COMMONWEALTH OF AUSTRALIA.

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GEOLOGY AND GEOPHYSICS.

RECORDS.

1954/57

NOTES ON A GEOLOGICAL SKETCH MAP OF CORONATION HILL AREA NORTHERN TERRITORY

by

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CANBERRA, A.C.T.

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GENERAL

The area shown in the accompanying geological sketch map, No. NT63/9, was surveyed in 1953.

The mapping was carried out by using a grid marked out with improvised survey pegs at intervals of 100' along magnetic bearings N-S and E-W. The average error in this grid was quite small.

The datum for the grid was chosen to coincide with that of the base line of the Coronation Hill plane table survey.

Contours are based on levels obtained by aneroid barometer.

GEOLOGY

Upper Proterozoic Formations

The uppermost formation is a sandstone which is white, medium grained, and contains numerous bands of rounded quartz pebbles.

Immediately beneath this is a conglomerate, which is composed of large irregular fragments of porphyry and shale together with fragments of other underlying formations, set in a ferruginous highly weathered matrix.

This sandstone and conglomerate may be formations of the Mt. Callanan Group.

Unconformably underlying this conglomerate is a dark reddish porphyry of trachytic composition (White, 1953). The unconformity is not clear in the area but has been established in the area six miles south-east of Coronation Hill (White and Drew, 1953).

In the Coronation Hill area volcanics, a distinctive sandstone and a conglomerate, may represent formations of the Edith River Group although this is by no means established. The Porphyry already mentioned is part of a volcanic sequence represented more fully elsewhere.

A red, sericitic, medium grained sandstone underlies this porphyry. This sandstone contains ill-sorted irregular quartz grains in a fine arkosic matrix. Specimens examined from the area of mineralization were found to be cut by veins which contained quartz, barite, haematite, and flourescent wavellite.

Another conglomerate, composed of well rounded quartz fragments in a siliceous matrix, underlies this red, sericitic sandstone.

/Underlying

Underlying this conglomerate is a very altered formation which originally could have been either sedimentary or volcanic. It is apparent from thin sections examined that a good deal of secondary silicification has occurred.

The tuffs and slates in which the uranium occurs probably underlie the silicified formation just described but since no contact or other means of determining relative age was observed the age of these cannot be stated.

Lower Proterozoic Formations

The oldest rocks in the area were mapped as brown shales and these are unconformable beneath the overlying rocks. They were mapped as two formations, one being a fine grained greenish to brown shale; the other is a banded formation which is composed of alternate bands of white silica and brown shale up to an inch in thickness. The nature and origin of this rock has been described in some detail (White, 1953).

Igneous

The age relationships of the igneous rocks in the area are difficult to determine, and with the exception of the red porphyry no attempt has been made to do this.

The fine grained quartz porphyry is an altered and silicified rock with hornblende phenocrysts replaced by finely crystalline chlorite. This resembles a similar rock in some of the drill core thin sections.

Diorite, which outcrops in this area, occurs elsewhere in the region. This has been described by White (1953).

Outcrops of a dark grey, fine grained, massive rock, occur in isolated patches and have not been related to the other rocks in the sequence either lithologically or otherwise. Thin sections have revealed that it is composed almost entirely of chlorite, with veins and amygdales of calcite. This rock has evidently undergone a good deal of alteration and its origin was difficult to determine. It was mapped with the igneous rocks as it may possibly have been derived from a dyke rock of basic composition.

The rhyolites outcrop over a wide area and a typical one has been described from specimen C.6.

DESCRIPTIVE NOTES ON ROCK SPECIMENS

The position of samples are given as co-ordinates in feet from Map Datum on plan No. NT63/9.

C1 Red Sericitic Sandstone (0470W-0390S)

Consists of fragments of felspathic sandstone surrounded by a mass of radiating fibrous red mineral, which is probably barite. A colourless to pale blue mineral in veins cutting across the sandstone fragments and the radiating red mineral is probably apatite. The sandstone fragments consist mainly of irregular quartz grains with some fine interstitial material containing sericite. Fine hematite is scattered throughout the rock.

C2 Red Sericitic Sandstone (Rubble scattered around 0500W-0480S)

Consists largely of irregular quartz grains rather angular and from 0.01 to 0.1 mm. in size. Iron staining is abundant throughout particularly in the region of the quartz grains. The interstitial material contains sericite probably from altered felspars, and this occurs as component grains and as finely crystalline material. Thin veins throughout the rock contain a mineral which is flouresecent under the UV lamp and optical and chemical tests have shown it to be wavellite.

C2C, C2D Red Sericitic Sandstone (Rubble scattered around 0500W-0480S)

Consists of mineralized sedimentary material. The mineralization is hematite, quartz, and wavellite.

C4 Uranium bearing Siliceous Tuff (0120W-0460S)

Consists of very fine grained siliceous irregular particles in which patches of chloritic material are present. Fine veins of quartz are to be found throughout the rock and associated with these are grains of Autunite. Iron staining is prominent throughout although mainly confined to the chloritic patches particularly at the borders.

C5A Chlorite Calcite Rock (1700E-2150N)

Consists mainly of chlorite showing a fine fibrous fan-shaped structure and dark blue interference colours. Thin veins of calcite occur throughout together with isolated patches of this same mineral scattered abundantly throughout the rock.

C5B Chlorite Calcite Rock (1700-2150N)

This rock is very similar to C5A except the structure is more lineated. This structure consists of interbedded calcite and chlorite: this may have been produced by shearing.

C5C Chlorite Calcite Rock (1980E-0720N)

This consists almost entirely of equally abundant chlorite and calcite, but in addition some eroded felspar crystals are present. The boundaries of these felspare are surrounded by calcareous material and joints and fractures running through them are also of this mineral. This felspar is of andesitic composition. In addition ilmenite and leucoxene is present. The origin of this rock is difficult to determine but its field occurrence in small dark isolated outcrops indicates that it might be a dyke rock of basic composition.

/C6

C6 Rhyolite

This rock has been named a rhyolite on its structure which may be described as residual flow structure, recognisable but somewhat masked by subsequent alteration. Xenoliths of sedimentary fragments seem to be caught up in the original lava. These xenoliths include angular eroded quartz crystals and irregular patches of finely crystalline material showing characteristic colours of sericite. The ground mass of the rock is of extremely fine-grained quartz through which the flow structure is traced out by greenish chloritic material evidently rich in sericite.

Fine veins which are filled with fine grained sericite, traverse the flow direction.

C7A Silicified Sediment or Volcanic Rock (2820W-0070N)

This rock appears to be an altered fine-grained siliceous volcanic rock or sediment. Alteration has masked the original grain boundaries which are now only just discernable through the abundant mass of irresolvable material in which only extremely fine-grained sericite can be recognised.

Small quartz fragments show evidence of secondary silicification as these are surrounded by an aureole of this silica.

Hematite is finely disseminated throughout.

C7B Silicified Sediment or Volcanic Rock (0940W-1240S)

The general texture of this rock is similar to C7A but small differences are apparent. Most noticeable is the larger grain size and the presence of angular fragments of very fine chloritic material with thick hematite enrichment around their boundaries.

C8 Altered Volcanic Rock (3580E-1360S)

This rock contains large rounded eroded crystals of quartz which may originally have been phenocrysts. These are surrounded by rich hematite staining which in places has eaten cavities into the quartz. These cavities are rich in iron on the outside and in the centre a greenish mineral, probably chlorite, has formed. Apart from these altered phenocrysts the rock is very siliceous and although this siliceous material has undergone a good deal of alteration and masking with iron staining, areas of optical continuity indicate the bounderies of the original grains. The abundance of chlorite and iron is probably from the breakdown of hornblends and biotite.

C9 Fine Tuff or Slate (0140W-0270S)

The material of this rock is mostly too fine or too altered to be determined. The general appearance is greenish grey probably due to chloritic matter. Fine veins of sericite traverse the direction of bedding in this rock. Hematite is finely disseminated throughout.

C10A Brown Shale (1900E-2170N)

This is an extremely fine grained rock made up of quartz particles and an irresolvable green body mass which is probably chloritic. Fine veins are threaded throughout in all directions and some of these contain a little sericite in addition to the normal quartz.

/C10B

C10B Brown Shales (0050W-1580S)

Similar to C10A but with no recogniseable particles of quartz. The thin veins traversing this rock are of quartz containing a little scattered hematite.

C11 Fine Quartz Porphyry (1430E-0400S)

This rock has been somewhat altered and in naming it the assumption of its probable origin has been made. It consists of rounded and eroded quartz fragments and large areas of altered ferromagnesian minerals set in a very fine siliceous ground mass. These ferromagnesian minerals are entirely replaced by chlorite which is very finely crystalline. The fragments however are euhedral and examination of the angles indicates they were probably hornblende.

C12 White Cericitic Sandstone (2830W-0470W)

This sandstone is very different in appearance from that described in C1 since in hand specimen it is white and free from hematite. Thin section however reveals some similarity. This rock consists largely of medium size interlocking quartz grains with a matrix made up of very fine grained quartz containing areas of finely crystalline fibrous sericite.

Descriptions of thin sections of samples from DDH1

C31 Chloritic Tuff (43'0 to 43'3")

Consists mainly of chlorite which has a structure that could be interpreted as due to distorted bedding in which is embedded fragments of quartz. Richly disseminated throughout the chloritic material are small blebs of opaque hematite. The quartz fragments are made up of strained grains about 0.1 mm. or less, which in turn are made up of smaller irregular bounded crystals. The origin of this rock is obscure, but it may have been a basic tuff.

C32 Conglomerate (97'0 to 97'3")

The rock consists of coarse fragments of siliceous and chloritic material. The siliceous fragments are made up of irregular grains between 0.1 and 0.2 mm. bonded with a matrix that is largely sericitised and showing iron staining and a little chlorite.

Some of the chlorite replaces another mineral. The larger fragments of chloritic material are similar to the rock described in C31 except that the texture is finer and more homogeneous and the quartz fragments not so prominent. Quartz occurs in fine veins and cavities in these fragments.

C33 Conglomerate (134'6" to 134'9")

Consists mainly of fragments of quartz and calcite, with a little chlorite. The quartz fragments range in size from 1.0 to 0.1 mm. and constitute about 70% of the rock. Calcite occurs both as fragments and interstitially round many of the quartz grains.

C34 Conglomerate (170'6" to 170'9")

Made up of large rounded fragments of 1 to 3 cm.; the fragments vary in constitution and texture. One such fragment consists of irregular quartz grains from 1.0 to 0.1 mm. set in a calcareous matrix which also contain some chlorite. Another is similar to the sample C31 while yet another is of very fine quartz grains set in an irresolvable matrix.

/C35

C35 Chloritic Schist (173'3" to 173'6")

This consists almost entirely of pleochroic chlorite in which hematite is richly disseminated in fine particles. Sericite is present and also a pale green mica which occurs in patches bounding siliceous areas. These siliceous areas consist of very irregular grains 0.1 to 0.001 mm. The whole rock has fine quartz veins throughout and some of these contain hematite.

C36 Grey Porous Sandstone (177'0" to 177'3")

This is made up of irregular quartz grains 0.5 to 0.1 mm. in a matrix of greenish grey material which contains a pale green mica and sericite. In addition there are some fragments of chloritic matter and some scattered hematite.

C37 Hematitic Sandstone (274'0" to 274'3")

Mainly irregular quartz grains 0.5 to 0.1 mm. together with a little altered felspar. These latter give rise to the sericite which is finely crystalline and occurs across the face of the altered grains as well as interstitially. The matrix material is rich in hematite which is finely disseminated throughout but mainly along the margins of the irregular quartz veins occurring in the rock.

C38 Altered Tuff (283'0" to 283'6")

This rock was originally named an amygdaloidal lava. This is almost certainly a misnomer although the designation as an altered tuff cannot be assured.

The rock consists of eroded euhedral quartz crystals set in a ground mass made up largely of fine chloritic material, evidently an alteration product. This alteration has masked to a large degree the original nature of the rock, but some features can still be distinguished. The ground mass is not homogeneous but varies according to the original fragments of which it is made. The boundaries of these original fragments can be roughly traced in some cases. Areas of pure chloritic material may come from the alteration of euhedral hornblende, while other areas which cannot be resolved are probably of chlorite and sericite: this latter judged by its high colours. Some patches are distinctly siliceous, and these are probably due to originally siliceous fragments. In addition fine veins of quartz occur throughout due to later mineralizing processes that are common in the area. Hematite is abundantly scattered throughout.

C39 Fine Angular Conglomerate (296'0" to 296'6")

Mainly of sub-angular quartz grains set in a ground mass of variable detrital material, which in some cases is made up of fine siliceous grains but is mostly chloritic.

C40 Altered Sandstone (310'0" to 310'3")

Mainly of irregular quartz grains 2.0 to 0.1 mm. set in a matrix which although too fine to resolve appears to contain a little calcite. It is, however, mainly chloritic with disseminated hematite.

C41 Altered Sandstone (331'8" to 331'11")

This is similar to C40 except for less quartz and more chlorite.

/C42

C42 Chloritic Shale (345'0" to 345'3")

Consists mainly of chlorite with a little sericite and fine disseminations of hematite throughout.

C43 Fine Angular Conglomerate (386'6" to 368'9")

Composed of fine fragments of variable material but predominately quartz. The majority of fragments are fine grained 0.01 to 0.1 mm. stained with hematite. In addition to this more angular quartz fragments occur set in a matrix containing calcite, chlorite, and sericite.

C44 Hematite Breccia (378'0" to 378'6")

Contains eroded fragments of very fine grained material in which only quartz and sericite can be recognised. Interstitial to these fragments are rich seams of hematite with a little chlorite.

C45 Hematite Breccia (286'0" to 386'9")

Similar to C44.

C46 Ferruginous Sandstone (404'0" to 404'5")

Mainly of fine rounded quartz grains 0.1 mm. average, together with what are probably grains of felspar altered to patches of sericite. The matrix is mainly sericite and chlorite together with abundant hematite.

C47 Chloritic Sandstone (414'0" to 414'4")

Consists of medium grained siliceous fragments, angular and in general oriented to form definite bedding along the elongated direction of the fragments. The matrix is chloritic with a little sericite and hematite.

C48 Chloritic Sandstone (431'0" to 431'4")

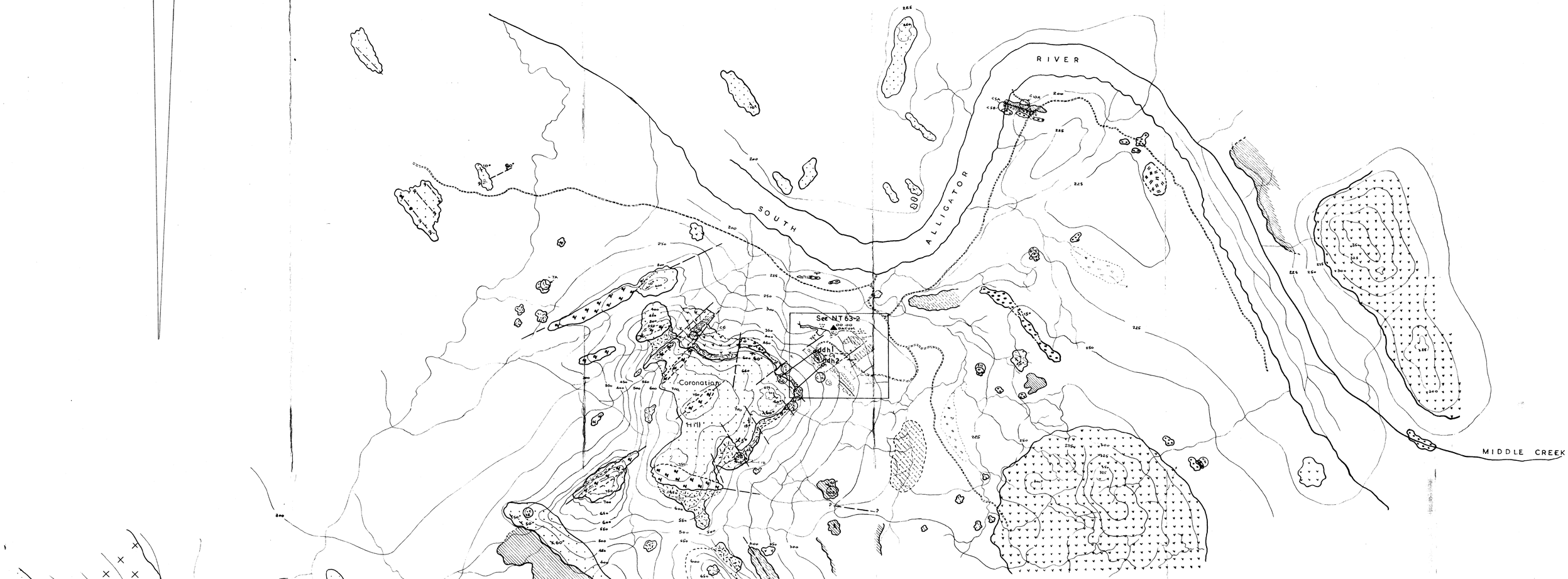
Mainly of very fine grained chloritic and sericitic material with a little quartz. Hematite is abundant throughout staining the rock a characteristic red.

C49 Sandstone (460'0" to 460'3")

Consists of fine grains of quartz irregular and rounded 0.1 to 0.5 mm. with matrix containing chlorite and sericite.

TRUE NORTH

MAGNETIC NORTH



GEOLOGICAL SKETCH MAP CORONATION HILL AREA

NORTHERN TERRITORY

SCALE 500 0 500 1000 1500 2000 FEET

Rock Sample

Water Course

Swamp

Vehicle Track

Contours

Outcrop Boundary

Probable Boundary

Silicified Cappings

Diamond Drill Hole

REFERENCE

UPPER PROTEROZOIC

- White Medium Sandstone
- Coarse Fragmentary Conglomerate
- Red Sericitic Sandstone
- Pebble Congl.
- Silicified Volcanics & or Sediments

?? LOWER PROTEROZOIC

- Tuffs & Slates
- Brown fine grain Silica Replaced Shale
- Brown fine grain Shale

IGNEOUS

- Porphyry
- Fine Qtz Porphyry
- Rhyolite
- Diorite
- Calcitic Chlorite Bed

DATE July - October 1953

COMPILED R.A. Britten.

RELIABILITY

HORIZONTAL Control by plane table & tape

VERTICAL Control by barometer ± 20'

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