

CONFIDENTIAL

Note for file on the Vic/P41 Interpretation

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Contents

Introduction.....	1
Data Base	1
Well results	2
Sole-1	2
Dart-1	3
Hammerhead-1	3
Shark-1	4
Whaleshark-1	4
Northright-1	5
Seismic Interpretation	5
Mapping	6
Depth Conversion	6
Leads	7
Kipling Lead	7
Benchley Lead	7
Cotton Lead.....	7
Junger Lead.....	8
Wilde Lead.....	8
Scorpion Lead	8
Oscar Leads.....	8

Figures

- 1 Identified leads in Vic/P41
- 2 V₀-K Trends to Top Latrobe Group
- 3 V₀-K Trends Top Latrobe Group to Top Kate Shale
- 4 V₀-K Trends Top Latrobe Group to Top Golden Beach

Enclosures

- 1 Top Latrobe Group TWT Structure Map
- 2 Near Top Kate Shale TWT Structure Map
- 3 Top Golden Beach TWT Structure Map
- 4 Vic/P41 Bathymetry Map
- 5 Top Latrobe Group Depth Structure Map (calibrated)
- 6 Top Kate Shale Depth Structure Map (calibrated)
- 7 Top Golden Beach Depth Structure Map (calibrated)
- 8 Well and Seismic Line Location Map

Introduction

This note for file is intended as a summary of the Vic/P41 interpretation project. It is work in progress and will be revised accordingly. The area of interest and the identified leads are shown on Figure 1.

Data Base

The following 2D seismic data were loaded;

- GBS02 survey
- GEBR01 survey
- GEBR99 survey
- G94A northern lines (shared from another project)
- G92A survey
- GS91A survey
- G89A survey
- GS88B survey
- GH88A survey
- BMR87 2 lines
- GS 82A survey
- GS81A survey
- GS73A selected lines reprocessed 1988

No 3D seismic surveys have been acquired in Vic/P41.

The datum in which the project is stored and displayed is AGD66. It was learned after loading of data that a couple of the surveys were actually shot in AGD84, however the error margin, if any will be no more than 1-2 metres.

All surveys in the permit area were analysed for misties in correlation with the reliable G92A regional survey. No significant misties were observed, and consequently no mistie corrections were applied. Some seabed inconsistencies were observed during correlation, which were attributed to the sea bottom topography as they occurred in deep water surveys.

The G94A 2D seismic lines, present to the west of Vic/P41, were interpreted to extend trends and closures along the Rosedale Fault falling outside of the permit. Comparisons with the G92A regional survey showed misties in the data. Mistie analyses were then performed on the survey, and an average bulk shift of 30 ms was applied to each line in the G94A survey.

The following well data were loaded, representing all wells drilled in the permit area.

Dart-1
 Hammerhead-1
 Kipper-1 (outside area of interest, to the west)
 Northright-1
 Shark-1
 Sole-1
 Whaleshark-1

A revised biostratigraphic analysis was commissioned from Alan Partridge for the wells Hammerhead-1, Kipper-1 & Shark-1. Stratigraphic markers for Dart-1 and Whaleshark-1 were sourced from their respective well completion reports.

Wireline logs were loaded for the wells Hammerhead-1, Shark-1, Whaleshark-1 & Kipper-1. Wireline logs for Dart-1, Sole-1 and Northright-1 were reviewed on paper sections. Check shot data were loaded for all wells from the well completion report. Sonic logs were calibrated to the check shot data with some minor drifts observed and corrected. Synthetics were generated for the wells Hammerhead-1 and Shark-1.

Well results

Sole-1

Spud date:	1973
Operator:	Shell
Objective:	Top Latrobe (Eocene Latrobe Valley Formation sandstones)
Total depth:	1129 m
Total depth formation:	Strzelecki Group
Results:	Plugged and abandoned as gas discovery

Sole-1 was drilled to test an anticline associated with a right-lateral shear system, and a vertical closure of 280' was mapped at Top Latrobe. Lithologies similar to those of the Latrobe Group penetrated at Wahoo-1 were expected, and it was expected that oil would be found, since the prospect was located in an interpreted oil-prone part of the basin. Drilling confirmed (Esso's) structural interpretation, and the Latrobe lithologies penetrated were similar to those predicted. However, gas rather than oil was found, with some residual oil staining apparent in the gas column, and to a point 25 metres immediately below the gas/water contact. The base of the oil staining coincides closely with the structural spill-point.

Dart-1

Spud date:	1974
Operator:	Esso
Objective:	Top Latrobe
Total depth:	1219 m
Total depth formation:	Strzelecki Group (<i>C.hughesii</i>)
Results:	No hydrocarbon shows encountered

Dart-1 was a follow-up well to Sole-1, targeting a separate culmination at Top Latrobe, defined by an abnormally high amplitude response on seismic. The well encountered no hydrocarbon shows. The formation depths were generally as predicted, although the Top Latrobe was approximately 30 metres deeper, due to a faster velocity in the section than interpreted from seismic velocity analysis. The Latrobe section contained excellent reservoir sands, whose unconsolidated nature resulted in a decrease in interval velocity and formation density when compared to the overlying Gippsland marls. The combination of these effects generates a large negative reflection coefficient and was responsible for the high amplitude seismic event at the Top Latrobe.

Hammerhead-1

Spud date:	1982
Operator:	Shell
Objective:	Top Latrobe
Total depth:	2130 m
Total depth formation:	Emperor Subgroup
Results:	No significant hydrocarbon shows

Hammerhead-1 tested a potential upper Latrobe trap on the southern, basinward side of the Rosedale Fault System. Seismic interpretation showed a large closure of up to 25 km². Late Cretaceous-early Palaeocene (Latrobe) lower coastal plain source rocks with oil and gas potential were predicted to be present, as well as the possibility of Cretaceous (Strzelecki) mature gas source rocks.

The predicted lithologies were fairly accurate, although intra Latrobe seals were not well developed. No significant hydrocarbon shows were encountered in the well. The well, drilled as a vertical well, left the downdip lower Latrobe and Golden Beach sections untested as it passed into the upthrown block before they were reached.

Shark-1

Spud date:	1989
Operator:	Shell
Objective:	Top-Intra Golden Beach Group
Total depth:	3518 m
Total depth formation:	Emperor Subgroup (<i>P. mawsonii</i>)
Results:	No significant hydrocarbon shows

The primary objective of Shark-1 was to test alluvial sandstones in a downthrown fault trap at top and intra-Golden Beach Group levels. Top seal was expected to be provided by weathered volcanic rocks. The drill depths to the seismic markers are in very close agreement with the predicted depths, and the lithological and stratigraphical sequences encountered in the well were mostly as anticipated from regional mapping. The Latrobe Group consisted of a typical transgressive sequence from upper coastal plain to estuarine, however, the lowermost Latrobe Group comprised more upper coastal plain facies than the expected lower coastal plain facies. Instead of the expected weathered basalts, the top Golden Beach is marked by a tuffaceous pyroclastic sequence interbedded with sandstones and claystones. No significant hydrocarbon shows were encountered. Shell attributed failure to a lack of hydrocarbon charge, although recent seismic interpretation suggests a lack of structural closure.

Whaleshark-1

Spud date:	1992
Operator:	Esso
Objective:	Top Latrobe
Total depth:	2870 m
Total depth formation:	Latrobe Siliciclastics (<i>T. longus</i>)
Results:	No hydrocarbons encountered

The objective of Whaleshark-1 was to test the hydrocarbon potential of a Top Latrobe Group erosional remnant, interpreted to have 105m of mapped four way dip closure. The Top Latrobe Group was intersected 140 metres lower than predicted. It was found that the Top Latrobe was interpreted pre-drill to be 50msec too high, and that the interval velocity used to the top of the Latrobe during pre-drill mapping was too slow. The predicted top seal of the Lakes Entrance Formation was also much thinner than anticipated, and the predicted reservoir interval (Upper *T. Longus* sands) was intersected 217 metres lower than expected. No hydrocarbons were encountered in Whaleshark-1. The well results can be explained by; 1) the well was drilled outside closure at the top of porosity level; 2) reduced thickening and abundant faulting of the Lakes Entrance Formation makes it an ineffective top seal, or; 3) lack of access to mature source rocks since trap formation. Lack of closure is now considered the likely cause of failure.

Northright-1

Spud date:	2001
Operator:	Eagle Bay Resources
Objective:	Top Latrobe
Total depth:	391 m
Total depth formation:	Strzelecki Formation
Results:	No hydrocarbon shows encountered

The objective of Northright-1 was to test the integrity and hydrocarbon potential of a reverse fault structural trap set up at the top of the Latrobe Group reservoir. The fault trap was against a major east-west trending basin margin fault and updip from the known oil and gas accumulations of Sole and Leatherjacket.

The Latrobe Group sandstone was prognosed to be sealed by marls of Tertiary Lakes Entrance Formation and underlain by secondary objective sandstones of Late Cretaceous Golden Beach Group. The prognosed formation top depths closely match the actual depths. Early Cretaceous sandstone, litharenite and volcanics of the Strzelecki Group form the basement and underlie a Latrobe Group fluvial channel/flood and coastal plain sequence. Northright-1 did not encounter any hydrocarbon shows or significant gas concentration in either the primary or secondary reservoir objectives. It was plugged and abandoned upon reaching the Strzelecki Group. A lack of top or lateral fault seal is suggested to be reason for failure.

Seismic Interpretation

The seismic interpretation project is in IESX and Geoframe 4.0.3 format and mapping in Petrosys PC format. Projects are backed up onto Exabyte cartridge and an external hard disk.

The following significant seismic events and markers were correlated from well to seismic:

- Top Latrobe Group AK in all wells
- Near Top Kate Shale in Sole-1, Hammerhead-1 and Kipper-1
- Top Golden Beach Subgroup from Shark-1 to Kipper-1

In addition, a subcrop event at intra Latrobe was interpreted, as was the Top Strzelecki Group, where apparent.

These events were correlated from the wells into the seismic and were interpreted on every line.

Mapping

The data were exported to Petrosys. Every single CDP was transferred for the horizon data.

Data were gridded in time using a grid dimension of 200 by 200 m. Two-way time structure maps were generated with faults for the following horizons:

- Top Latrobe Group
- Near Top Kate Shale Formation
- Top Golden Beach Subgroup

These events are shown as enclosures 1 through 3.

Depth Conversion

Depth conversion was undertaken for the following layers:

Seabed

Top Latrobe Group

Top Kate Shale

Top Golden Beach

A seawater velocity of 1498m/s was used, more representative of the deeper water areas of Vic/P41.

Examination of the velocity depth trends for the wells in the region show a linear trend of velocity increasing with depth down to the top of the Latrobe group. A velocity depth trend was determined from Hammerhaed-1, Shark-1, Whaleshark-1 and Kipper-1 (see figure 2):

$$V = 2020 + 0.59 Z \text{ (Z is depth in metres from mean sea level)}$$

This was used to depth convert the top Latrobe Group reservoir level and resulted in depth conversion values accurate to less than 4% at the wells. The residual error was gridded and corrected to produce a depth map conformable with the well data.

In order to depth convert down to the Top Kate Shale and Top Golden Beach seismic events a second velocity depth trend was determined from the Hammerhaed-1, Shark-1, Whaleshark-1 and Kipper-1 well data (see Figures 3 and 4) with the equation;

$$V = 2600 + 0.27 Z$$

As for the Top Latrobe, this was used to depth convert down to these two deeper horizons, and the residual error, which was less than 2% and 0.5%, respectively, was corrected resulting in depth maps conformable to well data.

Depth structure maps have been produced for the following horizons:

- Sea bottom (bathymetry)
- Top Latrobe Group
- Top Kate Shale
- Top Golden Beach

These are included as enclosures 4 through 7.

Leads

A number of leads are currently identified from the depth mapping and are described below, and shown on figure 1.

Kipling Lead

Kipling is a downthrown fault closure along the Rosedale Fault mapped at Top Golden Beach level. It is analogous to the Kipper Field. Hammerhead-1 drilled into the upthrown fault block before testing this substantial mapped closure at this level. Top seal is interpreted to be provided by volcanics equivalent to those drilled in Kipper-1.

An areal and vertical closure of 45km² and 355m has been mapped in Vic/P41 and adjacent application area V02-3 (with 85% being in Vic/P41). The culmination is at about 1400m in Vic/P41. It is anticipated that 3D acquisition and further mapping will segment this lead into several smaller prospects.

Benchley Lead

The Benchley Lead is a downthrown fault closure along the Rosedale Fault mapped at Top Kate Shale level (other smaller closures are also identified along trend). Lateral fault seal and structural definition are significant risks. Benchley is distinct from the Kipling Lead in that closure at this shallower level is less extensive and more segmented than that mapped at Golden Beach level. The areal and vertical closure mapped is 8.4km² and 115m, with a culmination at 1300m.

Cotton Lead

The Cotton Lead is mapped at Top Kate Shale and Top Golden Beach levels and forms a downthrown fault closure along the Rosedale Fault. A significant Latrobe Group section is mapped within this closure of at least 360m vertically. Seismic facies suggests potential intraformational seals within this Latrobe section from marine shales, which could provide for stacked pay. Whilst closure is also identified at Top Golden Beach level, reservoir development is unknown, and intraformational sealing less likely. An areal and vertical closure of 9.6km² and 190m at Top Kate Shale and 7km² and 265m at Top Golden Beach have been mapped. Culminations for these two events are at 1460m and 1820m, respectively.

Junger Lead

The Junger Lead is a downthrown fault closure at Top Latrobe and Top Kate Shale levels, east of the Sole Gas Field. Lateral fault seal is a significant risk, although the same fault is interpreted to seal in Sole. At Top Latrobe level the structural closures are relatively small. At Top Kate Shale level, vertical and areal closures of 215m and 24km² have been mapped, with a culmination at 880m. Seismic coverage on this lead is currently very poor.

Wilde Lead

The Wilde Lead is a Top Latrobe truncation and fault trap, partly analogous to the Fortescue Field. Seismic coverage is currently very poor, although areal closure could potentially be over 100km². Significant lateral seal risks exist over this lead.

Scorpion Lead

Scorpion is a faulted anticline/upthrown fault block closure, originally mapped by Eagle Bay Resources, and confirmed by BSOC's own mapping. It has a significant depth conversion risk and is in a water depth of about 530m. BSOC identify the existence of a significant areal closure of 7.6km² at Top Kate Shale level and 5.3km² at Top Golden Beach level, although a significant part of the closure extends into Vic/P49 towards the south. The culmination at Top Kate Shale level is at 2210m and 2650m at Top Golden Beach level.

Oscar Leads

The Oscar Leads are a number of tilted fault closures at Top Golden Beach level, which require further seismic definition to mature.