WCR FOR GANNET-1 (W599)

W599

Endeavour Oil Company N.L.

52 pages.
4 ENCLOSURES.

GANNET #1 599

COMPLETION REPORT

by

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I SUMMARY

The Gannet #1 well was drilled in Victorian Permit #8 in the Gippsland Basin, offshore from Lakes Entrance, by Endeavour Oil Company N.L. under a farmout agreement with the title-holders: Australian Oil & Gas Corporation Limited, B.O.C. of Australia Limited, Continental Oil Company Limited, Planet Exploration Company Pty. Ltd., and Woodside Oil Co. N.L.

The well was spudded from the "GLOMAR III" on July 18, 1970, in 128 feet of water and drilled to a total depth of 4,786 feet. It was plugged and abandoned as a dry hole on July 29, 1970.

The well was favourably located to test a seismically determined feature at the top of the Latrobe Valley Coal Measures (horizon 'H'). Lateral closure of some 13 square miles (within the 0.625 second structure contour mapped at the 'H' level) was controlled by wedge-out of the Latrobe Valley Coal Measures to the north, west and east,and by dip to the south.

An expected Tertiary sequence, comprising the Gippsland Formation, the Lakes Entrance Formation, and the Latrobe Valley Coal Measures, was penetrated before drilling ceased in Lower Cretaceous sediments of the Strzelecki Group.

A basal sandstone unit of the Lakes Entrance Formation (2,189-2,215 feet) overlies the Latrobe at Gannet #1. This unit is regarded as a time-equivalent, basinward facies of the Colquhoun Gravels penetrated in wells drilled onshore.

Drilling confirmed the Latrobe wedge-out edge as predicted, but indicated that the overlying, permeable, muddy sandstone of the basal Lakes Entrance Formation was an inadequate seal. An effective trap was therefore not present at the Gannet location.

Minor dry gas shows of up to 9 units methane were recorded on the hot-wire detector whilst drilling through the Latrobe Valley Coal Measures. Subsequent wireline log evaluation indicated that an insignificant quantity of gas (up to 8%) was present within the interval 2,255-2,281 feet. No formation tests were conducted.

The salinity of the formation water within the Latrobe was calculated at 3,500 p.p.m. NaCl from the wireline logs. A similar figure for salinity was computed for the formation water within the basal Lakes Entrance Formation at the East Lake Tyers #1 well drilled onshore, thus suggesting water continuity between the two rock units and the lack of an effective upper Latrobe seal.

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II INTRODUCTION

The Gannet #1 well was drilled on shot point 722 on line 4 of the Offshore Lakes Entrance (1969) Seismic Survey about 7½ miles east-south-east of the town of Lakes Entrance, Victoria.

The Gannet well was designed as a stratigraphic test of an 'H-K' seismic wedge-out within a broad embayment at the 'H' level.

Closure to the north, west and east was controlled by the wedge-out of the 'H-K' seismic interval and to the south by dip. An area of some 13 square miles was closed within the zero edge of the 'H' reflector and the 0.625 second structure contour mapped at the 'H' level.

The northern up-dip limit of horizon 'H' was presumed to represent the depositional or erosional edge of the Latrobe Valley Coal Measures overlain and sealed by the marls of the Lakes Entrance Formation.

The well was, therefore, favourably sited to test for an up-dip accumulation of hydrocarbons within the sands of the Latrobe Valley Coal Measures provided adequate sealing of the reservoirs was present.

III WELL HISTORY

(1) General Data:

(a) Well Name and Number:

Gannet #1

(b) Location:

Latitude:	37°54'20.56" S
Longitude:	148°08'08.54" E
X-Co-ordinate:	599,842 metres
Y-Co-ordinate:	5,804,024 metres
Water Depth:	128 feet

(c) Name and Address of Tenement Holders:

Australian Oil & Gas Corporation Limited,
261 George Street, Sydney, N.S.W.

B.O.C. of Australia Limited,
37-49 Pitt Street, Sydney, N.S.W.

Planet Exploration Company Pty. Ltd.,
Corner Hunter and George Streets, Sydney, N.S.W.

Woodside Oil Co. N.L.
151 Flinders Street, Melbourne, Victoria.

(d) Details of Petroleum Tenement:

Petroleum Permit VIC/P8 issued under the Petroleum (Submerged Lands) Acts of the Commonwealth of Australia and the State of Victoria, covering an area of 1507 square miles. Endeavour Oil Company N.L. subsequently farmed into a portion of this permit (see Fig. 1).

(e) District:

Offshore Lakes Entrance, Eastern Victorian waters.

(f) Total Depth:

4,786 feet (Driller)

(g) Date Drilling Commenced:

July 18, 1970

(h) Date Drilling Completed:

July 28, 1970

(i) Date Rig Released:

July 29, 1970

(j) Drilling Time to Total Depth:

11 days

(k) Elevation:

Permanent datum - mean sea level
Well datum (K.B.) - 32 feet above mean sea level

(l) Status:

Dry, plugged and abandoned.

(m) Cost:

Not available

(2) Drilling Data:

(a) Operator: Endeavour Oil Company N.L., 24 Collins Street, MELBOURNE, Victoria, 3000, AUSTRALIA.

(b) Drilling Contractor: Global Marine A/asia Pty. Ltd., 360 Lonsdale Street, MELBOURNE, Victoria, 3000, AUSTRALIA.

(c) Drilling Vessel: GLOMAR III

(d) Drawworks:

Make -	National
Type -	1625 DE
Rated Capacity -	25,000 feet
Power -	2 each GE752 R1 Electric Motors

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(e) Derrick: Global Marine Design 136' x 56' x 34'. 1,000,000 lb. hookload capacity.

(f) Pumps (2):

Make -	National
Type -	G-1000-C
Size -	7-3/4" x 16"
Power -	Dual GE 752 R1 Electric Motors independantly driven.

(g) Blow-Out Prevention Equipment:

Make -	Hydril	Hydril	Cameron Triple "U"
Size -	20"	13-5/8"	13-5/8"
Working Pressure -	2000 lb.	5000 lb.	5000 lb.

(h) Operations:

(i) GLOMAR III was picked up at Endeavour Albatross #1 location at 06-00 hours on July 18, 1970.

(ii) GLOMAR III moved to Gannet #1 location and surveyed into position.

(iii) Anchors 1, 4, 5 and 8 set and tested at 16.45 hours on July 18, 1970.

(iv) Gannet #1 spudded at 19.30 hours on July 18, 1970.

(v) Surface hole drilled to 677 feet, pile joint run and cemented; and remaining anchors set and tested at 0.400 hours on July 19, 1970.

(vi) Drilling completed at 4,786 feet at 06.00 hours on July 28, 1970.

(vii) All plugs setand sub-sea equipment recovered at 10.00 hours on July 29, 1970.

(viii) Anchors picked up and rig released at 22.00 hours on July 29, 1970. Gannet #1 abandoned.

(i) Operational Period:

A period of 11 days and 16 hours elapsed from the time GLOMAR III was picked up at Albatross #1 location until the vessel was released from the Gannet #1 location.

(j) Hole Sizes and Depths (R.K.B.):

(1)	36"	to	194'
(2)	17½"	to	677'
(3)	12¼"	to	1,600'
(4)	8½"	to	4,786' (T.D.)

(k) Casing and Cementing Details:

Size	30"	20"	13-3/8"	9-3/8"
Weight	319	94	61	47
Grade	B	X-52	J-55	N-80
Range	2	3	3	3
Thread	Welded	Vetco "L"	Buttress	Buttress
Setting Depth (R.K.B.)	175'	194'	662'	1,505'
Cement (sax)	Included in 20"	120	860	475
Class	A	A	A	A
Cemented to (R.K.B.)	Ocean Floor	Ocean Floor	Ocean Floor	Ocean Floor
Method used	Displacement	Displacement	Displacement	Displacement

Slurry Details - 30" x 20" : 120 sax neat mixed with sea water to 15 lbs/gal.

13-3/8" : 660 sax 2.5% pre-mix gel mixed with fresh water at 12.1 lbs/gal. followed by 200 sax neat mixed with sea water at 15.5 lbs/gal.

9-5/8" : 475 sax neat with 1% calcium chloride mixed with sea water at 15.7 lbs/gal.

Pile Joint Assembly - Utilizing a Cameron sub-sea suspension system, the 30" and 20" housings were pre-fabricated as one unit employing one joint each of 30" x 20" conductor pipe. On completion of drilling 36" surface hole the pile joint assembly was lowered on drill pipe to the landing base and cemented through drill pipe with ample returns to the ocean floor. Thus providing a suspension system for the 13-3/8" casing which was used as a surface string to 662'. This enabled the 13-5/8" B.O.P. system to be utilized throughout the duration of the well and eliminated the necessity to use the 20" B.O.P. stack at any time.

(l) Drilling Fluid:

Salt water was utilized in drilling to 677' with returns dumped to ocean floor. Salt water was also used to drill from 677' to 1,600' with returns overshakers. After setting 9-5/8" pipe to 1,505', a fresh water, bentonite, spersene, XP-20 mud was instituted and this system maintained to toal depth.

Caustic soda was used for pH control and barytes for weight control.

Average Properties:

Date	Wt.	Vis.	W.L.	pH	F.C.	Sand %	Solids %
3	9.5	34	5.7	9.1	1/32"	.25	-
4	9.8	39	6.2	10	1/32"	.60	-
5	10.0	40	7.2	9.3	1/32"	1.15	12
6	10.0	37	6.2	9.2	1/32"	.75	9
7	10.0	38	5.7	9.4	1/32"	.25	10
8	9.7	47	5.1	9.5	1/32"	.25	11
9	9.7	37	5.4	9.2	1/32"	.20	10

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Materials Consumed:

Bentonite	279 sax
Caustic	2300 lbs.
CC-16	96 sax
XP-20	31 sax
Barytes	400 sax
Q-Broxin	139 sax

(m) Fuel and Water:

Transported by supply boat from Barry Beach Marine Terminal.

Usage:	(i)	Potable Water	26,500 gals.
	(ii)	Drill Water	3,200 bbls.
	(iii)	Fuel	26,500 gals.

(n) Fishing Operations: Nil

(o) Formation Testing: Nil

(p) Coring: Nil

(q) Drilling Bits (R.K.B. Depths):

No.	From	To	Size	Make	Type	Footage	Hrs.	Condition
	Ocean Floor	194'	36"	SEC	H.O.	34	¼	T1-B1-1G
(R.R.)	194'	720'	17½"	REED	YTIAJ	526	2-3/4	T1-B1-1G
1	720'	1600'	12¼"	HTC	X3AJ	880	6	T4-B4-1G
2	1600'	2791'	8½"	HTC	X3AJ	1191	14	T6-B6-1G
3	2791'	3331'	8½"	HTC	OSC-1GJ	540	8½	T3-B6-1G
4	3331'	3550'	8½"	HTC	OSC-1GJ	219	4-3/4	T2-B2-1G
5	3550'	3793'	8½"	HTC	XV-J	243	6	T2-B8-1G
6	3793'	3989'	8½"	SEC	S-44	196	6	T2-B2-1G
7	3989'	4257'	8½"	SEC	S-44	268	10¼	T3-B2-1G
8	4257'	4611'	8½"	HTC	XV-J	357	18¼	T4-B8-1G
9	4611'	4786'	8½"	HTC	XV-J	175	10-3/4	T2-B4-1G

(r) Abandonment:

(i) Plug No. 1 2370'-2100' 160 sax cement 1% calcium chloride mixed with sea water.

Top of plug tagged at 2204' with 10,000 lbs. weight.

(ii) Plug No. 2 1650'-1450' 125 sax neat cement mixed with sea water.

(iii) Plug No. 3 350'-200' 55 sax neat cement mixed with sea water.

(iv) Casing was severed with explosive charge at 190' (i.e. 30' below ocean floor) and all sub-sea equipment recovered.

(s) Supply Vessels:

M.V. "Point Coupee" was used for all anchor handling work and general supply work during the operation.

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M.V. "San Pedro Strait" was used for general supply duties during the operation.

Both vessels assisted with location surveys and buoy laying.

(3) Logging and Testing:

(a) Ditch Samples:

Ditch samples were collected at 10-foot intervals whilst drilling. Four sets of washed and dried cuttings samples were bagged and distributed as follows:

Endeavour Oil Company N.L. (2 splits),
B.O.C. of Australia Limited (1 split), and
Victorian Mines Department (1 split).

One set of unwashed cuttings samples was also collected and stored with Endeavour Oil Company N.L.

(b) Coring:

No cores were cut.

(c) Sidewall Sampling:

A total of 20 sidewall cores were requested by Endeavour geologists at the depths listed below. Schlumberger Seaco succeeded in shooting 30 sidewall cores of which 21 were recovered. Some shots were fired at the depths programmed.

An electrical fault caused the gun to fire two shots at some levels. The gun was expended before the final four programmed shots could be taken.

The lithology of some of the sidewall cores recovered (at the depths stated by Schlumberger) are not consistent with the known lithology of the section at the levels shot.

See Appendix 2 for Sidewall Core Descriptions.

SWC No.	Programmed Depth (ft.)
1	4563
2	4425
3	4268
4	4082
5	3915
6	3452
7	3053
8	2864
9	2420
10	2310
11	2295
12	2285

S.W.C. No.	Programmed Depth (ft.)
13	2274
14	2266
15	2253
16	2247
17	2240
18	2220
19	2214
20	2195

Schlumberger S.W.C. No.	Schlumberger Depth (ft.)
1	4563
17	4428
2	4425
18	4271
3	4268
5	3915
6	3452
7	3053
23	2867
8	2864
24	2433
9	2420
25	2313
10	2310
11	2295
27	2288
12	2285
29	2269
14	2266
30	2256
16	2246

(d) Wireline Logging:

Wireline logs were run by Schlumberger Seaco Inc. and included an Induction Electrical Log, Borehole Compensated Sonic - Gamma Ray, Micrologי - Caliper - Microlaterolog, Compensated Formation Density Log, Continuous Dipmeter Log.

All logs were recorded on the 2 inch = 100 feetand 5 inch = 100 feet scales.

Details of the logging runs are as follows :-

Induction Electrical Log (IES)

Run 1 :	1599'- 662'
Run 2 :	3531'-1550'
Run 3 :	4609'-3400'

Microlog - Caliper - Microlaterlog (MLC-MLL)

Run 1 :	3532'-1550'

Borehole Compensated Sonic - Gamma Ray (BHC-GR)

Run 1 :	1599'- 662'
Run 2 :	3526'-1550'
Run 3 :	4607'-3400'

Compensated Formation Density Log (FDC)

Run 1:	1599'- 662'
Run 2:	3531'-1550'

Continuous Dipmeter Log (CDM)

(e) Drilling Time and Gas Log:

Continuous monitoring of the drilling mud and the rate of penetration was performed by Core Laboratories (Australia) Limited. In addition to the normal hot wire(wheatstone bridge) mud gas recorder, a gas chromatograph, and a hydrogen sulphide detector were used. Cuttings gas was monitored regularly using a Waring blender.

No significant shows of gas were recorded whilst drilling.

(f) Formation Testing:

No formation tests were conducted.

(g) Deviation Surveys:

Deviation Surveys were taken using a double recorder Totco inclinometer. The results are as follows:-

$\frac{1}{4}^{\circ}$	- 1600'
2°	- 3550'
$4\frac{1}{2}^{\circ}$	- 4786'

(h) Temperature Surveys:

None conducted.

(i) Other Well Surveys:

None conducted.

IV GEOLOGY

(1) Summary of Previous Work

The following remarks refer only to work done in and around, or with relevance to, Endeavour's Vic/P8 farm-in area.

(a) Geological:

Since the discovery of hydrocarbons at Lakes Entrance in 1924, a total of more than 60 Government and company wells have been drilled in that area, most of them in the ensuing 25 years (Boutakoff, 1964). One of the highlights of the Lakes Entrance activity was the sinking of a 1,117 foot shaft by the Commonwealth and State Governments during the Second World War. However, little more than 8,000 barrels of heavy oil have been produced from the Lakes Entrance field, along with some methane gas, the main reservoir being the tight but locally permeable Greensand Member of the Lakes Entrance Formation. The underlying clean sands of the Colquhoun Gravels Member, which rest unconformably on Palaeozoic basement, are flushed by relatively fresh artesian water. An additional well drilled in 1966 by Woodside Oil, namely Lakes Entrance #1, failed to make any further contributions to the geology or hydrocarbon potential of the area (Jessop, 1966). Wells drilled east of Lakes Entrance, for example, Arco-Woodside's East Lake Tyers #1, also encountered a marginal Lakes Entrance Formation sand facies above Palaeozoic basement, but were dry (Ingram, 1962).

In 1967 Arco-Woodside's Duck Bay #1 well was drilled south of Bairnsdale in a position roughly 26 miles west of the Gannet #1 location along the general depositional strike. A 400 foot L.V.C.M. section, mostly sands, was encountered. In addition, the well penetrated a Strzelecki wedgeout (with basal volcanics), a previously unknown Permian section, and then bottomed in Ordovician bedrock (Arco-Woodside, 1966). It was abandoned as a dry hole.

Other offshore wells in the vicinity of Gannet #1 include Endeavour's Albatross #1, 6 miles south-west, Esso-B.H.P.'s Flathead #1, about 24 miles south-east, and Emperor #1, about 16 miles south-south-west (Fig. 1). Albatross #1 was dry, and the latter two both encountered hydrocarbons shows which are of no apparent commercial value. The closest of the Esso-B.H.P. fields, Snapper, is about 20 miles south of the Gannet location.

(b) Geophysical:

(i) Gravity and Magnetics: In 1949 the Robert H. Ray Company conducted a gravity survey in the onshore Lakes Entrance area for Lakes Oil Ltd. (Boutakoff, 1964, Fig. 3) and some years later the Bureau of Mineral Resources carried out a regional gravity survey of East Gippsland that included the same area (Dooley & Mulder, 1953).

Airborne magnetic surveys of both onshore and offshore Gippsland were made by the B.M.R. in

1951-52 and 1956 and are summarised by Quilty (1965). Interpreted depth to magnetic basement (presumably Palaeozoic) is slightly more than 4,000 feet at the Gannet #1 location.

The gravity and magnetic surveys confirm a fact that is also revealed by field mapping and drilling, namely that the Palaeozoic bedrock is relatively shallow in the onshore Lakes Entrance area and has a north-south structural trend.

(ii) Seismic: Although the first onshore seismic survey in Gippsland was completed in 1952, this and subsequent surveys were restricted to central and southern Gippsland with none in the Lakes Entrance area.

In early 1963 Western Geophysical shot 463 miles offshore for Arco Ltd. in the present VIC/P8 area between Corner Inlet (in the south-west) and Marlo (in the north-east) (Western Geophysical Co., 1963). The lines concerned were G-1 and MA-1 to MA-37. Single-fold and two-fold coverage was achieved and the main reflector mapped was the top-of-L.V.C.M. coals which could be traced throughout most of the area. One of the exceptions was in the offshore Lakes Entrance area where the strong coal reflector was lost due to shallow basement influence.

In October, 1967, G.S.I. completed a second marine seismic survey in VIC/P8 for B.O.C. of Australia Ltd. The survey was programmed to provide further detail on the Golden Beach structure, which was located by the Arco survey (1963) and subsequently drilled by B.O.C., and also to investigate pre-L.V.C.M. features. Because of six-fold digital coverage along these lines, which were labelled 67-40 to 67-48, the record quality was far superior to earlier efforts. Line 67-40 in particular, which ran for 70 miles and paralleled the coast some 1 to 2 miles offshore, provided excellent control with high calibre data down to and beyond the L.V.C.M. coals. In addition to this line acting as an excellent framework on which to base previous onshore and offshore seismic, it was especially significant in Endeavour's operations since it enabled the major reflectors to be carried into the 1969 survey grid in the VIC/P8 farm-in.

In October, 1969, a marine seismic survey was conducted for Endeavour in the VIC/P8 farm-in by the United Geophysical Corporation. A total of 512 miles were shot on a tight rectangular grid (Lines 1 to 42) and yielded data capable of twelve-fold or 2400% subsurface coverage. Processing and interpretation by Geocom Inc. led to the mapping of the 'G'(top of Lakes Entrance), 'H' (top of L.V.C.M.), 'K' (top L.V.C.M. coal), 'L' (deeper L.V.C.M. coal), and 'S' (top of

Strzelecki) horizons (Frankovitch, 1969; Warner, 1970). Isochron maps of the 'G-K', 'H-K', and 'K-S' intervals were also constructed. Emphasis was placed on mapping the updip wedgeout of 'H-K'. The mapping of 'H' was considerably enhanced by the predominantly one-half mile by one-mile seismic grid.

(2) Summary of Regional Geology

(a) Stratigraphy:

The Gippsland Basin is generally accepted as an Upper Cretaceous-Cainozoic basin, one that occupies some 16,000 square miles of south-east Victoria (the southernmost part extending into Tasmanian waters) of which all but one-fifth is offshore (Fig. 1). The basin is bounded on the north and south-west by Palaeozoic rocks and on the west by recently uplifted Lower Cretaceous rocks, and is open-ended to the east. It deepens in an easterly direction where the maximum sediment thickness reaches 15,000 feet or more.

In early to middle Palaeozoic times the region was part of the Tasman Geosyncline, a complex mobile belt that produced tightly folded and faulted low-grade metasediments and metamorphics intruded by early Devonian granitic rocks, plus minor Devonian extrusives. Stabilisation during the latter part of the Palaeozoic led to sedimentation in restricted, gently-deformed, fault-controlled basins, especially during the late Devonian. Permian sediments are known only from Duck Bay #1 well south of Bairnsdale (Arco-Woodside, 1966).

Whereas the main Palaeozoic structural grain is north-south, a pronounced east-west trend developed during the Mesozoic with the formation of a 'graben' of sedimentation, referred to here as the "Strzelecki Basin" (the ancestral Gippsland Basin), which averages 50 miles width and extends 100 miles across south-east Victoria from Westernport to the indented continental slope (Weeks & Hopkins, 1966). Sedimentation in this basin occurred during the early Cretaceous - neither Triassic nor Jurassic sediments have been confirmed - and consisted of more than 10,000 feet of fluvio-lacustrine sandstones (generally chloritic, feldspathic, lithic arenites of fine to medium size) as well as siltstones, shales and minor coals *(Strzelecki Group)* (Edwards & Baker, 1943). A basal unit of chloritised volcanics, believed to be a major provenance for Strzelecki sandstones, exists in Duck Bay well, and elsewhere marginal conglomerates are encountered in outcrop.

Gippsland Basin sedimentation commenced in middle to late Cretaceous times within the eastern half of the former Strzelecki Basin and extended westwards into the Seaspray area during the Paleocene (Richards & Hopkins, 1969). Because of the waning influence of the north and south bounding fault systems during the Eocene, sedimentation expanded across virtually the entire present-day basin area so that through much

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of the basin the Eocene sediments are unconformable on Strzelecki or Palaeozoic basement. Collectively, the late Cretaceous to Eocene sediments form a fluvio-deltaic complex that exceeds 10,000 feet in the eastern part of the basin *("Latrobe Valley Group"* also known as 'Latrobe Delta Complex'). It is characterised in all but the western marginal areas by poorly sorted, fine to gravelly quartzose sandstones that tend to be associated with shales and siltstones in the Upper Cretaceous-Palaeocene *(Golden Beach Beds)* and with coals in the Eocene *(Latrobe Valley Coal Measures)*. Along the western margin, coals of the L.V.C.M. are prolific and appear to persist with time through to the early Miocene. In this same area the Latrobe is characterised by a near-basal unit of volcanics, generally altered basalts *(Thorpdale Volcanics)*, that overlie a thin unit of Latrobe clastics *(Childers Formation)*; these units crop out around the edges of the South Gippsland Hills and extend eastwards into the subsurface. Volcanics are also encountered offshore near the base of the Latrobe.

Basin subsidence and tilting at the beginning of the Oligocene resulted in a major marine transgression from the south-east, accompanied by widespread erosion and some canyon cutting. The transgression extended north-westwards to Sale, the dominant lithology being foraminiferal calcareous mudstones, although glauconitic sands are developed along the north and south margins *(Lakes Entrance Formation)* (Hocking & Taylor, 1964). At Lakes Entrance, due north of Endeavour's VIC/P8 farm-in, the sands of the Lakes Entrance Formation *(Colquhoun Gravels/Greensand Member)* unconformably overlie Palaeozoic bedrock. The maximum Lakes Entrance Formation thickness in the basin, excluding canyon-fill, is about 2,000 feet in the eastern part. The formation does not crop out.

The maximum marine transgression, almost to Rosedale in the northwest, occurred during the Miocene at which time up to 6,000 feet of a limestone-marl sequence was deposited *(Gippsland Formation)*. Bioclastic (mostly bryozoal) limestones and marly limestones, and also some basin-edge littoral sands, predominate in the more marginal areas of the basin whereas marls, including canyon-fill, are dominant in the deeper parts. Onshore, Lower Miocene limestones are exposed in the Sale-Yarram area (Hocking, 1970), whereas Middle-Upper Miocene limestones and sands are exposed between Bairnsdale and Orbost (Carter, 1964).

At the close of the Miocene and in the early Pliocene a period of marine regression produced up to 500 feet of glauconitic sandy marls *(Tambo River Formation)* and overlying shelly sands and sandy marls *(Jemmy's Point Formation)* in onshore Gippsland. Outcrops are located in river and coastal sections in and around the Lakes Entrance area. Because of lack of sample returns, these and younger formations have not been recorded offshore.

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The return to continental conditions in onshore Gippsland occurred in the middle to late Pliocene with the deposition of a sand-clay unit with some carbonaceous layers which is 700 feet thick at Sale *(Boisdale Beds)*; the sands are the main fresh water aquifers of Gippsland (Jenkin, 1962). Overlying the Boisdale Beds around the onshore margins of the basin is a 150 feet thick sand-clay unit with characteristic gravel interbeds *(Haunted Hill Gravels)* that was deposited during the Plio-Pleistocene. The latter unit, and the final Quarternary veneer, account for most of the outcrop in the Gippsland Basin onshore.

(b) Structure:

Gippsland Basin sediments have been deformed by two major periods of anticlinal folding with some associated faulting, the first in the late Eocene to early Oligocene and the second during the late Pliocene and Pleistocene. The former, coincident with the major marine transgression, led to the development of predominantly east-west trending anticlinal structures across the central basin deep (Fig. 1). The fold belt appears to owe its origin to draping of the Cainozoic section over differentially displaced fault blocks in the underlying Strzelecki. The areas to the north and south, including the VIC/P8 farm-in, differ in that they show little or no structural deformation other than minor draping over buried basement topographic highs.

The Plio-Pleistocene earth movements caused uplift in the onshore marginal areas (including formation of the Mesozoic South Gippsland Hills) with modification and basinward tilting of pre-existing structures.

(c) Hydrocarbons:

The main oil and gas accumulations of the Gippsland Basin are on the Gippsland Shelf within the east-central basin deep. The accumulations are in permeable sands of the Latrobe, especially at the top where the overlying Lakes Entrance marls provide a suitable cap. Trapping is in the large closed anticlines referred to above. Oligocene erosion and canyon cutting has often modified the shape of the structures and in some cases the canyon-fill contributes to the closure. The coals and shales of the Latrobe appear to be a major source for the oil and gas (Richards & Hopkins, 1970).

At Lakes Entrance the non-commercial heavy oil and gas accumulations of the Lakes Entrance Formation appear to be indigeneous. Trapping is within permeable sand lenses that are superimposed on a south trending Palaeozoic bedrock nose.

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(3) Stratigraphic Table:

The sequence found in the Gannet #1 well is as follows:-

		Rock Unit	Depth below datum (K.B.)	Depth below sea level	Thickness	
Tertiary	(Miocene (	Gippsland Formation	First returns at 720'	- 688'	1057+'	
	(Oligocene (((	Lakes Entrance Formation -				
		('mudstone unit'	1777'	-1745'	412')	438'
		('sandstone unit'	2189'	-2157'	26')	
	(Eocene	Latrobe Valley Coal Measures -				
		('upper unit'	2215'	-2183'	41')	102'
		('lower unit'	2256'	-2224'	61')	
	- UNCONFORMITY -					
Mesozoic	(Upper Jurassic - (Lower (Cretaceous	Strzelecki Group	2317'	-2285'	2469+'	
	- TOTAL DEPTH -		4786'	-4754'		

(4) Stratigraphy

The representative lithologies, and the lithologic and stratigraphic subdivisions, are shown on the enclosed Composite Log. Additional stratigraphic information is given below, with particular emphasis on the comparison between the Gannet #1 and Albatross #1 wells.

(a) Tertiary:

The criteria for selection of Tertiary formation boundaries in the Gippsland Basin are reasonably well established (miscellaneous well completion reports; Hocking, 1965), and have been adhered to in this report except where otherwise stated.

The lithological and formation subdivisions also follow the pattern of those adopted for the Albatross #1 well (Jessop et al., 1970).

Sample returns commenced at 720 feet, so one can only speculate on the nature of the section above this depth. Based on correlation with onshore wells, it is probably that thin Jemmy's Point/ Tambo River Formation (Upper Miocene-Pliocene) representatives exist beneath the ocean floor. However, the first returns at 720 feet are from high in the Gippsland Formation.

Gippsland Formation (720-1777'):

The Gippsland Formation in the Gannet #1 well can be subdivided, as for Albatross #1, into an upper bioclastic limestone unit, followed by interbedded

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limestones and marls, then a basal marl unit. The two sections can be easily correlated (Fig. 5). The Gannet section has a higher proportion of limestone beds which probably reflects its closer proximity to the basin edge and the Miocene shoreline. The time-regressive character of the base of the upper limestones is illustrated in Fig. 4.

Lakes Entrance Formation (1777-2189'):

The top of the Lakes Entrance Formation has been selected on a similar basis to that in Albatross #1 (Jessop et al., 1970). The only difference is that in Gannet #1 the top does not correspond exactly with the top of the Oligocene, but is 27 feet deeper.

The formation is 438 feet thick, compared with 260 feet in Albatross #1 and approximately 523 feet in East Lake Tyers #1.

It is observed that Gannet #1 has a more sandy Lakes Entrance Formation section than Albatross #1, since, ~~in Miocene times,~~ Gannet was closer to the basin edge and the Oligocene shoreline than Albatross. ?

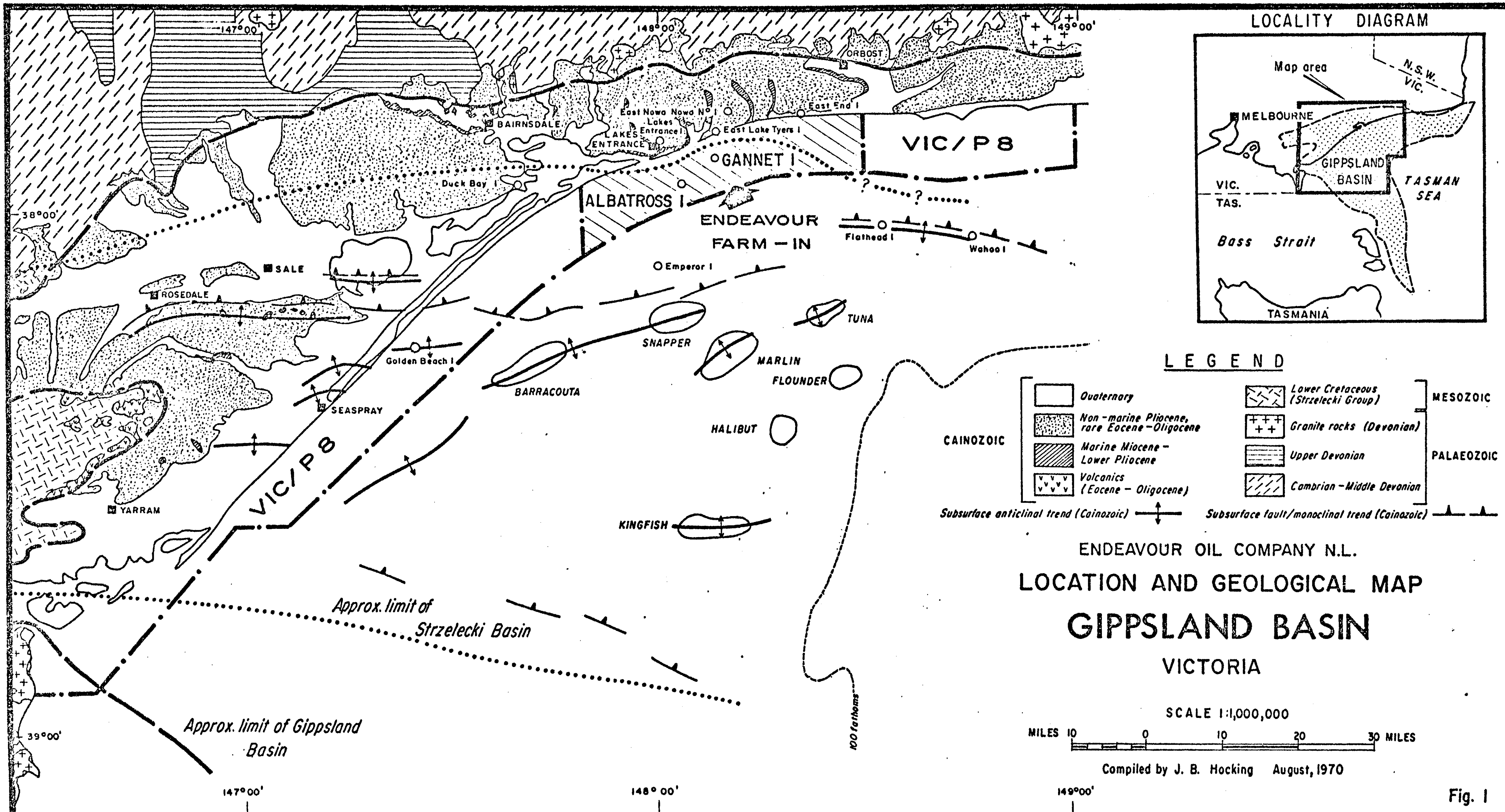
The formation can be subdivided into two units, an upper 'mudstone unit' and a lower'sandstone' unit:-

(i) 'Mudstone unit' - this unit is divisible into an upper mudstone sub-unit (1777-1951 feet), a middle calcareous mudstone (1951-2071 feet), and a lower, sandy calcareous mudstone with some muddy sandstone pockets (2071-2189 feet).

The unit correlates with the complete Lakes Entrance Formation at Albatross #1where the upper two sub-units are present. The lower sub-unit below 2071 feet appears to correlate with the more sandy, calcareous mudstone below approximately 2280 feet in Albatross #1. The thin, hard, calcareous sandstone interbeds found onshore are uncommon in Gannet #1.

The upper part of the lowest sub-unit, between 2071 feet and approximately 2107 feet, can be compared with the Greensand Member in East Lake Tyers #1 between approximately 1287 and 1340 feet. It is characterised by abundant glauconite and also some pelletal limonite, but is not the true Greensand lithology seen onshore.

The lower part of the sandy, calcareous mud-



ENDEAVOUR OIL COMPANY N.L.

LOCATION AND GEOLOGICAL MAP

GIPPSLAND BASIN

VICTORIA

Fig. 1

stone sub-unit, between approximately 2071 and 2189 feet, is probably a time-correlate, and therefore a deeper shelf-mud facies equivalent, of the upper sands of the Colquhoun Gravels at East Lake Tyers #1 (see Fig. 4).

(ii) 'Sandstone unit' - the basal 26 feet of the Lakes Entrance Formation in the Gannet well consists of sandstones,either friable and porous muddy sandstones or tight sideritic sandstones of littoral or shallow marine origin. These beds are equivalent of the Colquhoun Gravels onshore and may be correlated with the lower part of the Colquhoun Gravels in East Lake Tyers #1 (see Fig. 4).

The'sandstone unit' is not present in Albatross #1 except possibly for the basal 1 foot sideritic sandstone bed (see Fig. 5).

The porosity of the 'sandstone unit' is a factor that has adversely affected hydrocarbon trapping potential at the Gannet prospect (see Occurrence of Hydrocarbons).

<u>Latrobe Valley Coal Measures (2215-2317')</u>:

The top of the Latrobe Valley Coal Measures, at 2215 feet, is taken as the contact between a fossiliferous,sideritic sandstone above and friable and highly porous, unfossiliferous sandstones below. There is a corresponding break in the wireline log response. Pyrite is associated with the Lakes Entrance/Latrobe contact but, unlike Albatross #1, is concentrated in the basal Lakes Entrance beds rather than the top of Latrobe.

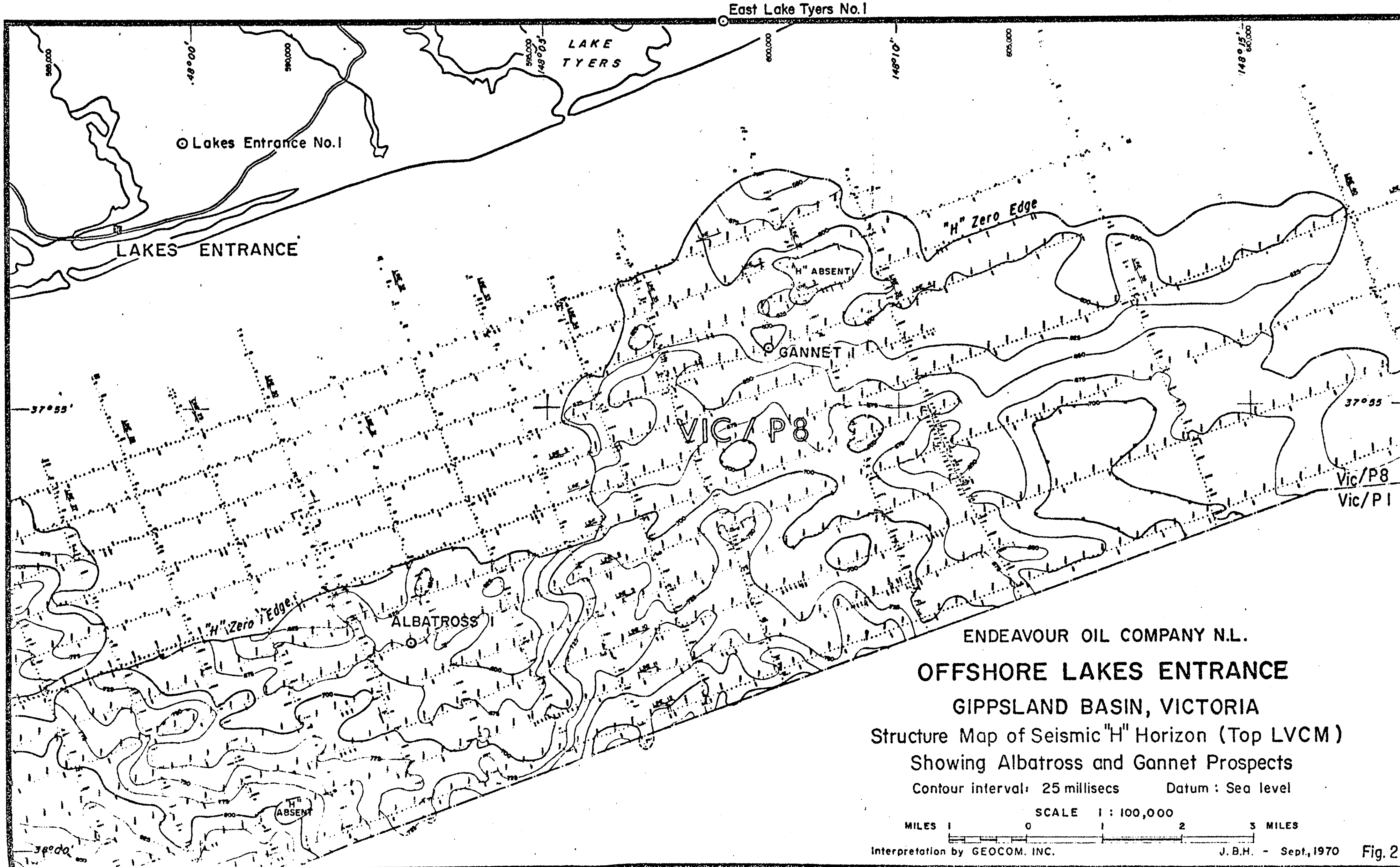
The Latrobe is divisible into two arbitrary units:-

(i) 'Upper unit (2215-2256 feet) - clean,friable, and highly porous, unfossiliferous, slightly gravelly sandstones with interbedded weakly-cemented, fossiliferous, calcareous/sideritic sandstones. The unit has been allotted to the Latrobe rather than the Lakes Entrance since the predominant lithology is Latrobe-type sandstones.

(ii) 'Lower unit' (2256-2317 feet) - clean, porous sandstones, as above, with some coal and mudstone interbeds.

As with Albatross #1, the Latrobe Valley Coal Measures at Gannet #1 are completely lacking in the coal seams of substantial thickness that were anticipated (see Fig. 3).

The lithologic association of the upper unit suggests a deltaic or estuarine type of environment. It cannot be established whether this upper


East Lake Tyers No. I
LAKE TYERS
Lakes Entrance No. I
LAKES ENTRANCE
148°00'
148°05'
148°10'
148°15'
37°55'
38°00'
"H" Zero Edge
"H" ABSENT
GANNET
VIC / P8
ALBATROSS
Vic/P8
Vic/P I
ENDEAVOUR OIL COMPANY N.L.
OFFSHORE LAKES ENTRANCE
GIPPSLAND BASIN, VICTORIA
Structure Map of Seismic "H" Horizon (Top LVCM)
Showing Albatross and Gannet Prospects
Contour interval: 25 millisecs
Datum : Sea level
SCALE 1 : 100,000
MILES 1 0 1 2 3 MILES
Interpretation by GEOCOM. INC.
J.B.H. - Sept., 1970
Fig. 2

unit is a time-equivalent, or else slightly younger than the 'non-marine' upper unit in Albatross #1. Hence the environmental relationship between the two is not precisely understood. The lower unit closely resembles that in Albatross #1 and was probably desposited in a channel sand/swamp environment along a coastal plain.

Although the labelled depths are contradictory, it is believed that the sandstones recovered in sidewall cores 30, 29, 27, 25, 24, 23 and 17 are from the Latrobe Valley Coal Measures (see Appendix 2).

(b) Mesozoic:

Strzelecki Group (2317-4786' (T.D.)):

The top of the Strzelecki Group, at 2317 feet, is readily selected by the break in lithology and wireline log response.

The representative lithologies are the same as in Albatross #1, except perhaps that the sandstones are less calcareous. In addition, the relative proportion of sandstone is considerably less in Gannet #1.

Six arbitrary subdivisions are recognisable based on their predominant lithology, namely siltstone (2317-2446 feet), sandstone (2446-2843 feet), siltstone-shale (2843-3076 feet), sandstone (3076-3434 feet), siltstone-shale with subordinate sandstone (2434-4336 feet), and shale-siltstone with negligible sandstone (4336-4786 feet (T.D.)). The uppermost and lowermost subdivisions were not penetrated in Albatross #1. However, the remaining four can be tentatively correlated between the two wells (see Fig. 5).

The lowermost shale-siltstone unit (which is stratigraphically deeper than the Albatross T.D.) is believed to be of Uppermost Jurassic-Lower Cretaceous age (see Appendix 4), thus ranking it with the oldest Strzelecki Group beds found in Gippsland. It is of similar age and lithology to the shale-mudstone-siltstone Strzelecki section (491 feet thick) in Duck Bay #1 well south of Bairnsdale. It is not known whether Gannet #1 bottomed close to the top of Palaeozoic or whether basal Strzelecki volcanics, similar to those in Duck Bay #1, might exist at the Gannet location.

Tuffaceous sandstones occur at two levels, between 3076-3184 feet and 4033-4206 feet, yet neither appears to correlate with the tuffaceous zone of Albatross #1 which is stratigraphically intermediate between the two.

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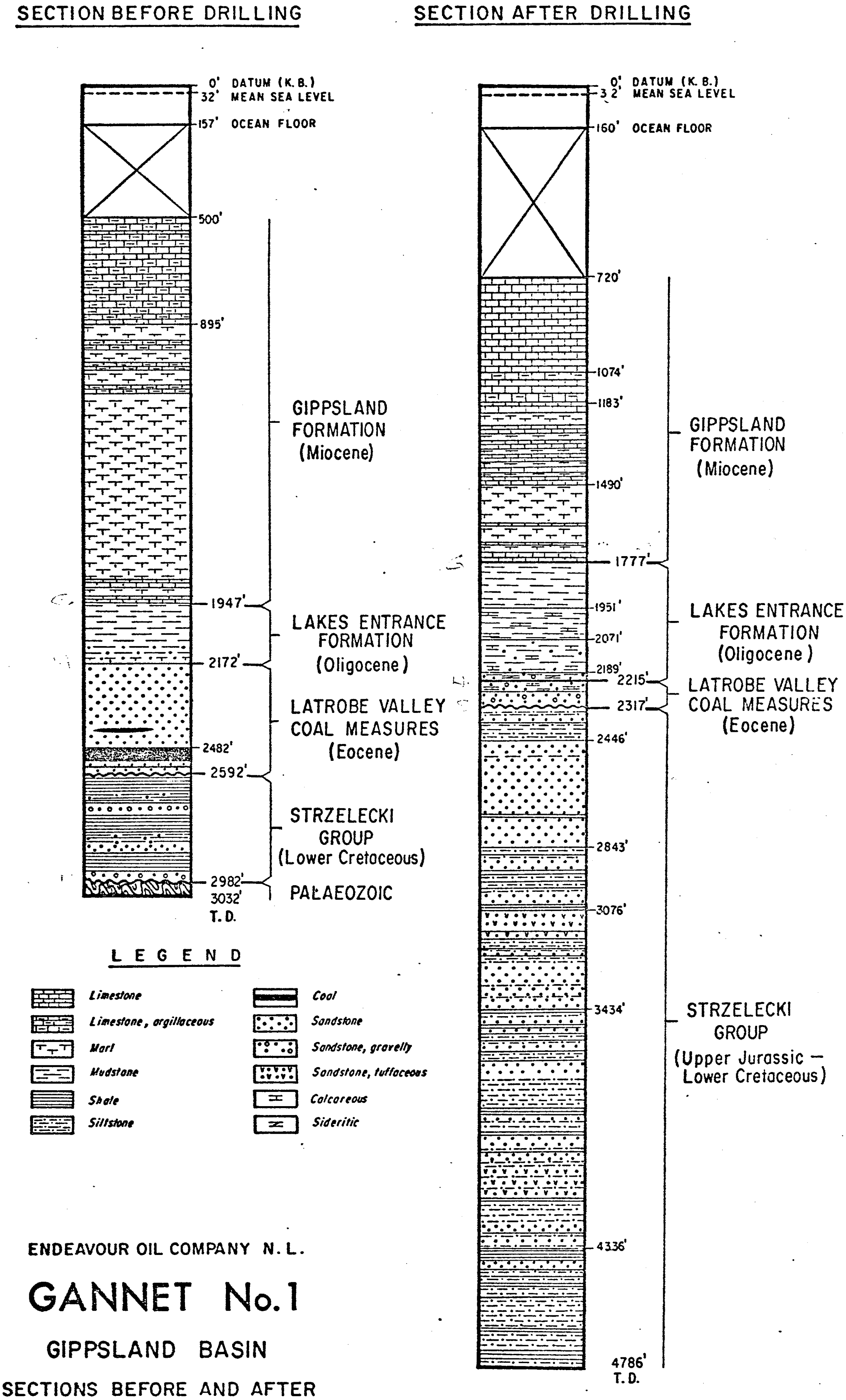

ENDEAVOUR OIL COMPANY N.L.

GANNET No.1

GIPPSLAND BASIN

SECTIONS BEFORE AND AFTER DRILLING

VERTICAL SCALE 1" = 500'

Prepared by J.B. Hocking Oct., 1970

Fig. 3

The Strzelecki-Palaeozoic unconformity dips at more than 9° between East Lake Tyers #1 and Gannet #1, unless there are major intervening faults which are not evident from the seismic (see Fig.4). It is possible that the Palaeozoic rocks had considerable topographic relief at the time of the Strzelecki deposition, such that the unconformity surface is one with initial dip. Even so, there was no evidence of marginal conglomerates in the Gannet well.

(5) Structure:

The Gannet #1 well was drilled primarily to test a Latrobe Valley Coal Measures wedge-out within an embayment defined by the zero edge of the 'H' (top of Latrobe) seismic horizon (see Fig. 2).

Lateral closure was defined by wedge-out to the north, west, and east, and by dip to the south. The area of closure was approximately 13 square miles (within the 0.625 second contour at the 'H' level); the total vertical relief over the prospect being almost 400 feet.

The development of the embayment was probably related to downthrow to the east of the north-south trending fault due east of the Albatross prospect (Jessop et al., 1970).

Regional dips at the Gannet location are from 3° to 4° south-southeast in the Tertiary and, despite inconclusive C.D.M. evidence, appear to be 4° to 5° south to south-southeast in the Mesozoic. There is negligible angular discordance at the Tertiary-Lower Cretaceous unconformity.

(6) Ocurrence of Hydrocarbons:

The hot-wire detector recorded up to 8 units of gas, predominantly methane, whilst drilling through the Latrobe Valley Coal Measures.

An evaluation of the wireline logs (see Appendix 1) indicated that the interval 2,256-2,281 feet in the Latrobe ('Lower Unit') contained traces of gas (Sw = 92%).

No other gas shows of any significance were recorded. No fluorescence was observed in the drill cuttings or the sidewall samples.

Formation water salinity of the Latrobe Valley Coal Measures, determined from cross-plots, is comparable with the water salinity of the basal Lakes Entrance Formation sandy facies at the East Lake Tyers #1 well drilled onshore (viz. 3,500 ppm NaCl). This is to be expected, since the two rock units are in direct contact in the Gannet well and farther updip (see Fig. 4).

The lack of a desirable, impermeable caprock, above the Latrobe section in the Gannet well, is one obvious explanation for the absence of hydrocarbons at that location.

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(7) Porosity and Permeability:

The limestones of the Gippsland Formation generally have good porosity and permeability, especially the uppermost, friable biocalcarenite section. Recrystallisation tends to inhibit porosity, especially below 1,183 feet.

The Gippsland Formation marl section and the Lakes Entrance Formation mudstones are tight and impermeable. The basal 'sandstone unit' of the Lakes Entrance Formation has poor to intermediate porosity and permeability in the muddy sandstone beds, and for this reason the Lakes Entrance Formation is not an effective seal for potential Latrobe Valley Coal Measures hydrocarbon accumulations at the Gannet prospect.

The non-calcareous sandstones of the Latrobe Valley Coal Measures have high porosity and permeability. Porosity values from wireline logs are generally between 20% and 35% and occasionally as much as 38% in the 'lower unit' (see Appendix 1).

The Strzelecki Group section is tight and impermeable with the possible exception of some sandstones where a small negative SP deflection is registered.

(8) Contributions to Geological Knowledge:

Gannet #1 was the second Gippsland Basin well to be drilled a short distance offshore from the abandoned Lakes Entrance Oilfield. The continental shelf adjacent to Lakes Entrance has long been regarded as having petroleum potential, not only because of the proximity of the Lakes Entrance Oilfield to the north, but more so in recent years owing to the discovery of Esso-B.H.P.'s fields to the south. Although a dry hole, the following valuable geological information about the area has been provided by the Gannet #1 well:-

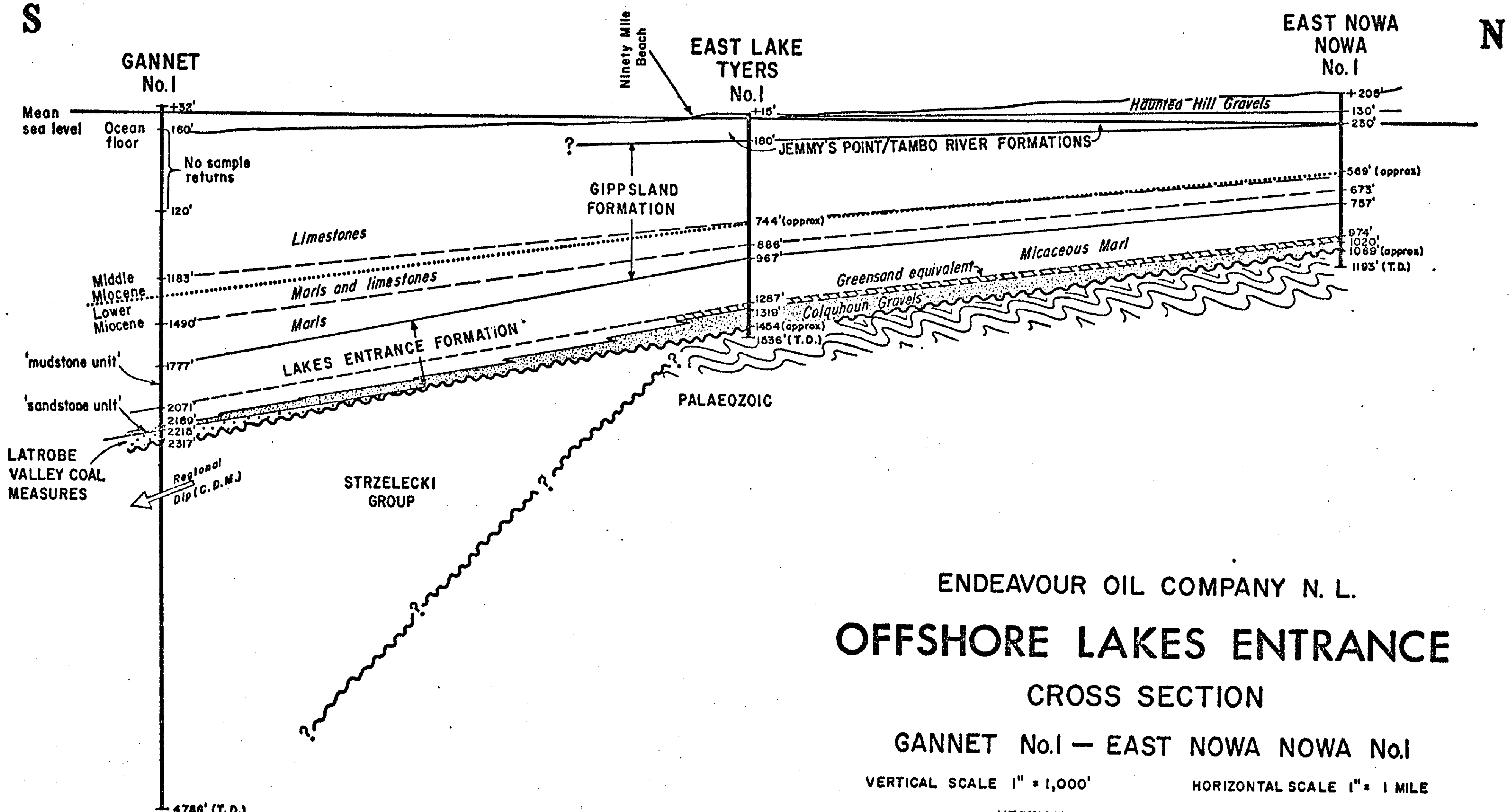
(a) The principal objective, the Latrobe Valley Coal Measures, was penetrated as predicted but contained only a trace of gas. The thickness of the Latrobe (102 feet) was less than predicted (402 feet), owing to the misinterpretation of seismic reflector 'K' (see Fig. 3).

(b) Coals were absent from the Latrobe section (with the exception of rare, very thin seams) and have apparently wedged-out downdip.

(c) The well confirmed the wedging-out of the entire Latrobe section in an updip position along the northern margin of the basin (see Fig. 4); the wedge-out edge is about 2 miles south of the present coastline.

(d) The Latrobe caprock, a somewhat permeable basal sandstone unit of the Lakes Entrance Formation, was ineffective. An adequate seal of the Latrobe wedge was not present.

(e) The salinity of the formation water within the Latrobe sands (viz. 3500 ppm NaCl) is com-



ENDEAVOUR OIL COMPANY N. L.

OFFSHORE LAKES ENTRANCE

CROSS SECTION

GANNET No.I — EAST NOWA NOWA No.I

VERTICAL SCALE 1" = 1,000'   HORIZONTAL SCALE 1" = 1 MILE

VERTICAL EXAGGERATION 5·28 TIMES

Prepared by J. B. Hocking Nov, 1970

Fig.4

parable with the salinity of the formation water within the basal Lakes Entrance sandy facies at East Lake Tyers #1 well, drilled further updip near the coast north of Gannet #1 well. Such similar water salinities suggest that fluid migration and admixing of formation waters between the non-marine Latrobe and the overlying marine Lakes Entrance Formation has occurred, and tends to confirm the inadequacy of the seal overlying the Latrobe wedge.

(f) The Gippsland Formation has a higher proportion of limestone beds than Albatross #1 as a result of its closer proximity to the basin margin and Miocene shoreline.

(g) The Lakes Entrance Formation is a hybrid between the deeper basin type found in Albatross #1 and other offshore Gippsland wells and the more sandy, marginal type found along the north margin of the basin and typified by the onshore Lakes Entrance sections.

(h) The Strzelecki Group is considerably thicker than predicted (+2469 feet). The predicted horizon 'K' (top of upper Latrobe coals) and horizon 'S' (top of Strzelecki) were found to be intra-Strzelecki reflectors (see Fig. 3). Horizon 'P' (predicted base of Strzelecki/top of Palaeozoic) was not intersected.

(i) The Strzelecki Group has noticeably fewer sandstone beds than the corresponding section in Albatross #1.

(j) A supposedly basal shale-siltstone unit of the Strzelecki was intersected below 4336 feet and is Uppermost Jurassic-Lower Cretaceous in age; these are the oldest known Strzelecki beds. This unit can be equated with a unit of similar lithology and age in Duck Bay #1 well, south of Bairnsdale. The well may have bottomed within a few hundred feet, or less, of Palaeozoic bedrock.

(k) The secondary objective of permeable Mesozoic sandstones or conglomerates, especially at the base, was not realised.

The Gannet #1 well has demonstrated that an effective Latrobe caprock does not exist. The prospects for stratigraphic accumulation of hydrocarbons within an updip wedge-out of the Latrobe Valley Coal Measures are unlikely to present in the area of the Gannet prospect.

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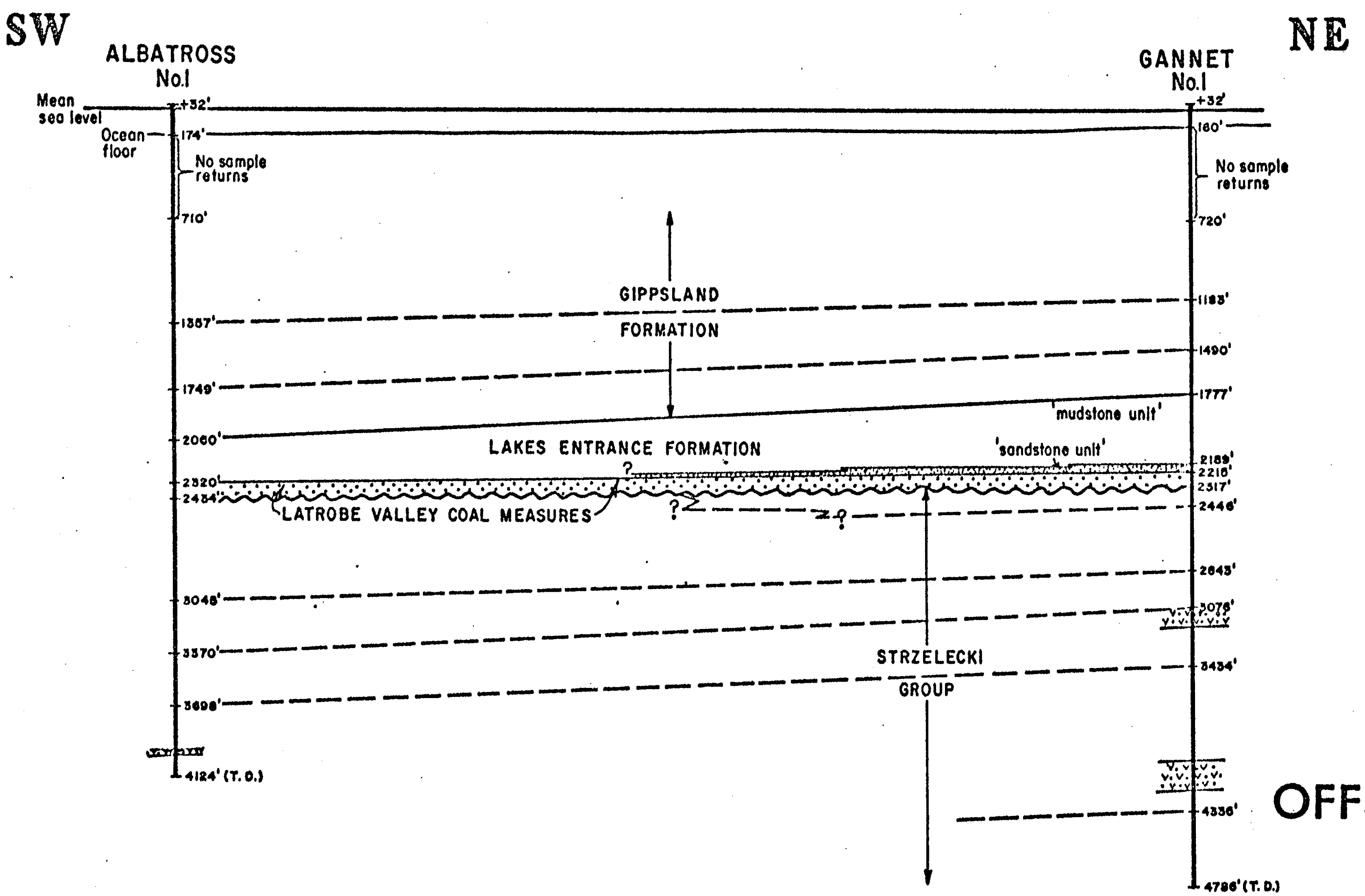

ENDEAVOUR OIL COMPANY N. L.

OFFSHORE LAKES ENTRANCE

CROSS SECTION

ALBATROSS No.1 – GANNET No.1

VERTICAL SCALE 1" = 1,000'   HORIZONTAL SCALE 1" = 1 MILE

VERTICAL EXAGGERATION 5·28 TIMES

Prepared by J. B. Hocking Nov, 1970

Fig. 5

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APPENDIX (1)

LOG INTERPRETATION

GANNET #1

Depth	#	SSP	R_{IL}	R_{MLL}	Δt	ρb	F_D	F_R	$Ø_D$	$Ø_R$	FR/FD	R_{mf}	R_W	R_{wa}	Sw (D x R_{IL})	Sw Eqn.
2212-16	1	+16	9.6	10.0	108	2.32	14.5	14.1	23.0	23.5	0.97	0.71	1.17	0.66	100	100
2220-24	2	+16	9.1	7.0	117	2.35	18.0	9.9	21.0	27.5	0.55	0.71	1.17	0.51	100	100
2234-40	3	+16	13.6	10.0	98	2.36	19.0	14.1	20.5	23.5	0.74	0.71	1.17	0.72	100	100
2244-48	4	+16	8.0	4.7	131	2.10	6.6	6.6	33.3	33.3	1.00	0.71	1.17	1.21	100	100
2250-54	5	+16	8.2	5.5	130	2.12	7.4	7.8	32.0	31.0	1.06	0.71	1.17	1.11	98	100
2264-68	6	+16	7.6	4.1	142	2.03	5.5	5.8	37.5	35.0	1.11	0.71	1.17	1.38	89	94
2272-76	7	+16	8.5	3.4	148	2.09	7.2	4.8	33.8	38.0	0.71	0.71	1.17	1.18	92	92
2282-88	8	+16	4.4	4.2	145	2.06	5.8	5.9	35.7	35.0	1.02	0.71	1.17	0.76	100	100
2306-12	9	+18	12.0	7.3	115	2.28	15.5	10.3	22.5	27.0	0.57	0.71	1.17	0.77	100	100

SCHLUMBERGER

Gannet #1
FDC vs { R_{IL} / R_{MLL} }

RESISTIVITY VS POROSITY

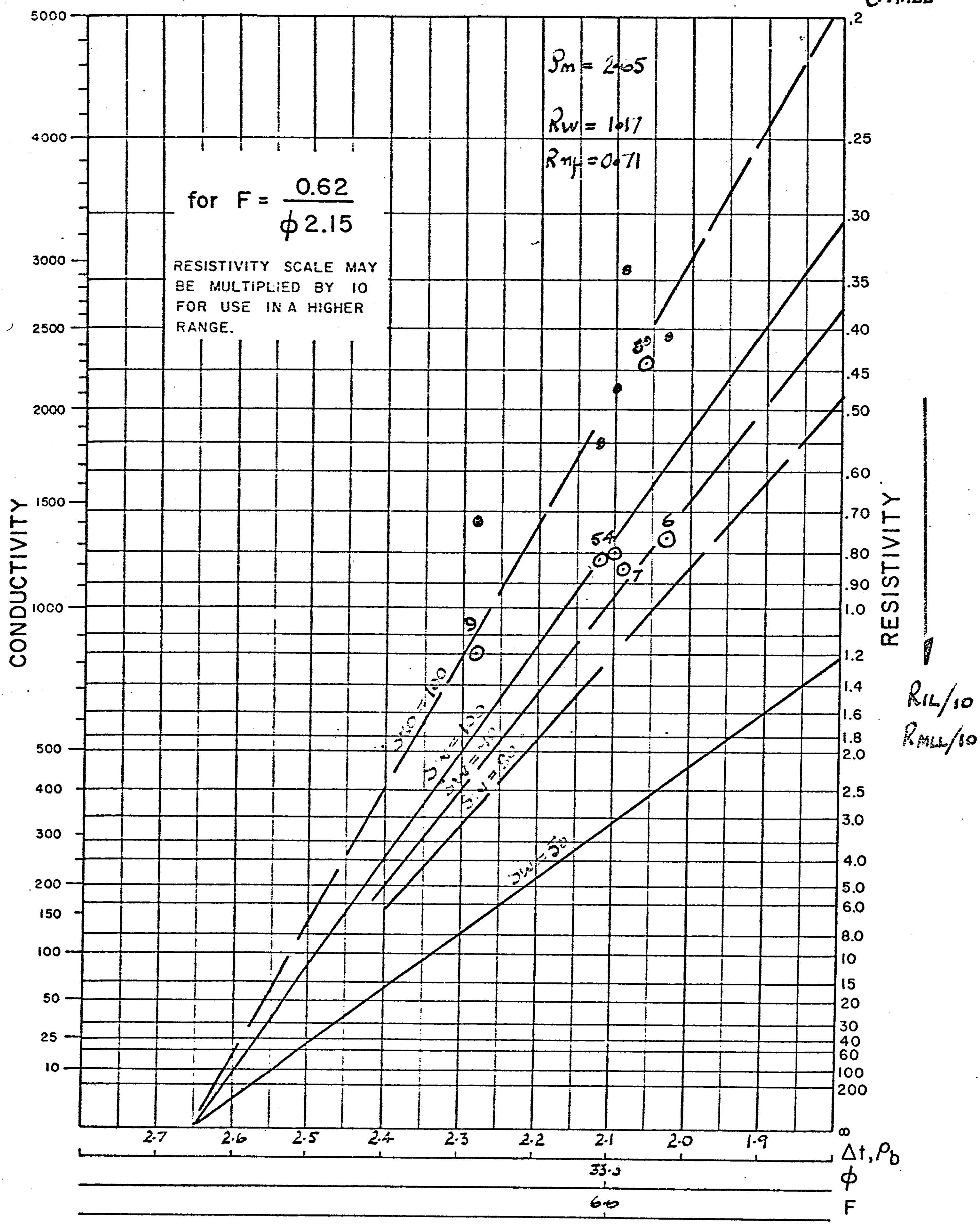

FIG. 1

SCHLUMBERGER

Gannet #1
Δt vs { R_{IL}, R_{MLL} }

RESISTIVITY VS POROSITY

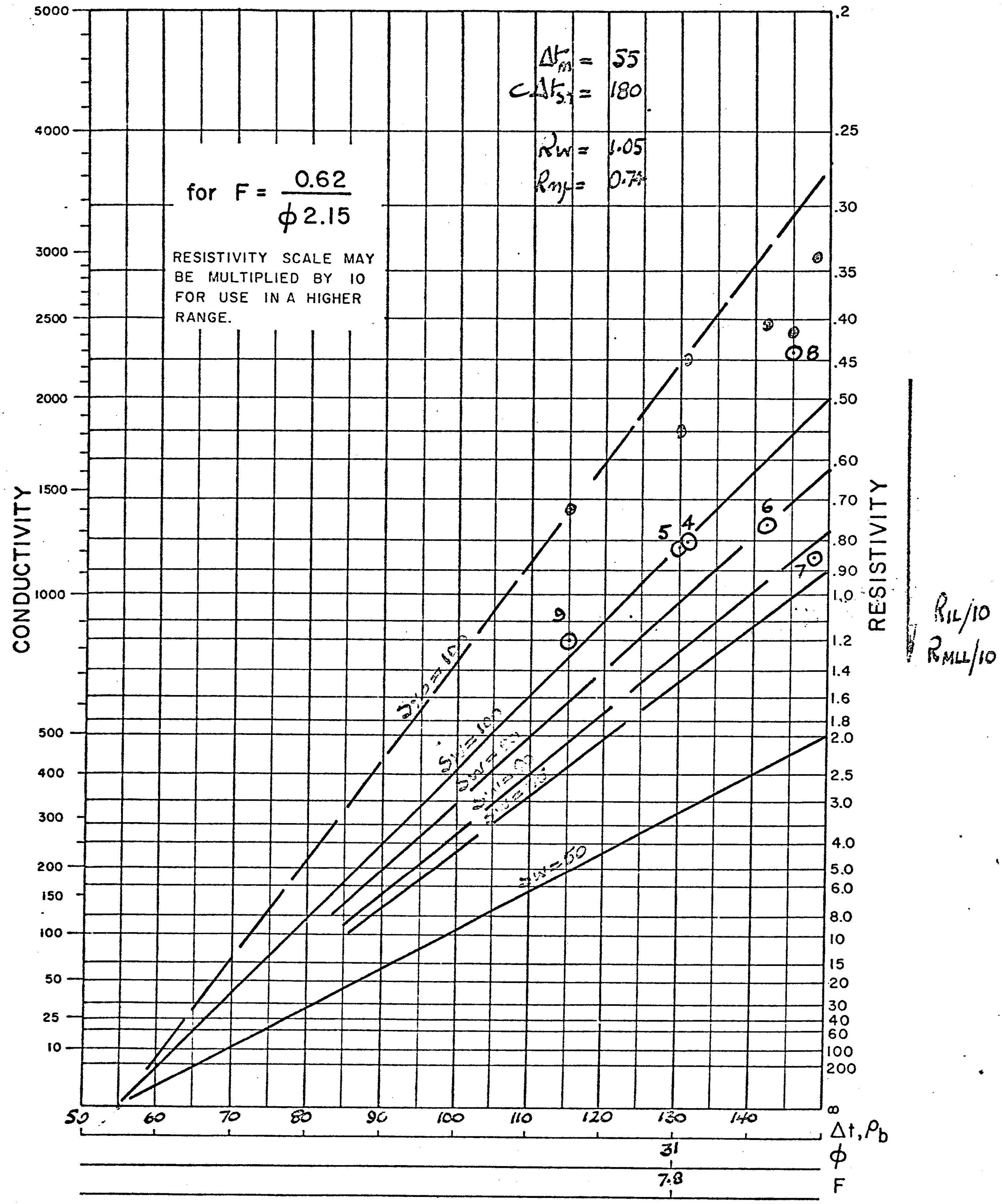

FIG. 3

Ganner #1
R_{IL} vs R_{MLL}

$R_w = 1.14$

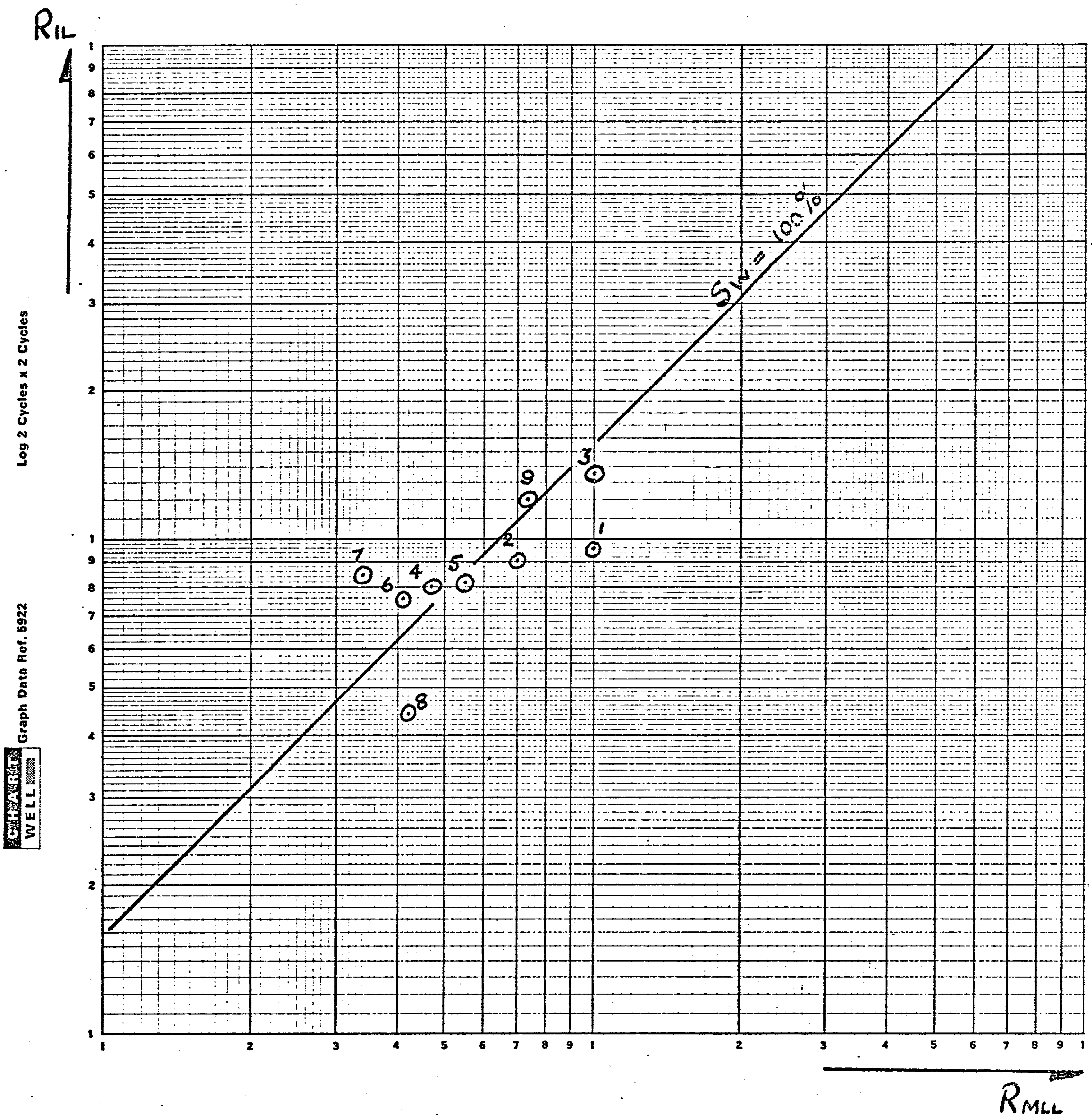

FIG. 3

GANNET #1

INDUCTION ELECTRIC LOG

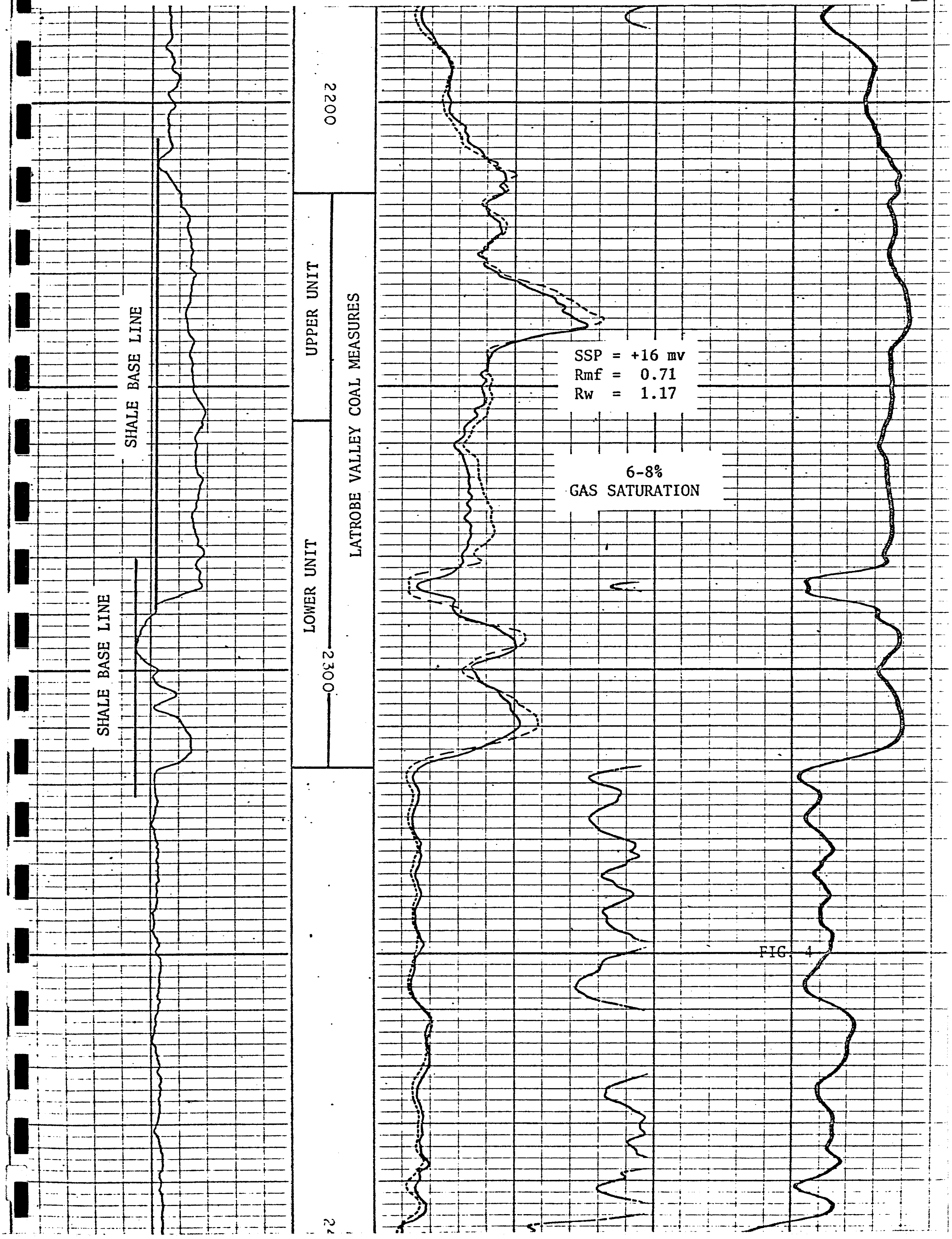

FIG. 4

GANNET #1

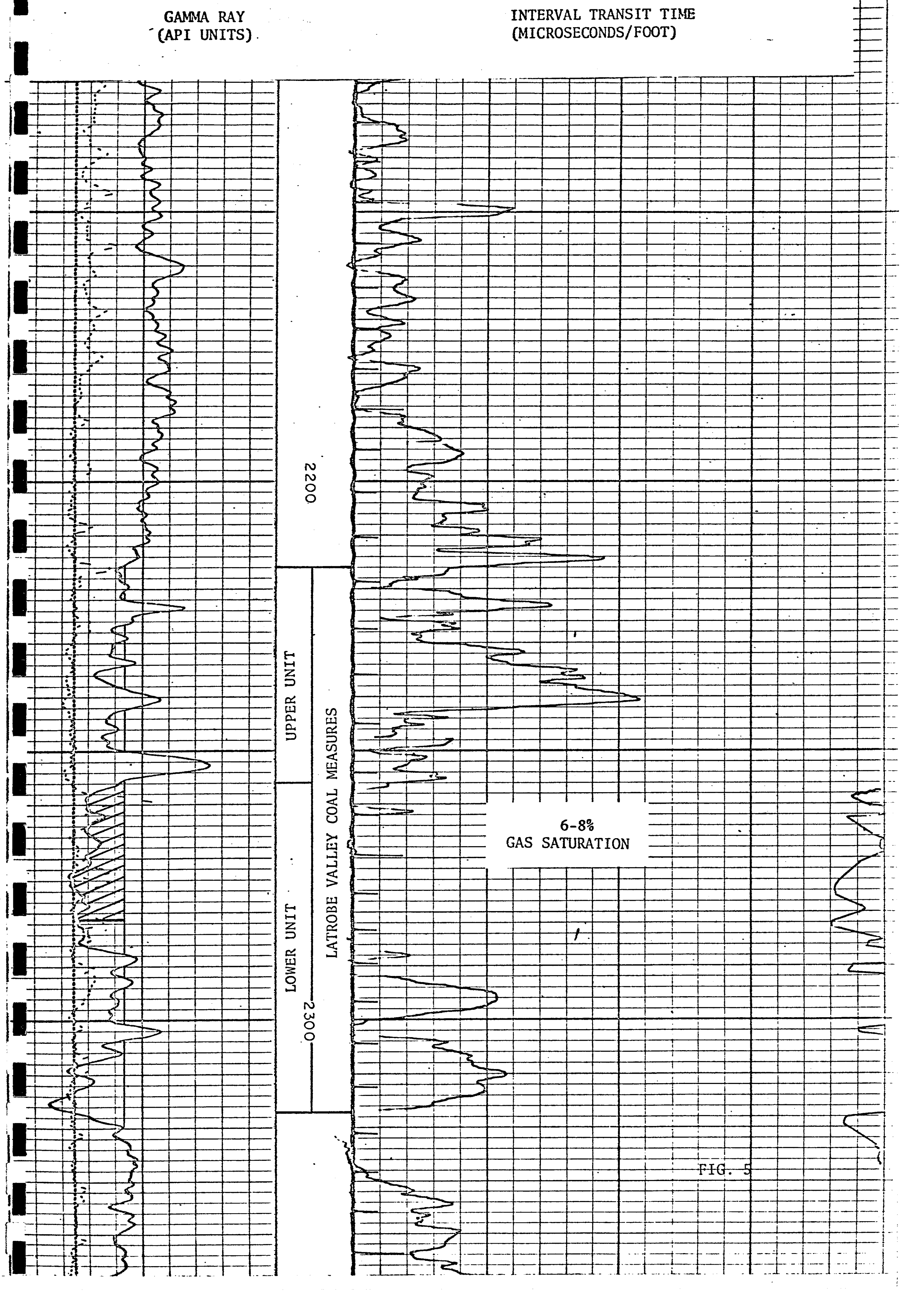

FIG. 5

APPENDIX (2)

SIDEWALL CORE DESCRIPTIONS

SIDEWALL CORE DESCRIPTIONS

2247 S.W.C. No. 16 Recovery: 2¼"
Mudstone: medium light grey to greenish grey, predominantly argillaceous, soft to firm, but locally more hard, traces mica and occasional carbonaceous laminae. Laminae are horizontal but locally up to 40° due to possible diastrophic effects; weak jointing is suggested.

2256 S.W.C. No. 30 Recovery: 2"
Sandstone: light olive grey, soft and unconsolidated, clean, fine-grained with medium sand maximum, moderately well sorted, mostly subangular, quartzose, with rare carbonaceous specks. Porosity good. Fluorescence nil.

2266 S.W.C. No. 14 Recovery: 1-3/4"
Carbonaceous Claystone: dark grey to brown black, firm, slightly silty; with occasional very thin laminae of coal, black, hard, lustrous and brittle, maximum dip of 20° to 25°.

2269 S.W.C. No. 29 Recovery: 1½"
Sandstone: as for 2256'

2285 S.W.C. No. 12 Recovery: 1-3/8"
Claystone: light grey to light medium grey, soft to firm, slightly silty, rare very fine mica.

2288 S.W.C. No. 27 Recovery: 2"
Sandstone: as for 2256'. A small lenticular carbonaceous lamina is visible, and is horizontal.

2295 S.W.C. No. 11 Recovery: 1½"
Mudstone: pale yellow brown to medium light grey, soft to firm, partially carbonaceous. Carbonaceous wisp dips at almost 30°.

2310 S.W.C. No. 10 Recovery: 1¼"
Mudstone: medium light grey (with very faint green tinge), soft to firm, predominantly argillaceous with rare carbonaceous specks.

2313 S.W.C. No. 25 Recovery: 1¼"
Sandstone: as for 2256'.

2420 S.W.C. No. 9 Recovery: 1-3/8"
Mudstone: medium light grey to light olive grey, soft to firm, with scattered carbonaceous specks.

2423 S.W.C. No. 24 Recovery: 1½"
Sandstone: as for 2256'

2864 S.W.C. No. 8 Recovery: 3/4"
Sandstone: mottled, but mostly medium light grey, firm to moderately hard, slightly argillaceous, fine to medium grained (coarse maximum), fair to poor sorting, subangular to angular, consisting of quartz, kaolinised feldspar, minor lithics and traces of carbonaceous grains. Porosity very low. Fluorescence nil.

../

2867 S.W.C. No. 23 Recovery: 1"
Sandstone: light olive grey, soft and unconsolidated, predominantly fine-grained but with a very coarse sand and gravel fraction (? contamination), poorly sorted, subangular, abundant quartz, minor quartzite. Porosity good, Fluorescence nil. (Sample contaminated by drilling mud).

3053 S.W.C. No. 7 Recovery: 1-3/8"
Mudstone: medium grey (with light brown grey tinge) soft to firm, mostly argillaceous.

3452 S.W.C. No. 6 Recovery: 1-3/4"
Sandstone: very light grey to light grey, speckled, firm, argillaceous with white kaolinitic matrix, fine grained (medium sand maximum), fair sorting, angular to subangular, consisting of quartz with minor feldspar and traces of lithics. Porosity negligible. Fluorescence nil.
Mudstone: (½" lamina in above): medium grey (slight brown tinge), soft to firm, predominantly argillaceous, rare carbonaceous specks, traces of very fine to fine quartz sand. Horizontally bedded.

3915 S.W.C. No. 5 Recovery: 1"
Mudstone: light grey to medium light grey (with faint green tinge), firm to moderately hard, mostly argillaceous.

4268 S.W.C. No. 3 Recovery: 1-1/8"
Mudstone: medium grey to brown grey, firm, traces of very fine to fine quartz sand. Interlaminated with:-
Sandstone:very light grey (pink tinge), relatively soft, very argillaceous with white kaolinitic matrix and silty, very fine to fine-grained (coarse maximum), fair to poor sorting, subangular, consisting of quartz, minor feldspar and traces of lithics, (?) mica, and carbonaceous specks. Porosity negligible. Fluorescence nil.
Laminae dip at 5^{o} to 10^{o}.

4271 S.W.C. No. 18 Recovery: 2-1/8"
Mudstone: medium light grey to light olive grey, firm, more silty than at 4268 feet, traces of mica.

4425 S.W.C. No. 2 Recovery: 7/8"
Mudstone: medium grey, firm, mostly argillaceous. With very thin laminae of:-
Siltstone: light grey to light greenish grey, soft, argillaceous, with traces of very fine quartz sand, also mica. Negligible dip.

4428 S.W.C. No. 17 Recovery: 1-3/4" (approx.)
Sandstone: pinkish grey, unconsolidated, medium to coarse (very coarse sand to gravel maximum), poor sorting, subangular to subrounded, quartzose (clear), traces of feldspar, scattered chips with pyrite cement. The outer, mud-impregnated part of core contains 3/8" chips of pyritic sandstone, also rare glauconite, and minor chips of dark brown carbonaceous sandy mudstone with a partial calcareous cement, and of light grey quartzose coarse siltstone; the above are likely contaminants. Porosity good. Fluorescence nil.

4563 S.W.C. No. 1 Recovery: 1"
Mudstone: medium grey to medium dark grey, firm, mostly argillaceous.

APPENDIX (3)

MICROPALEONTOLOGICAL REPORT

MICROPALEONTOLOGICAL REPORT ON GANNET #1 WELL

Cuttings from the Gannet #1 well were submitted by Endeavour Oil Co. N.L. for selective micropaleontological examination. The following samples were examined micropaleontologically in early September, 1970:-

Depth
750'- 760'
900'- 910'
1100'-1110'
1300'-1310'
1500'-1510'
1700'-1710'
1750'-1760'
1800'-1810'
1850'-1860'
2070'-2080'
2170'-2180'
2180'-2190'
2190'-2200'

Foraminiferal assemblages in the samples from 750' to 1510' depth are very sparse. *Cibicides victoriensis* and a few recrystallised specimens of *Orbulina* were noted at 900'-910' (indicating that the strata represent Carter's Faunal Unit 11 or are even younger); in the other samples only non-diagnostic benthonic foraminifera were observed. J.B. Hocking (Endeavour Oil Co.) has noted the presence of *Lepidocyclina* at 1360'-1370'; the base of Middle Miocene, equated with the base of FU 10, may thus be placed shortly above this level, perhaps at 1300'.

Foraminiferal assemblages in the samples from 1700' to 2200' are considerably richer and include planktonic forms. No species indicating FU 7 or younger strata were observed. One specimen of *Globoquadrina dehiscens* was observed at 1700'-1710' (similarly at 2070'-2080', but this is regarded as contaminant). The base of Miocene, equated with the base of FU 6, is hence tentatively placed at 1750'.
A specimen of *Victoriella conoidea* was noted at 2070'-2080'.

The lowest beds of the marine sequence probably represent FU 4, rather than FU 5, although no undoubtedly diagnostic foraminifera were observed.

Dr. C. Abele,
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Victorian Mines Department.

(Unpublished Report 1970/42)

APPENDIX (4)

PALYNOLOGICAL REPORT

PALYNOLOGICAL REPORT ON ENDEAVOUR GANNET No. 1 WELL

At the request of Endeavour Oil Company N.L. ten samples of sidewall cores taken from Gannet No.1 well in Bass Strait have been examined palynologically. The samples are documented as being representative of the Latrobe Valley Coal Measures, which occupies the interval between (2242 and 2318 feet, and the underlying Strzelecki Group from between *((2318 and 4786 feet. However, some confusion exists as to the precise sampling depths of the sidewall cores. The Schlumberger depths ascribed to the samples are thought to be at variance with lithological data as follows (see also Company's letter 2nd September, 1970):

Schlumberger S.W.C. No.	Schlumberger Depth (ft.)	"Possible Depth"
1	4563	4563
2	4425	4425
3	4268	4271
5	3915	4085
7	3053	3918
10	2310	3452
12	2285	3053
14	2266	2864
16	2247	2420
18	4271	2310

The samples were prepared for palynological analyses by a method involving the use of hydrofluoric acid, zinc bromide, and short exposure to ultrasonic vibration. The resultant residues were found to contain good concentrations of moderately carbonised plant matter including fair to poorly preserved spores, pollen grains, and fragments of wood and cuticle. Further treatment of the residues was considered unnecessary and portion of each was mounted in unstained glycerine jelly on glass microscope slides for microscopic examination.

Specific analyses of the microfloras indicates that the sequence examined is of Lower Cretaceous age with a possible extension into the

* Note that the top of Latrobe is now taken as 2215 feet and the top of the Strzelecki as 2317 feet.

Upper Jurassic. Moreover, the microfloras enable palynological subdivision of the sequence in terms of Dettmann and Playford's (1969) spore-pollen zonation scheme of the eastern Australian Cretaceous. Sediments represented by sidewall cores nos. 3,5,7,10,12,14, and 16 are considered to be from the basal portion of the Cyclosporites hughesi Subzone and thus of Neocomian-Aptian age (see Dettmann and Playford 1969, Evans and Hawkins 1967). The horizon from which sidewall core no18 was taken is referred to the uppermost Jurassic-lowermost Cretaceous Crybelosporites stylosus Zone, and sidewall cores nos. 1 and 2 although lacking zonal indices are shown to be of uppermost Jurassic or lowermost Cretaceous age. None of the samples contain plant microfossils of Upper Cretaceous or Tertiary age.

Microfloral Assemblages

The majority of samples provided abundant plant material including reasonably diverse spore-pollen assemblages. Preservation quality of the contained microfossils is fair to poor and the majority of forms present in the individual assemblages are identifiable at specific level. Specific content of each assemblage is documented below with reference to the sidewall core no. rather than depth.

Sidewall core 1

The sample provided a high yield of plant microfossils including fair to poorly preserved spores and pollen grains. Species identified include:

Spores
- Aequitriradites spinulosus (Cookson & Dettmann)
- Baculatisporites comaumensis (Cookson)
- Ceratosporites equalis Cookson & Dettmann
- Biretisporites spectabilis Dettmann
- Contignisporites cooksonii (Balme)
- Coronatispora perforata Dettmann
- Cyathidites australis Couper
- C. minor Couper
- Dictyophyllidites crenatus Dettmann

Foramimisporis dailyi (Cookson & Dettmann)
Klukisporites scaberis (Cookson & Dettmann)
Leptolepidites verrucatus Couper
Lycopodiumsporites austroclavatidites (Cookson)
L. facetus Dettmann
L. nodosus Dettmann
Neoraistrickia truncata (Cookson)
Staplinisporites caminus (Balme)
Stereisporites antiquasporites (Wilson & Webster)

Pollen
Araucariacites australis Cookson
Alisporites grandis (Cookson)
A. similis (Balme)
Microcachryidites antarcticus Cookson
Podocarpidites cf. ellipticus Cookson
Tsugaepollenites dampieri (Balme)

Incertae Sedis
Schizosporis spriggi Cookson & Dettmann

Sidewall core 2

Plant material extracted from the sample includes fairly common spores and pollen grains together with plentiful woody fragments. Spores and pollen grains exhibit fair to poor preservation and include the following species:

Spores
Baculatisporites comaumensis (Cookson)
Ceratosporites equalis Cookson & Dettmann
Contignisporites cooksonii (Balme)
Cyathidites australis Couper
C. minor Couper
Dictyophyllidites crenatus Dettmann
Foraminisporis dailyi (Cookson & Dettmann)
Klukisporites scaberis (Cookson & Dettmann)
Leptolepidites verrucatus Couper
L. major Couper
Lycopodiumsporites circolumenus (Cookson & Dettmann)
L. eminulus Dettmann
L. reticulumsporites (Rouse)
L. austroclavatidites (Cookson)
Neoraistrickia truncata (Cookson)

Pollen
Alisporites grandis (Cookson)
Araucariacites australis Cookson
Microcachryidites antarcticus Cookson
Podocarpidites cf. ellipticus Cookson

Sidewall core 3

A profuse assemblage of fair to poorly preserved plant microfossils was extracted from the sample. The following species of spores and pollen grains were identified:

Spores Aequitriradites spinulosus (Cookson & Dettmann)
Baculatisporites comaumensis (Cookson)
Biretisporites spectabilis Dettmann
Ceratosporites equalis Cookson & Dettmann
Cicatricosisporites ludbrooki Dettmann
Contignisporites cooksonii (Balme)
C. multimuratus Dettmann
Coronatispora perforata Dettmann
Cyclosporites hughesi (Cookson & Dettmann)
Cyathidites australis Couper
C. minor Couper
Dictyotosporites speciosus Cookson & Dettmann
Foraminisporis dailyi (Cookson & Dettmann)
Klukisporites scaberis (Cookson & Dettmann)
Leptolepidites verrucatus Couper
L. major Couper
Lycopodiumsporites austroclavatidites (Cookson)
Murospora florida (Balme)

Pollen Alisporites grandis (Cookson)
Araucariacites australis Cookson
Microcachryidites antarcticus Cookson
Podocarpidites cf. ellipticus Cookson
Tsugaepollenites dampieri (Balme)

Sidewall core 5

Abundant plant material composed chiefly of woody tissue was obtained from the sample. Spores and pollen grains are infrequent and exhibit fair preservation. The following species are represented in the residue:

Spores Cicatricosisporites australiensis (Cookson)
Cyathidites australis Couper
C. minor Couper
Dictyotosporites speciosus Cookson & Dettmann
Lycopodiumsporites austroclavatidites (Cookson)
Stereisporites antiquasporites (Wilson & Webster)

Pollen Araucariacites australis Cookson
Podocarpidites cf. ellipticus Cookson

Sidewall core 7

A diverse assemblage of the following species of fairly preserved spores and pollen grains was extracted from the sample:

Spores Aequitriradites spinulosus (Cookson & Dettmann)
Baculatisporites comaumensis (Cookson)
Biretisporites spectabilis Dettmann

	Cicatricosisporites ludbrooki Dettmann
	Coronatispora perforata Dettmann
	Cyathidites asper (Bolkhovitina)
	C. australis Couper
	C. minor Couper
	Dictyophyllidites crenatus Dettmann
	Dictyotosporites speciosus Cookson & Dettmann
	Foraminisporis wonthaggiensis (Cookson & Dettmann)
	Klukisporites scaberis (Cookson & Dettmann)
	Leptolepidites major Couper
	Lycopodiumsporites austroclavatidites (Cookson)
	Matonisporites cooksoni Dettmann
	Stereisporites antiquasporites (Wilson & Webster)
Pollen	Alisporites grandis (Cookson)
	A. similis (Balme)
	Araucariacites australis Cookson
	Podocarpidites cf. ellipticus Cookson
	Tsugaepollenites dampieri (Balme)
Incertae Sedis	Schizosporis spriggi Cookson & Dettmann

Sidewall core 10

Fair to poorly preserved spores and pollen grains occur commonly in the residue which also contains abundant wood and cuticular tissue. The following forms were identified:

Spores	Baculatisporites comaumensis (Cookson)
	Biretisporites spectabilis Dettmann
	Coronatispora perforata Dettmann
	Cyclosporites hughesi (Cookson & Dettmann)
	Cyathidites australis Couper
	C. minor Couper
	Dictyotosporites speciosus Cookson & Dettmann
	Foraminisporis dailyi (Cookson & Dettmann)
	Klukisporites scaberis (Cookson & Dettmann)
	Lycopodiumsporites austroclavatidites (Cookson)
	L. circolumenus Cookson & Dettmann
	Leptolepidites major Couper
	L. verrucatus Couper
Pollen	Alisporites grandis (Cookson)
	A. similis (Balme)
	Classopollis cf. classoides Pflug
	Microcachryidites antarcticus Cookson
	Podocarpidites cf. ellipticus Cookson
Remanié	Nuskoisporites sp. - Permian

Sidewall core 12

The fair to poorly preserved microflora is restricted in species. Other plant matter occurring in the sample includes wood and cuticular fragments.

Spores Ceratosporites equalis Cookson & Dettmann
Coronatispora perforata Dettmann
Cyclosporites hughesi (Cookson & Dettmann)
Cyathidites australis Couper
C. minor Couper
Dictyotosporites speciosus Cookson & Dettmann
Klukisporites scaberis (Cookson & Dettmann)
Leptolepidites major Couper
L. verrucatus Couper
Lycopodiumsporites austroclavatidites (Cookson)
L. eminulus Dettmann
Neoraistrickia truncata (Cookson)
Stereisporites antiquasporites (Wilson & Webster)

Pollen Araucariacites australis Cookson
Alisporites grandis (Cookson)
Podocarpidites cf. ellipticus Cookson

Sidewall core 14

A diverse assemblage of fair to poorly preserved spores and pollen grains and abundant cuticular material was extracted from the sample. Spore-pollen species identified include:

Spores Aequitriradites spinulosus (Cookson & Dettmann)
Baculatisporites comaumensis (Cookson)
Ceratosporites equalis Cookson & Dettmann
Cicatricosisporites ludbrooki Dettmann
Contignisporites cooksoni (Balme)
Cyathidites australis Couper
C. minor Couper
C. punctatus (Delcourt & Sprumont)
Foraminisporis dailyi (Cookson & Dettmann)
Lycopodiumsporites austroclavatidites (Cookson)
L. nodosus Dettmann
Neoraistrickia truncata (Cookson)
Stereisporites antiquasporites (Wilson & Webster)

Pollen Alisporites grandis (Cookson)
Araucariacites australis Cookson
Classopollis cf. classoides Pflug
Cycadopites nitidus (Balme)
Microcachryidites antarcticus Cookson
Podocarpidites cf. ellipticus Cookson

Incertae Sedis Schizosporis reticulatus Cookson & Dettmann
S. spriggi Cookson & Dettmann

Sidewall core 16

The sample yielded a restricted microflora in which the following species were identified:

Spores	Baculatisporites comaumensis (Cookson)
	Cooksonites variabilis Pocock
	Cyathidites australis Couper
	C. minor Couper
	C. punctatus (Delcourt & Sprumont)
	Cicatricosisporites australiensis (Cookson)
	Dictyotosporites speciosus Cookson & Dettmann
	Foraminisporis dailyi (Cookson & Dettmann)
	Ischyosporites punctatus Cookson & Dettmann
	Leptolepidites major Couper
	Lycopodiumsporites austroclavatidites (Cookson)
	Neoraistrickia truncata (Cookson)
	Pilosisporites notensis Cookson & Dettmann
Pollen	Classopollis cf. classoides Pflug
	Microcachryidites antarcticus Cookson
	Podocarpidites cf. ellipticus Cookson
Incertae Sedis	Schizosporis spriggi Cookson & Dettmann

Sidewall core 18

The residue contains abundant plant matter including the following species of fair to poorly preserved spores and pollen grains:

Spores	Aequitriradites spinulosus (Cookson & Dettmann)
	Baculatisporites comaumensis (Cookson)
	Ceratosporites equalis Cookson & Dettmann
	Cyclosporites hughesi (Cookson & Dettmann)
	Crybelosporites stylosus Dettmann
	Cyathidites australis Couper
	C. minor Couper
	Dictyophyllidites crenatus Dettmann
	Dictyotosporites speciosus Cookson & Dettmann
	Klukisporites scaberis (Cookson & Dettmann)
	Leptolepidites verrucatus Couper
	Lycopodiumsporites austroclavatidites (Cookson)
	L. circolumenus Cookson & Dettmann
	L. nodosus Dettmann
	L. facetus Dettmann
	Murospora florida (Balme)
	Neoraistrickia truncata (Cookson)
	Stereisporites antiquasporites (Wilson & Webster)
Pollen	Alisporites grandis (Cookson)
	A. similis (Balme)
	Cycadopites nitidus (Balme)
	Microcachryidites antarcticus Cookson
	Podocarpidites cf. ellipticus Cookson

Discussion

All of the samples examined yielded microfloras characteristic of an uppermost Jurassic - Lower Cretaceous age, and are thus considered to be representative of horizons of the Strzelecki Group as penetrated by Gannet No.1 well.

Sidewall cores nos. 3,5,7,10,12,14, and 16 provided microfloras diagnostic of the lower portion of the Neocomian - Aptian Cyclosporites hughesi Subzone (see Dettmann and Playford 1969), and are typified by the presence of Dictyotosporites speciosus, Cyclosporites hughesi, Cooksonites variabilis, and Murospora florida. In a quantitative sense, the microfloras are characterized by an abundance of cyathaceous, osmundaceous, lycopodiaceous, and podocarpaceous elements, a feature consistent with microfloras from the basal portion of the Cyclosporites hughesi Subzone in the Gippsland and Otway Basins.

Sidewall core 18 yielded Crybelosporites stylosus, Dictyotosporites speciosus, Murospora florida, and Cyclosporites hughesi in an assemblage containing extremely abundant osmundaceous and lycopodiaceous forms together with common cyatheaceous, podocarpaceous, and auracariaceous elements. The sediment is aaccordingly assigned to the Crybelosporites stylosus Zone of uppermost Jurassic - lowermost Cretaceous age (see Dettmann and Playford 1969).

Sidewall cores nos. 1 and 2 contain spore-pollen suites which are of uppermost Jurassic - lowermost Cretaceous aspect. The presence of Staplinisporites caminus in sidewall core 1 and the lack of Dictyotosporites speciosus, Crybelosporites stylosus, and Cicatricosisporites may be significant in suggesting an Upper Jurassic rather than a Lower Cretaceous age. Quantitative features of the microfloras include abundant osmundaceous, lycopodiaceous, and bisaccate podocarpaceous forms; cyatheaceous types are also plentiful.

Sampling Depths of Sidewall Cores

Although the palynological evidence provides no exact estimate of the sampling depth of each sidewall core, it establishes that all cores are from the Strzelecki Group. Furthermore, the stratigraphical sequence of the sidewall cores can be broadly interpreted from their zonal attribution as detailed below.

Spore-pollen Zone	Schlumberger S.W.C. No.
Cyclosporites hughesi	3,5,7,10,12,14,16.
Crybelosporites stylosus	18
uppermost Jurassic - lowermost Cretaceous	1,2

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21st October, 1970.

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280380

Page 1 of 4

THE FORAMINIFERAL SEQUENCE IN GANNET # 1

by

David Taylor
Consultant

January, 1980

Esso Australia Ltd.
Palaeontology Report No. 1980/5

2/4

INTRODUCTION

GANNET-1

Twenty-two ditch cutting samples were examined between 730 feet and 2200 feet from the Gannet # 1 oil exploration well. However, both the quality of the samples and the forams were so poor as to preclude any reliable biostratigraphic analysis. It was therefore necessary to revert to the outmoded and less accurate "Stage Classification" system. These "stages" are in fact Kleinpellian and show a generalised sequence of events during the ? Pliocene to ? Oligocene. This sequence is as follows:-

DEPTH IN FEET	KLEINPELLIAN ZONE	ENVIRONMENT	AGE
730 to 1120	"Kalimnan" Zone of *Cibicides cynorum*	shallow inner shelf	? Pliocene to ? Late Miocene
1120 to 1780	"Batesfordian" Zone of *Amphistegina* and *Operculina*	Photic Zone Shoal bank edge of inner shelf	? Mid to ? Early Miocene
1860 to 1950	"Longfordian" Zone of miliolids	mid shelf	? Early Miocene
2010 to 2220	"Janjukian" Arenaceous Zone	embayment to inner shelf	? Early Miocene to Late Oligocene

* A distribution chart follows on page 2. Note that very few planktonic specimens were recorded.

GANNET # 1

Ditch cutting samples in feet at	730	820	940	1030	1120	1230	1330	1430	1530	1610	1730	1780	1860	1900	1950	2010	2060	2090	2150	2200
PLANKTONIC FORAMINIFERA																				
Globigerina bulloides															D	D				
G. woodi woodi															1	1	1			
G. praebulloides																	1			
G. aff. euapertura																	1			
BENTHONIC FORAMINIFERA																				
Ammosphaeroidina sp.	°			°													°	1		
Quinqueloculina lapidera	°																			
Lenticulina megalophoto		°				°				°										
L. spp.		°					°			1	°	°								
Lingulina metungensis			°									°								
Cibicides cygnorum			°		°	°	1		°			1	1							
opacus			°				1					°	1	D	1	1	1			
mediocris			°									°	1		1		1			
lobatulus				°		°			1			°	1		1	1				
refulgens				°								°	1							
Operculina victoriensis					D	D	D	A	D	A	A									
Amphistegina lessonii					A	1	1	1	A	A	A									
Nodosaria spp.					°	1	°	°	1	1	°	°	1				°			
Carpentaria sp.										1	A									
Miliolids												1		°	°	°	°	°		
Guttulina problema												1	°	°		°	°			
Textularia spp.												°	1	°		1		1		
Pyrgo sp.													°							
Gyroidinoides sp.													°	°	°	°	°	°		
Stomatorbina concentrica													1							
Sphaeroidina bulloides													1	°		°				
Elphidium spp.													°	1	°					
Haplophragmoides spp.														1						
Anomalinoides spp.															°	1				
Cassidulina subglobosa															1	1	°			
Karreria maoria															°	1				
Gaudyrina heywoodensis															1	1	1	1		
G. rudis															1	1		1		
Cibidides perforatus																1	1			

GRAIN COMPOSITION

Cement %	50 40 20 5 10 510 10 3030 30 5 5
Bryo. %	40 50 4075 70 8070 80 5050 50 1030 40 20
Ech. spines %	10 10 1510 15 1015 5 1510 10 5 5 5
Moll. frags. %	C C r r C r r r r r 5 5 5
Pyrite	C C r r r r r r
Limonite	r r r r C C C
Calc. Siltst. %	7030 60 80 65 60 2[illegible]
Foraminifera %	5 10 4010 20 5 10
Ostracodes %	5 r r r r
Glauconite	r r R70 301
Sponge spicules	r r
Fine qtz. sandst.	
Coarse angular qtz.	

LEGEND

. =	1-20 specimens
I =	20 specimens
D =	60% cf specimens
A =	50 specimens
C =	common

MICROPALEONTOLOGICAL DATA SHEET

4/4

BASIN: GIPPSLAND ELEVATION: KB: ______ GL: ______

WELL NAME: GANNET # 1. TOTAL DEPTH: ______

AGE		FORAM. ZONULES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
PLEISTOCENE		A_1										
		A_2										
PLIOCENE		A_3			730	4						
		A_4										
		B_1										
MIOCENE	LATE	B_2								1030	4	
		C			1120	4						
	MIDDLE	D_1										
		D_2										
		E_1										
		E_2			1880	4				1780	4	
	EARLY	F										
		G										
		H_1			2010	4				1950	4	
OLIGOCENE	LATE	H_2										
		I_1								2220	4	
		I_2										
	EARLY	J_1										
		J_2										
EOCENE		K										
		Pre-K										

COMMENTS: The quality of both the samples and the forams was so poor as to prevent accurate biostratigraphic analysis.

CONFIDENCE RATING:
- 0: SWC or Core - Complete assemblage (very high confidence).
- 1: SWC or Core - Almost complete assemblage (high confidence).
- 2: SWC or Core - Close to zonule change but able to interpret (low confidence).
- 3: Cuttings - Complete assemblage (low confidence).
- 4: Cuttings - Incomplete assemblage, next to uninterpretable or SWC with depth suspicion (very low confidence).

NOTE: If an entry is given a 3 or 4 confidence rating, an alternative depth with a better confidence rating should be entered, if possible. If a sample cannot be assigned to one particular zone, then no entry should be made, unless a range of zones is given where the highest possible limit will appear in one zone and the lowest possible limit in another.

DATA RECORDED BY: S.M. CONLEY DATE: 26th March 1980

DATA REVISED BY: ______ DATE: ______

TL 26-10-79

OIL AND GAS DIVISION

A PALYNOLOGICAL ANALYSIS OF GANNET-1, GIPPSLAND BASIN

by

H.E. STACY

ESSO AUSTRALIA LIMITED

PALEONTOLOGY REPORT 1979/27

SEPTEMBER 26, 1979

INTRODUCTION GANNET - 1. 2/6

Ten sidewall cores and eleven cutting samples were collected from the Victorian Mines Department's core store and processed for palynology. Recovery was fair to poor, but most (18 out of 21) samples could be assigned to a stratigraphic age with fair confidence.

L. N. asperus 676.65 - 701.04 m

Zones and lithological/facies subdivisions of the Latrobe and Strzelecki groups are summarised below. All samples summarised in Table 1 and each occurrence of individual species is tabulated in the distribution chart.

SUMMARY

Unit/Facies	Zone	Depth (Feet)
Latrobe Group	Lower N. asperus	2220'-2300'
UNCONFORMITY		
Strzelecki Group	C. striatus	2295'?-2380'
	F. asymmetricus	2420'-4760'
	C. striatus 699.52?- 725.4m	T.D. 4786'
	F. asymmetricus 737.6 - 1450.8 m	
	T.D = 1458.8m	

GEOLOGICAL COMMENTS

1. As was true with Albatross-1, only Middle Eocene (N. asperus zone) sediments were identified in the Tertiary part of the section. Although the floras were generally poor, accessory species, found in both the top and bottom samples, strongly suggested that only Lower N. asperus beds are present.

2. Sidewall cores #11 (2295') and #25 (2312') are reversed in age and one or the other, or perhaps both, samples are mislabelled and out of place. Sidewall core #11 from 2295' is good Crybelosporites striatus zone of the Lower Cretaceous, while the assemblage recovered from SWC #25 from 2312' is Tertiary in age, although the exact palynologic zone could not be identified. This means that the major unconformity that separates the Tertiary from the Early Cretaceous can only be located palynologically somewhere between the Tertiary sample at 2288' and the top of the consistent Cretaceous at 2360', almost a 1000' interval.

DISCUSSION OF ZONES   GANNET-1   3/6

The presence and distribution of individual species is tabulated on the distribution sheet. The basis for zonation is discussed below.

Foraminisporites asymmetricus zone : 2420' to 4760'

A well-developed spore flora which includes Pilosisporites notensis Contignisporites cooksonii, Dictyotosporites speciosus and Cyclosporites hughesi is indicative of the F. asymmetricus zone of the Lower Cretaceous.

Crybelosporites striatus zone : 2295'? to 2360'

The sidewall core #11, labelled 2295', contains a well-developed C. striatus zone assemblage. The only problem is that the sidewall core immediately below (SWC #25, 2312') contains an equally positive Tertiary flora. So the question is not whether the C. striatus zone is present, but at what depth it actually occurs. The sample from 2360' also partially belongs to the C. striatus zone, although the index species was not found.

Lower Nothofagidites asperus zone : 2220' to 2288'

The presence of Phthanoperidinium eocenicum, P. coreoides and Nothofagidites asperus are considered indicative that the enclosing sediments are N. asperus in age. In addition, the occurrence of A. diktyoploteus at 2220' and S. cainozoicus and S. prominatus in the sample from 2290' demonstrate that only the Lower part of the N. asperus zone was encountered.

REFERENCES

STACY, H., 1979, Paleonological analysis of Albatross-1, Gippsland Basin, Esso Australia Paleo. Report, 1979/26.

Table 1: SUMMARY OF PALEONOLOGICAL ANALYSIS, GANNET-1, GIPPSLAND BASIN

SAMPLE	DEPTH (m)	DEPTH (ft.)	ZONE	AGE	CONFIDENCE RATING	YIELD	DIVERSITY	COMMENTS
Ctngs	671-74	2200-10	Indeterminate	-	-	Low	Poor	
"	677-80	2220-30	Lower *N. asperus*	Middle Eocene	3	Fair	Moderate	*Phthanoperidinium eocenicum*, *A. diktoplokus*
"	680-83	2230-40	Lower *N. asperus*	Middle Eocene	3	Fair	Moderate	*Phthanoperidinium eocenicum*, *A. diktoplokus*
SWC 30	688	2256	Lower *N. asperus*	Middle Eocene	4	Low	Poor	*N. asperus*
SWC 29	692	2269	Indeterminate	-	-	Low	Poor	
Ctngs	695-701	2280-2300	Lower *N. asperus*	Middle Eocene	3	Fair	Moderate	*T. simatus*, *S. prominatus*
SWC 27	697	2288	Indeterminate	-	-	Low	Poor	Probably Tertiary
SWC 11	700	2295	*C. striatus*	Early Cretaceous	2	Fair	Moderate	Mislabeled?
SWC 25	705	2312	Indeterminate	Tertiary	3	Fair	Moderate	Mislabeled?
Ctngs	719-25	2360-80	*C. striatus*/ *F. asymmetricus*	Early Cretaceous	3	Fair	Moderate	Some Tertiary from above.
SWC 9	738	2420	*F. asymmetricus*	Early Cretaceous	1	Fair	Moderate	
SWC 24	739	2423	*F. asymmetricus*	Early Cretaceous	1	Fair	Moderage	
Ctngs	759-62	2490-2500	*F. asymmetricus*	Early Cretaceous	3	Good	High	
SWC 8	873	2864	*F. asymmetricus*	Early Cretaceous	2	Low	Poor	
Ctngs	878-81	2880-90	*F. asymmetricus*	Early Cretaceous	3	Good	High	
"	991-94	3250-60	*F. asymmetricus*	Early Cretaceous	3	Good	High	
SWC 6	1052	3452	*F. asymmetricus*	Early Cretaceous	1	Fair	Moderate	
Ctngs	1137-50	3730-40	*F. asymmetricus*	Early Cretaceous	3	Fair	Moderate	
"	1271-74	4170-80	*F. asymmetricus*	Early Cretaceous	3	Good	High	
SWC 17	1350	4428	*F. asymmetricus*	Early Cretaceous	2	Low	Poor	
Ctngs	1448-51	4750-60	*F. asymmetricus*	Early Cretaceous	3	Good	Moderate	

GANNET-1

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GANNET-1.
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P A L Y N O L O G Y D A T A S H E E T

B A S I N: GIPPSLAND ELEVATION: KB: 32 feet GL: 128 feet

WELL NAME: GANNET-1 TOTAL DEPTH: 4786 feet

AGE	PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
	T. pleistocenicus										
NEOGENE	*M. lipsis*										
NEOGENE	*C. bifurcatus*										
NEOGENE	*T. bellus*										
	P. tuberculatus										
PALEOGENE	Upper *N. asperus*										
PALEOGENE	Mid *N. asperus*										
PALEOGENE	Lower *N. asperus*	2220'	3	2280'	3		2290'	3			
PALEOGENE	*P. asperopolus*										
PALEOGENE	Upper *M. diversus*										
PALEOGENE	Mid *M. diversus*										
PALEOGENE	Lower *M. diversus*										
PALEOGENE	Upper *L. balmei*										
PALEOGENE	Lower *L. balmei*										
LATE CRETACEOUS	*T. longus*										
LATE CRETACEOUS	*T. lilliei*										
LATE CRETACEOUS	*N. senectus*										
LATE CRETACEOUS	U. *T. pachyexinus*										
LATE CRETACEOUS	L. *T. pachyexinus*										
LATE CRETACEOUS	*C. triplex*										
LATE CRETACEOUS	*A. distocarinatus*										
EARLY CRET.	*C. paradoxus*										
EARLY CRET.	*C. striatus*	2295'	2	2360'	3		2360'	3		2	
EARLY CRET.	*F. asymmetricus*	2380'	3	2420'	1		4760'	3			
EARLY CRET.	*F. wonthaggiensis*										
EARLY CRET.	*C. australiensis*										
	PRE-CRETACEOUS										

COMMENTS: Sidewall Core #11 from 2295' contains a good C. striatus (Early Cretaceous) flora, while the sidewall core #25 (2312') below this carries an exclusively Tertiary assemblage. The depth and labelling is highly suspect. All depths in feet.

CONFIDENCE RATING:
- 0: SWC or Core, Excellent Confidence, assemblage with zone species of spores, pollen and microplankton.
- 1: SWC or Core, Good Confidence, assemblage with zone species of spores and pollen or microplankton.
- 2: SWC or Core, Poor Confidence, assemblage with non-diagnostic spores, pollen and/or microplankton.
- 3: Cuttings, Fair Confidence, assemblage with zone species of either spores and pollen or microplankton, or both.
- 4: Cuttings, No Confidence, assemblage with non-diagnostic spores, pollen and/or microplankton.

NOTE: If an entry is given a 3 or 4 confidence rating, an alternative depth with a better confidence rating should be entered, if possible. If a sample cannot be assigned to one particular zone, then no entry should be made, unless a range of zones is given where the highest possible limit will appear in one zone and the lowest possible limit in another.

DATA RECORDED BY: H.E. STACY DATE: SEPTEMBER 14, 1979

DATA REVISED BY: DATE:

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Well Name GANNET-1 Basin GIPPSLAND Sheet No. 1 of 1

PALYNOMORPHS \ DEPTHS	2200-20	2220-30	2230-40	2256	2269	2280-300	2288	2295	2312	2360-80	2420	2423	2490-500	2864	2830-90	3250-60	3452	3730-40	4170-80	4428	4750-60
SAMPLE TYPE *	T	T	T	S	S	T	S	S	S	T	S	S	T	S	T	T	S	T	T	S	T
Dil. tuberculatus	/			/																	
H. harrisii	/	/							/	/											
Isch. gremius	/																				
L. florinii	/	/	/	/		/	/		/												
Noth. brachyspinulosus	/	/	/	/	/	/	/		/												
Noth. emarcidus/heterus	/								/	/											
Noth. falcatus	/	/	/	/	/		/		/												
Simpl. meridianus	/		/																		
System. placacantha	/																				
Achom. ramulifera	/																				
Ling. machaerophorum	/																				
Operc. centrocarpum	/	/		/	/	/															
Cupan. orthoteichus		/																			
Dil. granulatus		/	/			/															
L. balmei		/		/					/												
Myrat. parvus		/																			
Noth. deminutus		/	/	/	/				/												
Noth. flemingii		/		/	/	/	/		/												
Phyl. mawsonii		/				/	/		/												
Areosph. diktyoplokus		/																			
Hystr. tubiferum		/																			
Phthan. coreoides		/																			
Phthan. eocenicum		/	/																		
Apteod. australiense		/																			
Protod. simplex		/																			
Spin. ramosus			/							/											
Noth. asperus				/																	
Prot. adenanthoides				/		/				/											
Noth. goniatus					/				/										/		
Prot. annularis					/	/			/												
Sant. cainozoicus						/															
Spinizono. prominatus						/															
Tricolp. simatus						/															
Verruc. kopukuensis						/															
Isch. irregularis							/														
Class. classoides								/		/	/				/	/		/	/		/
Lepto. verrucatus								/		/	/		/			/	/	/	/		/
Crybel. striatus								/							/						
Lycopodium facetus								/					/								
Osmund. wellmanii								/													
Cerato. equalis								/					/			/		/			/
Couper. tabulatus								/				/			/	/	/				
Cicatricosi australiensis								/			/	/	/		/	/			/		
Crybel. stylosus								/													
Dictyo. filosus								/													
Phelodinium sp.								/													
Odontochitina sp.								/			/										
Dictyo. speciosus										/	/		/	/		/					
Cyath. asper										/			/			/	/	/	/		
Lycopodium. nodus										/			/								
Lycopodium. circolumenus											/										
Cyclo. hughesi											/					/					
Neoraist. truncatus											/		/			/	/	/	/		/
Cyath. minor												/									
Cyath. australiensis													/		/	/		/	/	/	/
Kluki. scaberis													/				/	/			/
Aequit. spinulisus													/								
Tsuga. trilobatus													/								
Alisporites similis													/			/		/	/		/
Podocarp. multesimus													/		/						
Foram. wonthaggiensis															/				/		/
Jan. spinulosus															/						
Crybel. punctatus															/						
Contig. cooksonii															/						
Rouse. reticulatus															/		/				
Filo. notensis															/						
Cook. variabilis															/						
Aequit. verrucosis															/						
Lycopodium. eminulus																/					
Baimei. heiediutkon																/					
Cicatricosi hughesi																/	/				/
Dictyo. complex																/					
Lycopodium austroclavatidites													/						/	/	
Tsuga. dampieri																			/		
Cicatricosi hughesi																					/

*C=core; S=sidewall core; T=cuttings.

PE601465

This is an enclosure indicator page.
The enclosure PE601465 is enclosed within the container PE902800 at this location in this document.

The enclosure PE601465 has the following characteristics:

ITEM_BARCODE = PE601465
CONTAINER_BARCODE = PE902800
NAME = Composite Well Log
BASIN = GIPPSLAND
PERMIT =
TYPE = WELL
SUBTYPE = COMPOSITE_LOG
DESCRIPTION = Composite Well Log, page 2 of 2, (enclosure 1 of WCR) for Gannet-1
REMARKS =
DATE_CREATED = 29/07/1970
DATE_RECEIVED =
W_NO = W599
WELL_NAME = Gannet-1
CONTRACTOR = Endeavour Oil Co
CLIENT_OP_CO = Endeavour Oil Co NL

(Inserted by DNRE - Vic Govt Mines Dept)

PE601466

This is an enclosure indicator page.
The enclosure PE601466 is enclosed within the container PE902800 at this location in this document.

The enclosure PE601466 has the following characteristics:

ITEM_BARCODE = PE601466
CONTAINER_BARCODE = PE902800
NAME = Composite Well Log
BASIN = GIPPSLAND
PERMIT =
TYPE = WELL
SUBTYPE = COMPOSITE_LOG
DESCRIPTION = Composite Well Log, page 1 of 2, (enclosure 1 of WCR) for Gannet-1
REMARKS =
DATE_CREATED = 29/07/1970
DATE_RECEIVED =
W_NO = W599
WELL_NAME = Gannet-1
CONTRACTOR = Endeavour Oil Co
CLIENT_OP_CO = Endeavour Oil Co NL

(Inserted by DNRE - Vic Govt Mines Dept)

PE603419

This is an enclosure indicator page.
The enclosure PE603419 is enclosed within the container PE902800 at this location in this document.

The enclosure PE603419 has the following characteristics:

ITEM_BARCODE = PE603419
CONTAINER_BARCODE = PE902800
NAME = Grapholog (Mud Log)
BASIN = GIPPSLAND
PERMIT = VIC/P17
TYPE = WELL
SUBTYPE = MUD_LOG
DESCRIPTION = Grapholog (mud log) , enclosure 4 of WCR, for Gannet-1
REMARKS =
DATE_CREATED = 26/07/1970
DATE_RECEIVED =
W_NO = W599
WELL_NAME = GANNET-1
CONTRACTOR = CORE LABORATORIES AUSTRALIA LTD
CLIENT_OP_CO = ENDEAVOUR OIL COMPANY

(Inserted by DNRE - Vic Govt Mines Dept)

PE902801

This is an enclosure indicator page.
The enclosure PE902801 is enclosed within the container PE902800 at this location in this document.

The enclosure PE902801 has the following characteristics:

ITEM_BARCODE = PE902801
CONTAINER_BARCODE = PE902800
NAME = Synthetic Seismogram
BASIN = GIPPSLAND
PERMIT =
TYPE = WELL
SUBTYPE = SYNTH_SEISMOGRAM
DESCRIPTION = Synthetic Seismogram (enclosure 2 of WCR) for Gannet-1
REMARKS =
DATE_CREATED =
DATE_RECEIVED = 02/01/1986
W_NO = W599
WELL_NAME = Gannet-1
CONTRACTOR = Digital Technology Pty Ltd
CLIENT_OP_CO = Endeavour Oil Co NL

(Inserted by DNRE - Vic Govt Mines Dept)