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TENEMENT: O.E.L. No. 22

TENEMENT HOLDER: General Exploration Company of Australia Ltd.

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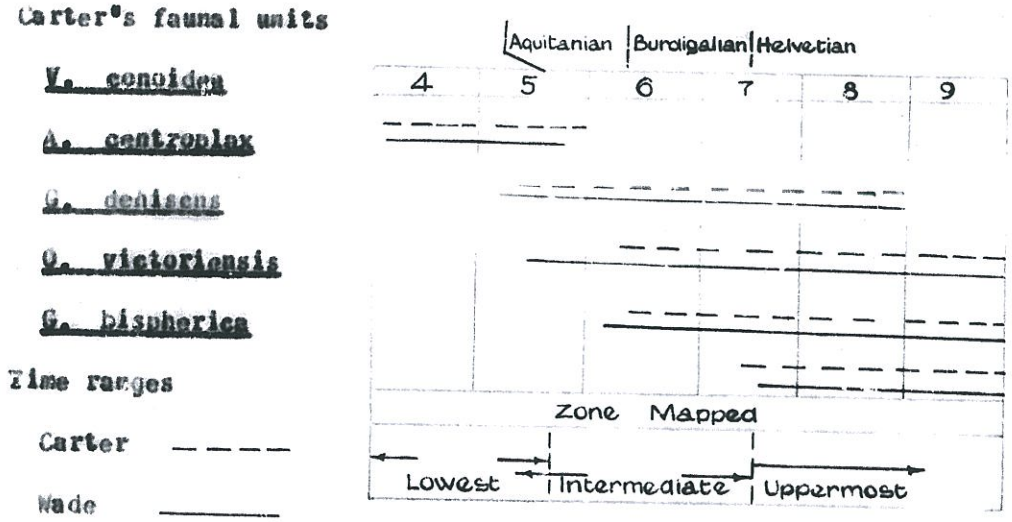
BIOSTRATIGRAPHIC MAPPING IN THE GAMBIER-NORTHUMBERLAND DISTRICT

The study of structure in the Mt. Gambier area cannot be based on lithology, since there are no consistent, mappable changes at definite stratigraphic horizons. Dolomitization and the formation of flint bands and nodules are similarly not restricted to such horizons. The slight measurable dips in the strata do not add up to a comprehensive overall structural picture and only indicate slight local irregularities of the general structure.

Interpretation of structure is based on the recognition of foraminiferal zones. Since no continuous section in the area concerned is available for study, such zones are based on ranges of foraminifera given by Carter and extended by Wade. Five species are found to be of most value in the biostratigraphic zonation in this area. These are, in order of oldest to youngest, Victoriella conoidea, Astrononion centroplax, Globoquadrina dehiscens, Operculina victoriensis and Globigerinoides bisphorica.



Of the five species shown in the above table only G.bispherica is considered as sufficiently common and unrestricted by different ecological conditions for its absence to be considered as a reasonably safe indication that the strata are older than the beginning of the time range of G.bispherica. In the case of the other species only their presence serves as a really safe age criterion, and even then it must be kept in mind that their local time ranges may be longer or shorter than is thought to be the case at present. However, for example, if all the samples in a certain area contain A.centrolax and do not contain either G.dehiscens or O.victoriensis, the strata exposed in this area may be regarded as generally being older than strata exposed in an area from which all or most of the samples contain one or both of the last mentioned two species.

Three foraminiferal zones (as indicated in the table above) are used in structural interpretation. The degree of certainty of assignment of limestone outcrops represented by samples from different localities to a particular zone varies. The absence of G.bispherica is a reasonably safe criterion for regarding limestone as older than that belonging to the youngest of the three zones, the lower boundary of which coincides with the beginning of the time range of G.bispherica. Beds in which G. bispherica is absent, and O.victoriensis and/or G. dehiscens present, are placed in the intermediate zone. The boundary between the intermediate and the lowest zone is arbitrarily considered as coinciding with the top of the time range of V.conoidea, but the determination of whether a sample represents the lowest or the intermediate zone is complicated by several factors. The first

is the fact that neither G.dehiscens nor O. victoriensis is as abundant as G.hispherica, and hence the absence of G.dehiscens is not as safe an indication that a sample belongs to the lowest zone. Thus, some of the samples plotted as A on the overlay may belong to the intermediate and not to the lowest zone. The second factor is the apparent influence of variation of facies on the distribution of V.conoidea; hence the absence of V.conoidea does not necessarily mean that the bed is younger than those belonging to the lowest zone even if the sample contains G.dehiscens (i.e. the age of some samples containing G.dehiscens and not V.conoidea may fall within the period of overlap of time ranges of these two species, and hence they may belong to the lowest, and not the intermediate zone).

The subdivision of the intermediate and the lowest zones into several subzones (e.g. in the case of the former, using the presence or absence of O.victoriensis as the differentiating criterion) does not lead to a more refined interpretation of structure, because of the apparent influence of facies variation on the distribution of the species considered, i.e. the assumption that the age of a sample falls outside the local time range of the species cannot be based solely on the absence of the species in the sample; nor are the local time ranges considered as sufficiently well established for such a purpose.

The occurrences of the five species considered are plotted on the transparent overlay of the Gambier and Northumberland sheet (the occurrences of species whose time ranges extend through two (or three) of the zones were not plotted if species whose time ranges

do not extend into the lowest one or two) of the zones were present in the sample). The symbols used are as follows:-

G. hisphorica	B
O. victoriensis	O
G. dehiscens	Q
A. centroplax	A
V. conoidea	V

A number of samples collected, though yielding fairly rich micr. faunas, did not contain any of the five species discussed above. The localities of such samples are not plotted on the overlay.

In the N.W. corner of the area covered by the Gambier-Northumberland sheet, and to the immediate NW and W of this area, limestone outcrops belonging to the lowest zone occur, together with a few scattered outcrops representing the intermediate zone. Surface samples from the lowest zone, surrounded by limestone outcrops representing the intermediate zone, indicate the presence of a closed structural high, elongate in a roughly NW direction, immediately to the SW or Mt. Salt HS. To the NE and SW respectively of the structural high, areas of outcrops belonging to the upper zone, interspersed with outcrops of the intermediate zone occur. These areas are elongate in a direction roughly parallel to the direction of elongation of the structural high. The density of

distribution of the samples collected is not sufficiently large to demonstrate whether the latter has formed wholly by folding or whether faulting is partly responsible.

From the thicknesses of Gambier Limestone recorded in various bores in the area, the thicknesses of the foraminiferal zones are estimated to be of the order of 200' or more each. Since neither the relative stratigraphic position within [illegible] zone of the horizons represented by surface samples [illegible]ng N.coquiden from the area of the structure high, nor the thickness of intermediate zone removed by erosion in the areas to NW and SE of latter is known, the structural closure to the SW of Mt. Salt H.S. can be estimated only very approximately.

Charles Abele

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University of Adelaide.

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0015

BIOSTRATIGRAPHIC MAPPING IN THE GAMBIER - NORTHUMBERLAND DISTRICT

(Progress Report for October 1960)

by

C. Abele

An earlier report (March 1960) by C. Abele for Geosurveys with the above title, should be referred to for a full explanation of the basis of biostratigraphic mapping in the Gambier - Northumberland district, and the limitations of the criteria involved. It is stressed again that the micropalaeontological differentiation between samples representing the lowest zone and those representing the intermediate zone is more in the nature of a high statistical probability rather than absolute certainty, i.e. a sample containing G.dehiscens. and not V.concidea. can usually be considered to come from the intermediate zone, but may occasionally belong to the lowest zone; also, while most samples containing V. conoidea (and not G.dehiscens) indicate older strata than samples containing G.dehiscens (and not V.conoidea). in some cases the converse may apply. The reasons for the above possibilities are the overlapping of the time-ranges of V.concidea and G.dehiscens at their upper and lower extremities respectively, and the fact that neither of the two species is present in all the samples of limestone deposited within the respective times of their existence.

0016

Presence of G.bispherica at localities 310 and 312 indicates that the N.E. boundary of the structural high S. of Mt. Salt H.S. is formed by a fault. A fuller report will be made when all the samples collected by E.J.Brock have been studied.

31st October 1960.

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Coulcheque 19 ft.

FINAL REPORT

on

0017

BIOSTRATIGRAPHIC MAPPING IN THE GAMBIER - NORTHUMBERLAND DISTRICT

by

C. Abele

About two hundred samples collected by E.J. Brock from the vicinity of Mt. Salt H.S. and to the southwest of Mt.Schank were submitted by Geosurveys to the writer for micropalaeontological examination. Two earlier reports (March 1960, and October 1960) by C.Abele for Geosurveys, with the above title, should be referred to for a full explanation of the basis of biostratigraphic mapping in the Gambier - Northumberland district and the limitations of the criteria involved. The presence or absence of Astrononion centroplax in samples was ignored during the construction of the biostratigraphic map accompanying this report since the relation of the bottom of the time range of this species to the base of Gambier Limestone is considered as rather uncertain. The three zones used in biostratigraphic mapping, namely the lowest, intermediate and uppermost, agree essentially with the foraminiferal zones formally named by A.N. Carter (Mining and

Geological Journal vol. 6 (1958/1959 No.3 P.48-54) as *V.plecte* (-*conoidea*) zone, *G.dehiscens* zone and *G.triloba* zone respectively.

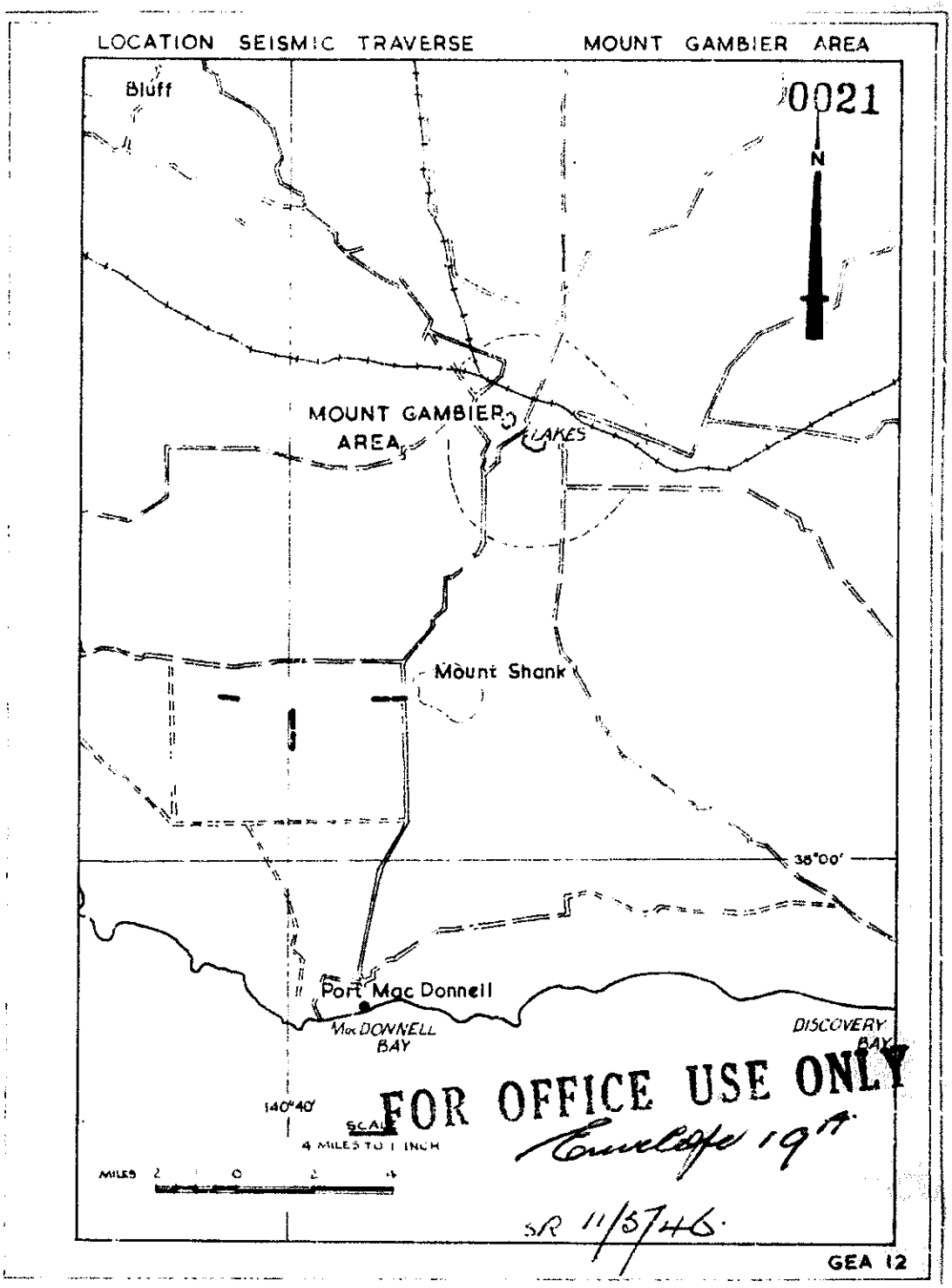
The present investigation has fully confirmed the "closure" of the structural high (to the south of Mt.Salt H.S.). in a northwesterly direction (the presence of undoubtedly younger strata in all other directions was already obvious from earlier work). The occurrence of limestone belonging to the lowest and the uppermost zones respectively at localities 25 and 250, and again at 132, 316, and 310, 312, without intervening outcrop samples from the intermediate zone, suggests that the northeasterly boundary of this structural high is at least partly formed by en echelon faults extending in a roughly northwesterly direction. Flatly dipping strata to the north west, south west and south east of the structural high are indicated by comparatively wide areas separating limestone outcrops representing the lowest and uppermost zones **reppectively.** The isolated outcrops containing *V.conoides*. e.g. at localities 362 and 252, suggest a somewhat undulating structure.

Information from additional samples necessitates certain changes in the boundary between areas of limestone outcrops belonging to the intermediate and uppermost zones, as drawn

0019

on Geosurveys map G.E.A. 13 (Biostratigraphic and structure map of the S - N area).

22nd November, 1960.


LOCATION SEISMIC TRAVERSE MOUNT GAMBIER AREA
Bluff
0021
N
MOUNT GAMBIER AREA
LAKES
Mount Shank
38°00'
Port Mac Donnell
MacDONNELL BAY
DISCOVERY BAY
140°40'
SCALE
4 MILES TO 1 INCH
MILES 2 0 2 4
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Cuscaden 19th
SR 11/5/46.
GEA 12

GAMBIER NORTHUMBERLAND AREA

BOUGER GRAVITY ANOMALY

ISOGAL INTERVAL 5 GRAVITY UNITS

SCALE: 1 INCH = 1 MILE GEA 3

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GRAVITY DATUM STATION GK15 SA. DEPT. MINES
LEVELS RELATED TO PORT ADELAIDE DATUM

ENV 19-1

GENERAL EXPLORATION OF AUST. LTD.

BOUGUER GRAVITY MAP
OF
SOUTH EAST SOUTH AUSTRALIA
AND
SOUTH WEST VICTORIA

BASIC DATA BY SOUTH AUST. GEOLOGICAL SURVEY
AND BUREAU OF MINERAL RESOURCES RESPECTIVELY
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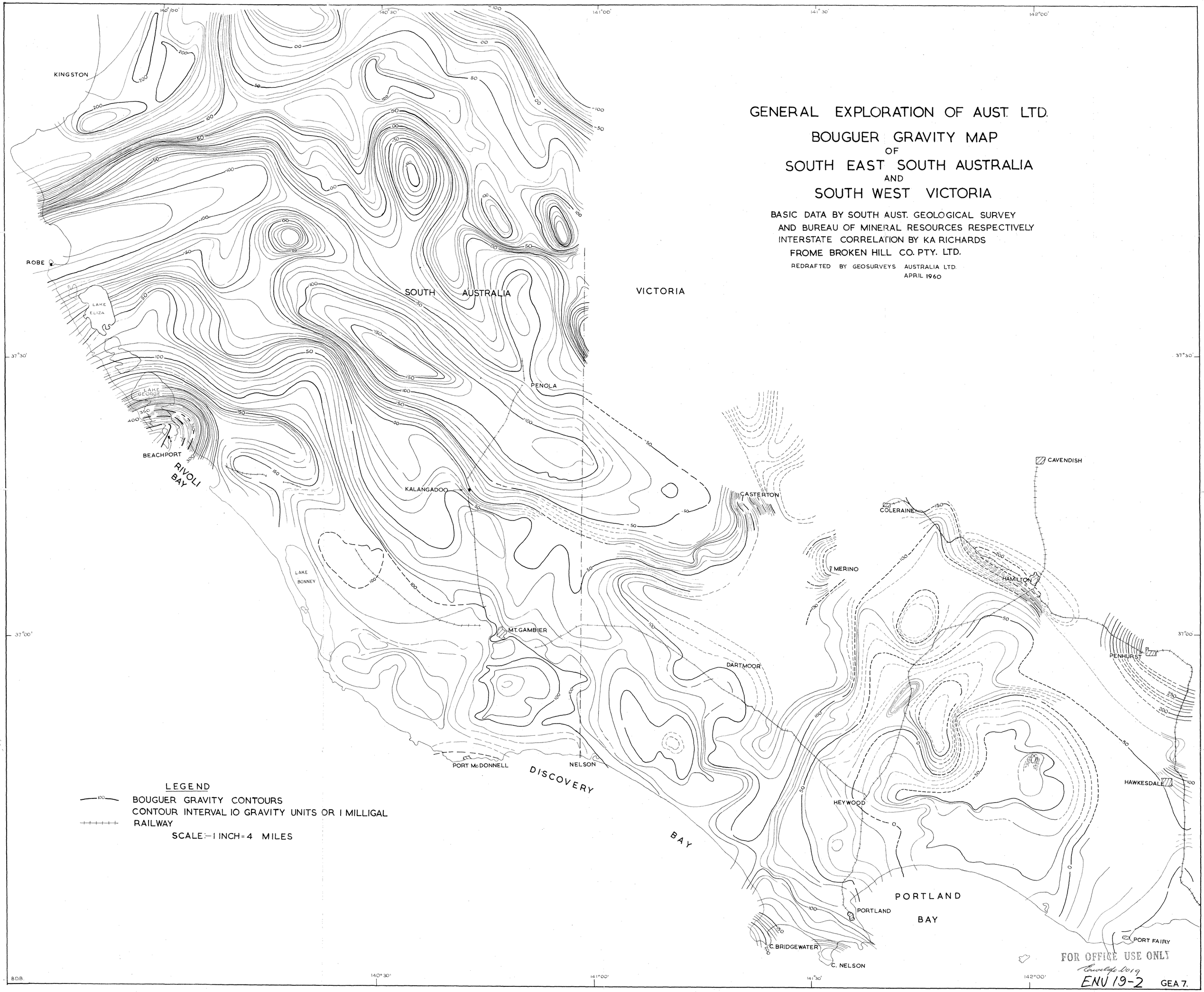

LEGEND

—100— BOUGUER GRAVITY CONTOURS
CONTOUR INTERVAL 10 GRAVITY UNITS OR 1 MILLIGAL
RAILWAY
SCALE:- 1 INCH = 4 MILES

GEA 7.

B.D.B.