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THE GOLD MINERALIZATION OF MISIMA ISLANDS WITH PARTICULAR REFERENCE TO THE AREA COVERED BY THE PROSPECTING LICENCE OF PACIFIC ISLAND MINES LIMITED NEW GUINEA

by

G. Brouxhon

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CONTENTS

FIGURES

PLATES

THE GOLD MINERALIZATION OF MISIMA ISLAND WITH PARTICULAR REFERENCE TO THE AREA COVERED BY THE PROSPECTING LICENCE OF PACIFIC ISLAND MINES LIMITED.

SUMMARY

Misima Island consists of folded and faulted metamorphic rocks of unknown age intruded by pre-Tertiary igneous rocks. The general trend of the folds is east. The island can be regarded as an up-thrusted faulted block tilted down to the east. This faulting occurred in Quaternary times. Concomitantly and subsequently, erosion exposed a zone of high-grade metamorphism on the western part of the island and low-grade metamorphic rocks on the eastern part.

The mineralization is confined to the eastern part of the island where, in addition to gold and silver, small amounts of lead, zinc, and copper are known to occur. Gold deposits are generally low grade, ubiquitous, and unevenly distributed in the area covering the Prospecting Licence of Pacific Island Mines Limited. Gold is mostly found in quartz lodes of hydrothermal origin occurring as sills and dykes cutting across the low-grade metamorphic rocks and the associated igneous porphyry intrusion. The mineralization is epigenetic and epithermal. The contact between porphyry and schist is generally fractured. The schists have not been metamorphosed by the porphyritic intrusions nor have the country rocks been thermally affected by the lodes; in places the porphyry is bleached where it is exposed near a lode. The lodes are closely associated with porphyritic intrusions. They are either penecontemporaneous or possibly younger.

The contact between country rocks and lode is generally fractured. The lode quartz is always fractured and commonly very brecciated; in places it is banded and contorted.

Where gold occurs in the schist or porphyry which forms the country rock, then either lode material is found nearby or the gold is associated with small veins and stringers or quartz, which fill fractures and joints in the country rock itself. These veins and stringers commonly yield wire gold.

The various mineral associations found in the lodes are:-

Quartz - Manganese

Quartz - Magnetite, and/or Hematite

Quartz - Sulphides - (Galena, Sphalerite, Pyrite, Chalcopyrite).

Quartz from lode material shows a variety of textures. The sulphides are commonly oxidised to cerussite and pyromorphite; calcite is present in some as a gangue mineral. In some lodes one component may become dominant and concentrated into irregular lenses. Lens-like bodies of magnetite, manganese and sulphides are often exposed in the lodes.

The prospecting work carried out by Pacific Island Mines has uncovered new occurrences of lode material. Their points of interest can be summarized as follows:-

a) The lode occurrences in the Ara Creek area can be regarded partly as a northward extension of the Umuna lode.

b) The Mill Creek, Imgubinaina Creek, and Grants Claim areas together with the Dee Cubed area, form a nearly continuous but irregular zone of lode occurrences extending over one mile. The lodes are generally tabular and slightly inclined and of variable thickness. A conservative estimate of the total available quantities of lode material indicated by surface exposures and the topography would be 5 - 6 million tons of ore, that is about three times the amount of lode material estimated for Dee Cubed. Many of the new lodes would be suitable for open-cut mining.

From surface evidence, the new lodes offer no prospect for lead, zinc or copper; although the grade of ore has not been adequately established, it is likely to be low.

The sulphide zone of the main Umuna lode must be prospected in order to assess its potential, particularly for the base metals.

INTRODUCTION

Misima is a mountainous island in the Louisiade Archipelago, 150 miles east-south-east of the south-eastern tip of Papua in the Milne Bay District of the Territory of Papua and New Guinea. The island is 25 miles long (east-west), and has a maximum width of 6 miles.

Bwagaoia, the administrative centre of Misima Island, is situated in the south-east of the island. Misima can be reached at least fortnightly from Samarai by a small trading vessel in about 16 to 18 hours. Previously, an air service linked Port Moresby with Deboyne Lagoon, 4 hours by boat from Bwagaoia.

A sinuous road 4 miles long joins Bwagaoia to the operational centre of Pacific Island Mines Limited, where a mining engineer, Mr. J. Brodie, is assisted by a European field assistant and a small number of native labourers.

Misima has a long mining history which can be traced back to 1888, when Mr. R. Boyd discovered alluvial gold in Ginesia Creek. Later he found the Umuna Lode, which has since been the major ore body known on the Island of Misima. The discovery of gold attracted other prospectors, and gold was soon won by various companies and syndicates throughout the area. Among the more important companies were:

Block 10 Misima Gold Mines;
Cuthbert's Misima Gold Mines Limited; and
Gold Mines of Papua Limited.

These 3 companies worked the main Umuna Lode. Quartz Mountain Limited worked the Quartz Mountain area. Few of these companies were successful. Very few records exist of the early mining activities.

The bulk of the gold was produced before the evacuation of Europeans in 1942. The total production of gold, alluvial and lode, was 236,000 ounces - 114,000 ounces came from the central section of the Umuna Lode, which was worked by Block 10 Misima Gold Mines and Cuthbert's Misima Gold Mines Limited. The latter company worked profitably an easily mined oxidised zone with an average recovery grade of 5.2 dwts to the ton. After the war, the company unsuccessfully attempted to re-open the mine. The post-war production of gold is negligible.

To-day, Oceanic Mineral Development Proprietary Limited, a fully owned subsidiary of Pacific Island Mines Limited, holds exclusive Prospecting Licence Number 1, which grants prospecting

Rights
~~lodes~~. The only gold produced within the exclusive Prospecting Licence is by native mining operators, who are working small alluvial deposits on Ara Creek.

The present report covers an 18-day inspection of the area held by Pacific Island Mines Limited. Some of the material used in this report has been derived from de Keyser (1960).

PHYSICAL GEOLOGY

The Island of Misima has a very rugged landscape with particularly high ground on the narrow western part of the island, where the land rises abruptly to an average of 2,500 feet, and up to 3,400 feet above sea level at Mount Oiatau (Plate 2). Mount Oiatau is situated north of Tubula Point on the divide that runs the entire length of the island. To the east, the island broadens out with a concomitantly gradual attenuation of the relief down to sea level at Cape Henry, the eastern point of the island. In the area covered by the Prospecting Licence of Pacific Island Mines Limited, hills of 400 to 700 feet high commonly alternate with steep-wided valleys.

The drainage is north and south of the water divide. The streams are perennial and commonly torrential. Their gradient is generally steep.

The rugged topography, the presence of many raised coral reefs up to a thousand feet above sea level on the western side of Misima, and the low-lying raised coral benches of the eastern part, indicate considerable recent rejuvenation. The Island of Misima is bounded on the north and south sides by marine deeps that are possibly faulted troughs. The island can be regarded as a horst.

REGIONAL GEOLOGY

In 1959 F. de Keyser and D.S. Trail, of the Bureau of Mineral Resources mapped the geology of Misima Island, to establish the regional geological setting of the gold mineralization. The following notes are a precis of their observations:

Misima Island is composed of faulted and folded metamorphic rocks of unknown age associated with Pre-Tertiary intrusive rocks and quartz veins. The general trend of the folded metamorphic rocks is east. In the north the metamorphic series is overlain by Tertiary beds, and on the south and east metamorphic rocks are rimmed by raised Quaternary coral reefs.

The Metamorphic Rocks:

Two grades of metamorphic rocks are present on the island. On the western side a zone of high-grade metamorphic rocks occurs consisting of schists, gneisses, and partly migmatised amphibolites. The eastern side of the island contains schists of the greenschist facies with the characteristic mineral assemblage of quartz, albite, muscovite, and chlorite. The lower-grade metamorphics have been subdivided into a lower series called the 'Ara Green Schist', and an upper series referred to as the 'Umuna Schist'. The two series are separated by a bed of marble, the 'Saint Patrick Limestone'.

The Intrusive Rocks:

The intrusive rocks follow the same pattern of distribution as the metamorphic rocks. On the western side of the island occur igneous intrusive rocks of basic to acid composition ranging from hornblendite to trondhjemite. On the eastern side of the island, acid to intermediate porphyritic rocks outcrop extensively and are considered by some geologist to be responsible for the gold mineralization.

The Sedimentary Rocks:

The Tertiary deposits in the north-eastern portion of the island include rocks of three different, but contemporaneous types; a volcanic facies in the east (Kobel Volcanics), a conglomerate facies in the west (Liak Conglomerate), and an intermediate clastic facies (Gulewa Formation).

The Quaternary sediments are chiefly represented by coral reefs, which were raised above sea level in several stages to a masimum elevation of about 1,400 feet; alluvium is rarely present because of the rugged, rejuvenated topography.

ECONOMIC GEOLOGY

The Umuna Lode:

From the Umuna Lode came the bulk of the gold production and the highest values ever recorded in the mineralized area of eastern Misima.

We will briefly survey the attitude of the lode, its mining history and its mineralization.

Attitude of the Lode: The Umuna line of lodes occurs along a faulted zone of about 1.5 miles long, and possibly extends 2.5 miles into the Ara Creek area. The strike of the zone is north-north-west. In its central part the Umuna Lode forms a faulted breccia, consisting of quartz, pug and rocky gangue material.

Here the fault dips steeply to the west.

To the north at Mount Sisa, and in the south at Kulumalia the lode is not so well defined. Here the lode appears to ramify into a network of smaller lodes. All along the main lode off-shoots are present.

Mining History: The Umuna line of lodes has been arbitrarily divided into three sections. Each section has been worked by different mining companies and syndicates.

These sections are:-

(i) UMUNA - central part of the lode;
(ii) MOUNT SISA- northern end of the lode;
(iii) KULUMALIA - near the southern end of the lode.

Umuna Central: The Umuna Lode in its central part has been extensively worked by Block 10 Misima Gold Mines (1914-1922), and Cuthbert's Misima Gold Mines Limited (1935-1942). These two companies together produced 97 percent of the recorded production - equivalent to some 114,000 ounces of gold, at an average recovery grade of 6 dwts per ton (Palmer, 1957) from a total of 376,000 tons of ore.

Access into the mineralized zone was gained initially by adits driven into the hillside and into the lode, and later by drives along the lode. From these drives cross-cuts were driven to intercept the ore body whenever the latter had been displaced through faulting.

Altogether, seven levels were developed, mainly by Block 10 Misima Gold Mines. These were subsequently extended by Cuthbert's Misima Gold Mines Limited. The central section of the Umuna Lode was mostly worked in its southern part, that is south of Cooktown Creek, where it cuts across the Umuna Lode. Mining at Umuna was confined to the oxidised zone down to the seventh level, where a zone of mixed ore was encountered containing oxides as well as sulphides of the base mineral. The sulphides consist of sphalerite, galena, pyrite, and chalcopyrite.

Although Cuthbert's Misima Gold Mines Limited operated profitably at 60 percent of tonnage cost, the mining methods used were not efficient. Much good ore was left as supporting pillars between successive levels and between stopes. The remaining ore reserves of the oxidised zone, including probable and possible ore, are estimated to be 400,000 tons (Palmer, 1957). The ore reserves of the oxidised zone of the Umuna Lode

are too small to be of interest. It is probable that below the zone of mixed ores (oxides and sulphides), the gold content would decrease with depth, but this could be compensated by an increase in the grade of the base metals. The occurrence of gold in the Umuna Lode appears to have a primary zonal distribution.

The sulphide zone has not been successfully tested by any company.

Mount Sisa and Kulumalia: In the Mount Sisa area, the lode was worked, before the war, by Gold Mines of Papua Limited. This company produced 8,500 ounces of fine gold and 24,000 ounces of silver from 40,000 tons of ore. After the war, Mararoa Gold Mines and H. Gladstone recovered 150 and 1,225 ounces of gold respectively.

Two companies were active in the Kulumalia section; Misima Gold Reefs and Gordon's Misima Company Limited, which took over in 1940. Three main lodes and at least five other lodes were reported in the area. The lodes at Kulumalia are off-shoots of the main Umuna Lode.

The entry of Japan into World War 2 prevented the start of production. Ore reserves as estimated in 1938 amounted to 40,000 tons at 4.8 dwts per ton. After the war, Mr. Gladstone milled about 150 tons of the better ore, but production did not confirm reported assays.

Mineralization: Since the mineralization is confined to the intrusive lode, the mineralization is epigenetic. The vuggy and drusy texture of the quartz, the brecciated nature of the lode, the presence of honey-coloured sphalerite (indicating a low temperature of formation) and of barytes, all favour the view that epithermal conditions had prevailed during the emplacement of the lode. In other words, the emplacement of the lode occurred near the land surface. The lode has crystallised from a hydrothermal solution, which was injected along an extensive fractured zone.

The enrichment of gold in the lower levels of the Umuna Lode has been tentatively explained by a very complicated mechanism of secondary enrichment by leaching processes (Palmer 1957, and other investigators).

Laboratory experiments have shown that gold is soluble in surface waters only in the presence of free chlorine, which can be produced by the inter-action of sulphuric acid, sodium chloride, and manganese dioxide. On Misima, sulphuric acid

would be generated by the oxidation of pyrite; sodium chloride may have blown in from the sea, and manganese oxides are present. The ultimate product, the soluble, but highly unstable gold chloride, would percolate downwards and precipitate in a reducing environment, such as would exist in the presence of carbonates, sulphides or organic matter. Gold and manganese would then be precipitated.

Although such leaching processes by meteoric waters may have occurred, what evidence is there that gold has been deposited from secondary solutions? Further, such leaching processes have never been known to account for the enrichment of gold in commercial quantities.

The suggestion of a primary zonal distribution of the ore and a secondary mechanical enrichment of gold - induced by the retreat of the water table is more acceptable. This secondary mechanical enrichment of gold could be brought about by the solution and the removal from the sulphide zone of the more soluble compounds, which would be washed down to lower levels as the water table retreats. The highly insoluble gold would be left behind. Another form of mechanical concentration of gold is known to occur in the Quartz Mountain area, where sulphides are exposed at the surface. Here, C.H. Donaldson, Manager of Quartz Mountain Papua Limited, reported that the enrichment of gold was caused by percolating surface waters carrying fine gold into the cracks and fissures of the faulted zone.

Mr. J. Brodie has graphically plotted gold and silver assay values of samples selected from adit faces along some sections of levels 6 and 7 of the Umuna Lode. These figures were recorded in one of the reports from Cuthbert's Gold Mines Limited. They showed that the gold value fluctuated considerably, that the values for silver followed the same trend as the gold, and also that there was a certain correspondence between the distribution of gold in the two levels. The average grade taken from the graph shows 10 to 11 dwts of gold per ton. However, the mill feed figures gave 6 dwts to the ton.

DEVELOPMENT WORK:

A total of 2½ miles of costeans, a 400-foot long adit, and a 100-foot cross cut have been respectively cut and driven by Pacific Island Mines Limited since December, 1959.

The trenching work consisted of long shallow costeans which were supplemented by numerous shorter and deeper costeans

wherever lode material was exposed. The trenching work is mostly confined to four areas:

Mill Creek (Plate 2)
Dee Cubed (Plate 1)
Imgubinaina
Ara Creek.

The total expenditure of the company between 1st November, 1961 and 30th April, 1962 was £4,764. 2. 0.

PROGRAMME:

Because of the erratic distribution of the gold, Pacific Island Mines Limited has decided not to test the lodes by drilling. Instead, in 1961, it intended to test the grade of the ore in a pilot plant using bulk samples of a ton or more and arriving at the head grade by combining the recovery grade and the assay values of the tailings - (Pritchard, 1961). This part of the programme has not been fully carried out. The treatment plant, which was installed in 1961, has now been dismantled because the Hazemac Impact Crusher was ineffective in handling harder and more compact quartz material of the lodes. Subsequently, to correct this situation, Pacific Island Mines Limited bought a 5-head stamp battery with £400 worth of spares, but the company has not yet put it into operation. The Hazemac Impact Crusher was disposed of.

Recently, the company decided to drive a new adit into the lode near Grant's Claim. This work is to begin shortly.

Pacific Island Mines Limited has temporarily abandoned the project of driving a 1,600 foot adit into the Umuna Lode, the purpose of which was to test the sulphide zone below Number 7 level.

THE NEW LODES

As previously stated, the trenching work carried out by Pacific Island Mines, has uncovered four areas of lode occurrence- The Dee Cubed, the Mill Creek, Imgubinaina and Ara Creek. The writer has examined and mapped the Dee Cubed and the Mill Creek areas. The Ara Creek and its northern extensions were visited only briefly. In 1961 Mr. P. Pritchard inspected the lode areas of Imgubinaina Creek and Adit No. 1, which was driven by the operating company.

THE DEE CUBED AREA: (Plate 5)

The Dee Cubed area of lode occurrence is situated three quarters of a mile due east of Pacific Island Mines residence. The lode occupies a ridge - 700 feet above sea level - on the northern side of the head waters of Ginesia Creek.

At Dee Cubed, some 16 costeans have been dug, most of them exposing quartz lode material.

In the past, the area had been extensively prospected and worked by the early miners. Many old adits and trenches can still be seen to-day.

Attitude of the Lode: The distribution of outcrops of lode material exposed by the costeans in the Dee Cubed area shows that they can be related to form a continuous, but irregular, single lode 1,700 feet long, and striking east-west. The dip of the lode is south, but the amount of dip ranges along the strike from 10° on the western end to a possible dip of 16° on the eastern side. Here, the lode appears to have a gradient comparable to the local topography (Plate 5). The width of the lode is variable, but a calculated average thickness of 30 feet is acceptable.

Geological environment of the Lode: The main lode and associated minor off-shoots cut across the Umuna schists, which, together with the porphyry, make up the country rock. The contact between lode and schist is generally fractured. The relationship between lode and porphyry is more complex. The hydrothermal siliceous phase is either penecontemporaneous to the intrusive porphyry or possibly younger. The contact between porphyry and schist is usually sheared. On the eastern tip of the lode and on the southern side, the contact with the schist appears faulted.

Nature of the Lode: Where observed, the quartz of the lode is extremely fractured. In places the intensive brecciation of the lode is accompanied by precipitation of abundant manganese minerals, possibly wad, which extend into the joints and fractures developed in the adjoining schist. Within the lode, large and small but irregular xenoliths of schist are commonly exposed.

Four different types of quartz have been observed in the lode. Towards the base, the quartz is usually banded, contorted, and fractured. The colour is grey to grey-white. In the upper part of the lode, the quartz is fine-grained and has a saccharoidal texture. This quartz is greyish-white. In

this sugary zone occur patches of yellowish vuggy quartz. Small veins of white and massive quartz intrude the schists.

Ore Reserves: Based on a lode strike length of 1,700 feet, an average thickness of 30 feet, and a dip length of 800 feet, the probable tonnage of ore reserves can be estimated to be 2.7 million tons calculated from surface exposures and assuming 15 cubic feet to the ton.

Sampling Methods and Grade of the Ore: Pacific Island Mines have carried out a systematic sampling programme along the costeans, with the object of determining the grade of the ore by a visual estimation of the gold content from dish concentrates. Along some of the costeans gold occurred throughout, in others gold occurred erratically or was not observed at all. This method is unreliable.

To make some assessment of the grade of ore in the lode during the current visit, seven bulk samples were selected from about a ton of ore, which was taken from some of the costeans (sample localities shown in Plate 5). The assay results of these samples are also shown on Plate 5. The bulk samples are not to be considered as representative of the grade of the ore, but they give a better indication than by visual estimation of the gold content from a dish concentrate.

THE MILL CREEK AREA:

The Mill Creek area is situated a couple of hundred yards south and south-west of Pacific Island Mines residence. Besides one natural outcrop of lode, only four costeans have exposed lode material. Unfortunately, the existing trenching work does not adequately reveal the attitude and the relationship between the outcrops of lode material.

A general impression is that there is a lode system of irregular sills and dykes throughout the entire area. Here as in the Dee Cubed area, the lodes are generally very fractured and in places the lodes are manganiferous. Dish washing of lode material occasionally shows fine-grained gold.

THE ARA CREEK AREA:

The Ara Creek area of lode occurrences is confined mainly to the drainage area of Ara Creek; that is north of the Umuna Lode from Mount Sisa. This area can be regarded as a northern extension of the main Umuna Lode.

In many places the quartz of the lode is drusy with many cavities lined with secondary quartz crystals; in other places

the quartz is massive. The texture of the quartz in these lodes is similar to that in the Umuna Lode.

THE IMGUBINAINA CREEK AREA AND THE ADJOINING GRANT'S CLAIM:

These two areas occur near the Pacific Island Mines Residence, and north-east of it. P. Pritchard has examined the Imgubinaina Creek area, and his comments on it are:-

> "On the right bank of Imgubinaina Creek, one hundred and twenty yards downstream from its junction with Wiregold Creek, a sulphide-bearing quartz/manganese lode is exposed, dipping parallel to the hill slope. It is more than fifteen feet thick and is reported to carry five dwts of gold to the ton".

The writer has examined superficially the Grant's Claim area. Here the lode is distinctly tabular and is at least twenty feet thick. The quartz of the lode is stained with much iron oxide material.

MINERAL ASSOCIATION IN THE LODES

Quartz in various forms makes up the great bulk of the new lodes. Other minerals are usually present in small amounts, though locally they can be concentrated in appreciable quantities; this happens with manganese and iron minerals. Other minerals found in lode material are various sulphides, including pyrites, chalcopyrite, sphalerite, and galena, while calcite, cerussite, and hemimorphite, and baryte are known to occur. The separate occurrence of lodes with different mineral association and the different mineral association occurring within the same lode suggest that the lodes are zoned.

Manganese and Quartz: This is the most common mineral association. It is typical in the Dee Cubed and the Mill Creek areas. Generally manganese minerals are abundantly found in the intensely brecciated parts of the lode. At Dee Cubed, where the attitude of the lode is fairly well defined, the manganese mineralization is particularly well developed near the floor and the roof of the lode. The manganese is earthy, black, and looks like wad.

Iron and Quartz:

This is the next most common mineral association. Boulders of magnetite and hematite have been known to occur in the river beds of Cooktown and Imgubinaina Creeks. One of these boulders was ultimately found by Mr. J. Brodie near the head

waters of Imgubinaina Creek. Here the boulders are exposed over an area of some 150 square feet and consist of large eluvial boulders of massive magnetite and hematite. The contact with the lode is obscured by overburden, but nearby a boulder consisting of quartz and magnetite crystals was observed. Farther away, the lode is heavily stained with iron oxides. This reddish coloration persists throughout the lode system, and extends into Grant's Claim area.

Sulphides and Quartz:

Visible sulphides are present in the lodes in the Imgubinaina Creek area. They were found in Adit No. 1 which was mapped by P. Pritchard. Here the lode is vertical. Since these individual mineral associations may occur separately a classification into five types is suggested -

Quartz - - Quartz
Quartz - - Manganese
Quartz - - Magnetite and/or Hematite
Quartz - - Sulphides

No doubt some of these mineral association overlap.

INTERPRETATION

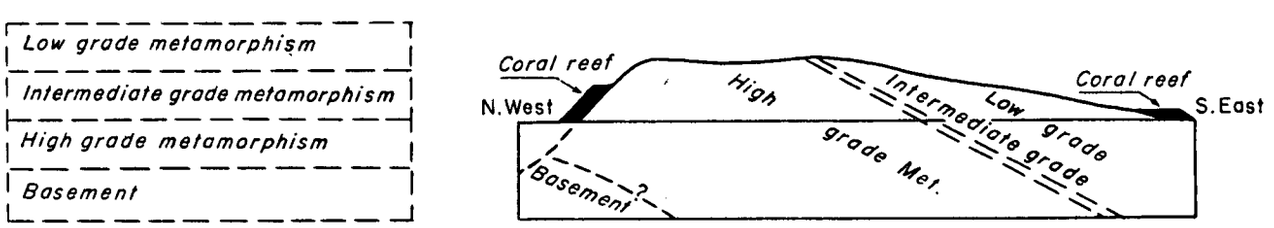
The persistent association of low-grade metamorphic rocks, porphyritic intrusions and auriferous quartz veins, all confined to the eastern part of the Island, cannot simply be regarded as accidental.

Since the metamorphism of the country rocks is regional, the two distinct grades of metamorphic rocks occurring respectively in the eastern and the western side of the Island of Misima, can be attributed to a zonal distribution reflecting different intensity of metamorphism. F. de Keyser, states 'the nature of the boundary between the two grades of metamorphism is not clear', but he also says 'that a narrow transitional zone of intermediate grade is known to occur in Weipoou Creek'. Such zonal distribution could be related to the depth of burial of the sediments in the geosynclinal trough. Figure 1 illustrates a broad and simple interpretation of the geographic distribution of the metamorphic rocks in terms of epeirogenetic movement and erosion.

Figure 1.

Zonal distribution of metamorphic rock in geosynclinal trough

Subsequent tilt and present topographic distribution of metamorphic zones



The auriferous hydrothermal siliceous solutions may have originated from the metamorphism of a gold-bearing sedimentary bed. This possibility has been mentioned by F. de Keyser (op. cit.), who was thinking of the Ara Green schist as a possible gold-bearing bed, because of areal relationships of porphyries - greenschists - gold lodes - and because of a similar case in the literature. This process would involve the selective mobilisation of gold and other minerals, together with quartz from a sedimentary bed and their subsequent concentration as hydrothermal solutions along structural zones of weakness occurring in the country rock. The intrusive porphyry could have induced the geothermal gradient necessary for the mobilisation of the ore mineral.

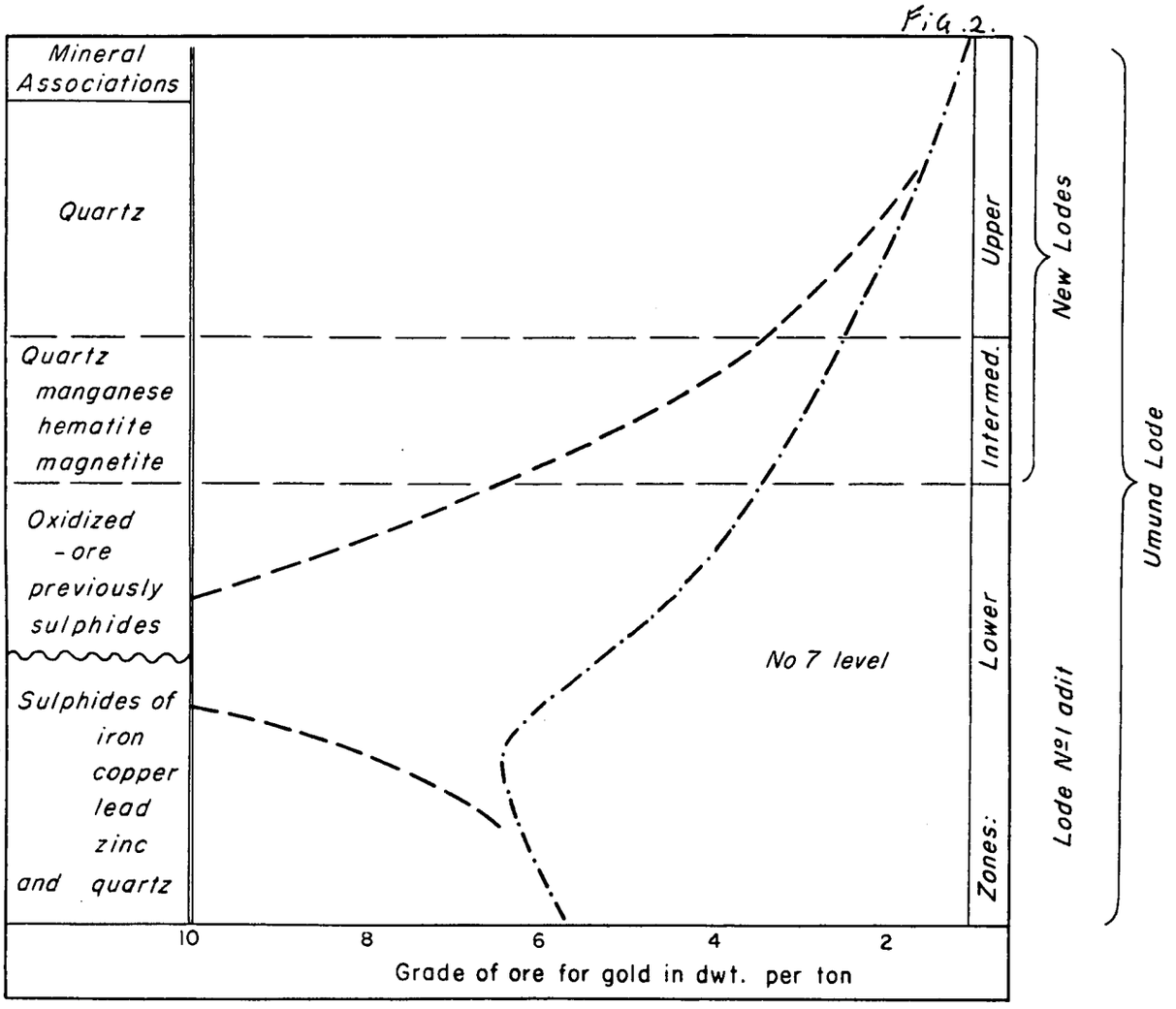
Although a primary zonal distribution is attractive, more geological work will be required to establish the sequence of distribution of these zones. A tentative classification is suggested as follows:-

An upper zone consisting essentially of quartz; an intermediate zone, which in addition to quartz contains manganese-magnetite and hematite; and a lower zone containing the sulphides of lead, zinc, iron, and copper.

In the new lodes the mineral associations belong to the upper and intermediate zones.

The assay results of the bulk samples collected from the new lodes were particularly low. Higher values could possibly be found within the sulphide zones at greater depth. The writer's opinion is that the distribution of gold in the Umuna lode, particularly in the lower levels, is due to the cumulative effect of a primary zonal distribution and a secondary mechanical enrichment (Figure 2).

Fig. 2.



—·—·—·— Curve showing primary distribution of gold

— — — — Curve showing effect of secondary enrichment

porphyritic intrusions might be critical factors in the mineralization. This criterion could be used to delineate likely zones of gold mineralization throughout the Territory of Papua and New Guinea. It is interesting to note the similarity of the geological environment between Misima and the other occurrences of gold in the Territory.

RECOMMENDATIONS

Sufficient prospecting work has been carried out in the area for the sole purpose of discovering lodes. More work should be spent on trenching and pitting, to ascertain the attitude and the thickness of the lodes already found, particularly in the Mill Creek, Dee Cubed, and Grant's Claim areas.

Since the grade of the ore in the new lodes is virtually unknown, it is suggested that the initial programme of setting up a pilot plant be resumed. This would have the advantages of determining the grade of the ore from bulk samples and of procuring some kind of financial return to the Company.

Pacific Island Mines has sufficient equipment to set up a crushing unit. Because of the extremely fine grain-size of the gold, a cyanidation plant recovery would be more suitable.

Many of the new lodes, particularly those of Dee Cubed and Grant's Claim areas, would be suitable for open-cut mining operations, and therefore a relatively low-(yield) grade ore may become payable.

Quarrying price figures given by Hornibrooks (Port Moresby) Limited, which include firing, loading, and carting a distance of some two hundred yards, are approximately 12/- per ton. A cost of 25/- per ton would be acceptable for the treatment of free milling ore, such as would be the case for much of the new lode material.

New Guinea Gold Mines work profitably in ore carrying 3.4 dwts of fine gold to the ton.

For the main Umuna Lode the initial programme of driving an adit into the lode to test the sulphide zone should be followed up. The adit should aim to strike the lower levels of the oxidized zone. If this be too costly, then drilling operations should be started. The most obvious place is where Cooktown Creek crosses the Umuna lode.

The alluvial flats of the lower reaches of Cooktown and Imgubinaina Creek could be tested for gold by sinking pits.

The area to the west of the main Umuna lode, and included between Weipoou and Kobel Creeks should be prospected.

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GOLD MINERALIZATION
MISIMA ISLAND

Plate 1.

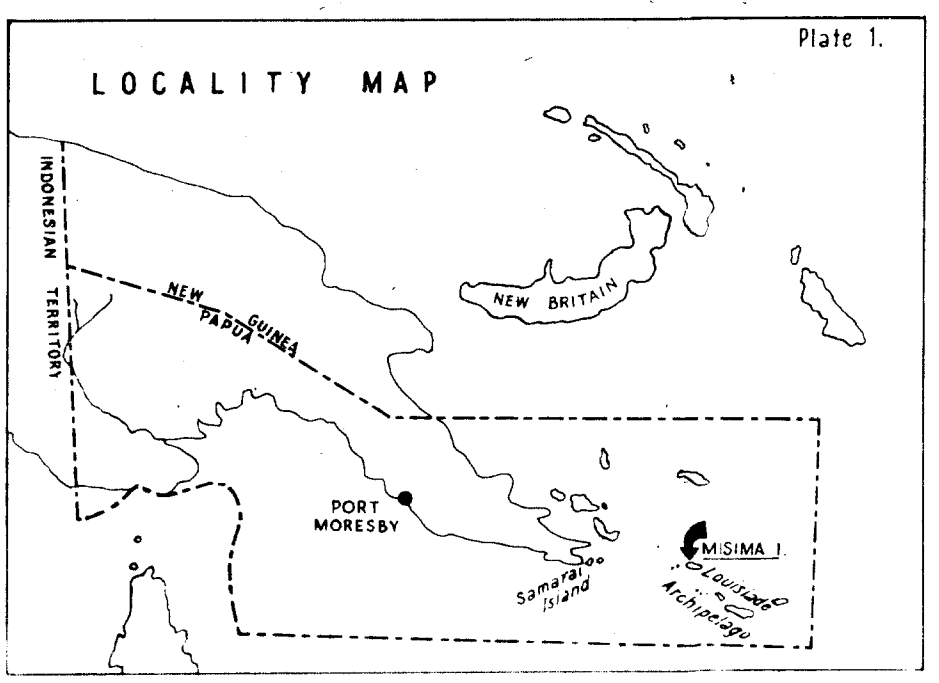


Plate 2

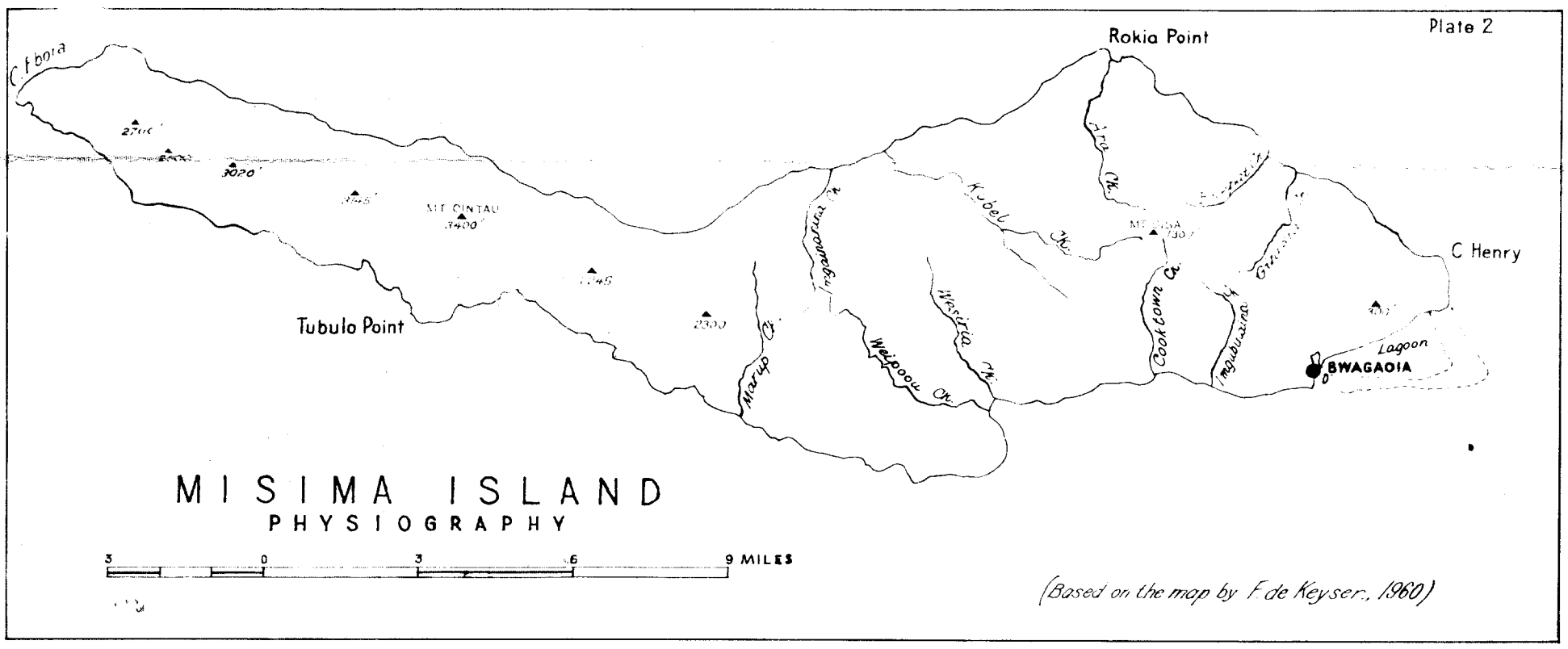
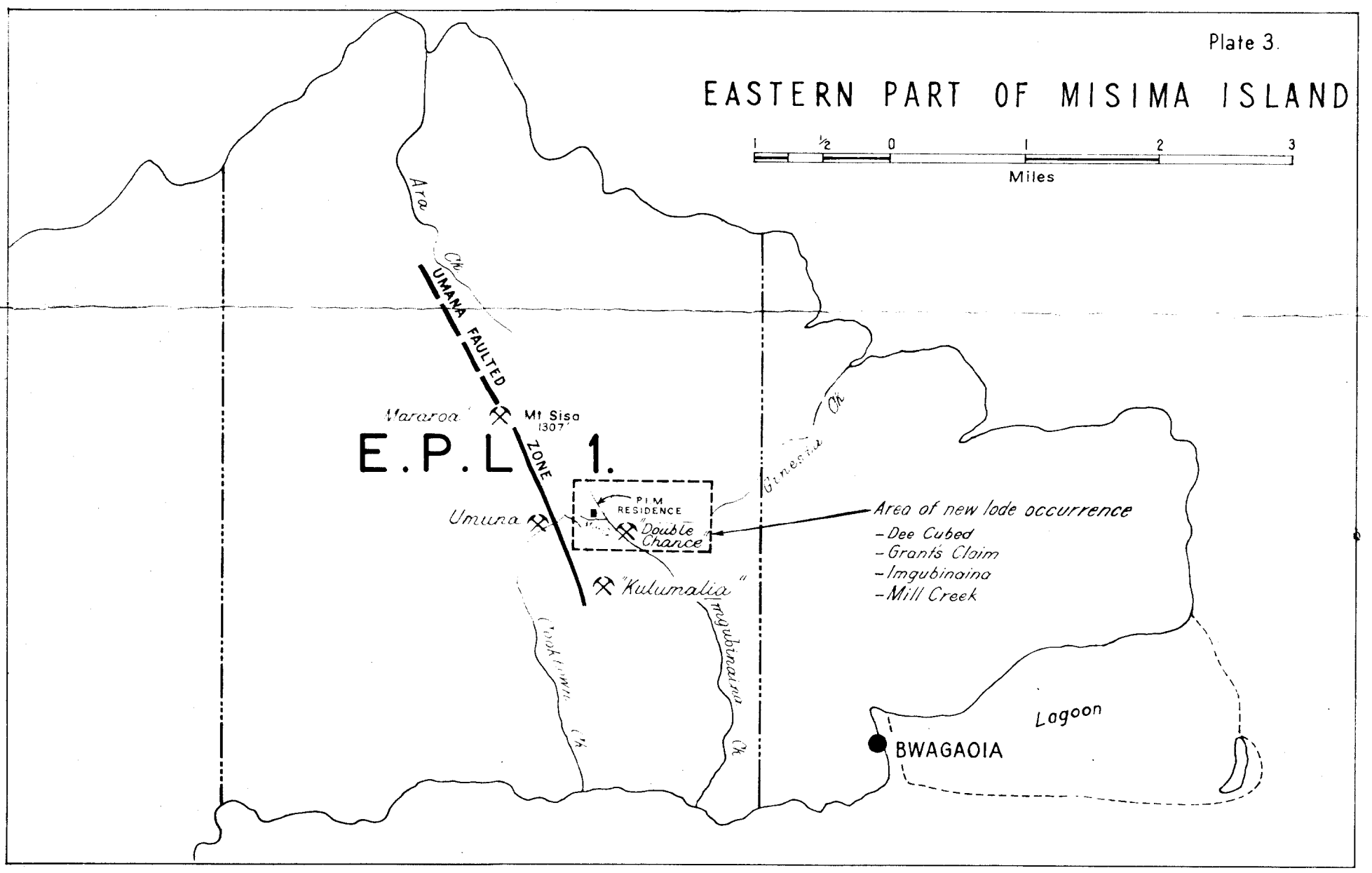


Plate 3.



Bureau of Mineral Resources, Geology & Geophysics. November 1963.

To accompany Record 1963/139

C56/A10/3 G.M.

EXCLUSIVE PROSPECTING LICENCE Nº1

MISIMA ISLAND

PAPUA

SCALE
1 ¾ ½ 0 1 Mile

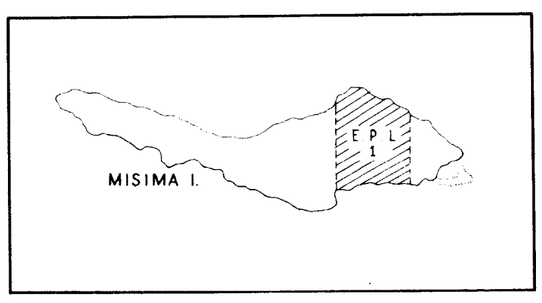
(Map from Pacific Island Mines, Ltd.)

Rokia Point
SIAGARA
Ara Creek
1075'
BOIOU
ARA CREEK AREA
Boiou Creek
OLD MISIMA NORTH
P.I.M. REST HOUSE
Bulpat Creek
MARAROA
MT. SISA 1300'
ARIBA
EAST IMGUBINAINA
DEE CUBED
ST AIGNON OPEN CUT
P.I.M. RESIDENCE
West Adit
UMUNA
LOGIA Adit
Proposed Adit
WELLS TUNNEL
KULAMALIA
QUARTZ MOUNTAIN
1150'
Inhabit Creek
Imgubinaina Creek
RESIDENCE
NARIAN
MISSION

30000N
20000N
10000N
0-0
0-0
10000E
20000E

TRUE NORTH
MAG

LOCALITY MAP



REFERENCE

- Surface indications of lode
- Defined lode
- Costeans
- Reconnaissance costean
- Underground workings
- Track
- Peak
- Village
- E.P.L. boundary

DEE CUBED LODE

0 40 80 160 240 320 400
FEET

REFERENCE

- Porphyry outcrop
- Porphyry
- Schist
- Manganiferous quartz lode
- Sugary quartz lode
- Eluvial or colluvial lode material
- Interpolated boundaries of lode
- Shear zone
- ② Costean
- 700 Contour (approximate)
- •450' Spot heights.

MN

Bulk sample N°6 (Trace)
Bulk sample N°5 O.Scharffton
Bulk sample N°4 (Trace)
Bulk sample N°3 (Trace)
Bulk sample N°7 (Trace)
Bulk sample N°1 (Trace)
Bulk sample N°2 (Trace)
Mn stains
Mn stains
OLD ADIT
Wide
240 Wide
Genesia
Ck.

DEVELOPMENT WORK

MILL CREEK AREA

MISIMA ISLAND, PAPUA

0 80 160 240 320 400
FEET

REFERENCE

- Porphyry
- Schist
- Quartz lode
- Eluvial or colluvial lode material
- Strike and dip of lode
- Contours (approximate)
- Spot heights.

MN

Surveyed by Pritchard (1961)

To Umuna

UMUNA ROAD

MANAGERS RESIDENCE

Imgubiuma Ck

380' True elevation

Mill Creek

To Bwagaoia