



LAKES OIL N.L.

(ACN 004 247 214)

As operator for

PETRO TECH PTY LTD

(ACN 009 116 429)

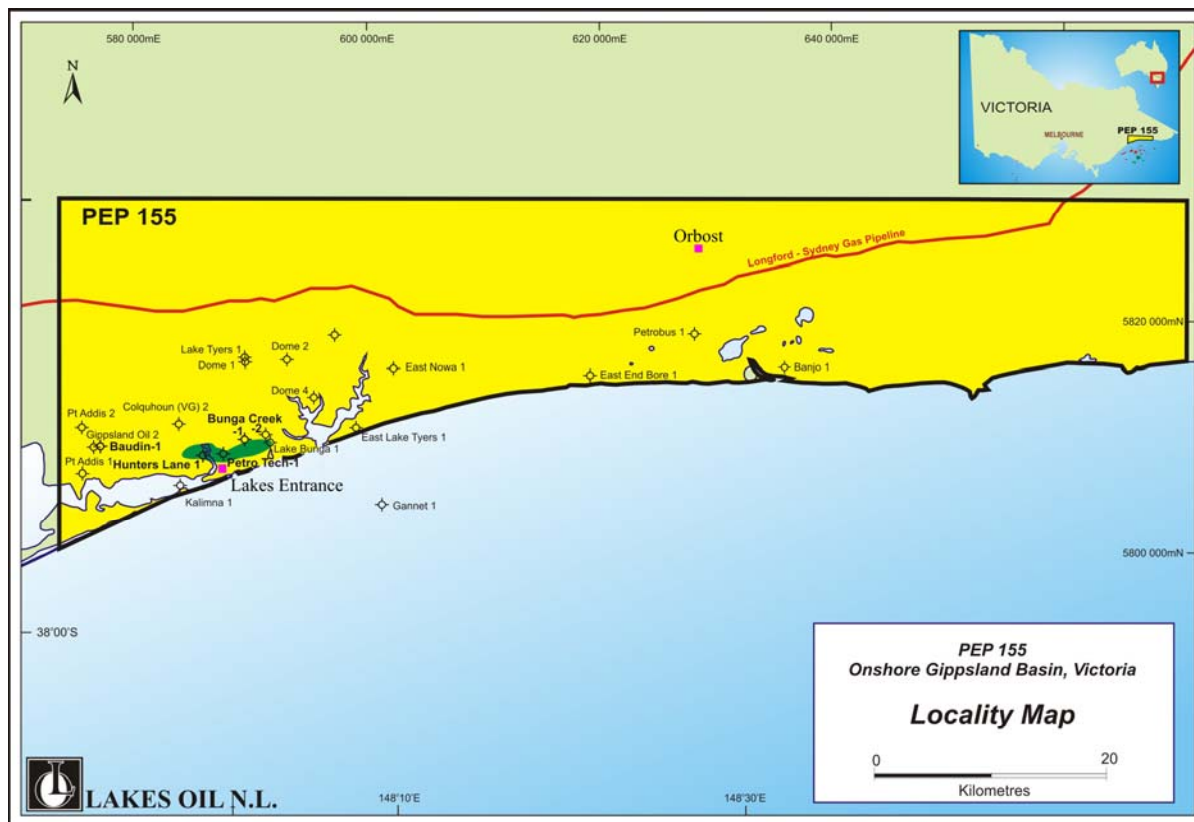
Permit holder

**PEP 155
ONSHORE GIPPSLAND BASIN**

FINAL REPORT

17 August 2000 to 28 August 2006

May 2007



PEP 155 SUMMARY

PEP 155 is located along a westerly extension of the rich hydrocarbon producing Gippsland Basin. The upper section of dominantly carbonate rocks comprises lower glauconitic marl and mudstone unit of Oligocene aged Lakes Entrance Formation overlain by limestones and marls of the Miocene aged Gippsland Limestone Formation. Both units constitute the Seaspray Group and can be up to 500 m thick. Younger thinner mixed clastic and limestone units of the Tambo River and Jemmys Point Formation overlie the Gippsland Limestone. The highly productive offshore Latrobe Group thins onshore into PEP155 where it becomes known as the Latrobe Valley Group. In PEP155 the Latrobe Group underlies the Lakes Entrance Formation which at Lakes Entrance can contain degraded oil. Deposits of this nature were considered to be possible targets in PEP155, sourced from the Latrobe and Strzelecki Groups underneath. The Latrobe Valley Group contains some brown coal deposits interbedded with sands and clays. Below the Latrobe Valley Group and outcropping extensively throughout the South Gippsland Highlands is the Lower Cretaceous age Strzelecki Group sediments, which are known to be tight but can contain gas. In the north of PEP155 the Strzelecki Group is in fault contact with Palaeozoic basement rocks.

Structuring within PEP155 occurs within the Latrobe Group that predates the Seaspray Group. In some areas such as near Bairnsdale and near Metung, the early structuring has caused the Latrobe Valley Group to be stripped from the top of or thins over some highs so that they are now covered by Seaspray Group sitting on thin Latrobe Group or Strzelecki Group or basement. These structures were considered to be favourable targets for hydrocarbon entrapment where hydrocarbons generated from the deeper Latrobe and Strzelecki Group may have migrated up dip onshore and become entrapped in these porosity-permeability pinchouts. These types of plays have been found to contain significant oil deposits in the Lakes Entrance area. Therefore Lakes' endeavoured to test similar highs with drilling in PEP155.

No seismic exists or was acquired in this permit. High resolution gravity data was acquired and interpreted during the life of the permit. The density of historic bores in the Lakes Entrance area allowed prospect mapping based on formation tops. Bunga Creek 1, Bunga Creek 2, Partrobus 1 and Banjo 1A were drilled by PetroTech in the permit term. PEP 155 expired on 28 August 2006 with all work programs and expenditure commitments exceeded.

Lakes Oil has been awarded the Retention License 3 over portions of PEL 155 in 2007.

STRATIGRAPHY

Basement in the region consists of Ordovician - Middle Devonian weakly metamorphosed sediments of the Jordan River and Walhalla Groups and in some areas Devonian granite intrusions and in others, red beds of the Lower Carboniferous Avon River Group. Unconformably overlying basement is the Early Cretaceous Strzelecki Group, a 2 to 6 km thick non-marine continental section of volcanogenic sandstones interbedded with siltstones, mudstones, claystones, shales and subordinate coals.

The Strzelecki Group is unconformably overlain by the Latrobe Group of Cenozoic age. It comprises a sequence of non-marine sandstones, siltstones, shales, claystones and minor coals. The Oligocene to Miocene Seaspray Group is probably disconformable-unconformable on Latrobe Group and comprises lower glauconitic marl and mudstone unit of Oligocene aged Lakes Entrance Formation overlain by limestones and marls of the Miocene aged Gippsland Limestone Formation. Both units constitute the Seaspray Group and can be up to 500 m thick. Younger thinner mixed clastic and limestone units of the Tambo River and Jemmys Point Formation overlie the Gippsland Limestone.

PETROLEUM GEOLOGY

The offshore Gippsland Basin is the most prolific hydrocarbon producing basin in Australia. Since the discovery of the Barracouta Gas Field in early 1965, this small basin has provided the vast majority of Australia's hydrocarbon requirements. The basin hosts the giant oil fields of Kingfish, Mackerel and Fortescue, giant gas fields such as Snapper, Marlin and Barracouta and several giant oil and gas fields at Flounder and Tuna. Many other smaller oil and gas fields have been discovered. To date potential recoverable reserves of 4 billion barrels of oil and 10 TCF of gas have been proven.

SOURCE ROCKS AND MATURITY

Few data are available for wells drilled in the PEP155 sector of the basin as most wells are shallow and were drilled from 1890's through until the early 1970's. Little geochemical analysis was done as a matter of course during those times. However extensive geochemical studies have been conducted on all wells drilled in the offshore sector of the basin. The general conclusions indicate the coals and carbonaceous shales of the Strezlecki Group, lower Latrobe Group and the Golden Beach Groups are the major hydrocarbon source for the Gippsland Basin.

FLUID ANALYSIS

Oil Viscosity and Composition

The reservoir oil viscosity is 369 centipoise at reservoir temperature and the underlying and associated water has 0.6 centipoise viscosity. The Lakes Entrance oil is a biodegrade asphaltic base crude with 13.9° - 15.7° API gravity and with a specific gravity of 0.961. Early distillation tests (Boutakoff, 1964) show that the oil has no gasoline and kerosene fractions.

RESERVOIRS

The main reservoir unit at the Lakes Entrance field is the Greensand Member of the Lakes Entrance Formation. The unit is Oligocene in age. Within the glauconitic sandstone gross reservoir there are probably lenticular thin sand bodies with poor lateral correlation between wells. The distribution and thickness of the Greensand is somewhat erratic and highly variable. The average thickness is about 10 metres.

Core and well data indicate that the best sandstones have a total porosity in the range of 30% to 40%, but much of this is microporosity associated with the high chlorite clay content reducing the effective intergranular porosity to about 18%.

The reservoir has a low permeability for a conventional oil reservoir with core work indicating the glauconitic greensand having a permeability in the range of 2 to 10 millidarcies. The chlorite clay can provide fines that migrate and block pore throats further reducing the permeability.

The primary reservoir interval offshore is the 'Coarse Clastics' at the Top of the Latrobe Group. This unit hosts 90% of the basin's oil in the offshore sector. It consists of clean quartzose sands with porosities generally exceeding 30% and with permeabilities of several darcies. Very good sandstone reservoirs occur in the Intra-Latrobe Group section where porosities are generally in the order of 25% and permeabilities often exceed one darcy. These sandstones are abundantly present in the Latrobe Group and constitute a primary target in the PEP155.

SEALS

The Lakes Entrance Formation provides an extensive seal above the primary reservoir targets within the Latrobe Group. It is present throughout PEP155 and numerous intraformational seals are also known to be present within the Seaspray Group. Several carbonaceous shales are present within the Latrobe Valley Group and they provide extensive regional seals. It has been noted that the thick extensive coal beds within the Latrobe Group act as seals to oil pools in the offshore sector of the basin. In the PEP 155 area, these coal beds are even thicker and therefore could act as significant regional seals.

GENERAL EXPLORATION PHILOSOPHY AND PREVIOUS WORK

An oil exploration play had been proposed for PEP 155, where the pinchout of the Latrobe Group onto structural highs provided a prospective target for finding entrapped oil migrating updip from deeper and offshore source beds. A secondary objective is the lower beds of the Lakes Entrance Formation that can be sandy, glauconitic and contains hydrocarbons at Lakes Entrance to the east.

WORK COMMITMENTS, PROGRAMS AND ACHIEVEMENTS

Application for **PEP 135** (the earlier permit number for **PEP 155**) was submitted to the DPI on June 30, 1995 and was granted to Petro Tech Pty Ltd (a wholly owned subsidiary of Lakes Oil N.L.) on 29/8/95 for 2 years with the following approved program of exploration:

Year 1:

Data acquisition and interpretation. Preliminary feasibility studies related to recovery options. Gravity programme in the order of 100 stations to provide additional data relating to the area along the strike from the Lakes Entrance Oil Field. (Estimated expenditure: \$100,000).

Year 2:

Drill one well (to estimated TD of 400m) to evaluate the reservoir as well as providing structural and stratigraphic information and oil and/or gas analyses. (Estimated expenditure: \$350,000 to 400,000)

It was extended by DPI to 28 August 1998 and subsequently to 28 August 1999 and 28 August 2000.

The subject of this report is Exploration Permit 155 with a 5 year work program was granted to Petro Tech for a 5 year term from 29 August 2000.

This work program was as follows:

Year one	25 km seismic survey	estimated expenditure: \$ 200,000
Year two	Geological and geophysical studies	estimated expenditure: \$ 50,000
Year three	Drill one well	estimated expenditure: \$ 300,000
Year four	25 km seismic survey	estimated expenditure: \$ 200,000
Year five	Drill one well	estimated expenditure: \$ 300,000

Variation to the Permit conditions were:

- On 16/01/04 Permit 155 was allowed to suspend the work program conditions for a period of 6 months to August 16, 2004
- Permit extension granted for expiration of permit on 16 February 2006

- On 9 July 2004, Petro Tech Pty. Ltd requested that the year 4 program of 25 km of Seismic be changed to an extra exploration well to be drilled south east of Orbost. On 10 September 2004, DPI approved the variation to this program by substitution of the year 4 program with: Year four: Drill one well
- Permit suspended: 16 Feb – 16 Aug 2004 for DPI permit duration tenure review
- Permit extended to 16 Feb 2006
- Farm in PEP 155 – Gippsland Offshore Petroleum – November 2004 approved 6 January 2005
- Department of Primary Industries approved suspension of conditions and extension of terms for PEP 155 applied for on 11/12/03 and approved on 16/1/04 enabling expiry of permit on 16 August 2004.

This permit was renewed as Exploration Permit 155 with a 5 year work program from 29 August 2000. The Field Activity met the Permit requirements over the Permit term.

Permit Year	Calendar Date	Activity Commitment	Estimated Expenditure	Field Activity	Field Expenditure
Year one	Aug 2000 - 2001	Seismic	\$200,000	G&G	
Year two	Aug 2001 - 2002	G&G studies	\$50,000	G&G	
Year three	Aug 2002 - 2003*	Drill one well	\$300,000	G&G, Falcon, Drill Bunga Creek 1 & 2	\$201,780 \$177,365
	Aug 2003 - 2004			Drill Bunga Creek 2	\$23,927
	Aug 2003 - 2004			G&G; Falcon Survey	\$117,150
	Mar 2004 - Dec 2004	Period report		G&G; Falcon Survey	\$106,400
Year four	Feb 2004 - 2005	Drill one well	\$300,000	Falcon gravity, mag, radiometric; G&G	\$119,250
Year five	Feb 2005 - 2006	Drill one well	\$200,000	Drill Patrobus & Banjo wells; G&G	\$442,907
	Jan 2006 - June 2006	Period report		G&G, Drilling analysis	\$164,890
	Feb 2006 - Aug 2006	Period report		G&G, environmental	\$41,370
Total Summary	Aug 2000 - 2006	Three wells G&G Geophysical Survey	\$1,050,000	Four wells G&G Geophysical Survey	\$1,395,039

Results:

The following reports have been submitted:

- 1) 'Gippsland PEP135 and 136 Prospects and Leads' prepared by Rod Hollingsworth that covered the Baudin and Investigator Prospects and Leads L1, L2 and L3.
- 2) 'PEP 155 Phase 2 Basement Interpretation for Lakes Oil' prepared by Encom September 2004 provided an extension to the magnetic basement modelling undertaken.

- 3) 'Falcon Airborne Gravity Gradiometer Survey Lakes Entrance, Victoria Data and Interpretation Report – Greg Walker and Grant McLatchie, Feb 2003.
- 4) Half yearly report to 28 February 2003 covering Geophysical, drilling and expenditure. Interpretation of Falcon gravity/magnetic data was finalised. Drilling of Bunga Creek 1 was in progress and encountered a normal section down to the top of the Lakes Entrance Formation but encountered basement high to prognosis at 364 m without encountering any significant oil shows. Expenditure was \$177,365.
- 5) Annual review for 12 months to August 2003 covering geophysical review, reports and expenditure. Interpretation of Falcon gravity/magnetic data was finalized. Well Bunga Creek 1 was drilled to 351.2 m in Feb-Mar 2003. The well encountered a normal section down to the top of the Lakes entrance Formation but encountered basement high to prognosis at 364 m without encountering any significant oil shows. Well completion reports for Bunga Creek 1& 2 were submitted to the DPI in July 2003. Expenditure was \$201,780.
- 6) Supplemental review to December 2003 covering Geophysics and Drilling. The Gilbert Falcon Gradiometer Survey report was submitted. Well Bunga Creek 2 core hole was drilled to 351.2m in February-March of 2003. The target Colquhoun gravel section was not encountered in the well, which intersected metamorphic basement at 348m, 72 meters high to prognosis. The well was abandoned on 25 November 2003. Expenditure was \$23,927.
- 7) Annual review for 12 months to September 2004 covering G&G, Geophysical Survey, Reports submitted and expenditure. Airborne Falcon gravity, magnetic and radiometric survey was conducted. The results indicate the presence of a previously undetected half-graben with increased sedimentary section in both the onshore and near shore areas in the Marlo region. The results are being integrated with the geological mapping and the aerial photographic studies. A scout hole is planned in the Marlo area to investigate the hypothesis that updip migration of hydrocarbons from the offshore fields could be trapped in Latrobe Group sequences in the onshore extension of the NNE trending half-graben. An airborne Falcon gravity, magnetic and radiometric survey was conducted in the permit during the period. The Falcon AGG Data Release for the Lakes Entrance (April 2004) was submitted. Expenditure was \$117,150.
- 8) Supplemental review to December 2004 covering G&G, Geophysical Survey, reports and expenditure. The activity was as per the review to September 2004. Expenditure was \$106,400
- 9) Annual review to December 2005 covering G&G, Geophysical survey and expenditure. A review of technologies for the separation of oil from water in Hunters Lane 1 well was conducted during the period. Planning is underway to open the well to test. Patrobus 1 and Banjo 1A scout holes were drilled in the Marlo area to test the hypothesis that oil, which is know to be spilling from offshore fields has migrated to the Marlo area. Patrobus was spudded on September 6, 2005. Potential reservoir and seal units were encountered but no visible signs of hydrocarbons were encountered. The TD of 282 meters was reached on October 9, 2005. The well was plugged and abandoned following electric logging. Post drilling core analysis indicated that residual hydrocarbons were present in very small amounts in potential reservoir rocks intersected. Banjo- 1 was spudded on December 6, 2005. At 66.8 meters, after several attempts to get circulation failed, Banjo-1 was abandoned on December 13, 2005. A percussion rig will be used for

Banjo-1A a few meters away. The well has potential Tertiary targets in the Cunningham Greensand and the Colquhoun Gravel. Expenditure was \$312,660.

- 10) Supplemental report to 16 August 2005 detailing exploration activity, reports submitted and expenditure. Patrobus 1 was abandoned at 282.1 meters. Banjo 1A Stratigraphic Well was spudded on December 6, 2005. The well reached a total depth of 282 meters and was abandoned on January 26, 2006. Expenditure was \$442,907.
- 11) Six month report to August 2006 included G&G, Reports submitted and expenditure. Planning underway to reopen Hunters Lane 1, awaiting approvals to begin testing. An environmental study was commissioned for proposed re-entry of Hunters Lane 1. Post drilling analysis on Patrobus and Banjo 1A was completed and reported in the well completion report. Continued mapping of the Tertiary sequences in the Marlo region was calibrated with the results from the wells. Well completion Reports for Patrobus 1 and Banjo 1A were submitted. The environmental report for Hunters lane area was submitted to DPI. Expenditure was \$164,890.
- 12) A retention lease application was submitted in August 2006.