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EAST LAKE TYERS NO. 1

FINAL WELL REPORT

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ARCO LIMITED / WOODSIDE (LAKES ENTRANCE)
OIL CO. N. L.

EAST LAKE TYERS NO. 1

GIPPSLAND BASIN

by

FRANK T. INGRAM

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SUMMARY

The East Lake Tyers No. 1 well was drilled 8 miles east-northeast of the town of Lakes Entrance on the south-east side of Lake Tyers. The objective of this well was marine Middle Devonian limestones similar to those found at Buchan, 25 miles north of the wellsite.

The well was drilled to a total depth of 1,541 feet. Tertiary sediments were present from the surface to 1490 feet. From 1,490 feet to the total depth, steeply dipping phyllite of Ordovician age was encountered, and the Middle Devonian sediments were completely absent.

No shows of hydrocarbons were found, and the well was plugged and abandoned.

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INTRODUCTION

In the highlands north of Lake Tyers a large block of Middle Devonian limestones occurs downfolded into phyllites and volcanics of Ordovician and Lower Devonian age respectively. This limestone section is approximately 2,000 feet thick and contains sufficient organic material to be considered possible source beds for hydrocarbons in the Gippsland Basin.

A gravity survey by the Bureau of Mineral resources showed that the Buchan area is situated in a gravity low which extends southward through the east side of Lake Tyers and into Bass Strait.

Since no wells had penetrated the Tertiary sequence in the Lake Tyers area the presence, or absence, of Middle Devonian sediments was unknown prior to drilling the East Lake Tyers No. 1. The wellsite was located 6 miles east-northeast of the town of Lakes Entrance on the southeast side of Lake Tyers. The site was chosen so as to be near the axis of the gravity low and as far south on land as possible.

The well was designed primarily as a stratigraphic test to investigate the nature of pre-Tertiary rocks, especially the Middle Devonian. It was realized that the Middle Devonian might be absent, but the only way of determining this was to drill.

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DATA SHEET

Name	:	EAST LAKE TYERS NO. 1
Location	:	Longitude 148°07'33" East
		Latitude 37°50'38" South
Elevation A.S.L.:		Ground 10' (approximated)
		Kelly Bushing 15' (approximated)
Total Depth	:	1,541 feet (Driller)
		1,536 feet (Electric Log)
Spudded	:	Oct. 7, 1962. Completed: Oct. 18, 1962
Hole Size	:	0 - 300 feet, 8-3/4"
		300 - 1541 feet, 5-5/8"
Drilling Time (Spud to Release of Rig)	:	11 days
Drilling Rig	:	Failing 3500
		Contractor : W.L. Sides & Son Pty. Ltd.
Formation Tops	:	30 feet Gippsland Limestone (Bairnsdale Limestone Member)
		700 feet Gippsland Limestone (Longford Limestone Member)
		1290 feet Possible Lakes Entrance Formation
		1490 feet Ordovician phyllite
Casing	:	7" N-80, 26 lbs. LT & C, range 3, set at 300 feet, cemented to surface with 60 sacks construction cement.
Plugs	:	Cement plug at 1350-1450 feet with 20 sacks cement.
		Cement plug at 265-310 feet with 10 sacks cement.
		Metal cap screwed on top of 7" casing.
Status	:	Plugged and Abandoned.
Logs	:	Widco Electric Log by Victorian Bureau of Mines 296-1536 feet
		Lithologic Log by Frank T. Ingram 30 - 1541 feet
Geologists	:	Frank T. Ingram and D. Rutledge

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DRILLING

A Failing 2500 rig was contracted from W. L. Sides and Son Pty. Ltd. The well was drilled on a footage basis from the surface to the base of the Tertiary at the rate of 70 shillings per foot. Below the base of the Tertiary the rig was contracted on a daily rate of £288 while drilling, and £200 while standing-by.

The rig was equipped with 3-1/2" drill pipe and 7 - 4-1/2" drill collars. Two steel tanks 6' x 6' x 4' were used for the drilling mud, and a third of equal size was used for mixing cement. The shale shaker was powered by a small diesel motor mounted above the shaker.

The mast was 58 feet high and capable of pulling range 1 doubles. The power for the rig and mud pump was supplied by two 4/71 GM diesel motors. A single 5" x 8" mud pump was used. After setting 7" surface pipe a Hesnch Rees autolock type blowout preventor was installed.

The rig performed satisfactorily except for the surface mud circulation arrangement. The flowline from the well head did not have sufficient gradient to allow a rapid flow of mud to the mud tank. The mud frequently flowed over the top of the drilling nipple, especially when the mud viscosity increased. It was not practical to lower the mud tanks, as this would decrease the efficiency of the mud pump which was located on the truck frame 3 feet above ground level, and operated with a suction lift from the mud tank. After increasing the size of the flow line the overflow around the drilling nipple was greatly reduced, and only a small amount of mud was lost afterwards.

An 8-3/4" bit was used to drill the surface hole to 300 feet. Then 7" casing was set at 300 feet and cemented to surface with 60 sacks of construction cement. A 5-5/8" bit was used from 300 feet to the total depth of 1541 feet. One 8-3/4" bit, 3 - 5-5/8" bits and 2 core heads were used to drill to total depth.

A fresh water bentonite mud controlled by

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caustic soda. Lo Vis and soda ash was used with good results. No hole problems were encountered.

Totco surveys of hole deviation were made with results as follows :

300 feet	1/2°
750 feet	1/2°
850 feet	1/4°

A Reed Kor-king conventional core barrel and core head was used for the two cores that were cut. The size of the core was 2-3/8". A total of 23 feet of core was cut, and 16 feet was recovered for a recovery of 70 %.

G E O L O G Y

The well was spudded in the Bairnsdale member of the Gippsland limestone. The base of this member is at 700 feet as determined by identification of Foraminifera. This member consists of coquina, marl and limestone. The coquina is composed of pelecypods, bryozoa, gastropods, Foraminifera, echinoids and occasional coral fragments. The majority of the large fossil material is fragmented, but the smaller forms, such as tiny gastropods and Foraminifera, are usually whole.

The marl is typically medium gray, silty, soft and gummy, glauconitic and very fossiliferous. The marl is interbedded with the coquina in beds 50 to 100 feet in thickness. Limestone or cemented coquina is present in the Bairnsdale member at only one interval, 530 - 560 feet.

The marl is impervious, while the coquina and limestone is very porous. The electric log indicates that these porous beds contain fresh water.

The Wuk Wuk marls, 700 - 900 feet, is very similar in lithology to the Bairnsdale member. The top and bottom of this member have been determined from Foraminifera in cuttings and for this reason the boundaries are not too accurate.

The Longford Limestone member was identified from

Foraminifera in cuttings at 900 feet. No useful additional paleontological information was obtained below the Longford Limestone, but there is a definite lithological change at 1290 feet which is possibly the base of this unit. From 900 to 1290 feet the sediments consist of claystone, siltstone and minor limestone (possibly cavings). The claystone is gray to green, and fossiliferous. The siltstone is brown to gray-green, argillaceous, micaceous and fossiliferous. Both the claystone and siltstone are glauconitic and poorly consolidated.

The claystone and siltstone in the interval 700 - 1290 feet is probably the age equivalent of the Longford Limestone, but in the Lake Tyers area it represents a near shore facies and contains only minor limestone.

The interval 1290 to 1460 feet consists mostly of sand and sandstone, clay and minor marl. The sandstone is brown to gray-green, friable to slightly hard and glauconitic throughout. Pyrite is very abundant from 1375 to 1460 feet, and dolomitic cement is common throughout. The grain size is fine in the upper half, but coarse grains and pebbles appear in the lower half.

The clay occurs mostly in the interval 1413 to 1460 feet. It is gray to brown and interbedded with sand.

The marl logged at 1412 - 1460 feet is probably all cavings as the Foraminifera identified in this interval are indicative of the Longford Limestone.

The interval 1320 - 1412 feet appears porous on the electric log, but permeability in this interval may be poor due to its firm-grained nature.

A core taken at 1350 - 1363 feet recovered fossiliferous silt and firm-grained sand. The Foraminifera in this core were not diagnostic, however. From the stratigraphic position and the presence of glauconitic sand the interval is thought to be correlative with the Lakes Entrance formation. Because of the coarser grain size and the lack of marl the

Lakes Entrance formation is thought to represent a nearer shore facies than at Lakes Entrance, or in the central part of the Gippsland Basin.

The basal member of the Tertiary sequence in the Lake Tyers No. 1 is represented by a pebbly, coarse-grained sand from 1460 to 1490 feet. The sand consists mostly of sub-angular quartz grains and is clean and unconsolidated. The porosity and permeability of this sand are very good, and the electric log indicates the water in this zone is fresh. This sand is probably the equivalent of the Colquhoun gravels in the Lakes Entrance area. Foraminifera of Eocene age have been identified in the Colquhoun gravels in the Lakes Entrance area and the Southwest Bairnsdale No. 1 well; however, no fossils were identified in this zone in the Lake Tyers No. 1 well.

At 1490 feet weathered phyllite was encountered, and this passed into consolidated, slightly weathered phyllite at 1515 feet. A bottom hole core at 1531 to 1541 feet recovered 7 feet of phyllite mottled red, white, yellow and cream with well developed cleavage dipping about 45^{0}. The core is highly fractured and the fractures are filled with brown chalcedony.

No fossils were found in the phyllite, but the lithology is similar to Ordovician phyllites exposed on the surface about 12 miles north of the well site. The slope of the basement surface from the outcrop south to the Lake Tyers No. 1 is about 140 feet to the mile.

OCCURRENCE OF HYDROCARBONS

In core number 1 at 1350 to 1363 feet a dark brown stain was present, but there was no taste, smell, fluorescence or cutwith CCl_4. Apparently the staining was not derived from hydrocarbons. No other indications of hydrocarbons were noted in the well.

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CONCLUSION

1. Tertiary sediments directly overlie Ordovician phyllites at the East Lake Tyers No. 1 well, and no rocks of Middle Devonian age are present.

2. The well penetrated a thin Tertiary section from Miocene (Bairnsdale Limestone) to Eocene (Colquhoun Gravels). The lithologies encountered in the Tertiary represent a near shore marine environment.

3. The slope of the surface of the basement rocks from the outcrop south to the East Lake Tyers No. 1 wellsite, is about 140 feet to the mile.

4. No shows of hydrocarbons were encountered in the well. Dark brown staining in core number 1 at 1350 - 1363 feet had no odor, taste, fluorescence or cut with CCl_4, and apparently was not derived from hydrocarbons.

NOTE : The Ordovician "phyllite" may actually be volcanic tuff altered so that it resembles phyllite, but no petrolotical work has been done to either prove or disprove this.

CORRECTION:

Since completing this report petrological examinations of the Ordovician "phyllite" have been made by the Dallas Lab. of the Atlantic Refining Co. and the Department of Mines of Victoria. Both of these examinations revealed that the "phyllite" is actually unaltered silty claystone. According to the Department of Mines, the lithology is very similar to the Ordovician claystones in the vicinity of Tabbarabbera, north of the Gippsland Basin. It is still considered basement.