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DEPARTMENT OF NATIONAL DEVELOPMENT.

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS.

RECORDS:

1964/68

REPORT ON PHOTO-INTERPRETATION OF THE PORT KEATS AND CAPE SCOTT 1:250,000 SCALE SHEETS.

by

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SUMMARY

The photogeological study of the Port Keats and Cape Scott 1:250,000 scale Sheet areas has delineated Lower Proterozoic formations in the form of two strongly folded ridges, with a north-north-east direction, overlain on the east by Upper Proterozoic and Cretaceous formations, and to the north probably intruded by granite.

West of the Lower Proterozoic ridges lies the eastern flank of the sedimentary Bonaparte Gulf Basin (Port Keats Group).

On the Cape Scott Sheet there is a small area covered by horizontal formations considered as Lower Palaeozoic.

Two main directions of faulting are apparent, the first north-easterly parallel to the folded ridges, and the second north-west.

GENERAL STATEMENT

The photogeological study of the Port Keats and Cape Scott Sheets has resulted in the differentiation of a number of photogeological units as shown in the legend (page 3).

Reference was made to the following literature:- "The Geology of the Ord-Victoria Region, Northern Australia" by D.M. Traves (1955), the "Tectonic Map of Australia" at 1:2,534,400 scale, the 1:250,000 scale geological map of Pine Creek with explanatory notes by E.J. Malone (1962) and 1:250,000 scale geological map of Fergusson River with explanatory notes by M.A. Randal (1961). The latter two areas join the sheets referred to in this report to the east.

The quality of the available photographs is very poor, mainly on Cape Scott Sheet, and with better photographs more information could have been obtained.

PHYSIOGRAPHY

As a result of this study and previous geological mapping on Fergusson River and Pine Creek Sheets, it is possible to divide the area into six physiographic units:- the Tablelands, the Wingate Plateau, the Uplands, the Plains, the Lowlands and the Mesas.

The Tablelands extend from the Fergusson River Sheet to the south-east corner of the Port Keats Sheet, and are followed immediately to the north by the extension of the Wingate Plateau. To the west are the Uplands formed of two broad Proterozoic (P2) ridges, the eastern one being partly concealed beneath the Wingate Plateau, and continuing to the north on to the Fergusson River and Pine Creek Sheets. The western ridge continues on to the Cape Scott Sheet where it is broken by the wide valleys of the Daly and Reynolds Rivers; in the north it reappears as a short narrow ridge (Murrenja Hill - Mt. Johns).

The Plains unit, the extension of the Western Plains of the Pine Creek Sheet, occupies the whole of the eastern part of the Cape Scott Sheet, and the north-east corner of the Port Keats Sheet.

The Lowlands unit corresponds closely to the area occupied by rocks of the Port Keats Group.

The Mesas are well developed near Port Keats Mission and in the Docherty Hills area, and the probable reason for their existence is the lateritisation of the Cretaceous rocks.

STRATIGRAPHY

The stratigraphical names used herein are taken from the literature. Because our litho-stratigraphical boundaries may not coincide with field observed geological limits, the symbols used refer only to the general periods rather than to specific formations.

LOWER PROTEROZOIC B1 - B2

These formations are divided into two subdivisions based on the photogeological character and also on the factthat Pz appears to lie unconformably on B1.

B1 occupies topographically flat lying areas and shows continuous trend lines. It is possible that B1 is Archaeozoic.

B2, forms the two broad north-north-east trending ridges of folded rocks on the Port Keats Sheet. The eastern ridge is overlapped by the Cretaceous cover but its presence may be inferred from some trends. Close to the eastern limit of the sheet it reappears and can be followed on the Fergusson River and Pine Creek Sheets. The western ridge continues on Cape Scott Sheet and progressively disappears. In the north of this sheet a short and narrow ridge (Murrenja Hill, Mount Johns) is certainly the continuation of this ridge.

LEGEND

Photogeological Character	Symbol	Possible Geological Interpretation	
	Q	Alluvium QUATERNARY	CAINOZOIC
	Cz	Cover Undifferentiated	CAINOZOIC
Grey tone, thin formation, always covered by vegetation, forming a low scarp.	K		CRETACEOUS
	Unconformity		
Grey tone, soft formation, in places well bedded.	Pk	Port Keats Group	PERMIAN
	Unconformity		
Grey tone, soft formation, in places forming a low scarp. (Cape Scott Sheet only).	Pzl		LOWER PALAEOZOIC
	Unconformity		
Grey tone, very well bedded and scarp forming. (Port Keats Sheet only)	B3	Sandstone	UPPER PROTEROZOIC
	Unconformity		
Grey tone, showing generally rounded form.	g2	Intrusive rocks (Granite, Gabbro ....?)	
Grey tone, low hills in places, characteristic drainage pattern.	g1	Granite ...?	
	Unconformity		
Grey tone, strongly folded formation.	B2	Sandstone	LOWER PROTEROZOIC
	Unconformity		LOWER PROTEROZOIC
Grey tone, forming plains and showing continuous trend lines.	B1		LOWER PROTEROZOIC
	U	Undetermined	

UPPER PROTEROZOIC B3

This is recognised only in the south-east corner of the Port Keats Sheet. It includes formations of the Victoria River and Tolmer Groups which have been mapped on the adjoining Fergusson River Sheet (Randal, 1961).

In the field it may be possible to see the angular unconformity with B2 in the scarp made by B3 along the wide north-north-east trending valley between B2 and B3. At the northern end of this valley there is evidence of an unconformity on the photos.

On Run 10, Photo 5076-8 and on Run 11 Photo 5080 is a scarp-forming unit which may be equivalent to the Tolmer Group. (Fergusson River Sheet). However it is shown with B3 symbol although separated by a boundary. Within the area mapped as K, some beds are shown which probably indicate B3 under a thin Cretaceous cover. It is probable that inliers of B3 may be found within the K area, and this could explain the apparent discrepancy between the photogeological sheet and the published Fergusson River map.

LOWER PALAEOZOIC Pz1

This formation was recognized on Cape Scott Sheet only. The symbol Pz1 was preferred following the "Tectonic Map of Australia" rather than the one used on the Pine Creek sheet. An examination of the photographs covering Pine Creek area confirmed the presence of a nearly horizontal formation in which, according to Malone (1962) Cambrian fossils were found.

PORT KEATS GROUP Pk

The rocks of the Group are found west of the P2 ridges. Wide areas on the map although shown as Pk may be obscured by superficial cover, and on the higher hills Cretaceous may be present. An attempt was made to subdivide the Group into units in order to obtain more information about the general structure, but unfortunately the poor quality of the photos, the cover and the softness of the units themselves made this work impossible.

The coastline was studied very closely, and particularly the cliffs, hoping to find evidence of some tectonic movements. It is possible that the direction of some dips is wrong because observations were hindered by the Cz cover, (for example around Anson Bay). Unfortunately in several areas where the drainage would have been very helpful it was impossible to trace it. Bedding is indicated where possible, to show where the outcrops may be found.

It is possible also that close to the B2 ridges some older formations could be present but these could not be differentiated.

On Port Keats Sheet Run 2 Photo 5050, there is a thick formation similar in appearance to the Pk at Table Hill. This formation is regarded as Pk also and the locality may be a suitable place for measuring a section.

CRETACEOUS K

The Cretaceous lies unconformably on B2 and covers a wide area on the Port Keats Sheet, where it is difficult to differentiate it from B3.

On the Cape Scott Sheet in the Docherty Hills the Cretaceous overlies the Port Keats Group.

It is probable that some of the small hills close to Port Keats Mission are covered by K, but, to avoid confusion of boundaries with scarp symbols we preferred to leave it out.

COVER Cz.

As mentioned previously, wide areas of the map delineated as Pk may be obscured by superficial cover which is not shown. On the Cape Scott Sheet however, is a cover of somewhat different appearance that has been separated out as Cz.

UNDETERMINED U

On the Port Keats Sheet four areas are indicated as undetermined :- On Run 2 Photo 5053 a very small outcrop may be a sedimentary formation older than Pk;

On Run 3 Photo 5062, perhaps Archaean rock;

On Run 5 Photo 5133, perhaps Pk lying on B2;

On Run 5 Photo 5138, a boundary is drawn mainly round a tonal differentiation on the photo. This small area is close to the faulted north-north-west area and could be interpreted as an intrusive rock close to the surface.

IGNEOUS ROCKS g1 and g2.

g1 is the extension of the Litchfield Complex (Fergusson River and Pine Creek Sheets). Within g1 some areas of low hills have been separated by a probable boundary, and these may be part of a very old unit, such as the Hermit Creek Metamorphics. West of Murrenja Hill g1 has an appearance slightly different from that of g1 elsewhere. g2 appears to be younger than g1 and probable intrusive e.g. at Hermit Hill (Cape Scott Sheet).

On the Port Keats Sheet two possible dykes trend north-east, one on Run 7, Photo 5206 in the Port Keats Group and the other on Run 3, Photo 5065 through the granite g1.

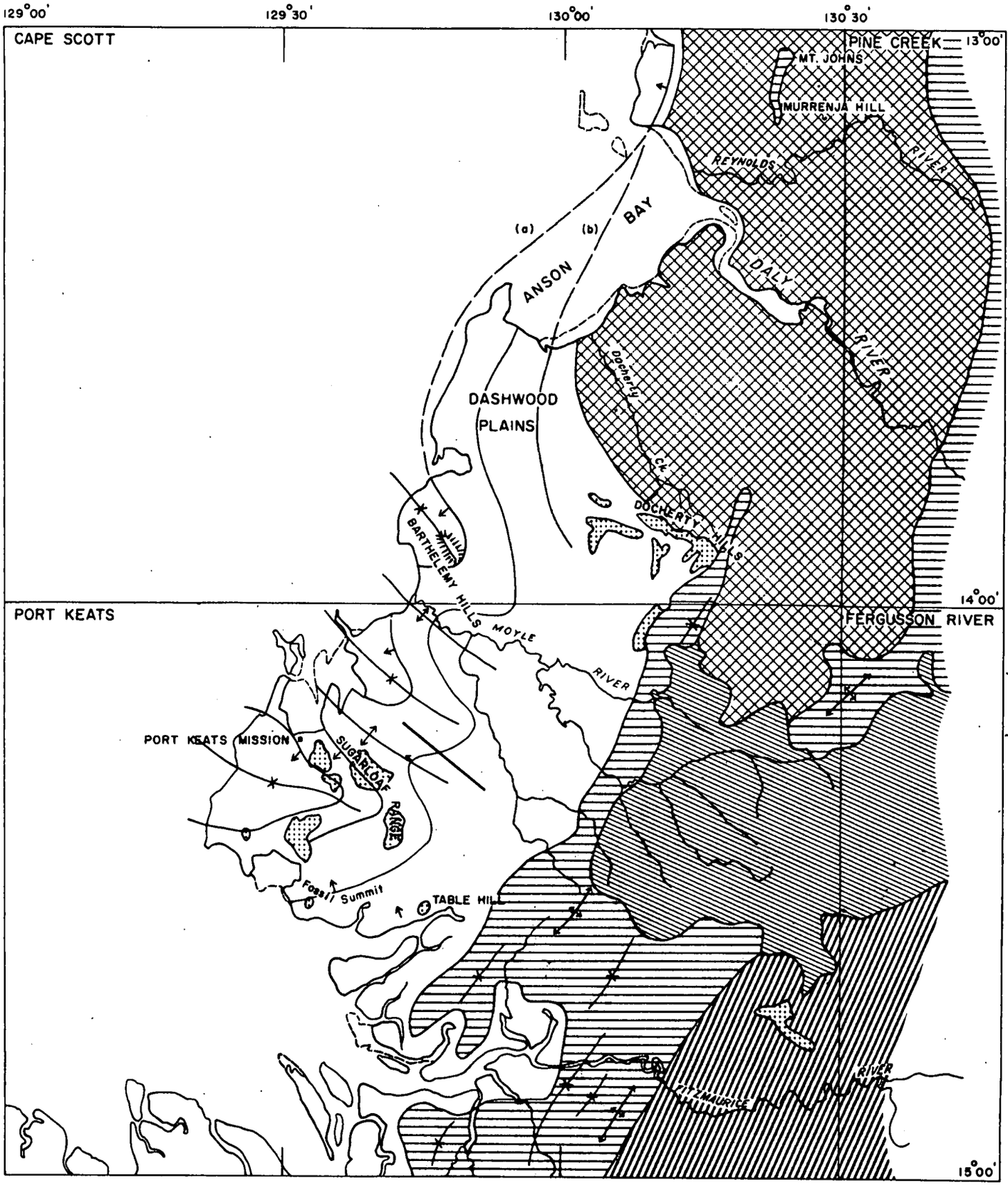
STRUCTURE

This is considered in three areas :-

B2, forming the Uplands is very strongly folded and the general direction of the axes is north-north-east.

East of the B2 Ridges on Port Keats Sheet B3 shows a general monoclinal form, very gently folded.

PHYSIOGRAPHIC and STRUCTURAL SKETCH MAP



SCALE 1 : 1,000,000

10 0 10 20 30

Lowlands

Wingate Plateau

Uplands

Mesas

Tablelands

Plains

Fault

Axis of Anticline showing plunge

Axis of Syncline

Trend line with prevailing dip

Bureau of Mineral Resources, Geology and Geophysics. March 1964.

D52/6 JdH

West of the B2 Ridges the Port Keats Group shows a general monoclinal form affected in places by gentle movements. South of Port Keats Mission is a syncline of which Sugarloaf Range forms the north-eastern flank (Fig.1).

North of this syncline two possible interpretations are offered ;-

(1) The formations with a general south-west dip form the northern flank of the syncline, and further north we would expect to find all the Pk group formations and probably older formations.

(2) Alternatively it may be that the northern area is affected by a fold movement expressed by two anticlines the axes of which trend north-north-west.

North of the Sugarloaf Range is the first anticline the northern flank of which is affected by the north-west trending faults.

The second anticline is situated in the Moyle Plain.

On Cape Scott Sheet these movements become more difficult to follow. However, the Barthelemy Hills area seems to show a synclinal fold, the northern flank of which may be the extension of the Pk sediments north of Anson Bay (see sketch map, broken line a). Alternatively, the latter may be stratigraphically below the Barthelemy Hills sediments (see sketch map, broken line b).

The Moyle River and the unnamed creeks to the north drain in an approximate west-north-west direction, whereas Docherty Creek flows in a more northerly direction. This phenomenon is perhaps because of the particular cover (Cz) previously mentioned, or because of the new direction taken by the Pk Group formations. A third explanation can be offered, that is, that close to Docherty Creek there is the limit of the Pk Group formations lying unconformably on some older formation perhaps the extension of the Pzl or the extension of the granite g1.

CONCLUSIONS

An important problem is the elucidation of the structure of the Port Keats Group. In this connection, field study of the coastal sections should provide useful structural information that is not obtainable from the air photos.

Field work is required to differentiate between rocks of the Victoria River Group, the Tolmer Group, and the overlying Cretaceous rocks on the Port Keats Sheet.

REFERENCES

TRAVES, D.M., 1955 - The Geology of the Ord-Victoria Region, Northern Australia. Bur.Min.Resour.Aust. Bull. 27.

MALONE, E.J., 1962 - Pine Creek 1:250,000 Geological Series. Bur.Min.Resour.Aust.Explan.Notes,D/52-8.

RANDAL, M.A., 1961 - Fergusson River 1:250,000 Geological Series. Bur.Min.Resour.Aust.Explan.Notes, D/52-12.

BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS

PORT KEATS
NORTHERN TERRITORY

AUSTRALIA 1:250,000
PHOTOGEOLOGICAL SHEET D 52 – 11

REFERENCE

Photogeological Character			Possible Geological Interpretation	
	Q	Alluvium	QUATERNARY	CAINOZOIC
	Cz	Cover	Undifferentiated	CAINOZOIC
Grey tone thin formation always covered by vegetation, forming a low scarp	K		CRETACEOUS	
Unconformity				
Grey tone, soft formation, in places well bedded	Pk	Port Keats Group	PERMIAN	
Unconformity				
Grey tone, very well bedded and scarp forming	P3	Sandstone	UPPER PROTEROZOIC	
Unconformity				
Grey tone, showing generally rounded form	g2	Intrusive Rocks (Granite Gabbro.....?)		
Grey tone, low hills in places, characteristic drainage pattern	g1	Granite.....?		
Unconformity				
Grey tone, strongly folded formation	P2	Sandstone	LOWER PROTEROZOIC	
Unconformity				
Grey tone forming plains and showing continuous trend lines	P1			
	U	Undetermined		

- Lithological boundary
- Probable lithological boundary
- Anticlinal axis
- Synclinal axis
- Fault
- Probable fault
- Edge of bed
- Probable edge of bed
- Edge of bed expressed as scarp

Estimated dips

- Horizontal
- Very low
- Low
- Medium
- Steep
- Vertical

- Trend line
- Joint pattern
- Topographic scarp
- Laterite (L), Terrace (T), Scree (S)
- Dyke

- Principal road
- Minor roads and tracks
- Railway line
- Telephone line
- Fence
- State boundary
- Mine
- Homestead
- Yard
- Windpump
- Airport or Airfield, Landing ground
- Bore
- Tank
- Well
- Spring
- Waterhole
- Dam
- Photo-centre points
- Photo-centre points-adjoining sheet
- Sand dune
- Swamp
- Mangroves

Compiled by the Bureau of Mineral Resources, Geology and Geophysics.
Detail adjusted to photoscale compilation prepared by the Division of National Mapping, Department of National Development.
Aerial photography by Royal Australian Air Force; complete vertical coverage at 1:46,000 scale
Transverse Mercator Projection.

SCALE 1: 250.000

5 0 5 10 15 MILES

5 0 5 10 15 20 KILOMETERS

INDEX TO ADJOINING SHEETS

	CAPE SCOTT	PINE CREEK
MEDUSA BANKS	PORT KEATS	FERGUSSON RIVER
CAMBRIDGE GULF	AUVERGNE	DELAMERE

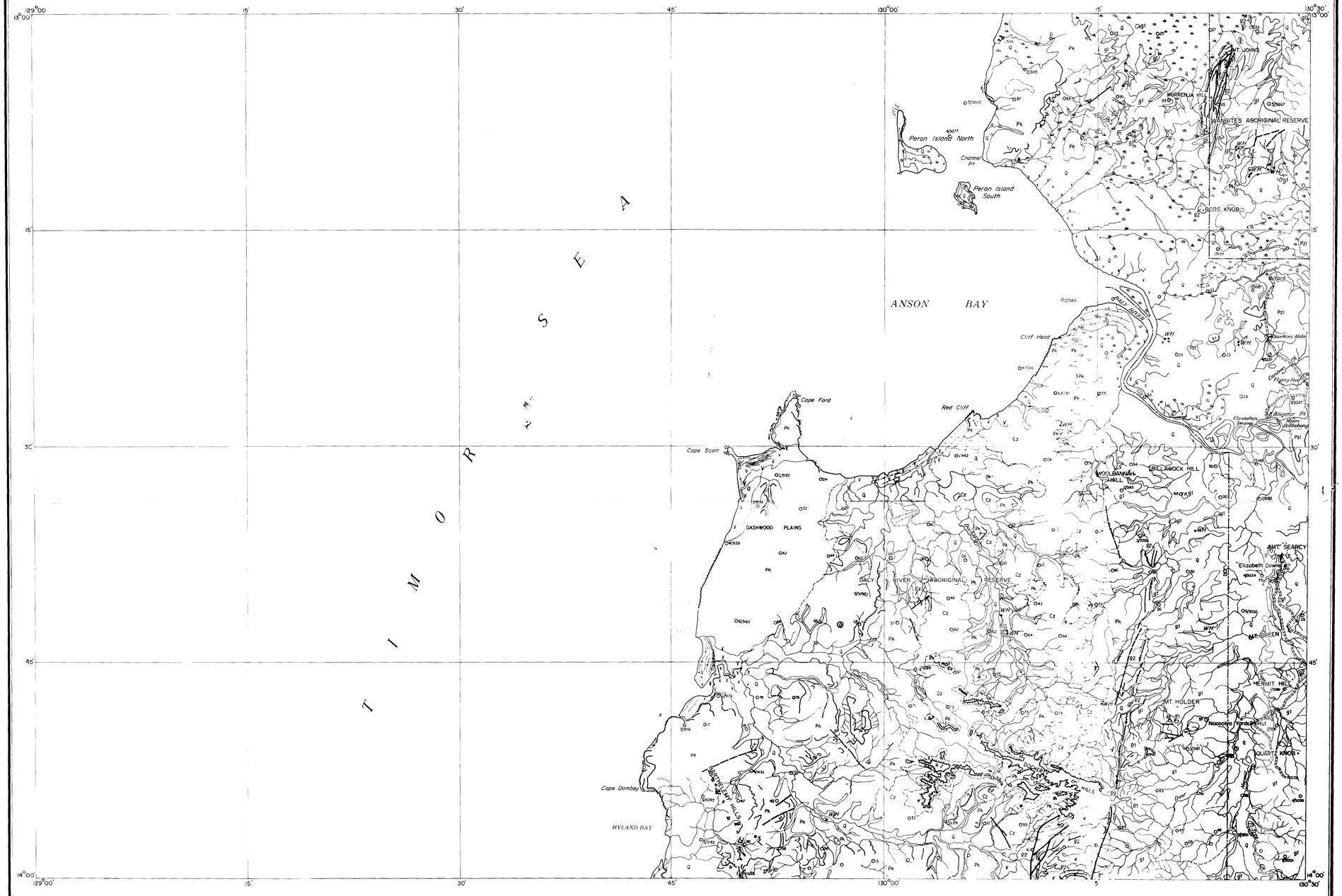
Photo-interpretation by the Photogeological Section, Bureau of Mineral Resources, Geology and Geophysics 1964
Interpreted by: R.Richard, Institut Français du Pétrole
Drawn by: J.Posman

D52/A11/1

BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS

CAPE SCOTT
NORTHERN TERRITORY

AUSTRALIA 1:250,000
PHOTOGEOLOGICAL SHEET SD52-7



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Unconformity				
Grey tone, showing generally rounded form	g2	Intrusive Rocks (Granite Gabbro.....?)		
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Grey tone, strongly folded formation	E2	Sandstone	LOWER PROTEROZOIC	
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Grey tone forming plains and showing continuous trend lines	E1		LOWER PROTEROZOIC	
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Transverse Mercator Projection.

SCALE 1:250,000

5 0 5 10 15 MILES

5 0 5 10 15 20 KILOMETRES

INDEX TO ADJOINING SHEETS

	FOG BAY	DARWIN
	CAPE SCOTT	PINE CREEK
MEDUSA BANKS	PORT KEATS	FERGUSSON RIVER

Photo-interpretation by the Photogeological Section,
Bureau of Mineral Resources, Geology and Geophysics 1964
Interpreted by: R.Richard, of the Institut Français du Pétrole
Drawn by: R.J.Molloy

D52/A7/1