DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Rois Malk Epithermal Gold System, Republic of Palau

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SUMMARY

A ten day geologic reconnaissance of the Republic of Palau funded by the United States Geological Survey and the Office of Territorial and International Affairs resulted in the identification of a large epithermal gold system having anomalously high gold contents (as much as 1/4 oz/ton) at the surface. The gold system is in an area previously prospected by the Japanese, but in 1938-39 was considered to be on no commercial interest (U.S. Army 1956). The zone of observed mineralization has a minimum inferred length of 1 1/2 km and a width of 200 m. and occurs in andesite flows. Significant concentrations of silver, zinc, and copper occur with the gold. This zone occurs in an area known as Rois Malk.

INTRODUCTION

The Republic of Palau occupies the westernmost part of the Caroline Islands, 1,500 km southwest of Guam (fig. 1), and is part of the Trust Territories of the Pacific. Babelthuap is the largest of Palau's 200 islands and the Rois Malk gold system occurs in the southeast part of this island. A team of USGS geologists spent ten days in Palau evaluating the mineral resource potential of those islands composed largely of volcanic rocks. Surface rock, stream sediment, and water samples were taken and subsequently analyzed for gold and associated metals. Zones of hydrothermal alteration were mapped in the field and samples analyzed in the laboratory.

Volcanic island arcs in the South Pacific have recently become the focus of gold exploration programs. Epithermal gold deposits associated with island arc volcanism had previously been recognized in Fiji, New Zealand, and the Philippines (Sillitoe and Bonham, 1984). Recent discoveries of gold deposits in areas previously unknown for gold mineralization, such as in New Guinea at Porgera, Wau, and Lihir (Williamson, 1983) have opened large areas of the western Pacific for prospective gold mineralization (see fig. 1). Epithermal gold deposits are economically attractive because they are amenable to low cost open-pit mining methods, and some contain large tonnages of ore with a total contained gold value of as much as $(U.S.) 1 billion. The Rois Malk gold system occurs in a geologic environment similar to that of recently discovered deposits and has a high potential for becoming an important gold deposit.

GEOLOGY

The geology of Palau is similar to other island arcs in the South Pacific, consisting of a volcanic edifice composed of basaltic, andesitic, and dacitic flow breccias and tuffs of Oligocene and Miocene age (U.S. Army, 1956). Widespread development of carbonate reefs in the Miocene, and subsequent development of karst topography, dominate the landscape of most of Palau's islands. The volcanic sequence is present on only four islands of the Palau group and is best exposed on Babelthuap. Oligocene andesite flow breccias and tuffs comprise most of the island and they are deeply weathered. The tuffs are related to a small caldera which occupies the western part Babelthuap. Miocene andesite flows which are less abundant, are generally fresh and unaltered.

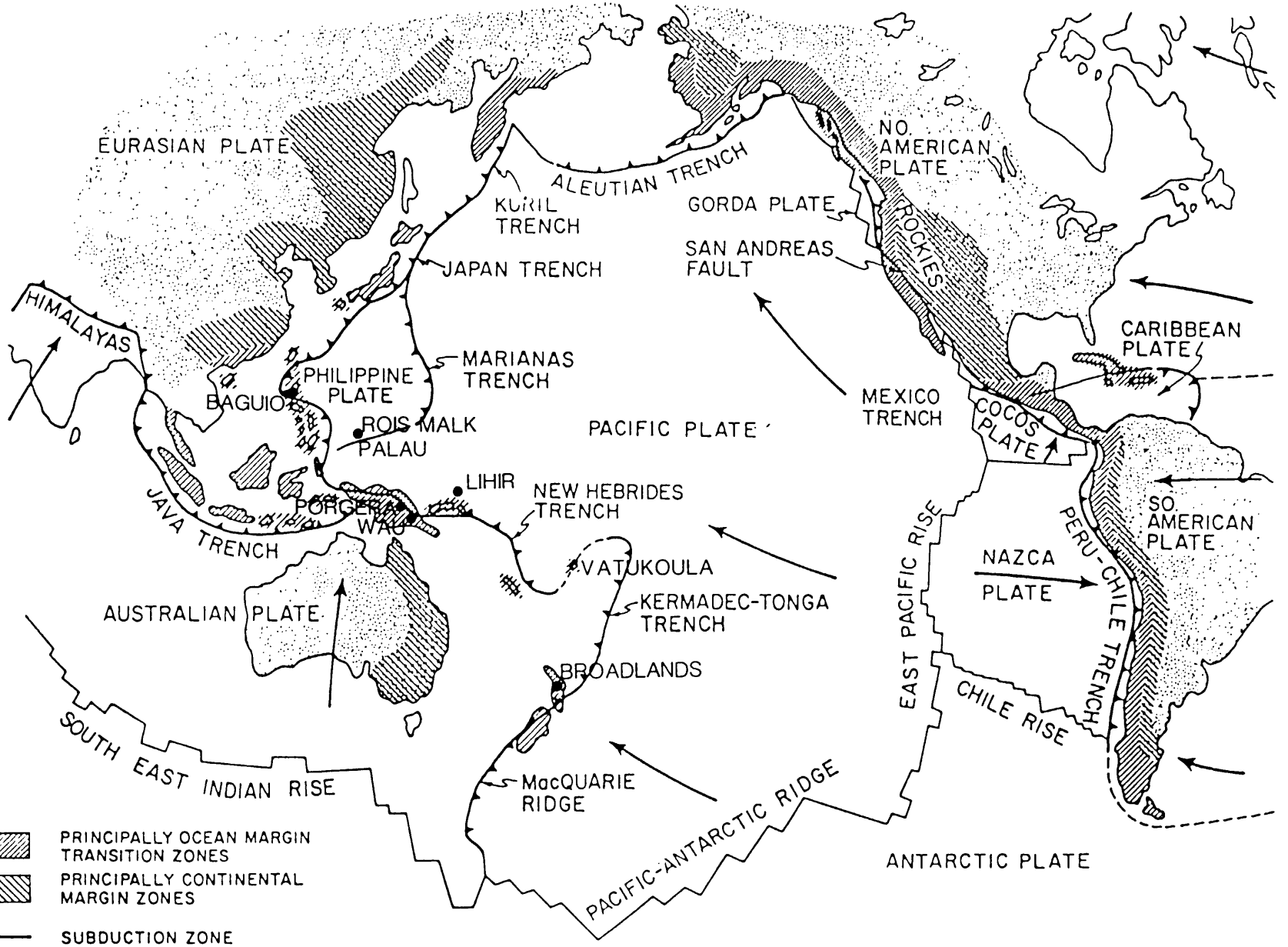

FIGURE 1 LOCATION OF ROIS MALK GOLD DEPOSIT, PALAU AND EPITHERMAL GOLD DEPOSITS IN THE WEST PACIFIC

ROIS MALK EPITHERMAL GOLD SYSTEM

Rois Malk epithermal gold system occurs in Oligocene andesite flows and flow breccias that are intruded by highly altered dikes. The zone of mineralization strikes NNE and extends for slightly less than 1 1/2 km along strike and has a minimum width of 200 m (fig. 2) and an estimated minimum depth of 100 m, based on topographic relief in the alteration zone. All rock samples taken from the zone of mineralization contain gold (table 1) with highest values, as much as 1/4 oz per ton, occurring at the southern and northern ends of the zone (fig. 2). The zone of mineralization is characterized by numerous quartz veins and zones of stockwork veining ranging from fracture fillings to veins as much as 9 inches wide. The veins show typical epithermal textures such as comb quartz, numerous open vugs, and banded, lamellar quartz veins. Sulfides associated with the gold include pyrite, sphalerite, and galena. The country rock adjacent to veins is argillically altered and contains anomalously high gold concentrations. Other ore metals associated with the gold are presented in table 1. Silver is associated with the gold with values as high as 1.5 oz per ton. The Ag:Au ratio ranges from 5:1 to 10:1. High Zn values, as much as 10 percent, and Cd, as much as 0.13 percent are associated with high gold values. Pb and Cu values are commonly high, with values of as much as 2 percent and 0.3 percent, respectively. The presence of base metals in the veins is highly favorable because epithermal vein systems commonly are productive for precious metals only in the zone where base metals are present. Other elements associated with the gold include As, Hg, Sb, and Te. The presence of as much as 130 ppm Te is very favorable because many of the largest, and most productive epithermal gold systems contain gold and complex Bi-Pb tellurides. The Vatukoula deposit in Fiji (fig. 1) is a gold telluride system occurring on the margin of a caldera and has Au reserves of 3.6×10^6 oz. Although the Rois Malk gold system seems to have some geochemical characteristics similar to those of Vatukoula, the base metal content is considerably higher and more typical of epithermal vein systems such as Creede. Further work is necessary to characterize the deposit type.

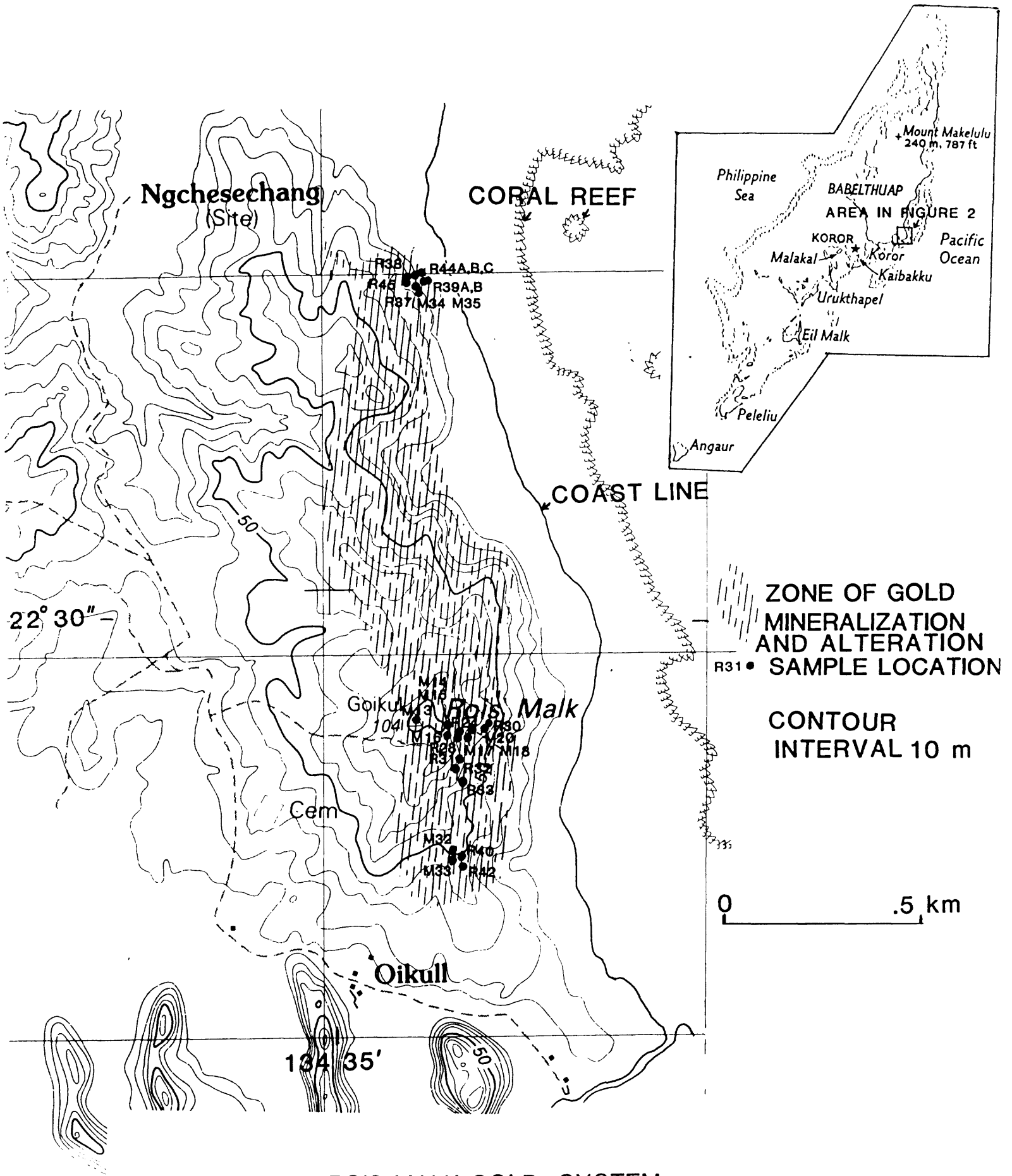

FIGURE 2 ROIS MALK GOLD SYSTEM

Table 1.--Selected chemical analyses of rocks from the Rois Malk epithermal gold system.

Sample no.	Au (ppb)[4]	Au (oz/ton)	Te (ppb)	Others (ppm)
M[1]17	240		7,000	200 Cu, 200 Zn
18	220		6,000	200 Cu, 100 Pb
19	280		4,400	500 Cu
21	500		130,000	15 Bi, 1,000 Cu
32	700		6,000	500 Cu
33	2,800	.08	2,000	30 Ag, >500 Cd, 3,000 Cu 1,500 Pb, >10,000 Zn
34	7,500	.23	2,400	10 Ag, >200 Cu, 700 Pb 300 Zn
35	1,600	.05	200	50 Ag, >500 Cd, 700 Cu >20,000 Pb, >10,000 Zn
R[2]24	190		NA[3]	23 Se, 3 Ag, 110 Zn
30	223		NA	18 As, 190 Zn
31	1,030	.03	NA	293 As, 700 Se, 4 Ag
32	2,960	.09	NA	35 As, 61 Se, 110 Zn
38	1,640	.05	NA	12 As, 343 Cd, 8 Ag 23,100 Zn
39A	786		NA	26 As, 300 Cd, 12 Ag 23,700 Zn
39B	4,560	.14	NA	38 As, 1,350 Cd, 19 Ag >90,000 Zn
41	190		NA	14 As, 99 Cd, 8,400 Zn
44A	2,450	.07	NA	25 As, 274 Cd, 3 Ag 25,300 Zn
44B	2,110	.06	NA	10 As, 598 Cd, 6 Ag 55,100 Zn

[1]For samples prefixed M, analyses for Au and Te by AA, remaining elments by emission spec. (USGS labs).

[2]For samples prefixed R, analyses by Neutron Activation (Bondar-Clegg lab), Cu and Te were not determined.

[3]NA not analyzed.

[4]33,000 ppb = 1 oz per ton.

REFERENCES

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