PROPOSED STRAT. DRILLING - 1973

PEDIRKA 73/15

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GEOLOGICAL SURVEYS

PETROLEUM EXPLORATION DIVISION

STRATIGRAPHIC PROBLEMS AND PROPOSED DRILLING NORTH OF OODNADATTA

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SEL

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
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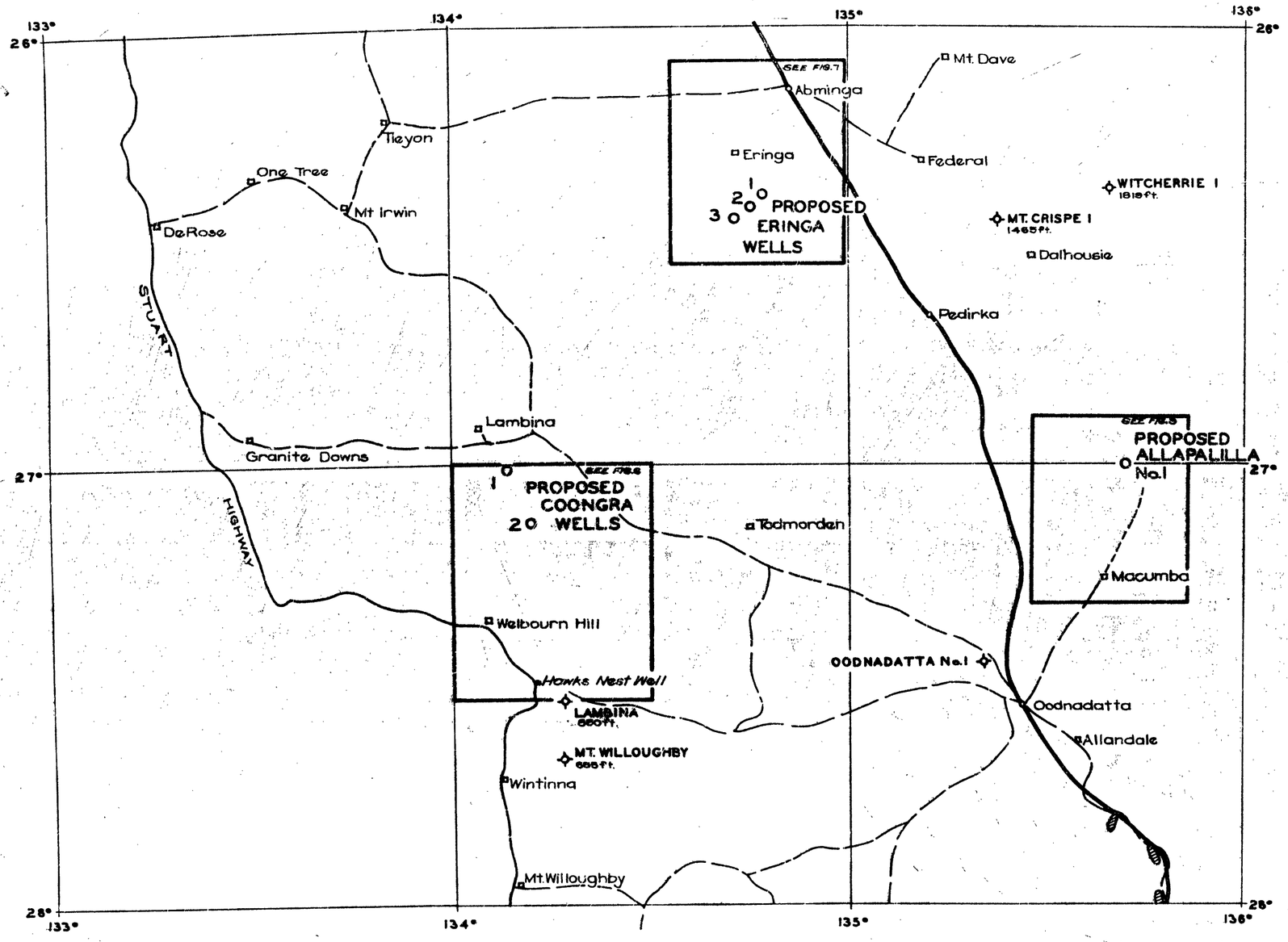

LEGEND

- Proposed well
- Dry hole
- Outcrop of Permian rocks
- Railway
- Highway
- Track

SCALE IN KILOMETRES
40 0 40 80 120 160
32 16 0 32 64 96
SCALE IN MILES

FIG. 1

PETROLEUM SECTION	DEPARTMENT OF MINES — SOUTH AUSTRALIA	Scale: 1:2,000,000 (ORIG)
Compiled: S.B.D.	BITCHERA RIDGE AREA	Date: 16 JAN 1973
Drn. A.G.R. Ckd.	LOCATION MAP	Drg. No. 73-20 Bad

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DEPARTMENT OF MINES
SOUTH AUSTRALIA

Rept.Bk.No.73/25
G.S.No.5031
D.M.No.175/73

STRATIGRAPHIC PROBLEMS AND PROPOSED DRILLING NORTH OF OODNADATTA

ABSTRACT

The Pedirka, Arckaringa and Officer Basins converge north of Oodnadatta between the Musgrave and the Denison Blocks. The stratigraphic inter-relationships here are complex and have particular significance for Palaeozoic and Mesozoic palaeogeography, history and petroleum potential. Six drill holes are proposed for the area. The Department of Mines Failing 1500 Rig is capable of drilling five of the six holes. The proposed wells are COONGRA Nos. 1 and 2; ERINGA Nos. 1, 2 and 3 and ALLAPALILLA No.1.

INTRODUCTION

Recent studies of the Pedirka Basin[1] and Arckaringa Basin [2] have focussed attention on the intervening structurally high area. Four basinal features converge in this general area in the region of 135°E and 27°S. The Pedirka, Officer and Arckaringa Basins and the structural low at the northern end of Lake Eyre come together here (Fig.1). The area forms a saddle between the structurally positive Musgrave and Denison Blocks to which we will refer informally as the Bitchera Ridge (Fig.2).

The stratigraphic sequences in these basins are not well documented. In fact, the structural low north of Lake Eyre has not one drill hole. The Palaeozoic sequences in the three other basins, although poorly known, exhibit individual and characteristic differences as well as many similarities. This makes the question

[1] Youngs, B.C., in prep., The geology and hydrocarbon potential of the Pedirka Basin. Dept. Mines unpublished report.

[2] Townsend, I.J., in prep. A synthesis of stratigraphic drilling in the Arckaringa Basin, 1969-1971. Dept. Mines unpublished report.

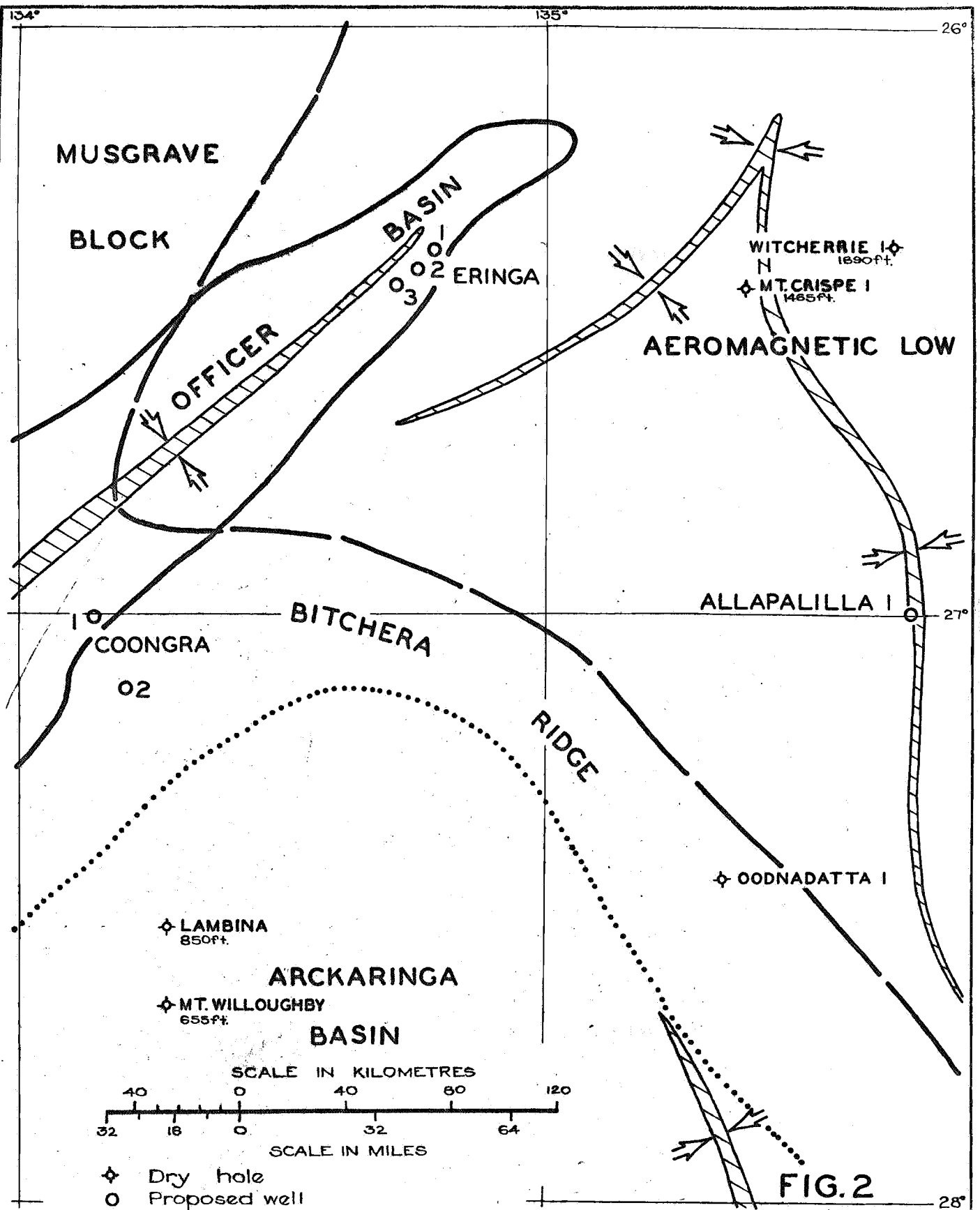


FIG. 2

PETROLEUM SECTION	DEPARTMENT OF MINES — SOUTH AUSTRALIA	Scale: 1:2,000,000 (ORIG)
Compiled: S.B.D.	BITCHERA RIDGE AREA	Date: 16TH JAN. 1973
Drn. A.G.R. Ckd.	TECTONIC ELEMENTS OF SURROUNDS	Drg. No. S10105 Bat'd

300—6.72 C5552

of the stratigraphic inter-relationships around the Bitchera Ridge a complex one. The purpose of this report is to propose stratigraphic drilling in that area to help answer some of these questions.

We have attempted to design this stratigraphic drilling programme within the capabilities of the present equipment of the Department of Mines. Five of the six wells in this proposal can be drilled with the D.M. Failing 1500 Rig. Three holes are programmed to 3500 feet (1060 m), one to 2000 feet (606 m) and one to 550 feet (170 m). The depth of 3500 feet (1060 m) can be attained by a Failing Rig only with slim hole coring.

The proposal of these wells is not meant in any way to constitute a replacement of the proposals for stratigraphic holes by H. Wopfner and B.E. Milton in DM. Rept.Bk.No.71/53, "Proposal for drilling of four stratigraphic wells in the Arckaringa and Western Great Artesian Basins". The importance of drilling those wells is at least as great now as when they were first proposed. However these targets are beyond the drilling capacity of any equipment operated by this Department.

The better definition of the stratigraphic sequence in each basinal area and the inter-relationships of the stratigraphy in the connecting zone has particular significance to petroleum exploration in this State. Sediments appear to be present here of an age and sedimentological type similar to the Permian sediments to the east in the Cooper Basin which have large oil and gas reserves and similar to the Ordovician sediments to the north in the Amadeus Basin which have gigantic gas-condensate reserves. Stratigraphic drilling in the Bitchera Ridge area will allow a comparison of depositional facies with these productive areas and add to our ability to reconstruct paleogeography.

Active petroleum exploration in South Australia is concentrated at present almost solely in the Cooper Basin. Interest in other areas needs stimulating. The proposed stratigraphic drilling will bring the attention of petroleum exploration companies to the area and yield information of undoubted geologic interest. The

Bitchera Ridge is within PEL 5 and 6 so that it is available for drilling to virtually only the licence holders and the Department of Mines. The licence holders are fully committed to development of their Cooper Basin reserves and appear unable and unwilling to commit funds to this area. At the same time drilling in this Bitchera Ridge area has significance for areas outside PEL 5 and 6 well as within the licence areas. It falls to the lot of the Department of Mines to take the initiative.

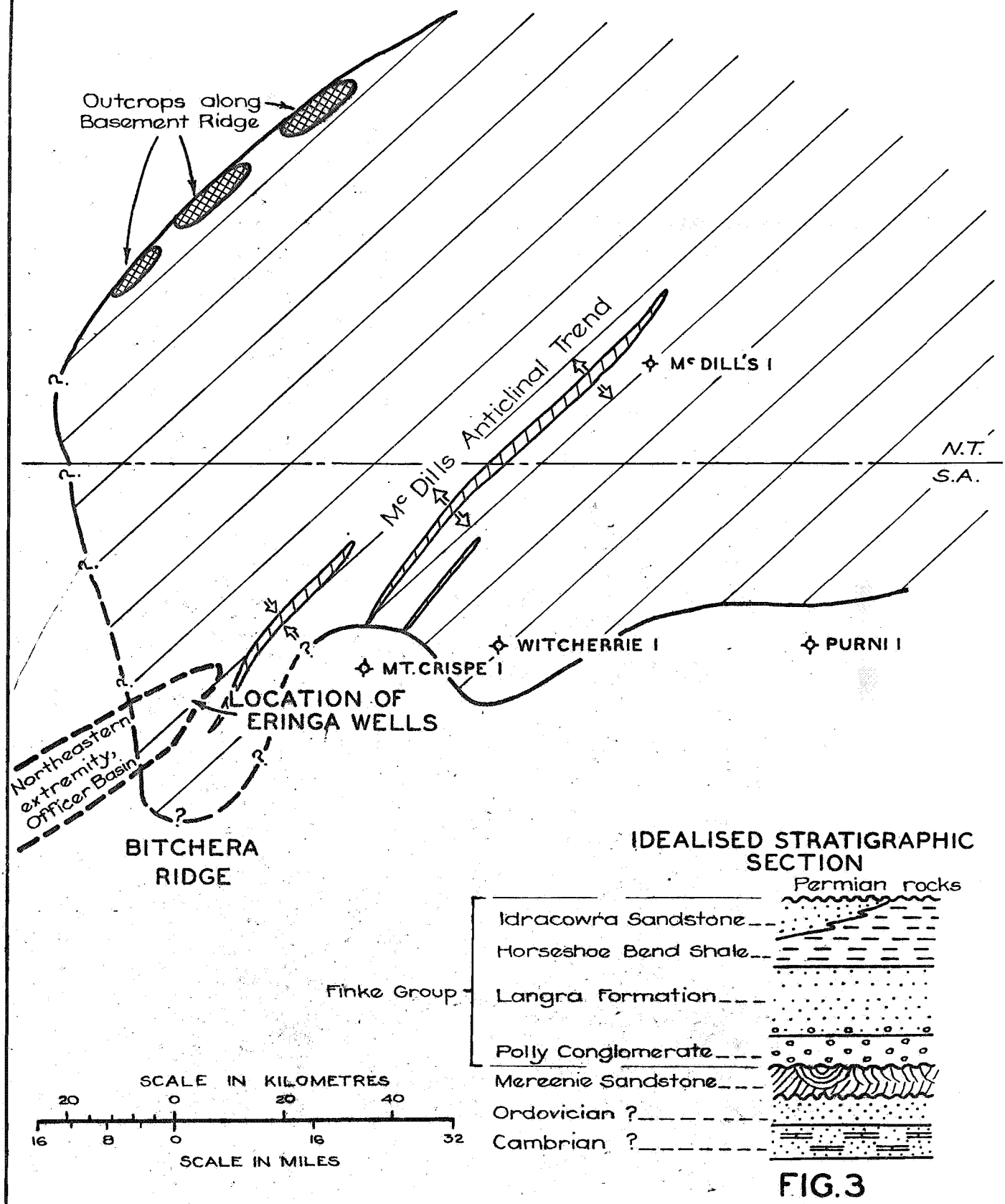
Some overall stratigraphic problems and questions are discussed in a general treatment immediately below. The specific objectives of each proposed well site are treated in their respective proposals.

STRATIGRAPHIC PROBLEMS

Ordovician Rocks

Extremely large reserves of gas condensate at the Palm Valley and Mereenie Fields have been proven in Ordovician rocks with limited drilling in the Amadeus Basin which is to the north of the Musgrave Block. The Officer Basin, on the southern side of the Musgrave Block has many structural and stratigraphic similarities to the Amadeus Basin (H. Wopfner, pers. com). Nevertheless the Officer Basin, at present is classified as a high risk, high cost petroleum prospect because so little is known about its geology and because of the logistical problems. The only way to reduce the risk and enhance the attractiveness to petroleum exploration companies is to increase the knowledge of the structure and stratigraphy of the basin. The Seismic Section of the South Australian Geological Survey is presently engaged in a seismograph mapping program of the Officer Basin which will extend for four or five years. This will help to assess the petroleum potential from the structural view point. Nevertheless full advantage of this structural information cannot be taken if stratigraphic information is not available.

The rational approach to further petroleum exploration of the Officer Basin



IDEALISED STRATIGRAPHIC SECTION

FIG.3

PETROLEUM SECTION	DEPARTMENT OF MINES — SOUTH AUSTRALIA	Scale: 1 : 1,000,000 (ORIG)
Compiled: B.C.Y.	BITCHERA RIDGE AREA	Date: 16TH JAN 1973
Drn. A.G.R. | Ckd.	SCHEMATIC AREA DISTRIBUTION OF FINKE GROUP IN SOUTHERN PEDIRKA BASIN	Drg. No. S10106 994-2+81

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is to obtain as much stratigraphic information as possible by the cheapest methods possible. Shallow stratigraphic drilling on the basin margins is the most realistic and cheapest approach. Admittedly, the basin-margin facies may not be the same as central basin facies which also should be drilled, but knowledge of basin margin facies provides a basis for prediction of deep basin facies.

The Mt. Chandler Sandstone which crops out in the Mt. John Range area is described as strikingly similar to the Ordovician succession in the Amadeus Basin viz. the Stairway Sandstone and Pacoota Sandstone which are the proven reservoirs in that basin. Stratigraphic drilling near the Bitchera Ridge may confirm this assessment of the Mt. Chandler Sandstone. Geophysical information shows a basement configuration which suggests Officer Basin sediments may extend beneath Pedirka Basin sediments in the northwestern Bitchera Ridge area.

Mt. Crispe No.1 and Witcherrie No.1 in the Pedirka Basin encountered a hard, pink-white quartzite with a few fine clay layers which was called the Witcherrie Quartzite and assumed to be Ordovician. This was also designated Stairway Sandstone by the operational company, French Petroleum Company (Australia). On the other hand, Purni No.1 and Mokari No.1 encountered green-grey shales with dips of about 50^{o} which are dated as lower Ordovician. The facies to the southwest of Mt. Crispe towards the Bitchera Ridge and Officer Basin is unknown. Unfortunately, the French Petroleum Company (Australia) opined in the well completion report on Mt. Crispe No.1 that "Mt. Crispe demonstrated the unreliability of the Cambo-Ordovician sequence for reservoirs". This opinion is too general on the limited information. Hopefully, the sandstones southwest of Mt. Crispe may contain less diagenetic cement. As a comparison, the permeability of the Pacoota Sandstone in the very productive Amadeus Basin is quite variable. Stratigraphic wells in the Bitchera Ridge area could test these possibilities.

SCHEMATIC SECTION, PERMIAN ROCKS

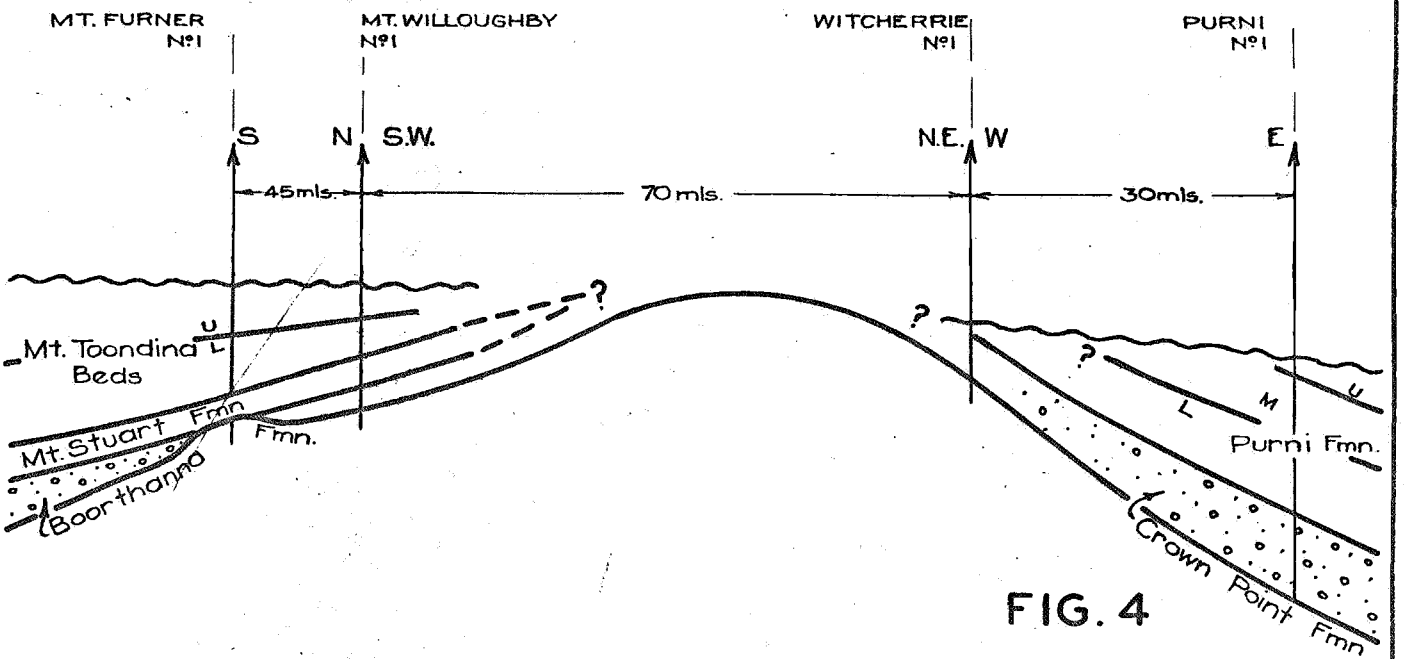

FIG. 4

SCHEMATIC SECTION CRETACEOUS ROCKS

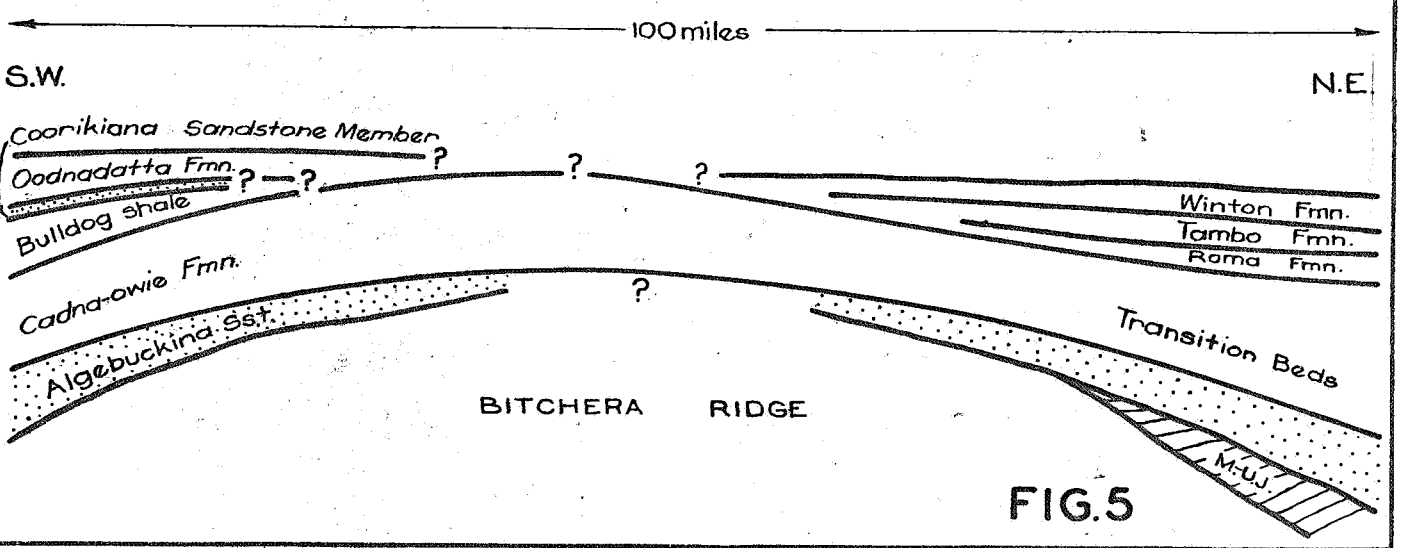

FIG.5

PETROLEUM SECTION	**DEPARTMENT OF MINES — SOUTH AUSTRALIA**	Scale: DIAGRAMMATIC
Compiled: S.B.D.	**BITCHERA RIDGE AREA**	Date: 16TH JAN. 1973
Drn. A.G.R. | Ckd.	**SCHEMATIC SECTIONS OF PERMIAN AND CRETACEOUS ROCKS**	Drg. No. S10107 Bat'd

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Devonian Rocks

The Mereenie Sandstone in the Amadeus Basin consists of mainly very mature medium to coarse grained orthoquartzites which range up to 3000 feet in thickness. The sandstone unit beneath the Finke Group in McDills No.1, and Witcherrie No.1 is tentatively correlated with the Mereenie Sandstone. This unit's distribution and facies in the lobe of the Pedirka Basin southwest of the McDills structure is unknown but it appears possible that the Mereenie Sandstone may be continuous from the Amadeus Basin, through the Pedirka Basin and into the Officer Basin. In the Mt. John Range a feldspathic sandstone with sedimentary features similar to the Mereenie sandstone crops out. Subsurface information between the Mt. John Range outcrop and the Mt. Crisp No.1 well would help to resolve the question of the Mereenie Sandstone distribution.

The Devonian Finke Group is described from the southeast Amadeus Basin where it is contiguous with the Pedirka Basin. The formations of the Finke Group (Fig. 3) correlate reasonably well to the subsurface of the Pedirka Basin. Nevertheless the Finke Group appears to have limited distribution beneath the Pedirka Basin and does not appear to extend to the lobe east of the McDills anticlinal Trend. No exploration wells have been located in the synclinal feature southwest of the McDills anticlinal zone (Fig. 3). How far into that synclinal area towares the Bitchera Ridge the Finke Group extends needs to be known.

If any Finke Group units extend onto the northwestern Bitchera Ridge, their facies in that area will have prime interest. The Witcherrie No.1 well is probably close to the Finke Group's defined southern edge. In that well the unit interpreted as Polly Conglomerate is not as conglomeratic as in the Amadeus Basin outcrop. The Langra Sandstone is a possible petroleum reservoir. The Horseshoebend Shale provides a caprock on the Langra Sandstone but it may not extend as a cap to the basin margin. The Langra Formation has been interpreted from the Amadeus Basin outcrop as the most extensive of the Finke Group rock units so that it may not be overlapped at the margins by the shale unit. The relationship of the boundaries of

these two units, therefore, has considerable significance to petroleum exploration.

Permian rocks

Sparsely distributed seismic surveys mainly by the S.A. Geological Survey indicate that Permian sediments are either thin or absent over the Bitchera Ridge area. If Permian sediments are thinner than about 200 feet, then no characteristic 12 000 ft/sec. reflector/refractor will be identified. Hence seismograph information is unable to map a definite Permian sediment edge. Drilling is necessary to define the nature of the Permian sediments if they are present over the Bitchera Ridge. Drilling will also improve the reliability of seismograph information by providing opportunities for down-hole velocity surveys. With such surveys at hand, re-interpretation of existing seismic data will yield better results.

The presence or absence of Permian sediments on depositionally high areas, and the nature of the sediments, if present, have significance for regional paleogeography and basin history. The possible facies and stratigraphic inter-relationships of the Permian rock units (if present) on the Bitchera Ridge are particularly interesting. The Stuart Range Formation of the Arckaringa Basin is a marine shale. In two stratigraphic wells in the northern end of the basin the lithology becomes relatively sandy, perhaps indicating a possible gradation to a shoreline facies. The interpretation is based on the most likely stratigraphic correlation of the Permian rocks between the widely separated holes drilled so far. Alternative stratigraphic interpretations are possible.

No lithology of marine aspects similar to the Stuart Range Formation has been encountered above the basal (?glacial) conglomerate in the Pedirka Basin by the sparse drilling in that basin (Fig.4). A regional northern limit of shoreline of the Stuart Range Formation may exist on the flank of the Bitchera Ridge. The sea may have encroached northwards but may have never transgressed the Bitchera Ridge so that the Pedirka Basin remained subject to only nonmarine deposition throughout

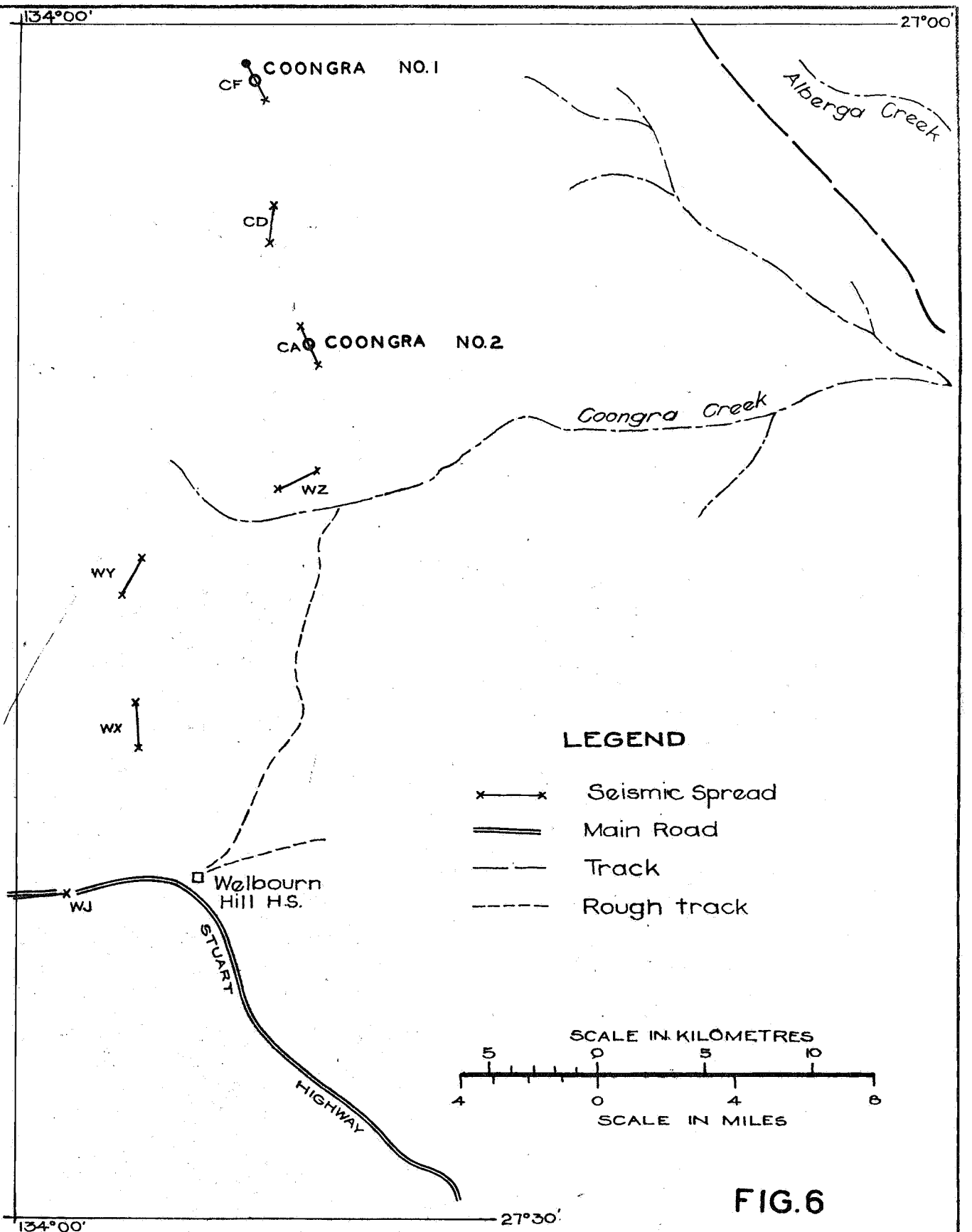

FIG.6

PETROLEUM SECTION	**DEPARTMENT OF MINES — SOUTH AUSTRALIA**	Scale: 1:250,000 (ORIG)
Compiled: I.J.T.	**BITCHERA RIDGE AREA**	Date: 16TH. JAN. 1973
Drn. A.G.R. Ckd.	LOCATION PLAN FOR PROPOSED COONGRA WELLS	Drg. No. 10109 Bd

300—6.72 C5552

this stage. Thus we can hypothesize that the non-marine Purni Formation may have crossed the Bitchera Ridge and spread southward over the Arckaringa Basin as a regression unit known there as the Mt. Toodina Beds. Alternatively the Bitchera Ridge may have remained exposed throughout the Permian era, shedding sediments north to the Pedirka Basin and south to the Arckaringa Basin, that is to say, the two basins may have remained separate depositional entities throughout the Permian. Only drilling can resolve these questions.

Jurassic Rocks

The Algebuckina Sandstone is 800 feet thick in Mt. Crispe No.1 and Witcherrie No.1 over the Pedirka Basin; but is only 150 feet thick in Cootanoorina No. 1 and absent in Oodnadatta No.1 over the Arckaringa Basin. The Algebuckina Sandstone is an important aquifer. Any information on thickness gained in the Bitchera Ridge area will provide control for the isopachous and structure maps in this dry area. Lower Jurassic units are not expected to be present in the area.

Cretaceous Rocks

The nature and extent of the marine Cretaceous units are unknown in the Bitchera Ridge area. The Oodnadatta Formation thins from 350 to 120 feet from Witcherrie No.1 to Mt. Crispe No.1 over the Pedirka Basin, and may be thinner or absent farther south. Likewise the Bulldog Shale may be absent in the Bitchera Ridge area. Similarly the Bulldog Shale and Oodnadatta Formation of the Arckaringa Basin may have feather-edges or be thinly continuous over the Ridge.

A further question of facies variation is the presence or absence and/or nature of the Coorikiana Sandstone Member of the Oodnadatta Formation. The questions of these possible relationships are summarised schematically in Figure 5.

The Cretaceous rocks have a petroleum potential east of the Bitchera Ridge area (H. Wopfner, pers. comm).

PROPOSAL TO DRILL STRATIGRAPHIC WELLS

The following well site locations have been selected on the basis of (1) suitability to obtain maximum information on stratigraphic problems and (2) availability of seismograph records.

Samples: Cutting samples will be caught, washed, described, bagged and labelled at 10 feet (3 m) intervals from surface to total depth.

Cores: All cores will be described on site by the geologist. Cores will be washed thoroughly labelled according to departmental practice, boxed and eventually stored at the Thebarton Depot.

Water Analyses: Where possible permeable aquifers of Palaeozoic age will have water samples taken. These will be chemically analysed by AMDEL.

Palynology: All formations will be subjected to palynological investigations. The Permian sediments in particular, should be intensively studied.

Geophysical Logging: Geophysical logs will be run on the advice and supervision of the Geophysical Section.

PROPOSAL TO DRILL TWO STRATIGRAPHIC WELLS IN THE COONGRA CREEK AREA OF S.A.

71-21

COONGRA NO.1

Location: 27°01'00"S

134°06'30"E

At s.p. 103, on D.M. line CF

Elevation: 953', a.s.l.

Total Depth: 2000 feet (610 m) ± 150 feet (50 m).

Aims:

Both Coongra wells are located on Department of Mines short seismic reconnaissance depth probe spreads. The locations are approximately 8 miles apart (Fig. 8). They will provide an investigation of the 12 000 ft/sec. refractor present in No.1 but not in No.2. This refractor is interpreted as ?Permian sediments but has a 30% higher velocity than known Permian sediments elsewhere.

The wells are located on the northwestern margin of the Bitchera Ridge and on the flanks of the negative gravity anomaly which is thought to represent an extension of the Officer Basin. This interpretation of the basin configuration will be tested.

Further stratigraphic questions which will be tested include:

(1) Permian sediment facies variation between points where the sediments are 550 fe thick and possible 100 feet thick.

(2) The shoreline limit of the Stuart Range Formation.

(3) The relationship of the Mt. Toondina Beds and the Purnie Formation.

(4) Likely petroleum potential of Cretaceous rocks to the southwest of this location

(5) The nature of Pre-Permian sediments if they are encountered rather than the predicted crystalline basement.

These stratigraphic questions are discussed in detail above in the general section.

Stratigraphic Prognosis:

The following depth prognosis is based entirely on seismic results and errors in estimation may be up to 15%.

Formation	Depth below surface ~~(p)~~ (top)
Weathered material	0
Mesozoic	30' (9 m)
?Permian	540' (164 m)
?Crystalline Basement	1150' (413 m)
T.D. (if C.B. encountered)	1200' (364 m)
T.D. (if pre-PERMIAN SEDIMENTS ENCOUNTERED)	2000' (606 m) minimum.

Coring: The hole will be wireline cored from the depth that Permian sediments are first recognised to T.D.

COONGRA No.2

Location: 27°08'15"S

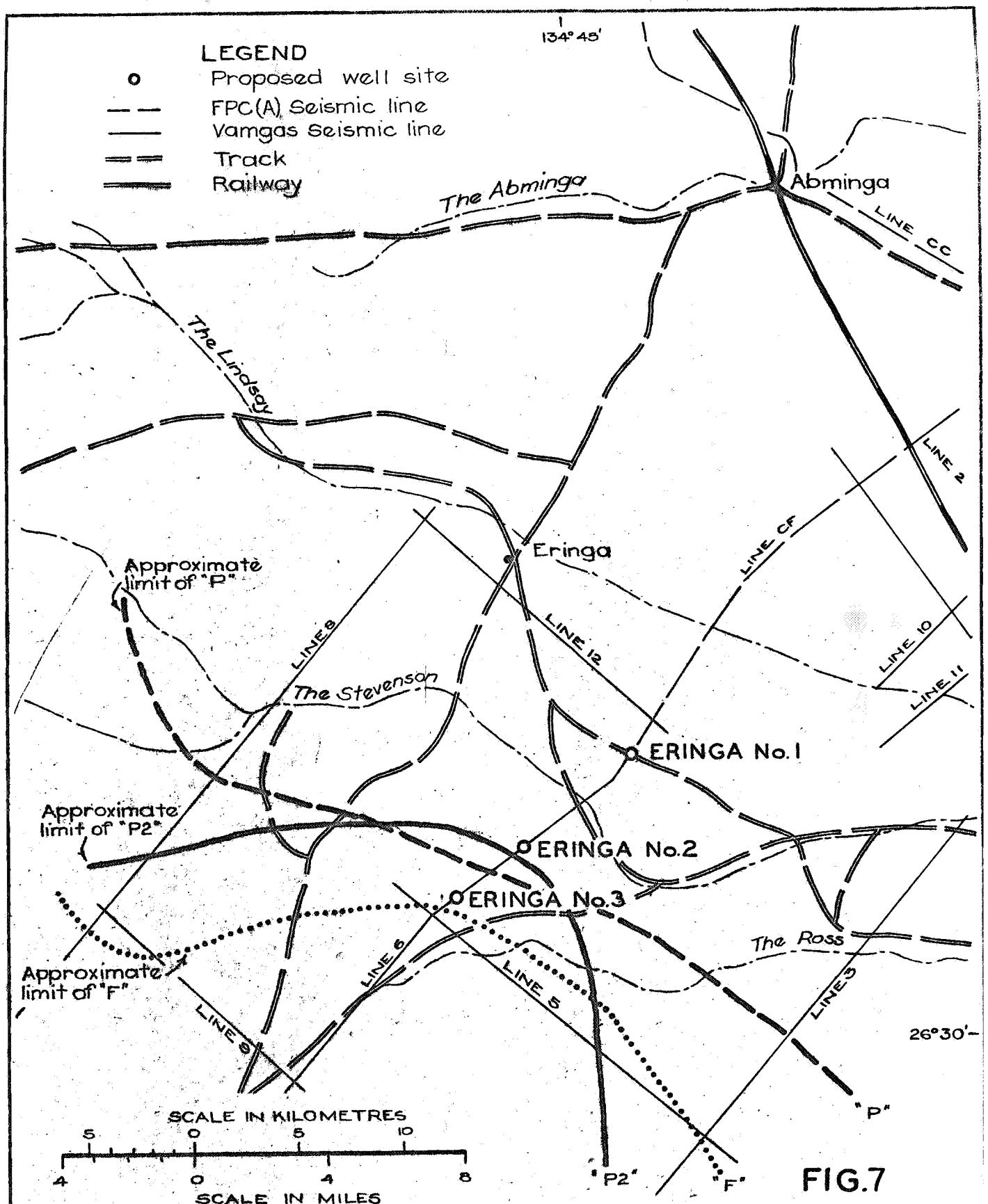

FIG.7

PETROLEUM SECTION	DEPARTMENT OF MINES — SOUTH AUSTRALIA	Scale: 1:250,000 (ORIG)
Compiled: B.C.Y.	BITCHERA RIDGE AREA	Date: 16TH JAN 1973
Drn. A.G.R. | Ckd.	PROPOSED SITES FOR ERINGA NO'S 1 TO 3 SHOWING TRACKS SEISMIC LINES AND APPROXIMATE FORMATION LIMITS	Drg. No. S10108 Bd

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2708

134°08'20"E

At s.p. 103, on D.M. line CA

Elevation: 955' a.s.l. (292 m)

Total Depth: 550' ± 50' (167 m ± 15 m)

Aims: See Coongra No.1 above.

Stratigraphic Prognosis: No refractor having a velocity characteristic of Permian sediments can be identified at this point. Nevertheless thin Permian sediments may be present immediately above basement. Crystalline basement is predicted at 550 ± 50 feet.

Coring: The hole will be cored from the time that Pre-Mesozoic sediments are first recognised to T.D.

PROPOSAL TO DRILL THREE STRATIGRAPHIC WELLS IN THE ERINGA AREA OF S.A.

Three wells situated a few miles south of Eringa Homestead (Fig.6) are proposed in order to evaluate the sediments at the margin of a Palaeozoic Trough which has been investigated only by seismic work. Wells No. 1 and 2 are proposed to be drilled by the DM. Failing 1500 to a depth of 3500 feet (1067 m) using slim hole coring techniques. A rig of capacity larger than any at present in the employ of the Department of Mines would be necessary for well no. 3. The No.1 well is designed mainly as a test of the Finke Group and Nos. 2 and 3 as tests of the Permian sediments.

ERINGA NO.1

Location: 26°26'25"S

134°41'45"E

At shot point 18, on Vamgas line 6.

Elevation: approximately 730 feet above m.s.l. (223 m)

Aims: (1) To determine if any Permian sediments are present in this area where there is no P2 nor P seismic reflector.

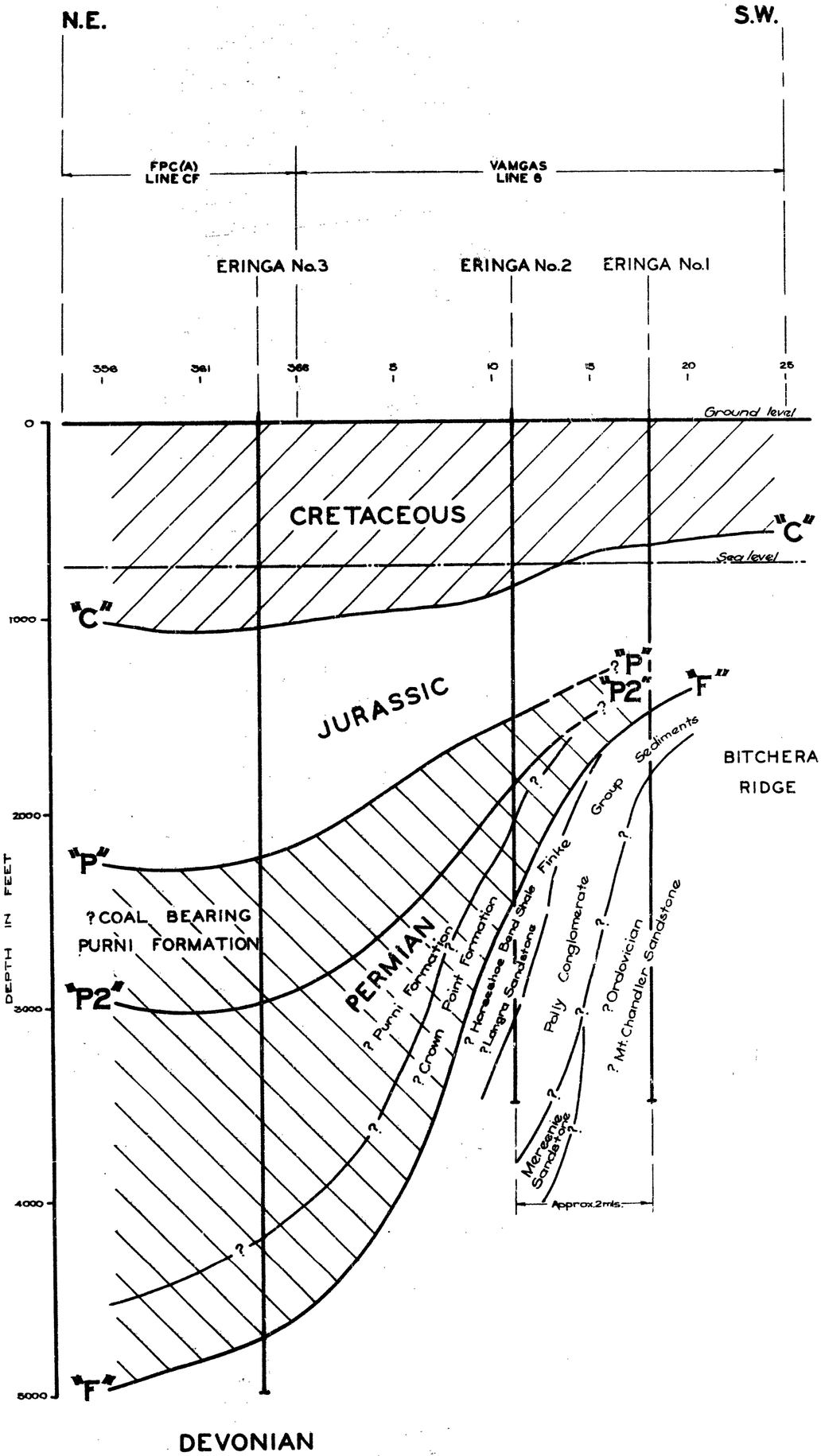

FIG. 8

PETROLEUM SECTION	DEPARTMENT OF MINES — SOUTH AUSTRALIA	
Compiled: B.C.Y.	BITCHERA RIDGE AREA	Scale: As shown
Drn. A.G.R. / Ckd.	EXPECTED STRATIGRAPHIC SECTION THROUGH PROPOSED ERINGA WELLS	Date: 16 JAN. 1973
		Drg. No. 73-21 Bd

(2) To test the possible presence of Ordovician Mt. Chandler Sandstone and compare its facies with the outcrop in the Mt. John area and with the Pacoota Sandstone and Stairway Sandstone in the Amadeus Basin.

(3) To test the presence of Devonian Finke Group sediments (see Fig. 3); further, to investigate the facies of the Finke Group formations that may be present; to investigate the areal distribution of the Horseshoebend Shale with respect to the Langra Formation.

Total Depth: The well is programmed to 3500 (1067 m) and is anticipated to bottom in Lower Palaeozoic strata.

Stratigraphic Prognosis: This depth prognosis is based entirely on seismic results and errors in estimations may be up to 10% (see Fig.7).

Formation	Depth to Top
Holocene	
Cretaceous - Oodnadatta Formation	0
Bulldog Shale	
Cadna-owie Formation	
?Jurassic - Algebuckina Sandstone	630 feet (192 m)
?Permian - ?Purni Formation	?~~2140~~ 1240 feet (376 m (?base of coal-bearing strata @ ?~~3170~~ 1370' (418 m))
?Crown Point Formation	
?Devonian - ?Finke Group	?1480 feet (451 m)
?Ordovician/Cambrian/Basement	?1640 feet (500 m)

Coring: The hole will be wireline cored from the depth Permian sediments are first recognised to T.D.

ERINGA NO. 2

Location: $26^{o}25'15"S$
approximate
$134^{o}43'30"E$

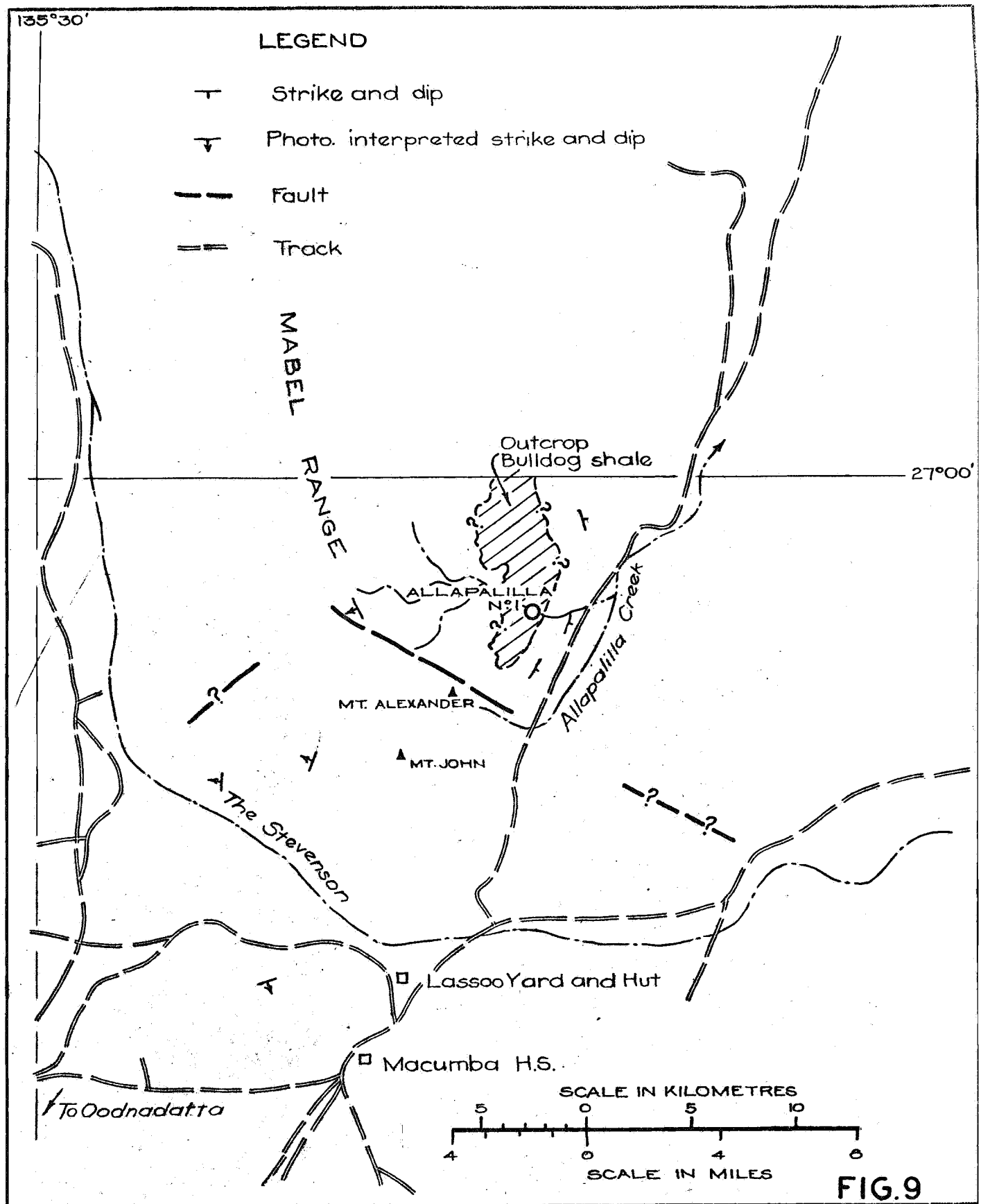

FIG.9

PETROLEUM SECTION	**DEPARTMENT OF MINES — SOUTH AUSTRALIA**	Scale: 1:250,000 (ORIG)
Compiled: B.C.Y.	**BITCHERA RIDGE AREA**	Date: 16TH JAN. 1973
Drn. A.G.R. | Ckd.	LOCATION PLAN FOR PROPOSED ALLAPALILLA WELL	Drg. No. 10110 Bd

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Elevation: approximately 730' a.s.l. (223 m)

Aims: 1. To identify the P2 seismic reflector which, to date, has not been drilled

2. To investigate facies of the Permian sediments. The Crown Point Formation is expected to be present, and perhaps the Lower Purni Formation. The marine shale, the Mt. Stuart Formation known in Arckaringa Basin wells may be present.

Total Depth: The well is programmed to 3500 feet (1067 m) and is anticipated to bottom in Pre-Permian sediments which are anticipated as possibly Devonian (Finke Group).

Stratigraphic Prognosis: The following depth prognosis is based entirely on seismic results and errors in estimation may be up to 10% (see Fig.7).

Formation	Depth below surface (top)
Holocene	
Cretaceous - Oodnadatta Formation	
Bulldog Shale	0 feet
Cadna-owie Formation	
Jurassic - Algebuckina ~~Siltstone~~ Sandstone	830 feet (253 m)
Permian - Purni Formation	1520 feet (463 m) (base of coal bearing strata at ?1820 feet (555 m)).
Crown Point Formation	
?Devonian - Finke Group	2540 feet (774 m)

Coring: The hole will be wireline cored from the depth Permian sediments are first recognised to T.D.

ERINGA NO. 3

Location: 26°22'40"S

approximate

134°46'45"E

At shot point 364, on FPC(A) line Cf.

Elevation: approximately 730 feet a.s.l. (223 m)

Aims: This well is designed as a test of the full Permian section in the area. It will provide a more mid-basin facies for comparison with margin facies encountered in No. 2 and possible No.1. The well may be drilled as an alternative to No. 2.

Total Depth: The well is programmed to approximately 5000 (1524 m) or more, and should penetrate the Permian strata and identify the underlying beds, which are believed to be Devonian Finke Group. This depth is beyond the capacity of any rig presently held by the Department of Mines.

Stratigraphic Prognosis: The following depth prognosis is based entirely on seismic results and errors in estimation may be up to 10% (see Fig.7).

Formation	Depth below Surface (top)
Holocene	
Cretaceous - Oodnadatta Formation	
Bulldog Shale	0
Cadna-owie Formation	
Jurassic - Algebuckina Sandstone	1040 (317 m)
Permian - Purni Formation	2200 feet (617 m) (base coal bearing strata at
Crown Point Formation	3000 feet (914 m)).
?Devonian - Finke Group	c.5000 (1524 m)

Coring: Cores will be taken every 500 feet (150 m) from the depth at which Permian sediments are first recognised.

PROPOSAL TO DRILL A STRATIGRAPHIC WELL AT ALLAPILILLA CREEK S.A.

ALLAPILILLA NO.1

Location: 27°03'24"S

135°44'15"E

Approximately 1½ miles westward and upstream on tributary on Allapililla Creek from its crossing with the northward track from Lasoo Yard and Hut. Approximately 14.3 miles (22.9 km) at 22°(T) from Macumba H.S. (See Figs. 1 and 9).

Elevation: Approximately 650 feet above m.s.l. (197 m)

Total Depth: 3500 feet (1067 m)

Aims: (1) To test for the presence of Permian sediments and evaluate these facies if present.

(2) To test for the presence of Finke Group sediments. These are not expected to be present. Other Devonian sediments may be present; for example, dolomites encountered in the Arckaringa Basin.

(3) To test for the presence of Ordovician sediments. These might be similar to the Pacoota and Stairway Sandstones of the Amadeus Basin.

(4) To test for the presence of Cambrian sediments. These are likely to be calcareous if present. If encountered, this location is strategically placed to add to the paleogeography of the Warburton depositional Basin.

Stratigraphic Prognosis: The following depth prognosis is derived from regional isopachous trends of Mesozoic and Permian strata. No estimate of the Pre-Permian section is possible. There is no seismograph control in the area. The well will spud in mapped ?Bulldog Shale which should provide a minimum Mesozoic section and a large Palaeozoic section.

Formation	Depth below surface (top)
Weathered material	0
Bulldog Shale	30(9[illegible] m)
Cadna-owie Formation	400 (121 m)
Algebuckina Sandstone	500 (151 m)
Permian sediments	1100 (333 m)
pre-Permian sediments	1200 (363 m)
T.D.	3500 (1067 m)

Coring: The hole will be wireline cored from depth that Palaeozoic sediments are encountered.

SUMMARY

Drilling of six wells is proposed north of Oodnadatta at approximately the convergence of the Arckaringa, Pedirka and Officer Basins in order to shed light on some of the following specific stratigraphic problems as well as general palaeogeography and history.

Ordovician Rocks

1. Test for a northwest extension to the surface of the Chandler Sandstone.
2. Compare subsurface Chandler Sandstone, if present, with the Stairway and Pacoota Sandstone reservoirs of the Amadeus Basin thereby possibly confirm their existence in Mt. Crispe No.1 and Witcherie No.1.
3. Test for the southward extension of ?Ordovician sandstone from the Pedirka Basin and compare with Chandler Sandstone.
4. Attempt to find permeable Ordovician sandstone to revise the F.P.C.A. condemnation of the Cambro-Ordovician System for reservoir rocks.

Devonian Rocks

1. Test for the southward extension of the Finke Group from the Pedirka Basin.
2. Test the Horseshoebend Shale caprock relationship to the Langra Formation at the basin margin.
3. Test the hypothesis of the Mereenie Sandstone extending from the Amadeus Basin, to the Pedirka Basin to the Mt. Johns Range outcrop.

Permian Rocks

1. Test for the presence of thin Permian Rocks where they may be too thin for seismic records to identify such rocks.
2. Test for a northern shoreline limit of the marine Stuart Range Formation.
3. Investigate the relationship of the Purni Formation (Pedirka Basin) to the Mt. Toondina Beds (Arckaringa Basin).

Jurassic Rocks

1. Provide thickness control on the Algebuckina Sandstone, an important aquifer.

Cretaceous Rocks

1. Investigate the facies of the Cretaceous rocks over the Bitchera Ridge to assess their petroleum potential in the southwest Frome Embayment.

General

1. Provide downhole velocity surveys for the seismograph in an area of little control.