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GEOLOGY AND GEOPHYSICS.

RECORDS.

1957/19

INTERIM REPORT ON THE GEOLOGICAL RECONNAISSANCE OF THE
AIFUNKA-RAIPINKA AREA, KAINANTU SUB DISTRICT

by

G. Siedner

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GENERAL

The geological reconnaissance of the Aifunka-Raipinka area, during August-September, 1956, was conducted in conjunction with a detailed plane-table survey of the gold-magnetite lodes at Aifunka crater. The purpose of the reconnaissance was chiefly exploratory and to obtain a general picture of the geology, as a basis for planning detailed mapping in the future.

The area as a whole was mapped on a regional scale - directly onto aerial photographs - but certain localities were mapped in greater detail by tape and compass. The aerial-photo coverage consisted of one trimetrogon run from Hengenofi to Aiyura. A base map was prepared by the radial-line method.

Points a, b, c and d on the map refer to the principal points of A.P.'s Aiyura-Chimbu 13-V, 14-V, 15-V, and 16-V respectively. The letter suffixed to a location symbol (e.g. "c" of S 29/c) indicates that point S/29 is to be found on A.P. 15-V, whose P.P. is "c".

At the time of writing, no microscopic study of the Kainantu rocks has been made, therefore all names and descriptions must be considered essentially ad hoc field terms - based entirely on megascopic features.

STRATIGRAPHY AND PETROGRAPHY

The following table shows the tentatively proposed sequence of units mapped in the course of the reconnaissance.

Lake Beds	: boulder and gravel beds, sand and clay beds.	} PLEISTOCENE
Volcanics	: (not in proper sequence) agglomerate flows {dacitic {andesitic hypabyssal : biotite andesite (Munefinka) basic dykes and sills	} LATE TERTIARY
Intrusives	: gabbro granodiorite	
Ornapinka Sediments:	shale, siltstone, quartzite, shaly grit, greywacke, conglomerate, basalt (?).	} EARLY TERTIARY(?) (Mio/Pliocene)
Metamorphics:	indurated shale phyllite mica schist, quartz-garnet-mica schist quartz-felspar-mica schist quartz-felspar gneiss	} MESOZOIC (?)

LAKE BEDS

The Lake (or Kainantu) beds are the youngest sediments in the area mapped - overlying all other units. They form extensive terraces throughout the low-lying reaches of the Upper Ramu River and its tributaries. In the Kainantu valley, this terrace - sloping evenly down towards the NE - has been dissected by the present Ramu drainage.

These sediments - estimated by Mackay to have a maximum thickness of 100 feet - comprise boulder and gravel beds, interbedded horizons of sand and clay and, in the vicinity of Raiapinka crater, layers of fine volcanic agglomerate.

Conspicuously present in the wash is a coarse blocky quartz gravel which characteristically exhibits striations suggestive of having been recently derived from a vein environment. Most of the alluvial gold mining in the area is connected with this quartz gravel, which forms particularly rich terraces along Ornapinka, Efontera, Barola and Nasananka Creeks, as well as in numerous unnamed tributaries.

In some localities, e.g. S 27a/b and in Efontera Creek (not shown on map), an older boulder wash - comprising mainly granodiorite and volcanic boulders and pebbles - forms part of the sequence. This unit contains very little blocky quartz, although carrying good gold values. The gold is typically large and sluggish and may have been derived from magnetite lodes on the hill immediately to the NW of it. But this suggestion must be checked against the distribution of gold finenesses throughout the area - when these become available.

VOLCANICS

In the area mapped, extensive volcanics are distributed along a belt - $\frac{1}{2}$ to $1\frac{1}{2}$ miles wide - and are marginally overlapped by the Lake Beds. While the true extent of the local volcanics cannot be accurately determined, there is evidence of contemporary vulcanism extending far beyond Aiyura in the SE. Considerable extension to the NW is indicated by isolated outliers in that direction.

The source of these volcanics is several vents lying on an approximately straight line trending NE-SW. The remnants of these vents form a chain of hills, up to 1500 ft. higher than the surrounding alluvial terraces. Their vent-like configuration first became obvious from the study of aerial photos. The altitudes of associated flows and tuffs completely confirmed this suggestion.

The volcanics consist, in the main, of flows in the andesite-dacite range of composition. These rocks are fine-grained, white when fresh, weathering to yellow, brown, red, purple. Often associated with the andesite - especially in regions where lode-gold is found (S 9/b, S 38/b Aifunka North-ridge) - is a light-grey, very fine-grained rock having a siliceous character and fine pyritic veins. Its composition is not known, but its appearance and occurrence suggest a chilled phase of the andesite flows.

Considerable thickness (at least 150 feet) of thinly bedded (seldom wider than 1") tuffs overlying the flows, indicates an explosive finale to the volcanic epoch.

These tuffs vary in colour from yellow through brown, red, purple to black, and were previously mapped as sediments, which they closely resemble. Close examination, however, revealed evidence of vulcanism (thin flows of the fine-grained rock of S 9/b which weathers to reddish ochre, and rare volcanic breccia remnants on the Moki road.

A type widely associated with the andesitic flows is a basic rock of basaltic character, having large porphyritic pyroxene (sometimes minor quantities of feldspar) in a dark, fine-grained matrix (S 1/b, S 8/b, S 32/b, S 38/b, S 47/b). A fine dissemination of pyrite is generally present, often within the pyroxenes. The great depth of weathering and the general absence of contacts combine to obscure the mode of emplacement of the rock. In one locality (S 47/b), however, it occurs as a flow approximately 4 feet wide, traceable over some 140 feet.

Another basic rock intrudes the volcanics at S 10/c as a dyke or sill. It comprises mainly pyroxene with accessory olivine and has a hypidiomorphic texture.

Gold mineralization in the Aifunka-Raiapinka area is associated exclusively with the andesitic volcanics. The gold is invariably accompanied by iron-ore gangue with which it forms fairly regular orebodies in rough parallelism with the attitude of the flows. Frequent and abundant presence of pyrite - especially in fresh specimens - points towards an original pyrite lode from which the hematite and magnetite are derived. At Barola Reef South (S 38/b), an iron-rich garnet occurs together with the gold-magnetite lode. Transgressing and partly assimilating the garnet-magnetite-andesite rock is a small sill-like body of a basic, porphyritic rock. Proximity of the large gabbroic body east of Aifunka Crater, suggests the possibility of a genetic relationship with the basic, porphyritic flows and dykes enumerated above.

Mt. Munefinka, west of Aifunka, is a prominent land mark rising to 6,700. It is a coarsely porphyritic pyroxene-biotite-andesite containing large (up to 5 mm.) feldspars, and smaller phenocrysts of biotite and pyroxene - all in a fine, light-grey matrix. Large (up to 7.5 mm.) rounded amygdales with a radial structure are prominent and free quartz is a minor constituent. The nature of its rock, as well as its configuration, strongly suggest that Munefinka is the remnant of a volcanic plug or pipe which, in its extrusive period, may have produced some of the andesitic flows or breccias in the vicinity.

INTRUSIVES

Immediately east of Ainfunka, outcropping in a fairly large land-slip is a gabbroic body of considerable size. The rock is hypidiomorphic in texture, coarse-grained, and consists chiefly of pyroxene with subordinate feldspar and possibly, olivine. No quartz was seen macroscopically. A rough schistosity is sometimes observable. There is only a very slight variation in the relative proportions of pyroxene and feldspar but the grain size changes considerably: from ca. 4 mm. at S 40/b to ca. 2 mm. at S 41/b.

Capping the gabbro, near the top of the slip, is a coarse volcanic agglomerate, containing bombs (up to 18" diameter) and smaller angular fragments. This agglomerate is deeply weathered but is identical in appearance to the weathered gabbro, i.e. a mottled white and red clay. It

is reported that gold was won by prospectors in streamlets heading from the gabbro. About 20 dishes were washed by myself, using in situ weathered gabbro, wash from the bottom of the slip (near S 41/b), and numerous small streams in the vicinity. No trace of gold was found.

East again of the gabbro is a mass of granodiorite. A fresh outcrop in situ occurs at S 18/b and in some nearby streams, but the weathered rock forms prominent hills approx. 1/3 mile to the east. The granodiorite has a coarse-grained (up to 6 mm.), hypidiomorphic texture. The dominant mineral is the plagioclase; pyroxene and quartz are abundant and minor quantities of biotite are present. A vague schistosity, due to lineation and segregation of Fe-Mg minerals, may be seen.

The intrusive relationship between the gabbro and the granodiorite is not yet known.

SEDIMENTS AND METAMORPHICS

The rocks of sedimentary origin in the Aifunka-Raiapinka area were mapped by Mackay (1953) as consisting entirely of metamorphics - probably of Palaeozoic age. Closer examination, however, indicated the presence of two fairly distinct groups: (a) slightly or unmetamorphosed sediments of a strongly arenaceous character, outcropping chiefly in Ornapinka and Barola Creeks; and (b) intensely metamorphosed phyllites and schists, occurring in the hilly region in the west and on the hill NW. of Raiapinka. Furthermore, the two groups appear to be separated by an unconformity - the steep irregular dips of group (b) contrasting significantly with the regular attitude of the group (a) sediments.

The groups will, therefore, be treated singly and, although no chronological evidence has been found tentatively assigned to the (a) early Tertiary and (b) Mesozoic periods respectively.

(a) SEDIMENTS

The rocks considered in this group have been observed to extend from the Ornapinka-Ramu junction to the Ornapinka-Barola junction and about 1 mile up Barola Creek. Apart from their regional attitude (strike NEN-SWS, dip 40°-50° to SE), they are very little distorted. The basal shales are somewhat sheared and occasionally have a phyllitic character. Their total thickness, in the area under discussion is approx. 5,000 ft.

The following units (in order of deposition) were recorded:

- Shale (S 29/b) - micaceous, well cleaved; locally intruded by dykes.
- Basalt (S 49/b) - chilled; very fine-grained; black; local contamination and breccia.
- Shaly grit (S 8/c) - black
- Conglomerate (S 34/b) - coarse; micaceous pebbles of schist, quartz, volcanic rock.
- Siltstone (dark, well-bedded) and grits alternating with conglomerate (S 34/b -- S 7/c.)
- Quartzite, siltstone, and micaceous shales alternating (S 6/b).

(In Ornapinka Creek there now begins a succession of phyllitic shales and phyllites, with the same attitude as the above sediments, up to the junction with Barola Creek. Between S 4/c and S 3/c there is a marked discontinuity: high-grade metamorphism, extensive lit-par-lit injection by basic dykes and quartz veins, irregular attitudes. The sequence can, however, be continued in Barola Creek).

Grit or metasomatised tuff (S 9/d) - thinly bedded, with a fine dissemination of pyrite, and carbon at the interfaces. A more massive variety has abundant mica.

Quartzite (S 10/d) - vaguely stratified.

Greywacke (S 11/d) - locally micaceous.

Conglomerate (S 1/d) - silicified; injected lit-par-lit by coarse grained, felspathic material. Alternates with coarse grits and siltstone.

(b) METAMORPHICS

Owing to intense folding and irregular attitudes, a depositional sequence cannot be given at this stage.

Shales (S 5/d, S 13/d) - black indurated shales with lit-par-lit quartz stringers and transgressively injected by igneous material.

Phyllites (S 5/d, S 17/d, S 4/c) - black and brown; micaceous; injected lit-par-lit by quartz stringers, $\frac{1}{8}$ " to 2" wide.

Mica Schist (S 23/b, S 26/b, S 28/b) - purple; fissile; thinly bedded.

Quartz-garnet (?) - mica schist (S 17/d) - grey-green; thinly bedded; intensely metamorphosed; streaky with augen of quartz and garnet (?), abundant biotite.


Quartz-felspar-mica schist (S 15/d) - white, thinly bedded medium-grained, abundant muscovite.

Quartz-felspar gneiss (S 15/d) - irregular streaky lenses of quartz and felspar separated by muscovite. Coarse grained (up to 8 mm.).

STRUCTURE

The controlling structural feature in the area mapped is, without doubt, the regional attitude of the Tertiary(?) sediments. Ornapinka Creek becomes a strike stream as it passes from the metamorphics into the overlying sediments; more significant is the parallelism shown by a line joining the vents, the direction of elongation of Munefinka, and the NEN strike of the sediments. The dyke at S 10/c also follows this trend.

It is doubtful, however, whether the "strike" of the orebodies at Aifunka - in general agreement with the NE regional strike - could be attributed to the structural control of the sediments. Present evidence, although by no means conclusive, indicates a genetic relationship between the gold-magnetite lodes and the andesitic volcanics. In this case, their attitude is a function of their volcanic host rock - it being likely that the lodes were emplaced fairly late in the volcanic sequence of events.



The presence of garnet in the Barola South lode, at S 39/b, opens the possibility of it being connected with the gabbro body to the east (olivine-gabbro-garnet-omphacite eclogite). This aspect will have to await detailed petrological work before being discussed further.

ECONOMIC.

GOLD AND SILVER

Gold and silver are the chief minerals mined in the district - the latter being a by-product in the extraction of gold.

The only lode mine in the area is operated by Buchanan and Bloomfield at Aifunka. The gold-magnetite lode is associated with the andesitic volcanics, generally conforms to their attitude, is rarely transgressive. The fineness of the gold extracted between October 1955 and September 1956 is as follows:

Average - 885.6; maximum - 940; minimum - 785.5 parts

Alluvial mining is practised extensively throughout the area - the gold being derived mainly from the Pleistocene Lake beds.

T. Ubanks, who is operating a hydraulic claim in Barola Ck., obtained gold of the following fineness (July 1955-July 1956):

Average - 833.4; maximum - 853; minimum - 825 parts

N. Stagg's claim is on one of the tributaries of Ornapinka Creek near Raiapinka mission. He is, at present, obtaining his gold from fine pyroclastic deposits containing sandy and clayey members. These deposits overlie the lake-beds at their margin. The fineness of his gold (obtained between Dec. 1955, and August 1956) is as follows:

Average - 821.2; maximum - 844; minimum - 803.

It will be noticed that this gold is of a considerably lower fineness than that obtained from the Aifunka lodes - a fact casting doubt upon its derivation from a nearby lode of similar character.

At Yonki Creek F. Romanoff is sluicing an old alluvial terrace, his gold (September, 1955 to September, 1956) having the following fineness:

Average - 907.8; maximum 913; minimum 902.

The higher fineness of this gold indicates that its source was different to that of the Kainantu valley gold. The shed of the gold is the granodiorite batholith, in which Yonki Creek heads and flows, but it is not clear whether the gold was emplaced in contact veins of a pegmatitic character, in magnetite lodes (of which there is evidence), or merely as a dissemination throughout the granodiorite and concentrated by alluvial action.

PLATINUM. It is reported that small quantities of platinum are being obtained from serpentine rock, near Hengenofi. This occurrence has not been investigated and no details are known.

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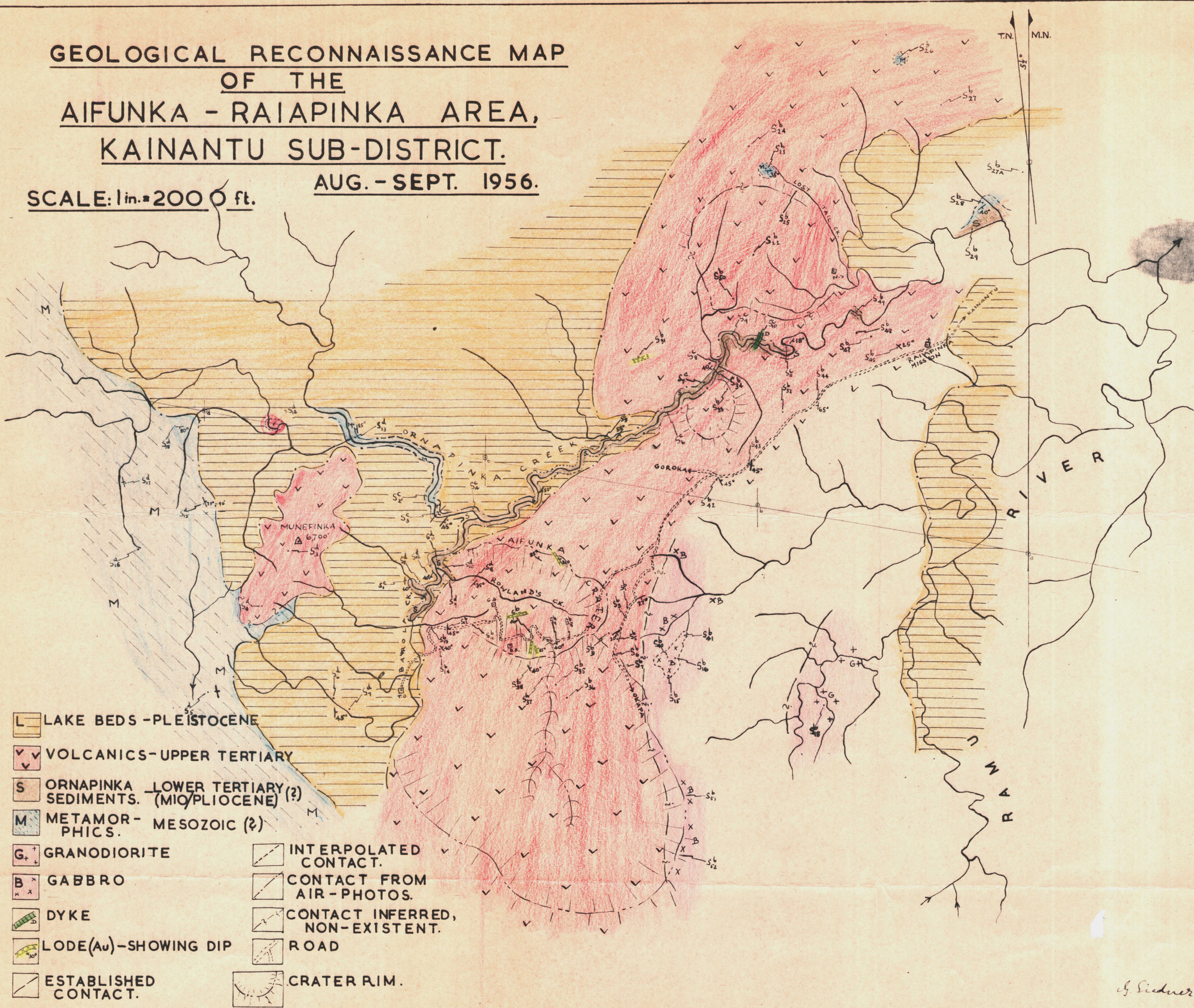
BASE METALS. In Yonki Creek, several hundred pounds of copper ore were extracted from a dyke-like lode in a volcanic (?) matrix. The ore, which was selectively quarried, consisted mainly of malachite and covellite, assayed 20.4% Au. The mineralised body has a width of ca. 10 feet. Vertical exploration stopped at a depth of about 15 feet and about 20 feet along the length was exposed by quarrying. Attempts to pick up the continuation of this body approx. 250 feet along the "strike" by costeaning were unsuccessful.

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Wau.
April, 1957.

GEOLOGICAL RECONNAISSANCE MAP OF THE AIFUNKA - RAIAPINKA AREA, KAINANTU SUB-DISTRICT.

SCALE: 1 in. = 2000 ft.

AUG. - SEPT. 1956.



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