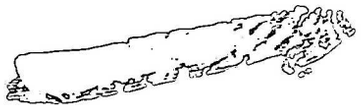
4



COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES.

GEOLOGY AND GEOPHYSICS

RECORDS 1957, No. 45

PRELIMINARY REPORT ON A SEISMIC REFLECTION SURVEY IN THE SYDNEY BASIN, N.S.W., FEBRUARY-MAY, 1957

by

C. S. ROBERTSON

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ILLUSTRATIONS

1. INTRODUCTION.

The Sydney Basin seismic survey was undertaken by the Bureau of Mineral Resources on the application of the Australian Oil and Gas Corporation, supported by the New South Wales Department of Mines. The Bureau carried out the survey with the object of determining whether the reflection seismic method of prospecting is applicable to the Sydney Basin. This involved the following :-

(i) Testing of shooting conditions on the various formations encountered in the Sydney Basin.

(ii) Experimenting with different shooting techniques, particularly with the use of multiple arrays of geophones, in areas of poor quality reflections.

(iii) Investigation of the sedimentary section in the Sydney Basin.

Tests were carried out between 25th February and 13th May, 1957, in the Llandilo, Dural, Maroota and Camberwell areas of New South Wales. These tests showed that, in general, the reflection seismic method of prospecting is applicable to the Sydney Basin, but special techniques are needed in some areas to obtain useful results. Reflections of fair quality were obtained in the Llandilo area from depths of up to 14,000 feet even when using standard techniques.

In the final report on the survey, to be issued at a later date, the geology of the areas in which seismic work was carried out will be discussed in some detail. In this preliminary report the following columnar section of Permian and Triassic rocks of the Sydney Basin (Raggatt, 1954) will suffice to give a general picture of the sedimentary section in the area.

TRIASSIC	WIANAMATTA GROUP (800 FT)	Upper half mainly sandstone, lower half mainly shale.
	HAWKESBURY SANDSTONE (900 FT)	Predominantly sandstone
	NARRABEEN GROUP (2300 FT)	Sandstone and shale at top; red and green claystone and sandstone in middle; mainly conglomerate and sandstone at base.

PERMIAN	UPPER COAL MEASURES	NEWCASTLE COAL MEASURES (1500 FT)	Mainly sandstone, conglomerate and coal seams.
		TOMAGO COAL MEASURES (2000 FT)	Mainly sandstone, shale and coal
	UPPER MARINE	MULBRING SHALE (3000 FT)	Predominantly shale
		MUREE (400 FT)	Sandstone and conglomerate
		BRANXTON (3000 FT)	Sandstone, sandy shale and Fenestella shales
		GRETA COAL MEASURES (300 FT)	
	MARINE	FARLEY (1000 FT)	Sandstone and tuff
		RUTHERFORD (1150 FT)	Sandy shale and mudstone; minor limestone; basalt

LOWER	ALLANDALE (1000 FT)	Sandstone, basalt, tuff and conglomerate.
	LOCHINVAR (2750 FT)	Sandstone, basalt and sandy shale mainly; some shale.

Conditions for seismic surveys were tested by surveying traverses on a shale area of the Wianamatta Group, on the Hawkesbury Sandstone and on the Upper Coal Measures. A few spreads were shot also on the Upper Marine strata. Different techniques of employing ten 6-cycle-per-second geophones per trace were tried on the first traverse, at Llandilo, and a system developed which was used on the three succeeding traverses with some success. Results obtained using multiple shot holes were compared with those using multiple geophones. The plotted sections obtained from the seismic work were generally in agreement with results inferred from geological work, both as regards thickness of sedimentary section and geological structure at depth. The seismic method proved valuable in indicating geological structure in other areas in which little information could be obtained from surface geological mapping.

2. SEISMIC WORK ON THE WIANAMATTA SHALE, NEAR LLANDILO

(a) Programme of Work.

Eight and a half miles of traverse were surveyed in an east-west direction immediately south of Llandilo, 30 miles west of Sydney (see Plate 1). Seismic work was commenced on this traverse on 25th February and completed on 21st March.

Commencing at shot point (S.P.)1 near the middle of the traverse, the traverse was surveyed in a westerly direction to S.P. 17 near Cranebrook. A short cross traverse, ½-mile in length at right angles to the main traverse, was surveyed between shot points 6 and 7. S.P.20 was ¼-mile east of S.P.1 and the traverse was continued in an easterly direction from there to S.P.35 near the Richmond-Blacktown Road. The depth of weathering on the traverse was usually about 35 feet and shot holes were drilled to about 85 feet. Drilling was moderately fast along the traverse; 60 holes were drilled and the total footage drilled was 5,355 feet.

On the western half of the traverse, reflections of reasonable quality were obtained using single shot holes and the T.I.C. 20 c.p.s. multiple 4 geophones, which were spaced at intervals of 5 feet.

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Only a few reflections of very poor quality were obtained from S.P. 20 to S.P.27, so it was decided to experiment on this portion of the traverse with different shot and geophone arrangements.

At S.P.22, 6-c.p.s. TIC geophones were used in multiples of 10 per trace and placed in line along the traverse with 5 geophones on either side of each geophone peg. This arrangement was tried with the geophones at intervals of 10 feet, 30 feet and 50 feet apart. The first test (10-foot intervals) resulted in a small improvement on the record obtained with the multiple 4 geophones. The second test (30-foot intervals) resulted in a marked improvement. The third test (50-foot intervals) gave only a slight improvement on the second test. The geophones were used in multiples of 10 because this was the greatest number available per trace. It is probable that the use of larger groups would further improve the results.

In addition to the geophones being placed in line they were tried in square grid patterns about the geophone pegs, i.e. they were placed in 3 rows of 3 geophones, 50 feet apart, with an additional geophone at the central point, making 10 geophones altogether. The result using this arrangement was of similar quality to the result obtained when the geophones were used at 50-foot intervals in line.

With geophones laid out in the above-mentioned patterns a conventional 9-hole diamond pattern of shots at 50-foot spacings, using 2½ lb. of Geophex in each hole, was fired for comparison with the results obtained with a single 25 lb shot. The pattern shot resulted in a record which was a marked improvement on that obtained using a single shot.

As a result of these experiments a workable system for using multiples of 10 geophones was developed and used extensively during the remainder of the Sydney Basin survey. In this system the geophones were laid along the traverse line at intervals of 24.5 feet with 5 geophones on either side of each geophone peg and take-out point on the Vector geophone cable. The interval of 24.5 feet was selected so that the furthest geophone from each take-out point fell on the next geophone peg, thus enabling first break times at the geophone pegs to be obtained. Pattern shots were used whenever the rate of progress of the drilling crews permitted. By varying the number of holes drilled at each shot point, the rate of progress of the drilling crews could be readily adjusted to that of the recorder crew using the geophones in multiples of 10.

Shot points 20 to 27 were re-shot using the multiple 10 geophones and one, two or three shot holes. Much improved results were obtained. This technique was also employed on shot points 28 and 29. Shot points 30 to 34 were shot using the multiple 4 geophones.

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(b) Results and Interpretation.

The results from the Llandilo traverse are shown on Plate 3 in the form of a preliminary correlation cross-section labelled traverse A.

Many reflections of quality ranging from very poor to good, were recorded on the traverse from estimated depths down to 22,000ft. These give quite a good indication of the geological structure in the area. The outstanding feature of the preliminary correlation cross-section plotted from the seismic results is a series of persistent reflections from about 4,000 ft. These reflections can be correlated across practically the whole length of the traverse. It is possible that they come from the Permian Upper Coal Measures which are believed to occur at about 4,000 ft. A second, slightly less persistent series of reflections was obtained from about 6,000 ft.

The reflections from above 14,000 ft. indicate dips of less than 10 degrees. On the western half of the traverse there is a general easterly dip of about 200 feet per mile. To the east of S.P.2, near the centre of the traverse, reflections indicate that the strata are generally horizontal except for an anticline of minor proportions near S.P.25, about 3 miles east of Llandilo, and a less well-defined syncline to the west of this with its axis near S.P.20. The reflecting layers dip away from S.P.25 for ½-mile to either side at about 300 feet per mile. Further seismic work to investigate this structure is warranted.

Reflections from below 14,000 feet are not numerous and are completely lacking in the central portion of the traverse. Near both ends of the traverse the deep reflections indicate dips of about 10 to 15 degrees towards the centre. There is evidence of an unconformity at about 14,000 feet, the reflections from below this depth indicating generally steeper dips than those above it. These reflections are rather scattered and could well be reflections from within the basement. Alternatively, they may be multiple reflections and therefore not truly indicative of geological change at depth. They are not sufficiently numerous or consistent to permit detailed analysis of this aspect. Keeping this in mind, and also the fact that the velocities used have a fairly large probable error, it may be stated that the seismic section indicates a sedimentary section of at least 14,000 feet.

Reflections obtained on the short cross-traverse near S.P.7 indicate that the strata are horizontal, or nearly so, in the north-south direction.

3. SEISMIC WORK ON THE HAWKESBURY SANDSTONE, NEAR DURAL.

(a) Programme of Work.

The second traverse in the Sydney Basin was surveyed from near Kenthurst in an easterly direction to

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the Australian Oil and Gas Corporation's drill site (Dural No. 1), east of Dural (see Plate 1). This traverse passed through several small farming properties and was 3½ miles in length. Seismic work on the Dural traverse was commenced on 21st March and completed on 9th April.

Along the greater portion of the traverse the Hawkesbury Sandstone is overlain by 5 to 20 feet of Wianamatta Shale, but some shot points, notably near the eastern end of the traverse, were directly on Hawkesbury Sandstone or derived soil. From S.P.1, at the western end, to S.P.8 the best shooting depth was from 150 to 200 feet and shot holes were therefore drilled to 200 feet. To the east of S.P.8 reflections of reasonable quality were also obtained when shooting at depths between 50 and 100 feet; drilling of deep holes was therefore discontinued from S.P.10 onwards. Drilling in the hard Hawkesbury Sandstone proved fairly slow. The total footage drilled on the Dural traverse was 3165 feet, distributed over 32 holes. A 7-hole pattern shot was fired at S.P.2. The 6-c.p.s. T.I.C. geophones were used in multiples of 10 along the whole length of the traverse.

(b) Results and Interpretation.

The results from the Dural traverse are shown on Plate 4 in the form of a preliminary correlation cross section labelled traverse C. Few reflections were obtained. Along most of the traverse 50 c.p.s. A.C. interference from power lines presented a problem. The level of this interference was above that of the reflected energy after about 1.0 to 1.5 seconds on most records, so that reflections from below about 8,000 feet would have been masked by the 50-cycle oscillations. However, at shot points 1, 2 and 14, where there was little A.C. interference, no reflections were recorded from beyond 1.0 seconds. It is possible therefore that absence of A.C. interference would not have resulted in much better results.

The plotted results of the Dural traverse on the Hawkesbury Sandstone provide a much less complete picture of subsurface structure than was obtained on the Wianamatta Shale near Llandilo. Nevertheless, the persistence of reflections at about 0.45 seconds across most of Dural traverse provides useful information. The seismic results indicate a westerly dip of about 150 feet per mile westwards from the A.O.G. drill site as far as S.P.9. The few reflections obtained at S.P.14, east of the drill site, indicate an easterly dip. The seismic results therefore tend to support the belief that the drill site is near the crest of an anticline. There is some evidence of a slight easterly dip from S.P.1, at the western end of the traverse, to S.P.5.

A cross-spread along the Galston Road was shot from near S.P.7 on the main traverse. This produced a fair reflection at 0.6 seconds which indicated little or no dip. Several poor reflections were also recorded.

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4. SEISMIC WORK ON THE HAWKESBURY SANDSTONE, NEAR MAROOTA.

(a) Programme of Work.

Two miles of seismic traverse were surveyed east of Maroota, 15 miles north of Dural, in order to provide a further test of shooting conditions on the Hawkesbury Sandstone (see Plate 1). Seismic work commenced at Maroota on 10th April and was completed on 24th April.

On this traverse there was little or no shale cover over the sandstone and no A.C. interference. The 6-c.p.s. geophones were used in multiples of 10 at all shot points on the Maroota traverse except at the northernmost end (S.P.24). Shot-hole patterns were used along the traverse, the number of holes per shot point ranging from 2 to 9. The depth of weathering on the traverse ranges from 25 to 45 feet and most holes were drilled to about 65 feet. Drilling was moderately fast compared with that on the Dural traverse. A total of 41 holes was drilled and the total footage was 3,018 feet.

(b) Results and Interpretation.

The seismic results from the Maroota traverse are shown on Plate 5 in the form of a preliminary correlation cross section labelled traverse D. Reflections were obtained at all shot points except number 24, but the quality was poor in every case. The most persistent reflections were obtained from about 3,000 feet. These give some evidence of an anticline centred near S.P.20, but the poor quality of the reflections makes the existence of the structure doubtful.

5. SEISMIC WORK ON THE UPPER COAL MEASURES, NEAR SINGLETON (CAMBERWELL).

(a) Programme of Work.

On the Upper Coal Measures, 5½ miles of seismic traverse were surveyed from the New England Highway 3 miles north of Singleton in a westerly direction to the Hunter River. The traverse crossed the Australian Oil and Gas Corporation's Camberwell Structure and proposed drilling site. A one-mile cross-traverse was surveyed approximately at right angles to the main traverse at S.P.34, ½-mile east of the proposed drilling site (see Plate 2). Seismic work near Singleton commenced on 29th April and was completed on 13th May.

The 6-c.p.s. geophones were again used in multiples of 10 along the main traverse, as the majority of reflections obtained were poor in quality. The 20-c.p.s. geophones were used in multiples of 4 on the cross traverse. Single shot holes were used except at shot points 36, 38 and 39, where 3-hole pattern shots were fired. The depth of weathering on the Camberwell traverse is mostly about 30 to 40 feet and the best shooting depth 60 to 70 feet.

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The majority of shot holes were drilled to 75 feet. On the western half of the traverse two holes were drilled to twice this depth and shallow coal seams were encountered. Drilling was mostly moderately fast on the Camberwell traverse but hard bands of material were encountered at several shot points near the eastern end and water circulation was lost at two shot points. Forty-one holes were drilled and the total footage was 3,036 feet.

(b) Results and Interpretation.

The seismic results from the Camberwell traverses are shown on Plates 6 and 7 in the form of preliminary correlation cross-sections labelled traverses E and F respectively.

Strong reflections were recorded at about 0.6 seconds at many points but, apart from these, reflections were generally poor. Many reflections were obtained on traverse E from S.P.27 at the eastern end to S.P.34, while shooting on the Permian Upper Coal Measures. Only a few, much poorer, reflections were obtained at shot points 35 and 36, which are located on an anticline where the Upper Marine Series crops out at the surface. From S.P.37 westwards, the traverse was on Upper Coal Measures and reflections were obtained at shot points 38 and 39 and on the western side of 37. However, reflections were absent from S.P.40 to S.P.45.

This lack of reflections may be a consequence of the presence of shallow coal seams, as evidenced by the drilling. It is apparent from all the traverses so far surveyed in the Sydney Basin that the coal-bearing strata are good reflectors of seismic energy. The strongest and most persistent reflections obtained at Llandilo, Dural and Maroota appeared to come from the same depth as the Upper Coal Measures. On the Camberwell traverse very strong reflections were obtained from about the known depth of the Lower Coal Measures. It is likely that the presence of coal seams near the surface at shot points 40 to 46 on the Camberwell traverse prevented penetration of the seismic energy to depth. Shooting in deep holes (165 feet) was tried at shot points 41 and 42, but without success. Reflections were obtained at shot points 46, 47 and 48.

A cross-traverse consisting of 4 shot points was surveyed approximately at right angles to the main traverse. This cross-traverse was not surveyed through the proposed drilling site (S.P.36) as the reflections obtained at this point were few and of very poor quality.

Reflections were recorded on the Camberwell traverse down to about 14,000 feet and plotted using the correlation method of plotting, in which all reflections are plotted directly under the shot points at which they were recorded.

The reflections indicate a moderately steep and consistent component of dip of the order of 700 feet per mile along the direction of the traverse from S.P.27 to S.P.29. Between shot points 29 and 34 the shallower reflecting layers appear to be more or less horizontal. However, this portion of the section particularly, is

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subject to re-interpretation. Several reflections in this part of the section show different slopes on opposite sides of the shot points and these differences are not explainable in terms of variations in weathering thickness, elevation or spread correction. In the preliminary cross-section, additional corrections calculated by trace analysis have been applied to the central trace times to eliminate this "wash-boarding" effect.

There is little reflection data from shot points 35 to 37. Reflections down to 6,000 feet between shot points 37 and 39 indicate a consistent westerly dip of about 700 feet per mile. Reflections between shot points 45 and 49 indicate a similar westerly dip.

On the short north-south cross-traverse (Plate 7), the reflections indicate the existence of an anticlinal structure. The axis is about a quarter of a mile south of the main traverse at a depth of 3,500 feet, but reflections from 7,000 feet indicate that at that depth the axis is only about one eighth of a mile from the main traverse.

6. CONCLUSIONS

(i) In the areas investigated, seismic shooting conditions in the Sydney Basin are moderately good on Wianamatta Shale and on some parts of the Upper Coal Measures. The seismic method of prospecting proved quite successful when used on these strata. The traverses surveyed at Dural and Maroota demonstrated that useful results can also be obtained on Hawkesbury Sandstone, although the results are generally much poorer than those from shale or coal measure areas.

(ii) The use of geophones in multiples of 10 proved successful in areas of poor reflections. In this survey, 10 geophones per trace was the maximum number available, but it is probable that larger number of geophones would be even more successful. The multiple 10 geophones gave considerably better results than those obtained using the multiple 4 geophones which were employed in previous surveys. Surveying with the multiples of 10 progressed at approximately half the speed of normal surveying when using multiples of 4. However, a faster technique could undoubtedly be developed. In the Sydney Basin the multiples proved just as effective when used in line along the traverse as when laid out in square grid patterns about the geophone points. It was found that a convenient and effective interval at which to space the 10 geophones was 24.5 feet. Reflection quality can be much improved by using patterns of, say, 9 shot holes instead of a single hole with the same total amount of explosive charge. The technique of using shallow pattern shots with a very large number of holes was not tried but may well prove economical and effective in the Sydney Basin.

(iii) The seismic survey indicates that structures suitable for the accumulation of oil or gas may exist at depth at Llandilo, Dural and Camberwell. Insufficient seismic work was done to prove the existence of such structures. The limited amount of reflection data obtained at Dural tends to confirm the existence of an

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anticline with its axis near the Dural No. 1 well. It was unfortunate that rough terrain prevented the seismic traverse being continued any appreciable distance to the east of the supposed axis. At Camberwell there is good evidence of westerly dip on the western flank of the Camberwell Anticline. Reflection information on the eastern side of the Anticline is much less definite. The information will be re-examined and plotted on a section in which the reflections are migrated and plotted in their apparent correct positions before conclusions are drawn. The cross traverse at S.P.34 indicates that there is a definite reversal of dip in the north-south direction.

On the basis of the seismic work so far done at Camberwell it would appear that a more intensive and detailed seismic investigation would be desirable before an expensive deep test location is finally selected. The difference in dip between reflections recorded at shot points 35 and 38 may be indicative of faulting, although the change is such that it may be accounted for in terms of folding.

7. REFERENCES

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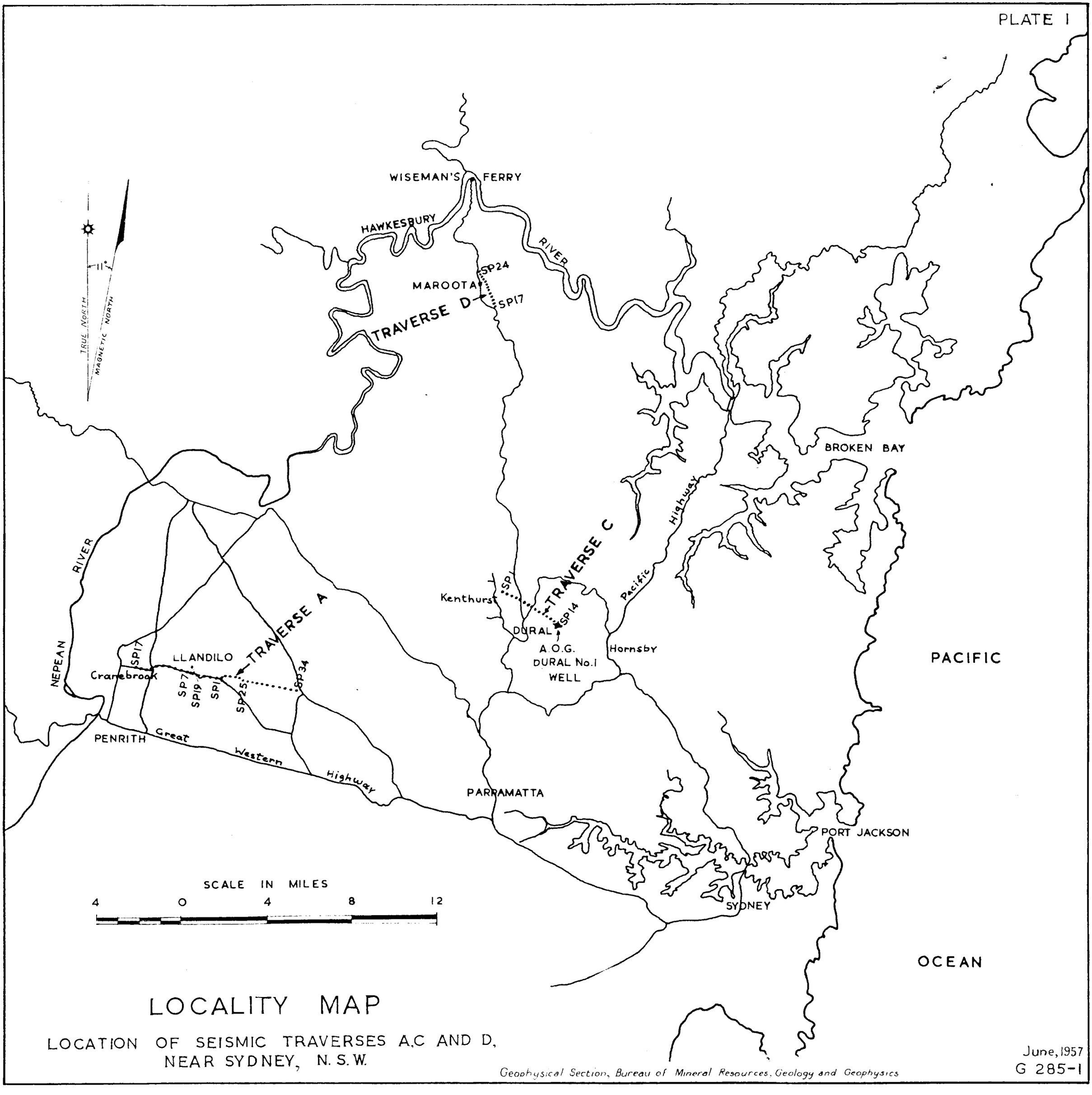
Raggatt, H.G., 1954 - The Search for Oil in Australia and New Guinea. Bur. Min. Resour. Aust. (Booklet).

PLATE I



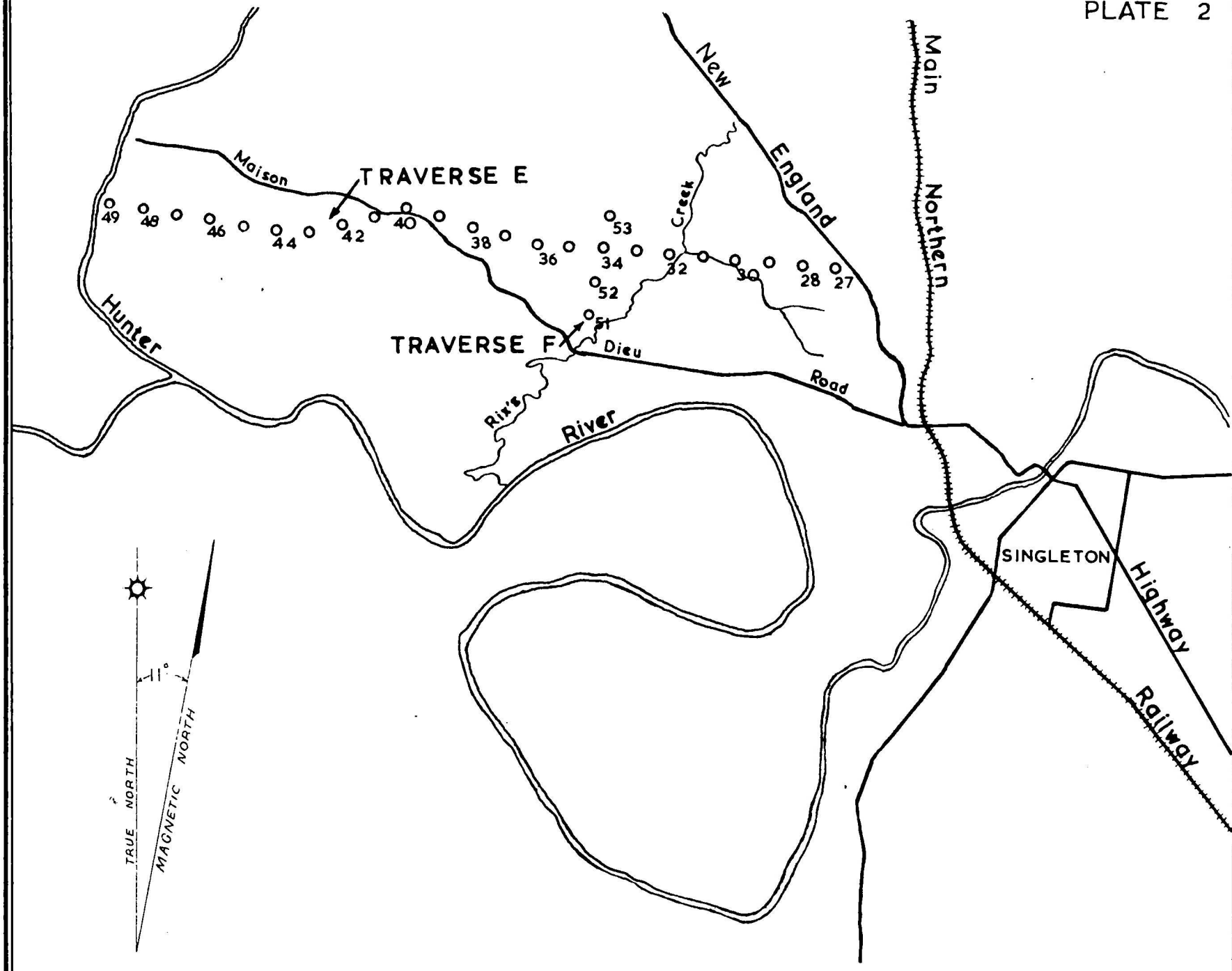
LOCALITY MAP

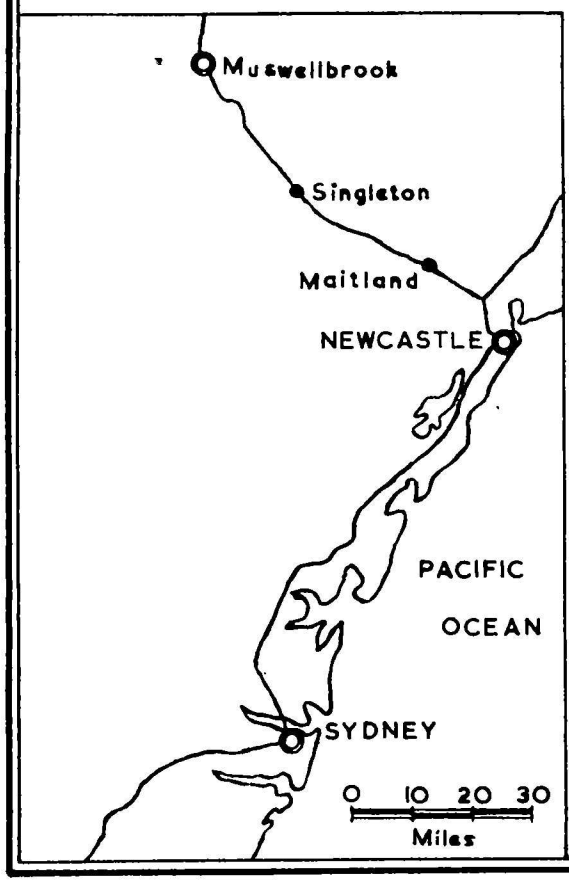
LOCATION OF SEISMIC TRAVERSES A,C AND D,
NEAR SYDNEY, N. S. W.

Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics

June, 1957
G 285-1

PLATE 2





SCALE: 1 MILE TO 1 INCH

0 1 2 3

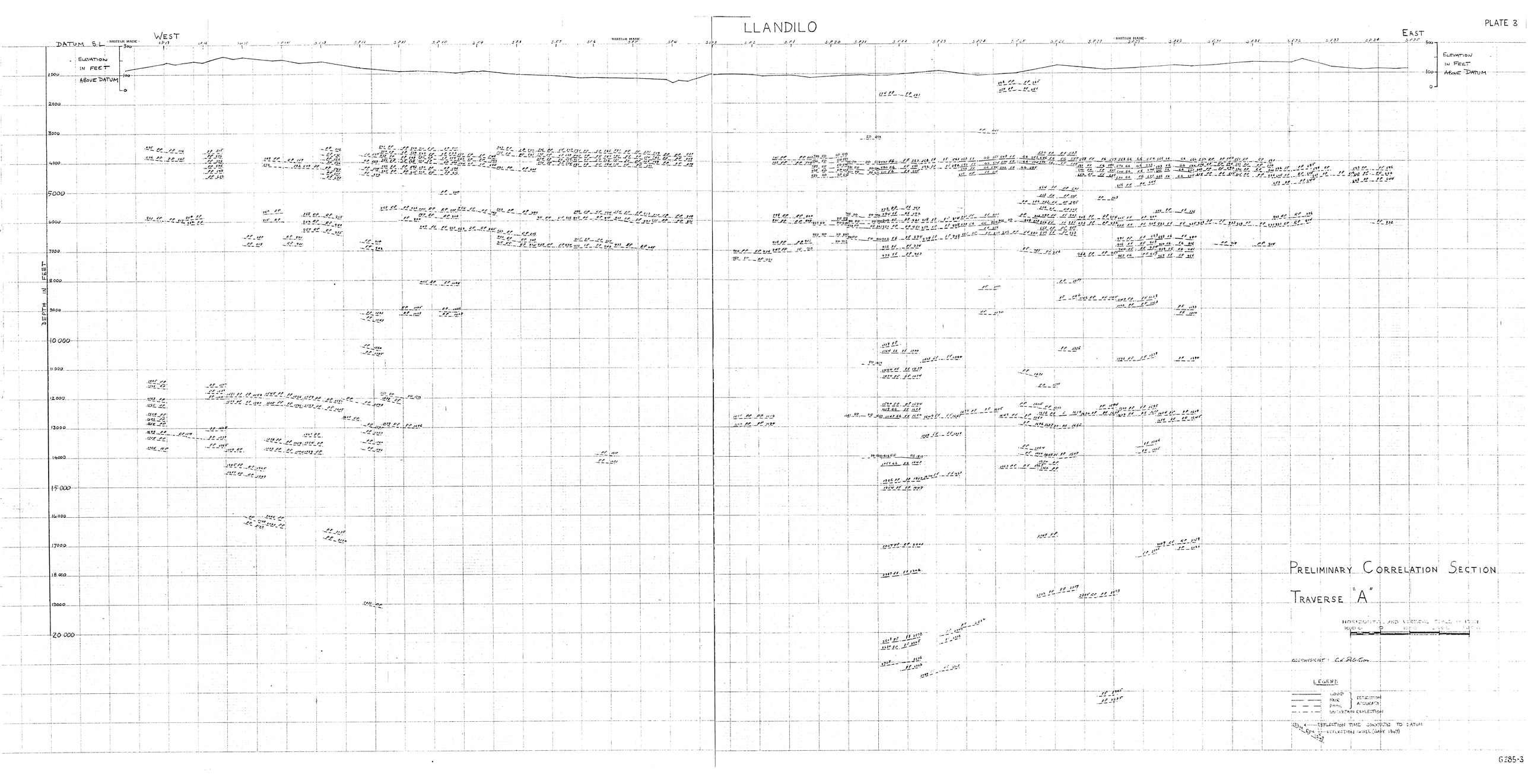
LOCALITY MAP

SHOWING LOCATIONS OF SEISMIC TRAVERSES E AND F AND SHOT POINTS, NEAR SINGLETON, N.S.W.

G285-2

Geophysical Section, Bureau of Mineral Resources, Geology & Geophysics June, 1957.

LLANDILO



PRELIMINARY CORRELATION SECTION

TRAVERSE "A"

HORIZONTAL AND VERTICAL SCALE AS SHOWN

GEOPHYSICIST: C.E. PALGRAVE

LEGEND:

- GOOD } REFLECTION
- FAIR } ACQUISITION
- POOR }
- INTERPRETATION REFLECTION
- (123) ← REFLECTION TIME CORRECTED TO DATUM
- SP 1234 ← REFLECTION SHOT (MAY 1947)

G285-3

DURAL

WEST — EAST

BRITISH MADE DATUM-SL

BRITISH MADE

ELEVATION IN FEET ABOVE DATUM

DEPTH IN FEET

PRELIMINARY CORRELATION SECTION

TRAVERSE "C"

HORIZONTAL AND VERTICAL SCALES IN FEET

SEISMOLOGIST C.J. Robertson

LEGEND

- GOOD
- FAIR
- POOR
- UNCERTAIN REFLECTION

} REFLECTION ACCURACY

REFLECTION TIME CORRECTED TO DATUM

REFLECTION GRADE (GAREY 1947)

G285-4

MAROOTA

DATUM – S.L

DEPTH IN FEET

1000 2000 3000 4000 5000 6000 7000 8000 9000 10 000 11 000 12000 13000 14000 15 000 16000 17000 18000 19000 20 000

17 18 19 20 21 22 23 24

700 500 300 100 0

ELEVATION IN FEET ABOVE DATUM

362 RP 347

416 PP 396 . 397 PP 399 PP 402 .
445 PP 425 . 420 PP 417 PP 424 .
471
485 RP 473
424 467 474 481 PP 484
438 PP 461

411 PP 410 . 414 RP
431 PP 425
RP 425 . 421 RP 436 . RP 427
401 RP 415

507 RP 493

521 RP 550

523 PP 552

613 PP 649

625 RP 616

678 RP 684

741 RP 754
766 RP 764

769 RP 792
801 RP 792
834 RP 822

814 PP 244
833 RP 827

807 RP 803

828 RP 925

814 RP 826

852 RP 867

936 PP local

1113 RP 1131

1143 RP 1151

1185 RP 1173

1350 RP 1354
1383 RP 1367

1412 PP 1377

1464 RP 1424
1509 RP 1521

1606 RP 1613
1646 RP 1646

1687 RP 1622 . RP 1662

1735 RP 1746

1770 RP 1777

2020 RP 2015

2154 RP 2116

2214 RP 2206

LEGEND

GOOD
FAIR
POOR
} REFLECTION ACCURACY
UNCERTAIN REFLECTION

1234 ← REFLECTION TIME CORRECTED TO DATUM
RP ← REFLECTION GRADE (EASY 1947)
1247

PRELIMINARY CORRELATION SECTION

TRAVERSE "D"

HORIZONTAL AND VERTICAL SCALE IN FEET
1000 0 1000 2000 3000

GEOPHYICIST : C. J. Robertson

G 285-5

CAMBERWELL

W ← → E

PLATE 6

DATUM — S.L.

ELEVATION IN FEET ABOVE DATUM

500 300 100 0

48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27

DEPTH IN FEET

5000

10000

15000

PRELIMINARY SECTION ONLY
SUBJECT TO RE-INTERPRETATION.

PRELIMINARY CORRELATION SECTION

TRAVERSE "E"

HORIZONTAL AND VERTICAL SCALE IN FEET
1000 0 1000 2000 3000

LEGEND

GOOD
FAIR
POOR
} REFLECTION ACCURACY
UNCERTAIN REFLECTION

1234 ← REFLECTION TIME CORRECTED TO DATUM
RP ← REFLECTION GRADE (G/A/P) 1947

GEOPHYSICIST : C. A. Roberton

G285-6

PLATE 7

CAMBERWELL

S ← → N

DATUM = S.L

51 52 34A 53

ELEVATION IN FEET ABOVE DATUM

300 200 100 0

1000
2000
3000
4000
5000
6000
7000
8000
9000
10 000
11 000
12 000
13000
14 000
15 000

DEPTH IN FEET

467 RP 464 RP 456 459 RP 460 FP 465
504 RP 489 RP 485 488 PP 487 FP 489
478 RP 489
503 PP 518 RP 543
534 PP 546 RP 572
564 PP 574
593 PP 605
623 RP 635 RP 670
567 PP 560 PP 552 551 RP 548
601 FP 587 FF 579 583 FF 579 PP 580
610 PP 612 RP 609

NO REFLECTIONS

911 PP 900 904 PP 892 RP 888
928 PP 918 RP 914
953 PP 942
913 PP 934
940 FP 968
972 PP 998
1028 PP 1025
1062 RP 1050
1138 RP 1124
1170 RP 1155
1430 RP 1420
1469 PP 1466

PRELIMINARY CORRELATION SECTION

TRAVERSE "F" (CROSS TRAVERSE THROUGH S.P. 34)

HORIZONTAL AND VERTICAL SCALE IN FEET

1000 0 1000 2000 3000

GEOPHYSICIST: C. S. Robertson

LEGEND

GOOD, FAIR, POOR } REFLECTION ACCURACY

UNCERTAIN REFLECTION

1234 ← REFLECTION TIME CORRECTED TO DATUM

RP ← REFLECTION GRADE (GABY 1947)

1247

G285-7