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DEPARTMENT OF NATIONAL DEVELOPMENT.
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RECORDS.

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AN EXAMINATION OF THERMAL AREAS AT

GARUA HARBOUR, NEW BRITAIN

AUGUST 1954

by

M.A. Reynolds

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1. INTRODUCTION.

Reference to the Talasea and Garua Harbour thermal areas was made by Fisher (1939)^x but there have been no other reports since then. He describes the fumaroles as "issuing through highly odoriferous mud at temperatures up to nearly 100 degrees Centigrade, and carrying a considerable proportion of sulphuretted hydrogen and carbon dioxide." During 1952, Best stopped at Talasea to take temperatures of thermal areas but unfortunately burned his foot at the first area examined (Zone B of this report.) The 1954 investigation was primarily concerned with examination of as many of the thermal areas as possible in the short time available, and to record temperatures which could be used as a basis for comparison in future investigations.

DETAILS OF THE INVESTIGATION.

The writer arrived at Talasea on the "Theresa May" on the 28th August after completing investigations in the Langila Crater area and on Vitu Island. Over the next three days thermal areas near Talasea and west of Pangala village on the north coast of Garua Harbour were visited and temperatures taken. Two police boys, one of whom, Wareambu, accompanied the writer during investigations in the Langila Crater area, were allocated to act as guides during this period. On the 1st September the writer returned to Rabaul on the Qantas Sandringham.

A set of Kodaslides taken during this investigation is kept at the Observatory, Rabaul, for reference.

11. PHYSIOGRAPHY

Talasea is situated on the southern side of Garua Harbour, about half-way along the eastern side of Willaumez Peninsula. The peninsula has been built up by several volcanoes, only one of which, Garbuna^{xx}, is not entirely extinct, and the products of their activity. The thermal areas scattered along the peninsula are surface manifestations of the last remnants of the vulcanism.

Small ridges built up of old lava flows from extinct cones to the west and pumiceous dust deposits form the sites for the district office and some other administration buildings in the vicinity of Talasea. The small peninsula in the north-eastern portion of Talasea is composed of one of these old lava flows and is flanked on the east by a small area of Recent coral limestone and on the west by a partly altered tuffaceous deposit.

111. THERMAL AREAS.

During the short time available, it was possible only to make a rough estimate of the positions of the areas, and these have been divided into zones classified A to E. Owing to their proximity to the district office and the road, fumaroles, mud springs etc. in Zone C were plotted more accurately, and a detailed map of portion of that zone is included with the report.

^x "Report on the Volcanoes of the Territory of New Guinea", Fisher N.H. Geol. Bull. No. 2 TNG. 1939.

^{xx} Refer Appendix 1, "Volcanic Activity: Mts. Tolcker and Garbuna, Jan.-Feb. 1954", Monthly Vulcanological Reports, Jan., 1954.

1. Zone A: There are two main areas within this zone which is about 200 feet above sea level, the northernmost close to the track which leads to Waru village and the other a short distance south in a small creek.

Within the northernmost area, less than 100 feet in diameter there are about 20 grey mud springs through which gas is issuing. The nature of the ebullition depends upon the viscosity of the mud. Where high, small spatter cones have been formed over vents, and there is a sibilant escape of vapour and gas. Gas exhalation through mud which is less viscous but still highly plastic results in a series of bubbles breaking through the surface with a force sufficient to throw small mud pellets to heights of sometimes over 5 feet above the surface. From the least viscous of the mud springs, the pressure required for gas to reach the surface is less, and there is a constant ebullition similar to that formed by boiling water. Temperatures measured here were as follow: 96°, 81°, 77°, 93°, 94°, 90°, 92°, 91°, 86°, 92°C. The first four readings are from springs nearest the track and the temperatures of 81°, 77° were obtained in the westernmost of these springs. The remainder were taken in the eastern portion where springs occur in an elongate area of hot, muddy ground.

Gas ebullition in the creek, a short distance south of the above, is confined to a small elongate area where rocks have been intensely altered. Temperatures were taken from the eastern end, along the northernmost edge and in the western portion. In the latter part there is an area about 5 feet in diameter where steam with a trace of sulphuretted hydrogen gas is being emitted under pressure and forcing the water to a height of about one foot above the surface. The following temperatures are given in the order taken as described above: 99°, 96°, 89°, 94°, 95°, 96°, 97°, 98°, 92°, 82°, 98°C. Owing to the pressure of gas ebullition in the westernmost area, the thermometer could not be lowered into any of the vents and the temperature obtained, 98°C, is that of the hot water.

2. Zone B: This zone is in a gully west of the administration house (as shown in the map) at a height of about 100 feet above sea level. The zone is divided into two areas by a small ridge, the northernmost where rocks have been extensively altered by fumarolic activity, and the other, extending from south to west of the ridge, where gas ebullition occurs in springs and the headwaters of a small creek.

Owing to the alteration of rocks and sediments, the fumarolic area is mainly white and red with small amounts of a greenish encrustation which appears to have formed by precipitation from small hot water seepages. There are some small accumulations of yellow sulphur crystals. Owing to the nature of the activity and possibly to percolating hot water, some parts of this area, covered by a thin white siliceous crust, have been undermined and a false surface exists. The area is fumarolic mainly along the eastern margin and temperatures from north to south were as follows: 84°, 83°, 89°, 92°, 100°, 98°C. A small blowhole, about 2 feet in diameter, at the southern end of the area has resulted from the escape of gas and steam under pressure. The area surrounding the blowhole has a false surface and the temperature, 104°C, was taken from the ridge at the southern end.

The temperatures of mud and water springs south of the ridge varied between 90° and 102°C at the eastern end. At the western extremity, temperatures taken were between 80° and 100°C.

3. Zone C: Thermal points at which temperatures were taken in this zone are numbered on the map, scale 1 inch equals 100 feet. Temperatures taken, with remarks on the nature of the hot point, are given in Table I. Three groups of mud springs were discovered, just prior to departure, aligned in a direction approximately north

east of point 10c. These extend to the eastern side of the small peninsula composed of lava to a point just north of the limestone outcrop. Temperatures taken along the coast in Zone C were as follows: 98°, 92°, 85°, 98°C.

4. Zone D: The eastern margin of this zone is formed by a line of fumaroles oriented north-south and extending inland to high ground south of the road. A number of readings were taken of temperatures along this line and all, except that taken under the sea (96°C) were 100°C. Other thermal areas in this zone extend to the west along the coast. A reading of 74°C was obtained from a vent just east of the old drums, the remnants of a small jetty built during the war. Just west of the drums is an area, stained red-brown on the surface, where temperatures of 99°, 88°, 102°, 102°, 102°C were recorded. The following readings were taken at vents in a small group about 100 feet west of the above: 99°, 98°, 100°, 94°, 97°, 98°. Other temperatures taken along the coast were within the range of this group. 80°C. was recorded at the head of a small creek in an area of hot ground and springs between the Chinese store and the coast.

Temperatures of vents along the coast were recorded during the period of low tide.

5. Zone E: This zone occurs at the northern side of Garua Harbour west of pangalu village. It is close to the beach, behind a small ridge and almost due north of Zone D on the southern coast. The fumarolic area is oval-shaped and according to Fisher (1939), is "about 200 by 100 metres." There are two geysers within the area, and the steam emission from a vent in a ridge in the western section was periodic and distinctly geyser-like in action. This vent was small and situated well above the level of the water noted in the geysers during quiescent periods. Probably the fissure through which steam escapes is -shaped below the water, and steam accumulates in the manner typical of geysers. When the pressure is released, steam cannot escape in the manner of geysers with open vents, but must force its way through another fissure and some of the energy is expended. As a result there is a periodic emission of a small cloud of steam. The temperature recorded in a small vent on the same ridge was 104°C. The thermometer was lowered into the geyser in the north-west section of the zone, and a reading of 102°C. was obtained. The temperature in a vent nearby was 104°C. The largest of the geysers is in the central portion, but owing to distance from the mouth of the vent to the water surface level, no temperatures could be taken. A reading of 92°C. was recorded from a small vent just east of the geyser vent. Towards the eastern end of the zone, steam, obviously under pressure, is being sibilantly emitted. A temperature of 104°C. was recorded also from this vent. The extreme eastern end of the zone consists of a shallow lake where water from the geysers accumulates.

6. Other areas: White steam clouds were noted rising from two areas west of Zone E, and other fumarolic areas were reported to exist north of Pangalu. These areas on the north coast of Garua Harbour are mentioned by Fisher (1939) who states: "North and north-west of Pangalu, farther from the beach, are other active fumarole areas, but none so extensive or so vigorous as the one described" (Zone E.)

IV. CONCLUSIONS

Although residents of Talasea, in particular those who work in the district office, are continually oppressed by the smell of sulphuretted hydrogen, the only real danger to the inhabitants and also to animals exists in the proximity of thermal areas to buildings and the road. It is suggested that the projected plan for fencing off the most dangerous areas be effected as soon as possible. The possibility of volcanic activity in the Garua Harbour area is not considered likely, but it is desirable that a periodic examination

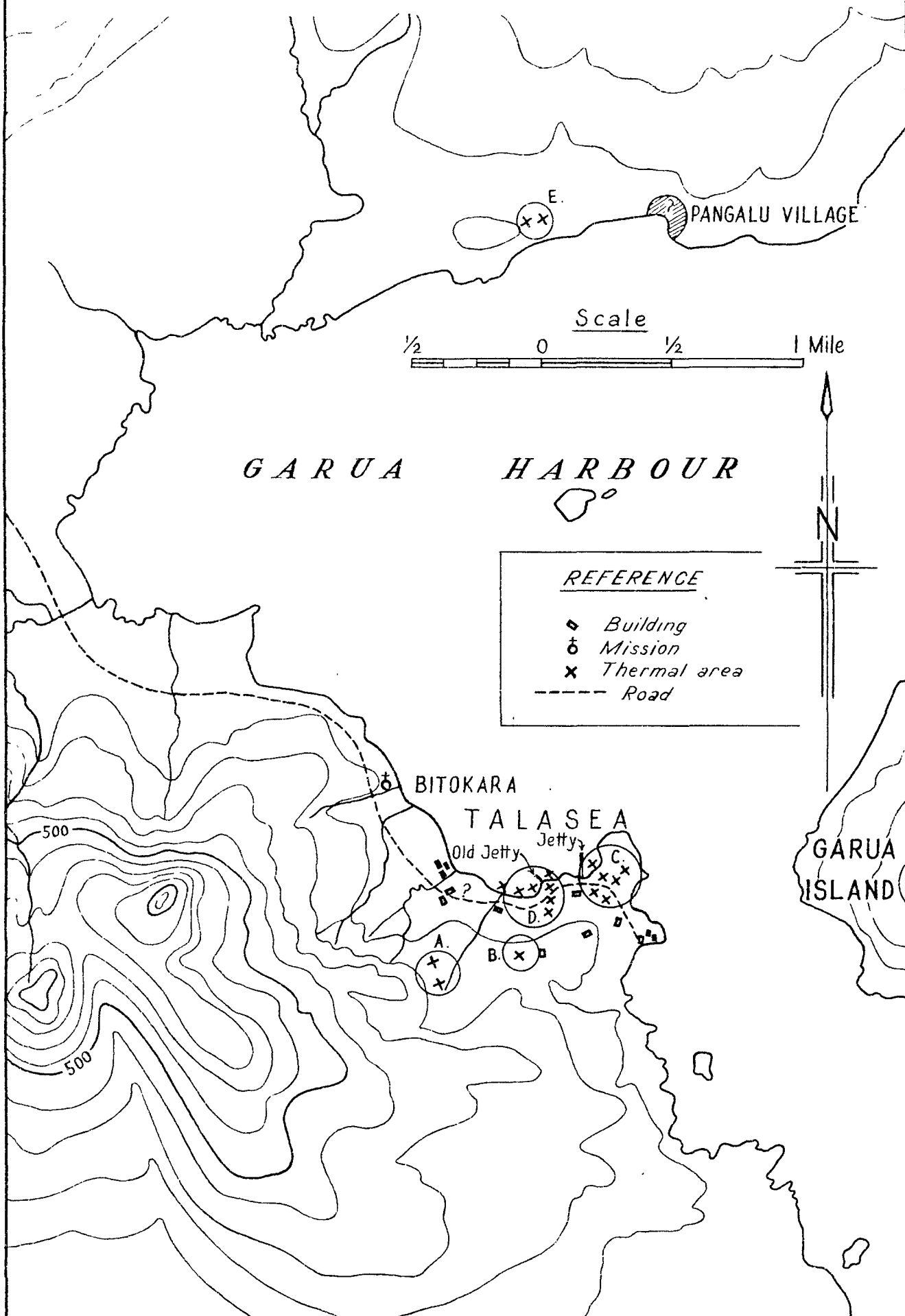
and measurement of temperatures of the thermal areas be conducted. Fisher concludes his remarks on this area with the following statement "There is no evidence for considering that Garua Harbour is, like Blanche Bay, an old crater or caldera, and the fumaroles and solfataras are only the end products of the regional volcanic activity which has affected the whole area."

TABLE I.

Point No.	Temperature (°C.)	Remarks.
1.	97	Fumarolic area
2.	93	Mud, water spring
3.	100	Vent in small cone built up of alteration products.
4a	90	Mud, water spring
4b	96	" " "
5.	99	" " "
6a	91	Mud with high viscosity
6b	94	" " "
7a	90	Mud, water spring
7b	92	" " "
7c	98	Vent in very small cone as at point 3.
8a	97	Mud, water spring
8b	84	" " "
8c	90	" " "
9a	90	" " "
9b	90	" " "
9c	91	" " "
10a	100	Vent in small cone as at point 3
10b	99	" " "
10c	88	Mud, water spring

THERMAL AREAS, GARUA HARBOUR

(Showing only those areas examined in August, 1954)



(Prepared from Provisional Map "Talasea, S515-EL 5000/15" 1 inch equals 1 mile Series, by Corps of Engineers, U.S. Army, Dec. 1943 and from information supplied by A. D. O. M. Foley, Talasea, August 1954.)

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THERMAL AREAS EAST OF DISTRICT OFFICE, TALASEA, NEW BRITAIN,

AUGUST 1954

