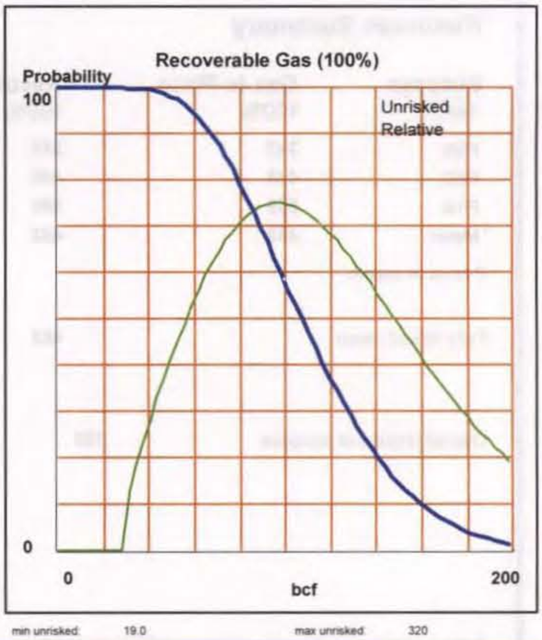
Economic Criteria

No economic minima applied

Reserves Summary

Unrisked bcf	**Gas-in-Place** 100%	**Recoverable Gas** 100%	Net Origin
P90:	**67.4**	**67.4**	**23.6**
P50:	**107**	**107**	**37.6**
P10:	**160**	**160**	**56.0**
Mean:	**111**	**111**	**38.9**
P-level at mean:			46.3
Fully risked mean:		**111**	**38.9**

Overall chance of success: **100**



Production Working Interest: **35.00**
Exploration Working Interest: **35.00**
Production Working Interest is used to calculate net volumes

Comments:

5 cm

REP file:	n:\bass\yolla\yolla 2000\yolla main rep sheets\yolla main 2973.r	Author:	USER
version:	4.20	Date:	12/11/01

General Consolidation - Recoverable Gas

LOGICOM

Country:
State:
Block:

Name: YOLLA MAIN BLOCK
Segment:
Classification: technical

Input Data

Net Recoverable Gas

Entry	Shape	min	P90	P50	P10	max	mean	net %	chance
..s\yolla main 2718 .ppr	poly	0.483	4.98	10.8	20.1	69.0	11.8	35.0	100
..ts\yolla main 2755.ppr	poly	11.9	42.7	70.1	104	220	72.0	35.0	100
..ts\yolla main 2809.ppr	poly	3.22	16.0	30.5	50.6	123	32.1	35.0	100
..ts\yolla main 2952.ppr	poly	0.291	1.47	2.88	4.55	10.6	2.96	35.0	100
..ts\yolla main 2973.ppr	poly	7.71	23.6	37.6	56.0	113	38.8	35.0	100

Common Risk Elements

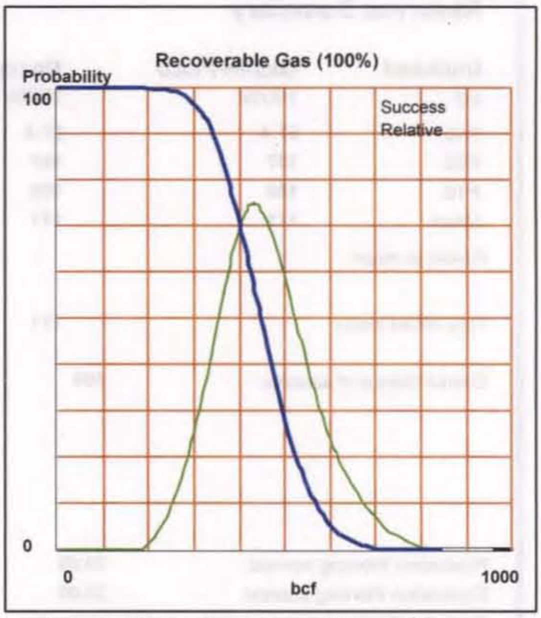
No common risk elements applied

Economic Criteria

No economic minima applied to results

Reserves Summary

Success bcf	Gas-in-Place 100%	Recoverable Gas 100%	Net Origin
P90:	342	342	120
P50:	448	448	157
P10:	569	569	199
Mean:	452	452	158
P-level at mean:			48.3
Fully risked mean:		452	158
Overall chance of success:		100	



min unrisked: 67.5 max unrisked: 845

In the success case at least one technical discovery is made

Comments:

5 cm

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version: 4.20
Author: USER
Date: 13/11/01

Prospect/Field Recoverable Gas

LOCICOM

Country: **AUSTRALIA**
State: **Tasmania**
Block: **T/RL1**

Name: **YOLLA NORTH**
Segment: **2718 SAND**
Classification: **technical**

Input Data

Variable	Unit	Shape	min	P90	P50	P10	max	mode
GRV	mmcm	triang	4.80	11.2	21.5	37.4	50.3	13.8
Deg. of fill	%	single	100	100	100	100	100	100
Net-to-gross	%	triang	12.0	27.2	46.1	64.8	80.0	46.2
Porosity	%	triang	11.5	12.4	14.6	18.1	21.0	12.3
Sw	%	80% dependent on porosity;			limits 20.0 - 50.0; -ve sense			
FVF (1/Bg)	vol/vol	triang	209	211	213	216	218	213
Gas rec fac	%	single	100	100	100	100	100	100

Risk Factors

Play Chance: **100** Prospect Specific Chance: **100**

Reservoir:	100	Trap:	100
Source:	100	Reservoir:	100
Regional Seal:	100	Seal:	100
		Migration:	100

Geological Chance of Success: **100**

Economic Criteria

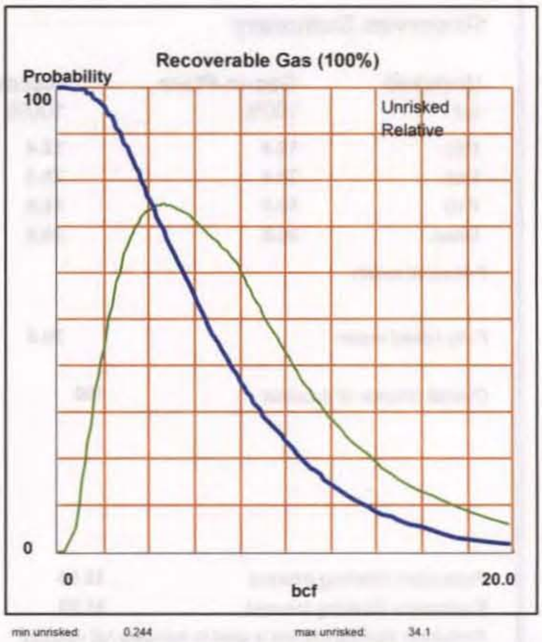
No economic minima applied

Reserves Summary

Unrisked bcf	Gas-in-Place 100%	Recoverable Gas 100%	Net Origin
P90:	**2.73**	**2.73**	**0.957**
P50:	**6.47**	**6.47**	**2.26**
P10:	**13.5**	**13.5**	**4.73**
Mean:	**7.45**	**7.45**	**2.61**
P-level at mean:			41.1
Fully risked mean:		**7.45**	**2.61**

Overall chance of success: **100**

Production Working Interest: **35.00**
Exploration Working Interest: **35.00**
Production Working Interest is used to calculate net volumes



Comments:

5 cm

REP file: n:\bass\yolla\yolla 2000\yolla north\yolla north 2718.pp
version: 4.20

Author: USER
Date: 13/11/01

Prospect/Field Recoverable Gas

LOGICOM

Country:	AUSTRALIA	Name:	YOLLA NORTH
State:	Tasmania	Segment:	2755 SAND
Block:	T/RL1	Classification:	technical

Input Data

Variable	Unit	Shape	min	P90	P50	P10	max	mode
GRV	mmcm	triang	5.40	29.6	60.6	99.3	131	52.2
Deg. of fill	%	single	100	100	100	100	100	100
Net-to-gross	%	triang	25.0	39.7	57.8	70.6	80.0	64.1
Porosity	%	triang	11.5	13.5	16.0	18.8	21.0	15.7
Sw	%	80% dependent on porosity;			limits 15.0 - 40.0; -ve sense			
FVF (1/Bg)	vol/vol	triang	207	209	211	213	215	211
Gas rec fac	%	single	100	100	100	100	100	100

Risk Factors

Play Chance:	100	Prospect Specific Chance:	100
Reservoir:	100	Trap:	100
Source:	100	Reservoir:	100
Regional Seal:	100	Seal:	100
		Migration:	100

Geological Chance of Success: 100

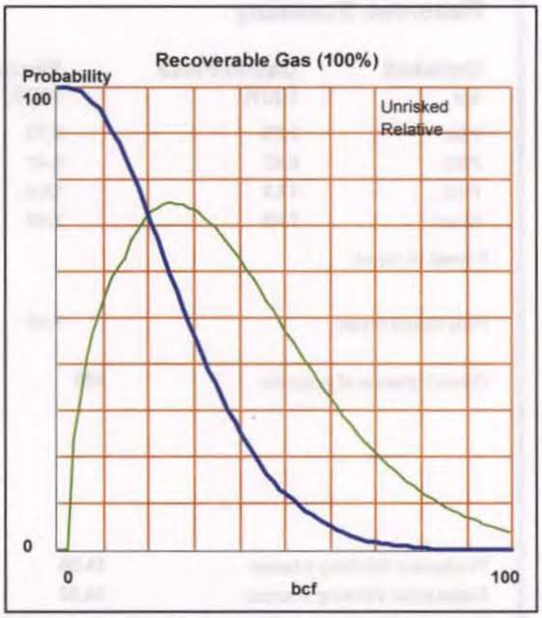
Economic Criteria

No economic minima applied

Reserves Summary

Unrisked bcf	Gas-in-Place 100%	Recoverable Gas 100%	Net Origin
P90:	12.4	12.4	4.34
P50:	28.4	28.4	9.96
P10:	52.6	52.6	18.4
Mean:	30.8	30.8	10.8
P-level at mean:			44.3
Fully risked mean:		30.8	10.8
Overall chance of success:		100	

Production Working Interest: 35.00
Exploration Working Interest: 35.00
Production Working Interest is used to calculate net volumes



min unrisked: 0.681 max unrisked: 140

Comments:

5 cm

REP file:	n:\bass\yolla\yolla 2000\yolla north\yolla north 2755.pp	Author:	USER
version:	4.20	Date:	13/11/01

Prospect/Field Recoverable Gas

LOGICOM

Country:	AUSTRALIA	Name:	YOLLA NORTH
State:	Tasmania	Segment:	2809 SAND
Block:	T/RL1	Classification:	technical

Input Data

Variable	Unit	Shape	min	P90	P50	P10	max	mode
GRV	mmcm	triang	0	3.18	11.0	23.5	33.7	3.00
Deg. of fill	%	single	100	100	100	100	100	100
Net-to-gross	%	triang	20.0	37.6	59.3	72.9	80.0	71.5
Porosity	%	triang	11.5	13.8	16.6	19.6	22.0	16.5
Sw	%	80% dependent on porosity;			limits 15.0 - 50.0; -ve sense			
FVF (1/Bg)	vol/vol	triang	207	209	211	213	215	211
Gas rec fac	%	single	100	100	100	100	100	100

Risk Factors

Play Chance:	100	Prospect Specific Chance:	100
Reservoir:	100	Trap:	100
Source:	100	Reservoir:	100
Regional Seal:	100	Seal:	100
		Migration:	100

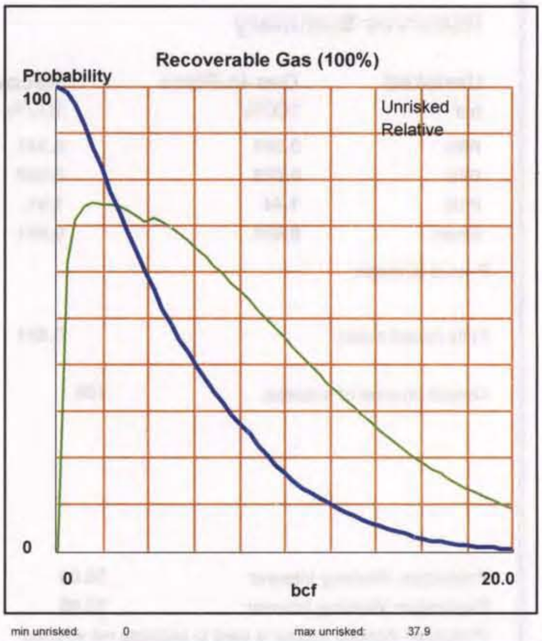
Geological Chance of Success: 100

Economic Criteria

No economic minima applied

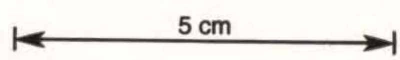
Reserves Summary

Unrisked bcf	Gas-in-Place 100%	Recoverable Gas 100%	Net Origin
P90:	1.30	1.30	0.456
P50:	4.85	4.85	1.70
P10:	12.0	12.0	4.21
Mean:	5.92	5.92	2.07
P-level at mean:			41.4
Fully risked mean:		5.92	2.07
Overall chance of success:	100		



Production Working Interest: 35.00
Exploration Working Interest: 35.00
Production Working Interest is used to calculate net volumes

Comments:



REP file:	n:\bass\yolla\yolla 2000\yolla north\yolla north 2809.pp	Author:	USER
version:	4.20	Date:	13/11/01

4.20

Prospect/Field Recoverable Gas

LOGICOM

Country:	**AUSTRALIA**	Name:	**YOLLA NORTH**
State:	**Tasmania**	Segment:	**2952 SAND**
Block:	**T/RL1**	Classification:	**technical**

Input Data

Variable	Unit	Shape	min	P90	P50	P10	max	mode
GRV	mmcm	triang	0	1.30	2.92	4.11	5.00	3.40
Deg. of fill	%	single	100	100	100	100	100	100
Net-to-gross	%	triang	20.0	31.7	46.1	59.3	70.0	47.2
Porosity	%	triang	11.5	12.2	13.1	14.2	15.0	13.0
Sw	%	80% dependent on porosity;			limits 15.0 - 45.0; -ve sense			
FVF (1/Bg)	vol/vol	triang	210	212	215	217	219	215
Gas rec fac	%	single	100	100	100	100	100	100

Risk Factors

Play Chance:	**100**	Prospect Specific Chance:	**100**
Reservoir:	100	Trap:	100
Source:	100	Reservoir:	100
Regional Seal:	100	Seal:	100
		Migration:	100

Geological Chance of Success: **100**

Economic Criteria

No economic minima applied

Reserves Summary

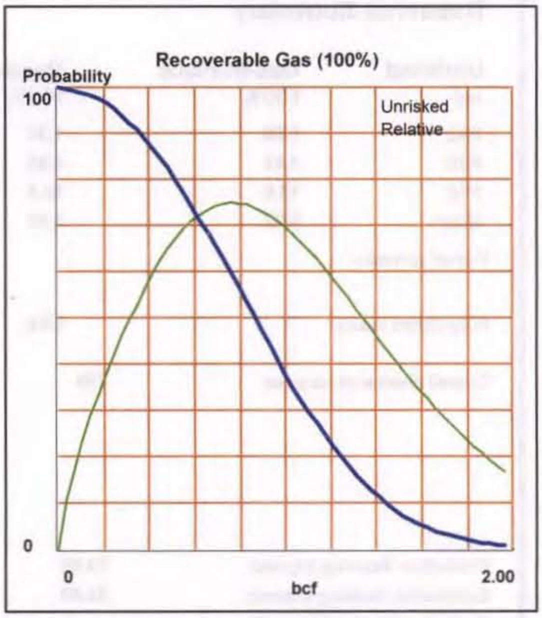
Unrisked bcf	**Gas-in-Place** 100%	**Recoverable Gas** 100%	Net Origin
P90:	**0.361**	**0.361**	**0.126**
P50:	**0.868**	**0.868**	**0.304**
P10:	**1.44**	**1.44**	**0.505**
Mean:	**0.891**	**0.891**	**0.312**
P-level at mean:			47.8
Fully risked mean:		**0.891**	**0.312**

Overall chance of success: **100**

Production Working Interest: **35.00**

Exploration Working Interest: **35.00**

Production Working Interest is used to calculate net volumes



min unrisked: 0 max unrisked: 3.42

Comments:

5 cm

REP file: n:\bass\yolla\yolla 2000\yolla north\yolla north 2952.pp
version: 4.20

Author: USER
Date: 13/11/01

640043

Prospect/Field Recoverable Gas

LOGICOM

Country:	AUSTRALIA	Name:	YOLLA NORTH
State:	Tasmania	Segment:	2973 SAND
Block:	T/RL1	Classification:	technical

Input Data

Variable	Unit	Shape	min	P90	P50	P10	max	mode
GRV	mmcm	triang	0	3.20	12.9	28.4	40.9	2.50
Deg. of fill	%	single	100	100	100	100	100	100
Net-to-gross	%	triang	35.0	46.5	60.7	71.6	80.0	64.3
Porosity	%	triang	11.5	12.9	14.7	16.0	17.0	15.3
Sw	%	80% dependent on porosity;			limits 15.0 - 35.0; -ve sense			
FVF (1/Bg)	vol/vol	triang	210	212	215	217	219	215
Gas rec fac	%	single	100	100	100	100	100	100

Risk Factors

Play Chance:	100	Prospect Specific Chance:	100
Reservoir:	100	Trap:	100
Source:	100	Reservoir:	100
Regional Seal:	100	Seal:	100
		Migration:	100

Geological Chance of Success: 100

Economic Criteria

No economic minima applied

Reserves Summary

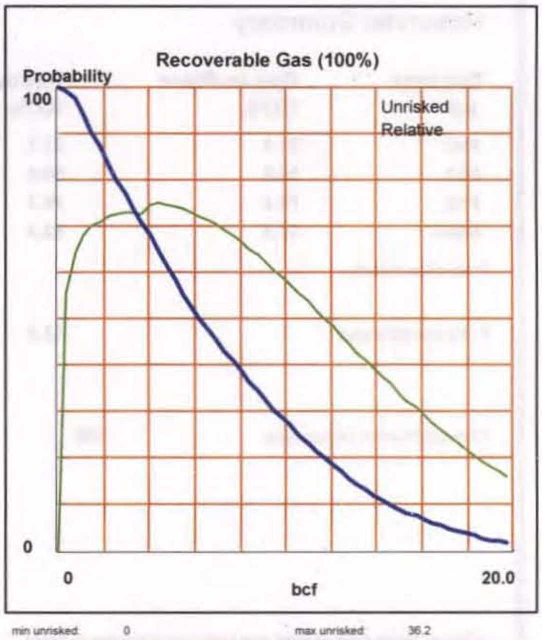
Unrisked bcf	Gas-in-Place 100%	Recoverable Gas 100%	Net Origin
P90:	1.55	1.55	0.542
P50:	6.27	6.27	2.19
P10:	14.6	14.6	5.10
Mean:	7.32	7.32	2.56
P-level at mean:			43.1
Fully risked mean:		7.32	2.56

Overall chance of success: 100

Production Working Interest: 35.00

Exploration Working Interest: 35.00

Production Working Interest is used to calculate net volumes



Comments:

5 cm

REP file: n:\bass\yolla\yolla 2000\yolla north\yolla north 2973.pp
version: 4.20

Author: USER
Date: 13/11/01

640044

General Consolidation - Recoverable Gas

LOGICOM

Country:
State:
Block:

Name: YOLLA NORTH BLOC
Segment:
Classification: **technical**

Input Data

Net Recoverable Gas

Entry	Shape	min	P90	P50	P10	max	mean	net %	chance
..h\yolla north 2718.ppr	poly	0.0856	0.957	2.26	4.73	18.2	2.60	35.0	100
..h\yolla north 2755.ppr	poly	0.732	4.34	9.96	18.4	49.6	10.8	35.0	100
..h\yolla north 2809.ppr	poly	0	0.456	1.70	4.21	13.4	2.07	35.0	100
..h\yolla north 2952.ppr	poly	0	0.126	0.304	0.505	1.21	0.311	35.0	100
..h\yolla north 2973.ppr	poly	0	0.542	2.19	5.10	12.8	2.56	35.0	100

Common Risk Elements

No common risk elements applied

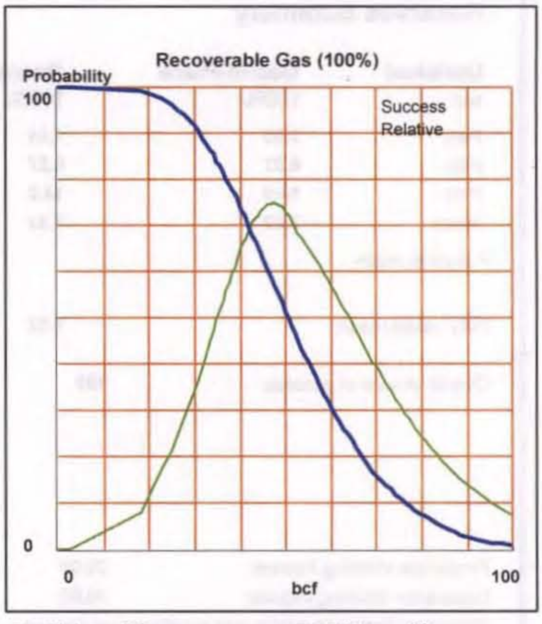
Economic Criteria

No economic minima applied to results

Reserves Summary

Success bcf	Gas-in-Place 100%	Recoverable Gas 100%	Net Origin
P90:	**31.1**	**31.1**	**10.9**
P50:	**50.6**	**50.6**	**17.7**
P10:	**76.4**	**76.3**	**26.7**
Mean:	**52.5**	**52.4**	**18.4**
P-level at mean:			45.9
Fully risked mean:		**52.4**	**18.4**

Overall chance of success: **100**



min unrisked: 2.34 max unrisked: 130

In the success case at least one technical discovery is made

Comments:

5 cm

REP file: **n:\bass\yolla\yolla 2000\yolla north\yolla north consolidation.p**
version: **4.20**

Author: **USER**
Date: **13/11/01**

General Consolidation - Recoverable Gas

LOGICOM

Country:		Name:	YOLLA MAIN BLOCK
State:		Segment:	
Block:		Classification:	technical

Input Data

Net Recoverable Gas

Entry	Shape	min	P90	P50	P10	max	mean	net %	chance
..s\yolla main 2718 .ppr	poly	0.362	3.74	8.09	15.1	51.7	8.85	35.0	100
..ts\yolla main 2755.ppı	poly	7.55	29.6	48.8	72.7	172	50.2	35.0	100
..ts\yolla main 2952.ppr	poly	0.194	1.02	2.00	3.19	8.25	2.06	35.0	100
..ts\yolla main 2973.ppr	poly	4.83	16.4	26.2	39.1	88.2	27.1	35.0	100
..ts\yolla main 2809.ppr	poly	2.15	11.1	21.2	35.3	95.8	22.3	35.0	100
..h\yolla north 2718.ppr	poly	0.0513	0.668	1.58	3.30	14.2	1.81	35.0	100
..h\yolla north 2755.ppı	poly	0.500	3.01	6.95	12.8	38.7	7.50	35.0	100
..h\yolla north 2809.ppr	poly	0	0.319	1.18	2.93	10.5	1.44	35.0	100
..h\yolla north 2952.ppr	poly	0	0.0873	0.212	0.353	0.942	0.217	35.0	100
..h\yolla north 2973.ppr	poly	0	0.375	1.52	3.57	9.98	1.78	35.0	100

Common Risk Elements

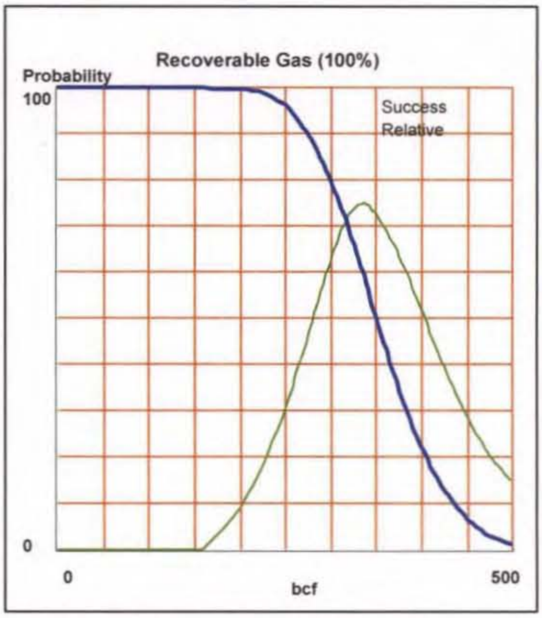
No common risk elements applied

Economic Criteria

No economic minima applied to results

Reserves Summary

Success bcf	Gas-in-Place 100%	Recoverable Gas 100%	Recoverable Gas Net Origin
P90:	**393**	**274**	**96.0**
P50:	**500**	**350**	**122**
P10:	**621**	**436**	**152**
Mean:	**504**	**353**	**124**
P-level at mean:			47.8
Fully risked mean:		**353**	**124**
Overall chance of success:		**100**	



min unrisked: 44.7 max unrisked: 690

In the success case at least one technical discovery is made

Comments:

5 cm

REP file:	n:\bass\yolla\yolla 2000\yolla total consolidation.pco	Author:	USER
version:	4.20	Date:	13/11/01