DEPARTMENT OF MINERALS AND ENERGY

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

~~RESTRICTED~~

Record 1973/124

PRESURVEY REPORT FOR THE AIRBORNE MAGNETIC AND RADIOMETRIC SURVEYS OF THE CLONCURRY 1:250 000 AND PROSPECTOR 1:100 000 SHEET AREAS, QLD 1973

by

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SUMMARY

During 1973 it is proposed to carry out a regional airborne magnetic and radiometric survey of the CLONCURRY 1:250 000 map area. In addition part of the area, viz. the PROSPECTOR 1:100 000 map area, will be flown in detail. This Record outlines the objectives of the surveys and summarizes the geology and previous geophysical work in the areas to be covered.

1. INTRODUCTION

The CLONCURRY 1:250 000 Sheet lies between lats. 20° and 21°, longs. 139°30' and 141°. The PROSPECTOR 1:100 000 Sheet lies between lats. 20° and 20°30', longs. 139°30' and 140°.

Proton magnetometer and 4-channel gamma-ray spectrometer surveys will be flown by Aero Commander aircraft VH-BMR during 1973. The CLONCURRY Sheet area will be flown at an altitude of approximately 150 m above ground level along east-west lines at 1.5 km spacing. The PROSPECTOR Sheet area will be flown at an altitude of approximately 80 m along east-west lines at 0.5 km spacing.

The airborne surveys form part of a BMR program of geological and geophysical investigations directed towards the evaluation of the mineral potential of the Cloncurry-Mount Isa region. The surveys will provide systematic magnetic and radiometric data to supplement the geological mapping, assist in the delineation of structures, and generally assist in the mineral exploration of the region.

The area of the CLONCURRY Sheet area falls into two physiographic units. The Precambrian outcrop area, which occupies about two-thirds of the Sheet area, forms the upland division which is of moderate relief and extensive rock outcrop. The remaining third, which forms the northeastern portion of the sheet, consists predominantly of 'black soil plains' with very little relief. The plains lie 130 to 200 m above sea level and fall gently to the northeast. The highest point in the Sheet area is at about 700 m above sea level and the greatest local relief is 200 m. The main watercourses, other than the Leichhardt and Cloncurry Rivers, are parallel to the most prominent fault systems.

The area has been the site of numerous geological investigations, mainly of individual mines and prospects. The geology of the CLONCURRY 1:250 000 Sheet area has been described by Carter (1959) and Grimes (1972), and the geology of the northwest Queensland mineral belt by Carter, Brooks, & Walker (1961) and Derrick, Wilson, Hill, & Glikson (in prep. b).

BMR and the Queensland Geological Survey have mapped in detail the 1:100 000 Sheet areas in the southern half of the CLONCURRY 1:250 000 Sheet (Derrick 1969; Glikson & Derrick, 1970; Derrick, Wilson, Hill, & Mitchell, 1971; Derrick, Wilson, Hill, Glikson & Mitchell, in prep a). Detailed mapping in the PROSPECTOR and QUAMBY 1:100 000 Sheets is scheduled for 1973.

2. GEOLOGY

Stratigraphy

Three fundamental stratigraphic divisions exist: a central crystalline basement 'welt', and an eastern and western sedimentary-volcanic succession. The Precambrian rock types in each of these are summarized in Table 1 (Derrick, pers. comm.).

A small outcrop of Middle Cambrian shale occurs on the southern edge of the CLONCURRY Sheet.

Mesozoic strata lie below the plains in the northeast and form the western limit of sediments in the Great Artesian Basin.

Cainozoic soil and alluvium cover the northeastern third of the sheet area.

Intrusive igneous rocks

The Naraku, Wonga, and Kalkadoon Granites are composite bodies, each probably of two ages in the Proterozoic. The Naraku Granite is less mafic than the other two.

Dolerite and gabbro of various ages have intruded the stratigraphic succession as dyke swarms, dykes, stocks, and possibly sills and lavas. Many of the dykes and stocks occupy fault lines or the noses of pitching folds.

Metamorphism

Regional metamorphism is widespread in the CLONCURRY Sheet, and contact metamorphism predominates locally. Except in the strata of the western geosyncline, the effects of regional metasomatism mask those of metamorphism in many places.

The Leichhardt Metamorphics appear overall to be more highly metamorphosed than the strata to the east, and contrast sharply with the strata to the west where the Eastern Creek Volcanics show only slight regional metamorphic effects. Strata in the eastern side are in the biotite zone or higher grades of metamorphism. Andalusite-garnet-mica schist occurs south-southeast of Cloncurry, and staurolite-garnet-mica schist is found in the upper Cattle Creek area.

TABLE 1. STRATIGRAPHIC TABLE

WESTERN SUCCESSION	BASEMENT	EASTERN SUCCESSION
		NARAKU GRANITE TOMMY CREEK MICROGRANITE BURSTALL GRANITE
MOUNT ISA GROUP 3000? (Magazine Shale (Kennedy Siltstone (Spear Siltstone (Urquhart Shale (Native Bee Siltstone (Breakaway Shale (Moondarra Siltstone (Warrina Park Quartzite	KALKADOON GRANITE	PORTAL GROUP (White Blow Formation 200? (Deighton Quartzite 2500 (Roxmere Quartzite 1000?
Surprise Creek Beds 7000? (slate, quartzite)	(Argylla Formation 3000? ((acid volcanics)	MARY KATHLEEN GROUP Lunch Creek Gabbro (Corella Formation 3000? (Marimo Slate 3000+? (Overhand Jaspilite
HASLINGDEN GROUP (Myally Beds 7000+ ((sandstone, siltstone) (Eastern Creek Volcanics (7000? (basalt) (Mount Guide Quartzite 3000+	TEWINGA GROUP (Magna Lynn Metabasalt 600 ((Leichhardt Metamorphics ((acid volcanics)	(Ballara Quartzite MALBON GROUP (Mitakoodi Quartzite 1000+ (Marraba Volcanics 3000
		Soldiers Cap Formation (basalt) 8000+
		?WONGA GRANITE Argylla Formation 3000?

Thickness in metres

Contact metamorphism occurs close to granite contacts. West of the Leichhardt Metamorphics widespread hydrothermal activity has produced low-temperature mineral assemblages in many rocks, particularly the basalts.

Regional metasomatism is probably genetically related to granitic processes.

Structure

Folding is strong to isoclinal, and fold axes are commonly overturned. Fold axes generally strike north except in the southeast of the Sheet area. Both east and west of Cloncurry, the major fold axes trend roughly east. Southwest of Cloncurry in the Mitakoodi Quartzite, fold axes strike northeast, roughly parallel to the main faults in the area, and intricate plastic deformation is common (Glikson, 1972).

The main northeast-striking faults are often quartz-filled and form prominent topographic features. Extensive conjugate shear faults strike northeast and northwest. High-angle thrust faults have throws of up to 8000 m, and strike faulting is widespread.

Mineralization

Copper mineralization is widespread and occurs in most Proterozoic rock types. Most copper orebodies occur in or close to faults or shears and are probably genetically related to granites and dolerites.

A large number of uranium prospects have been found. The most important is at Mary Kathleen where the orebody occurs in the axial zone of a syncline in the Corella Formation. Hughes & Munro (1968) believe that the orebody is metasomatic and related to the Burstall Granite which crops out to the east. The main structural controls of uranium mineralization are faults, shears, and joints. Other uranium prospects in the CLONCURRY sheet are the Counter, Milo, and Six Kangaroo deposits (Brooks, 1960, 1972).

Alluvial and reef gold has been produced, mainly south and east of Cloncurry. Most gold is associated with copper.

Other metals discovered in the CLONCURRY Sheet include lead, zinc, silver, cobalt, tungsten, rare earths, iron, manganese, and bismuth.

Limestone suitable for fluxing purposes forms the bulk of non-metallic mineral production in the area.

3. PREVIOUS GEOPHYSICAL WORK

Previous airborne surveys by BMR are described by Parkinson (1956), Mulder (1961a,b), Dockery & Tipper (1964, 1965) Lambourn & Shelley (1972). Magnetically disturbed areas correlate with Eastern Creek Volcanics, Magna Lynn Metabasalt, and Argylla Formation. The Leichhardt Metamorphics, Soldiers Cap Formation, Corella Formation, Deighton Quartzite and the granites are magnetically quiet. The magnetic response of the basic dykes is rather varied. Uranium anomalies have been recorded over the Mary Kathleen and Milo mines, some copper mines, other prospects, and some shear zones.

A regional gravity survey in 1966 (Darby & Vale, 1969) by BMR shows north and northwest trends and a gravity low in the northeast of the sheet.

Other geophysical surveys have been made by private companies but the results are not available.

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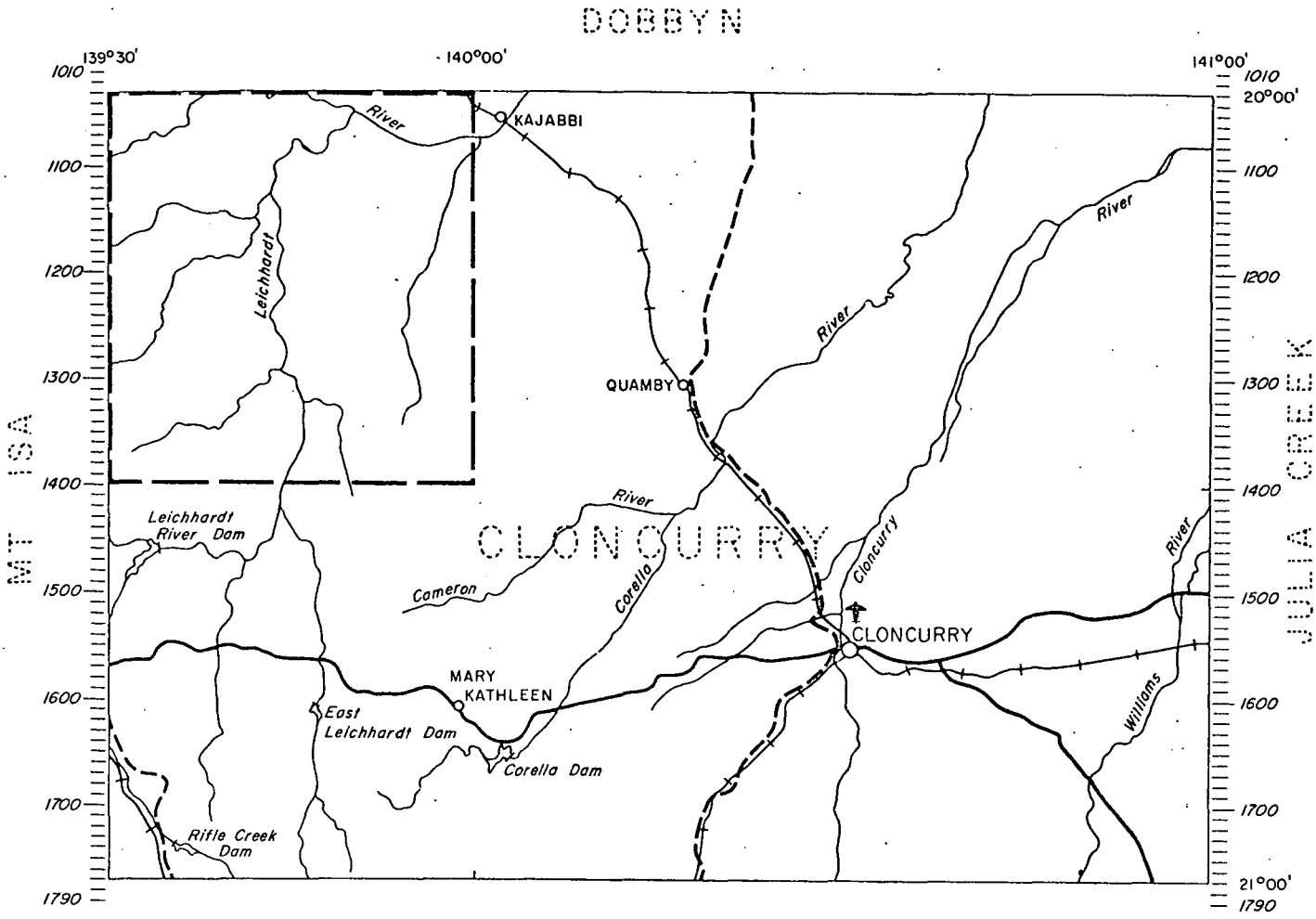
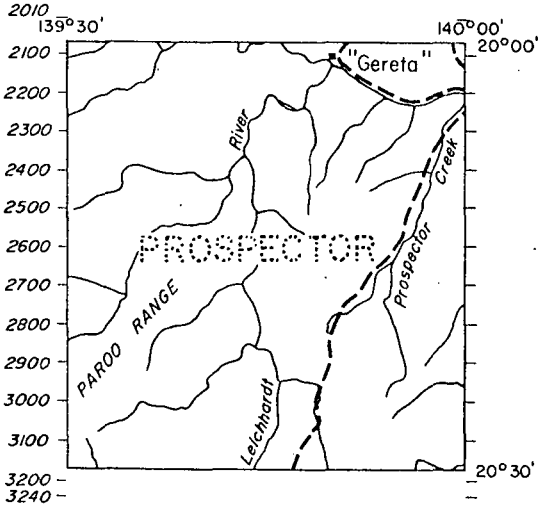
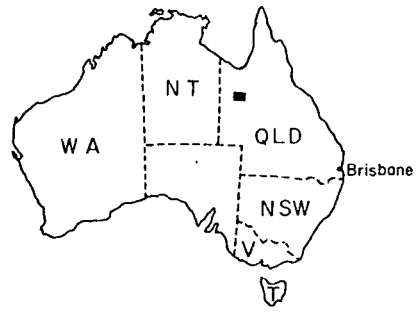


DUCHESS

REGIONAL SURVEY AREA





Highway
Road
Railway
Detailed survey boundary

DETAILED SURVEY AREA

AIRBORNE SURVEY, CLONCURRY, QLD 1973

FLIGHT - LINE SYSTEM

KILOMETRES 20 0 20 40 60 KILOMETRES

MILES 10 0 10 20 30 MILES

TO ACCOMPANY RECORD NO. 1973/124

F54/B1-79A