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Seismic Interpretation and Mapping of the Vic/P47 Moby 3D (GAP04A) Seismic Survey

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Bass Strait Oil Company Ltd.

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Executive Summary

Bass Strait Oil Company Ltd is operator and joint venturer of Vic/P47. This report documents the seismic interpretation of the GAP04A Moby 3D survey shot in and adjacent to Vic/P47. The location of the survey is shown on figure 1.

The survey was undertaken by WesternGeco for Apache Energy Northwest Pty Ltd (under an agreement with Bass Strait Oil Company Ltd). The objective of the survey was to improve the structural definition of the Moby-1 gas discovery and the leads identified on the flanks of the Flathead Anticline. The Moby 3D (GAP04A) covers approximately 148 CMP km^2 and was acquired between 1st January and 15th January 2005 using the m/v Western Trident. WesternGeco in Perth processed the survey between February and May 2005.

Four wells have previously been drilled in Vic/P47, from Flathead-1 in 1969 to Moby-1 in 2004, with Whale-1 (1981) and Judith (1989) in between. Moby-1 is an undeveloped gas discovery. Judith-1 does not fall in the Moby 3D area. These wells and others surrounding the area of interest were used for well seismic correlation of the key reservoir and seal pair units of the Gurnard Formation / Lakes Entrance, the Kingfish Formation / Gurnard Formation, the Volador Formation / Kate Shale and the top of the Strzelecki Group (see stratigraphic summary for the Gippsland Basin on figure 2). The seismic events mapped are the Top Gurnard Formation, the Top Kingfish Formation, Top Volador Formation and Top Strzelecki Group. Time and depth maps were generated for these four horizons to identify structural prospects and leads. The enclosures of this report include these mapped events in time and depth, and two large scale seismic lines from the Moby 3D are also included.

The main structural element of the area is the Flathead Anticline, which strikes east-west through the centre of Vic/P47. The Moby 3D covers this structural high.

The survey delineated the likely extent of the Moby gas accumulation, which has been downgraded from a ‘reserve’ to a currently uneconomic gas accumulation as a result. The structural interpretation also confirmed the existence of a number of prospects and leads. The most significant prospects identified are Maclean and Walton. Maclean has been estimated to have prospective resource or recoverable reserves potential for oil (P90, P50, P10) of 43, 77 and 135MMb respectively. Risk assessments for Maclean have not been made. The main risk is considered to be failure of the lateral fault seal or seat seal. Lesser risks are that any oil will not be mobile or flow rates will be uneconomic due to severe biodegradation.

Introduction

This report documents the seismic interpretation and mapping of the Moby 3D (GAP04A) seismic survey acquired in Vic/P47 in the offshore Gippsland Basin by Bass Strait Oil Company Ltd, the permit operator. The survey was acquired between 1st January and 15th January 2005. The area of interest is shown on Figure 1.

Database

The database of wells and seismic is shown on Enclosure 1.

The Moby 3D, VIC/P47 (Gippsland Basin) Marine Seismic Survey was conducted in Bass Strait, Victoria by WesternGeco, under client project number GAP04A by Apache Energy Northwest Pty Ltd for Bass Strait Oil Company Ltd. The objective of the survey was to delineate the extent of the gas accumulation encountered in Moby-1 drilled in October 2004 by Bass Strait Oil Company Ltd, east of the producing Patricia/Baleen fields. In addition, the survey was designed to delineate prospects on the southern flank of the Flathead Anticline.

The survey consists of approximately 148 CMP km^2 of data. The field data were acquired by WesternGeco (m/v Western Trident). Data processing was carried out between February and May 2005 by WesternGeco in Perth.

The key acquisition parameters of the survey are indicated in Table 1 below.

Recording

Recording type:	MSX
Recording medium, format:	3590B cartridge, SEGD 8058, Revision 1
Record length:	5120 ms
Sample rate:	2 ms
Low cut filter:	2 Hz, 12 dB/octave
High cut filter:	206 Hz, 264 dB/octave

Source

Source type:	Tuned sleevegun array
Number of source arrays:	2
Source array separation:	50 m
Shotpoint interval:	18.75 m flip/flop (37.5 m/array)
Array volume per source:	3000 cu in
Operating pressure:	2000 psi
Source depth:	7 m
Number of sub-arrays/source:	4
Sub-array separation:	6 m
Number of airguns/sub-array:	8

Sub-array length:	15.1 m
Nominal CMP fold:	64

Streamer

Streamer type:	MSX solid streamer
Number of streamers:	8
Group length:	17.75 m
No. of hydrophones/group:	14
Group interval:	12.5 m
Hydrophone sensitivity:	13.8 v / bar
Streamer length:	4800 m
Streamer depth:	8 m
Streamer separation:	100 m
Number of groups/streamer:	384
Nearest offset (nominal):	238 m

Navigation

Primary navigation system:	Cnav
Secondary navigation system:	Fugro Multifix 4
Tertiary navigation system:	Trinav GPS 2.6

Table 1 – Moby 3D (GAP04A) survey acquisition parameters

The data were processed through a prestack sequence consisting of 2 passes of SWATT, Tau-P linear noise attenuation, DBS, 3D bin regularisation by interpolation, 3D PreStack Time Migration, Radon multiple attenuation. On the whole, three passes of velocity analyses were performed; 1st pass at 1 km x 1 km grid, 2nd and 3rd pass were at 0.5 km x 0.5 km grid. The data were full offset stacked and angle stacked with final (3rd pass) picked velocities then followed by poststack crossline trace interpolation from 25 m to 12.5 m.

Line GAP04A1200P1002 was chosen as primary test line. Occasionally, additional testing for additional test lines were carried out to further improve the data quality when necessary. Testing was performed concurrently with the production. The Moby 3D was loaded to the Geoquest workstation and ties checked with the intersecting 3D seismic data. The following 3D seismic volumes for the Moby 3D were loaded; unfiltered PSTM, filtered and scaled PSTM, near offsets PSTM, mid offsets PSTM and far offsets PSTM. The filtered and scaled version was used for the main interpretation, although amplitude anomalies were examined on the unscaled version as required. The velocity functions used to derive the angle mutes were calculated from the smoothed final velocity field. The ‘nears’, ‘mids’ and ‘fars’ angle stacks were loaded to allow a subjective inspection of AVO effects, however due to the separation of the nearest offsets and the shallow target depth the ‘nears’ show little resolution of the target. The 3 angle stack volumes generated were:

Near: 0^{O} - 14^{O}
Mid: 14^{O} - 28^{O}

Far: 28^{O} - 42^{O}

Time slices were generated at intervals of 20msec for use in the interpretation.

The following additional 3D and 2D seismic data were also loaded:

- GC00A Baleen 3D PSTM data acquired in 2000
- Northern Fields ingress data 3D; acquired in 2001/2002 by Esso Australia, the field data ingressing Vic/P47 was processed for Bass Strait Oil Company Ltd by Velseis in Brisbane to 'post stack' migration
- G92A survey, 2D data acquired 1992
- G92D survey, 2D data acquired 1992
- GB79 survey, 2D data acquired 1979 and reprocessed by Shell in 1990
- GL88A survey, 2D data acquired 1988 and reprocessed by Shell in 1990

The seismic database is shown on Enclosure 1.

Well to seismic correlation

The following well data were loaded for well to seismic correlation.

- Baleen 1
- Flathead-1
- Judith-1
- Moby-1
- Patricia-1
- Sperm Whale-1
- Sweep-1
- Whale-1

Wireline logs were loaded for the wells. Sonic logs were calibrated to the check shot data with some minor drifts observed and corrected. Synthetic seismograms have been generated for the following wells in order to improve the well to seismic correlation and the suitability of events mapped; Baleen-1, Judith-1, Patricia-1, Moby-1 & Whale-1.

Well results

The well results in the area of interest are summarised below for reference.

Flathead-1

Spud date:	1969
Operator:	Esso
Objective:	Top Latrobe

Total depth:	1066 m
Total depth formation:	Strzelecki Group
Results:	Flathead-1 was drilled in a crestal position on the Flathead Anticline, 2km NE of Moby-1. It was plugged and abandoned as a potential oil discovery in the Kingfish Sandstone, with good gas shows in the Gurnard Formation siltstone. Oil was extracted from Kingfish Formation core with an API gravity of 14.6^{O} and 50 centipoise. Flathead-1 failed to encounter suitable reservoirs within the Gurnard Formation. The reservoir quality at the crest of the structure at Flathead-1 was very poor within the Gurnard Formation (where excellent gas shows suggest it is part of the downdip accumulation) with only minor fine grained sandstones and siltstones. Within the Kingfish Formation, 6m of coarse sandstones were encountered with good oil shows. It is not known if this oil is live or residual. Oil extracted from core at Flathead-1 was severely biodegraded in quality and likely flow rates posed a risk for any oil development on Moby.

Baleen-1

Spud date:	1981
Operator:	Hudbay Oil (Australia) Ltd
Objective:	Top Latrobe
Total depth:	1030 m
Total depth formation:	Strzelecki Group
Results:	Baleen-1 was drilled to test an anticline formed against a high angle reverse fault. Closure was mapped at Top Latrobe and Top Strzelecki. Gas was tested on DST's from two zones over intervals 700-706m (1.8MMscf/d dry gas) and 662-670m (6.3MMscf/d dry gas). The gas was encountered in the Gurnard Formation with log derived porosities ranging from 25-30%. However, formation permeability is only 56mD. No pay was encountered in the Kingfish Formation.

Whale-1

Spud date:	1981
Operator:	Hudbay Oil (Australia) Ltd
Objective:	Top Latrobe
Total depth:	810 m
Total depth formation:	Strzelecki Group

Results:	Drilled in a crestal position on the Flathead Anticline, 5 km NE of Moby-1. Excellent oil shows in Latrobe sandstone and Gurnard Formation, with some minor gas shows, although testing failed to recover fluids. Oil extracted from SWS cores in Gurnard Formation had API gravity from 19.9-22.3 degrees. Whale-1 failed to encounter suitable reservoirs within the Gurnard Formation.

Sperm Whale-1

Spud date:	1981
Operator:	Hudbay Oil (Australia) Ltd
Objective:	Top Latrobe and Top Strzelecki
Total depth:	1417 m
Total depth formation:	Strzelecki Group
Results:	Sperm Whale-1 was drilled to test an anticline formed against a high angle reverse fault. Closure was mapped at Top Latrobe and Top Strzelecki. Plugged and abandoned as a gas well with an oil leg, it flowed 5.4MMscf/d dry gas on DST from the interval 819-826m and degraded oil was encountered on RFT over the interval 831.5-833.5m.

Leatherjacket-1

Spud date:	1986
Operator:	Esso
Objective:	Top Latrobe
Total depth:	951 m
Total depth formation:	Strzelecki Group
Results:	The well drilled a dominantly fault dependent closure situated on the highside of a NE-SW trending inverted normal fault. A 25.5m gross oil bearing section was discovered in the upper Latrobe Group ‘Coarse clastics’ and a further 7.7m gross oil column was discovered in the deeper Latrobe Group.

Patricia-1

Spud date:	1987
Operator:	Lasmo Energy Australia Ltd
Objective:	Top Latrobe
Total depth:	900 m
Total depth formation:	Strzelecki Group

Results:	The well was located 2.5km SSE of Baleen-1 to test the extent of that discovery on a possible southern extension of the field. It was also expected to test the presence of any oil leg. The well encountered a total gas column of 50m reservoired in both the Gurnard and Barracouta formations. A gas water contact was encountered at 750mRT. The well was plugged and suspended as a gas producer.

Judith-1

Spud date:	1989
Operator:	Shell
Objective:	Lower Golden Beach
Total depth:	2958 m
Total depth formation:	Golden Beach Group
Results:	Judith-1 targeted Emperor Subgroup sediments within a rotated fault-block along the Rosedale Fault System. The well was plugged and abandoned as a gas discovery within Emperor Subgroup sediments. The well was also designed to test the updip extent of the Kipper Field's upper Golden Beach Subgroup reservoirs (post-drill re-assigned to the Golden Beach Subgroup – Chimaera Formation) with results indicating that the Kipper Fault bound them to the north. Strong gas shows were recorded whilst drilling, within multiple Kipper Shale and Admiral Formation sands. The onset of strong gas shows coincided with the well passing into the upthrown side of the Judith Fault at 2391m. Petrophysical re-interpretation (Locke, 2004) interpreted the presence of six possible multiple stacked gas columns from pretest results; spread over four gross sand packages with a total of 171.4m net pay.

Moby-1

Spud date:	2004
Operator:	Bass Strait Oil Company Ltd
Objective:	Gurnard Formation
Total depth:	660 m
Total depth formation:	Strzelecki Group
Results:	The well was plugged and abandoned as a gas discovery, with oil shows. The Moby-1 well was designed to test the Moby Prospect, primarily to target a seismic amplitude anomaly identified on the Baleen 3D survey, interpreted to

represent gas within reservoirs of the Gurnard Formation. Although the Moby Prospect is located on a significant anticline with over 70km^2 areal closure, the structure had previously been drilled by Flathead-1 and Whale-1 in a crestal location and which both failed to encounter suitable reservoirs within the Gurnard Formation. It was anticipated that Moby-1 would encounter improved reservoir development in a downdip location. Log evaluation, analysis of RCI pressure and sampling data and core analysis confirms the likely presence of a 21m gross column of gas within the Gurnard Formation, with an estimated free water level at approximately 555mTVDSS. Core measured porosities through the Gurnard Formation average 36.8% (31.6-39.2%), while measured permeabilities are in the range of 102-1850md (average 543 md). These latter figures are some 30% higher than those recorded from petrophysical analyses and do not reconcile with the low mobilities observed with the RCI tool and with the general log response expected from gas-filled sands of such high permeability and porosity.

Seismic Interpretation

The seismic interpretation project was undertaken in IESX and Geoframe 4.2 with mapping in Petrosys PC.

The key horizons, Top Gurnard Formation, Top Kingfish Formation, Top Volador Formation and Top Strzelecki Group were interpreted on every 10th inline and xline. The most significant observation on the Baleen 3D dataset is that the top Gurnard Formation reservoir sequence is nearly always marked by a decrease in acoustic impedance contrast relative to its overburden. When the Gurnard reservoir is gas bearing, as in the Patricia and Baleen Fields, the event experiences a sharp drop in acoustic impedance compared to water filled sands. This significantly increases the confidence in its interpretation and identifies areas most likely to be gas filled. The interpretation of the Gurnard Formation reservoir became problematic towards the South into Judith-1, as the sequence diverges. A significant top Latrobe ‘coarse clastics’ event was not apparent on the crest of the Flathead Anticline due to the thin reservoir section encountered, and therefore could not be mapped on seismic. A large part of the Latrobe Group is interpreted to subcrop along the southern flank of the Flathead Anticline. The top Volador Formation, tied to Judith-1, only exists in Vic/P47 south of Flathead- 1 towards the Central Deep and can be mapped with some difficulty through the Northern Fields 3D area. It was selected as it marks a major ‘intra-Latrobe’ reservoir sequence, and is at base of the regional Kate Shale seal. The top Strzelecki Group seismic event is always recognisable due to the existence of a steep angular unconformity and resulting event

terminations. The term 'top Strzelecki Group' as used here may include the Emperor Subgroup, for example as identified in Judith-1 to the south.

Interpretation of the Vic/P47 Moby 3D seismic data indicates that the Flathead Anticline, which contains the Moby Gas Field, is split by a number of significant faults. These faults effectively 'compartmentalise' the gas field and at the same time offer further potential for additional petroleum accumulations in undrilled fault blocks (eg Maclean Prospect).

The fault block in which the Moby-1 gas discovery was drilled is interpreted to not be in communication with the other to the east, as there is some indication from seismic data that the gas, which generates a significant anomalous response, is sealed against the fault (see Enclosure 7). This will significantly reduce the field size and potential 'reserves'. Interpretation of the area to the east of Moby is masked by the Flathead gas chimney which makes interpretation over the crest problematic.

Mapping

The data were exported to Petrosys PC. Every fourth CDP and every inline were exported for the 3D data.

TWT data were gridded for the Moby 3D interpretation using a least squares algorithm and a grid dimension of 50 by 50 m. Two-way time structure maps were generated with faults over the area of the Moby 3D for the following horizons:

- Top Gurnard Formation TWT
- Top Kingfish Formation TWT
- Top Volador Formation TWT
- Top Strzelecki Group TWT

These events are shown as enclosures 2 through 5.

Depth Conversion

Depth conversion was undertaken for the following layers:

- Top Gurnard Formation
- Top Kingfish Formation
- Top Volador Formation
- Top Strzelecki Group

The Moby 3D final stacking velocity data were used for the depth conversion of the horizons in the 3D area below seismic datum. These were velocities in the third pass 500m analysis, effectively giving a stacking velocity point at every 20th inline and xline.

In order to load the stacking velocity data into Petrosys the Western 3D format was first converted to a format with transposed inlines and xlines, then converted to a 'pseudo 2D' format by Petrosys Pty Ltd that is compatible with their software. Interval velocity points were determined from the stacking velocities for the following horizon intervals; Seismic datum to Top Gurnard and Seismic datum to Top Strzelecki. This is due to these being the only horizons present or interpretable at the well locations. The Top Kingfish and Volador events were correlated from wells outside the Moby 3D area, so could not be tied to wells using the Moby 3D stacking velocities. Examination of the velocity data indicated that there were no strong lateral velocity variations in the Tertiary section. This is often an issue in the Gippsland Basin due to the existence of submarine canyon sequences with laterally varying velocities.

Interval velocities for these two sequences were found to be geologically reasonable and were gridded and smoothed using a Bartlett 5 filter (moderate smoothing). The depth conversion was applied using the smoothed interval velocity grids from the stacking velocities and for these two events it was found to be between 11 and 30m deep at the three wells. This error was considered to indicate a high level of accuracy in these velocities. The depth grids were corrected to these three wells using krigging and final depth maps generated for the Top Gurnard and Top Strzelecki events. An isopach map of the Latrobe Group was generated by subtracting the Gurnard from Strzelecki layers and is shown in Enclosure 11. Depth conversion for the Top Kingfish and Volador events was more problematic in that it could not be tied to the wells. Interval velocity was determined for the Top Gurnard to top of these two events and heavily smoothed before being applied in a layer cake approach hung from the Top Gurnard. Due to the erosion of the Top Gurnard Formation in the south of the 3D area there is a data gap in the depth mapping of these two events.

A Halibut Subgroup Isopach was created from the top Kingfish Formation and Top Strzelecki Group events, this was used to highlight the Maclean Prospect on the southern flank. The depth converted horizons and isopachs are included as enclosures 6 through 12.

Geological setting

Vic/P47 is located offshore on the northern margin of the Gippsland Basin, straddling the Northern Platform and Northern Terrace, approximately 350 km east of Port Melbourne. The southern or 'neck' portion of the permit that incorporates the Moby 3D lies to the south of the Lake Wellington Fault System that separates the platform from the terrace. The generalised stratigraphic column reflecting the Early Cretaceous to Recent gross lithostratigraphic units of the Gippsland Basin (Figure 2) summarises much of the following discussion.

Geological Evolution

The east-west trending Gippsland Basin was formed as a consequence of Gondwana break-up (Rahmanian et al 1990; Willcox et al 1992; Willcox et al 2001; Norvick & Smith 2001; Norvick et al 2001) and the basin evolution is recorded by several depositional sequences that range from Early Cretaceous to Recent in age (Thomas et al 2003).
The profound tectonic control on sedimentary systems in the basin is exemplified by several basin-wide angular unconformities that are easily recognised on seismic sections. Other time-breaks are only recognised using biostratigraphic age determinations delineating missing sections. This is of particular relevance in the context of the upper Latrobe Group, where extensive channel incision and subsequent infill processes resulted in complex sedimentary sequences that developed at slightly different time intervals, the extent of which cannot be resolved by seismic mapping alone.

Tectonic History

The Gippsland Basin is an asymmetric graben formed by the incipient break-up of Australia and Antarctica (Otway Rift) during the earliest Cretaceous (130-96 Ma). As part of this Early Cretaceous rift system, the Gippsland Basin architecture initially featured a classic extensional geometry consisting of a depocentre (the Central Deep) flanked by platforms and terraces. These are defined by the Rosedale and Lake Wellington Fault systems on the northern basin margin and by the Darriman and Foster Fault systems on the southern margin. The Central Deep hosts most of the oil and gas fields and, to the east, is characterised by rapidly increasing water depths which exceed 3000m in the Bass Canyon (Hill et al 1998). The eastern boundary of the basin is defined by the Cape Everard Fault System, a prominent NNE-striking basement high clearly evident from the aeromagnetic data (Moore & Wong 2002).

Crystalline basement is formed by the low grade metamorphic and igneous rocks of the Palaeozoic Tasman Fold Belt that have a general north-south tectonic grain and are cross-cut by NE-SW trending basement-involved fault zones formed during the Cretaceous rift phase.

Australia commenced its separation from Antarctica during the Cenomanian. The plate suture did not extend into the Gippsland Basin, but instead continued down the western side of Tasmania. The break-up created an unconformity at the end of the Early Cretaceous, not only in those basins where new oceanic crust formed but also further east in the Bass and Gippsland Basins.

Initial rifling in the Early Cretaceous resulted in 30% crustal extension (Power et al 2001) and created a complex system of grabens and half-grabens. A compressional phase accompanied by uplift occurred between 100 and 95 Ma which has been linked to the separation of Australia from Antarctica (Duddy & Green, 1992). This produced a new basin configuration and provided the accommodation space for large volumes of basement derived sediments. A second phase of crustal extension, produced by rifting between Australia and the Lord Howe Rise (Tasman Rift), began at the end of the Early

Cretaceous and produced northwest-southeast oriented basement-involved normal faults and established the Central Deep as the main depocentre. The first marine incursion is recorded by Late Santonian sediments in the eastern part of the basin (Partridge, 1999). Many: of the earlier generated faults were reactivated during this tectonic phase.

Rifting was followed by the development of a margin-sag basin characterised by rapid subsidence. Extensional tectonism prevailed until the Early Eocene and produced pervasive NW-SE trending normal faults. By the Middle Eocene, sea-floor spreading had ceased in the Tasman Sea and a period of compressional tectonism began to affect the Gippsland Basin, initiating a series of NE to ENE trending anticlines (Smith. 1988). Compression and structural growth peaked in the Middle Miocene and resulted in basin inversion. All the major fold structures at the top of the Latrobe Group which became the hosts for the large oil and gas accumulations such as Barracouta, Tuna, Kingfish, Snapper and Halibut are related to this tectonic episode.

A second regional event at this stage was a widespread mid-Eocene marine transgression that is recognised in the Gippsland, Taranaki and southern Australian margins (Norvick et al, 2001). Plate reorganisation occurred at this time leading to the onset of fast spreading south of Australia, obduction in New Caledonia and other movements in New Zealand. The Lakes Entrance Formation became a widespread depositional unit at this time and was succeeded by prograding carbonate wedge deposits of the Gippsland Limestone that continue to be deposited today.

Tectonism has continued to overprint the basin as documented by localised uplift during the Late Pliocene to Pleistocene. This is also reflected in the uplift of Pliocene sediments on the Barracouta, Snapper and Marlin anticlines as well as around the township of Lakes Entrance on the Victorian coastline. Ongoing tectonic activity is episodically recorded by seismic events around the major basin bounding faults.

The superposition of different age structures in the Gippsland Basin has produced a structural style characterised by multi-directional fault, fold and erosional patterns, allowing a range of trapping mechanisms, from large anticlines to complex, fault-controlled rotated blocks and truncation plays. The timing of the structuring, specifically the large compressional anticlines initiated in the Late Eocene, is particularly critical to the entrapment of most of the hydrocarbons in the basin, as the key geometry of the traps was in place prior to the generation of most of the oil and gas.

Prospects and Leads

A number of new prospects are identified and described below and shown on figure 3.

Maclean Prospect

The Maclean Prospect is a downthrown fault closure on the southern flank of the Flathead Anticline, with a wedge of Halibut Subgroup reservoir developed on the

downthrown side of the fault. Cross fault sealing is envisaged against the Strzelecki Group in the upthrown fault block. Top seal is provided by the Gurnard Formation or, less likely, the Lakes Entrance Formation.

The main reservoir target is the Kingfish Formation of the Halibut Subgroup, which is interpreted to thicken significantly southwards and eastwards over the Maclean Prospect (and 'sister' Walton Prospect) on the southern flank of the Flathead Anticline. This sandstone reservoir has good porosity and permeability and is the main producing reservoir of the Gippsland Basin oil and gas fields. The Kingfish Formation reservoirs are now known to be predominantly absent on the shallow areas of the Flathead Anticline and in the Moby-1, Flathead-1 and Whale-1 wells. A secondary reservoir target is the deeper Volador Formation of the Halibut Subgroup, which is known to pinch out on the southeastern flank of the Flathead Anticline (the Walton Prospect). This sandstone reservoir has good porosity and permeability. A significant eastwards thickening of the Volador Formation occurs across the Maclean structure and is the reason for locating Maclean A on the eastern culmination. The existence of an amplitude anomaly within the Gurnard Formation near the culmination of Maclean suggests it may be gas bearing there, although the anomaly is not present at the proposed well location. This is considered to be due to the Gurnard Formation being non-reservoir at the well location and therefore not an objective. The amplitude anomaly does not extend significantly laterally or downdip over Maclean, indicating any hydrocarbons that may be present within the deeper Halibut Subgroup sequence are likely to be oil.

Good oil shows were encountered in a veneer of coarse-grained Latrobe in Flathead-1 and Whale-1 updip of Maclean-A, although Moby-1 encountered formation water in this same sequence. This sequence in Moby-1 was only 2.5m and may not be in communication with the other wells or Maclean. The oil shows in SWS and cuttings were excellent in all three wells and oil was also extracted from a core of the Halibut Subgroup section in Flathead-1. Based on recent petrophysical evaluation work, no unequivocal conclusions can be made on whether Flathead-1 and Whale-1 were actually oil discoveries or not, although it is considered more likely that they represent 'residual' oil shows than 'mobile' oil discoveries. Leatherjacket-1 was drilled 21km ESE of Maclean on a similar fault controlled structure, and encountered 32m of gross oil pay, with pressure data indicating two separate oil accumulations. Leatherjacket appears to have encountered a comparable section to that expected in Maclean and represents a similar and successful test of this play, therefore intraformational sealing may occur in the Maclean Prospect.

There is some indication from Flathead-1 that porous sandstones within the Strzelecki Group were encountered with core porosities between 25 and 35%. However, the prevalent lithic fragments and developed chlorite cements give rise to anomalously low permeabilities for such high porosities, with values typically between 1 and 100mD. The seismic data do not show any amplitude anomalies or flat spots continuing into interpreted Strzelecki Group sediments. This porosity is most likely isolated to areas of subareal exposure on the crest of the Flathead Anticline. The Strzelecki Group is

considered both a lateral fault and seat seal in Maclean, with the identified Strzelecki porosity posing a seal risk, although less significant in this non-crestal location.

The maximum mapped areal closure for Maclean extends into permit L21 to the west at its downdip limit, taken to be the cessation of top Kingfish Formation faulting to the east (see Enclosure 8). This maximum areal closure is 16.4 sq. km, with 14.1 sq km in Vic/P47 (86%). The mapped gross reservoir sequence is bound by the Top Kingfish Formation event and the Top Strzelecki Group event.

Maclean Prospect prospective resource estimates

These estimates are based on Vic/P47 only, not the possible extension into L21 to the west (although only a small fraction of the 'upside case is likely to exist in L21). The prospective resource or recoverable reserves potential for oil is P90, P50, P10 of 43, 77 and 135MMb respectively. Risk assessments for Maclean have not been made. The main risk is considered to be failure of the lateral fault seal or seat seal. Lesser risks are that any oil will not be mobile or flow rates will be uneconomic due to severe biodegradation.

Walton Lead

Walton is an anticlinal "rim" oil play along the southeastern edge of the Flathead Anticline, within Halibut Subgroup reservoirs, which relies on stratigraphic pinchout seal. Its main risks are that water was tested updip within Flathead-1 and Whale-1, and oil viscosity / biodegradation. Seismic definition of Walton east of the Moby 3D is unavailable as even 2D coverage is extremely poor.

Moby Gas Accumulation

Assessment of the Moby 3D survey indicate that the amplitude anomaly, which has been shown to represent the gas accumulation sampled at Moby-1, is not continuously extensive over the Flathead Anticline. The distribution of the anomaly exhibits the potential for several discrete accumulations (see Enclosure 7), some of which also have amplitude anomalies. The Moby-1 well intersected and sampled the westernmost of these and the 'Moby' accumulation is likely restricted to a reduced section of this western area.

It is therefore expected that the segmentation of the Moby accumulation has significantly reduced its earlier (pre-3D) perceived potential. The 'proven' gas in place is now restricted to the area penetrated by Moby-1 and possibly as far updip as Flathead-1. Reservoir quality in Moby-1 was shown to be relatively poor (although comparable but thinner than the Patricia/Baleen wells) and it decreases in quality towards Flathead-1. Further, given the reduced size of the Moby accumulation, BAS no longer believes that it can be classified as a 'reserve', which implies a commercially viable resource, but rather as a 'resource' which carries no implication of ultimate commerciality.

Summary

The Moby 3D (GAP04A) was acquired over approximately 148 CMP km^2 between 1st January and 15th January 2005 using the m/v Western Trident. WesternGeco in Perth processed the survey between February and May 2005. The 3D data were loaded into an existing database of seismic and well data for interpretation.

The Moby 3D seismic data is of a good quality, and tied well with the existing 3D and 2D data. Mapping was undertaken of the key events for determining prospectivity, being the Top Gurnard Formation, the Top Kingfish Formation, Top Volador Formation and Top Strzelecki Group. Time and depth maps were generated for these four horizons to identify structural prospects and leads and gain an insight into the extent of the Moby Gas Field.

The structural interpretation has confirmed the existence of a number of prospects and leads. The most significant prospect identified being Maclean. Maclean has been estimated to have prospective resource or recoverable reserves potential for oil (P90, P50, P10) of 43, 77 and 135MMb respectively. Risk assessments for Maclean have not been made. The main risk is considered to be failure of the lateral fault seal or seat seal. Lesser risks are that any oil will not be mobile or flow rates will be uneconomic due to severe biodegradation. A stratigraphic subcrop lead Walton, has also been identified but this requires further seismic definition.

Likely segmentation of the Moby accumulation has significantly reduced its earlier (pre-3D) perceived potential. The 'proven' gas in place is now restricted to the area penetrated by Moby-1 and possibly as far updip as Flathead-1. BAS no longer believes that it can be classified as a 'reserve', which implies a commercially viable resource, but rather as a 'resource' that carries no implication of ultimate commerciality.

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