

OR. 450

BASS BASIN GAS PROJECT 1998 REVIEW & FORWARD PLAN

Confidential presentation to Mineral Resources Tasmania

By

Boral Energy Resources Ltd.

as Operator of

T/RL1, T/18P & T/25P Joint ventures

18 December 1998

Boral Know How.



Agenda

1 Results of 1998 drilling campaign

Angus Guthrie

- Yolla 2
- White Ibis 1
- Implications/forward plan for Yolla

2 Exploration prospectivity - T/18P & T/25P

Richard Suttill

3 T/18P Permit plan

Jenny Bauer

- Key issues
- 1999 work plan
- Proposed permit renewal work program
- Areas proposed for relinquishment

1998 Expenditure by T/RL1 & T/18P joint ventures

	A\$ million
• Drilling of Yolla 2	27.5
• Drilling of White Ibis 1	21.5
• Studies (including G&G, development and marketing studies and IFP project)	0.9
• Permit Administration etc	0.3
	Total A\$ 50.2 Million

Significant changes in equity have occurred in the past 18 months

- **Premier Oil farmin September 1997 (T/RL1, T/18P, and T/25P).**
- **Santos farmout from T/RL1 and withdrawal from T/18P December 1998.**
- **CalEnergy farmin April/July 1998 (T/RL1, T/18P, and T/25P).**
- **Details are provided in the following slide.**

Significant changes in equity have occurred in the past 18 months

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T/RL1 Equity Participation				
	Aug. '97	Sept. '97	Dec. '97	Apr. '98
Boral Energy Resources Ltd	53.8615%	24.43075%	35.5%	25.5%
Boral Energy Northwest Ltd	5.0%	5.0%	5.0%	5.0%
Premier Oil (Australia) Ltd	-	29.43075%	40.5%	30.5%
CalEnergy Gas (UK) Ltd	-	-	-	20.0%
Galveston Mining Corp.	14.0%	14.0%	14.0%	14.0%
Santos Ltd	27.1385%	27.1385%	5.0%	5.0%
	100.0%	100.0%	100.0%	100.0%

T/18P Equity Participation				
	Aug. '97	Sept. '97	Dec. '97	Apr. '98
Boral Energy Resources Ltd	85.0%	49.0%	57.6%	41.4%
Premier Oil (Australia) Ltd		36.0%	42.4%	35.1%
CalEnergy Gas (UK) Ltd		-	-	23.5%
Santos Ltd	15.0%	15.0%	-	-
	100.0%	100.0%	100.0%	100.0%

T/25P Equity Participation				
	Aug. '97	Sept. '97	Dec. '97	Apr. '98
Boral Energy Resources Ltd	100.0%	64.0%	64.0%	44.0%
Premier Oil (Australia) Ltd	-	36.0%	36.0%	36.0%
CalEnergy Gas (UK) Ltd	-	-	-	20.0%
	100.0%	100.0%	100.0%	100.0%

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Drilling Operations

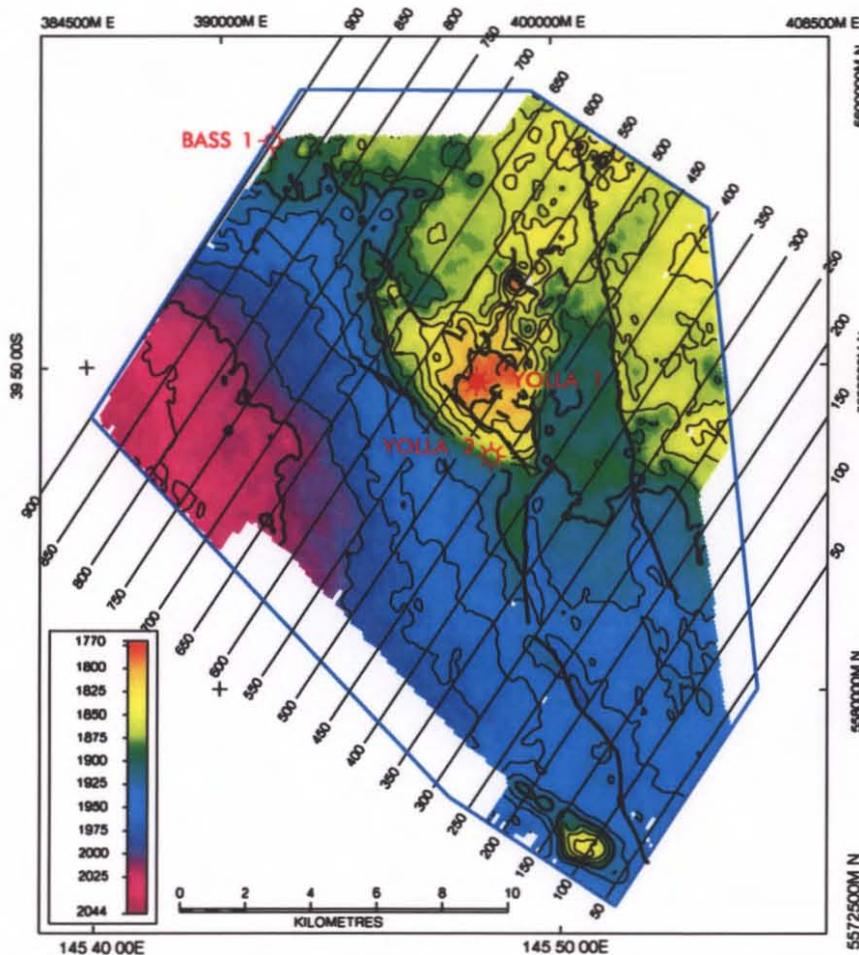
- **Northern Explorer III drillship successfully used to drill Yolla 2 and White Ibis 1**
- **No LTI's were recorded during the drilling of Yolla 2.**
- **One LTI occurred during the drilling of White Ibis.**
- **No environmental incidents occurred during the drilling operations.**
- **Both wells took considerably longer to drill than expected and were significantly over budget.**
 - Yolla 2 pre-drill estimate 35 days, actual 57 days
 - White Ibis 1 pre-drill estimate 20 days, actual 35 days

Results of 1998 drilling campaign

- **Yolla 2**
 - Spudded 9th April 1998
 - Rig released 30th May 1998
 - Total depth in Palaeocene igneous extrusives 3164m
 - Final estimated cost A\$27.5 million
 - Intra-EVCM (Paleocene to Early Eocene) objectives encountered between 2.5m low to prognosis at the top of reservoir sequence and 29m low to prognosis at base of sequence
 - Overpressure raises gas water contacts reducing gas in place
 - Secondary objective of sedimentary sequence onlapping basal volcanics was absent, reducing upside potential

Top Eastern View Coal Measures depth structure map

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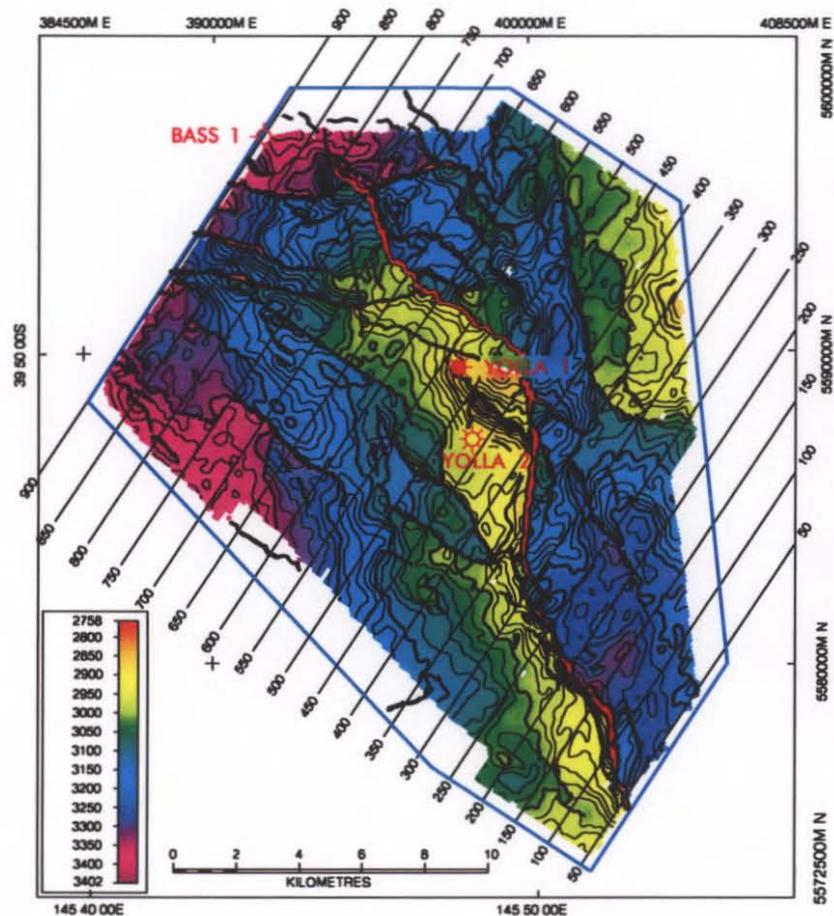


- **Yolla-1 is nearly crestal at the Top Eastern View Coal Measures**
- **Closure at this level is provided by drape over the underlying horst block with minor faulting.**
- **Depth conversion of the structure is impeded by the shallow volcanics to the northeast of Yolla-1. Residual velocity effects can be seen in this area.**

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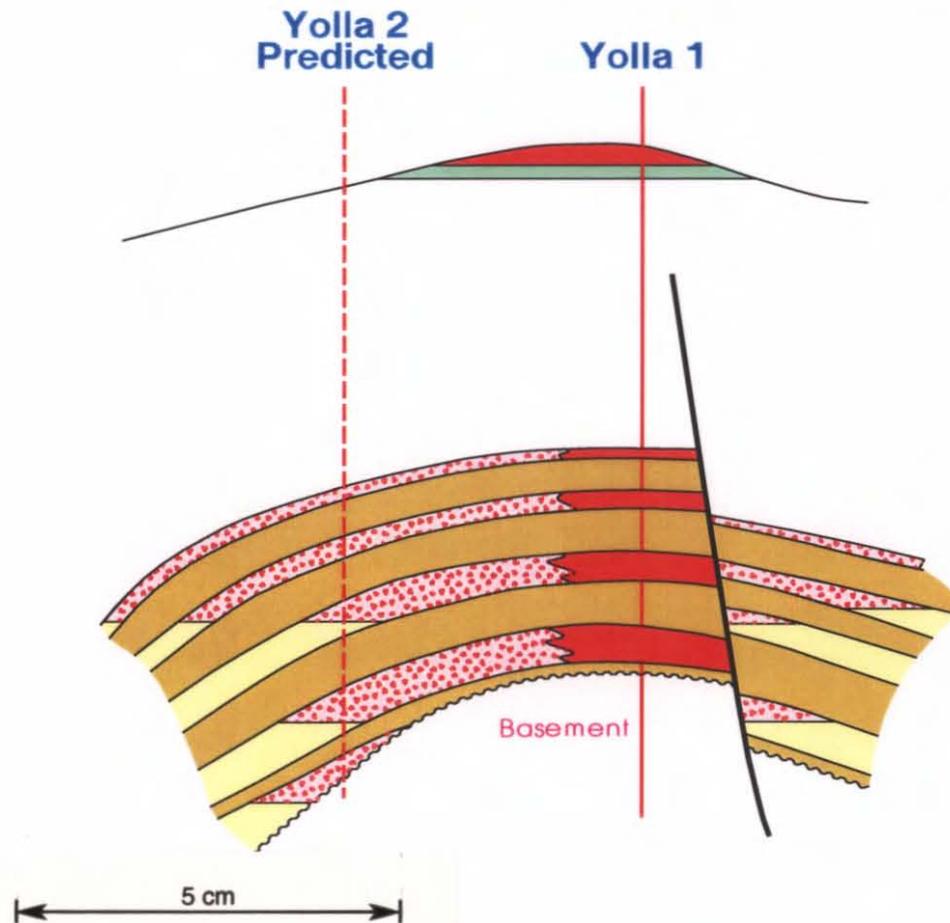
Early Palaeocene - Depth Structure Map

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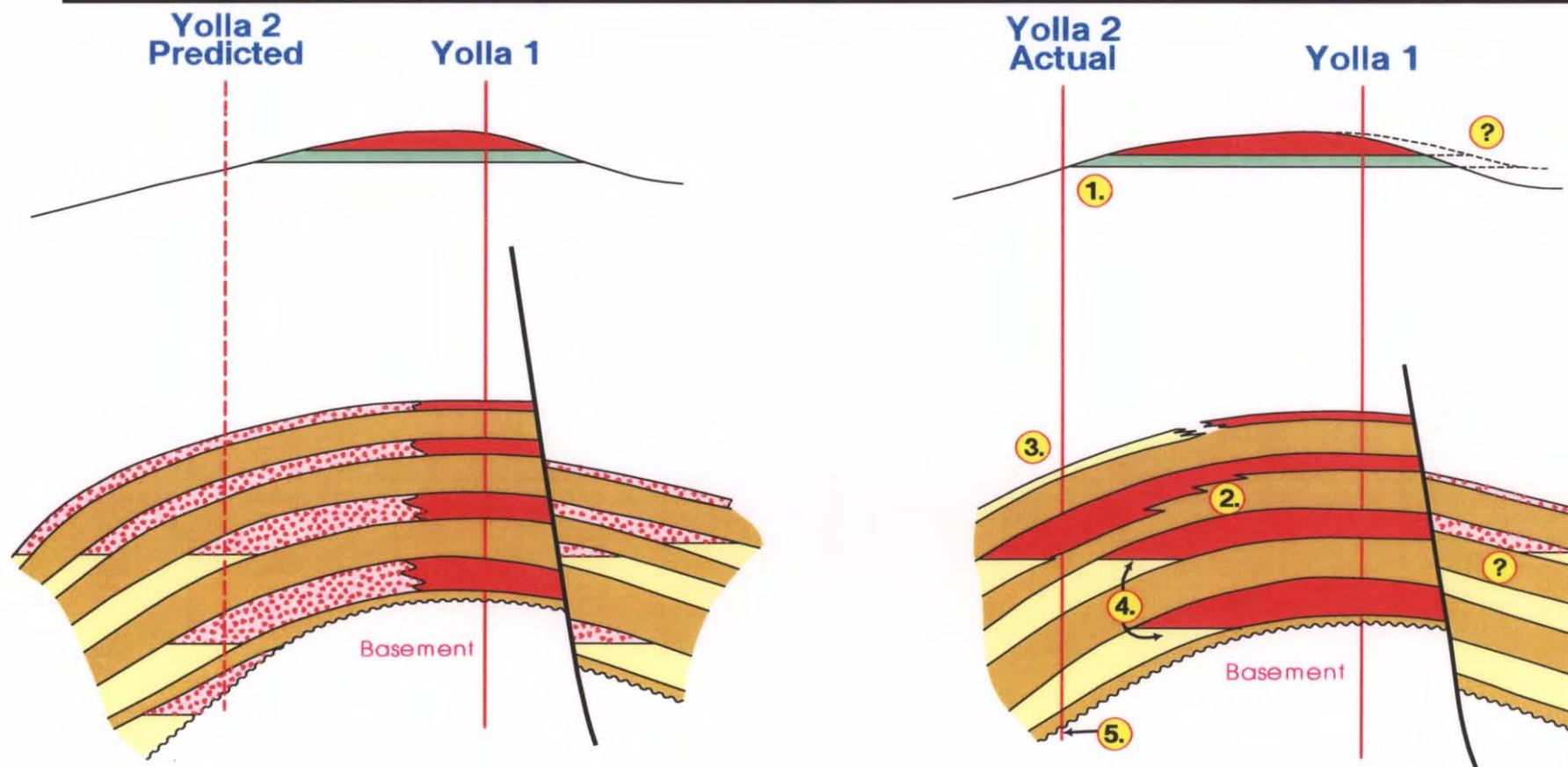
- At the Palaeocene level Yolla is an elongate trap door feature.
- The structure consists of several fault compartments. Each compartment will have to be tested as part of appraisal drilling.
- The shallow volcanics to the northeast have little impact on depth conversion data at this level, but reservoir continuity and hydrocarbon column height are the major uncertainties.

Appraisal of Yolla was required to test the downdip extent of gas discovered in Yolla 1



- **MAIN OBJECTIVES OF YOLLA 2**
- **Test for the quality and continuity of gas-bearing sands downdip of Yolla 1 at the Palaeocene level**
- **Test for sands onlapping basal volcanics**
- **To add Proven Gas in place**
- **To reduce uncertainty on probable and possible gas in place**

Yolla 2 has provided greater certainty on reserves but ruled out some of the highside.



- 1. Top EVCM larger
- 4. Gas Water Contacts higher

- 2. Better Reservoir
- 5. No extra section

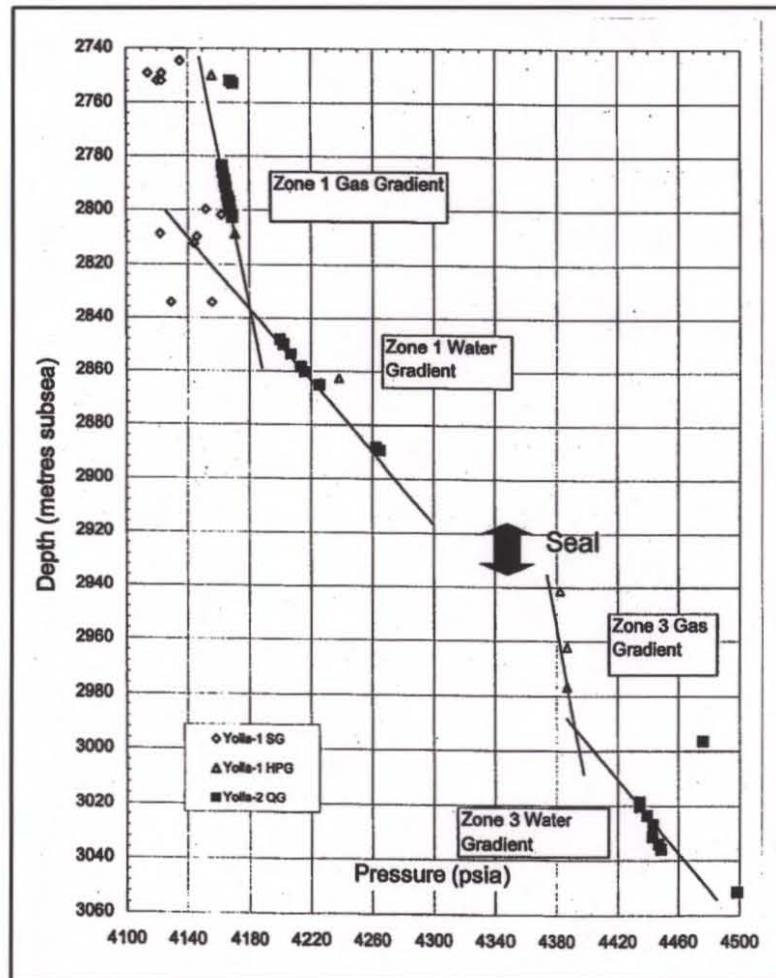
- 3. Some Sands discontinuous
- ? Uncertainty to north

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Yolla - pressure data and fluid contacts

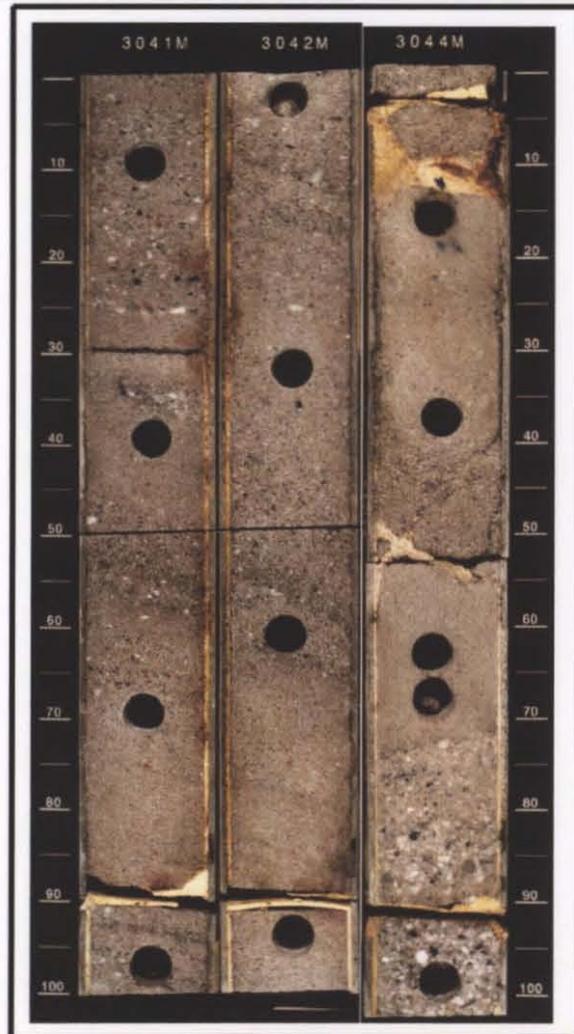


- **MDT pressure data confirm at least three gas gradients**
- **Overpressure resulted in higher gas-water contacts than predicted this resulted in**
 - reduced gas-in-place in Yolla Main fault compartment and other fault compartments if in communication
 - inability to test/sample zone 3 gas composition
 - opportunity to core zone 1, 2809 sand within gas zone was not available therefore water-bearing zone 3 sand cored to obtain reservoir data

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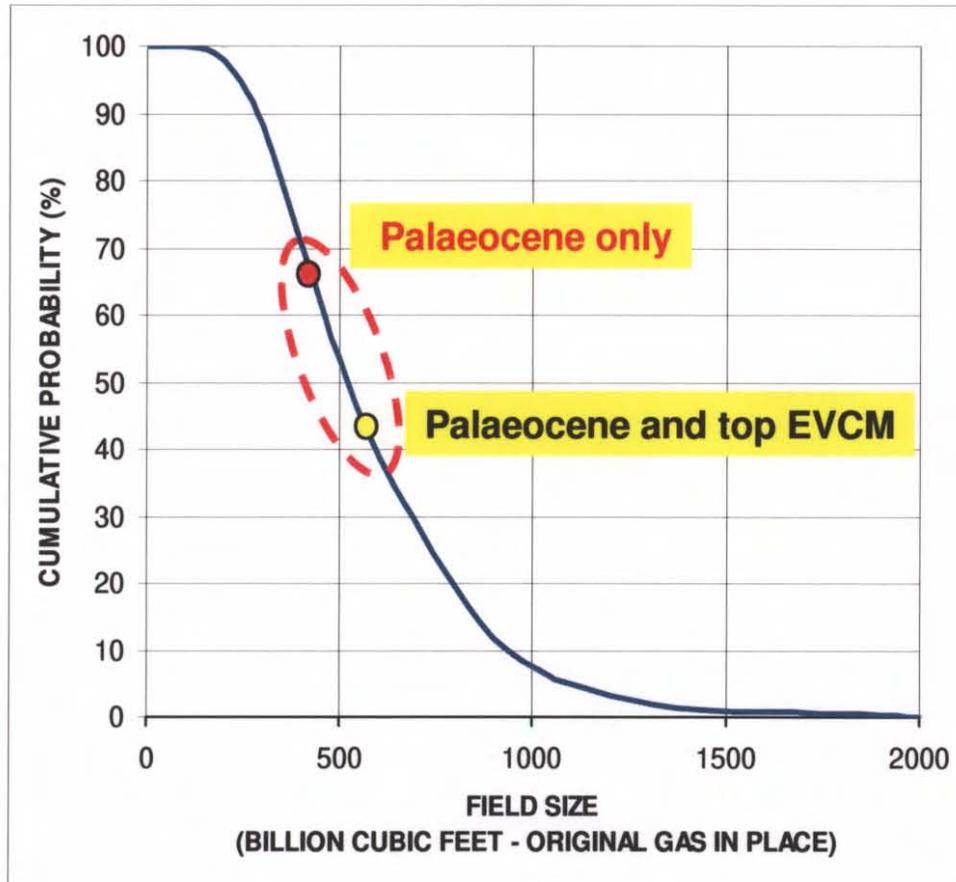
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Yolla 2 Cores from the Palaeocene



- **Excellent reservoir development at Yolla 2**
- **Sandstones medium to coarse gravel. High permeability pebbly intervals with erosional pebbly intervals with erosional bases**
- **Porosity ranges between 8% and 25% (mean 15%)**
- **High net reservoir sand:gross sand thickness**

Aims of appraisal



Prior to drilling Yolla 2 the Joint Venture described the Yolla resource in terms of a probability distribution ranging from:

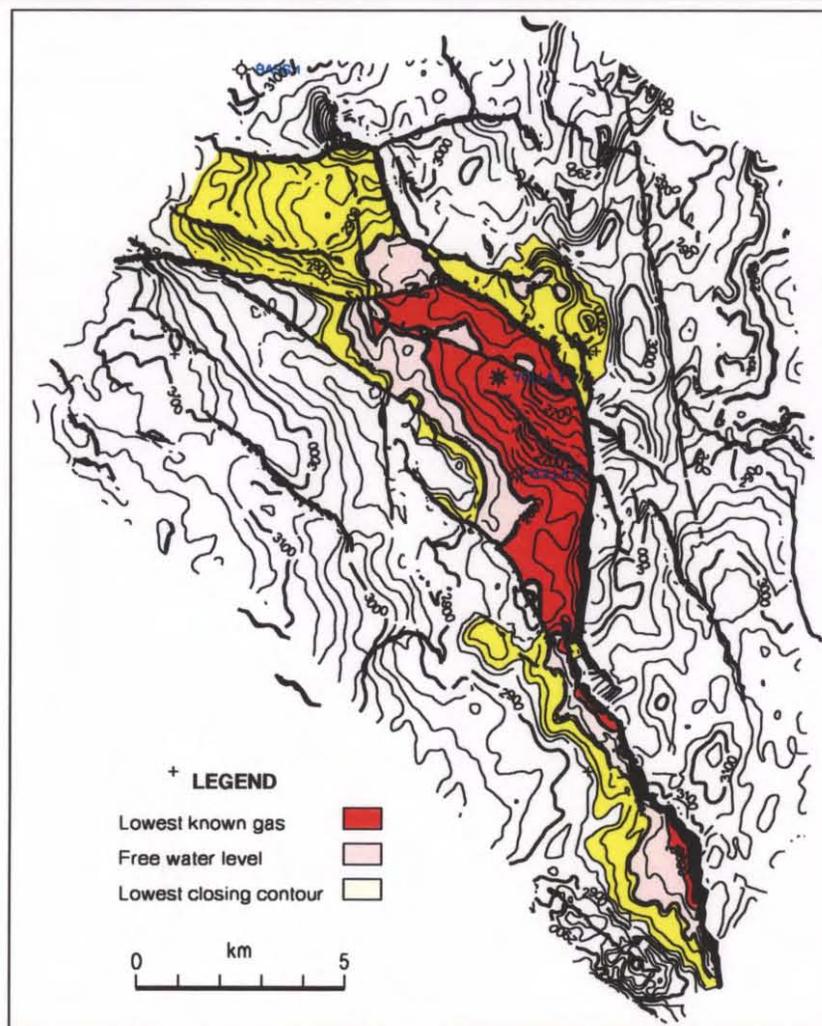
Proven gas in place 100-200 BCF

(High probability)

Total potential 2000 + BCF (very low probability)

The appraisal program has determined a narrower range of resource expectation with mean gas in place of 450 to 600 BCF. We will require at least one further appraisal well to confirm the size and deliverability of the resource.

Yolla gas field Palaeocene depth map - post Yolla 2



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**Gas distribution
for zone 1b**

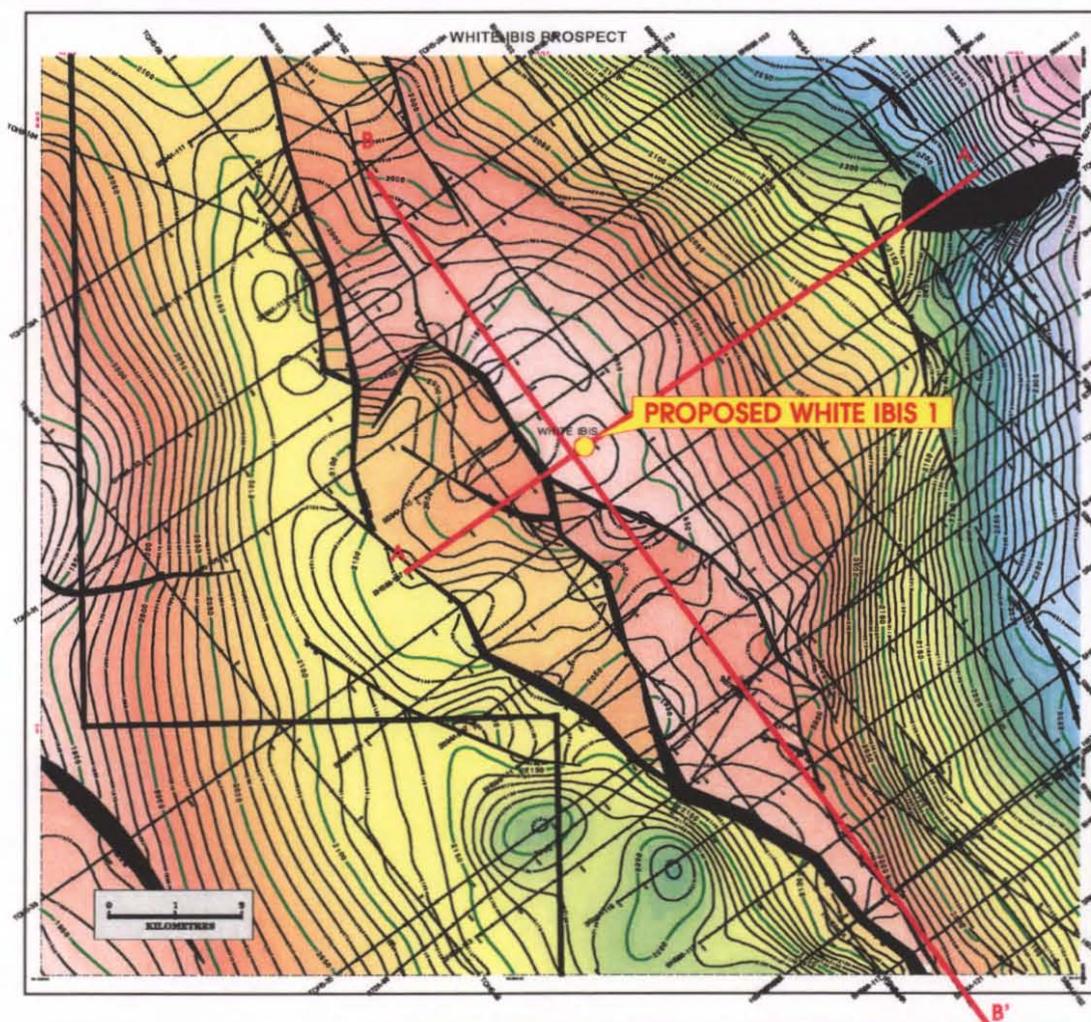
Yolla 2 - major advances in understanding

- **Yolla 2 demonstrated good continuity of reservoir sandstones over a distance of 2.35 kms between Yolla 1 and 2 confirming pre-drill sedimentological model**
- **High quality MDT pressure data has enabled confident prediction of fluid contacts (gas-water) at Yolla 2 enabling more confident calculation of gas in place.**
- **Core data obtained from intra-EVCM reservoirs subjected to routine and special core analysis for calibration of logs.**
- **Advanced logging techniques including CMR and FMS used to assist evaluation process particularly in determination of porosity, permeability and sedimentology.**
- **A poor seismic tie between Yolla 1 and Yolla 2 has spawned several geophysical studies to determine its cause, this will be followed by a phase of remapping.**
- **Fault seal analysis work undertaken prior to Yolla 2 will require re-calibration using new fluid contact data, stratigraphic data and remapping.**

Results of 1998 drilling campaign

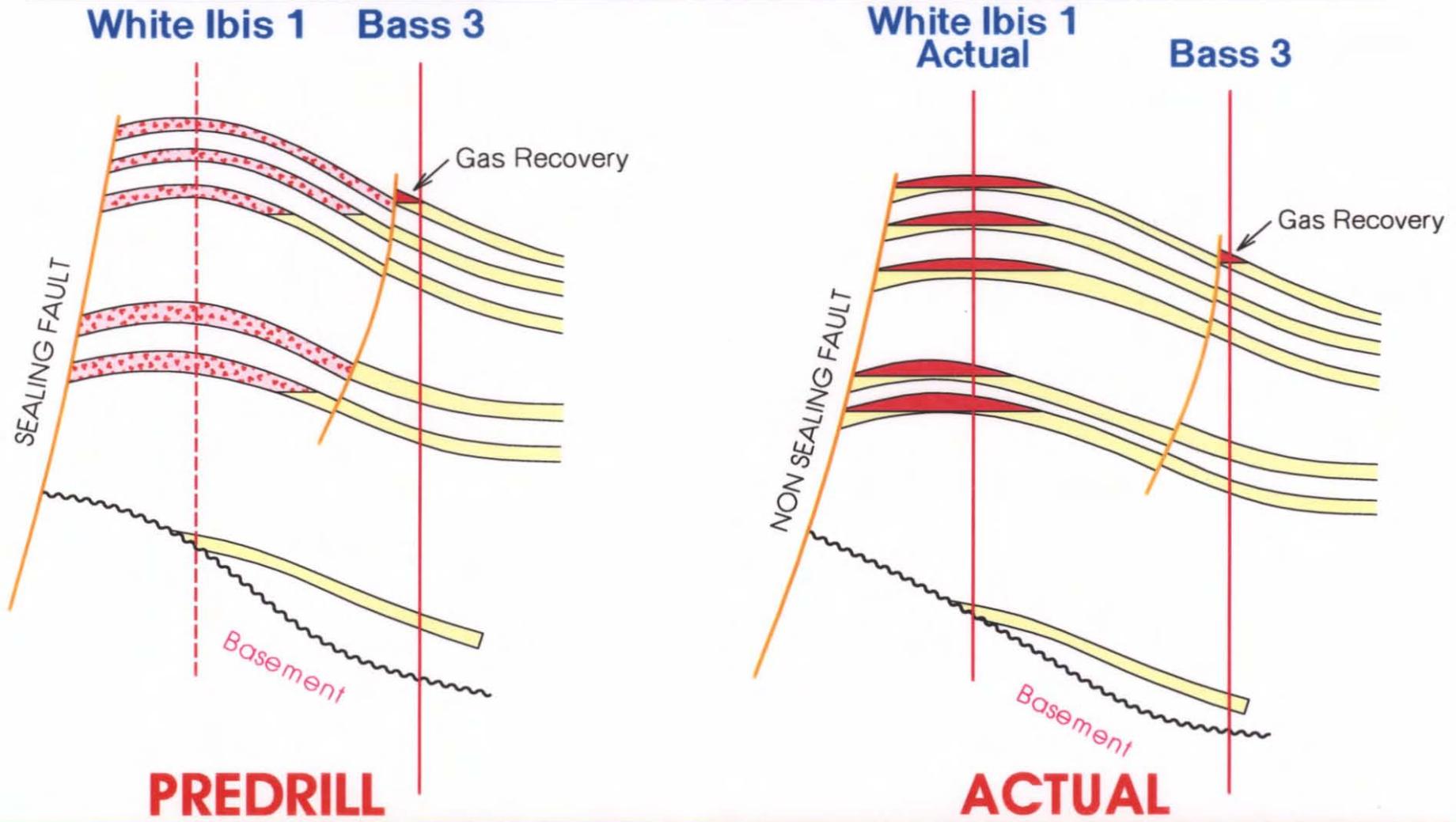
- **White Ibis 1**
 - Spudded 30th May 1998
 - Rig released 3rd July 1998
 - Total depth in economic basement 2220m
 - Final estimated cost A\$21.5 million
 - Predicted gas column in Palaeocene was actually two smaller columns
 - Gas volume in uppermost hydrocarbon column reduced by small oil leg
 - A third small gas column encountered in Late Cretaceous reservoirs which were deposited on basement.
 - Re-calibration of AVO and fault seal studies required

White Ibis - Palaeocene Depth Structure



White Ibis discovered gas but in sub-commercial quantities

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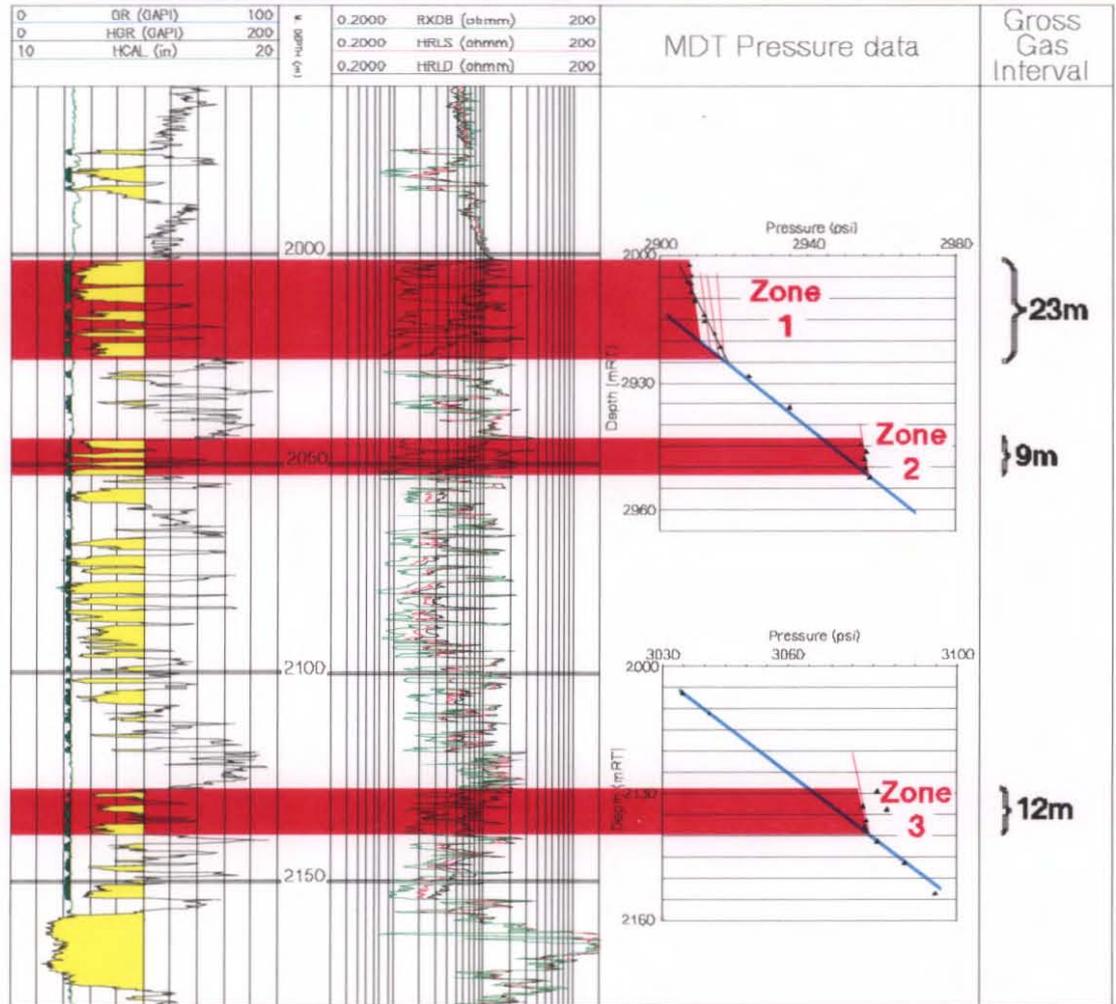


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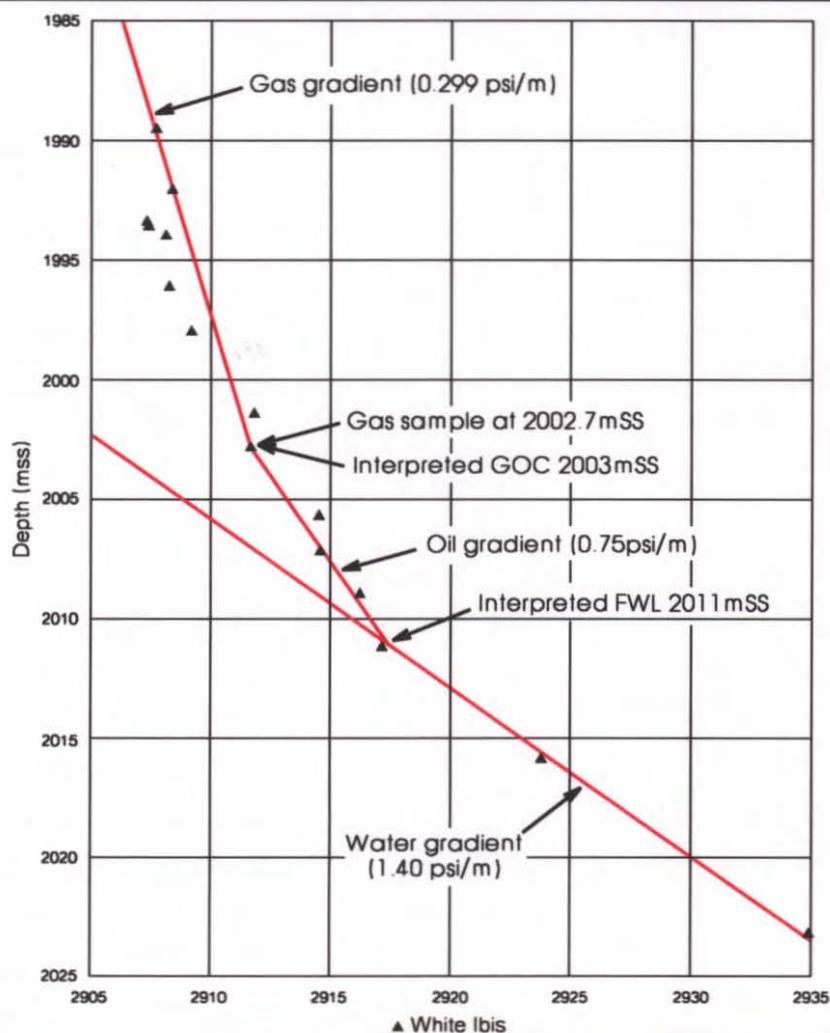


White Ibis - Gas accumulations



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White Ibis - Oil leg analysis (2002m sand)



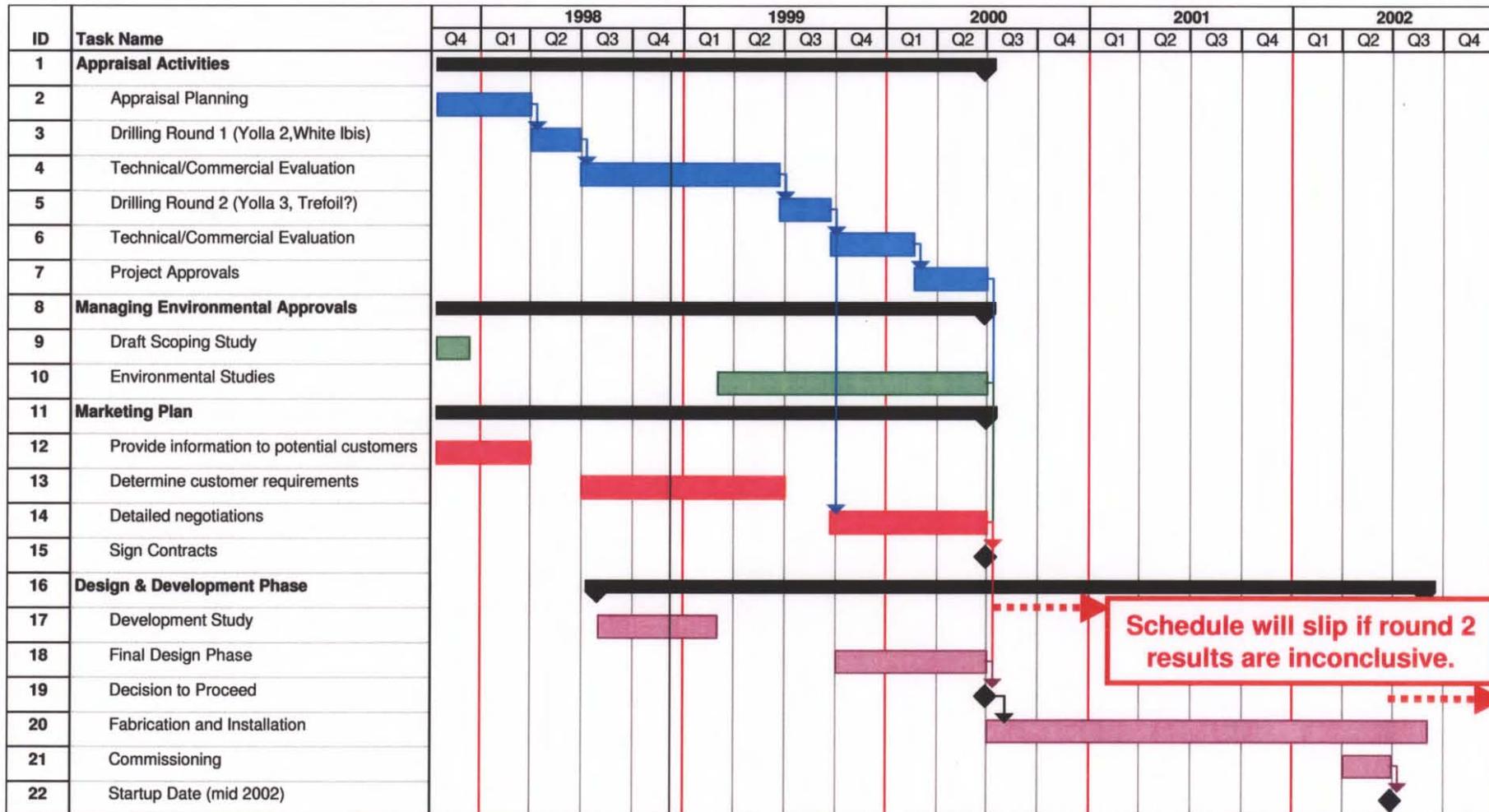
- MDT pressure data show change in pressure verses depth gradient within hydrocarbon column.
- Analysis of MDT gas sample indicate that the gas is near to dew point.
- Mudlog data from the gas chromatograph support the conclusion that the reservoir contains gas in association with oil.

White Ibis - major advances in understanding

- **The northern Bass Basin petroleum system (source, seals, reservoirs) predicted from distribution of shows and gas recoveries from Yolla and T/18P wells was confirmed by results of White Ibis 1.**
- **The use of amplitude and amplitude verses offset (AVO) mapping was successful in predicting the presence of gas bearing reservoirs.**
- **An oil leg is observed at the base of the uppermost gas column (discussed previously).**
- **Fault seal analysis work undertaken prior to drilling will require recalibration following the reduced height of gas columns at both White Ibis and Yolla.**
- **Results provide some encouragement but after spending over A\$20 million on our best prospect we do not have a commercial discovery. Remaining prospects are struggling to make the grade.**

Project Schedule: Target date for first gas mid 2002, but schedule may slip.

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The Joint Venture has undertaken a major (\$0.3 million) study of development options post Yolla 2

- **Study aims include**
 - Update development costs from previous studies
 - Model deliverability of Palaeocene and Top EVCM reservoirs
 - Examine the potential for separate development of the top EVCM oil accumulation.
 - Examine whether new technology can provide a cost breakthrough to lower development costs.
- **Study coordinated by Premier Oil using both local and international alliance partners. Input from Premier and BERL.**
- **Results due in January. Preliminary indications are not encouraging.**

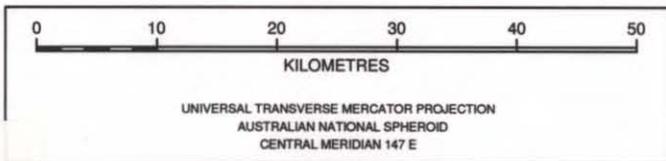
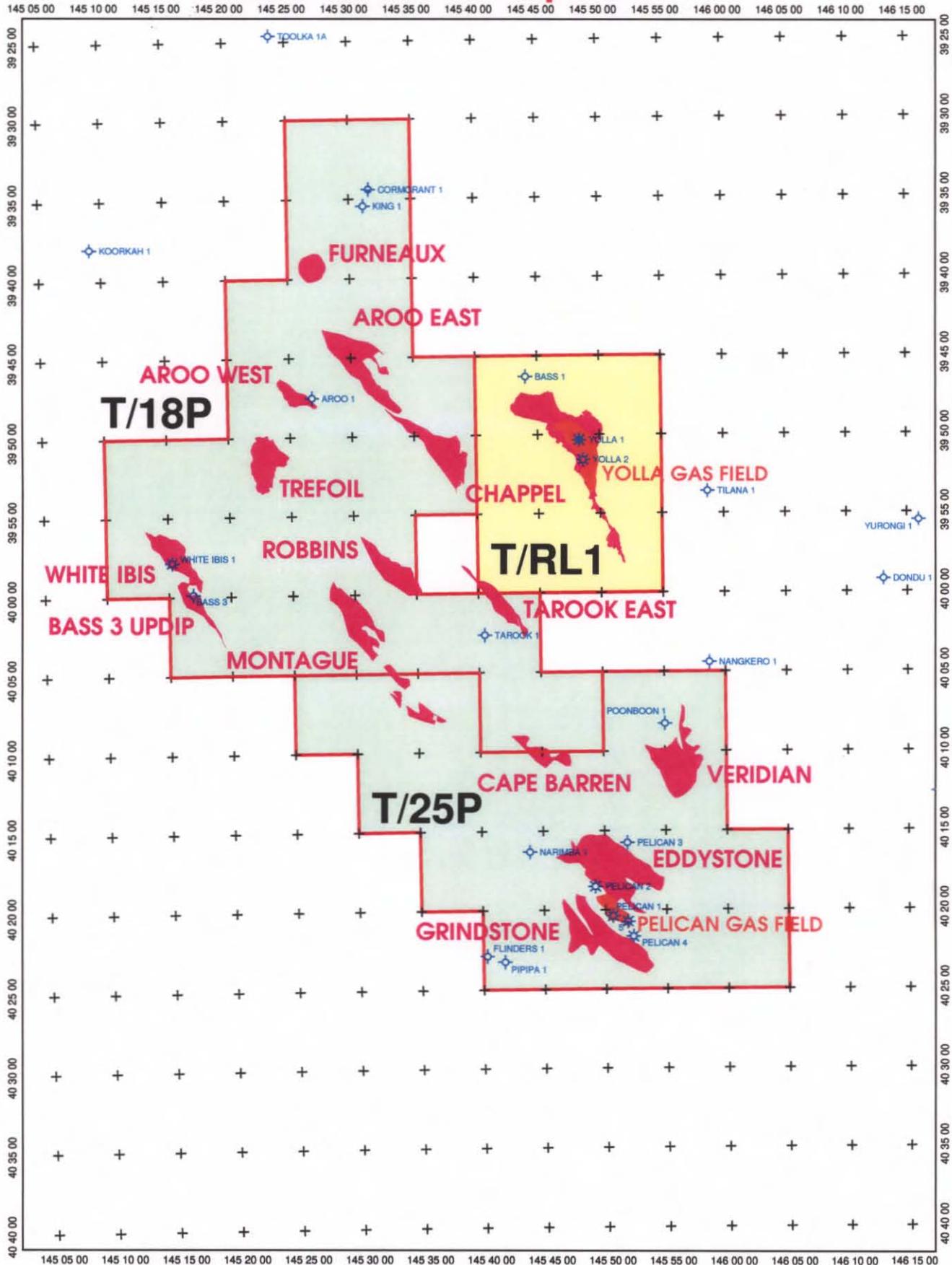
Marketing studies

- **Strategy has been to establish fundamental market requirements and prepare groundwork for contract negotiations post phase 2 drilling.**
- **Tasmania: Discussions progressed with**
 - Duke Energy
 - ABM
 - Amcor
 - Golden Triangle
 - Comalco
 - Goliath
 - Crest have refused to return our calls. Duke Energy has been unable to provide us with anything but the most cursory detail of potential requirements.
- **Contribution made to WTRMP**
- **Victoria: Discussions with Kinetik Energy, Ikon, Energy 21, Energy Projects Division, VENCORP, and Transmission Pipelines Australia. Study commissioned on transmission network analysis.**

Exploration prospectivity - T/18P and T/25P

- **Talk outline**
 - T/18P prospects
 - T/25P prospects
 - Key risks
 - Seismic attribute studies
 - Fault plane analysis
 - IFP study

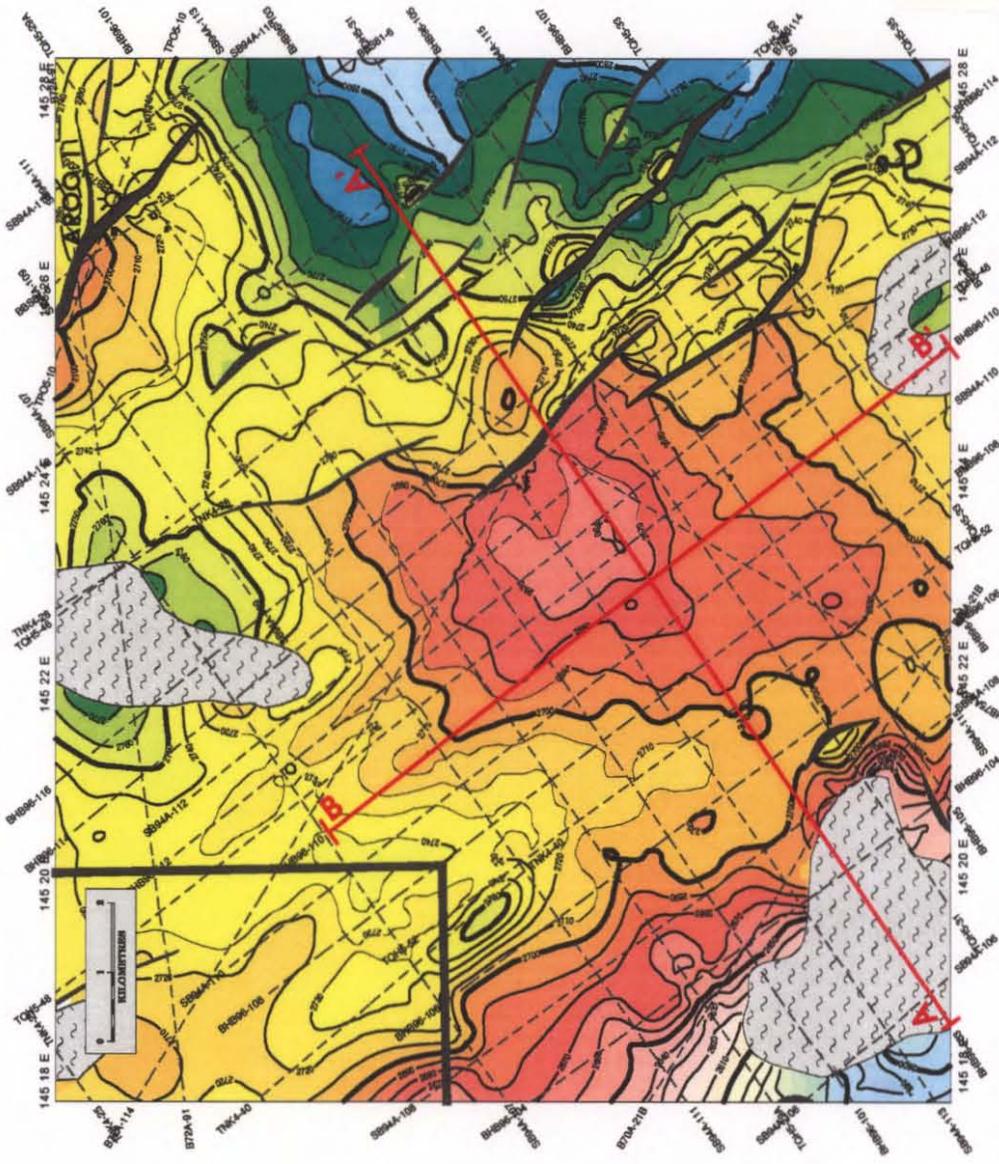
T/25P & T/18P, Bass Basin, Tasmania Leads and Prospects



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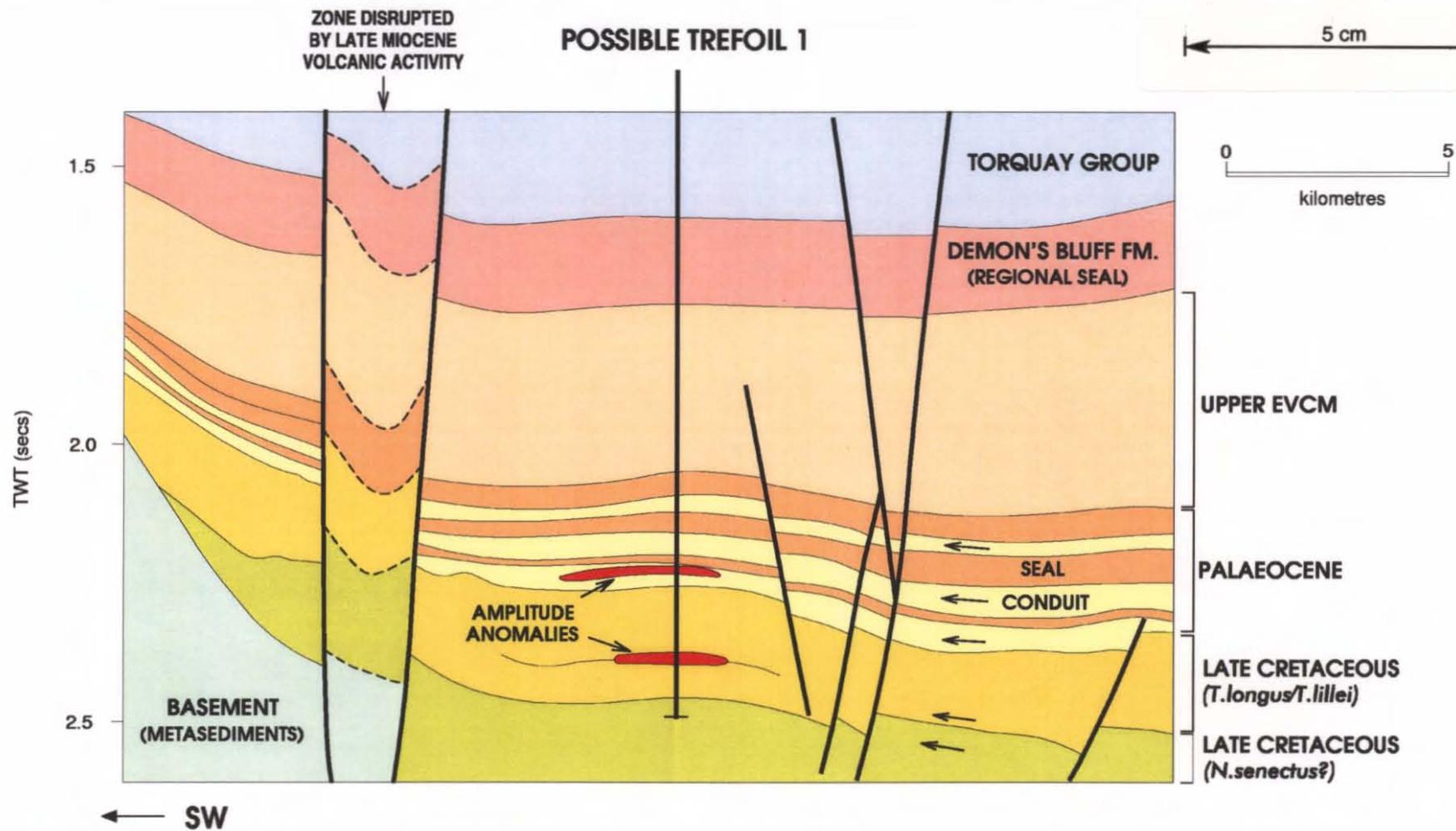
Trefoil - Palaeocene depth structure



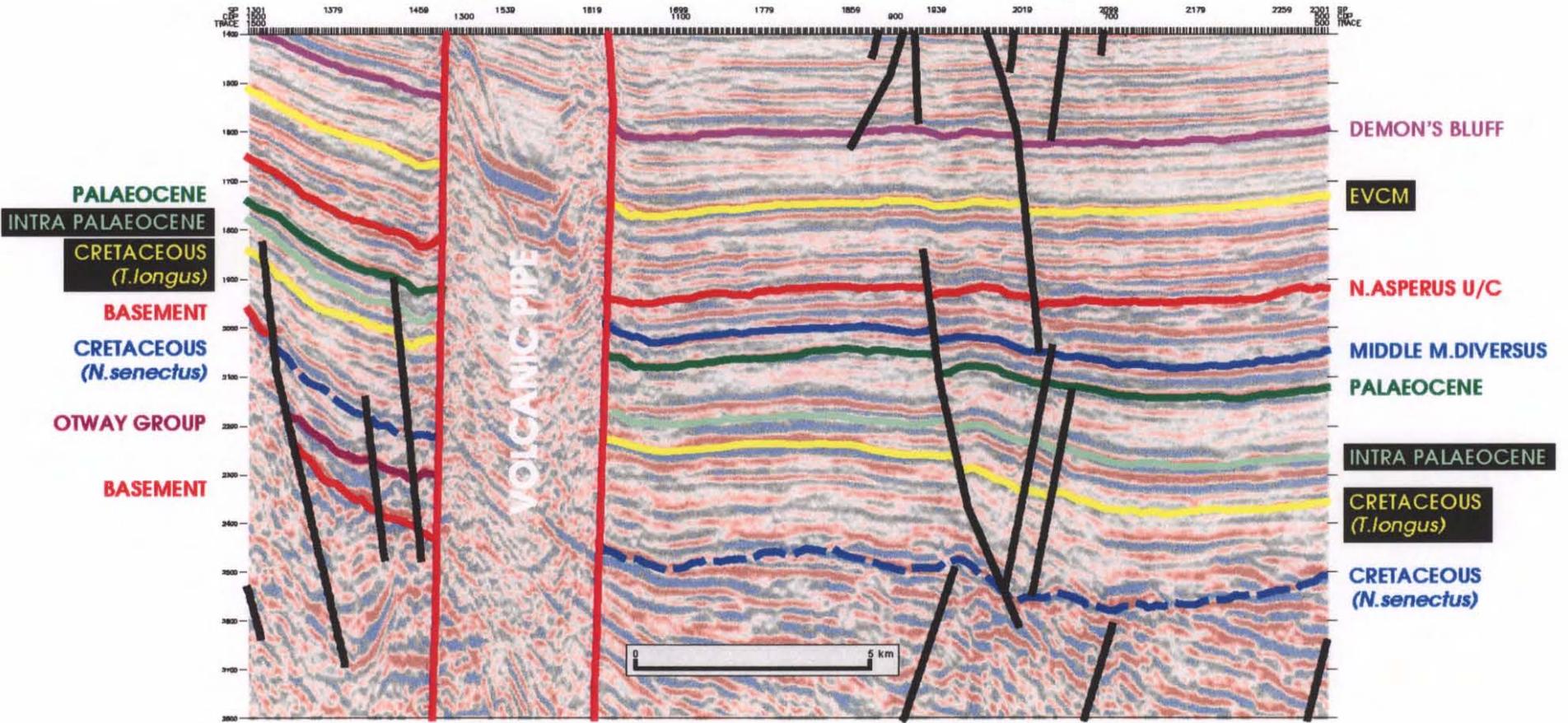
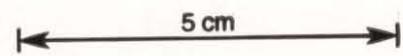
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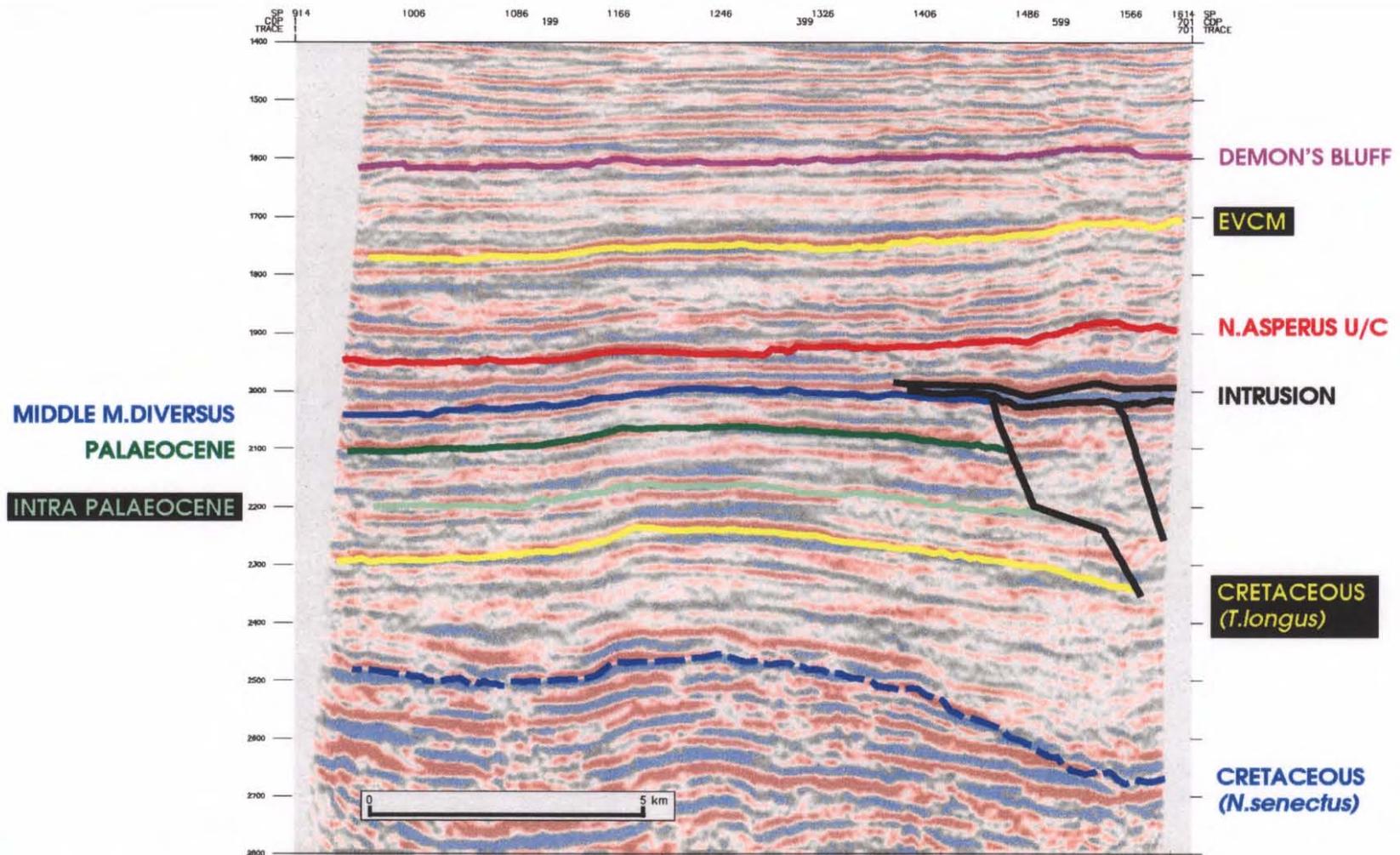
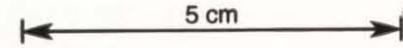
Trefoil play concept



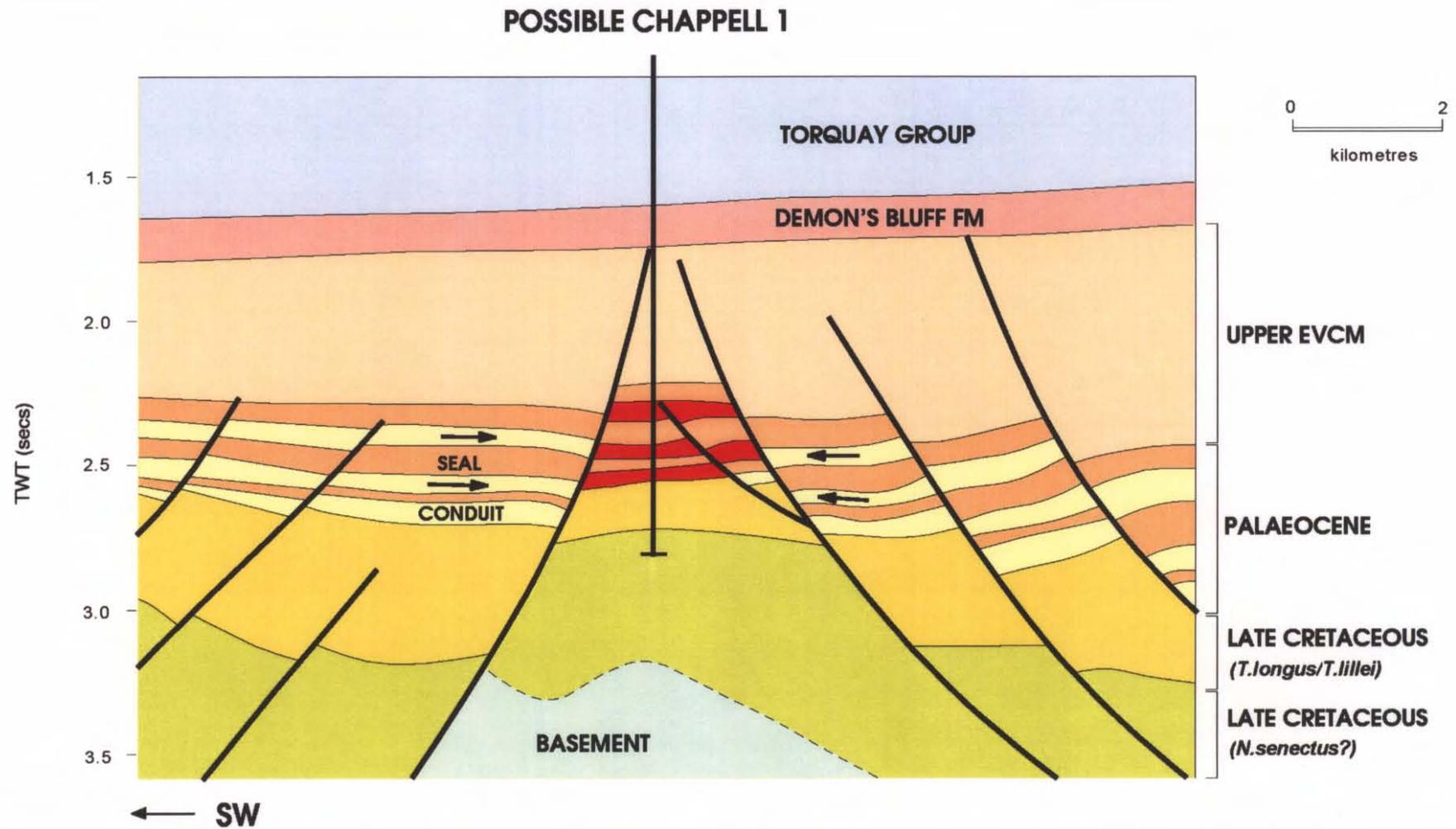
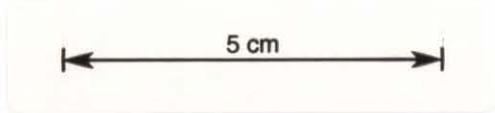
Trefoil dip line BHB96-103

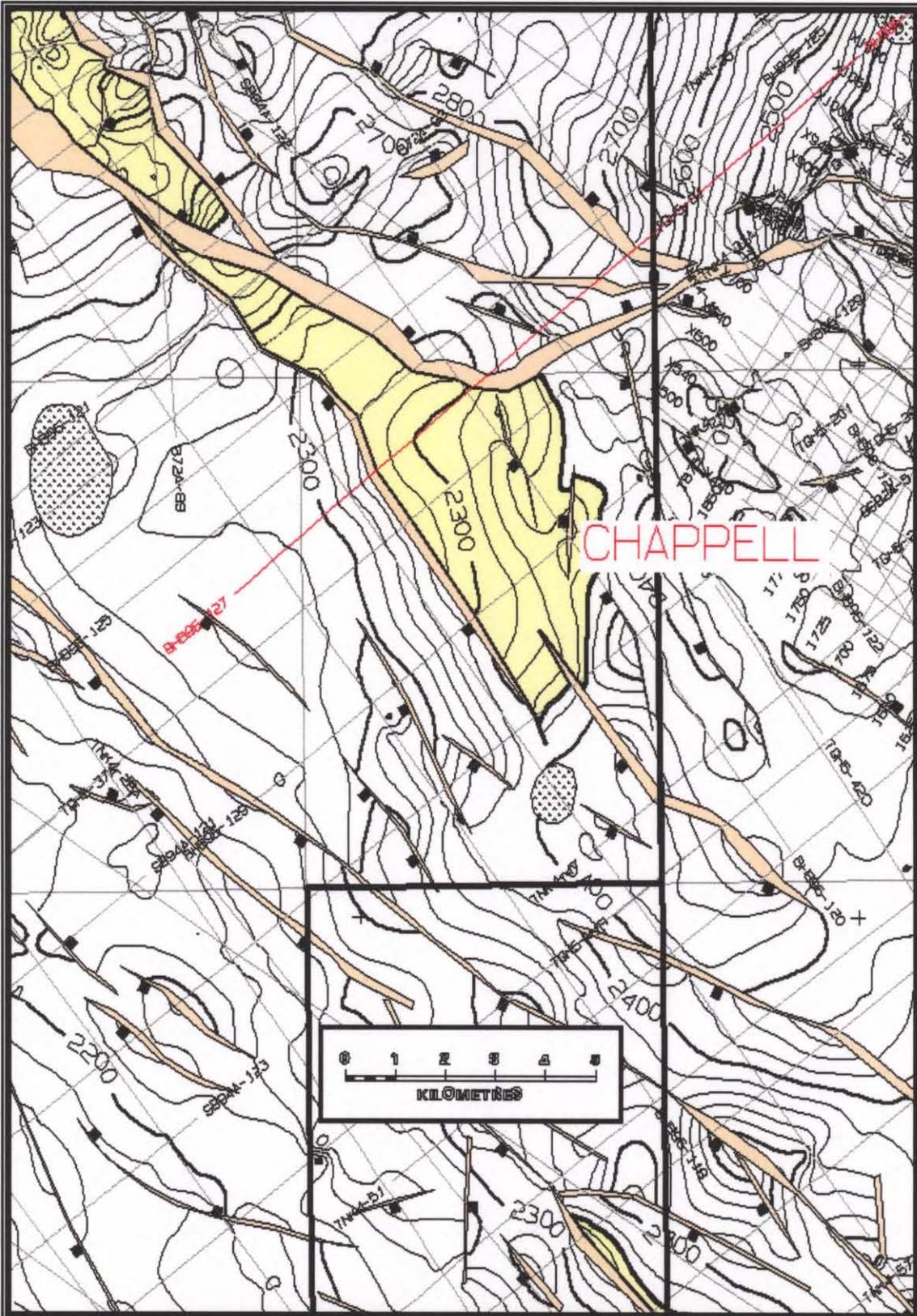


Trefoil strike line BHB96-110

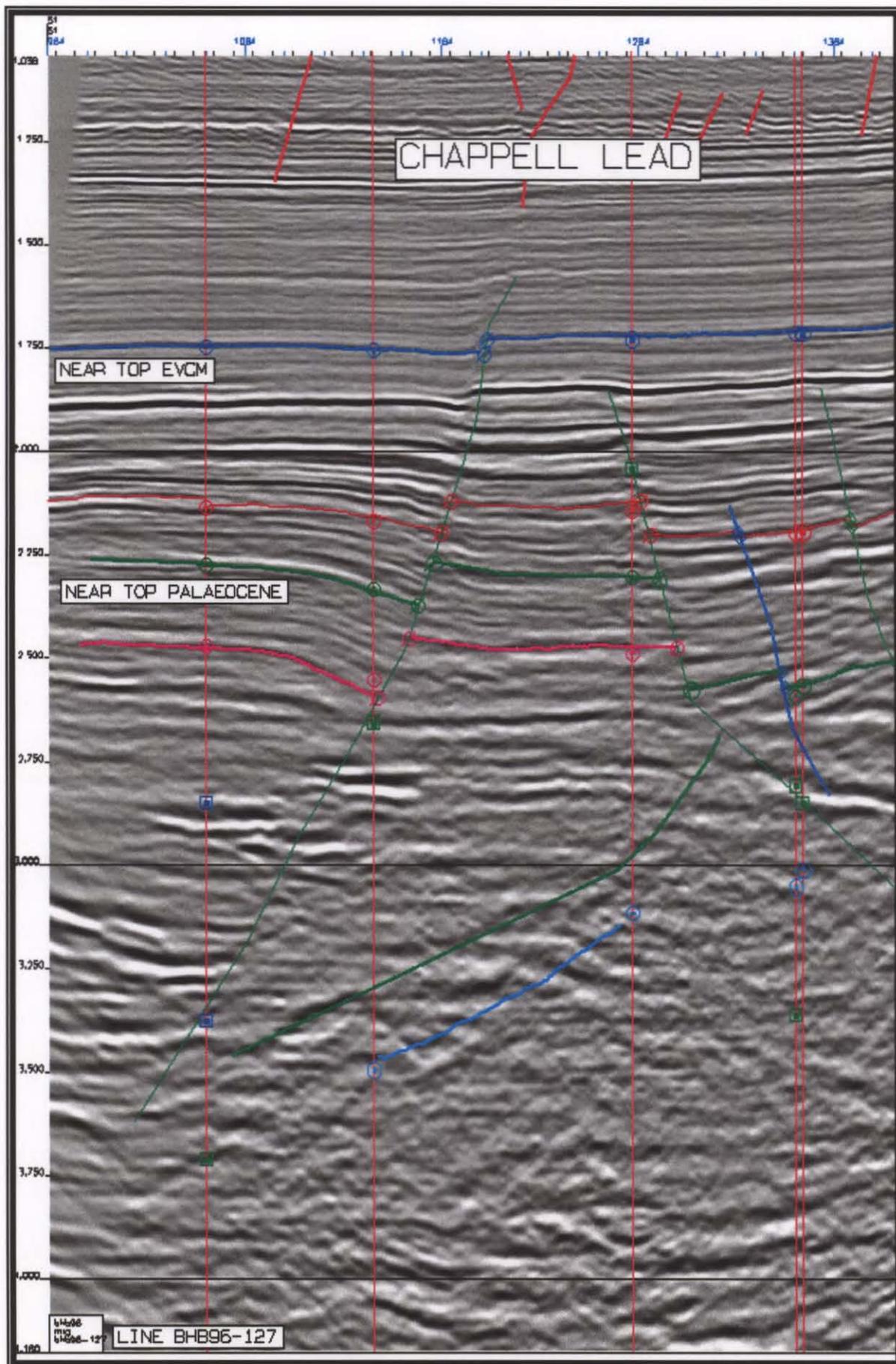


Chappell play concept

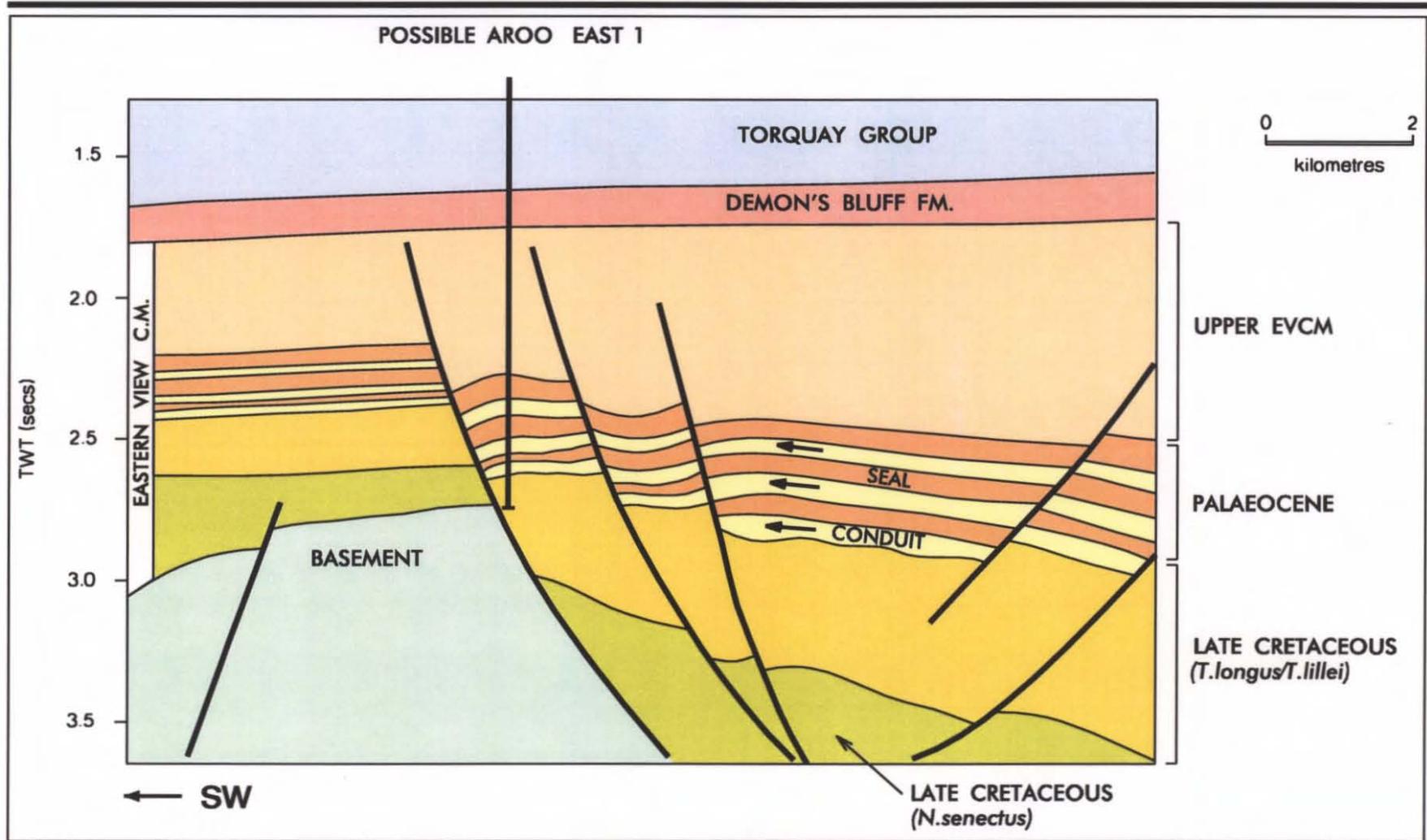
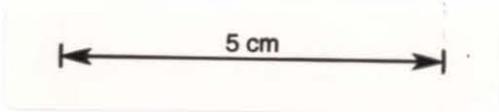


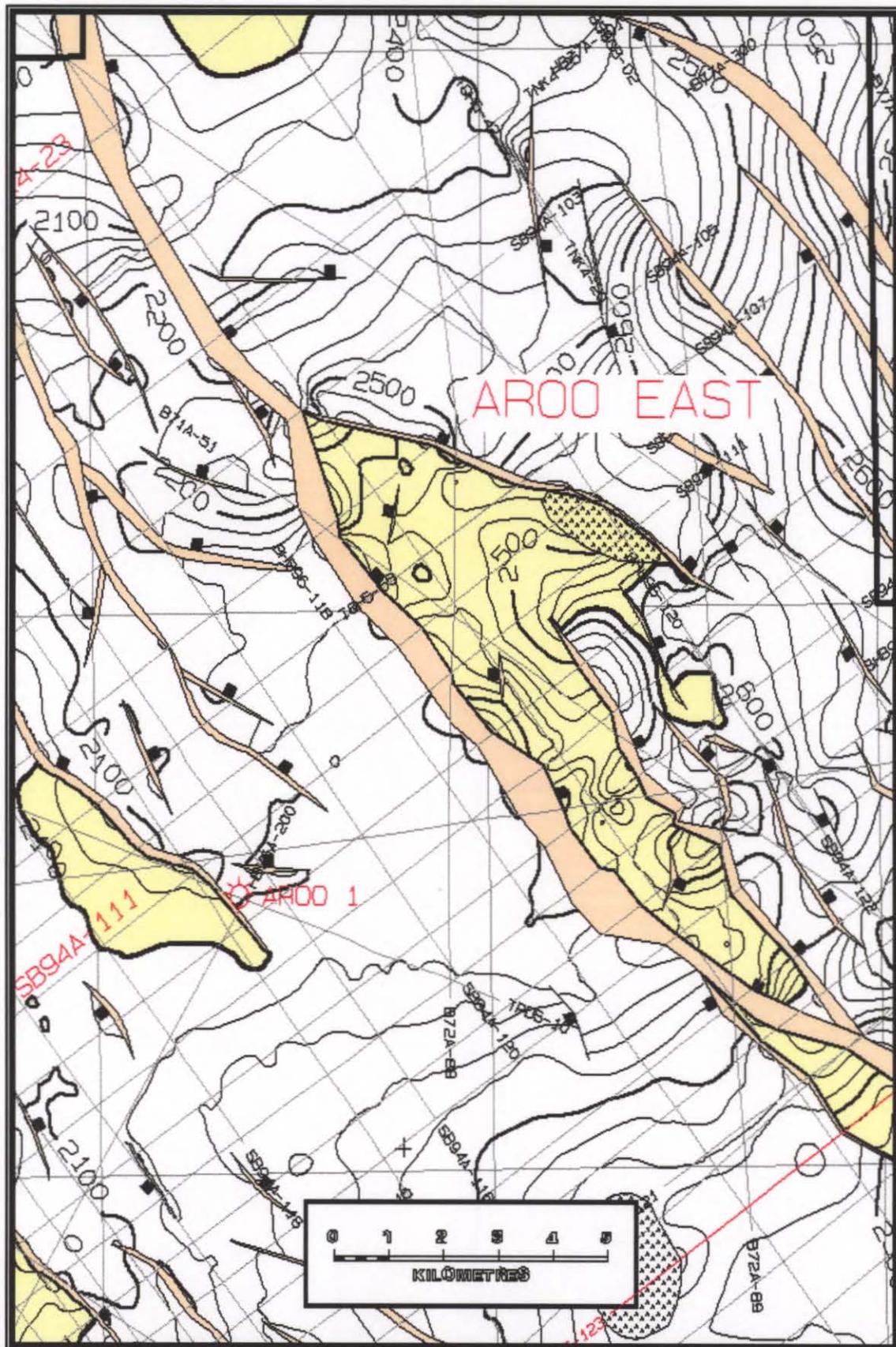


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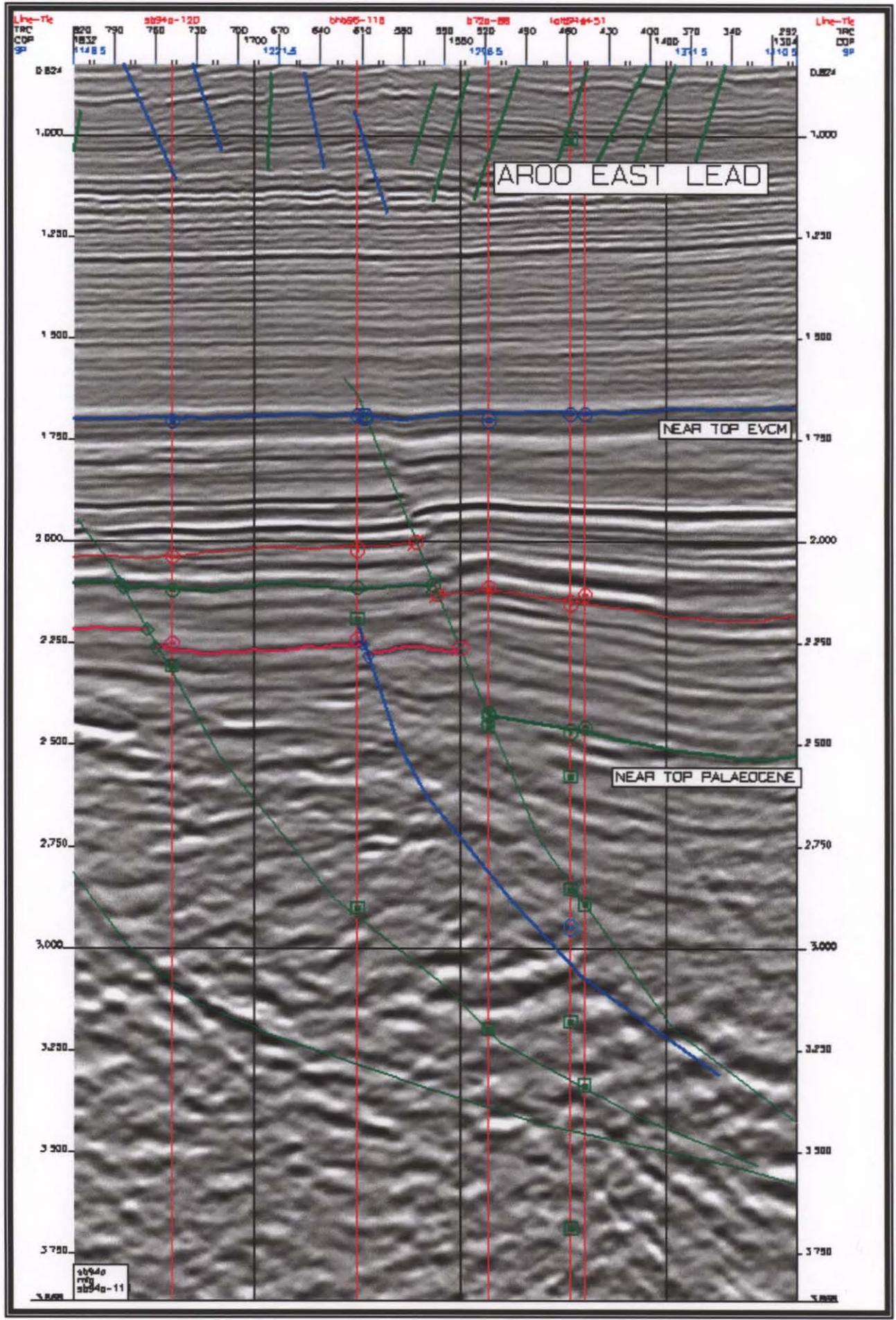
Aroo East play concept



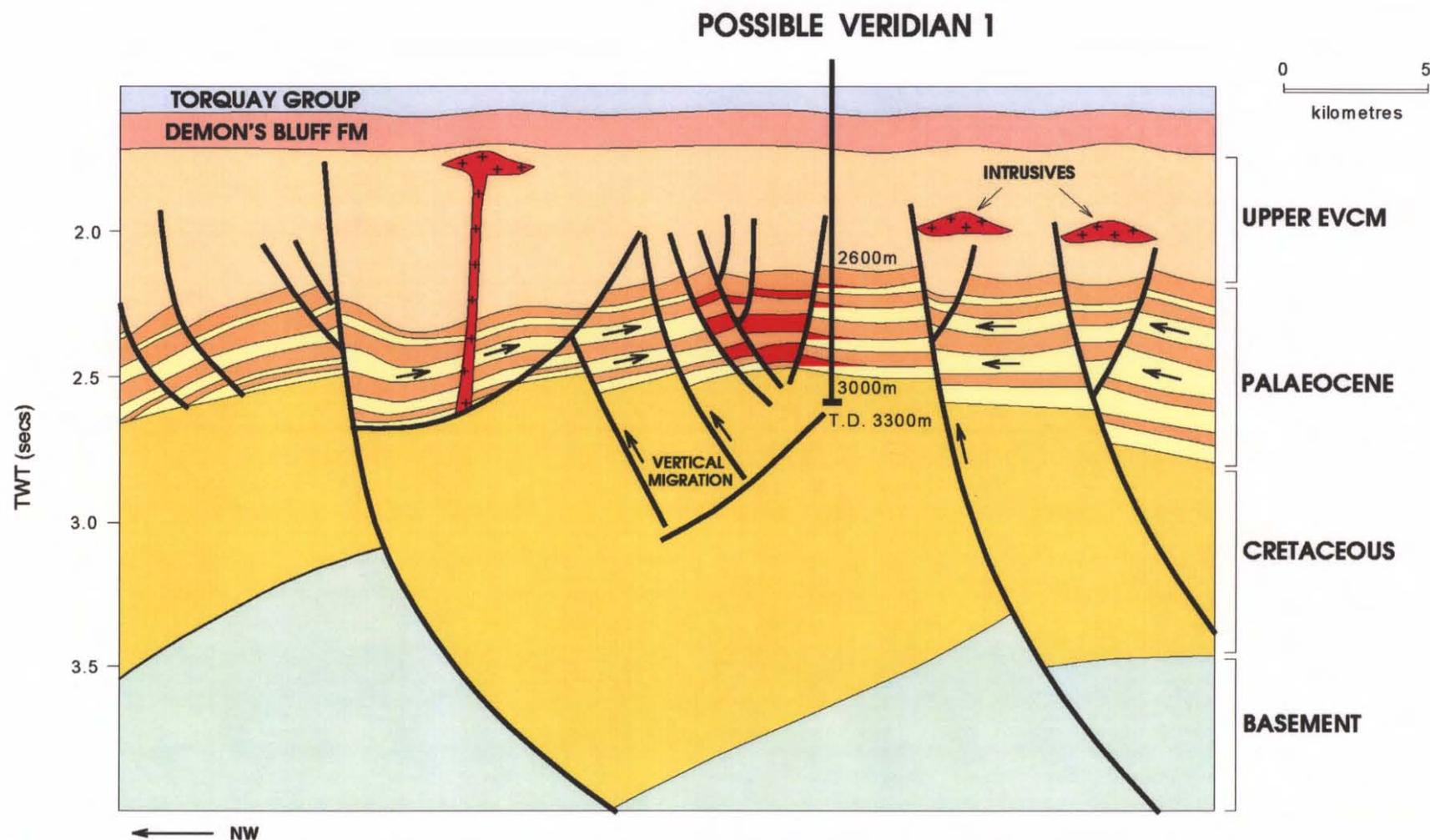
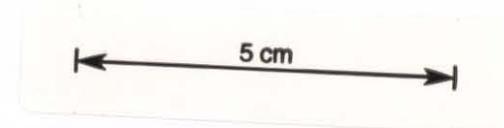


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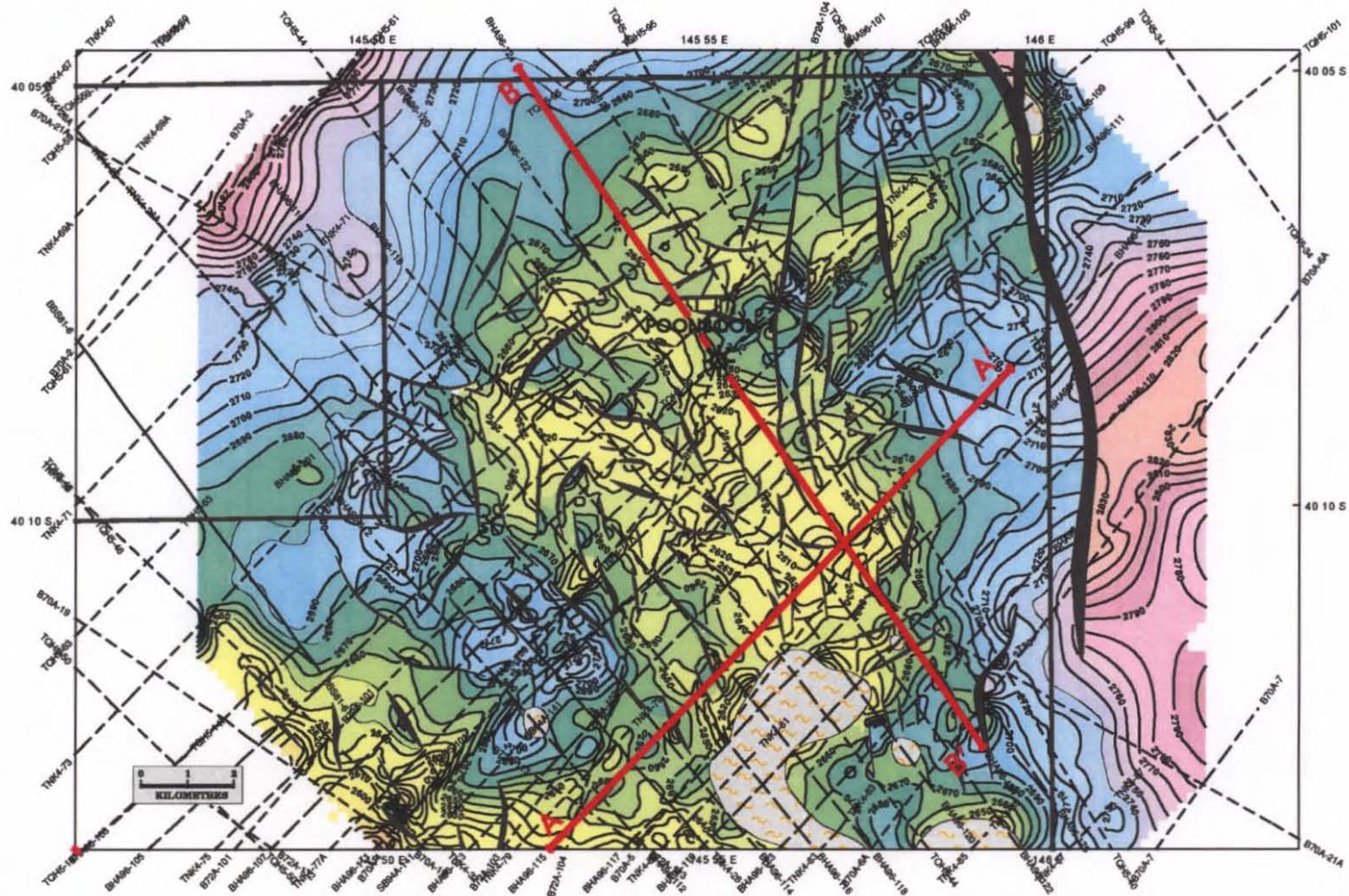
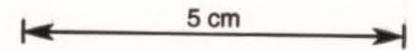


Veridian play concept



Veridian Prospect - Top Palaeocene depth structure

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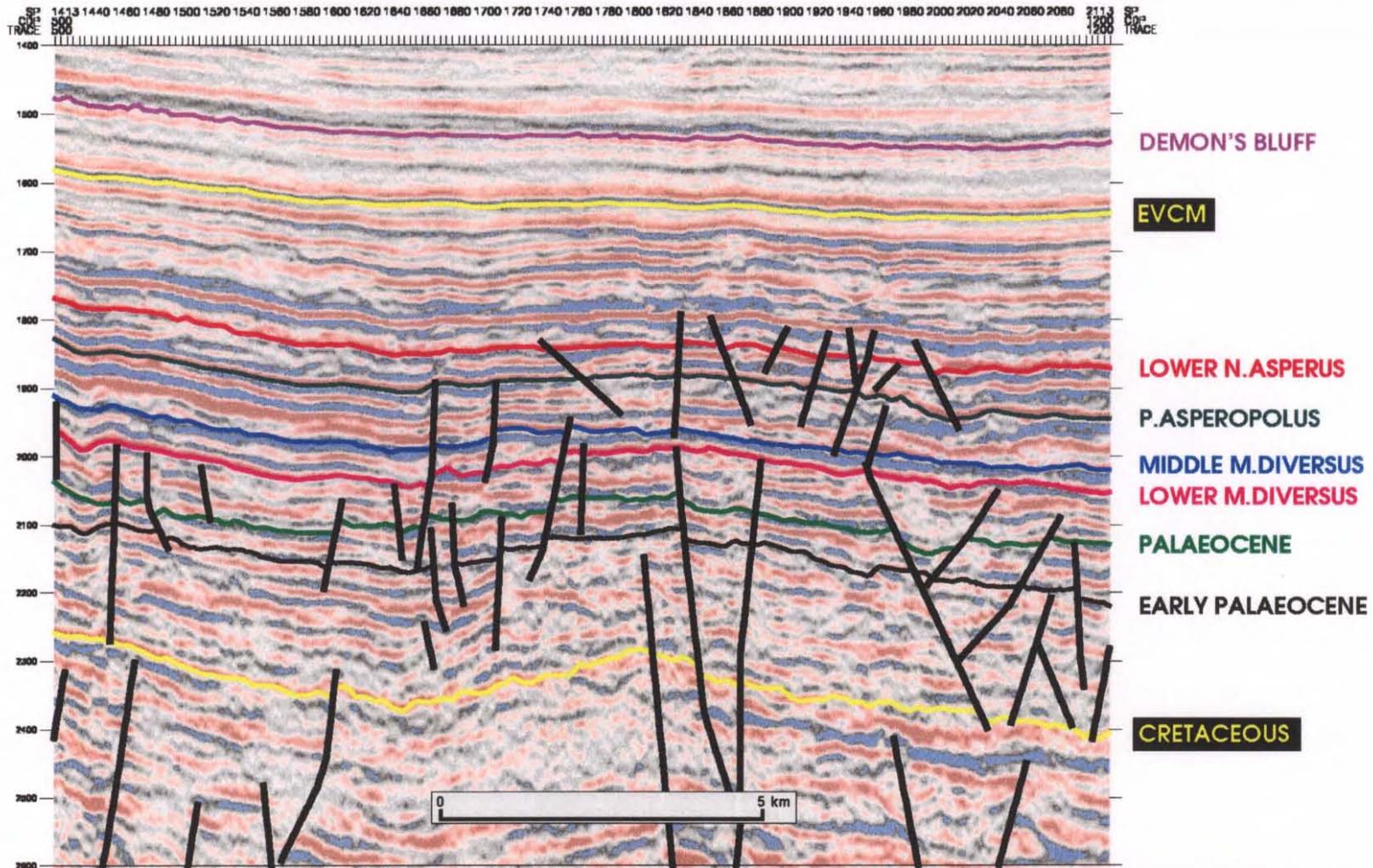
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T/25P-Veridian Prospect, dip line BHA96-115

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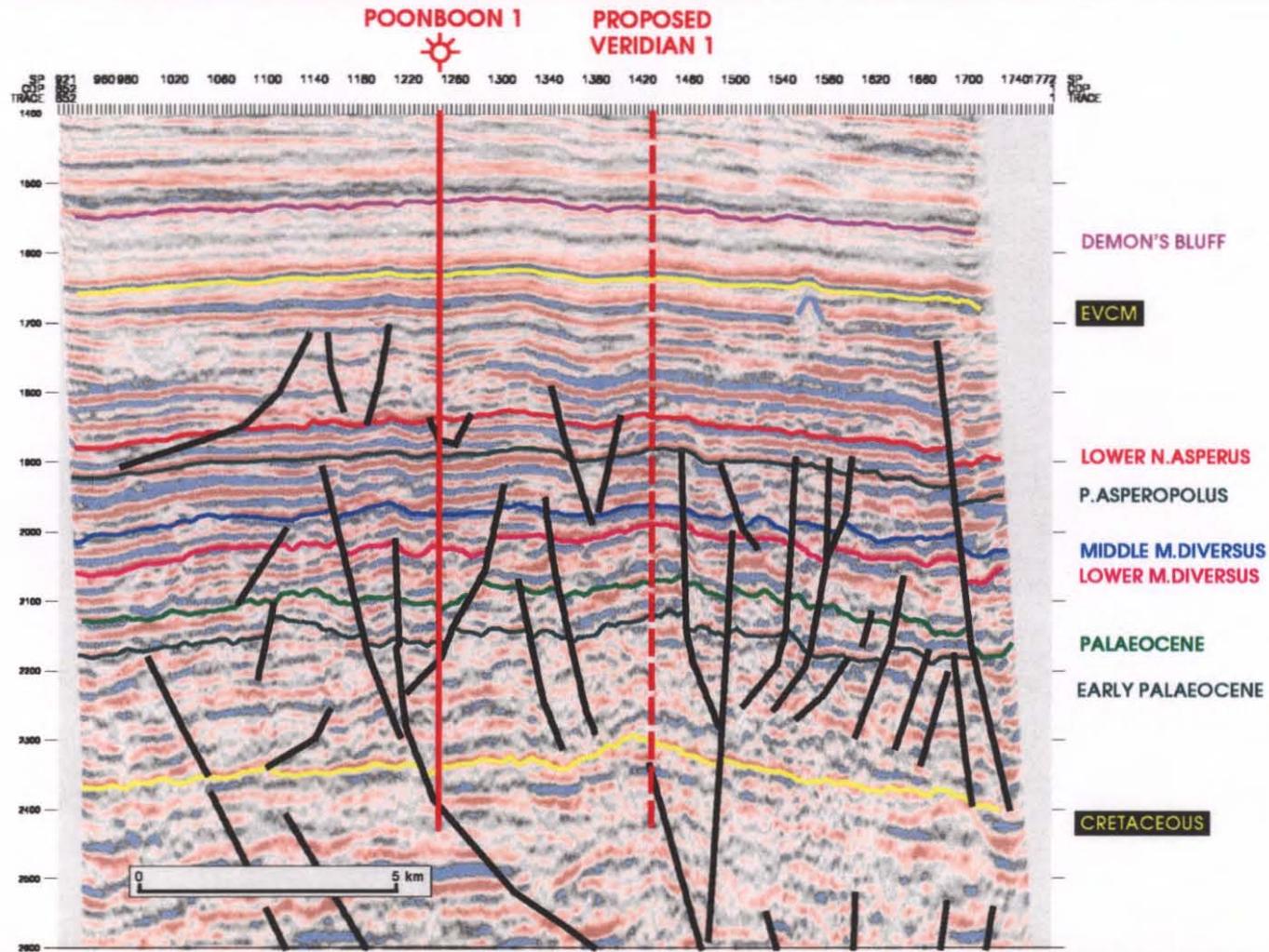
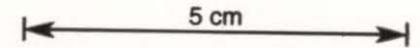
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T/25P-Veridian Prospect, strike line BHA96-124

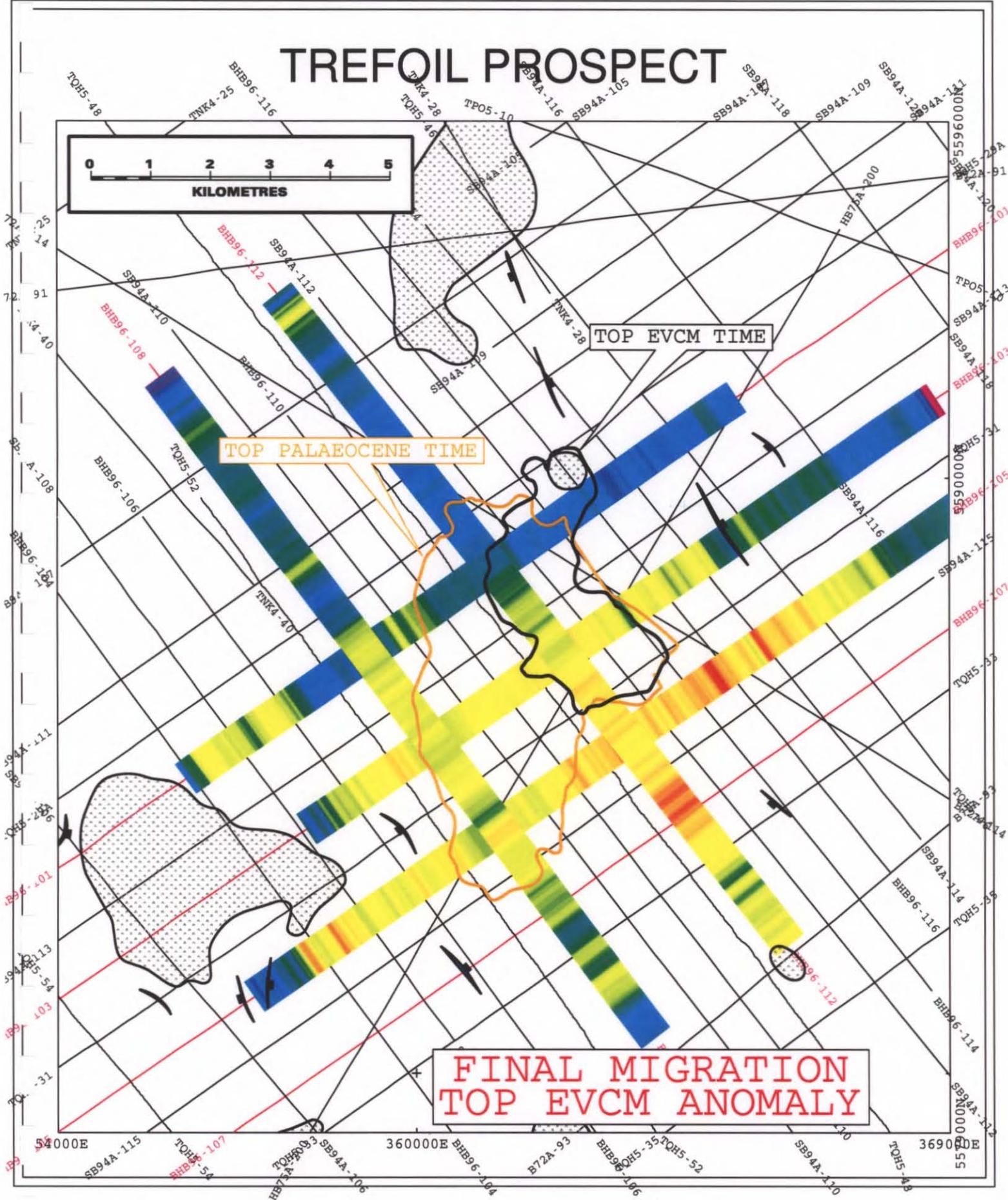


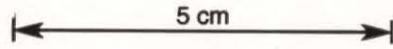
Bass prospectivity - key risks

Risk element	Where is it a problem ?	What is being done ?
Structural definition	Most leads have inadequate seismic, some are very complex such as Veridian.	Proposed 2D and 3D seismic programs, and possible aeromag.
Depth conversion	At many locations including Yolla and Trefoil, most problems relate to presence of igneous intrusives and extrusives	Geophysical projects such as PSDM and tomography
Seal	Most leads rely on cross-fault sealing, especially difficult in T/25P.	Fault plane mapping and fault plane seal attributes using FAPS software
Source	Source rock distribution and migration pathways poorly understood	IFP study is addressing these issues but limited database. BERL identified Northern Bass Basin Petroleum system important for White Ibis, Trefoil etc. AVO and seismic attribute studies
Reservoir	A key risk for basinal prospects such as Trefoil	Previous BERL palaeogeographic studies, IFP project, detailed isopach maps. AVO and seismic attribute studies

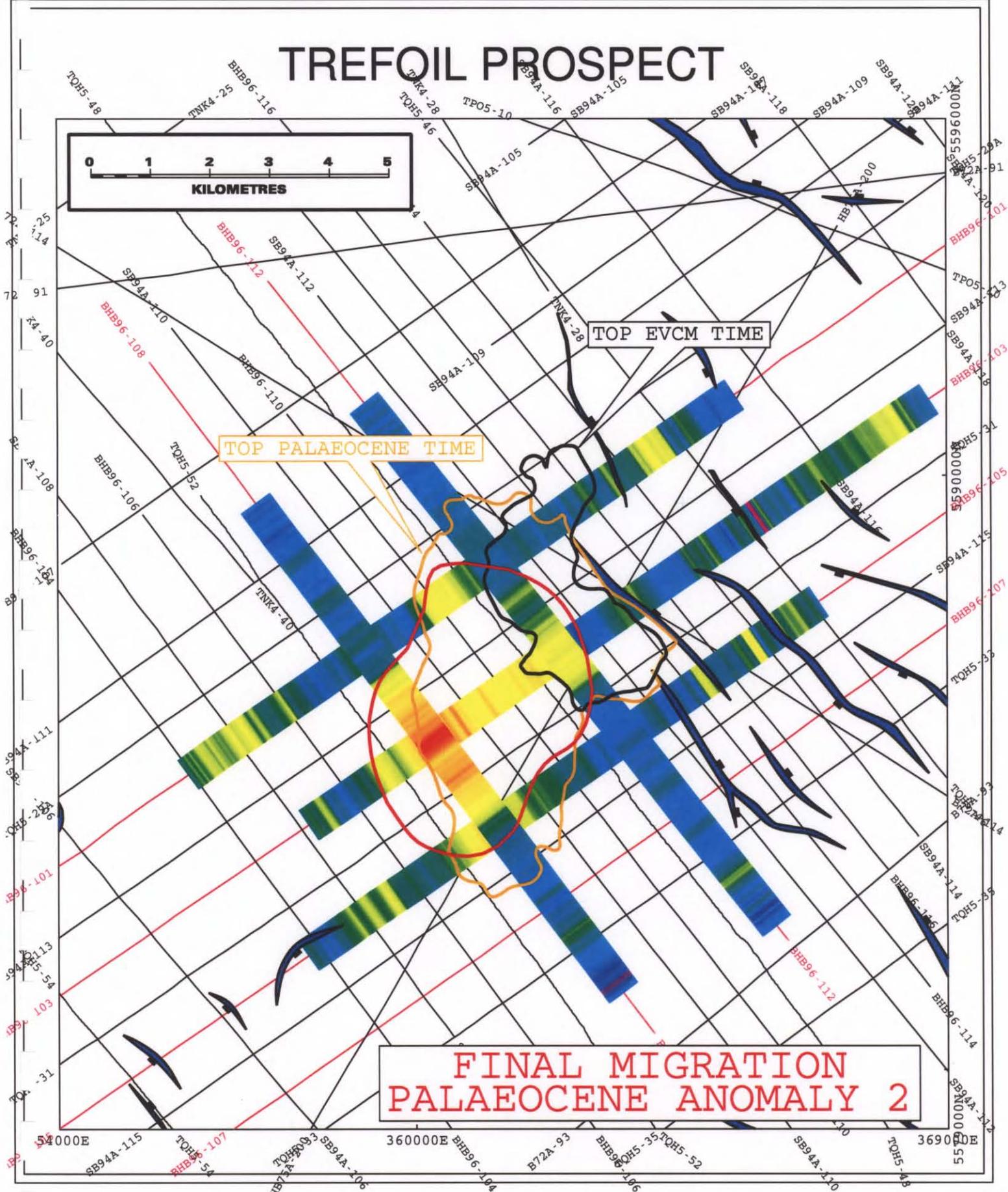
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TREFOIL PROSPECT





TREFOIL PROSPECT



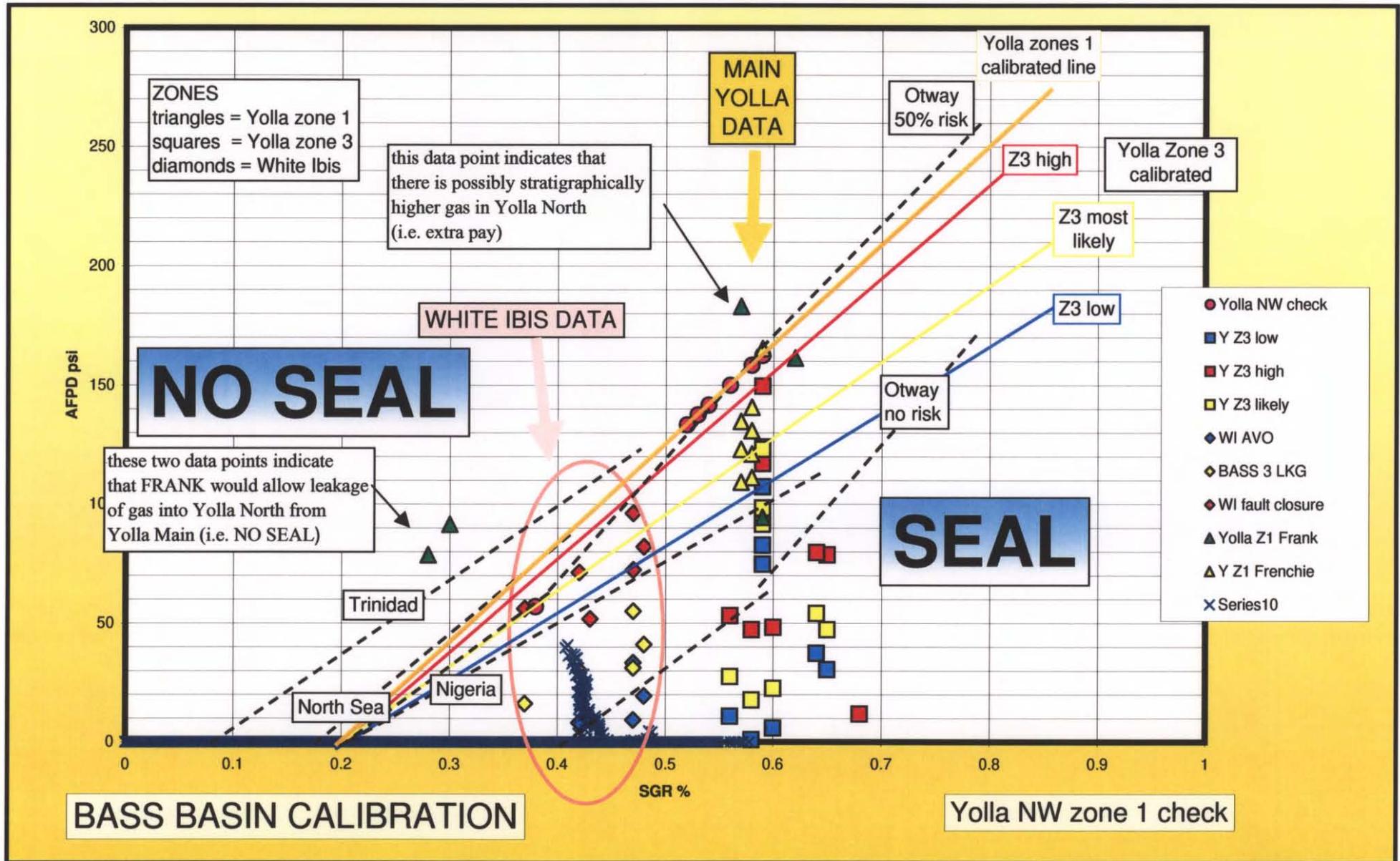
TOP PALAEOCENE TIME

TOP EVCM TIME

FINAL MIGRATION
PALAEOCENE ANOMALY 2

Fault plane seal analysis

- **Objective is to derive an empirical calibration for fault plane seals in the Bass Basin.**
- **Status of the calibration is initial and evolutionary as new faults are studied and new well data are incorporated.**
- **Method involves :**
 - construction of a fault plane map (Allen diagram) with fault throw contoured
 - calculation of shale volume from logs (typically the gamma ray)
 - calculation of shale gouge ratio (SGR) on fault plane (using shale volume and fault throw)
 - calculation of across fault pressure difference (AFPD)
 - construction of a graph of SGR verses AFPD particularly for various points along the fault plane (especially weak points where SGR is low and AFPD is high)
 - compare with worldwide and local calibration data to evaluate chance of fault seal being present
- **This procedure was previously done manually, BERL has now purchased FAPS software to increase efficiency.**



Institut Francais du Petrole (IFP) study

- **Study commissioned as part of Premier Oil farmin**
- **Technical work in progress**
- **Three major parts to the study:**
 - 1. Regional stratigraphic and palaeogeographic study of the Eastern View Coal Measures
 - 2. Source rock study of the Eastern View Coal Measures and Otway Group, involving new pyrolysis data, and calculation of wireline derived source rock properties
 - 3. Maturity modelling in 1D (well), 2D(profile) and 3D (regional) dimensions including mapping of the hydrocarbon source potential for discrete hydrocarbon kitchens.

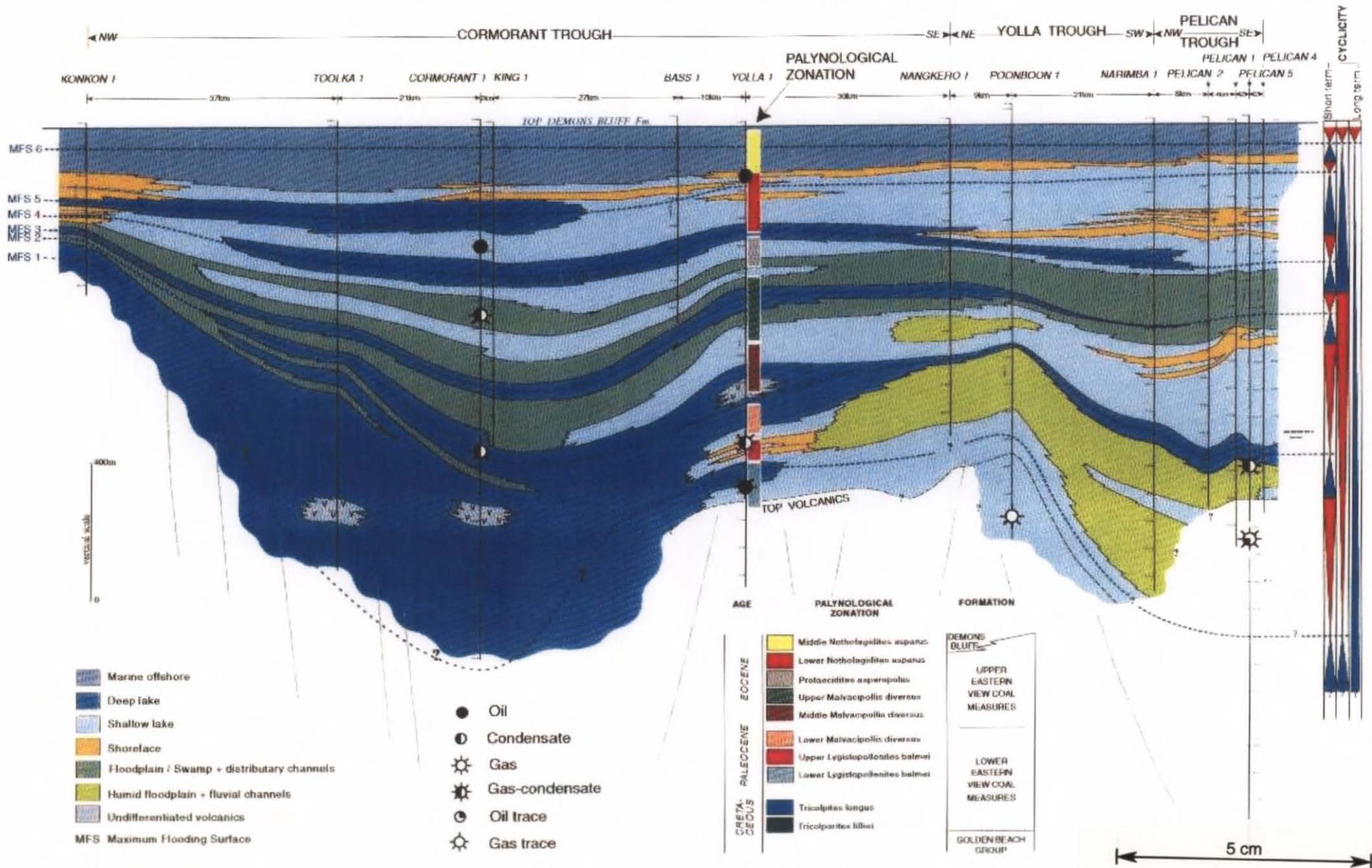
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BASS BASIN STUDY

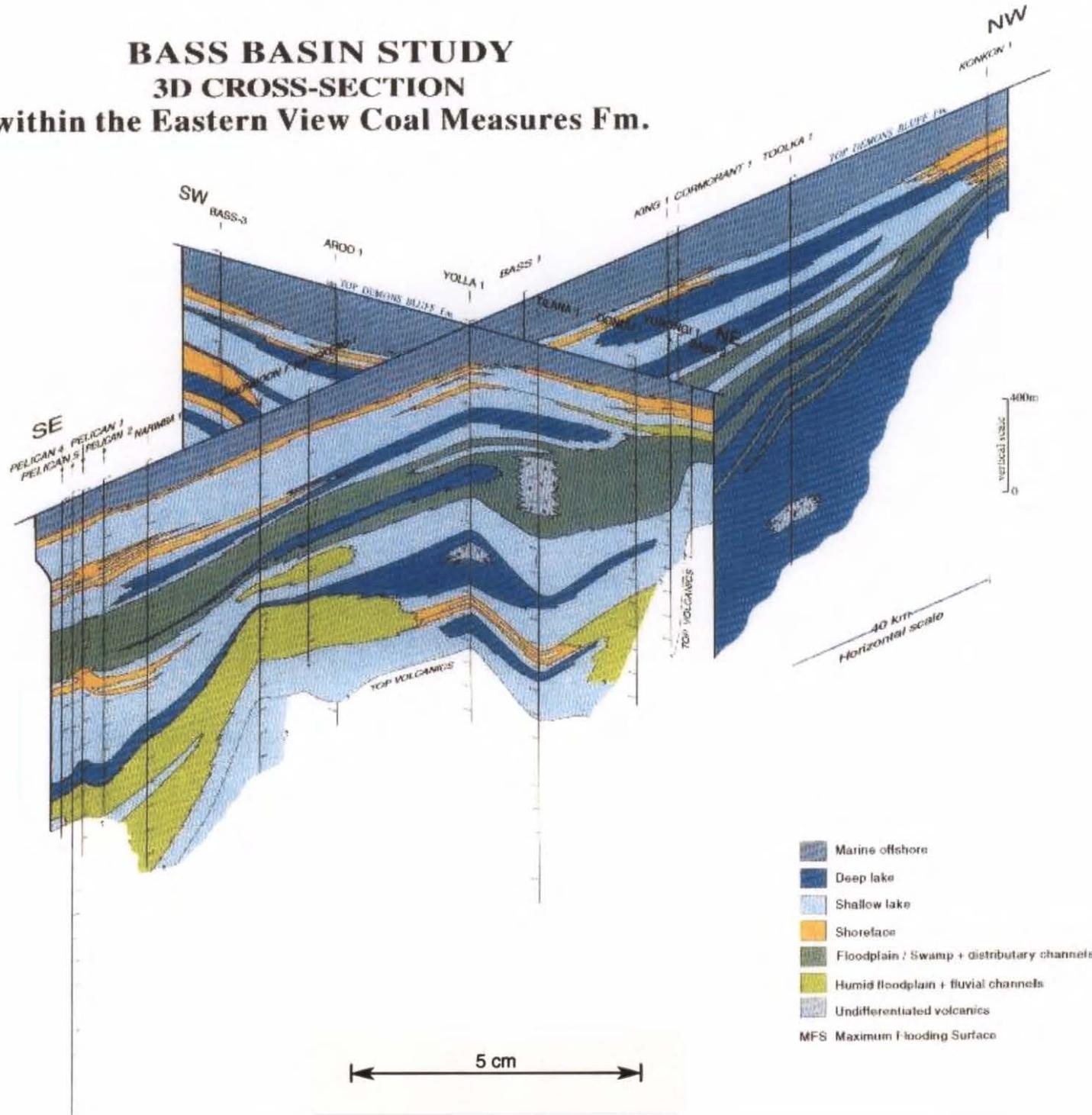
NW-SE STRATIGRAPHIC CROSS-SECTION within the Eastern View Coal Measures Fm.





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BASS BASIN STUDY 3D CROSS-SECTION within the Eastern View Coal Measures Fm.



- Marine offshore
- Deep lake
- Shallow lake
- Shoreface
- Floodplain / Swamp + distributary channels
- Humid floodplain + fluvial channels
- Undifferentiated volcanics
- MFS Maximum Flooding Surface

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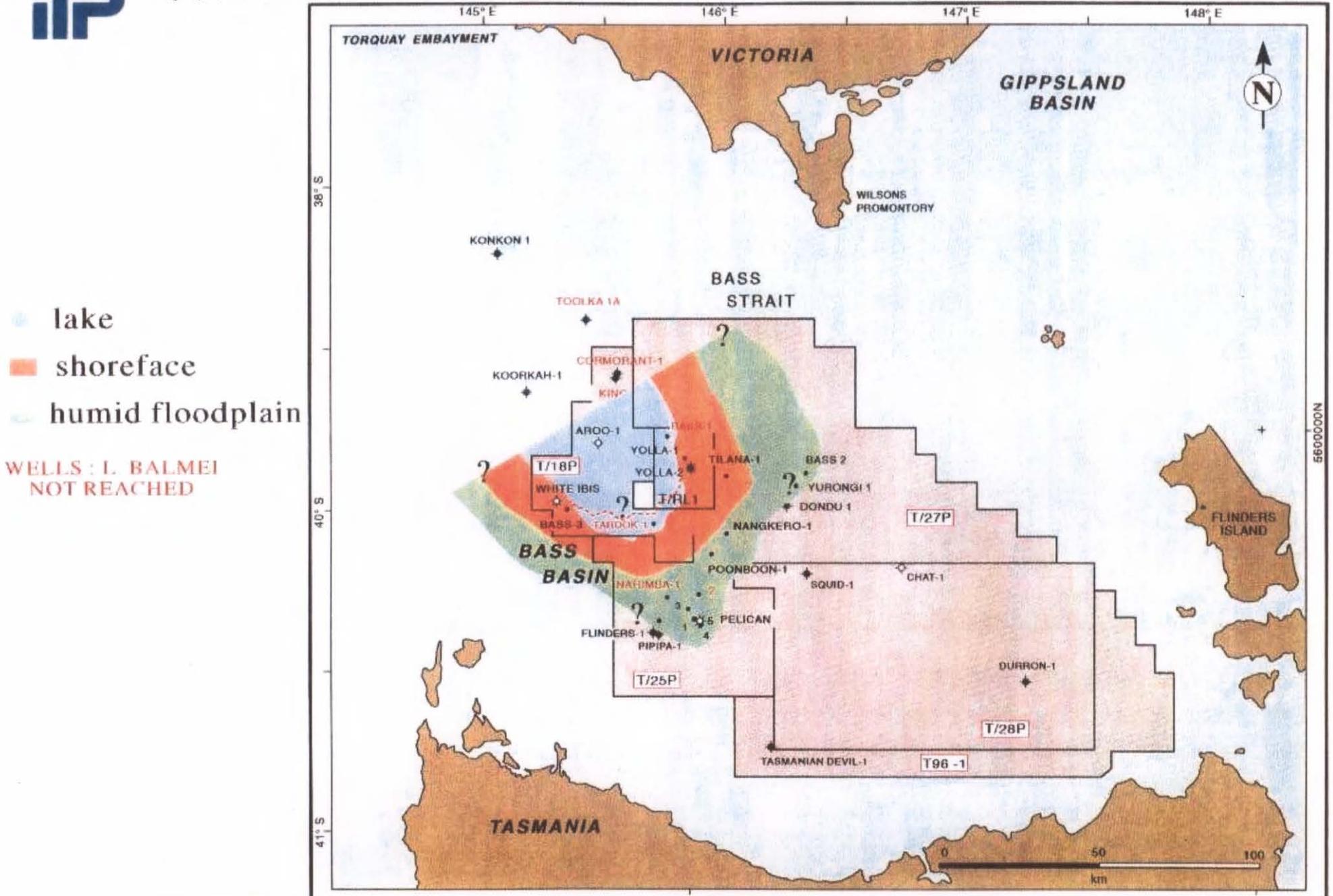
40 km
Horizontal scale

400m
Vertical scale
0

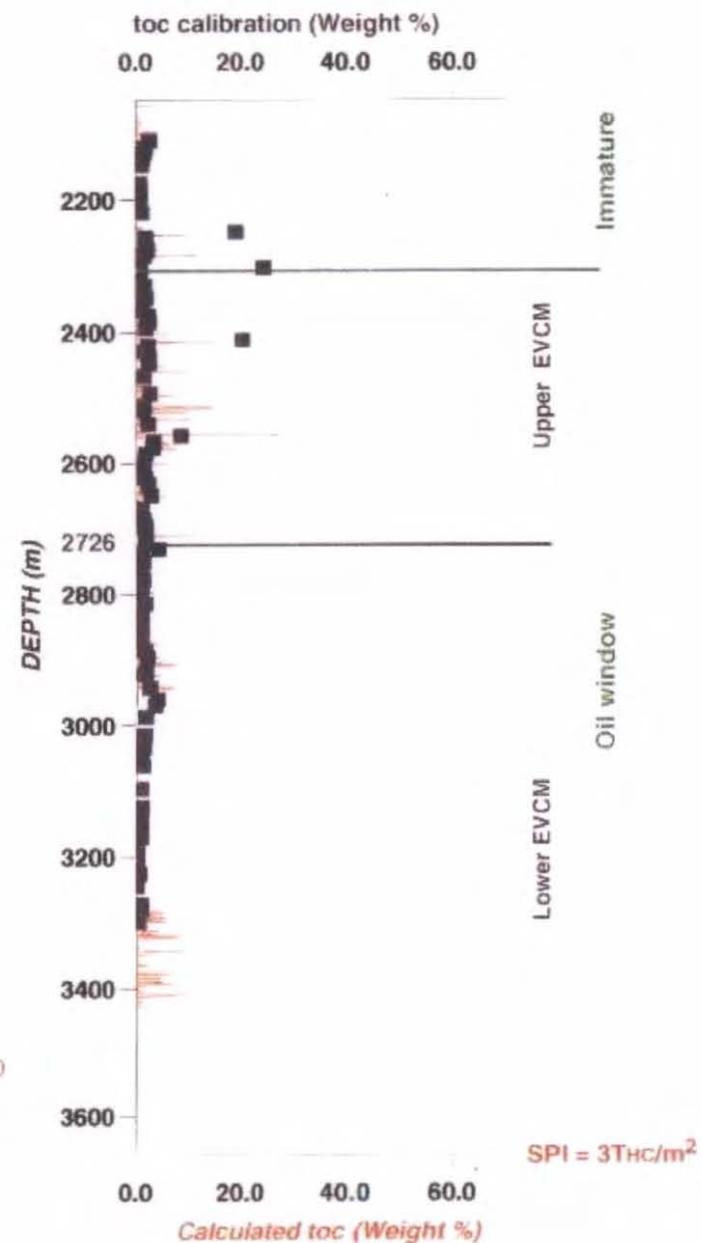
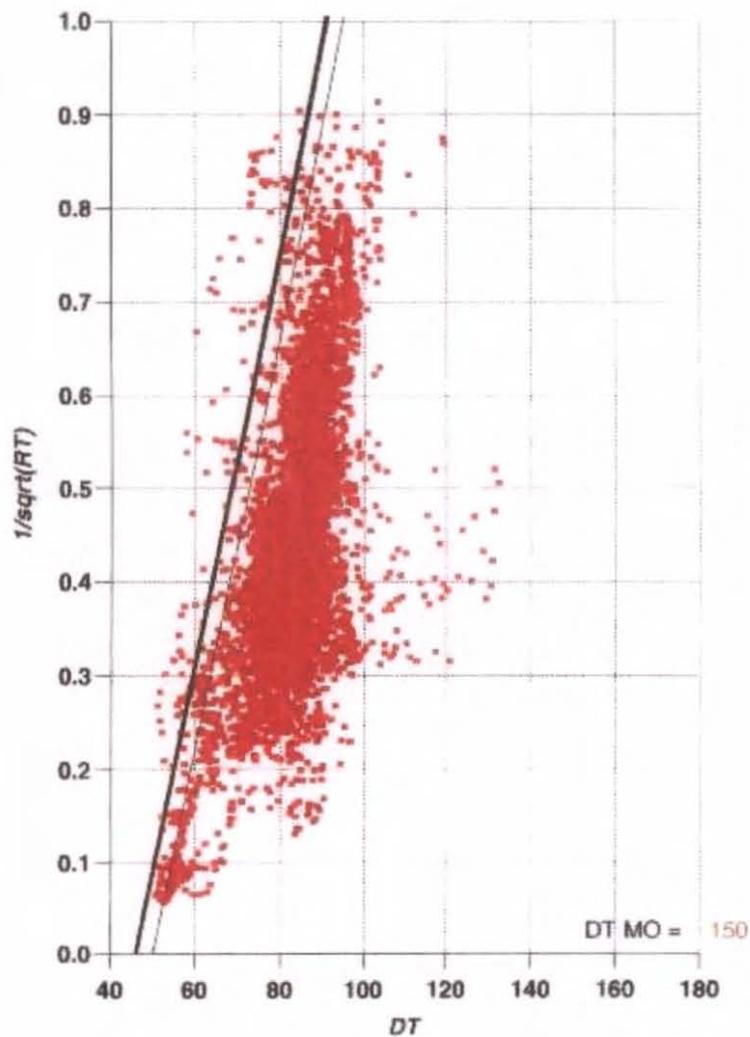
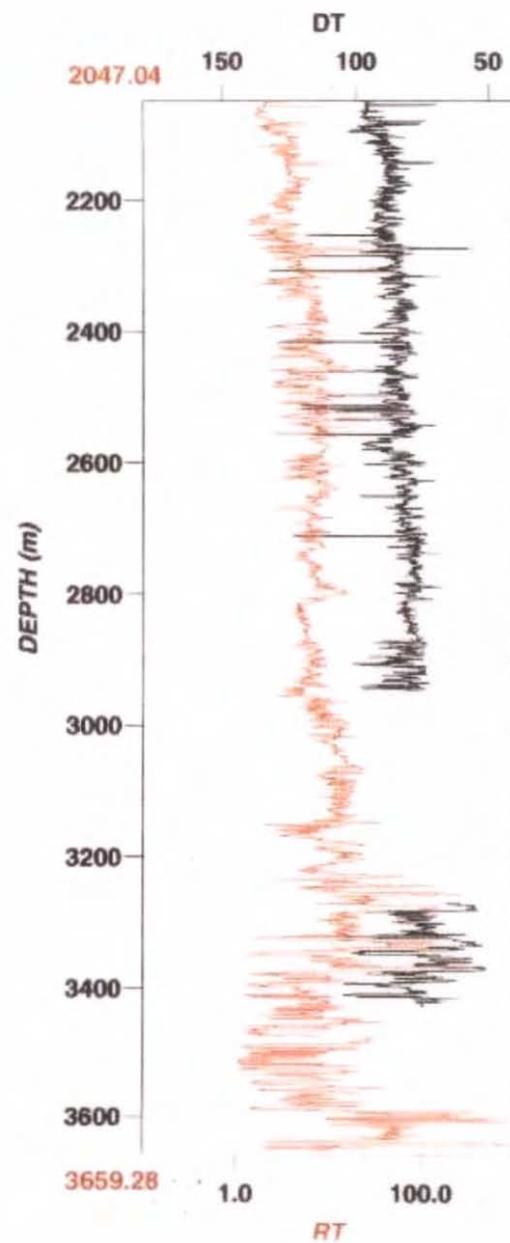


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SCHEMATIC PALEOGEOGRAPHIC MAP AT L. BALMEI LEVEL

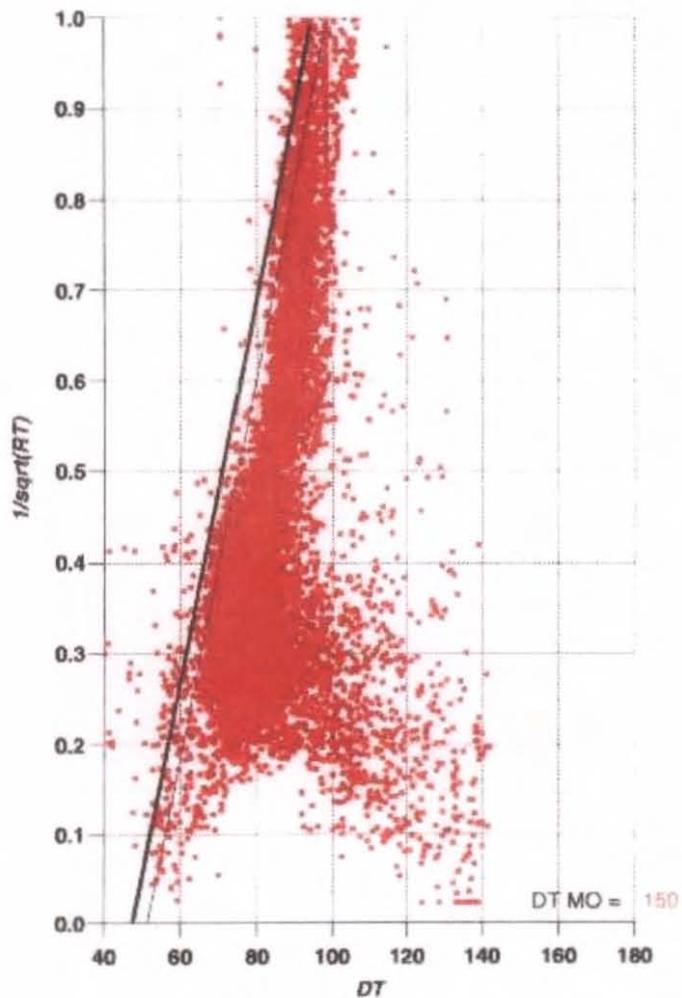
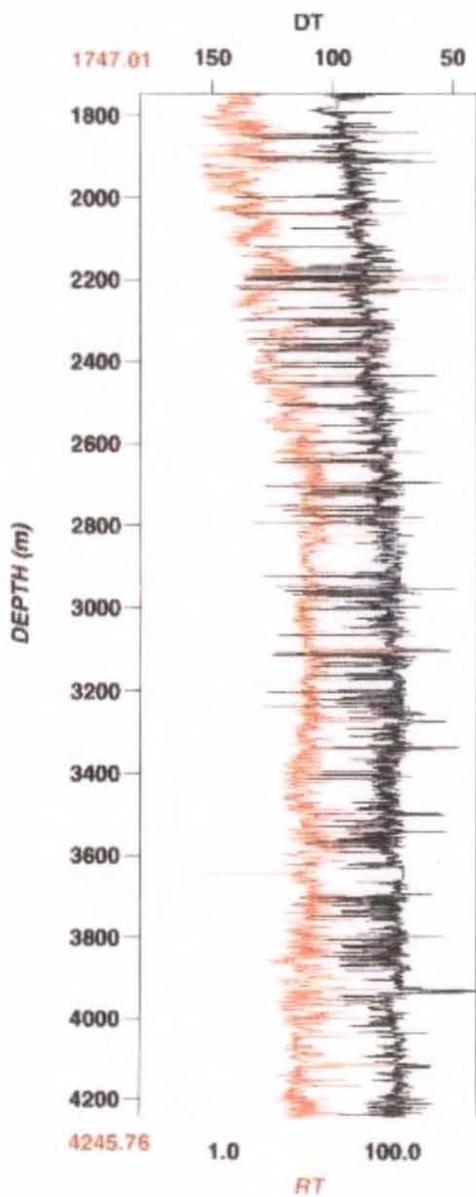


CARBOLOG AROO -1

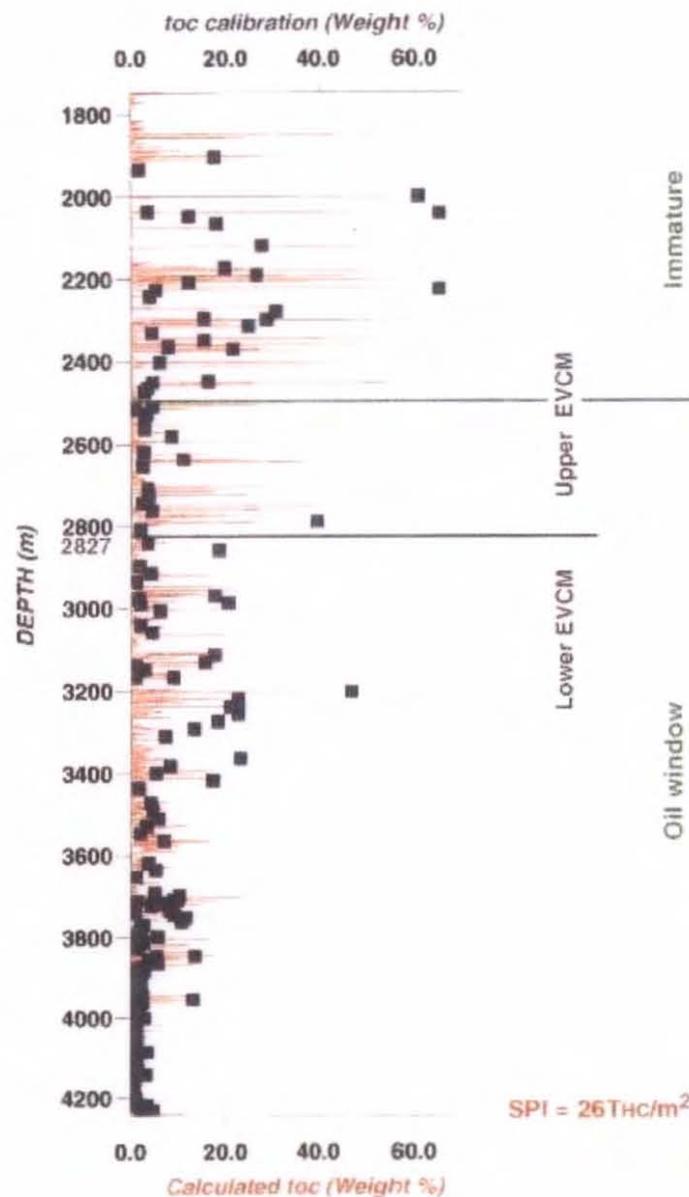


5 cm

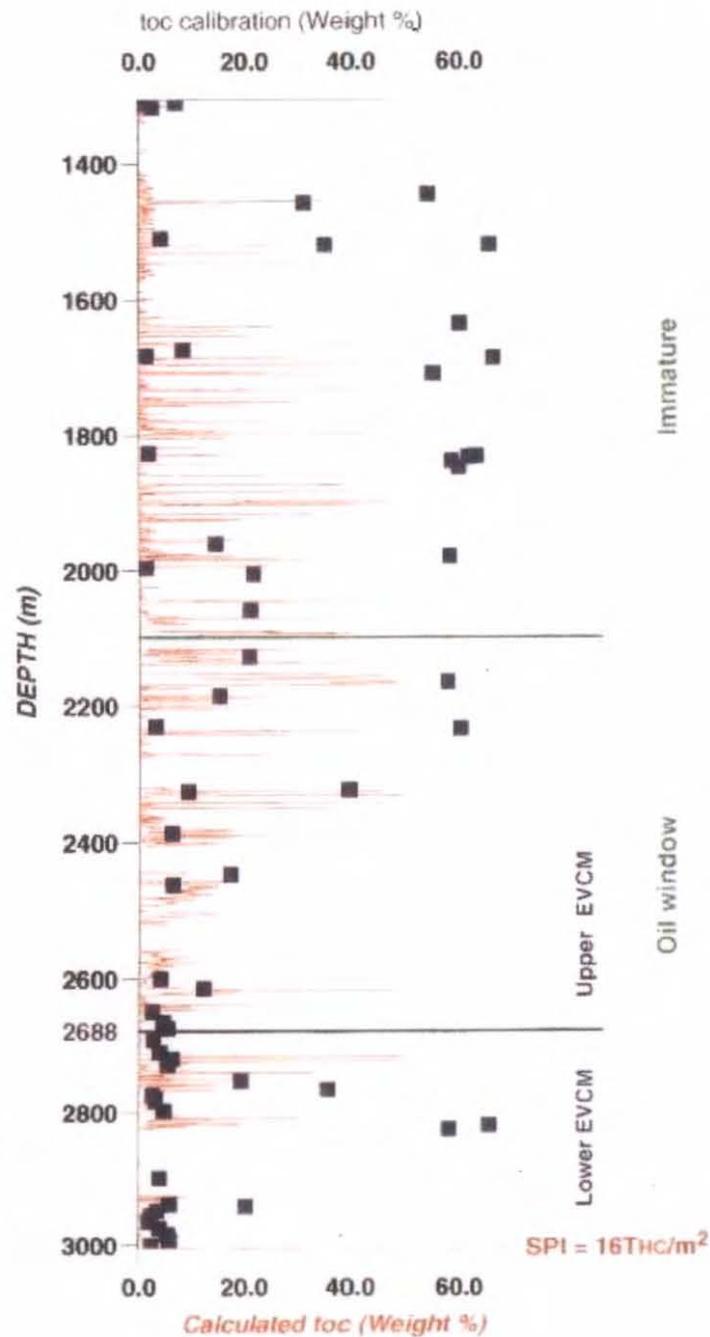
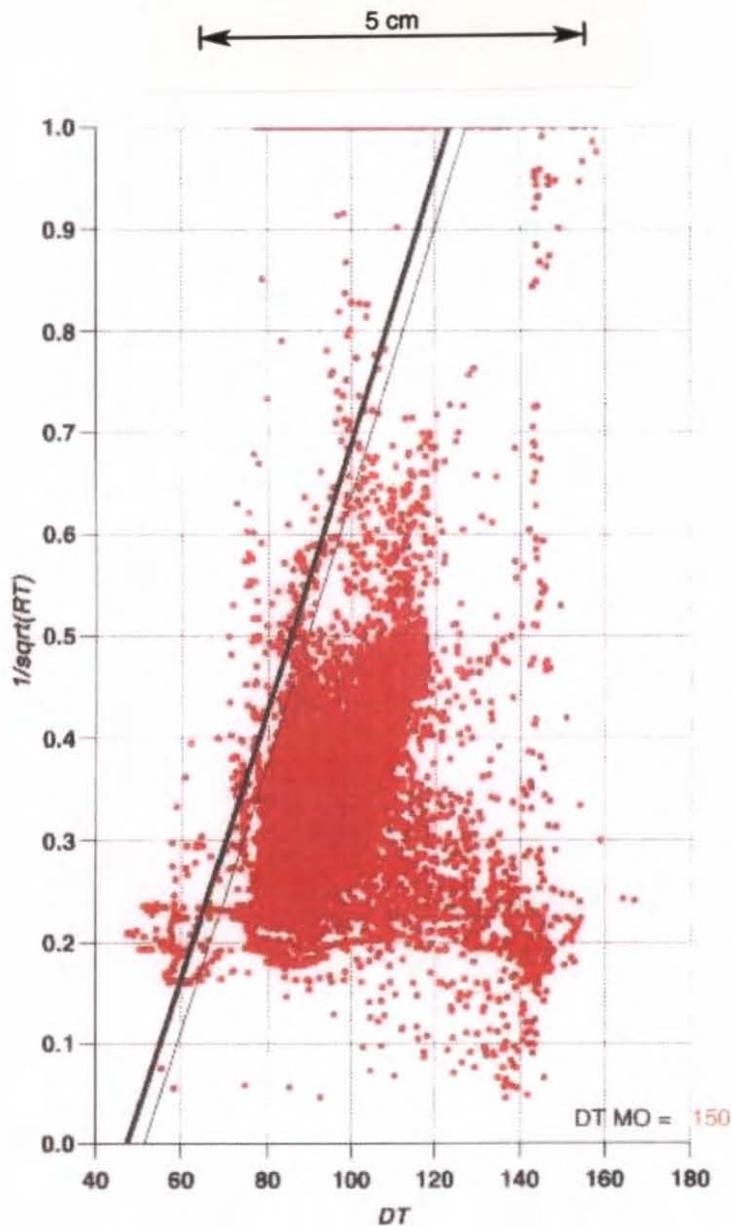
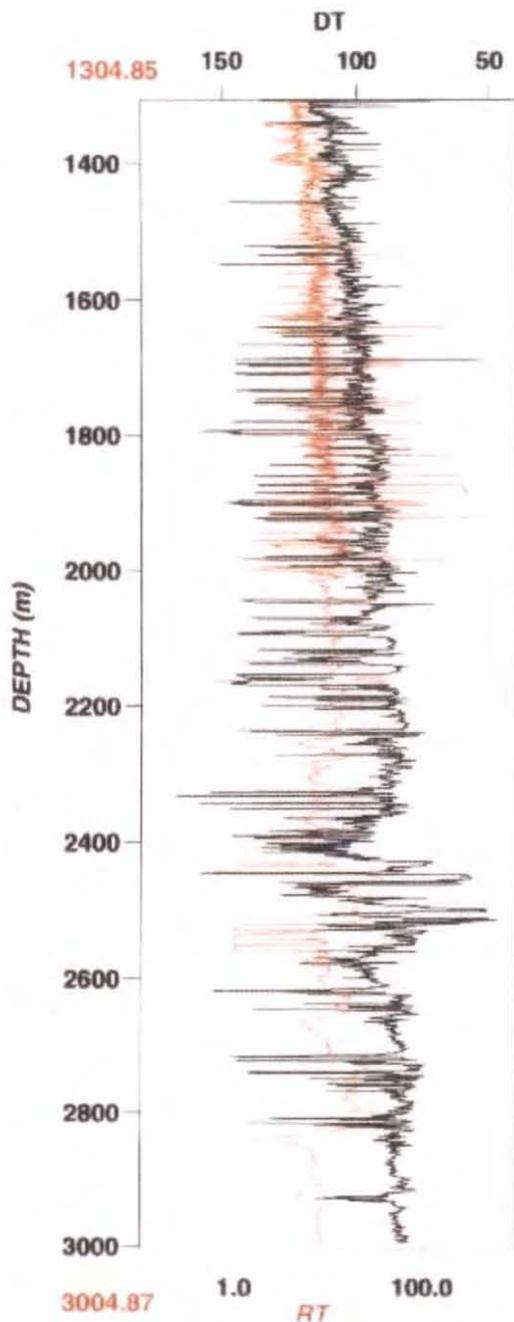
CARBOLOG PELICAN 5



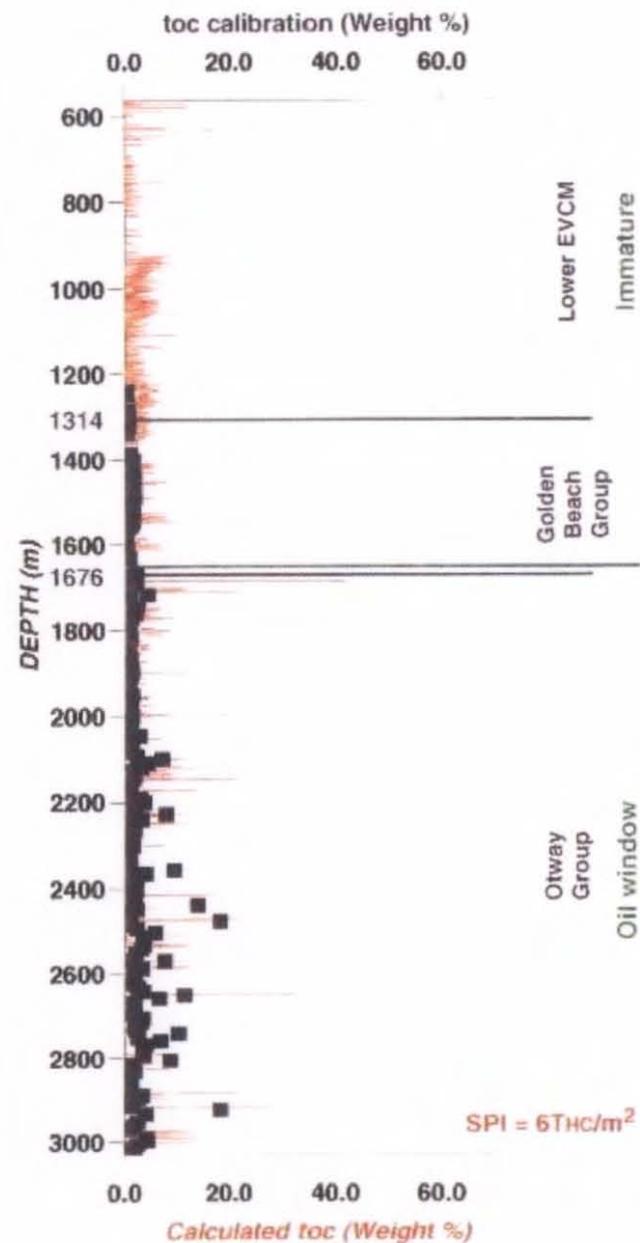
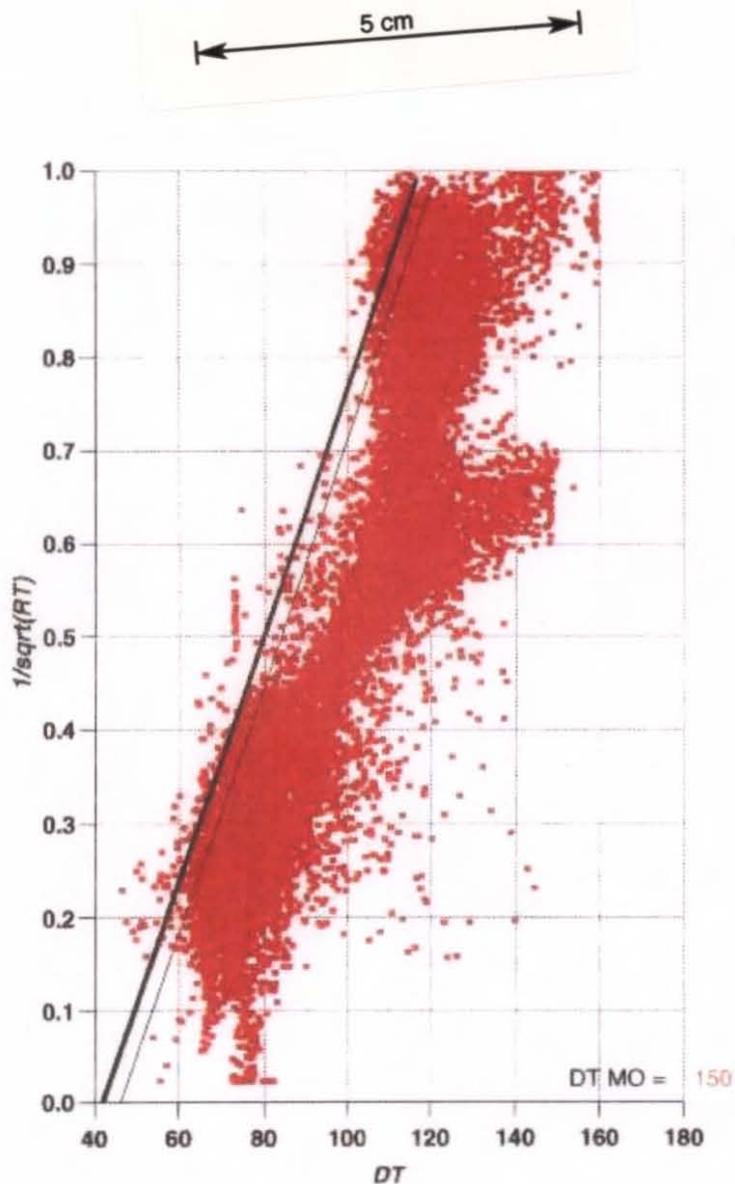
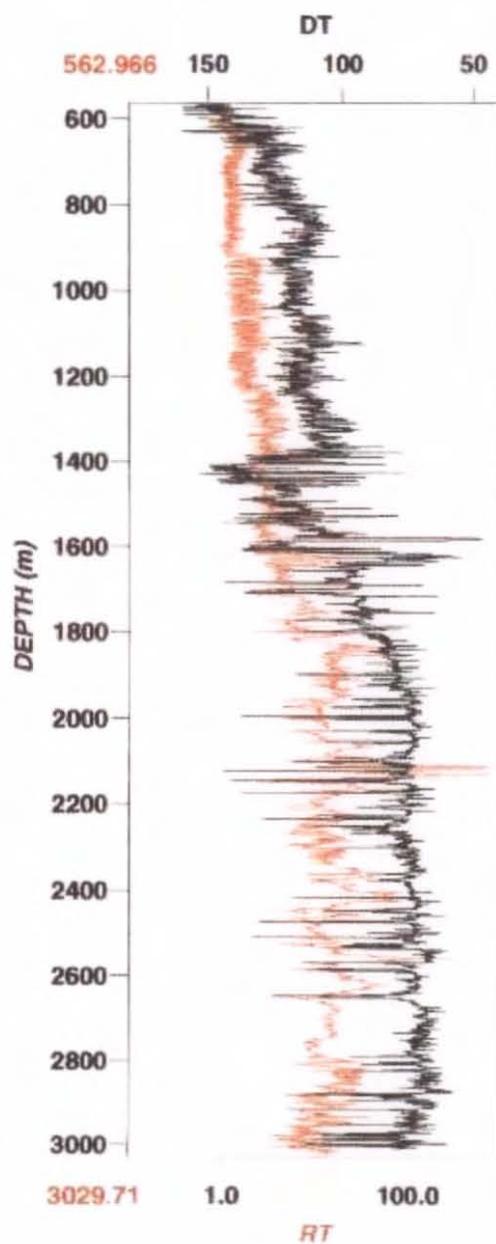
5 cm



CARBOLOG CORMORANT - 1



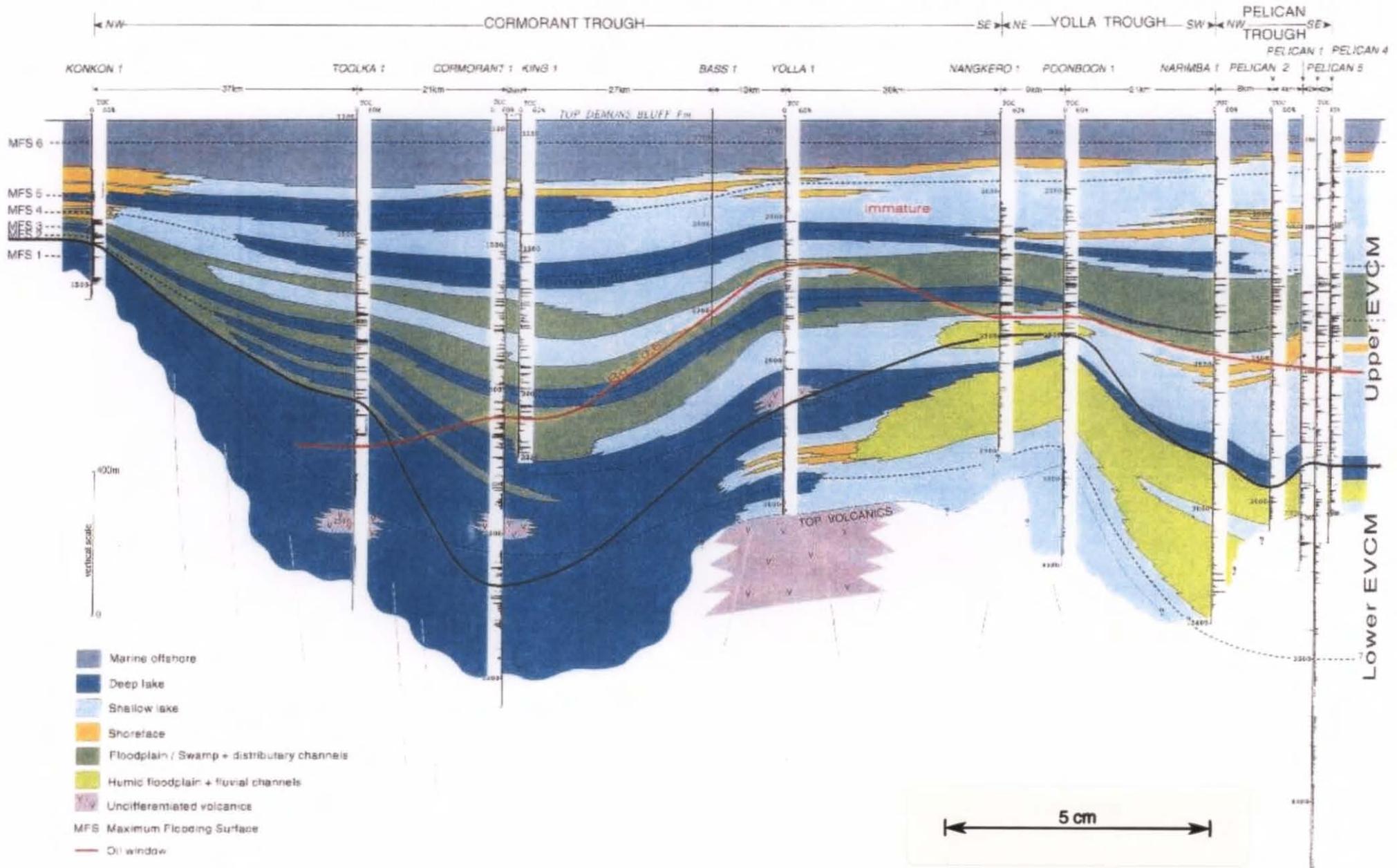
CARBOLOG DURROON - 1



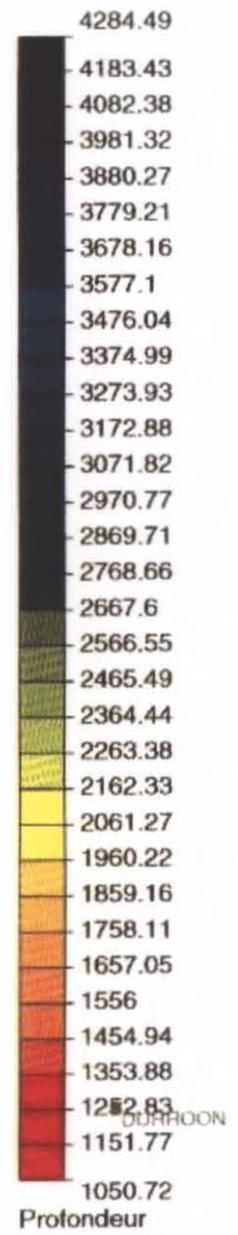
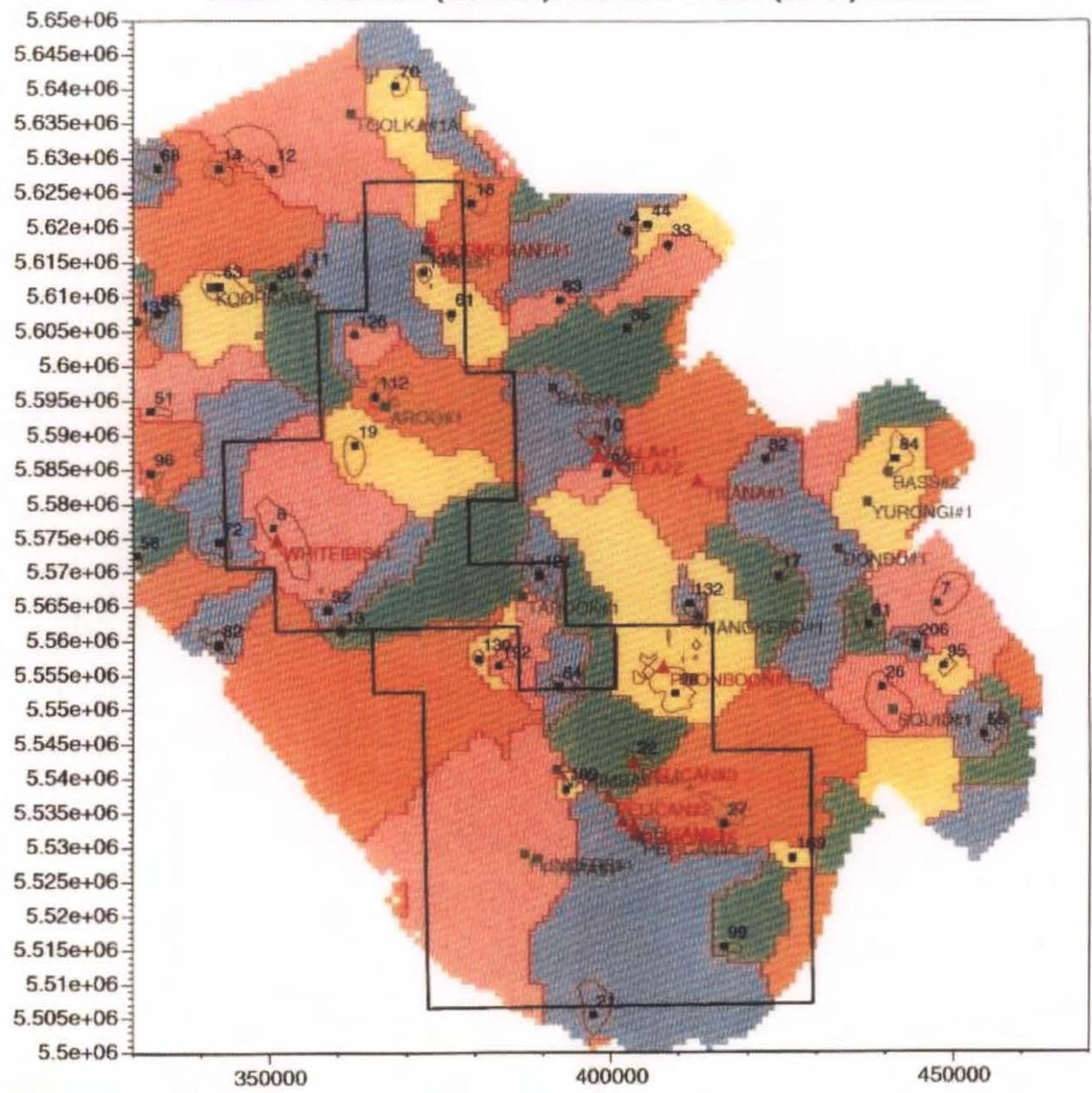


BASS BASIN STUDY

NW-SE stratigraphic cross-section and total organic carbon content distribution within the Eastern View Coal Measures Fm.

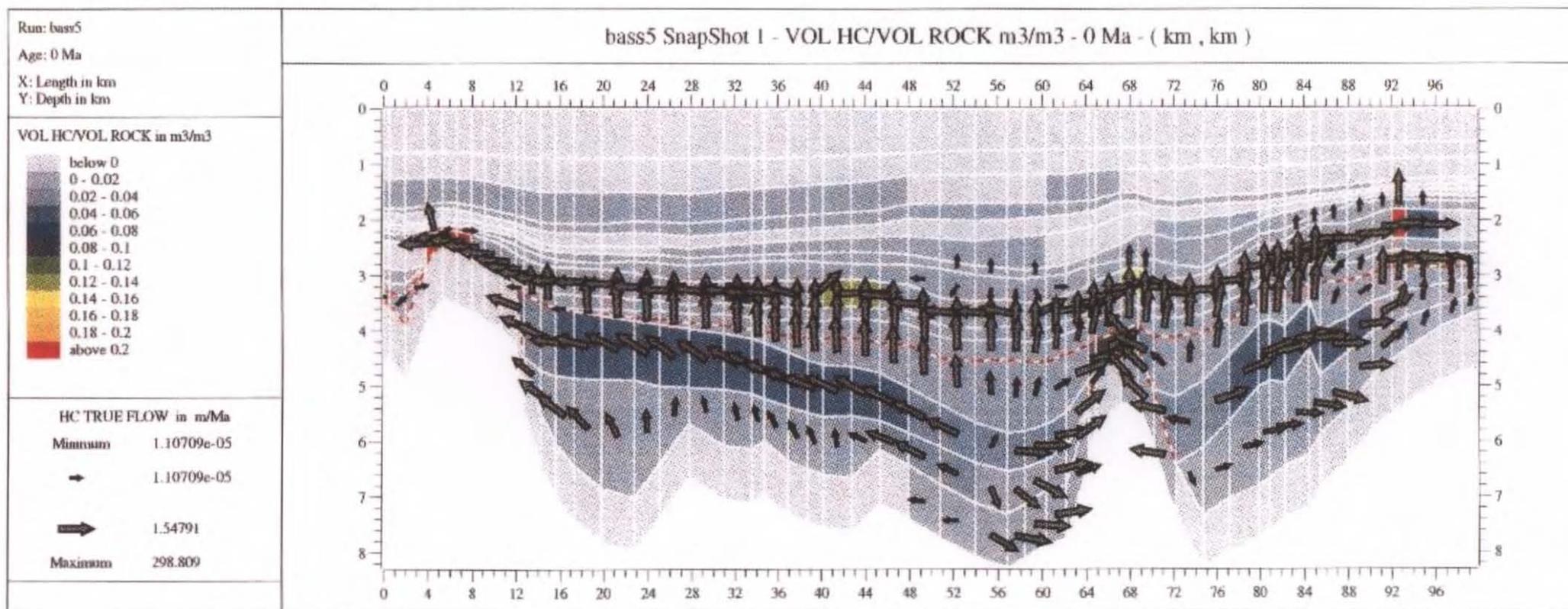


KONKON#1 Aires : -sans titre-(modifiØ) / Horizon : TULB (55.00) at 0.00 Ma



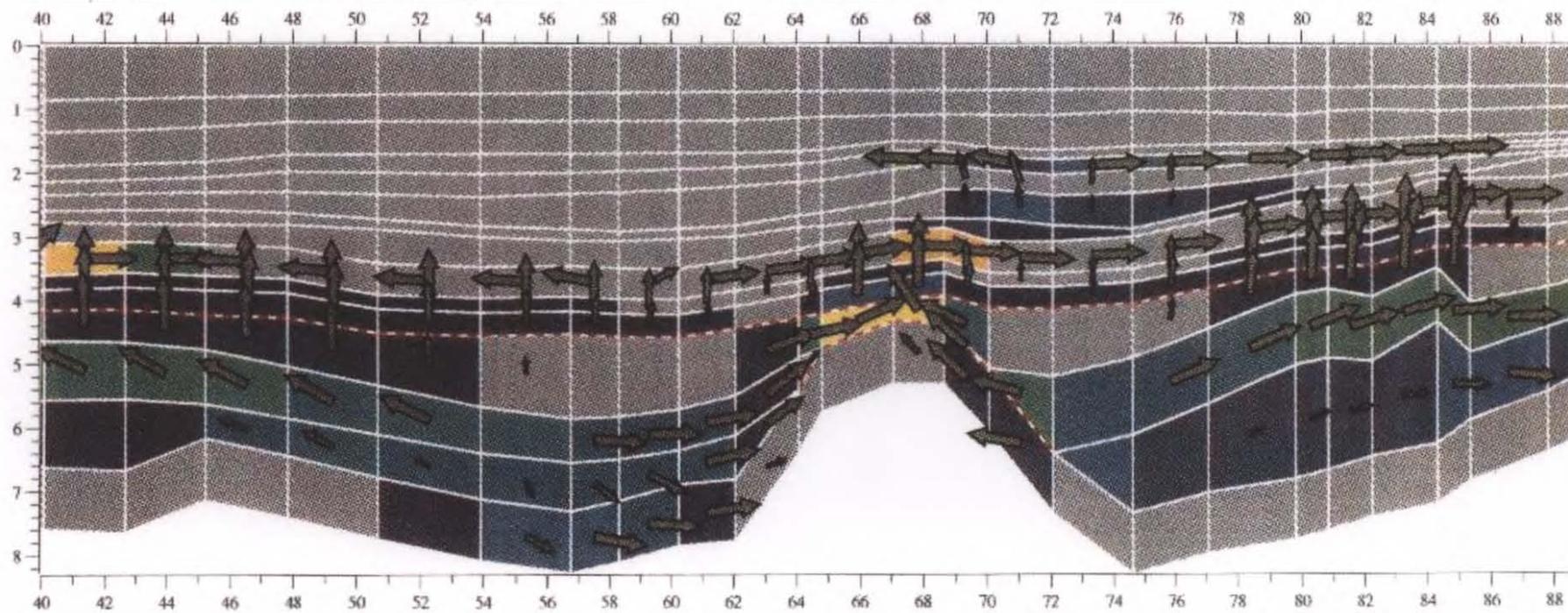
5 cm

TASMANIANDVL#1



bis

bass5-volca-14bis SnapShot 1 - SATURATION % - 0 Ma - (km , km)



ΔW in m/Ma
2.91495e-05
0.5

2.20283

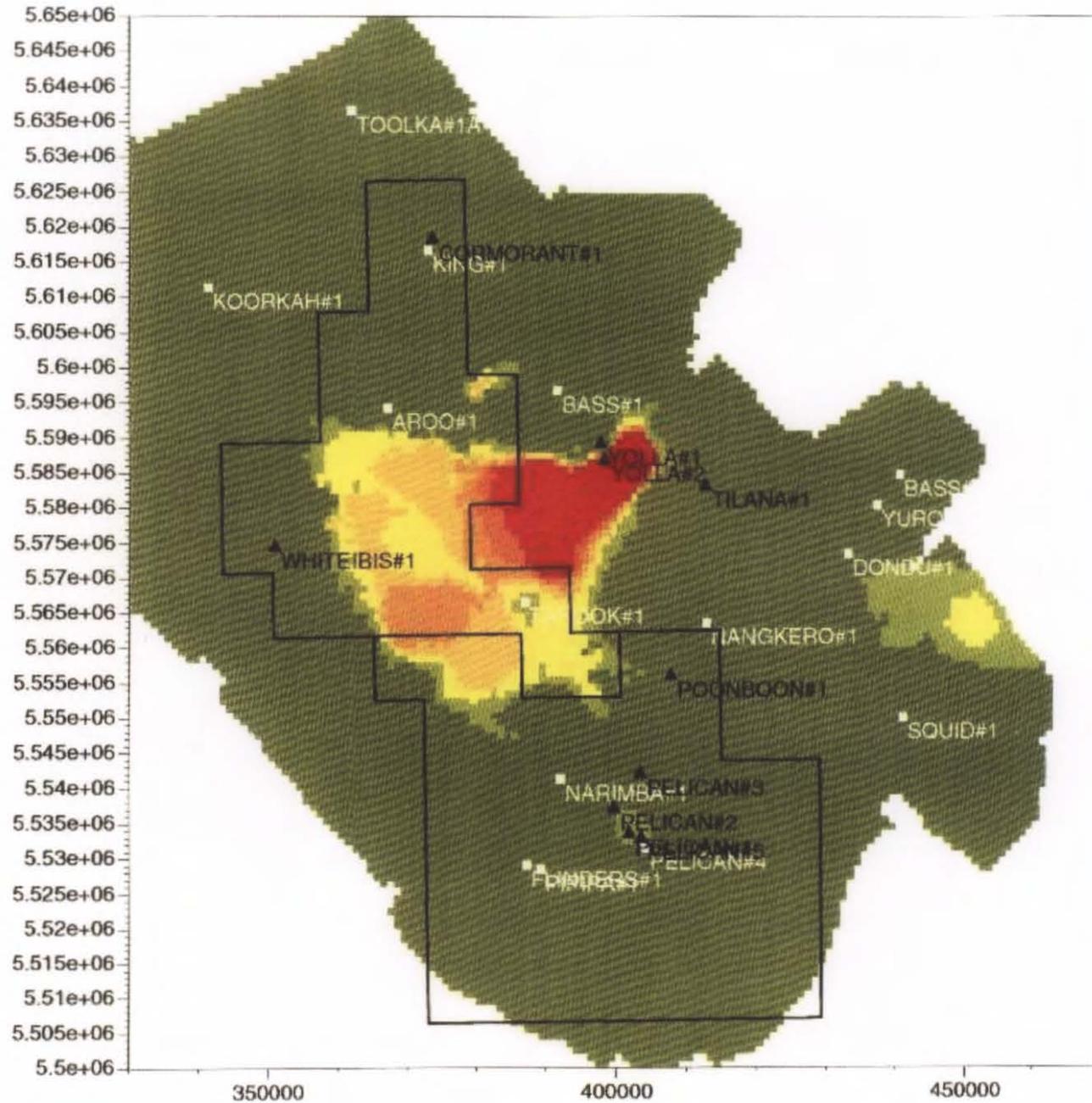
930.471

5 cm

Expelled gas from Otway "Poor" Assumption

567061

Vol



Vol

5 cm

T/18P Permit plan

- **Key issues**
- **Work plan for 1999**
- **Proposed permit renewal work program**
- **Areas proposed for relinquishment**

T/18P : Key issues

- 1 The joint venture wishes to renew the permit following expiry on 22 December 1998**
- 2 Trefoil is currently the most mature of identified leads & prospects, but further work is required to complete assessment and determine its viability for drilling**
- 3 All other identified leads require additional seismic data to adequately define them**
- 4 Other geophysical techniques, eg. aeromagnetic surveying, may be useful, but work is needed to evaluate this.**

T/18P : Work plan for 1999

- 1 Complete technical evaluation of Trefoil prospect**
 - Integrate AVO/inversion results to date with structural mapping
 - Conduct AVO replacement modelling with aim of determining likely sand quality, thickness and configuration, and fluid content
 - Integrate results of IFP study
 - Revise prospect volumetrics and geological risk assessment
- 2 Complete commercial evaluation of Trefoil drilling opportunity**
 - Integrate technical evaluation with development study results to determine whether Trefoil meets minimum economic criteria
- 3 If the drilling of Trefoil is determined to be commercially viable, commence drilling planning**
- 4 Review other leads and prospects**

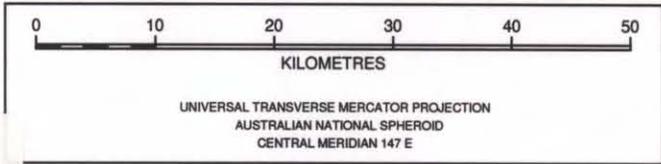
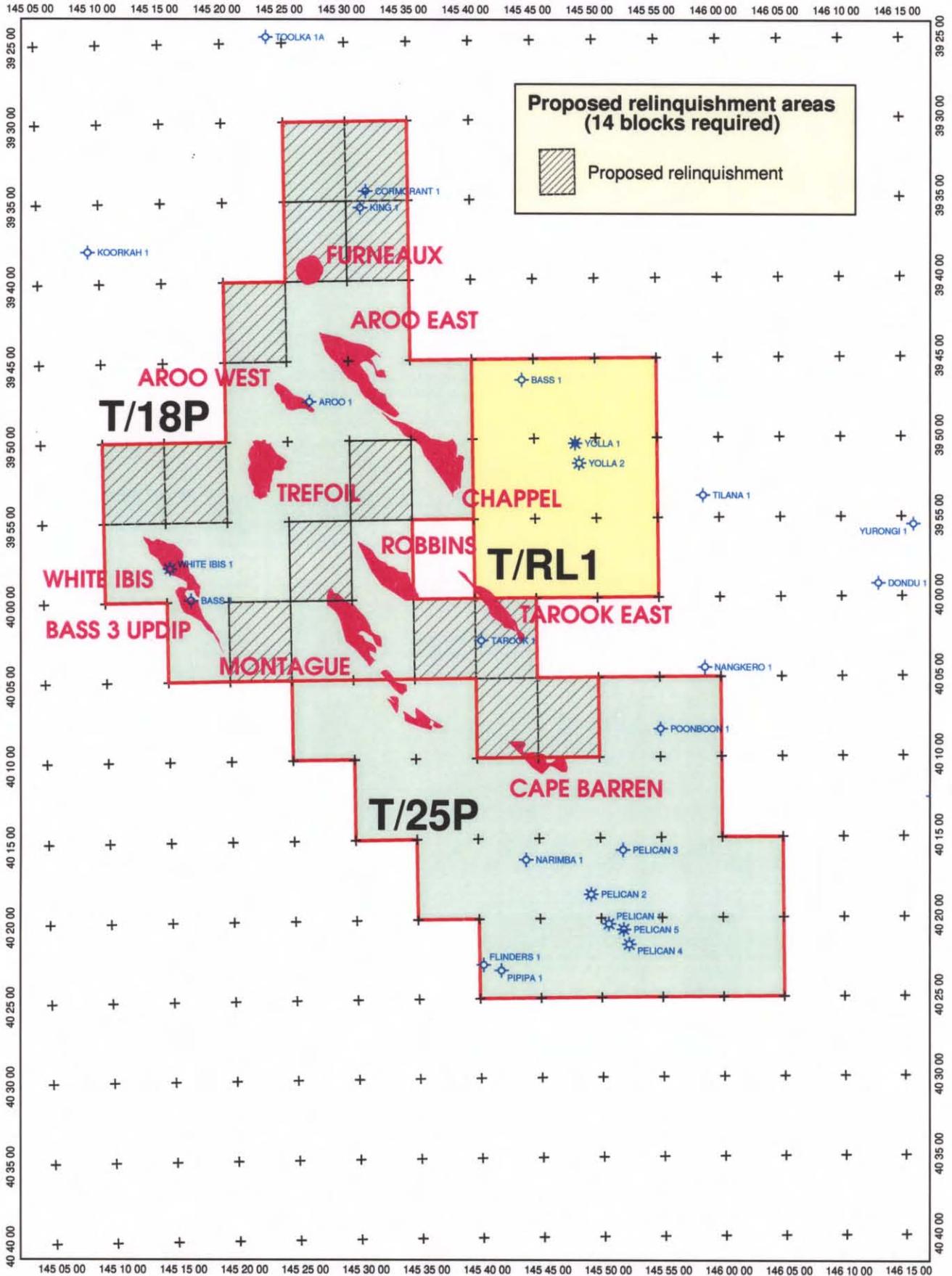
Continued

- 5 **Assess seismic program required to evaluate other potentially viable leads**
- 6 **Plan for acquisition of seismic program in year 2**
- 7 **Assess value of high resolution aeromagnetic data as an aid to evaluating prospectivity**
- 8 **If aeromagnetic data assessed to be of value, plan for survey in year 2**

T/18P proposed permit renewal work program

<u>YEAR</u>	<u>PROPOSED PROGRAM</u>	<u>INDICATIVE EXPENDITURE (A\$)</u>	<u>CONTINGENT* PROGRAM</u>
Guaranteed Primary			
1	G&G studies	150,000	Drill Trefoil
2	300 km 2D seismic survey	500,000	Aeromagnetic Survey
3	G&G studies	150,000	
Secondary			
4	1 well	10,000,000	* Not part of guaranteed work program
5	G&G studies	150,000	

T/18P, Bass Basin, Tasmania Proposed Relinquishment



5 cm