



PLANET EXPLORATION COMPANY PTY. LTD.

CASTERTON NO. 2 WELL

COMPLETION REPORT

by

PLANET EXPLORATION COMPANY PTY. LTD.

and

CUNDILL, MEYERS AND ASSOCIATES

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COMPLETION REPORT

P.E.P. NO. 26, VICTORIA

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PLANET EXPLORATION COMPANY PTY. LTD.

CASTERTON NO. 2 WELL

WELL COMPLETION REPORT

I. SUMMARY.

Location.

Planet Exploration Company's Casterton No. 2 well, Latitude 37° 39' 05", Longitude 141° 13' 20", K.B. Elevation 229 feet A.S.L., was located ten miles west-south-west of Casterton township in P.E.P. No. 26, Western Victoria.

Commencement/Completion.

The well spudded on 20th October, 1967 and was abandoned on 31st October, 1967, at a total depth of 5,008 feet.

Geological Environment.

The well was drilled in the rapidly thickening Mesozoic sediments of the Otway Basin. After drilling through a thin section of Recent and Pleistocene sands and clays, the well passed through Tertiary Eocene and Palaeocene sediments and encountered Upper Cretaceous beds at a depth of 1,040 feet (K.B.). Lower Cretaceous sediments consisting of siltstones and mudstones were encountered at 1,427 feet and continued to total depth (5,008 feet).

Target Horizon.

The well was drilled as a test of the Lower Cretaceous Heathfield Sand, a generally unconsolidated sand section having good porosity and permeability in each of the three Planet wells formerly drilled in the area. The well was located 2½ miles east of Heathfield No. 1 well on the same anticlinal trend. The well correlated 600 feet higher than the Heathfield No. 1 well but the target formation was absent.

Hydrocarbons.

No hydrocarbons were encountered by the well apart from a few traces of methane associated with coal and carbonaceous material.

Porosity and Permeability.

The prospective Lower Cretaceous sediments were tight. Good porosity and permeability existed in the overlying Tertiary and Upper Cretaceous sands.

Drilling Particulars.

Under the supervision of well-site geologist Mr. Jim Cundill of Cundill Meyers & Associates, the well was drilled with a National Ideal SDA rig owned and operated by Drilling Contractors (Australia) Pty. Ltd. Mr. M. Usings of Usings Drilling Consultants Pty. Ltd. was responsible to Cundill Meyers and Associates for the engineering of the well. Electric logging was carried out by Schlumberger Seeco and Halliburton Ltd. was responsible for cementing and testing services.

PLANET CASTERTON NO. 2 WELL

FINAL REPORT

II. INTRODUCTION

Geological.

Planet Casterton No. 2 well was drilled as an on-structure test of the Heathfield Sandstone (Unit 3 of the Lower Cretaceous Marine Group) in the Otway Basin. This sandstone was encountered in three previous wells drilled in the area - Tullich No. 1, Casterton No. 1 and Heathfield No. 1 - as an unconsolidated sand having good porosity and permeability. It produced gas-cut salt water in the Heathfield No. 1 well. Analysis of the gas showed it to contain 73% combustible gas.

Following a gravity survey conducted in the area in 1960, seismic reflection and refraction surveys were carried out in 1962 and 1963 by Hamco Geophysical and Austral Geoprospectors respectively. Data obtained from these surveys was too poor to provide reliable sub-surface structural information but it was used as a basis for the planning of a detailed seismic common-depth-point stacking reflection survey which was carried out by Petty Geophysical in March and April, 1967. From this survey, sections of considerably better quality were obtained and from them, and the results of dipmeter surveys run on the three previous wells, it appeared that the Casterton No. 1 and Heathfield No. 1 wells had been drilled off-structure. Because of the high porosity of the Heathfield Sandstone, and the occurrence of hydrocarbons in the Heathfield No. 1 well in this section, it was felt that an on-structure test in the vicinity of this well was warranted. The Casterton No. 2 Well, located on the basis of results of the 1967 seismic survey, was thought to fulfil these criteria.

After drilling through porous sands and clays of Quarternary and Tertiary age, Upper Cretaceous sediments were encountered at 1,040 feet, and the well passed into Lower Cretaceous sediments at 1,427 feet. Units 1, 2 and 3 of the Marine Group were found to consist of undifferentiated mudstones, siltstones and feldspathic, lithic and calcareous sandstones which were generally tight. The sandstone present in the interval 3,620 - 3,670 feet, the interval correlating to the Heathfield Sand in the other wells drilled, was of a normal Marine type, the target horizon being completely absent.

Engineering.

The well was spudded in at 8.30 a.m. on 20th October, 1967. After setting conductor pipe at 22 feet, 858 feet of 12 1/2" hole was drilled before setting 853 feet of 9-5/8" 36 lb. J-55 casing with 550 sacks of cement. An 8-3/4" hole was then drilled to total depth - 5,008 feet.

One core only was cut in the well. This was taken from the interval 4,704 to 4,724 feet, with a recovery of 14 feet. Logging was carried out by Schlumberger Geaco from casing shoe to total depth. Induction Electric, Sonic, Compensated Formation Density,

Microlog-logs, Continuous Dipmeter, S.P. and Caliper Logs were run. No drill stem tests were taken.

The well was plugged and abandoned at 5,008 feet, the rig and other contractors being released at 8 A.M. on 31st October, 1967.

III. WELL HISTORY

(1) General Data

- (a) Well Name and Number - Casterton No. 2.
- (b) Name and Address of Operator -
Planet Exploration Co. Pty. Ltd.
9th Floor,
280 George Street,
SYDNEY. N.S.W.
- (c) Name and Address of Tenant Holder -
Planet Exploration Co. Pty. Ltd.
9th Floor,
280 George Street,
SYDNEY. N.S.W.
- (d) Petroleum Tenement -
Petroleum Exploration Permit No. 26, Victoria.
- (e) District - Casterton, Victoria.
Map - Hamilton 1:250,000 sheet area.
- (f) Location - Latitude: 37° 39' 05"
Longitude: 141° 13' 20"
- (g) Elevation: Ground: 218 feet A.S.L.
K.B. : 229 feet A.S.L. (Datum elevation).
- (h) Total Depth - 5,008 feet. (Driller and Schlumberger).
- (i) Date Drilling Commenced - 20th October, 1967.
- (j) Date Total Depth Reached - 29th October, 1967.
- (k) Date Well Abandoned - 31st October, 1967.
- (l) Date Rig Released - 31st October, 1967.
- (m) Drilling Time in Days to Total Depth - 10
- (n) Status - Dry and abandoned.
- (o) Total Cost - To be forwarded separately.

(2) Drilling Data

(a) Drilling Contractor - Drilling Contractors (Australia) Pty. Ltd.,
168 - 170 Kent Street,
SYDNEY. N.S.W.

(b) Drilling Plant -

Make	National
Type	50A
Rated Capacity	8,000 feet with 4½" drill pipe
Motors	2 Waukesha Model 6 LROBSU totalling 900 H.P.

(c) Mast/Derrick

Make	Lee C. Moore, 131'
Type	Mast
Rated Capacity	480,000 lbs.

(d) Pumps -

Make	National (2)
Type	ES00
Size	8 x 14

(e) Blowout Preventor Equipment - Cameron Model SS 12" 900 Series
Hydril GK 12" 900 Series
(working pressures - 3,000 p.s.i.)

(f) Hole Sizes & Depths - 12½" diameter to 858 feet
8½" diameter to 5,008 feet

(g) Casing Details -

Surface String	25 joints of 9-5/8" diameter 36 lb. J-55 Range 2 ST&C Casing set at 853 feet (K.B.)
----------------	---

A conventional Baker guide shoe was run on the bottom of the casing and a Baker float collar was run above the first joint. Four (4) Baker type # centralizers were located at the following depths (K.B.) -

548', 518', 484' and 450'.

Cement was pumped to rise behind casing to surface using 550 sacks of Portland Class 'A' cement with 3% calcium chloride (1,400 lbs.), and plugs were set at top and bottom.

No other casing was run.

(h) Drilling Fluid

A fresh-water/base gel type mud was employed using Soda Ash, Q-Broxin/CC-16 with CMC for filtration control and diesel oil for filtration control and lubricity. During drilling, the average weight of fluid in lbs. per gallon was ten (10).

A table of consumption of mud constituents is set out below:

<u>INTERVAL</u>	<u>CONSTITUENTS ADDED</u>	<u>AMOUNT</u>	<u>TOTAL CONSUMPTION</u>
0-655'	Bentonite	81 sacks	81 sacks
655-2333'	Bentonite	30 sacks	111 sacks
	Soda Ash	1 "	1 "
	Q-Broxin	10 "	10 "
	CC-16	5 "	5 "
	Diesel Oil	1200 galls.	1200 galls.
2333-4082'	Bentonite	50 sacks	161 sacks
	Soda Ash	-	1 "
	Q-Broxin	50 "	60 "
	CC-16	25 "	30 "
	CMC	5 "	5 "
	Diesel Oil	1500 galls	2700 galls.
4082-5008' T.D.	Bentonite	10 sacks	171 sacks
	Soda Ash	-	1 "
	Q-Broxin	30 "	90 "
	CC-16	10 "	40 "
	CMC	5 "	10 "
	Diesel Oil	-	2700 galls.

(i) Water Supply -

A water well of 7-7/8" diameter was drilled using 6" standard bore casing but this well was unsuccessful as it caved up. Water was then carted by truck from a creek 2 1/2 to 3 miles away.

(j) Perforation and Shooting Record -

Nil

(k) Plugging Back and Squeeze Cementation Jobs -

The only plugs run were those for the abandonment program, as set out below:

<u>Interval</u>	<u>Length</u>	<u>Sacks of Cement</u>
2,600' - 2,700'	100'	50
1,360' - 1,460'	100'	70
780' - 880'	100'	70
0' - 60'	60'	60

- (1) Fishing Operations - Nil
- (2) Side-Tracked Hole - Nil

(3) Logging and Testing

(a) Ditch Cuttings -

Representative cuttings samples were taken at 10-foot intervals. They were washed, dried, bagged and labelled and portions were sent to:

Bureau of Mineral Resources,
Core and Cuttings Laboratory,
Collis Street,
FYSHWICK. A.C.T.

and

Department of Mines Core Depot,
PORT MELBOURNE. VIC.

and

Planet Exploration Company Pty. Ltd.

(b) Coring -

The original program provided for two conventional cores to be cut in the target zone intervals of interest. As the target horizon was absent, one core only was cut.

Equipment Used: 1 Reed Model 550 18' Core Barrel
1 7-7/8" Reid HF Core Head,
serial No. C-1708.

<u>Core No.</u>	<u>Interval</u>	<u>Feet Cut</u>	<u>Recovery</u>	<u>% Recovery</u>
1	4704'-4724'	20	14	20

Core samples were sent to the Bureau of Mineral Resources, Department of Mines Core Depot and Planet Exploration Co.

(c) Side-well Sampling - Nil

(d) Electrical and Other Logs -

The hole was logged by Schlumberger Geaco on 30.10.67 at driller's depth of 5,008 feet. The following logs were run:

<u>Tool</u>	<u>Interval</u>	<u>Interval Logged</u>
Induction Electrical	5,006' - 854'	4152'
Sonic	5,001' - 853'	4148'
Compensated Formation Density	5,006' - 20'	4986'
Microsterology-Microlog (with Caliper)	5,006' - 852'	4154'
Continuous Dipmeter	5,003' - 853'	4150'

(e) Penetration Rate Log

A geolograph drilling rate recorder was used to record the drilling rate. A drilling time log was prepared from this and appears on the composite log.

(f) Gas Log

A Continental Laboratories Compac CLI-200 portable gas analyzer was used on this well and a gas log appears on the composite well log.

(g) Formation Testing

No formation tests were carried out because of the absence of the target horizon, the Heathfield Sandstone.

(h) Deviation Surveys

Deviation surveys, using a Totco instrument, were run as follows:

<u>Depth</u> <u>(Feet)</u>	<u>Deviation from</u> <u>Vertical (°)</u>
90	1/2
190	1/2
500	1/2
858	1/2
1,603	1
2,333	0
3,146	1
4,270	1 1/2
5,000	1 1/2

(i) Temperature Surveys -

The only reliable temperature reading obtained was a bottom hole value of 150° obtained during the logging run at 5,006 feet.

(j) Velocity Surveys - Nil

(k) Other Well Surveys - Nil

(l) Production Testing - Nil

GROUNDWATER DATA: (T.D.S., screened intervals, S.L., Drawdown, Yield)

STRATIGRAPHY: Formation		Depth(m)	From	To	Comments
	Newer Basalt	CXNV			
	Whalers Bluff Fm	CQWB	0		
	Moorabool Viaduct Sds.	CXMO	20		
Heytesbury Group (CMT)	PortCambell Lst Fm	CMPC			
	Gellibrand Marl	CMAM			
	Clifton Fm.	COCL			
	Narrawaturk Marl	CONM			
Nirranda Group (COW)	Mepunga Fm	CEME			
	Dilwyn Fm (Easter View)	CPDI	35		
Wangerrrip Group (CPW)	Older Volcanics	CEEV			
	Pember Mudstone	CPPM			
	Pebble Point Fm.	CPPP	207		
	Paaratte Fm		214		
Sherbrook Group (MCS)	Timboon Sd (Skull Ck)	MCPA			
	Nullawaare Fm	MCTS			
		MCNG			
	Belfast Mudstone	MGBM			
	Flaxmans Fm	MCFL			
	Waarye Snds Fm	MCWA	316		
Otway Group (MCO2)	Summeralla Fm	MCEU	435		
	Pretty Hill Sds (GALTWOOD BEACH)	MCPH	1406	1526	
	Palaeozoic mudstones	P5MV			

OTHER DATA: (Velocity survey, seismic line, gas/oil show, tests)

DATA SOURCE, REFERENCES, COMMENTS

DTR

Composite logs available
J. Curdell Completion Report.

SEE P. R. Kenly Files

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PLANET EXPLORATION COMPANY PTY. LTD.

CASTERTON NO. 2 WELL, VICTORIA.

WELL COMPLETION REPORT.

IV. GEOLOGY

(1) SUMMARY OF PREVIOUS WORK.

Petroleum Exploration Permit No. 26 of Planet Exploration Company adjoins the Victorian-South Australian border and consequently has enjoyed the advantages of attention from both Victorian and South Australian geologists. The area is part of the Otway Basin.

Early workers on the Victorian side of the border included Caldwell (1937-1941) and Kenny and McEachern (1937), who were involved with the reconnaissance mapping of the parishes of Killara, Bangallah, Dergholm, Roseneath and Myaring, between the years about 1927 and 1932.

In 1945 the Nelson bore, located about 30 miles to the south-south-west of the Casterton No. 2 well was drilled to a depth of 7315'.

A regional airborne magnetometer survey was carried out in 1949 and Boutakoff (1952) published a paper discussing the structural pattern of the area. An important contribution was made by Kenley (1954) who recognised Cretaceous rocks in the area. In 1961 a paper on the sediments of the Nelson Bore was published by G. Baker.

In the meantime, regional ground gravity surveys had been undertaken by Frome-Broken Hill Co. since 1957, and these included work at the western end of the Otway Basin. During 1962 this company conducted seismic surveys in the area of Orford and Bessiebelle, north-east of Port Fairy, and towards the close of 1962 and early 1963 drilled two wells in the area. The first of these wells, which were located about 60 miles south-east of Casterton No. 1, was Frome-Broken Hill Pretty Hill No. 1, which was drilled to a depth of 8129'. The second was Eumeralla No. 1 which was taken to a depth of 10,308'.

Seismic work on Planet's P.E.P. No. 26 was carried out by Geoseismic and Namco in 1962, and by Austral Geo Prospectors in 1963.

Across the border in South Australia, the Otway Basin had been under geological investigation for a great number of years. A large amount of information on the Recent, Pleistocene and Tertiary sequence was accumulating from surface work and the numerous water wells drilled in the area. In 1952 R. C. Sprigg published a bulletin on the Geology of the South-East Province of South Australia, and in 1953 R. C. Sprigg and N. Boutakoff published a summary report on the petroleum possibilities of the Gambier Sunklands. In 1960 E. P. D. O'Driscoll published a bulletin on the Hydrology of the Murray Basin Province in South Australia. The area had also been the subject of a number of aeromagnetic and seismic surveys.

A few deep wells have added greatly to the knowledge of the pre-Tertiary on the South Australian side of the border. The first of these was O.D.N.L. Penola No. 1 which was drilled in 1961 to a depth of 4985' and which was located about 26 miles north-west of Casterton No. 2. This well was followed in 1961-62 by the South East Oil Syndicate Beachport No. 1 well which was taken to a depth of 3963'. In 1962 the O.D.N.L. Mount Salt No. 1 well (about 36 miles south-west of Casterton No. 2) was drilled to a depth of 10,044'. In the same year R. C. Sprigg was the author of a paper on the oil and gas prospects of the Gambier-Portland Basin (A.P.E.A. Conference papers 1962). In 1963 the Beach Petroleum Geltwood No. 1 well was drilled to a depth of 12,300'. Alliance Kalangadoo and Caroline wells were drilled to 9049+ feet and 11,061 feet respectively, encountering carbon dioxide gas. Robertson 1 and 2 were drilled near Penola in South Australia to relatively shallow depths, and recently Alliance drilled a deep well near Lake Bonnah in South Australia.

A great deal of palynological work has been carried out on the wells in the area by officers of the South Australian Mines Department (W. Harris and N. H. Ludbrook), the Bureau of Mineral Resources (P.R. Evans)

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and the Victorian Mines Department (J. Douglas). D. Taylor has undertaken considerable micropalaeontological work in the Victorian part of the Otway Basin, and numerous workers contributed to the recently published B.M.R. Otway Basin study.

In March and April of 1964, Planet Heathfield No. 1 well, located about 3 miles north west of Casterton No. 2 was drilled to a depth of 7500'. This well was still in Merino Group sediments at total depth. In August and September of 1964, Planet Tullich No. 1 well, located about 9 miles north-west of Casterton No. 2 was drilled to a depth of 5363'. This well also remained in Merino Group Sediments at total depth.

The Heathfield and Tullich wells provided much new information in the area, and several correlatable units were apparent between the two wells. In addition, dipmeter surveys on both wells contributed to the structural understanding of the area. A porous sand encountered in the Heathfield well (the "Heathfield Sandstone") was found to be also present in the Tullich well. Another sand in the Tullich well yielded a large very gassy water recovery on drill stem test and a small flare was lit for a few seconds.

Over a 19 day period commencing on September 10, 1964, an 18 well structure hole programme was conducted on a portion of P.E.P. 26 by Cundill, Meyers & Associates.

Following the structure drilling programme, about ten miles of refraction profiles were shot by Nanco International Inc. in the area of the structure, indicating the presence of between 6,000' and 9,000' of section above basement. Following this work, Casterton No. 1 was drilled to a depth of 8038'.

In 1967 a detailed seismic common depth point reflection survey was carried out by Petty Geophysical Co. and defined the structure on which Casterton No. 2 well was drilled.

(2) SUMMARY OF REGIONAL GEOLOGY.

Casterton No. 2 was drilled in the Otway Basin, which is an extensive area of Mesozoic and Tertiary sedimentation covering the south-

western part of Victoria and south-eastern part of South Australia. The Otway Basin is connected through a narrow area defined by the Mt. Lofty Range and the Padthaway granite ridge on the west and the "Dundas Peninsular" on the east, to the Murray Basin which is a large area of shallow sediments, mainly Tertiary, which covers parts of South Australia, Victoria and south-western New South Wales.

As well as a thick Tertiary section, both Upper and Lower Cretaceous sediments are present, although the area occupied by Upper Cretaceous is more limited than that occupied by the Lower Cretaceous. The maximum thickness of the Mesozoic section has not yet been established, but may be in excess of 16,000'. The rocks underlying the Lower Cretaceous Merino Group (or its eastern equivalent, the Otway Group) had been encountered only a few times in drilling. From Broken Hill Pretty Hill No. 1 struck (?) Cambrian diabase at 7874', Frome-Broken Hill Fergusons' Hill No. 1 terminated in schist, believed to be of Cambro-Ordovician age, between 11,513' and 11,633' and Kalangodoo No. 1 well bottomed in possible Palaeozoic sediments. Casterton No. 1 well made a major contribution to the understanding of the geology of the area, in that it penetrated the entire Mesozoic sequence revealing a wide range of lithologies, including Jurassic volcanics. It bottomed at 8038' in phyllitic slate of probable Lower Palaeozoic age. A Jurassic section was also encountered in the Alliance Robertson No. 1 and No. 2 wells.

(3) STRATIGRAPHIC TABLE

KB 229' A.S.L.
Ground 218' A.S.L.

Age	Formation	Informal Rock Unit	Tops Below KB	Subsea	Thickness
Recent		Sand and Clay	11	+ 218'	49'
Pleistocene	Whalers Bluff	Shelly sands & clays	60	+ 169'	55'
Eocene	Knight Group Dartmoor formation	Quartz sands & clays	115	+ 114'	707'
Palaeocene	Bahgallah formation	Greensands, quartz sands, glauconitic clays & silts	822'	- 593'	218'
Upper Cretaceous		Quartz sands, minor coal, pyritic sandstones & shales at base	1040'	- 811'	387'
Lower Cretaceous		Mudstone, siltstones & feldspathic, lithic, calcareous sandstones (Units 1, 2 & 3 undifferentiated)	1427'	- 1198'	2243'
		Siltstones & Mudstones with very minor sandstone interbeds as above.	3670'	- 3441'	945'
		Siltstone & mudstone with common very calcareous interbeds	4615'	- 4386'	393' +
				Total Depth	5008'

(4) STRATIGRAPHY.

(a) Recent

Surface - 60' (49') Sands and clays

Sand: Light grey, occasionally light brown, pink. Grades from very fine grained at top to very coarse grained at base. Consists of subrounded, rounded, subangular frosted quartz with occasional dark brown ferruginous grains.

Clay: Orange, brown, soft sticky, sandy. Some grey very silty clay.

(b) Fleistocene - Whalers Bluff formation

60' - 115' (55') Shelly sands and clays

10' of silts and clays at top underlain by shelly sands.

Silts and clays: dark brown, dark grey, soft sticky.

Sands: Light grey, coarse grained to very coarse grained, frosted and polished, rounded to subrounded quartz. Some dark grey cherty grains.

Silts, sands and clays contain abundant (up to 50%) coarse bivalve fragments and some small gastropods & bryozoa, commonly much abraded.

(c) Eocene - Knight Group - Dartmoor formation

115' - 822' (707') Quartz sands and clays

Sands: Light grey, occasionally light brown, white smoky, yellow or pink. Consists of coarse grained to very coarse grained, occasionally medium grained subrounded to subangular or rounded, polished or frosted quartz grains recovered loose in cuttings. Occasional coarse muscovite flakes are present. Lignitic material (in places as fragments up to $1\frac{1}{2}$ " long) and medium grained pyrite cemented sandstones are also present.

Clays: Soft brown clays are present in the section, almost all of which go into suspension in the drilling fluid. In the lower part of the unit, brown ferruginous clayey siltstones, sandstones, clays and

hard ironstones are present in minor amounts.

(d) Palaeocene - Knight Group - Bahgallah formation

822' - 1040' (218') Greensands, quartz sands, glauconitic clays & silts

Quartz sands: Light grey, rarely pink, consisting of angular to subrounded fine grained to coarse grained, glassy or frosted quartz and a trace of pyrite.

Glauconitic siltstones: Dark grey to green, strongly glauconitic, with included dark green, medium grained glauconitic pellets.

Greensands: Firm to hard, consisting of medium grained ovoid glauconite pellets in a glauconitic clay matrix. Grades to glauconitic clay where clay matrix predominates. Fossils are present at some horizons, consisting of bivalves, gastropods, echinoid spines and bryozoa.

(e) Upper Cretaceous

1040' - 1427' (387') Quartz sands, minor coal. Pyritic sandstones and shales at base

Sands: Light grey, clear, some smokey, yellow, pink and violet. Consists of fresh to polished, mainly coarse grained (some fine grained, medium grained and very coarse grained) angular, subangular and subrounded quartz, recovered as loose grains in the cuttings. Minor black coal, and occasional light brown ferrugeneous sandstones, and loose dark grey chert grains are present. In the basal 60', pyrite cemented fine and medium grained sandstone, hard dark grey pyritic and carbonaceous shales, and ironstones are present.

(f) Lower Cretaceous - Merine Group

1427' - 3670' (2243') Mudstones, siltstones and feldspathic, lithic, calcareous sandstones (Units 1, 2, 3 and undifferentiated)

Mudstones: Light greenish grey, blocky, soft, contain scattered carbonaceous flecks.

Siltstones: Light grey, some light brown, argillaceous, slightly micaceous, contain abundant carbonaceous specks and plant

fragments. Grey variety occasionally calcareous. May be feldspathic or contain very fine lithic material.

Sandstones: Generally light grey or whitish grey, very fine grained to fine grained. Consists of subrounded to subangular quartz feldspars, lithic material (carbonaceous material, green grey chloritic ? rock fragments, dark grey cherty grains, traces yellowish and reddish lithic fragments) minor mica, chlorite and resinous material in calcareous to kaolinitic matrix. Calcareous variety is hard, tight. Kaolinitic variety is softer, occasionally friable with some minor poor porosity.

3670' - 4615' (945') Siltstones, mudstones with very minor sandstone interbeds

Siltstones: Green grey, grey, brown grey. Carbonaceous specks common. Slightly micaceous. Some light grey or whitish, calcareous siltstones.

Mudstone: Green, some brown, soft, with occasional carbonaceous specks.

Sandstones: Very light grey, whitish grey, fine to very fine grained, feldspathic, lithic (dark grey carbonaceous material, cherty grains, green chloritic? rock fragments, red lithic grains, yellow clayey grains) and some coarse biotite in kaolinitic to calcareous matrix. Calcareous variety is hard. Traces of coal, black, dirty shaley.

4615' - 5008' (TD) (393' 4) Siltstone and mudstone with common calcareous sandstone interbeds

Sandstone: As previously, very calcareous, very fine grained, hard. Siltstones, mudstones and traces of coal as previously. Core indicates slumping, current bedding, microfaulting, steep calcite fill fractures and dips from 5° to 15°.

(5) STRUCTURE

Casterton No. 2 well was located in a seismic structure on the down thrown side of two arcuate north westerly trending faults.

The Marine top was encountered 236 ft. higher than the Heathfield No. 2 well, and the base of Units 1, 2 and 3 combined, was encountered 459 ft. higher than Heathfield No. 2.

As mentioned above, Core No. 1 indicated the presence of slumping and faulting in the Marine section.

(6) OCCURRENCE OF HYDROCARBONS

No hydrocarbons were present in the well, with the exception of a few traces of methane, recorded on the gas detector, which were associated with coal and carbonaceous material.

(7) POROSITY AND PERMEABILITY

The Knight sand and Upper Cretaceous sands probably have high porosities and permeabilities.

The Merino sandstones are fine grained, dirty, lithic and feldspathic. In places they are calcareous and in these cases they are invariably tight. Elsewhere they occasionally show porosity, but this is generally very poor. The thickest sandstones showing this type of porosity are present between 3620' and 3670' and between 2105' and 2160'.

(8) CONTRIBUTIONS TO GEOLOGIC KNOWLEDGE

The Cretaceous section was structurally higher than at Heathfield No. 1 well, but the "Heathfield Sandstone", which was the target in the well, was absent, and only the normal Merino type sandstone was present. This suggests that the Heathfield sandstone is rather more restricted in its occurrence than previously thought.

This report was prepared by J. R. Cundill of Cundill, Meyers & Associates.

19/26

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APPENDIX 1

CORE DESCRIPTION

21/26

PLANET CASTERTON NO. 2 WELL

CORE NO. 1. - 4704' - 4724'

RECOVERED 14'

4704' - 4708" (4' 8")

Very thinly interbedded and interlaminated siltstones and mudstones, and occasional coaly partings up to 1/8" thick.

The siltstones are of two types:-

- (1) Light grey, finely sandy, feldspathic, with traces of carbonaceous material and dark lithic grains and
- (2) Medium grey and brownish grey, argillaceous, with abundant carbonaceous material, fine plant fragments and some biotite flakes. The two types of siltstones form alternating lighter and darker bands.

Mudstone is a minor constituent and is slightly greenish grey, very silty, and grades to a siltstone. It is micaceous, and contains scattered large leaf fragments.

Coal traces are also commonly associated with minor dark grey carbonaceous shales, which contain traces of plant resin and are highly slickensided.

Sub vertical fractures are common, and are filled with gypsum. The core tends to break along these fractures, as well as along bedding planes, and also along slickensided fault planes, some of which are at fairly low angles. Due to these various directions of break, the core is very rubbly.

Dips 5° - 10° Abundant small scale current bedding, microslumps and lensing.

4708' 8" - 4712' 6" (3' 10")

Dominantly argillaceous siltstone and mudstone, with laminations, interbeds and lenses of sandy siltstone and fine grained sandstone, increasing in number and thickness downward. The siltstone is medium grey and greenish, very argillaceous and grades to mudstone. It is slightly micaceous and contains scattered very coarse brownish carbonaceous material (plant fragments)

The sandstone is light grey, very fine grained, calcareous, firm to moderately soft, consists of subrounded to subangular quartz, common feldspars, minor lithic grains (carbonaceous material, coaly grains, yellowish clayey grains, trace dark cherty grains, rare soft greenish grains and reddish material), some biotite and chlorite flakes in a calcareous kaolinitic matrix.

The sandstone is tight, and shows some dull gold mineral fluorescence in the more calcareous patches. No cut.

Current bedding, microslumps, lensing and flasers are common, and sub-vertical slickensided small scale faults (calcite filled) are present. Scattered plant fragments are fairly common.

Dips 5° - 15°

/cont...2

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CARTERTON NO. 2 WELL/CONT...

- 2 -

4712' 6" - 4716' 7" (4'1")

Sandstone, light greenish grey, very fine grained, rather massive, bedding not clearly evident. Occasional thin mudstone interbeds are present with a few associated mud pellets in the adjacent sandstone.

The sandstone is the same as in the unit above, except that it is very calcareous. Some slightly darker laminations with a higher % of argillaceous material and with scattered plant fragments are present. A dull gold mineral fluorescence (no cut) is present in highly calcareous areas.

The mudstone is greenish grey, very silty, slightly micaceous, and contains carbonaceous specks. It occurs in the adjacent sandstone as small pellets up to 1/4" in diameter.

The vague bedding in the sandstone shows some evidence of turbulent bedding, swirls, convolutions etc.

Calcite filled fractures (up to 1/4" across) are a feature of this unit, and dip at angles of 50° - 65° to the horizontal.

Scattered fine plant fragments are present.

4716' 7" - 4718' (1'5")

Mudstone, greenish grey, with lenses and laminations of siltstone. The mudstone is firm, blocky, silty and very slightly micaceous. The siltstone is light grey, argillaceous, feldspathic, slightly micaceous and contains carbonaceous specks.

Microslumps, contortions, and convoluted bedding are common. Some horizons show very abundant leaf impressions about 1/8" wide, and up to several inches long.

Average dip appears to be about 10°.

.....

/mw

November, 1967

APPENDIX 2

INTERPRETATION OF LOGS

PLANET CASTERTON NO. 2 WELL

ELECTRIC LOG INTERPRETATION

The following electric logs were run at the Casterton No. 2 well:

Induction E Log:	(1" & 5")	854' - 5006'
Sonic Log:	(1" & 5")	853' - 5001'
Compensated formation density log (with gamma-ray & caliper) (1" & 5")		853' - 5006'
(gamma-ray continued through casing		20' - 853'
Micrologerolog - Microlog (1" & 5")		852' - 5006'

The following values are used for the log calculations:

<u>R_{mf}</u>	1.82	Ω @ 56°	(from flow line)
<u>R_{mc1}</u>	2.81	Ω @ 56°	(from flow line)
<u>R_{ml}</u>	0.72	Ω @ 150°	

Temperature: B.H.T. at Casterton No. 2 (at 5006') was 150°. From Heathfield No. 1 well, where several log runs were taken, a geothermal gradient of between 1.2°F and 1.1°F was indicated between about 1400' and 6100'. At Tullich No. 1 a figure of 0.95°F per 100' was indicated between about 1500' and 5400', and at Casterton No. 1, 0.99°F per 100' between about 4100' and 6800'.

These values are very consistent, and a value of 1° per 100' can be safely assumed at Casterton No. 2 well below 1500'.

The following temperatures are therefore used at Casterton No. 2 well:

1500'	115°F
2000'	120°F
2500'	125°F
3000'	130°F
3500'	135°F
4000'	140°F
4500'	145°F
5000'	150° (measured)

Res. As no fluid recoveries were obtained at Casterton No. 2 well, no direct measurements are possible. However the following Res's were obtained from nearby wells:

Casterton No. 1 well:	1951-2016'	0.93 $\Omega @ 70^{\circ}F$
	5018-5084'	0.24 $\Omega @ 73^{\circ}F$
	5244-5280'	0.24 $\Omega @ 73^{\circ}F$
Heathfield No. 1 well:	4078-4144'	0.25 $\Omega @ 75^{\circ}F$

Values calculated from the logs at Casterton No. 2 well agree reasonably well with these readings.

Porosity.

The Marine sandstones are soft, very clayey, feldspathic, lithic, and very fine grained to fine grained. Porosity, where present, is generally very poor.

Because of the nature of the sandstone, the sonic log and formation density log do not give accurate porosity values. Some filter cake build up, not exceeding about $1/4''$ on each side of the hole, ($1/2''$ on the caliper log) is evident over a number of sands, and some slight positive separation is present on the microlog, over a proportion of these. Traces of very poor porosity were also evident in the cuttings. In one case (2105-2160') this was detected where there was only a hint of positive separation evident in the microlog. The microlaterolog porosity values calculated out realistically, and basically agreed with the overall visual impression of porosity values.

Water Saturation.

The following calculations were made over the porous sandstone intervals:

Sand	Thickness	Temp.	Res	β	Ro	Rt	Sw
1932-36	4'	119 $^{\circ}$	0.31	6	30+	3	100%
2105-54	49'	121 $^{\circ}$	0.30	8	30+	2	100%
2520-21	1'	125 $^{\circ}$	0.28	8	30+	2	100%
2804-06	2'	128 $^{\circ}$	0.27	8	30+	2	100%
2906-07	1'	129 $^{\circ}$	0.26	8	30+	3	100%
2993-97	4'	130 $^{\circ}$	0.26	7	30+	2	100%
3040-55	15'	130 $^{\circ}$	0.26	6	30+	3	100%

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3.

Sand	Thickness	Temp.	Por.	β	R _o	R _h	S _w
3271-73	2'	133°	0.24	8	30+	2	100%
3326-87	1'	133°	0.24	9	27	2	100%
3343-47	4'	133°	0.23	8	30+	2	100%
3455-56	1'	135°	0.23	9	27	2	100%
3635-72	37'	136°	0.21	12	13	2	100%
3786-93	7'	138°	0.20	12	12	2.5	100%
3871-74	3'	139°	0.19	6	30+	4	100%
3914-16	2'	139°	0.19	8	30+	4	100%
4329-30	2'	143°	0.15	8	22	6	100%
4667-69	2'	147°	0.13	10	12	6	100%
4814-16	2'	148°	0.11	7	23	4	100%
4841-44	3'	148°	0.11	9	12	4	100%

The logs thus indicate that no hydrocarbon bearing zones were encountered in the well.

PE902899

This is an enclosure indicator page.
The enclosure PE902899 is enclosed within the
container PE902898 at this location in this
document.

The enclosure PE902899 has the following characteristics:

- ITEM_BARCODE = PE902899
- CONTAINER_BARCODE = PE902898
- NAME = Drilling Performance Log for Casterton
2
- BASIN = OTWAY
- PERMIT = PEP 26
- TYPE = WELL
- SUBTYPE = DIAGRAM
- DESCRIPTION = Drilling Performance Log (enclosure
from WCR) for Casterton 2
- REMARKS =
- DATE_CREATED =
- DATE_RECEIVED =
- W_NO = W511
- WELL_NAME = Casterton-2
- CONTRACTOR =
- CLIENT_OP_CO = Planet Exploration Co P/L

(Inserted by DNRE - Vic Govt Mines Dept)

ENCLOSURES:

PE905717

This is an enclosure indicator page.
The enclosure PE905717 is enclosed within the
container PE902898 at this location in this
document.

The enclosure PE905717 has the following characteristics:

ITEM_BARCODE = PE905717
CONTAINER_BARCODE = PE902898
NAME = Geological Location Map
BASIN = OTWAY BASIN
PERMIT = PEP/26
TYPE = WELL
SUBTYPE = GEOL_MAP
DESCRIPTION = Geological Location map , Heathfeild-1,
Tullich-1 and Casterton-1 (enclosure 1
of WCR) for Casterton-2
REMARKS =
DATE_CREATED = 30/09/67
DATE_RECEIVED =
W_NO = W511
WELL_NAME = CASTERTON-2
CONTRACTOR =
CLIENT_OP_CO = PLANET EXPLORATION COMPANY PTY. LTD.

(Inserted by DNRE - Vic Govt Mines Dept)

PE905716

This is an enclosure indicator page.
The enclosure PE905716 is enclosed within the
container PE902898 at this location in this
document.

The enclosure PE905716 has the following characteristics:

- ITEM_BARCODE = PE905716
- CONTAINER_BARCODE = PE902898
- NAME = Structural Contour Map
- BASIN = OTWAY BASIN
- PERMIT = PEP/26
- TYPE = SEISMIC
- SUBTYPE = HRZN_CONTR_MAP
- DESCRIPTION = Structure Contour Map (enclosure 2 of
WCR) for Casterton-2
- REMARKS =
- DATE_CREATED = 30/09/67
- DATE_RECEIVED =
- W_NO = W511
- WELL_NAME = CASTERTON-2
- CONTRACTOR =
- CLIENT_OP_CO = PLANET EXPLORATION COMPANY PTY. LTD.

(Inserted by DNRE - Vic Govt Mines Dept)

PE601510

This is an enclosure indicator page.
The enclosure PE601510 is enclosed within the
container PE902898 at this location in this
document.

The enclosure PE601510 has the following characteristics:

ITEM_BARCODE = PE601510
CONTAINER_BARCODE = PE902898
NAME = Composite Well Log
BASIN = OTWAY
PERMIT =
TYPE = WELL
SUBTYPE = COMPOSITE_LOG
DESCRIPTION = Composite Well log, sheet 1 of 2,
(enclosure from WCR) for Casterton-2
REMARKS =
DATE_CREATED = 31/10/67
DATE_RECEIVED =
W_NO = W511
WELL_NAME = Casterton-2
CONTRACTOR = Planet Exploration Co P/L
CLIENT_OP_CO = Planet Exploration Co P/L

(Inserted by DNRE - Vic Govt Mines Dept)

PE601511

This is an enclosure indicator page.
The enclosure PE601511 is enclosed within the
container PE902898 at this location in this
document.

The enclosure PE601511 has the following characteristics:

ITEM_BARCODE = PE601511
CONTAINER_BARCODE = PE902898
NAME = Composite Well Log
BASIN = OTWAY
PERMIT =
TYPE = WELL
SUBTYPE = COMPOSITE_LOG
DESCRIPTION = Composite Well log, sheet 2 of 2,
(enclosure from WCR) for Casterton-2
REMARKS =
DATE_CREATED = 31/10/67
DATE_RECEIVED =
W_NO = W511
WELL_NAME = Casterton-2
CONTRACTOR = Planet Exploration Co P/L
CLIENT_OP_CO = Planet Exploration Co P/L

(Inserted by DNRE - Vic Govt Mines Dept)

PE604068

This is an enclosure indicator page.
The enclosure PE604068 is enclosed within the
container PE902898 at this location in this
document.

The enclosure PE604068 has the following characteristics:

ITEM_BARCODE = PE604068
CONTAINER_BARCODE = PE902898
NAME = Induction Electrical Log
BASIN = OTWAY BASIN
PERMIT = PEP/26
TYPE = WELL
SUBTYPE = WELL_LOG
DESCRIPTION = Induction Electrical Log (enclosure 4
of WCR) for Casterton-2
REMARKS =
DATE_CREATED = 30/10/67
DATE_RECEIVED =
W_NO = W511
WELL_NAME = CASTERTON-2
CONTRACTOR = SCHLUMBERGER
CLIENT_OP_CO = PLANET EXPLORATION COMPANY PTY. LTD.

(Inserted by DNRE - Vic Govt Mines Dept)

PE604069

This is an enclosure indicator page.
The enclosure PE604069 is enclosed within the
container PE902898 at this location in this
document.

The enclosure PE604069 has the following characteristics:

- ITEM_BARCODE = PE604069
- CONTAINER_BARCODE = PE902898
- NAME = Mud Log
- BASIN = OTWAY BASIN
- PERMIT = PEP/26
- TYPE = WELL
- SUBTYPE = MUD_LOG
- DESCRIPTION = Mud Log , 1 of 5, (from WCR) for
Casterton-2
- REMARKS = contains lithological descriptions
- DATE_CREATED =
- DATE_RECEIVED =
- W_NO = W511
- WELL_NAME = CASTERTON-2
- CONTRACTOR = CUNDILL MEYERST ASSOCIATES
- CLIENT_OP_CO = PLANET EXPLORATION COMPANY PTY. LTD.

(Inserted by DNRE - Vic Govt Mines Dept)

PE604070

This is an enclosure indicator page.
The enclosure PE604070 is enclosed within the
container PE902898 at this location in this
document.

The enclosure PE604070 has the following characteristics:

ITEM_BARCODE = PE604070
CONTAINER_BARCODE = PE902898
NAME = Mud Log
BASIN = OTWAY BASIN
PERMIT = PEP/26
TYPE = WELL
SUBTYPE = MUD_LOG
DESCRIPTION = Mud Log , 2 of 5, (from WCR) for
Casterton-2
REMARKS = contains lithological descriptions
DATE_CREATED =
DATE_RECEIVED =
W_NO = W511
WELL_NAME = CASTERTON-2
CONTRACTOR = CUNDILL MEYERST ASSOCIATES
CLIENT_OP_CO = PLANET EXPLORATION COMPANY PTY. LTD.

(Inserted by DNRE - Vic Govt Mines Dept)

PE604071

This is an enclosure indicator page.
The enclosure PE604071 is enclosed within the
container PE902898 at this location in this
document.

The enclosure PE604071 has the following characteristics:

ITEM_BARCODE = PE604071
CONTAINER_BARCODE = PE902898
NAME = Mud Log
BASIN = OTWAY BASIN
PERMIT = PEP/26
TYPE = WELL
SUBTYPE = MUD_LOG
DESCRIPTION = Mud Log , 3 of 5, (from WCR) for
Casterton-2
REMARKS = contains lithological descriptions
DATE_CREATED =
DATE_RECEIVED =
W_NO = W511
WELL_NAME = CASTERTON-2
CONTRACTOR = CUNDILL MEYERST ASSOCIATES
CLIENT_OP_CO = PLANET EXPLORATION COMPANY PTY. LTD.

(Inserted by DNRE - Vic Govt Mines Dept)

PE604072

This is an enclosure indicator page.
The enclosure PE604072 is enclosed within the
container PE902898 at this location in this
document.

The enclosure PE604072 has the following characteristics:

ITEM_BARCODE = PE604072
CONTAINER_BARCODE = PE902898
NAME = Mud Log
BASIN = OTWAY BASIN
PERMIT = PEP/26
TYPE = WELL
SUBTYPE = MUD_LOG
DESCRIPTION = Mud Log , 4 of 5, (from WCR) for
Casterton-2
REMARKS = contains lithological descriptions
DATE_CREATED =
DATE_RECEIVED =
W_NO = W511
WELL_NAME = CASTERTON-2
CONTRACTOR = CUNDILL MEYERST ASSOCIATES
CLIENT_OP_CO = PLANET EXPLORATION COMPANY PTY. LTD.

(Inserted by DNRE - Vic Govt Mines Dept)

PE604073

This is an enclosure indicator page.
The enclosure PE604073 is enclosed within the
container PE902898 at this location in this
document.

The enclosure PE604073 has the following characteristics:

ITEM_BARCODE = PE604073
CONTAINER_BARCODE = PE902898
NAME = Mud Log
BASIN = OTWAY BASIN
PERMIT = PEP/26
TYPE = WELL
SUBTYPE = MUD_LOG
DESCRIPTION = Mud Log , 5 of 5, (from WCR) for
Casterton-2
REMARKS = contains lithological descriptions
DATE_CREATED =
DATE_RECEIVED =
W_NO = W511
WELL_NAME = CASTERTON-2
CONTRACTOR = CUNDILL MEYERST ASSOCIATES
CLIENT_OP_CO = PLANET EXPLORATION COMPANY PTY. LTD.

(Inserted by DNRE - Vic Govt Mines Dept)