COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD No. 1967/11

REGIONAL GRAVITY SURVEYS,

EASTERN VICTORIA 1961 AND 1964

by

J.R.H. van Son and W.J. LANGRON

RECORD No. 1967/11

REGIONAL GRAVITY SURVEYS,

EASTERN VICTORIA 1961 AND 1964

by

J.R.H. van Son and W.J. LANGRON

CONTENTS

ILLUSTRATIONS

SUMMARY

The main feature of the Bouguer anomaly contours, drawn from the results of regional gravity traverses surveyed in Eastern Victoria during 1961 and 1964, is the presence of an intense 'low' in the central part of the area. The eastern portion of this 'low' has a trend direction similar to that of the Tasman Geosyncline. In its western portion the axis of this 'low' strikes westerly, and it is suggested that it is related to crustal warping associated with sedimentation in the Gippsland Basin.

The more intense negative Bouguer anomaly values are in general associated with topographic 'highs', though there is reason to suspect that significant deviations from a close relationship do occur.

In general, free-air anomalies are positive and of high values over the more elevated areas. However, there is one zone where negative free-air anomalies are associated with an area of fairly high topography.

Other, minor, gravity closures and features are discussed. Two small 'lows' are associated with granite outcrops and one 'high' is located over a ridge containing metamorphic rocks. As the latter gravity 'high' is also associated with granite, the possibility exists that there are granites of at least two types in the area under study.

1. INTRODUCTION

By the end of 1960, regional gravity coverage of Victoria had extended over most of the central and western portion of the State. However, little gravity work had been done in eastern and north-eastern Victoria, mainly because of the generally rough terrain there and also because of the lack of elevation data along most of the tracks which cross the Alpine region.

In the area considered here (Plate 2) the gravity work prior to 1961 consisted of regional traverses in connection with the Eastern Australian Calibration Line (Flavelle, 1966), other regional traverses by Williams, Gunson, and Goodspeed (unpublished data), a gravity tie to the Kiewa power station (Langron, 1964), and a considerable amount of detailed gravity work in Gippsland (Neumann, in prep.). The latter account also includes the results of subsidised and other gravity surveys made by private companies. Underwater and land gravity surveys in the Port Phillip Bay area are discussed by Gunson and Williams (1965). Waterlander (unpublished data) made underwater gravity measurements in the Corner Inlet area.

In 1961, regional gravity work was done in the area by Lonsdale (unpublished data). This work was an attempt primarily to obtain some coverage along tracks in the Alpine region. At the same time he was to clear up some discrepancies in the existing network and in particular to complete several ties between various detailed surveys in the Gippsland area so that these could be integrated. In 1964, van Son (unpublished data) aimed to complete the programme commenced by Lonsdale. These programmes had to be carried out during the January-March period for reasons of accessibility. However, at this time of year, there is always the danger of bushfires in the area and Lonsdale's programme was, in fact, held up because of this.

This Record is concerned in particular with the results of the work done by Lonsdale (for work other than that carried out in Gippsland) and van Son. Gravity values along other regional traverses have been included in the individual map areas as a basis for the contours in Plate 2. No results from detailed gravity surveys are included. Details of Lonsdale's Gippsland ties will be included in the report by Neumann (in prep.).

The report is not primarily interpretative, although a few comments concerning the correlation between the gravity results and structural geology are offered; the primary concern is to place on record the results of the regional gravity surveys.

2. GEOLOGY

The geology and physiography of the area will not be discussed in detail here; reference should be made to David (1950) and Hills (1940). Thomas (1959), in an article dealing with the geological structure of Victoria, includes a copious list of references to the geology of several localities within the area.

The area lies mainly within the Eastern Highlands and Southern Lowlands regions as defined by David. The Highlands contain remnants and reduced residuals of granite elevated in places to over 6000 ft. Elsewhere the broad belt of high country is composed largely of resistant Devonian and Carboniferous rocks, but the geological terrain also consists of steeply folded Silurian and Ordovician slates eroded into sharp-crested ridges. The Miocene peneplain, now greatly dissected, was developed over much of the highland area. There is evidence of numerous basalt and acid lava flows throughout this region.

The Southern Uplands and Southern Lowlands regions mainly lie in southern Gippsland, which is not considered in this report. The East Gippsland Plains, mostly less than 300 ft above sea level, constitute in part a sunkland bounded in the north and south by heavy faults against the highlands and intersected by numbers of minor faults, and in the east form coastal plains faulted against the Southern Uplands.

The northern boundary of the Mesozoic and Tertiary rocks has a westerly strike and lies mainly within the Gippsland area.

The region has been subject to several periods of uplift and orogeny during its geological history. Reference to the Tectonic Map of Australia (BMR, 1962) indicates that in this southern portion of the Tasman Geosyncline there are two principal fault systems, one broadly trending north and the other north-east to east. The question then arises as to whether this region is isostatically compensated. From a limited number of gravity measurements in and around the Snowy Mountains area of southern New South Wales, Marshall and Narain (1954) conclude that there is little evidence for any apparent isostatic compensation in the form of a 'root' for the Kosciusko mass. We may infer a similar conclusion for the Alpine region contained in the present area.

3. TECHNICAL DETAILS

Scope of the work

The traverses read by Lonsdale are located along the following roads:

Monbulk - Lilydale - Healesville - St Fillans - Alexandria - Seymour.
Warburton - St Fillans, via the Acheron Way.
Alexandria - Mansfield - Jamieson - Woods Point.
Mansfield - Mount Bullen.
Alexandria - Eildon - Jamieson.
Wangaratta - Yarrowonga - Cobram.
Wangaratta - Bright - Hotham Heights - Omeo - Mitta Mitta - Tallangatta.
Tallangatta - Corryong - Granya - Albury - Wodonga - Tallangatta.
Corryong - Sassafras Gap - Omeo - Bruthen - Bairnsdale.
Stratford - Dargo - Hotham Heights.
Bombala - Eden - Genoa - Cann River.
Heyfield - Licola.

In addition, ties were made to existing gravity stations at Monbulk, Warburton, Woods Point, Seymour, Wangaratta, Cobram, Albury, Wodonga, Cann River, Bairnsdale, Stratford, and Heyfield. BMR pendulum station No.3. at Bombala was also reoccupied.

Traverses read by van Son are located along the following roads:

Buxton - Cumberland Junction - Eildon.
Wodonga - Mount Beauty - Bright - Fall's Creek - Bairnsdale - Bairnsdale Airport.
Nowa Nowa - Buchan - Bonang - Bombala.
Genoa - Mallacoota - Mallacoota Airport.

Again, BMR pendulum station No.3 at Bombala was occupied during the survey.

All other traverses shown in Plate 2 were read during earlier surveys and will not be detailed here.

Survey procedures

The logistics for Lonsdale's and van Son's surveys are given in Appendices A and B, respectively.

Lonsdale used a Worden gravity meter (Serial No.140, calibration factor = 0.1110mgal/div). He used a looping procedure of the form A-B-C-A-C-D-E-C-E-F ... to obtain strict control of the gravity meter drift. Gravity stations were read at intervals of 4 to 5 miles along the traverses listed earlier. In the alpine region, however, it was often necessary to position stations at smaller intervals owing to rapid changes in the observed gravity values due to sharp elevation changes.

Two Askania microbarometers were used to determine the elevation of each station using the looping procedure noted above. For control purposes points of known elevation were used where possible. The usual method of operation was for one instrument to be read at intervals of ten minutes at the initial stages of the loop whilst the second instrument was used at stations around the loop. On returning to the initial station the field instrument was read again. In this way the sum pressure variation during the course of the loop and the drift of the field instrument could be allowed for on the assumption that a similar pattern of pressure variation existed at the base and field stations. In mountainous contry this assumption is perhaps suspect.

Where possible, new gravity stations were selected at railway stations, railway crossings, and bench-marks of the Victorian Department of Lands and Surveys. These stations therefore possess accurate values for elevations and can be plotted accurately on a map. For many stations elevations could be obtained only be barometric means. In addition, the latitudes and longitudes of most of these stations, although pricked on air photos, cannot be determined accurately because of the absence of accurate base maps over much of the area.

Van Son used a La Coste and Romberg gravity meter (Serial No.G20; calibration factor table as supplied by the maker) and a similar looping procedure to that used by Lonsdale except that with this gravity meter, loops could be of up to two hours' duration. Here most stations were located at railway features or road survey bench-marks, where elevations are known accurately. Elevations of the remaining stations were determined by means of microbarometers using a technique similar to that used by Lonsdale. Again, because of the lack of accurate base maps for most of the area, the true locations of many stations are in doubt.

Reduction of data

The values for gravity stations along all traverses shown in Plate 2 have been based on the 1957 adjusted values for the BMR pendulum stations. In particular the work discussed in this report is based on:

Melbourne (N.G.B.S.) : G_{obs} = 979,979.0 mgal.

Bombala (P.S.3) : G_{obs} = 979,744.1 mgal.

Several stations have been reoccupied during the course of the Isogal survey (Barlow, in preparation), and Table 1 shows the comparison between the 'May 1965 Isogal' values and values used in this report.

TABLE 1

Station	Gravity values in mgals		
	Lonsdale value	van Son value	Isogal value
6491.9006 (Mallacoota A/S)	--	979,997.91	979,998.71
6491.9005 (Bairnsdale A/S)	--	979,982.71	979,982.62
55099.9903 (Bombala P.S.)	979.744.1	979,744.64*	979,744.7**

* Value obtained by van Son in 1966 (van Son, 1966)
** An adjusted value of Dooley (1965). The proposed Isogal station at Bombala has not been read as yet.

All data have been calculated by hand and no attempt has been made to distribute loop misclosures. When the remaining Isogal traverse through Victoria is completed all data from this area will be processed by computer and a least-squares adjustment of results will be incorporated.

The calibration factor of the gravity meter used by Lonsdale is based on the accepted gravity interval of the Melbourne Calibration Range as at April, 1961. Calibration of gravity meters used in earlier work were based on the original range between Brennock Park and Kallista. The relation between the Melbourne Calibration Range and the Brennock Park - Kallista Range has been established (Barlow, 1965). However, the discrepancies in calibration factors between the quartz gravity meters used for the various surveys and the La Coste and Romberg meter G20 have not been fully investigated; this will be done when all the data are reprocessed by computer.

4. DISCUSSION OF RESULTS

Reference to Table 1 indicates that the corrections to be applied to the gravity values used in this report to bring them into agreement with values of stations in the Isogal network are less than 1 milligal. It may be assumed therefore that there will be no significant difference on the scale of Plate 2 between the gravity pattern presented in this report and that obtained using final (computer) values.

All of the gravity stations have been plotted on to 1:250,000 graticules. The Bouguer anomaly contour plan (Plate 2) has been compiled from the individual sheet areas and the following discussion relates to this plate.

With only a few exceptions all stations have negative Bouguer anomaly values. The lowest value is - 74 milligals for a station near Sassafras Gap on the Omeo-Corryong Road.

The most striking feature of the Bouguer anomaly contours is the presence of an elongated gravity 'low' trending approximately east to north-east from Mount Buller through Hotham Heights to Sassafras Gap. Thereafter, the trend of this feature is more north-easterly to north and there is a suggestion that after narrowing in the vicinity of Hotham Heights it broadens out (and may develop into a more intense 'low') in the region of the Snowy Mountains. In the main, the axis of this gravity 'low' is closely associated with the line of maximum elevations in the area. There is, however, a strong suggestion that the axis of the gravity 'low' does not coincide with the main ridges of some of the mountain ranges, e.g. in the region east of Sassafras Gap the gravity axis appears to lie to the west of the main ridge of the Snowy Mountains. Again, in the region west of Hotham Heights the gravity axis appears to lie to the north of the main ridge of the Great Divide, in addition to which the strength of the gravity 'low' is decreasing and possibly bifurcating in this region.

One cannot be dogmatic about any correlation in detail between gravity results and topography until the two can be compared on accurate base maps. In summary it can be said that this gravity feature is in general closely associated with the main mountain mass, that the lowest Bouguer anomaly values are related to the highest portion of the Alpine region, and that in its western portion the feature broadens and ceases to be an entity over the region to the north-east of Melbourne where the topography is fairly gentle. One point must be mentioned, however; no terrain corrections have been applied to the gravity measurements. Langron (1964) has shown that for stations in the Kiewa Valley (where excellant topographic maps are available) terrain corrections in excess of 20 milligals are applicable. As there was often little choice in the location of stations in the Alpine sections of the present work, it is likely that the terrain corrections which should be applied to such stations will be considerable. However, there is little doubt that a fairly intense gravity 'low' does exist in association with the main mountain mass in the region under study.

Free-air anomalies have been calculated, but not plotted, for all stations. There appear to be two significant features in connection with the free-air values. Firstly, they are generally highly positive within the zone of highest topography and within the area immediately to the south of the main mountain mass. For example, free-air anomaly values for stations near Mount Buller, Hotham Heights, Christmas Creek, Sassafras Gap, and Spring Hill Junction are plus 110, 137, 100, 72, and 88 milligals, respectively. On the other hand there is a region lying towards the River Murray, and especially the area between Tallangatta and Corryong, in which free-air values are generally negative. For example stations near Corryong, Walwa, Wangaratta, and Seymour have free-air values of minus 38, 32, 19, and 13 milligals, respectively. It is not always true that the strongly negative free-air values are associated with low valley stations, as is indicated by the readings in the region of Corryong. Thus there is good reason to believe that associated with the negative Bouguer pattern under consideration, there exist two zones which perhaps may differ in isostatic compensation. It would appear that everywhere within the area considered in this report highly positive free-air anomalies are associated with above average topography (even for isolated groups of stations such as those about Walwa in the Tallangatta - Corryong region).

The generality of positive free-air anomalies suggests that much of the area considered in this report is not isostatically compensated. If the free-air values for all stations over the whole of the area are averaged, the average free-air value is about plus 20 milligals. To carry the analysis beyond this stage would require the examination of isostatio anomalies as indicated by Heiskanen and Vening Meinesz (1958). One could also plot Bouguer anomaly values against elevation (the method used by Marshall and Narain, 1954) to examine the presence of 'roots' in the main granite massess which are also associated with the Bouguer anomaly 'lows'. In order to carry out such treatments, accurately plotted stations and detailed topographic maps are essential; both these requirements are lacking at present.

The other feature of major importance is that the trend of the gravity contours is in general contrary to the regional strike of rocks within the Tasman Geosyncline. East of Sassafras Gap the axis of the gravity 'low' discussed above does appear to follow the trend of lineaments shown in Plate 1; to the west of this point, however, the axis trends approximately westerly. No explanation in terms of the surface geology can be offered; it is noted from Plate 1 that there is a dispersion in direction of major faulting in the general vicinity of Sassafras Gap. It is felt, however, that such westerly-trending faulting is related to the post-Permian deposition of sediments in the Gippsland and Otway Basins which has resulted in crustal warping and in turn given rise to the westerly-striking mountain chain.

Southward from this central negative zone the Bouguer anomaly contours tend to be parallel to the coast line. There is a general rise in Bouguer anomaly values towards the coast; this is as expected because of the rise in the Mohorovicic Discontinuity from the continent to the ocean. However, from what was said in the previous paragraph it is predicted that the Bouguer anomaly values rise more quickly and to higher positive values towards the east coast than they do towards the south coast.

Two small gravity 'lows', one east of Seymour and the other east of Wangaratta, are associated with outcrops of granite. Some other irregularities in the gravity contours are also no doubt due to granite, which is fairly widespread throughout the area.

The north-trending gravity 'high' between Wangaratta and Cobram is located over a ridge within the Oaklands Basin. Associated with this ridge are metamorphosed Ordovician rocks, which may be considered responsible for the higher gravity readings. The fact that granite is also present suggests that granites of at least two types are present within the area. Such a probability has been discussed by Skeats (1931) and has also been commented upon by Marshall and Narain (1954). It is possible that this ridge continues southward between Seymour and Alexandria towards Melbourne, maintaining a strike parallel to the axis of the Tasman Geosynclinal Zone.

5. RECOMMENDATIONS

For a thorough examination of the results it is essential that they be reduced by computer (this to include amendment to the 'May 1965 Isogal' values, application of loop adjustments, and incorporation of terrain corrections) and then plotted on to accurate base maps. Calculation of isostatic anomalies for 10 or so stations is also recommended.

Bouguer anomaly and free-air anomaly contour maps should be compared with accurate and sufficiently detailed topographic maps and if possible with geological maps of the individual 1:250,000 map areas. The gravity data should, of course, be integrated with gravity results from surrounding regions when this information becomes available.

The authors feel that a full analysis of the present gravity data will form a valuable contribution to the study of isostatic conditions in south-eastern Australia.

6. REFERENCES

BARLOW, B.C. 1965 Establishment of gravity meter calibration ranges in Australia 1960-61. Bur. Min. Resour. Aust. Rec. 1965/19.

BARLOW, B.C. - The Australian isogal survey, 1964. Bur. Min. Resour. Aust. Rec. (in preparation).

B.M.R. 1962 Geological notes in explanation of the Tectonic Map of Australia. Bur.Min.Resour.Aust.

DAVID T.W.E. (ed. BROWNE W.R.) 1950 THE GEOLOGY OF THE COMMONWEALTH OF AUSTRALIA. London, Arnold.

DOOLEY J.C. 1965 Australian gravity network adjustment, 1962. Bur. Min. Resour. Aust. Rep. 72.

FLAVELLE A.J. 1966 Eastern Australian gravity meter ties between pendulum stations, 1959-1960. Bur. Min. Resour. Aust. Rec. 1966/45.

GUNSON S. and WILLIAMS L.W. 1965 Gravity surveys of Port Phillip Bay and adjacent areas, Victoria 1957-58. Bur. Min. Resour. Aust. Rec. 1965/64.

HEISKANEN W.A. and VENING MEINESZ F.A. 1958 The earth and its gravity field. McGraw-Hill, New York Book Co.Inc.

HILLS E.S. 1940 THE PHYSIOGRAPHY OF VICTORIA. Melbourne, Whitcombe, & Tombs.

LANGRON W.J. 1964 Kiewa hydro-electric power scheme gravity measurements, Victoria 1956. Bur. Min. Resour. Aust. Rec. 1964/16.

MARSHALL C.E. and NARAIN H. 1954 Regional gravity investigations in the eastern and central Commonwealth. Uni. of Sydney, Department of Geology and Geophysics. Memoir 1954/2.

NEUMANN F.J.G. - Gravity anomalies correlated with tectonics, Gippsland Basin, Victoria, 1949-61. Bur. Min. Resour. Aust. Rec. (in preparation).

SKEATS E.W. 1931 The age, distribution and petrological characters of the granites of Eastern Australia. Proc. Roy. Soc. Vic. 43(2), 101-119.

THOMAS D.E. 1959 The Geological Structure of Victoria. J. Roy. Soc. N.S.W. 92(4), 182-190.

van Son J.R.H. 1966 Regional gravity traverses, south-eastern NSW 1966. Bur. Min. Resour. Aust. Rec. 1966/184.

APPENDIX A

Details of the 1961 Survey

Logistical organization

Staff:	Geophysicist : G.F. Lonsdale Field assistant : C. Bannerman University student A.Distal joined the party for the period of the Gippsland work.
Vehicles:	One Landrover (C 10690) One international one-ton 4 x 4 (C10694)
Duration of Survey:	2nd February to 30th March 1961. (8th January to 31st January 1961 for the Gippsland ties).

Scientific organization

Instruments. Worden gravity meter No.140 (calibration factor of 0.11100 mgal/scale division) was used throughout the survey. The meter was calibrated on the Melbourne Calibration Range before and after the survey.

Meter drift was determined by using the looping method, i.e. reading stations in the order A-B-C-A-C-D-E-C-E-F ....

During the survey the drift rate was usually rather steeply upwards in the morning and somewhat flatter downwards in the late afternoon, suggesting that the air pressure inside the instrument may have been a little too high. Frequent adjustment of the coarse setting was necessary because of the steepness of the terrain encountered throughout the survey.

Askania microbarometers No's. 531306 and 531333 were used throughout the survey. For control purposes points of known elevation were read where possible as outlined in Chapter 3.

Elevations. Spirit level information for some stations was obtained from the Victorian State Railways Department and the Victorian Department of Lands and Surveys.

With microbarometer work, owing to the irregular nature of the terrain, certain pressure conditions prevailed at the farther points of the hourly loop which were not accounted for in the base station reading, e.g. one result of crossing a divide is that entirely new pressure conditions are often encountered. Such changes are considered responsible for the large adjustments, sometimes reaching 40 ft, found necessary to close the large loops. Most misclosures were about 5-10ft.

Plotting. Accurate base maps are not available for most of the areas covered by this report. As an interim measure all gravity stations have been plotted on to graticules. Stations not located at railway stations and identifiable Main Roads Bench-marks were plotted on to airphotos so that the plotted positions of all stations can be amended when appropriate mapping control becomes available.

Number of stations. During the survey 278 stations were occupied including 13 reoccupations.

Tie station. This work was tied to BMR pendulum station No.3 at Bombala (G_{obs} = 979.744.1 mgals).

Bouguer anomalies. The Bouguer anomalies were calculated using a density of 2.67 g/cm^3 in the Bouguer correction.

Gravity data files. (National Gravity Repository, BMR)

No. 6104.1	:	Station locations and sketches.
6104.2	:	Gravity field and drift sheets.
6104.3	:	Microbarometer field and drift sheets.
6104.4	:	Elevation computing sheets.
6104.5	:	Gravity computation sheets.

APPENDIX B

Details of the 1964 Survey

Logistical organization

Staff:	Geophysicist : J.R.H. van Son Field Assistant : K. Kirby W.J. Langron paid a visit of inspection to the party for 5 days. W. Lowndes joined the party for 4 days to receive training in handling the La Coste & Romberg gravity meter. F. Paranada (Philippines Naval Hydrographic Survey) spent 10 days with the party learning to handle the La Coste & Romberg gravity meter and how to conduct a gravity survey of this type.
Vehicles:	One International one-ton 4 x 4 (ZSU 066) One International one-ton 4 x 4 (ZSU 012) which was overturned on 18th March 1964 and replaced by: One long-wheel-base Landrover (ZSM 225).
Radios:	Two Traeger transceivers.
Duration of Survey:	10th March to 30th April 1964.

Scientific organization

Instruments. La Coste & Romberg gravity meter G20 was used throughout the survey. The calibration factor as supplied by the makers was used for the reduction of field data. The instrument was read over the Melbourne Calibration Range, before, during, and after the survey and values consistent with the accepted interval of 53.04 mgals were obtained on each occasion.

The instrument was involved in the vehicle accident on 18th March but subsequent tests and calibrations indicated that it had suffered no damage.

Gravity meter drift was checked by using a looping procedure similar to that used by Lonsdale except that repeat readings needed to be made only at intervals of two hours. The gravity meter drift throughout the survey was extremely low.

Two Mechanism microbarometers (Serial No's. 294 and 318) were used to obtain elevations of a number of stations throughout the survey area. A procedure similar to that of Lonsdale was used except that by means of the two-way radios the base barometer could be read at the same time as a reading was being obtained on the field instrument.

Elevations: Spirit level information is available for most stations read during this survey.

Plotting. Similar remarks apply here as to Lonsdale's work.

Number of stations. During the survey 68 stations were occupied including 25 reoccupations.

Tie station. This work was tied to BMR pendulum station No.3 at Bombala (G_{obs} = 979.744.1 mgals). Stations at airstrips at Bairnsdale and Mallacoota were also established for later reoccupation during the Isogal survey.

Bouguer anomalies. The Bouguer anomalies were calculated using a density of 2.67 g/cm^3 in the Bouguer correction.

Gravity data files. (National Gravity Repository, BMR)

No. 6401.1	:	Station locations and sketches.
6401.2	:	Gravity field and drift sheets.
6401.3	:	Microbarometer field sheets and elevation data.
6401.4	:	Gravity computation sheets.

GEOLOGICAL LEGEND

Cz	Undifferentiated	CAINOZOIC
T	Tertiary	CAINOZOIC
M	Undifferentiated	MESOZOIC
Pzu	Upper	PALAEOZOIC
Pzm	Middle	PALAEOZOIC
Pzl	Lower	PALAEOZOIC
Pg	Granite	INTRUSIVE IGNEOUS ROCKS
s	Ultrabasic	INTRUSIVE IGNEOUS ROCKS
(pattern)	Acid	VOLCANIC ROCKS
v v v	Basic	VOLCANIC ROCKS

TECTONIC LEGEND

- *Strike and dip of strata*
- *Bedding trends in gently folded strata*
- *Prominent grain of folded belt*
- *Anticline*
- *Syncline*
- *Fault*
- *Fault, concealed*
- *High-angle reverse fault*
- *Volcanic centres*

To accompany Record No. 1967/11

REGIONAL GRAVITY SURVEYS EASTERN VICTORIA 1961 & 1964

GEOLOGY

(AFTER TECTONIC MAP OF AUSTRALIA)

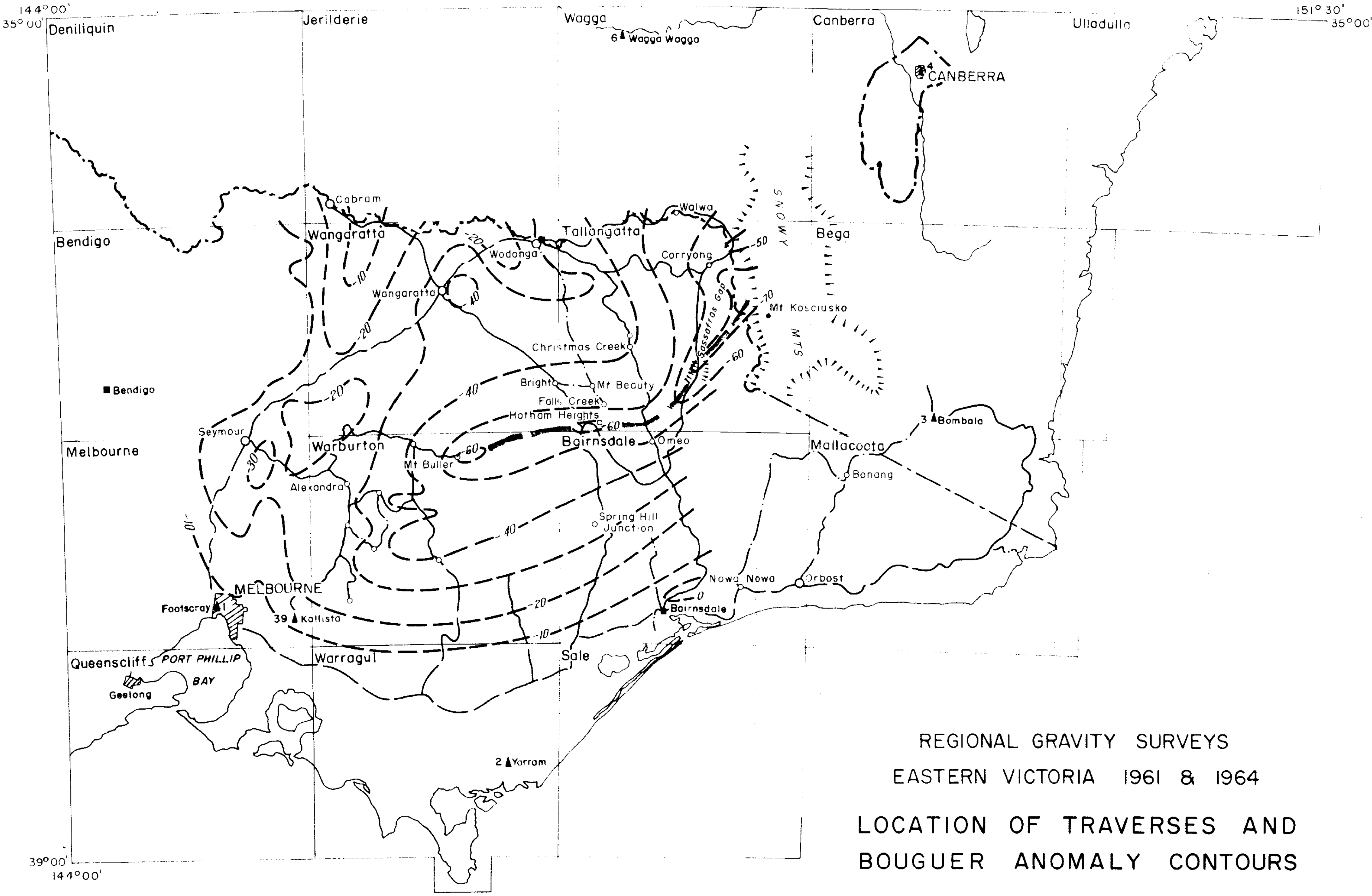
SCALE

40 0 40 80 120 MILES

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics

V/B2-1

PLATE 2



REGIONAL GRAVITY SURVEYS
EASTERN VICTORIA 1961 & 1964

LOCATION OF TRAVERSES AND BOUGUER ANOMALY CONTOURS

SCALE

40 0 40 80 Miles

LEGEND

- Traverses read by Lonsdale (1961)
- Traverses read by van Son (1964)
- Traverses read before 1961
- Isogals (10 milligal interval)
- Axis of gravity trough

To accompany Record No 1967/11

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics

J55/B2-104