

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

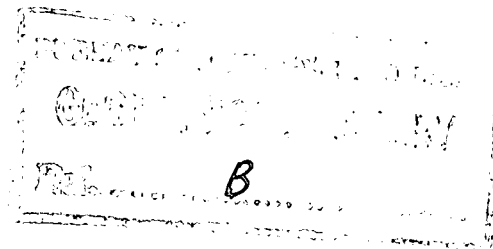
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PRELIMINARY REPORT ON AIRBORNE SCINTILLOMETER SURVEY AT
BROKEN HILL (VH-MIN) - FEBRUARY-MARCH, 1955.

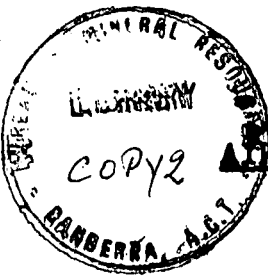
by

W.D. PARKINSON.



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AIRBORNE SCINTILLOMETER SURVEY-BROKEN HILL (VH-MIN)FEBRUARY - MARCH 1955PRELIMINARY REPORTGeneral.

A scintillometer reconnaissance survey of four areas near Broken Hill has been made in the Bureau's D.C.3 aircraft VH-MIN. Flying commenced on 23rd February and was completed on 11th March, 1955.

Personnel involved in the survey were Capt. Duffield, F/O. Wales, A.M. Kean (until 6th March) and A.M. Jackson of T.A.A., and Miss Cullen, Dr. Parkinson, and Messrs. Barlow, Kern, Irving and Gardener of B.M.R.

Operations.

Two Chalk River scintillometers were used (MEL Nos.13 and 14). Each detector was fed into a ratemeter, that for No.13 having a 2.0 second time constant, and that for No.14 having a 0.9 second time constant. For most of the survey only the records from the former were used, but late in the survey trouble developed in one of the photomultiplier tubes in this instrument. The records from the shorter time-constant instrument were therefore used for a few flights.

Four areas were flown at a height of 500 feet above the ground. For reference purposes these areas are referred to as:-

- (a) Turkey Creek area
- (b) Gnalta area
- (c) Fowler's Gap area
- (d) Burta area

A strip camera was operated continuously over the four areas. Navigation over the Fowler's Gap and Burta areas was done with the aid of photomosaics, on which flight lines had been plotted. The flight lines were spaced at half-mile intervals and were in an east-west direction.

No aerial photography was available for the Turkey Creek or Gnalta areas, and until photographs become available the position of the flight lines cannot be determined. Vertical photographs of the perimeter of these two areas were taken with an F-24 camera, and were later used to position survey flights. They proved to be of little use for navigation. Most of the flying in these two areas was therefore done on constant compass bearing and the limits of the flight lines were determined by the pilots' judgment.

Some delay was caused by an air-frame defect, which grounded the plane from 2nd March to 4th March.

Results.(a) Turkey Creek Area.

This area of about 2000 square miles is made up of an approximate square bounded by the parallels $30^{\circ} 22'$ and $30^{\circ} 59' S.$ and meridians $142^{\circ} 50' E.$, together with a triangular area to the south-east of the square extending to a point $31^{\circ} 30' S.$, $142^{\circ} 50' E.$, and bounded in the west by a creek

which flows past Gnalta Homestead. The area lies approximately 100 miles north-north-east of Broken Hill. The north-south extent of the whole area is about 65 miles. It was covered by 53 east-west flight lines, but since complete aerial photography was not available for navigation, the spacing was probably rather irregular.

Five anomalies were recorded, all of second order. They seem to be distributed at random, two in the south and three in the northern portion of the area. There is no obvious correlation with geology. In general, the ground radiation was low and rather uniform over the area. Aerial photography is not yet available and more exact locations of the anomalies cannot at present be given.

The general positions of the anomalies in this and other areas surveyed are indicated on the accompanying map by small shaded areas.

(b) Gnalta Area.

This area is a westward extension of the southern part of the Turkey Creek area and covers about 500 square miles. Its western boundary is roughly 20 miles west of the creek mentioned above, which defines part of the boundary of the Turkey Creek area. Its southern limit is at about latitude $31^{\circ} 20'S$. It was included in the survey because of some rock outcrops in the area. East-west traverses were made at approximately one-mile intervals but no anomalies were recorded over it.

(c) Fowler's Gap Area.

This area is roughly square and bounded by parallels $31^{\circ} 00'$ and $31^{\circ} 30'S$. and meridians $141^{\circ} 20'$ and $141^{\circ} 50'E$. It covers the western portions of the Fowler's Gap and Euriowie one-mile sheets and the eastern portions of the Woowoolahra and Torrowangee one-mile sheets. The total area is about 1100 square miles and it lies some 50 miles north of Broken Hill.

One-mile mosaics are available for the area covered and these were used for the survey. In general, there are no maps except for the most southerly portion which extends into the north of the area covered by the Broken Hill geological map prepared by Zinc Corporation.

Traverses were flown in an east-west direction at $\frac{1}{2}$ -mile spacing. Altogether eighteen anomalies were recorded of which only two were first order. Four of the second order anomalies lie grouped in the north of the area, two in the Woowoolahra, and two in the Fowler's Gap 1-mile map areas.

Of the remaining anomalies, three occur in the eastern portion of the Torrowangee 1-mile map area; the others lie in a band extending from just west of the centre of the Fowler's Gap area towards the south-east for a distance of about 20 miles. This band appears to coincide fairly accurately with a band of metamorphic rocks which lies within the Torrowangee sediments, and is known as the Euriowie Inlier. The three anomalies in the Torrowangee 1-mile map area appear to lie between the Euriowie Inlier and another band of metamorphic rocks which lie about 10 miles north-west of the Torrowangee quarries. The general level of radiation is higher over the metamorphic rocks than over the rest of the area. The boundaries of the metamorphic rocks are particularly well marked by a

change in radiation recorded by the aircraft.

(d) Burta Area.

This area of about 300 square miles comprises most of the Burta one-mile sheet and lies 20 miles south of Broken Hill. East-west traverses were flown at half-mile spacing. Only three second order anomalies were recorded. They are not grouped together in any significant way. The ground radiation over the area is rather low.

(W. D. PARKINSON)
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