DEPARTMENT OF
MINERALS AND ENERGY

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

Record 1973/84

GRAVITY SURVEYS IN THE TRARALGON SOUTH AREA, GIPPSLAND, VICTORIA, 1949-1959

by

F.J.G. Neumann and G.F. Lonsdale

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PLATES

FOREWORD

The Bouguer anomaly maps in this Record are contoured at closer spacing than is strictly justified by the gravity measurements, and are thus somewhat subjective. It is not BMR policy to prepare contour maps in this way, but this report was written many years ago and is issued now to place the findings of the survey on record.

SUMMARY

Gravity surveys by the Bureau of Mineral Resources, Geology and Geophysics in the Traralgon South area, Gippsland, Victoria since 1949 are described.

The object of these surveys was to assist in the assessment of the geological structure of coal measures in the area east and west of Traralgon Creek Valley.

The results of the surveys reveal a variety of gravity anomalies.

The relation between gravity Bouguer anomaly and the structural development is discussed.

1. INTRODUCTION

Geophysical surveys have been carried out by the Bureau of Mineral Resources, Geology & Geophysics (BMR) in the Latrobe Valley of Gippsland, Victoria, since 1943, initially using electrical resistivity methods (Thyer, 1944).

Gravity readings have been made in the Traralgon South area, from 1949 to 1959 by the following observers:

Year of Survey	Observer
1949	K. Holywell
1950	S. Waterlander
1951 to 1955	F.J.G. Neumann
1958	K. Lodwick
1959	B.C. Barlow

These surveys were conducted at the request of the State Electricity Commission of Victoria for the purpose of aiding the determination of structure of coal measures. The SEC co-operated in the gravity surveys by carrying out all topographic surveying.

A four-mile plan of gravity Bouguer anomalies in the east-central Gippsland region is shown in Plate 2, but some of the data outside the Traralgon South area postdates 1959.

In order to select the most economic sites for future power generating plants, information regarding the geological structure in which the coal occurs is vital and to this end gravity surveys make a valuable contribution. Naturally other factors are also important, as for instance, the quality of the coal, for combustion and briquetting, the average ash, water, and salt content of the coal, the ratio of coal thickness to overburden thickness, and also the total thickness and the composition of the overburden overlying the coal beds.

Test drilling has established that Bouguer anomaly contours indicate the trends of the geological structure of the coal seams very accurately.

The area covered by the gravity surveys described in this report extends from one-and-a-half miles north to four-and-a-quarter miles south of Traralgon South settlement, and from six miles west to four-and-a-half miles east of this settlement (Plate 3).

2. TOPOGRAPHY, GEOLOGY, AND STRUCTURE

Gravity station elevations shown in Plate 3 show an increase in altitude from an average of 200 ft in the lowlands of Traralgon Creek valley in the north of the map to more than 500 ft in the timbered hills north of Shingle Creek in the east central part of the map. Farther south the surface continues to rise fairly steeply to altitudes ranging from 700 to 900 ft near the southern margin of the map.

Two major topographic features are the valleys of Traralgon Creek and Flynns Creek both of which follow a northerly course across the map area, with steep and narrow valleys in the south becoming broader to the north.

This map shows Tertiary terrestrial sediments developed on the northern limb of a major dome of Jurassic rocks (Edwards, 1942), which crop out over larger areas of the Strzelecki Ranges (South Gippsland Hills).

Plate 4 shows an approximate north-south geological cross-section across the Traralgon South area which would be consistent with the gravity data.

The rocks which form the "commercial" basement beneath the Brown Coal Measures are composed of Narracan Volcanics of early Tertiary age and/or Jurassic continental arkosic sandstone. The lateral extent of the volcanic group is unknown. However, in the Darriman and Woodside bores near the Gippsland coast farther southeast the Lower Narracan Group is 500 to 600 ft thick, mainly composed of basalt and tuff. Outcrops of basalt occur north of Shingle Creek and in the valley of Flynns Creek. Basalt is also known from an area east of Traralgon Creek between gravity stations 16 and 3117 and between gravity stations 21 and 444 west of Traralgon Creek.

The geological sequences of Tertiary and younger strata in the western portion of Latrobe valley mainly after Thomas (1953) is shown in Table 1.

There is considerable variation in the development of the coal seams in relation to the age of the coal, to local structure, and to tectonic events which occurred after the end of the coal deposition period. The maximum aggregate thickness of the coal contained in the Latrobe Valley Coal Measures exceeds 1500 ft. In general Gippsland

TABLE 1: STRATIGRAPHIC SEQUENCE OF TERTIARY AND YOUNGER BEDS IN THE LATROBE VALLEY

FORMATION	GROUP	STRATIGRAPHIC CORRELATION
Alluvium	-	Gravel, sand, silty clay, silt.
Haunted Hills Gravels	-	Gravel, sand.
Latrobe Valley Coal Measures	Yallourn Group	Yallourn Seam, Yallourn Clay
	Morwell Group	Morwell No. 1 Seam Morwell Clay Morwell No. 2 Seam
	Yinnar Group	Clay with interbedded coal
	Lower Narracan Group	Thorpdale Volcanics (Older Basalt of Victoria), interbedded clay and coal - - - - - - - - - - - Sub-basaltic conglomerate, clay and sand.

brown coal is soft, has a high water content and is suitable only for local power generation and briquetting. However, hard brown coal of better quality and lower water content is also found. This coal is mainly contained in the Latrobe Seam, which is stratigraphically below the seams of soft coal.

This Latrobe Seam has for some time been known to occur at shallow depth in the northern fringe of the main coal basin north of Latrobe River where it has been mined in the Yallourn-North open cut since 1889. It occurs on a steeply dipping monocline. This monocline fold is associated with a narrow zone of strong gravity gradients trending northeast and east. Subsequent drilling along this trend proved the extension of the Latrobe Seam, varying in thickness and steepness, over a distance of at least nine miles.

More recent drilling has shown that another seam of hard brown coal exists at depth under soft coal seams of the upper portion of the coal measures in the Yallourn Syncline (Gloe, 1960). Hard coal some 100 ft thick was entered at 610 ft in Bore L.Y. 998 southeast of Traralgon near the centre of a local gravity 'high'. This 'high' is indicative of doming in the coal beds.

The likely existence of hard coal over large areas of the Gippsland Coal Basin emphasises the importance of elevated structure, where hard coal can be expected to occur in a high tectonic position suitable for open-cut mining.

The structural setting of the southern margin of the Latrobe valley differs distinctly from that which prevails along the northern fringe of the coal basin. Plate 1 shows as the main structure east of the Traralgon South area the Rosedale Fault. It is clearly shown by the Bouguer anomaly contours. This fault causes a throw in the coal measures of more than 2000 ft down to the north-west and north. The gravity anomaly extends from Traralgon Creek with northeasterly and easterly trend over a distance of more than 35 miles into the area southwest of Lake Wellington in east Gippsland.

To the south of the Rosedale Fault is the Baragwanath Anticline with a distinct gravity expression (Neumann, 1960).

From the west a huge monocline, the Carrajung Monocline (Thomas, 1953), extends into the area west of the Traralgon Creek valley. This monocline occurs in the Jurassic sediments and bounds the southern margin of the Latrobe Syncline of thick Tertiary and younger beds.

The structural relation between the Carrajung Monocline and the Traralgon Syncline, which forms a major portion of the Latrobe Syncline, was recently investigated by a seismic survey (Lodwick and Moss, 1959). The relation is complicated by the occurrence of faults including the Traralgon Creek Fault, which is almost at right angles to the trend of the Carrajung Monocline.

The geological structure east of Traralgon Creek valley is even more complex. Features include a major dome or platform bounded by monoclines southeast of Traralgon and northwest of the Rosedale Fault; a minor fault more or less coinciding with Shingle Creek and branching off westerly from the southwestern end of the Rosedale Fault; a major trough immediately north of the Rosedale Fault in the Melton Park area; and a smaller sunken area immediately east of Traralgon South settlement.

3. FIELD WORK

The Bouguer anomaly contour plan (Plate 3) incorporates all the work done in the map area up to 1959, listed in Table 2.

TABLE 2: BMR GRAVITY SURVEYS IN THE TRARALGON SOUTH AREA

Year of survey	Area surveyed/ Type of survey	Instrument Used	No. of stations shown in Plate 3
1949 to 1950	Morwell to Traralgon Reconnaissance	Western No. 29	61
1951	Rosedale-Southwest, Reconnaissance	Western No. 29	2
1953	Melton Park Area, Detailed Survey	Atlas No. F21	54
1953	South Gippsland Hills Reconnaissance	Heiland No. 53	5
1955	Fernbank Area, Detailed Survey	Heiland No. 53 & Worden No. 61	703
1958	Bennett's Creek. Semi-detailed Survey	Worden No. 61	66
1959	Traralgon South. Semi-detailed survey	Worden No. 140	111
		Total:	1002

The gravity surveys during the period from 1949 up to 1951 and the survey conducted during 1953 in the area of the South Gippsland Hills were essentially reconnaissance; traverses followed major roads, and stations were placed approximately at half-mile intervals. Stations for the 1953 and 1955 Melton Park and Fernbank detailed surveys were placed on a regular grid of 330 foot interval.

During the 1958 Bennetts Creek survey, stations were mainly read along seismic traverses at ten and twenty chain intervals. During the 1959 Traralgon South semi-detailed survey, stations were occupied along bush tracks and between earlier stations on roads to give an average interval of a quarter-mile.

In all, the data obtained from more than one thousand stations have been used for the preparation of Plate 3.

4. DISCUSSION OF RESULTS

In the southwestern portion of Plate 3 the overall Bouguer anomaly pattern is one of northeast-running contours with Bouguer values becoming more positive to the south at an average gradient of seven milligals per mile. A regular east-northeast trend is mainly expressed by the parallel zero to +5 milligal lines. The -5 milligal contour is somewhat wavy as it changes course frequently from northeast to east.

In the north the -10 to -13 contours initially trend more or less easterly, but this trend changes abruptly between stations 493 and 495 to a northeast one. Eastward these contours become more closely spaced.

East of Traralgon Creek several closed anomaly features occur. These are:

North of Shingle Creek is an elongated 'high', the 'Shingle Creek Gravity High', which is apparently closed by the +7 milligal contour. Further work is necessary to define this 'high'.

To the north of the 'Shingle Creek Gravity high' the easterly trend of the gravity contours predominates, but in the Fernbank area is another 'high', the 'Fernbank Gravity high', in the -3 to zero milligal contours. This 'high' includes an east-elongated ridge-like feature delineated by the -1 and zero milligal contours, and a broader extension southeast expressed in the -2 and -3 milligal contours.

To the southwest the 'Fernbank Gravity High' is adjacent to a 'low' of approximately two milligals closure immediately east of Traralgon South settlement.

To the east of the Fernbank Gravity High the trend is to the northeast with a low developing along Flynns Creek valley. This feature widens considerably beyond the map area to the northeast and is associated with the zone of strong gravity gradients caused by the Rosedale Fault.

Thus the Fernbank Gravity High is terminated both to the east and west by northeast-trending contours with steeper gradients between -5 and -10 milligals. To the north of the Fernbank Gravity High there is a more gentle gravity gradient with a pronounced easterly trend in the contours.

A somewhat unusual feature occurs in the middle of the map south of station LY 115, where a southerly trend is shown in the contour pattern. This trend appears to extend beyond the map area (Plate 3) into a prominent feature that roughly follows the course of Traralgon Creek in the South Gippsland Hills (Plate 2). More gravity work is required for reliable definition of this feature.

5. INTERPRETATION

Interpretation principles

Basically Bouguer anomalies are caused by variations in the densities of the rocks. A qualitative geological interpretation of the gravity pattern is normally attempted by way of correlating gravity contour trends, gradients and closed features with known geological data. Where adequate geological information is available, as for instance on cross-sections controlled by drilling, it is possible to establish a relation between gravity anomaly and the relative thicknesses of the beds, variations of thickness caused by faulting, the dipping of the strata, and the densities of the rocks which occur along any section line. By a reverse process it is then possible to use this information to interpret the geophysical-geological relationship in areas where no drilling has been performed.

In the western portion of the Latrobe Valley Syncline Neumann (1951) has shown that the major part of local gravity variations can be explained by contrast in density between the brown coal beds and the underlying 'commercial basement', composed of Jurassic sandstone and/or Tertiary basalt. The same principle is used here, and a comparison between Bouguer anomaly values and drilling results suggests a density contrast of 0.8 to 1.0 g/cm^3. The value 0.8 has been used to construct the cross-section shown in Plate 4.

Rock densities

Rock density data has been obtained from several sources including direct measurements on samples, field gravity measurements over topographic features and bulk values estimated from tonnages shifted in open cut mining operations. Table 3 shows a series of values.

TABLE 3: ROCK DENSITIES IN THE LATROBE VALLEY

No.	Type	Age	Mean density (g/cm^3)
1	Sandstone and gravel composing the over-burden above coal measures.	Quaternary and older	1.87
2	Brown coal obtained from various seams of soft coal.	Tertiary	1.10
3.	Limestone, fossiliferous, polyzoal.	Tertiary (Miocene)	2.19
4.	As above, specimens obtained from relatively porous bands.	As above	1.74
5.	Basalt "Older" basalt of Victoria.	Tertiary (Lower Eocene)	2.70
6.	Basalt, vesicular.	As above	2.29
7.	Sandstone, arkosic.	Jurassic	2.42
8.	Sandstone, quartzitic.	Palaeozoic	2.63
9.	Shale, metamorphic.	As above	2.55
10.	Granite	As above	2.64

Cross-section analysis

Cross-section X-X was chosen in order to further interpret the results of the gravity investigation in relation to geology. This section is shown in Plate 4 and the horizontal projection of the section-line appears in Plate 3. The probable densities of the layers which occur in the section were accepted as 2.5 for the basement and 1.7 for the coal measure beds giving a density contrast of 0.8 g/cm^3. The probable depth to the basement was computed from the Bouguer anomaly data and this has been plotted together with the bores and the formation outcrops.

Depths to basement have been estimated by the plate formula

$$g' = 12.77 \times d' \times h$$

where g' = Bouguer anomaly effect of the upper layer, in mGal.

d' = density contrast, and

h = thickness in kilofeet of upper layer.

The calculated basement profile shows a dip of approximately five degrees to the north. The thickness of nearly 600 ft shown for the Narracan Volcanics, is an estimate derived from the thickness of these rocks encountered in the Darriman and Woodside bores.

The maximum indicated thickness of the coal measures is approximately 1800 ft at the south end near bore No. 49. The results obtained from reflection seismic work to the west in the Bennetts Creek area indicate a similar, though perhaps slightly larger, thickness of these beds (Lodwick & Moss, 1959).

Geological interpretation

The gravity pattern clearly indicates that the geological setting west of Traralgon Creek Valley is different from that to the east. West of Traralgon Creek a general monoclinal downwarping to the north is suggested from the uniform gravity gradient. East of Traralgon Creek this monocline is replaced by a series of local features as far as Flynns Creek, beyond which the sharp gravity gradient indicates the presence of the Rosedale Fault.

The distinct contrast between gravity features east and west of Traralgon Creek is indicative of a major structure following the line of the Creek. This structure probably is a fault but there is insufficient gravity evidence to comment further.

The general decrease in Bouguer anomaly values northwards across the area shown in Plate 3 correlates with a thickening of the lower-density coal measures in the same direction towards the more central and deeper portions of the Latrobe Valley Basin. However, there are variations in the general anomaly pattern which indicate local structures superimposed on the general monoclinal feature. A distinct northeasterly trend occurs, for instance, over a distance of approximately three miles in the -3 to -7 mGal contours northeast of Bennetts Creek.

This trend can be related to seismic reflection results in this area (Lodwick & Moss, 1959). At a depth of 1000 to 2000 ft minor breaks occur in the reflector under shot-points 5 to 10½. These breaks most likely indicate faulting in the upper beds, possibly developed as a system of minor step-faults, and the gravity results would suggest that this system trends northeast.

A local bulging in the gravity contours is centred on Bore No. 56 at the northwest end of the seismic line. Under this area seismic results show a flattening of the reflectors at a depth from 1800 to 2300 ft. It is likely that some doming in the coal beds and in the basement occurs under this anomaly.

East of this suggested dome and as far east as the section-line X-X, the gravity trend becomes more uniform and more easterly for some two-and-a-half miles. This trend is expressed, for instance, between the -1 and -12 milligal lines, indicating a corresponding easterly strike in the Tertiary strata.

In the X-X section a dip of five degrees north was derived from gravity data for the surface of the basement with no apparent faulting of the beds. East of the X-X line the trend of the gravity contours is distinctly northeasterly indicating northeasterly strike in the coal beds immediately west of Traralgon Creek valley.

In the southwestern portion near the southern margin of the gravity map (Plate 3) somewhat wavy gravity contours, for instance the +8 to +12 milligal lines, occur on or near basalt outcrops and consequently are interpreted as the expression of Narracan Volcanics either in outcrops or at shallow depth.

East of Traralgon Creek and west of Flynns Creek two gravity 'highs' - a lobe-like anomaly in the south between stations 15, 16, 3117, and 3118 and the probably closed gravity 'high' north of Shingle Creek - are also caused by basalt underlain by Jurassic rocks under a relatively thin cover of more recent sediments.

A major structure is indicated by the 'Fernbank High'. On the four-mile gravity contour plan of East-Central Gippsland (Plate 2) this anomaly is descernible as a separate feature northwest of the prominent zone of relatively strong gravity gradients, which in the area south of Longford correlates with the position of the Rosedale Fault as established by drilling.

The earlier geological conception (Thomas, 1953) was that of the Rosedale Fault extending westerly from Rosedale into the Traralgon Monocline immediately southeast of Traralgon. However, gravity data show that the Rosedale Fault terminates to the north and northwest of the tilted block of the Baragwanath Anticline areas; the exact position of this fault is marked beyond doubt by a uniform zone of extremely strong gradients. This zone runs westerly to a point a few miles west of Rosedale, where it bends to a southwesterly direction. Strong gravity gradients indicate the Rosedale Fault running southwesterly over a distance of approximately twenty miles into the area between Flynns Creek and Traralgon Creek, where it gradually dies away.

With the fixation of the Rosedale Fault, the nature of the structure indicated on the gravity map by the Fernbank Gravity High must be reassessed. The Fernbank High is regarded, in view of its parallel eastern and western gravity contour boundaries and the northerly displacement of the gravity contours around its northern margin, as being produced by a high-standing block between parallel sided faults or steep monoclines, forming a platform-like extension into the Latrobe River Basin.

The gravity "low" southwest of the Fernbank High is indicative of a thickening of lower density beds, forming a local basin east of Traralgon South settlement. The basement appears to deepen to the west, the western margin rising fairly steeply immediately east of the settlement whilst the eastern margin rises more slowly towards the line of Flynns Creek. It seems probable that this basin was formed as a result of relative movement of the Fernbank Block, and that the deepening of the basin to the west is due to movement having been greater along the westerly fault than along the easterly one. Bores drilled by the State Electricity Commission encountered thick coal measures in this local basin, indicating that the movement of the Fernbank Block occurred most probably in the early part of the Tertiary period.

The strong gravity gradients in the southeastern portion of the map area (Plate 3), caused by the Rosedale Fault, decrease in intensity at the line of Flynns Creek. It seems, therefore, that the Rosedale Fault ceases to be a major feature here, but it probably bifurcates, one branch following the line of Shingle Creek and the other passing south of the local basin east of Traralgon South.

6. CONCLUSIONS AND RECOMMENDATIONS

Gravity contour trends, variations in the gravity gradients, and gravity anomaly closures show the primary structure of the area, particularly the exact position of the Rosedale Fault, and form a valuable supplement to the data available from drilling.

Detailed gravity investigations in the Bennetts Creek area provide a sensitive method locating local diversities in the general structure, for instance doming and faulting in the coal beds.

The gravity contour pattern as a whole shows the western part of the area investigated to be essentially a huge monocline flanking the South Gippsland Dome. The eastern portion of the surveyed area is a transition area between zones dominated by the Rosedale Fault and the huge monocline in the west. This transition is accompanied by typical structural development, including several minor faults branching off from the Rosedale Faults, and platform-type tectonics south of Traralgon.

If justified by commercial interests, it is recommended that a more adequate gravity coverage should be made of the area south of the Fernbank Detailed Survey in order to delineate more accurately the position of the Shingle Creek Fault. Beyond the southern margin of the area covered by this report the gravity expression of the suggested Traralgon Creek Fault should be further investigated as a major geological feature extending south into the hilly area of the South Gippsland Dome.

7. REFERENCES

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AUSTRALIA 1:253,440

WARRAGUL

VICTORIA

PLATE I

J 55/10-11 ZONE 7

GRAVITY SURVEYS (1949 - 1959)

TRARALGON SOUTH, VIC.

GEOLOGY AND MAJOR TECTONICS

SCALE IN MILES

GEOPHYSICIST: G. Neumann

DATE: 8-8-1960

MAP DATA

PROJECTION: Transverse Mercator, Australian Series.

DETAIL: Planimetry from Royal Australian Survey Corps Warragul 4 miles to 1 inch map

Geology from geological map of Victoria by Department of Mines, Victoria, 1955 and geological and topographical plan of part of South Gippsland by H. HERMAN, 1952.

Geophysical (gravity and seismic) information on structural features by B.M.R. surveys 1948-1956.

DROUIN — Royal Australian Survey Cps. 1 mile to 1 inch map.

G93-46 FOSTER — Previously published B.M.R. Bouguer anomaly 1 mile to 1 inch map

TO ACCOMPANY RECORD NO. 1973/84

G93-69

PLATE 2

GRAVITY MAP OF BOUGUER ANOMALIES

EAST CENTRAL GIPPSLAND, VICTORIA.

GEOPHYSICIST DATE

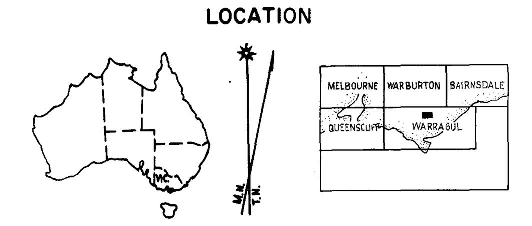
REVISED
MARCH 1959, JULY 1960, AUGUST 1962

TO ACCOMPANY RECORD NO. 1973/84

G93-38

PLATE 3

LOCATION



REFERENCE TO AUSTRALIAN NATIONAL 4 MILE MAP SERIES

FEBRUARY 1960

MAP DATA

CONTROL: *STATE ELECTRICITY COMMISSION OF VICTORIA FIELD SURVEYS*

DETAIL: *PLANIMETRY FROM S.E.C. OF VIC. DRAWING Nº B.C.I. 5-4-9*
GEOPHYSICAL DATA FROM B.M.R. SURVEY
GRID - S.E.C. ARBITRARY DATUM (10,000 FEET SQUARES)

RELIABILITY: *PLANIMETRIC - ACCURATE*
GEOPHYSICAL - SEMI DETAILED GRAVITY

TRARALGON SOUTH AREA AND VICINITY, GIPPSLAND, VIC.
B.M.R. GRAVITY SURVEYS (1949-1959)
BOUGUER ANOMALIES

SCALE IN MILES

¼ 0 ¼ ½ ¾ 1 1¼

CONTOUR INTERVAL 1 MILLIGAL

LEGEND

TOPOGRAPHY	GRAVITY	
ROAD	○	GRAVITY STATION (1949-1958)
TRACK	●	GRAVITY STATION (1959)
WATERCOURSE	•	DETAILED GRAVITY SURVEYS (1953 AND 1955)
△ TRIG. STATION	-7.5	RELATIVE BOUGUER ANOMALY (MILLIGALS)
▵ SURVEY MARK	345′	ELEVATION
✦ BORE (POSITIONS OF BORES APPROXIMATELY SHOWN)	-5 / -1	ISOGALS
		HIGH ANOMALY
		LOW ANOMALY

EXPLANATION

RELATIVE BOUGUER ANOMALIES ARE BASED ON THE OBSERVED GRAVITY VALUE OF 980,021·2 MILLIGALS AT B.M.R. PENDULUM STATION Nº 2, YARRAM, VIC.

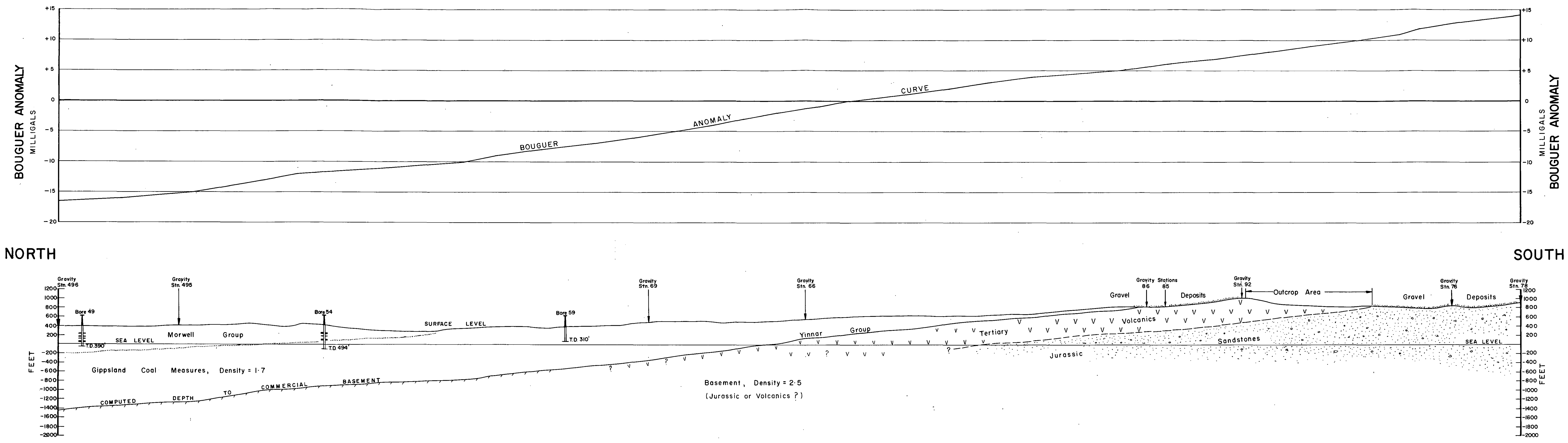
FOR THE CALCULATION OF BOUGUER ANOMALIES 1·9 GR/CM³ HAS BEEN ADOPTED AS AN AVERAGE ROCK DENSITY.

TO CONVERT TO BOUGUER ANOMALIES RELATIVE TO THEORETICAL VALUES ON INTERNATIONAL ELLIPSOID (DENSITY 2.67) SUBSTRACT FROM VALUES SHOWN 5·5 + 0·01 · h MILLIGALS WHERE 'h' IS THE STATION ALTITUDE IN FEET ABOVE SEA LEVEL.

TO ACCOMPANY RECORD NO. 1973/84

G39-71

PLATE 4



GEOPHYSICIST

Date: 20-7-60

TRARALGON SOUTH AREA, GIPPSLAND, VIC.

CROSS-SECTION X-X

BASEMENT DEPTH CALCULATED FROM BOUGUER ANOMALY

HORIZONTAL AND VERTICAL SCALE : 4 INCHES = 1 MILE

For further reference see G 39-71

TO ACCOMPANY RECORD NO. 1973/84

G 39-72