DEPARTMENT OF
MINERALS AND ENERGY

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

~~RESTRICTED~~

Record 1973/137

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

by

B.W. Wyatt

~~RESTRICTED~~

Record 1973/137

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

by

B.W. Wyatt

CONTENTS

FIGURES

SUMMARY

During 1973 it is proposed to carry out a regional airborne magnetic and radiometric survey of the WESTMORELAND 1:250 000 Sheet area. In addition, part of the area, viz. the HEDLEYS CREEK 1:100 000 Sheet 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 WESTMORELAND 1:250 000 Sheet lies between latitudes 17°S and 18°S and longitudes 138°E and 139°30'E. The HEDLEYS CREEK 1:100 000 sheet lies between latitudes 17°30'S and 18°S and longitudes 138°E and 138°30'E.

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

The purpose of the surveys is to provide systematic geophysical data to supplement the current BMR geological mapping and geochemical survey in the region and to assist mineral exploration.

The WESTMORELAND Sheet area may be divided into three main physiographic units:

a) Coastal dunes, swamps, and tidal areas extend as much as 30 km inland in the east of the area.

b) Level to gently undulating plain country occupies about two-thirds of the area. The plains lie between sea level and 100 m and drain east and northeast to the coast.

c) An elevated dissected region of extensive rock outcrop occurs in the west and southwest, between 70 and 270 m above sea level.

There are four main elevated areas, which trend east and are separated by relatively flat broad valleys containing Central and Lagoon Creeks, Yellow Waterhole and Cliffdale Creeks, and the Nicholson River. Mesas up to 70 m high occur in the extreme southwest of the hill country.

The present summary of geology is taken mainly from Carter (1959), Carter, Brooks & Walker (1961), Roberts, Rhodes & Yates (1963) and from personal communications with I.P. Sweet of BMR.

2. GEOLOGY

STRATIGRAPHY

Table 1 contains a condensed account of the stratigraphy of the WESTMORELAND Sheet. The geology of the western part of the Sheet is shown in Figure 2. The nomenclature used by Carter (1959) has been revised by Roberts, Rhodes & Yates (1963) and Sweet (pers. comm.).

Proterozoic

Cliffdale Volcanics. Five units have been recognized. The lower four units comprise ignimbrites, ash-fall tuffs, and lava flows; the uppermost unit is flow banded rhyolite with some breccia masses.

Granites. Three phases of granite have been mapped. Two of these intrude Cliffdale Volcanics but the relationship of the third is not yet known.

The Cliffdale Volcanics and granites form the east-trending Murphy Tectonic ridge which continues west into the CALVERT HILLS Sheet. Younger Proterozoic rocks were deposited in two distinct sedimentary basins - the South Nicholson Basin lying to the south of the Murphy Tectonic Ridge, and the McArthur Basin which extends northward through the coastal region of the Gulf of Carpentaria to Arnhem Land.

Tawallah Group. These rocks were deposited mainly in the McArthur Basin.

Westmoreland Conglomerate. The formation is about 1200 m thick and is unconformable on the Cliffdale Volcanics. It consists of four units of sandstone, quartzite, and conglomerate.

Peters Creek Volcanics. The volcanics are well developed in the South Nicholson Basin, where they are made up of a lower sequence of basaltic lavas and an upper sequence of intermediate, and possibly acid, lavas and intrusives (?). The lower volcanics are thought to be the equivalent of rocks mapped as Peters Creek Volcanics in the McArthur Basin, and the overlying intermediate to acid lavas equivalent to several younger units in the Tawallah Group.

The Upper Tawallah Group in the McArthur Basin consists of sandstone, siltstone, dolomite, rhyolite, basalt, and tuff.

Fish River Formation. The Fish River Formation occurs only in the South Nicholson Basin. It was thought by Roberts, Rhodes & Yates (1963) to be equivalent to the youngest formation of the Tawallah Group but Sweet (pers. comm.) considers it to be younger because it disconformably overlies the upper Peters Creek Volcanics. The Fish River Formation contains two sandstone units separated by shale and siltstone and is overlain unconformably by the Fickling Beds.

Fickling Beds. The Fickling Beds occur only in the South Nicholson Basin and consist of silicified dolomite overlain by siltstone, shale, and fine sandstone. They have been regarded as equivalent to part of the Mount Isa Group and have been prospected for base metal mineralization (Sweet, 1972).

South Nicholson Group. The youngest Proterozoic rocks crop out only in the southwestern extremity of the WESTMORELAND Sheet. The Constance Sandstone occupies most of the area and is overlain by the Mullera Formation (siltstone) in the extreme south.

Mesozoic

Many small mesas on the Precambrian rocks are capped by flat-lying, generally lateritized Mesozoic sediments. Porcellanite commonly forms the upper layers. The maximum thickness measured in WESTMORELAND is 30 m but a considerably greater thickness of Mesozoic strata probably lies beneath the soil and laterite of the plains country, thickening seawards. Mesozoic rocks occur on Mornington Island, and a bore at Burketown penetrates through nearly 700 m of probably Mesozoic sediments (Doutch, Ingram, Smart & Grimes, 1970).

Cainozoic

Cainozoic sediments cover most of the sheet area and include lateritic and non-lateritic soils, and coastal sediments including sand dunes.

STRUCTURE

The outcropping Precambrian strata are arched on an east-west axis along the Cliffdale and Yellow Waterhole stream system. This axis, the Murphy Tectonic Ridge, forms the boundary of the South Nicholson Basin to the south and the McArthur Basin to the north.

Dips in sediments and volcanics are generally less than 30° except for intraformational contortions and drag folding along faults.

The most important faults strike west-northwest to northwest. All of these dip at high angles and some are filled by sheared porphyry dykes. East-west faulting has been recorded in an south of the Murphy Tectonic Ridge, and some northwest and northeast faults have caused considerable displacement of strata.

The Westmoreland Conglomerate, Cliffdale Volcanics, South Nicholson Group, and Upper Tawallah Group are strongly jointed.

Mesozoic strata are flat-lying and have not been faulted.

MINERALIZATION

Uranium mineralization occurs within the Cliffdale Volcanics, Peters Creek Volcanics, and Westmoreland Conglomerate in the CALVERT HILLS Sheet area to the west. Livingstone (1957) recorded radiometric anomalies in the Westmoreland Conglomerate. Primary uranium mineralization is associated with joint zones and secondary stratiform deposits are also present (Brooks, 1972).

Malachite and galena occur in narrow fissure veins in the Gorge Creek area.

Some tin is associated with granite.

3. PREVIOUS GEOPHYSICAL WORK

BMR has flown an airborne scintillograph survey of the Nicholson River region (Livingstone, 1957). Many radiometric anomalies were detected in the Westmoreland Conglomerate.

A regional gravity survey by BMR has indicated a negative Bouguer anomaly in the CALVERT HILLS Sheet area to the west and a positive anomaly over BURKETOWN to the east.

4. REFERENCES

BROOKS, J.H., 1972 - Uranium exploration in Queensland, 1967-71. Rep. geol. Surv. Qld. 69.

CARTER, E.K., 1959 - Westmoreland - 4 mile geological series. Bur. Miner. Resour. Aust. explan. Notes E/54-5.

CARTER, E.K., BROOKS, J.H., & WALKER, K.R., 1961 - The Precambrian mineral belt of north-western Queensland. Bur. Miner. Resour. Aust. Bull. 51.

DOUTCH, M.F., INGRAM, J.A., SMART, J., & GRIMES, K.G., 1970 - Progress report on the geology of the Southern Carpentaria Basin. Bur. Miner. Resour. Aust. Rec. 1970/39 (unpubl.).

LIVINGSTONE, D.F., 1957 - Airborne scintillograph survey of the Nicholson River region, N.T. and Qld. Bur. Miner. Resour. Aust. Rec. 1957/51 (unpubl.).

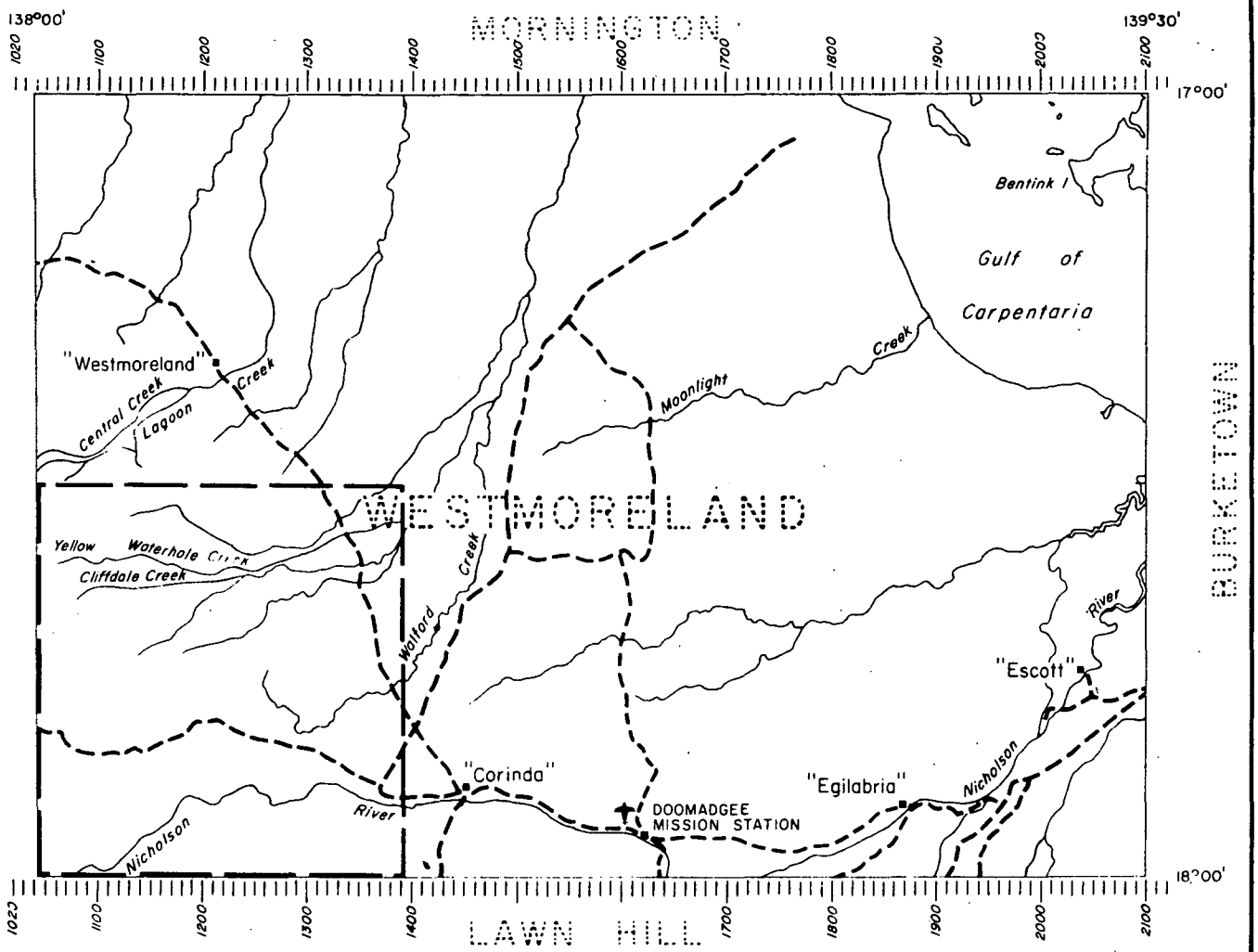
ROBERTS, H.G., RHODES, J.M., & YATES, K.R., 1963 - Calvert Hills 1:250 000 geological series. Bur. Miner. Resour. Aust. explan. Notes E/53-8.

SWEET, I.P., 1972 - Mount Isa Geosyncline, Qld, in Geological Branch Summary of Activities, 1972. Bur. Miner. Resour. Aust. Rec. 1972/103 (unpubl.).

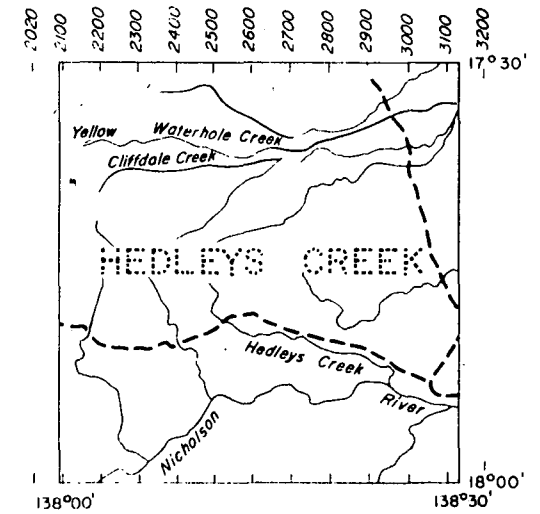
TABLE 1. STRATIGRAPHY OF WESTMORELAND SHEET

	Stratigraphic unit	Lithology
Quaternary	Qr	Coastal sediments, sand dunes, riverine deposits
Tertiary	Czn	Non-lateritic soils and riverine sediments
	Czl	Lateritic profile and associated soils
L. Cretaceous - Jurassic	M	Porcellanite, conglomerate, coarse sandstone, siltstone
Proterozoic		
South Nicholson Group	Mullera Fm. Psl	Shale, siltstone, sandstone, ironstone,
	Constance Sandstone Psa	sandstone.
	- - - - - - - - - - - Unconformity - - - - - - - - - - - - - - - - -	
	Fickling Beds Pmf	Silicified dolomite, siltstone, shale, sandstone
	- - - - - - - - - - - Unconformity - - - - - - - - - - - - - - - - -	
	Fish River Fm. Ptf	Sandstone, shale
	- - - - - - - - - - - Unconformity - - - - - - - - - - - - - - - - -	
Tawallah Group	Masterton Fm. Ptn	Sandstone
	Wollogorang Fm. Pto	Dolomite, siltstone, sandstone
	Settlement Creek Volcanics Pte	Basalt, volcanic agglomerate, siltstone tuff
	Aquarium Fm. Ptq	Sandstone, siltstone, dolomite
	Sly Creek Sandstone Ptl	Sandstone
	McDermott Fm. Ptd	Dolomite, sandstone
	Peters Creek Volcanics Ptp	Basalts, intermediate to acid volcanics, tuff
	Westmoreland Conglomerate Ptw	Sandstone, arkose, conglomerate
	- - - - - - - - - - - Unconformity - - - - - - - - - - - - - - - - -	
	Granites Pgo	Granite
	Cliffdale Volcanics Plf	Ignimbrites, ash fall tuffs, rhyolite, breccias.

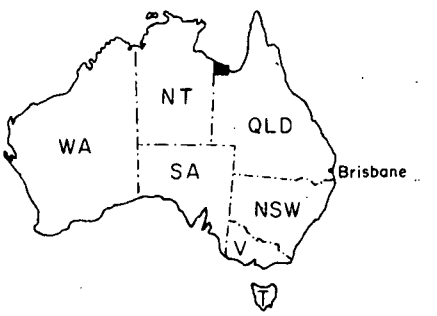
FIGURE 1



REGIONAL SURVEY AREA



DETAILED SURVEY AREA



Road

Detailed survey boundary

AIRBORNE SURVEY, WESTMORELAND, QLD 1973

FLIGHT – LINE SYSTEM

KILOMETRES 20 0 20 40 60 KILOMETRES

MILES 10 0 10 20 30 MILES

To Accompany Record No. 1973/137

E54/BI-63A

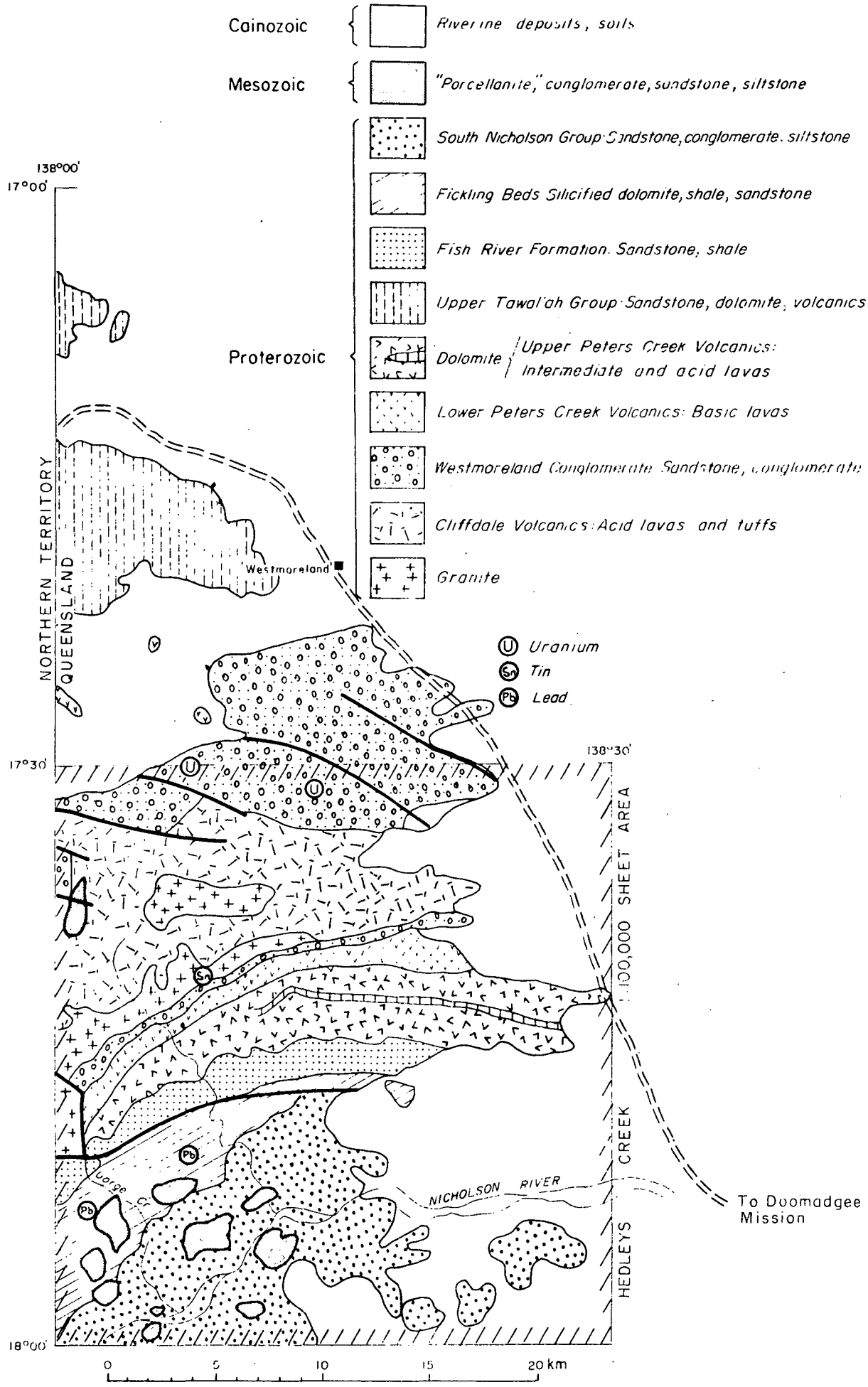


FIG. 2. GEOLOGY OF WESTERN PART OF WESTMORELAND 1:250,000 SHEET AREA (AFTER SWEET 1972)