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WELL COMPLETION REPORT - FERGUSONS HILL NO. 1

SOUTHWEST VICTORIA

by
J. S. Bain

Melbourne
July, 1964

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74 Pages
4 Plates

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ILLUSTRATIONS

1. Geological and Locality Map - Port Campbell Embayment.
2. Stratigraphic Column Prior to Drilling.
3. Geological Cross Sections Before and After Drilling.
4. Composite Well Log.

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APPENDIX 4

CORE DESCRIPTIONS AND ANALYSIS

CORE DESCRIPTIONS

FERGUSONS HILL - 1.

- Core No. 1 1,554 to 1,574 feet. Recovered 20 feet
19 feet SILTSTONE; mainly siltstone, but grades to very fine to medium SANDSTONE in a few places. Medium to dark grey and green-grey, poorly cemented, micaceous, glauconitic, carbonaceous and pyritic, dense, tight. A few brown glauconitic dolomite (?ankerite) fragments.
- 1 foot SILTSTONE as for top 19 feet but with approximately 10% medium to coarse sand.
- No evidence of hydrocarbons. No dip.
- Core No. 2 1,767 to 1,787 feet. Recovered 20 feet.
SANDSTONE; silty, green, contains clear, white fine to very coarse, poorly sorted, subangular to subround quartz set in dark green, very glauconitic matrix. Tight, dense. A little altered to limonite.
- No evidence of hydrocarbons. No apparent dip.
- Core No. 3 2,020 to 2,031 feet. Recovered 11 feet.
SILTSTONE-MUDSTONE; medium to dark grey, micaceous, glauconitic and pyritic, tight, soft in parts. Scattered coarse sand grains throughout core. Top part is less glauconitic than bottom. Pyrite usually as pyritised plant remains.
- No hydrocarbons. No apparent dip.
- Core No. 4 2,092 to 2,110 feet. Recovered 6 inches.
SAND-SANDSTONE; loose, light grey to white, fine to small pebble, poorly sorted, angular to subround, friable, very porous, trace carbonaceous matter, hardly any matrix.
- No evidence of hydrocarbons. No dip.
- Core No. 5 2,427 to 2,437 feet. Recovered 5 feet.
Top 4 feet SAND; loose, clear, milky, very fine to coarse, mainly fine to medium, friable, angular to subround with a slightly silty matrix. Minor carbonaceous matter, pyrite and a few dolomitic sandstone chips. This may be fill on bottom.
- Bottom 1 foot MUDSTONE; medium grey, tight, soft, carbonaceous, slickensided in places. Few pieces of amber-resin in the mudstone.
- No hydrocarbons. No dip.

- Core No. 6 2,437 to 2,449 feet. Recovered 12 feet.
Top 3 feet SILTSTONE; medium to dark grey, very carbonaceous, micaceous, dense, tight, pyritic with carbonaceous matter very abundant along a few of the bedding planes. Pyrite in stringers.
- 1 foot COAL; black with patches of amber-resin.
- 5 feet SILTSTONE-MUDSTONE; as for top of core.
- 1 foot COAL; as above.
- 2 feet SILTSTONE-MUDSTONE as for top of core.
- No evidence of hydrocarbons. Apparent dip on coal bands: 10°.
- Core No. 7 2,741 to 2,760 feet. Recovered 19 feet.
SANDSTONE; light grey, blue and green-grey, whitish colour in parts due to white, clayey matrix, soft, with abundant carbonaceous matter occurring along bedding planes. Sandstone is approximately 60% dark rock fragments and some dark grey mudstone-siltstone, 30% feldspar and 10% quartz, fine to coarse, mainly medium, and in general fairly well sorted. Angular to subround, uniform, some micaceous. Rest is noncalcareous and probably chloritic. Core is tight.
- No hydrocarbons. Apparent dip on coal bands: 15°.
- Core No. 8 3,085 to 3,105 feet. Recovered 12 feet.
SANDSTONE; light grey, green and bluish grey, made up of approximately 50% rock fragments (dark grey to black, green, pink, violet and brown), 40% feldspar, usually dull grey, greenish and quartz about 10%. Fine to coarse, mainly medium, angular to round, fairly well sorted, chloritic and tight. Abundant carbonaceous matter along bedding planes and associated resin patches. Evidence of light yellowish fluorescence and slight cut on some of the bedding planes in the bottom foot of the core. Not very strong fluorescence. No odour. Apparent dip: 15°.
Cuttings throughout interval showed mainly SANDSTONE as for core.
- Core No. 9 3,105 to 3,111 feet. Recovered 4 feet.
MUDSTONE; medium to dark grey, tight, dense with carbonaceous plant fragments. Core is darker in colour towards the bottom and falls apart on washing.
- No evidence of hydrocarbons. No apparent dip. Density: 2.4.

- Core No. 10 3,419 to 3,431 feet. Recovered 6 feet.
MUDSTONE; medium to dark grey, in places grades to SILTSTONE.
Dense, tight, with a few thin laminations of very fine SAND-
STONE, light to medium grey with high percentage of feldspar
and only about 20% rock fragments, noncalcareous, tight. Core
is broken and slickensided with calcite on slickensided surface.

No hydrocarbons. Apparent dip on thin sandstone laminae: 30°.
- Core No. 11 3,732 to 3,752 feet. Recovered 19 feet.
Top 8 feet MUDSTONE-SILTSTONE; medium grey, micaceous,
carbonaceous, very slightly fissile, dense, compact, tight,
containing lenses of sandstone with brecciated mudstones.

11 feet SANDSTONE; light grey mottled, containing 40% rock
fragments, 40% feldspar, 20% quartz, fine to coarse, mainly
medium, angular to subround. Matrix, white, calcareous.
Some granules and pebbles of round re-worked mudstone in sand-
stone. Carbonaceous plant remains. Tight.

No hydrocarbons. Apparent dip: 10°.
Density: 2.4 - sandstone; 2.5 - mudstone.
- Core No. 12 4,092 to 4,112 feet. Recovered 20 feet.
2 feet SILTSTONE to very fine SANDSTONE; light to medium grey,
carbonaceous, micaceous, compact, calcareous in part in sandstone.

2 feet MUDSTONE; dark grey, carbonaceous, tight, dense,
micaceous, slickensided and broken. Slightly laminated.

3 feet SILTSTONE as for top 2 feet.

4 feet MUDSTONE; slickensided as for mudstone above.

7 feet SILTSTONE to very fine SANDSTONE as for top of core
with some interbedded, tight, fine, light grey calcareous
sandstone.

1 foot MUDSTONE as above.

1 foot COAL.

No hydrocarbons. Apparent dip: 10°.
Density mudstone - 2.5. Density siltstone - 2.6.
- Core No. 13 4,514 to 4,534 feet. Recovered 6 feet.
SILTSTONE-MUDSTONE; medium to dark grey, dense, carbonaceous,
dolomitic and in a few places grades into very fine sandstone
which is tight. Made up mainly of angular to subround felds-
par and dolomite fragments and minor rock fragments. Few

- Core No. 13
(Cont'd) dolomitic concretions in core up to 1 inch across and some very thin carbonaceous stringers. Core is broken up and slickensided with calcite on slickensided surface.
- No hydrocarbons. Apparent dip: 10° .
- Core No. 14 5,077 to 5,097 feet. Recovered 20 feet.
- 9 feet MUDSTONE; medium to dark grey, carbonaceous, dense with some intraformational breccia and fine dolomite specks.
- $2\frac{1}{2}$ feet SILTSTONE; laminated, medium to light and dark grey laminae and fair amount of mica and carbonaceous matter, clay bedding planes, trace of resin and dolomite.
- $8\frac{1}{2}$ feet SANDSTONE; light grey, very fine to medium, angular to subround, dark rock fragments, feldspar and quartz in white, calcareous, argillaceous matrix (approx. 30%), tight, well sorted. Dolomite lenses between $5,088\frac{1}{2}$ and 5,090 feet.
- No hydrocarbons. Apparent dip 12° on mudstone; 25° to 32° in laminated siltstone.
- Core No. 15 5,554 to 5,569 feet. Recovered 14 feet.
- Top 4 feet SANDSTONE; very light to light grey to medium grey in places, very fine to medium, mainly medium, angular to subround, tight, calcareous, matrix made up of approx. 40% feldspar, 30% dark rock fragments, 20% light brown dolomite fragments, remainder quartz. Calcite veining present. Very carbonaceous in parts and dolomite in spots. Very little mica.
- 5 feet mainly very fine SANDSTONE-SILTSTONE; laminated, dense, tight. Same constituents as above, but more micaceous. Very dolomitic including 3" of dolomite. In places grades into very carbonaceous medium to dark grey MUDSTONE with carbonaceous plant fragments on bedding planes.
- 6 feet mainly medium to dark grey MUDSTONE-SILTSTONE as above, some of which is slickensided with calcite on surface.
- No hydrocarbons. Apparent dip 10° to 15° throughout core.
- Core No. 16 5,934 to 5,950 feet. Recovered 16 feet.
- Top 4 feet SANDSTONE; light grey mottled, with dark rock fragments, fine to coarse, mainly medium, angular to subround, well sorted, tight, slightly calcareous. 40% to 50% feldspar, 30% to 40% dark rock fragments, remainder brown dolomite (?siderite) fragments, matrix and quartz. Trace mica and carbonaceous plant fragments.

- Core No. 16
(Cont'd) 12 feet Mainly medium to dark grey and brown-grey MUDSTONE grading into SILTSTONE in a few places, and with one or two thinly laminated very fine SANDSTONE stringers. All is dense and tight, and in the bottom 2 feet very dolomitic including a six-inch section of brown dolomite with calcite veining. All this 12 foot section is very carbonaceous.
- No hydrocarbons. Apparent dip 15° to 20° , mainly 15° .
- Core No. 17 6,403 to 6,423 feet. Recovered 20 feet.
- Top 8 feet 6 inches SILTSTONE to very fine SANDSTONE; laminated, light and dark grey, dark grey laminae usually finer grained. Carbonaceous and micaceous along bedding planes, tight, dense. Minor microfaulting parallel to axis of core. Some dolomite grains - appear to be primary.
- 11 feet 6 inches SANDSTONE; light grey, fine to coarse, mainly medium, angular to subround, well sorted, made up of feldspar 70%, dark rock fragments, matrix, etc. Calcareous matrix, tight, with bottom 3 feet slightly coarser, mainly medium to coarse.
- Whitish yellow fluorescence and light yellow cut on bottom foot of sandstone in core. Slight hydrocarbon odour in this part, but no staining visible. Fluorescence scattered through the sandstone in this foot. Light yellow soxhlet cut.
- Apparent dip in core 25° to 30° .
- Core No. 18 6,555 to 6,570 feet. Recovered 12 feet.
- Top 4 feet SANDSTONE; light grey to medium grey, very dense, tight, compact, hard, very fine to fine, well sorted, calcareous matrix made up mainly of feldspar (approx. 70%). Rest is dark rock fragments, micaceous, matrix and quartz, dolomite fragments. Carbonaceous matter is predominant on bedding planes. Towards bottom some laminated light grey, very fine SANDSTONE with dark grey MUDSTONE and about 3" very dolomitic sandstone grading into dolomite.
- 8 feet interbedded, laminated, very fine SANDSTONE-SILTSTONE-MUDSTONE; light to dark grey - the finer the grain size the darker the colour in general. Very dolomitic in places and with calcite veining. Core is slickensided.
- No evidence of hydrocarbons. Apparent dip 20° .
- Core No. 19 7,037 to 7,047 feet. Recovered 9 feet.
- MUDSTONE; dark grey, carbonaceous, dense, interbedded SILTSTONE and few very fine SANDSTONE beds. Siderite or dolomite up to 2" thick, most probably as lenses. Coalified plant remains throughout core. SANDSTONE-SILTSTONE laminae or bands are micaceous, particularly on bedding planes.
- No fluorescence or indications of hydrocarbons. Apparent dip 20° to 30° .

- Core No. 20 7,220 to 7,237 feet. Recovered 14 feet.
4 feet SILTSTONE; medium to dark to brown-grey, laminated with carbonaceous material, fissile, coalified plants and mica accumulated on bedding planes. Odd greasy brownish specks with golden yellow fluorescence.
- 10 feet SANDSTONE; light grey, slightly carbonaceous and micaceous, very fine to medium, mainly fine, angular to sub-round, well sorted. 60% to 70% feldspar, 20% to 30% rock fragments, 10% quartz. Few chlorite grains. Tight, well cemented with siliceous, argillaceous and calcareous matter.
- No hydrocarbons. No fluorescence. Apparent dip: 30° in siltstone; up to 45° in sandstone.
- Core No. 21 7,330 to 7,345 feet. Recovered 15 feet.
1 foot SANDSTONE; light grey, very fine, very tight, 85% feldspar, 5% quartz, 10% dark fragments including rock and carbonaceous fragments, mainly carbonaceous material. Angular to subrounded, fairly well sorted.
- 4 inches SILTSTONE to very fine SANDSTONE, light grey, same as above.
- 13 feet 8 inches SILTSTONE; medium to dark grey, very tight, carbonaceous material.
Fine to very fine dolomite nodules and large nodules up to 1 to 2½ inches thick.
- No hydrocarbons or fluorescence. Dip: 12° to 18°.
- Core No. 22 7,818 to 7,832 feet. Recovered 14 feet.
SILTSTONE-MUDSTONE; medium to dark grey, carbonaceous, micaceous, slickensided in places, dense and laminated, fissile (shale). The mudstone is usually the darker colour (dark grey). Abundant plant remains.
- No hydrocarbons. Apparent dip 10° to 15°.
- Core No. 23 8,247 to 8,262 feet. Recovered 13 feet.
Top 8 feet medium to dark grey, dense, carbonaceous SILTSTONE-MUDSTONE, calcareous in places and slightly brown and harder, due to siderite, in spots. Laminated slightly in a few places with carbonaceous lenses of plant remains.
- Bottom 5 feet SANDSTONE; light to medium grey, very fine to fine, well sorted, very calcareous, angular to subround grains, a lot of which are brown (?siderite), carbonaceous, tight.
- Bright yellow fluorescence throughout sandstone, due to mineral, probably some impurity with calcite. No cut, no odour. Acetone negative. Soxhlet: small greasy cut. Apparent dip 15° to 20°. Note: Sandstone fragments after soxhlet still fluoresced.

- Core No. 24 8,758 to 8,774 feet. Recovered 15 feet.
SILTSTONE-MUDSTONE; medium to dark grey, dense, compact, slightly calcareous in some of the siltstone. Laminated in part with thin bands of carbonaceous material, and some bands of slightly coarser silt size, usually lighter in colour. Few fragments of brown, hard dolomite (siderite) and trace calcite. Cross-bedded.
- No hydrocarbons. Apparent dip 10° .
- Core No. 25 9,195 to 9,211 feet. Recovered 16 feet.
SILTSTONE-MUDSTONE; medium to dark grey, very carbonaceous, micaceous, fissile, lenticular, laminated with laminae of light to dark grey and of from clay to mudstone to very fine sandstone. Two feet from top a 6 inch band of SANDSTONE; light grey, very fine, laminated to massive, fluorescent, with a faint, greasy, yellowish cut.
- Apparent dip 3° to 10° . Cross-bedded parts up to 25° .
Soxhlet: Brown, waxy residue.
- Core No. 26 9,626 to 9,631 feet. Recovered 5 feet.
1 foot SANDSTONE; light grey, angular, very fine, poorly sorted, 90% feldspar, white to clear; 10% dark fragments, including muscovite, biotite, carbonaceous material. Calcareous, fairly tight, cross bedding with laminated carbonaceous matter. Yellow fluorescence as in Core No. 23.
- 4 feet SILTSTONE-MUDSTONE; very dark grey to black, tight, micaceous, feldspar, carbonaceous matter. Non-calcareous. Very fractured and slickensided with calcite fracture filling. Some very dull, brown fluorescence with fairly good cut. No apparent dip can be measured. Dip range would be fairly low - 10° or less. Soxhlet: Brown residue with dark golden yellow fluorescence.
- Core No. 27 10,092 to 10,101 feet. Recovered 4 feet.
Top 2 inches light grey CLAY-MUDSTONE; soft, interbedded with crystalline calcite.
- Rest of core SILTSTONE; medium to very dark grey, dense, micaceous, calcareous, carbonaceous with few light grey laminated SILTSTONE bands and darker grey carbonaceous lenses. Very fractured with calcite infilling and vein calcite, cross-bedded.
- No hydrocarbons. Apparent dip 10° to 15° .

- Core No. 28 10,574 to 10,588 feet. Recovered 16 inches.
Top 8 inches SILTSTONE; medium to dark grey, dense, carbonaceous with some golden mica. Interlaminated with light grey SANDSTONE to SILTSTONE; very fine, calcareous. Golden yellow fluorescence.
- 2 inches SANDSTONE; light grey, very fine, tight, calcareous, angular to subround, fairly well sorted, 90% feldspar, 10% carbonaceous fragments. Some golden yellow fluorescence as for Core No. 23.
- 6 inches SILTSTONE to MUDSTONE; very dark grey to black, dense, rare mica, carbonaceous fragments.
- 9 Cut: Greenish yellow greasy residue with golden yellow fluorescence.
- Apparent dip 50° to 55° . Core is slickensided and moderately fractured.
- Core No. 29 10,660 to 10,668 feet. Recovered 5 feet.
SANDSTONE; light to medium grey, very fine to medium, mainly fine, angular to rare rounded, well sorted, slickensided. Feldspar 80%, dark fragments 15%, quartz 5%. Calcareous. Chlorite, zeolite and few biotite, coarse dark brown grains of siderite. Feldspar is fresh to kaolinised. Argillaceous matrix. No bedding observed. Core breaks at angle 15° to 30° .
- No fluorescence. No hydrocarbons.
- Core No. 30 11,080 to 11,094 feet. Recovered 12 feet.
SILTSTONE-MUDSTONE; brown to very dark grey to black, carbonaceous. Very fractured and slickensided, with calcite filled fractures running in all directions. No apparent dip, some cross bedding.
- Fluorescence: Dull, golden yellow. Colourless, greasy residue after cut with bright golden yellow fluorescence.
- Core No. 31 11,419 to 11,432 feet. Recovered 12 feet.
5 feet SILTSTONE-MUDSTONE; medium to very dark to brown grey, carbonaceous, in places laminated, fissile, broken up and slickensided.
- 4 feet SILTSTONE interbedded with SANDSTONE, light grey to green grey, very fine to fine, mainly very fine, angular to subrounded, with black patches of tar-like carbonaceous matter both in siltstone and sandstone - more often in siltstone. Fractured, slickensided, with calcite filling.

- Core No. 31
(Cont'd) 1 foot SANDSTONE; light to green grey, fine, angular to rounded, well sorted, 80% to 90% feldspar, 10% to 20% rock fragments, less than 5% quartz. Rock fragments and feldspar often encapsulated by white film, probably zeolite. Matrix calcareous. Little biotite and chlorite.
- 3 feet SILTSTONE-MUDSTONE as for top of core, but more fractured.
- Dip approximately 10° . Dull brown fluorescence.
Soxhlet: Brown greasy residue with bright yellow fluorescence.
- Core No. 32 11,519 to 11,534 feet. Recovered 5 feet.
TALCOSE and micaceous SCHIST; light grey to green grey, with pearly lustre. The rock is composed of mica and talc, with minor quartz. Accessories are pyrite, magnetite, tourmaline and actinolite. The core is highly foliated and closely folded in parts. Some whole microcrystalline spherules are abundant. Some bedding, and dips of the order of 50° can be observed. Density: 2.76.
- Core No. 33 11,582 to 11,593 feet. Recovered 2 feet.
MICA SCHIST, with quartzitic appearance in parts. Greenish grey, polished, composed of quartz and phyllosilicates, probably muscovite, or the green variety may be chlorite or chloritoid. Mica appears to be colourless to silvery white to green with pearly lustre on cleavage surfaces. The core is greener and contains more quartz and is more massive than Core No. 32. Quartz is a major constituent, macro to microcrystalline usually without sharp boundaries. Accessory mineral is pyrite in fine crystalline form.
- Core No. 34 11,616 to 11,622 feet. Recovered 3 feet.
MICA SCHIST; green, very foliated, schistose, micaceous, silvery white, with pearly lustre. Main constituents are quartz and mica. Quartz also appears as pebble-like pieces. The rock is soft, with a greasy feel. Foliation dips 53° to axis of core.

SIDEWALL CORES

1,831 feet	1½"	SANDSTONE; dark grey-green, glauconitic, chloritic, fine to coarse, mainly medium, angular to subround, well sorted quartz set in a green glauconitic matrix.
1,951 "	1½"	SAND-SANDSTONE; light grey, very fine to fine, mainly fine, well sorted quartz, micaceous, slightly chloritic, silty.
1,982 "	1½"	SILTSTONE; sandy, light grey, fine to very coarse, mainly medium, quartz set in glauconitic and chloritic matrix.
2,032 "	1"	MUDSTONE; dark grey, micaceous, silty, soft, very slightly chloritic and glauconitic.
2,046 "	1"	SAND-SILTSTONE; sand is all clean quartz, fine to pebble, mainly medium, angular to subround and some round set in a dark grey silty, clayey matrix. Abundant pyrite and carbonaceous matter.
2,048 "	1½"	SAND; light grey to white, very fine to medium, loose, slightly silty, mainly fine to medium, angular to subround, all quartz.
2,051 "	1½"	SAND; as for 2,048 feet, but very fine to granule, mainly medium, all quartz.
2,063 "	1"	SAND; loose, white, slightly silty (due to mud filtrate), very porous, very fine to very coarse and some granule, mainly medium, angular to subround, mainly angular, poor sorting, all quartz.
2,072 "	1½"	SAND as for 2,063 feet.
2,105 "	1"	SAND; white to light grey, slightly silty (due to mud filtrate), very fine to granule, mainly coarse, angular to subround, fair sorting, very porous, all quartz.
2,117 "	1¼"	SAND; white, silty (mud filtrate), very fine to very coarse, mainly medium to coarse, angular to subround, very porous, all quartz.
2,123 "	1½"	SILT to VERY FINE SAND; light grey, micaceous, carbonaceous, soft.
2,175 "	1½"	SILTSTONE; medium grey, micaceous, slightly more compact than 2,133 foot sample.
2,189 "	1"	SAND; white, slightly silty (due to filtrate), very fine to granule, angular to subround, granules and very coarse sand usually round, poor sorting, quartz, some pink quartz.
2,219 "		No recovery.

2,299 feet	1"	SAND; light grey, silty (filtrate), made up of clear, very fine to coarse, mainly medium, angular to round loose quartz.
2,319	"	$1\frac{1}{4}$ " SAND; loose. white, light grey, silty (filtrate), made up of clear, fine to coarse, angular to round quartz.
2,356	"	1" SAND; as for 2,319 feet, except very slightly coarser.
2,400	"	$1\frac{1}{2}$ " SAND; as for 2,319 feet - carbonaceous.
2,419	"	Lost in hole.
2,430	"	2" SILT to VERY FINE SAND; interbedded, white and grey layers, carbonaceous, pyritic.
4,618	"	$\frac{1}{4}$ " SANDSTONE; light grey, buff, argillaceous, very fine to medium, tight, slightly carbonaceous, made up of feldspar, dark rock fragments, quartz, slightly calcareous. Slight gold-yellow fluorescence. No cut.
4,725	"	$\frac{1}{4}$ " SANDSTONE; light grey, fine to medium, angular to sub-round, feldspar, rock fragments and quartz, tight. Slightly carbonaceous, argillaceous.
4,815	"	$\frac{1}{2}$ " SANDSTONE; light grey, mottled, fine to coarse, mainly medium, angular to subround. Same constituents. No fluorescence.
4,952	"	No recovery.
5,241	"	$\frac{3}{4}$ " SANDSTONE; light grey, very fine to coarse, mainly medium, angular to subround, compact, tight, calcareous, feldspar, rock fragments, dolomite grains. No fluorescence.
5,439	"	No recovery.
5,735	"	No recovery.
5,830	"	No recovery.
5,913	"	$\frac{1}{4}$ " SANDSTONE; light grey, mottled, very fine to medium, calcareous, feldspar, rock fragments, quartz, angular to subround. No fluorescence.
11,333	"	No recovery.
11,349	"	$1\frac{1}{4}$ " MUDSTONE; very dark grey to brown grey, carbonaceous, tight.
11,350	"	$\frac{3}{4}$ " SANDSTONE; light grey, very fine to medium, mainly fine, calcareous, feldspar, rock fragments, chlorite, carbonaceous. Slight fluorescence. Acetone: Negative. Chlorothene: Fair cut.

- 11,385 feet $\frac{1}{4}$ " SANDSTONE; very light grey, very fine to medium, mainly fine, very argillaceous, calcareous. Acetone: Weak. Chlorothene: Weak.
- 11,396 " No recovery.
- 11,400 " $\frac{3}{4}$ " SANDSTONE; light grey, very fine to medium, mainly fine, calcareous, feldspar, rock fragments, chlorite, carbonaceous, argillaceous. Slight fluorescence. Acetone: Positive. Chlorothene: Good.
- 11,405 " 1" SANDSTONE; light grey, very fine to medium, mainly fine, calcareous, feldspar, rock fragments, chlorite, carbonaceous, blue fluorescence. Acetone: Good. Chlorothene: Good.
- 11,407 " No recovery.
- 11,410 $\frac{3}{4}$ " SANDSTONE; light grey, very fine to medium, mainly fine, calcareous, feldspar, rock fragments, chlorite, carbonaceous. Fluorescence: Blue. Acetone: Good. Chlorothene: Good.
- 11,415 " No recovery.
- 11,420 " $1\frac{1}{2}$ " SANDSTONE; light grey, very fine to medium, mainly fine, feldspar, quartz, rock fragments, chlorite. Brown fluorescence. Acetone: Good positive. Chlorothene: Good cut.
- 11,435 " No recovery.
- 11,438 " $2\frac{1}{4}$ " COAL.
- 11,445 " 1" SANDSTONE; light grey, very fine to medium, mainly fine, feldspar, quartz, rock fragments, chlorite, calcareous cement. Blue fluorescence. Acetone: Positive. Chlorothene: Fair.
- 11,450 " $\frac{3}{4}$ " MUDSTONE; dark grey to brown grey, carbonaceous.
- 11,455 " $1\frac{1}{4}$ " SANDSTONE; white to light grey, very fine to medium, mainly fine, angular quartz, feldspar, rock fragments. White fluorescence. Chlorothene: Fair.
- 11,460 " $\frac{3}{4}$ " SANDSTONE; light grey, fine, quartz, feldspar, rock fragments, chlorite, calcareous matrix. Blue fluorescence. Acetone: Good. Chlorothene: Fair.
- 11,465 " No recovery.
- 11,470 " $1\frac{1}{4}$ " SANDSTONE; light grey, quartz, fine to medium, angular to subrounded, calcareous, micaceous. No fluorescence. No cut.

11,481 feet	$\frac{1}{4}$ "	SILTSTONE to very fine SAND; dark grey, very carbonaceous, tight.
11,845 "	$1\frac{1}{4}$ "	MUDSTONE; dark to brown grey, tight, slickensided.
11,487 "	1"	MUDSTONE; dark grey to brown grey, tight, broken up.
11,489 "		Lost bullet.
11,490 "	$1\frac{1}{4}$ "	SILTSTONE-MUDSTONE; dark grey, carbonaceous, tight, with calcite fracture filling.
11,490 "		No recovery.
11,491 "		No recovery.
11,492 "	1"	MUDSTONE-SILTSTONE; dark grey to brown grey, tight, carbonaceous.
11,493 "		Lost bullet.
11,494 "	1"	SANDSTONE; light grey, very fine to medium, quartz, feldspar, rock fragments, chlorite, mica. Calcareous matrix. Very slight blue fluorescence. Acetone: Very weak positive. Chlorothene: Weak cut.
11,494 "	$\frac{1}{2}$ "	SANDSTONE; light grey, very fine to medium, angular to subrounded, quartz, feldspar, rock fragments, chlorite, compact, calcareous, some sercite in matrix. Strong fluorescence. Acetone: Weak positive. Chlorothene: Weak cut.
11,495 "	$\frac{3}{4}$ "	SANDSTONE; very light grey, very fine to medium, mainly fine, angular to subrounded, quartz, feldspar, rock fragments, green chlorite, micaceous, cemented, very calcareous, fairly argillaceous. Acetone: Weak positive. Chlorothene: Weak cut.
11,496 "	$1\frac{1}{4}$ "	SANDSTONE; very light grey, very fine to medium, mainly fine, angular to subrounded, quartz, feldspar, rock fragments, green chlorite, micaceous, cemented, very calcareous. No fluorescence. Acetone: Slight positive. Chlorothene: Weak cut.
11,496 "	$\frac{3}{4}$ "	SANDSTONE; very light grey, very fine to medium, angular to subrounded, mainly quartz, some feldspar, chlorite and rock fragments. Interbedded with coal. Silty, calcareous matrix. No fluorescence. Acetone: Positive.
11,497 "		No recovery.
11,497 "		No recovery.

- 11,498 feet $\frac{1}{4}$ " SANDSTONE, very light grey, very fine to medium, angular to subrounded, mainly quartz, some feldspar, chlorite and rock fragments. Interbedded with COAL. Silty, calcareous matrix. No fluorescence. Acetone: Weak positive. No cut.
- 11,499 " 1" SAND to SILT; light grey, micaceous, with rock fragments and feldspar. Fluorescence: Golden yellow. Acetone: Very slight positive. Chlorothene: Good cut.
- 11,499 " No recovery.
- 11,500 " No recovery.
- 11,500 " No recovery.
- 11,501 " No recovery.
- 11,501 " Lost bullet.
- 11,502 " Lost bullet.
- 11,502 " Lost bullet.
- 11,503 " $\frac{3}{4}$ " SANDSTONE; white to very light grey, very fine to coarse, clear quartz, poorly sorted, angular, very few subrounded, silty. Some green schist material, silvery white mica and/or talc. Few pyrite, red and pink quartz, feldspar, tourmaline fragments. Generally loose, however well cemented in parts. Cement is silty, non-calcareous. Acetone: Positive. Chlorothene: Weak cut.
- 11,504 " $1\frac{1}{4}$ " SAND; white to very light grey, silty, argillaceous, non-calcareous, angular, very fine to coarse, unsorted. Some pyrite. Fluorescence: Blue white. Chlorothene: Weak cut.
- 11,505 " $1\frac{1}{4}$ " SANDSTONE; as for 11,503 feet. Blue white fluorescence. Acetone: Positive.
- 11,506 " $1\frac{1}{4}$ " SANDSTONE; light grey to white, as for 11,503 feet. Acetone: Faint positive. Chlorothene: Weak cut.
- 11,507 " No recovery.
- 11,507 " No recovery.
- 11,508 " Lost bullet.
- 11,508 " No recovery.

- 11,509 feet 1 $\frac{1}{4}$ " SANDSTONE; white to very light grey, very fine to very coarse, clear quartz, poorly sorted, angular, very few subrounded. Some green schist material, silvery white mica and/or talc. Few pyrite, red and pink quartz, feldspar, tourmaline fragments. Generally loose, however well cemented in parts. Cement is silty, non-calcareous. White fluorescence. Acetone: Positive. Chlorothene: Fair cut. Fairly strong gas smell after opening bottle.
- 11,510 " Lost bullet.
- 11,511 " no recovery.
- 11,512 " No recovery.
- 11,513 " No recovery.
- 11,514 " $\frac{3}{4}$ " SAND; loose quartz, clear to slightly yellow, angular, orientated quartz grains, with appearance of broken glass. Weathered and bleached appearance. Strong blue fluorescence. Acetone: Weak positive. Chlorothene: Fair cut.
- 11,515 " 1" MICA SCHIST; white, with quartz and silvery white mica. Apparently slightly bleached, loose grains. Weak fluorescence. Acetone: Slight, positive. Chlorothene: Slight cut.

CORE ANALYSIS

The Bureau of Mineral Resources made the following determinations in regard to Cores 15 and 16.

(a) Porosity and Permeability:

Core 15 5,554 to 5,556 feet, and
 5,556 to 5,558 feet

Core 16 5,934 to 5,936 feet, and
 5,936 to 5,938 feet

One vertical cylinder and two horizontal cylinders at right angles to each other, were cut from each sample.

Permeabilities in all tests were nil, and effective porosities in all tests 9% to 10%.

(b) Acid Solubility:

Core 15 5,554 to 5,556 feet 33%
 5,556 to 5,558 feet 39%

Core 16 5,934 to 5,936 feet 10%
 5,936 to 5,938 feet 18%

BEACH PETROLEUM

NO LIABILITY

(Incorporated in South Australia)

POSTAL ADDRESS:
P.O. BOX 360, CAMBERWELL, VICTORIA. 3124
TELEPHONE: (03) 813 3311
TELEGRAPHIC ADDRESS: 'BEACHPET'
TELEX: AA 36500 BEAPET

4TH FLOOR
685 BURKE ROAD
CAMBERWELL, VICTORIA. 3124
AUSTRALIA

1st September 1983

The Minister for Minerals and Energy
Department of Minerals and Energy
Princes Gate East
151 Flinders Street
MELBOURNE Vic 3000

OIL and GAS DIVISION

14 SEP 1983

Attention: The Director - Oil and Gas Division

Dear Sir

Re: Beach Petroleum Source Rock Study - Otway Basin

Now that the results of the source rock analyses have become available they can be passed on to you. Thirty-five samples were collected from five wells. Those wells were:-

Garvoc-1
Ferguson Hill-1
Woolsthorp-1
Ross Creek-1
Port Campbell-2

Further, please find (i) specific gravity measurement
(ii) petrographic description for a basement sample of Moyne Falls Well No. 1.

Yours faithfully
BEACH PETROLEUM NO LIABILITY

DG Langton
EXPLORATION MANAGER

SG:cs

REFERRED TO OGD

FOR COMMENT

TO NOTE

FOR REPLY BY

NECESSARY ACTION

O.I.C. CENTRAL REGISTRY
14/9/83

Ferguson Hill No. 1

K.K. No.	Depth (m)	\bar{R}_V max	Range	N	Exinite Fluorescence (Remarks)
Eumeralla Formation					
18077	- Core 9	-	-	-	Sparse cutinite and sporinite, yellow to orange, sparse liptodetrinite, yellow to orange. (Claystone. D.o.m. sparse, I>E. Vitrinite absent, Inertinite and exinite sparse. Abundant carbonate.)
18078	1093 Ctgs	0.43	0.35-0.49	6	Rare to sparse cutinite, rare liptodetrinite yellow to orange, rare sporinite, orange. (Claystone>sandstone. D.o.m. sparse, I>E>V. Inertinite sparse, exinite rare to sparse, vitrinite rare. Abundant carbonate. Rare pyrite.)
18079	Core 12	0.53	0.47-0.58	3	Abundant sporinite, yellow to dull orange, common cutinite, yellow/orange to dull orange. (Claystone>coal. Coal, I>E>>V, exinite-rich durite. D.o.m. sparse, I>E>V. Inertinite sparse, exinite and vitrinite rare. Sparse carbonate.)
Geltwood Beach Formation					
18080	Core 13	0.47		1	Sparse sporinite, and rare cutinite, orange. (Claystone. D.o.m. sparse, I>E>V. Inertinite and exinite sparse. Vitrinite rare. Sparse carbonate. Rare pyrite.)
18081	Core 14	0.52	0.44-0.64	27	Common cutinite, yellow to dull orange, sparse sporinite, yellow/orange and sparse resinite, green/yellow to orange. (Siltstone. D.o.m. abundant, V>I>E. Vitrinite and Inertinite abundant, exinite common. Some reworked coal, R_V approx 0.80% to 1.10%. Sparse Iron oxides and pyrite.)
18082	Core 15	0.52	0.42-0.67	27	Common sporinite and cutinite, yellow to dull orange, common resinite, green/yellow to brown and rare fluorinite, green. (Claystone>>shaly coal. Shaly coal, V>E>>I. Resinite abundant in shaly coal. D.o.m. common, E>I>V. Exinite common, vitrinite and Inertinite sparse. Much of coal appears to be reworked. Material with a reflectance of 0.70% or higher has been excluded from the mean.)
18083	1876 Ctgs	0.64	0.48-0.77	21	Common cutinite and sparse sporinite, yellow/orange to dull orange, rare resinite, yellow, rare suberinite, brown. (Siltstone>claystone>carbonate>coal>sandstone>shaly coal. Coal, sparse, V>I>E, vitrinite>duroclarite=fusinite>claro-durite. Shaly coal, I>E>V. D.o.m. sparse, I>E>V. Vitrinite, Inertinite and exinite sparse. Some of the coal may be reworked. Common Iron oxides. Abundant carbonate.)
18084	2159 Ctgs	0.64	0.48-0.86	10	Sample heat altered. Sparse sporinite and cutinite, yellow/orange to orange. (Siltstone>claystone>sandstone>coal. Coal, rare, V>E>I, duroclarite. Some of the coal may be reworked, but it consistently has a vitrinite reflectance close to 0.80% and has been included in the data for the mean. D.o.m. sparse, E>or=I>V. Exinite and Inertinite sparse, vitrinite rare to sparse. Abundant carbonate and pyrite.)

Ferguson Hill No. 1

K.K. No.	Depth (m)	\bar{R}_V max	Range	N	Exinite Fluorescence (Remarks)
18085	2321 Ctgs	0.71	0.53-0.83	15	Sample heat altered. Common sporinite and sparse cutinite, orange to brown, rare resinite, dull orange, rare suberinite, brown. (Siltstone>claystone>coal. Coal abundant, I>V>E, clarodurite>duroclarite>fusite. D.o.m. sparse, I>E>V. Vitrinite, inertinite and exinite sparse. Abundant carbonate. Sparse pyrite.)
18086	2449 Ctgs	0.70	0.60-0.82	6	Sample heat altered. Sparse sporinite, yellow/orange to orange, sparse cutinite, orange. (Siltstone>claystone>coal. Coal sparse, V>I>E, duroclarite>vitrinite>clarite. D.o.m. common, I>E>V. Inertinite common, exinite sparse, vitrinite rare to sparse. Abundant carbonate. Sparse pyrite.)
18087	?2803 Core 25	0.84	0.64-0.98	6	Rare sporinite, dull orange, sparse leptodetrinite, orange. (Claystone and silty claystone. D.o.m. abundant, I>E>V. Inertinite abundant, exinite sparse, vitrinite rare.)
18088	Core 30	1.49	1.37-1.53	5	No fluorescing exinite. (Silty claystone. D.o.m. common. Inertinite common, exinite and vitrinite absent. Moderately intense pervasive mineral matter fluorescence. Common iron oxides. Sparse pyrite.)

FERGUSON HILL No. 1

Sample No.	Depth (m)	Total Organic Carbon
18077	Core 9	0.66
18078	1093 Ctgs	0.55
18079	Core 12	0.88
18080	Core 13	1.01
18081	Core 14	0.79
18082	Core 15	1.17
18083	1876	1.42
18084	2159	0.83
18085	2321	2.86
18086	2449	1.39
18087	Core 25	0.82
18088	Core 30	1.20

FERGUSONS HILL-1

DEPTH (metres)	ANALYST	SAMPLE TYPE	VITRINITE REFLECTANCE		NO. READINGS
			MEAN	RANGE	
471	CO		0.30	0.00-0.00	1
478	CO		0.43	0.38-0.46	6
478	BE		0.45	0.38-0.46	6
743	CO		0.49	0.44-0.58	19
743	BE		0.49	0.44-0.58	19
836	BE	CC	0.33	0.31-0.36	6
1093	PA	CTGS	0.43	0.35-0.49	6
1143	BE	CC	0.37	0.36-0.38	11
1250	PA	CC	0.53	0.47-0.58	3
1379	PA	CC	0.47	0.00-0.00	1
1548	BE	CC	0.44	0.42-0.46	7
1550	PA	CC	0.52	0.44-0.64	27
1695	PA	CC	0.52	0.42-0.67	27
1809	BE	CC	0.54	0.48-0.62	12
1876	PA	CTGS	0.64	0.48-0.77	21
1999	BE	CC	0.80	0.78-0.84	11
2159	PA	CTGS	0.64	0.48-0.86	10
2206	BE	CC	0.81	0.82-0.86	10
2237	BE		0.65	0.47-0.77	15
2237	CO		0.65	0.47-0.77	15
2321	PA	CTGS	0.71	0.53-0.83	15
2449	PA	CTGS	0.70	0.60-0.82	6
2518	BE	CC	0.72	0.65-0.74	4
2803	PA	CC	0.84	0.64-0.98	6
2803	BE	CC	0.75	0.73-0.80	12
3249	BE	CC	1.02	0.00-0.00	6
3379	PA	CC	1.49	1.37-1.53	5
3484	BE		1.57	0.00-0.00	14
3484	CO		1.57	1.20-2.02	14