1956/12

INVESTIGATIONS OF RECENT VOLCANIC ACTIVITY IN THE TERRITORY OF NEW GUINEA, 1953

BY

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1953.

TERRITORY OF PAPUA AND NEW GUINEA.

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INVESTIGATIONS OF RECENT VOLCANIC ACTIVITY IN THE TERRITORY OF NEW GUINEA.

Introduction.

The Territory of New Guinea, a Trust Territory, administered by the Australian Commonwealth is situated between longitudes 141° and 156° East and latitudes 0° and 7° South. It consists of several island groups and is, in part, contiguous with the Australian Territory of Papua.

Considerable portions of these island groups are built up of volcanic products and numerous well preserved volcanic cones testify to the comparative recency of active volcanism in this area. In general, volcanic activity in the Territory is in a decadent stage, there being only twenty-three active or suspected active areas known at present.

Volcanic Areas of the Territory of New Guinea.

The areas in which active or suspected active centres occur are divisible into four main groups:

(a) The island chain bordering the north-west coast of New Guinea consisting of Karkar Island and those west of it;

(b) New Britain group comprising New Britain and outlying islands;

(c) Bougainville group including the islands to the north of New Ireland;

(d) The Admiralty Group.

During the years 1952-1953 there have been eruptions at centres in groups (b), (c) and (d) and increased thermal activity at centres in groups (a) and (b).

The eruptions at Long Island - group (b) - St Andrew Strait - group (d) and the investigations at Mt Langila - group (b) and Manam Island - group (a) are dealt with in this paper.

The observations offered, are of necessity, incomplete, since staff shortage, particularly during 1953, has restricted the time available for investigation at each of these centres.

Mt LANGILA

Introduction.

Reports of increased activity at Mt Langila, led to the following investigations at this centre, from 20th-30th June (G.A. Taylor), 16th July-17th August and 18th October-4th November, 1952, (G.A. Taylor and writer).

The only previous investigation at this centre was that by N.H. Fisher in 1939.

Recent Investigation.

Physiography and Structure.

Mt Langila is the only active member of a group of volcanic cones which constitute the western end of New Britain. It is a strato-volcano about 3,800 feet high and lies on the eastern flank of a larger extinct cone (Mt Talawe, 6,600 feet). The lavas of Langila trend from basic to a more acid type, the lower members being basaltic and containing olivine phenocrysts, whilst the later flows are andesites containing large felspar phenocrysts.

The terminal cone of Langila contains two main craters aligned N.N.E.-S.S.W., developed on the N.N.E. flank of an older thickly timbered crater, Munlulu. From field evidence it appears that Munlulu represents an easterly migration of activity from Talawe, whilst the Langila craters represent subsequent northerly migrations, a decrease in size and elevation (5,000 feet down to 3,600 feet) is manifest as one proceeds from south to north.

The southern Langila crater consists of a shallow depression, with a high wall developed on the S.S.W. side, in the western portion of which lies a sheer sided explosion crater about 250 feet deep. The vapour cloud, mainly steam with a faint trace of sulphur dioxide, rising from the base of this crater, at all times obscures the lower regions. To the N.W. of this, on the outer edge of the rim of the main southerly crater a much smaller steam explosion crater contains mounds of sublimation products though which low temperature steam was escaping. Further to the N.W., about 150 feet down the flank, a further small explosion crater was emitting low temperature steam. These conditions were much the same as those described by Fisher in 1939.

However, a marked change was evident in the northern Langila crater which Fisher reported as "showing no signs of activity". Here two contiguous craters, aligned East-West are enclosed within the main crater. The western member consists of an inverted cone-shaped crater about 300 feet wide and 120 feet deep, about midway down the southern wall of which is developed a narrow fissure-like crater. Within this "Fissure crater" three large fumaroles and numerous minor vents were emitting high pressure vapour charged with acid gases at an elevated temperature.

Temperature.

Temperatures prevailing during July and August were between 220° and 230° C. whilst during October/November the average was about 200° C. This decrease was in general agreement with other observed changes.

Gas Emission.

The vapour was being emitted from the three main vents, with a low flat roar, and consisted mainly of steam. Sulphur dioxide was the main acid gas present and had afflicted an extensive area of vegetation on the lee side of the crater and flanks of the terminal cone. The concentration was such that a gas mask did not at all times ensure complete protection. Silver nitrate tests failed to reveal acid halides, although a gas manifesting similar physiological reactions was, at times, quite concentrated. Hydrogen sulphide was generally only detected outside the crater area; during October/November its concentration appeared to have increased somewhat.

Subterranean Explosive Phenomena and Seismic Activity.

On four separate occasions during the July/August investigation, muffled explosions were heard, seemingly emanating from directly beneath the observers, each was accompanied by a short period ground movement of brief duration. These muffled explosions were attributed to pressure adjustments occurring within the conduit. Their absence during the October/November investigation was a further indication of a slight decrease in potential.

Apart from these brief ground movements no other seismic activity was perceptible during the July/August investigation.

A crude recording pendulum constructed during this investigation was set up towards the end of it and when inspected in October was found to have recorded three distinct tremors. It is considered these were the tectonic tremors of 11th October with an epicentre near Umboi Island, about 40 miles to the South-west. Three minor tremors only, were noted during the October/November investigation, they were considered to be of tectonic origin.

Tilt.

A Tiltmeter was installed during the last investigation at the camp about 700 feet below the crater and in line with it. Alarming results were obtained, a maximum rise of 8 minutes being recorded over a period of several days. Subsequent comparison with earth tremor incidence at Umboi Island revealed a marked correlation between abnormal variation in tilt and tectonic earth tremor frequency.

Past Activity.

The date of the last eruption of Mt Langila is not known with certainty, however, from native reports it appears to have been about 1884. The eruption, purely explosive, continued intermittently for some time, and at no time reached violent proportions. The natives maintain that it was the northern crater only which was active.

The natives usually avoid Mt Langila and thus little information is available regarding changes at the crater. However, on Taylor's first inspection in June he had with him a native who had accompanied some American troops to the crater in 1944. This native stated that fumarolic activity was then evident in the northern crater, but not to the extent manifest in 1952.

Summary.

The recent investigations indicate a marked increase in activity over that described by Fisher in 1939.

The native report of minor activity in the Fissure Crater in 1944 is confirmed by the presence of old dead vegetation on the windward side of the present vents. It is probable that a waxing and waning of activity has occurred here during the intervening years. Observations indicate that the past increases did not reach the intensity of the present stage.

It is considered that the present increase became manifest about April, 1952, (the beginning of the south-west season); the absence of recently afflicted vegetation on the south-west side of the vents tends to confirm this. In any case the increase was sufficiently well established, by May, to be seen from the coast about 6 or 7 miles away. The latest investigation revealed a slight decrease in potential and it is regretted that commitments in other parts of the Territory over the past ten months have prevented a further check being made of this area.

LONG ISLAND.

Introduction.

From all available evidence Long Island (native name Arop) appears to be the most recent of the Territory's calderas. Subsequent activity appears to have been confined to the central portions of the caldera, successive eruptions having erected there a small pyroclastic cone, the most recent eruption resulting in its elevation above the surface of the lake occupying the caldera.

Physiography and Structure.

Long Island is situated at the northern end of Vitiaz Strait and lies about 40 miles north of the New Guinea coast. The island, somewhat ovate in plan (the long axis oriented North-north-west/south-south-east) is about one hundred and fifty square miles in area and is surmounted by two parasitic cones, Mt Reamur 4,278 feet to the north and Cerisy Peak, 3,727 feet to the south.

The central portion of the island consists of a vast caldera, roughly circular in plan, about thirty square miles in area and contains a pluvial lake (Lake Wisdom), the surface of which is 500 feet above sea level. The lake is of unknown depth, soundings to date indicating a depth in excess of 200 feet.

The rim of the caldera is at a general elevation of 1,100 to 1,200 feet above sea level and for the greater part of its circumference falls precipitously to the lake surface. Developed in the eastern caldera wall is a low gap about a mile wide and one hundred and fifty feet above lake level, this continues down to the coast as a broad valley into the floor of which is incised Monona Creek which drains the lake,

The island is entirely volcanic in origin, consisting of a base, mainly of effusive origin, over which violent explosive eruptions have laid a thick mantle of pyroclasts. The lavas are predominantly basaltic in which crystallisation is well advanced, whilst the pyroclasts are mainly ash and lapilli, no appreciable boulder deposits having been discovered to date.

Cliff sections around the coast reveal several stages of explosive activity, the final one being the most severe. Marine fossils in the penultimate bed of these deposits indicate that portion, at least, of the island was submerged during this particular stage, whilst completely charred tree trunks in the basal section of the uppermost deposit suggest that uplift and a protracted quiescent period must have preceded the final violent outburst.

It is considered that the caldera was formed by evisceration and collapse of the central portion of the edifice during this final castastrophic eruption, estimated to have occurred about two hundred years ago.

Past Activity.

That native legend still contains references to a former violent eruption at Long Island testifies to both its magnitude and the relative recency of the occurrence. It appears that the only survivors were those natives who managed to escape from the island, and, in fact, the island was uninhabited until the early 1920's when the present inhabitants, descendants of the originals, returned.

Records of post-caldera activity were until very recently non-existent. An investigation by Fisher in 1939 failed to reveal any signs of activity whilst in August, 1952, Taylor and the writer unsuccessfully endeavoured to locate the active vent indicated on the Military Sheet (prepared from air photos in 1943) nor was any information available from the natives regarding recent previous eruptions. However, after the May/June, 1953, eruption these same natives volunteered the information that there had been minor eruptions within the Lake in 1933, 1938 and 1943.

Recent Eruption.

The inhabitants of Long Island were completely unaware of the eruption within Lake Wisdom until visited by members of the Department of District Services and Native Affairs staff. The first report of activity in the area originated from Umboi Island 50 miles to the south-east from whence, on the 8th May, columns of "smoke" were seen rising above Long Island. An eruption was suspected and confirmed on the 9th by a Qantas aircraft diverted to inspect the area. The captain of this aircraft reported a small horse-shoe shaped ridge just above water level from within which explosions were hurling jets of black material and steam 300 to 500 feet into the air at about ten minute intervals. The writer first viewed the activity from the air on the 12th and by this time the cone had grown to about 200 yards long, 100 yards wide and 100 feet high, the vent being situated to the windward (south-east) of the main bulk of the cone. Explosions at 15 to 30 second intervals were ejecting black ash, lapilli and small boulders, together with billowing clouds of steam to about 400-500 feet above lake level. Vapour trails formed by some of the boulders in descent suggested a fairly high temperature for the solid ejectamenta, this was confirmed on a night inspection by a R.A.A.F. aircraft on the 14th May, the captain of which reported "belches of flame approximately every fifteen seconds".

The lack of staff prevented an observer being stationed on the island and hence the only observations were made from aircraft at irregular intervals.

On the 19th a further reconnaissance by a R.A.A.F. aircraft revealed the presence of a second vent. On this occasion explosions were originating from the main vent and, in addition, submarine explosions to the north-west of the cone indicated the existence of another vent.

On the 21st May a column of black smoke was seen from Saidor (40 miles to the south-west) rising above Long Island in three successive waves to a height of about 6,000 feet.

On the 23rd when the writer again flew over the area the cone was seen to consist of a ridge about 400 yards long, 100 yards wide and 100 feet high, containing two contiguous craters, only the northern member of which was explosively active.

The exact date of cessation of activity is not known, however, a commercial pilot reported on the 12th June that both vents were inactive.

To date attempts to make a ground survey of these new craters have been unsuccessful, strong winds and the resultant rough water proving too much for the small canoes available for launching on the lake.

ST ANDREW STRAIT.

Introduction.

The recent submarine eruption in St Andrew Strait in the Admiralty Group drew attention to this hitherto neglected portion of the Territory's active volcanic area.

History records an eruption in the Admiralty Group in 1883, however, the location and nature of the eruption are not recorded. From recent investigations it seems probable that it was the St Andrew Strait vent which was active on that occasion.

Physiography and Structure.

From the Admiralty Chart (1944) it is evident that the Admiralty islands are based on a large submarine mass lying about 2,500 feet below sea level. Beyond this mass the sea floor drops rapidly away to a depth of about 7,000 feet and it is considered that volcanic agencies have, in the main, erected this mass and subsequently, the Admiralty Islands upon it.

St Andrew Strait is situated about 25 miles south of the eastern end of Manus Island (the largest member of the Admiralty Group). The strait is aligned in a north-east/south-west direction and is bounded on the north-west side of Lou Island and on the south-east by the island groups of Pam and St Andrew.

Further reference to the Admiralty chart reveals the existence of a shoal area at a depth of 67 to 80 fathoms (400-480 feet) in the western end of the strait, westward of this the sea floor drops rapidly away to 400 fathoms (2,400 feet) Soundings are not plotted for the eastern end, however, the chart indicates "foul ground" between the eastern end of Lou Island and the Fedarb Islands.

The structure revealed by the chart suggests the presence of a submarine caldera of considerable dimensions, (about 6 miles long and 4 miles wide.) Ample confirmatory evidence is supplied by the structure and disposition of the surrounding islands.

Lou Island.

Lou Island is an arcuate shaped ridge convex towards the north-west, seven and a half miles long, two and three quarter miles wide (the long axis oriented approximately north-east-south-west) and 920 feet high. It consists of a thick mantle of pyroclasts on a foundation of dark basic lava flows and is deeply dissected, with an overall gentle slope to the north-west and a steep fall to the south-east coast.

The pyroclastic deposits are mainly pumiceous; massive lava fragments at all times being subordinate. On some portions of the island these lava-fragments are predominantly vitreous, angular fragments and blocks up to several feet in width.

On the south coast a cliff reveals about three hundred feet of a pale grey partially consolidated pumiceous breccia in which bedding is not discernible. On the north coast thin beds of pumiceous and massive ash and lapilli, lossely compacted, dip gently towards the coast.

The only thermal area on the island is located about midway along the south-east coast and consists of a few low temperature steam vents, developed in a denuded area of decayed lava and sublimation products.

This island is obviously the north-west remnant of a larger volcanic edifice and is considered to be portion of the rim of the St Adnrew Strait caldera.

Pam Islands.

These two small islands Pam Mandian and Pam Lin are considered to be remnants of the south-east rim of the caldera. Pam Lin, the northern member, consists of basic lava flows dipping to the south-east, cliff exposures on the north-west coast exposing vitreous phases, megascopically identical with the vitreous fragments found on Lou island. The remnant structure is not as obvious on Pam Mandian, but, it too, is composed mainly of basic lava flows in which vitreous phases are common. Pumice fragments included in these flows suggest contemporaneous effusive and explosive activity at some previous stage.

Mok Island.

Mok Island lying two miles south of Pam Mandian consists of thin beds of tuff and breccia dipping steeply (28° to 31°) to the south-east. It is considered that Mok is the south-east remnant of a parasitic pyroclastic cone developed on the southern flank of the caldera. Coral fragments in the beds indicate deposition under marine conditions.

Baluan.

Baluan island, roughly circular in plan, about three miles in diameter and 600 feet high, consists almost entirely of basic lava flows, the upper members of which are mainly AA, hence the surface although thickly vegetated is extremely rough and rocky. A large thickly timbered crater about three-quarters of a mile long, half a mile wide and 400 feet deep occupies the central portion of the island. Numerous thermal vents, mainly emitting warm over-saturated vapour, occur on the outer flanks and rim of the crater. A thin surface deposit of reddish brown scoria indicates that the last eruption at this centre was of explosive nature. It is considered that Baluan is a post-caldera parasitic cone developed on the southern flank of the caldera.

Recent Eruption 27th June-6th July, 1953.

At 11 p.m. on the 27th June, 1952, a distinct explosion heralded the eruption and shortly afterwards, clouds of vapour were seen rising from the sea at a point about two-thirds of the distance between Baluan and Lou islands. This explosion generated minor sea waves which inflicted only minor damage to some canoes at Pam Mandian; this was the only damage caused by the eruption.

Daylight revealed a vast column of white vapour rising from a patch of sea about half a mile in diameter, this cloud borne by the wind rose gradually to a height of about 2,000 feet some distance to leeward. Surrounding this area were large blocks of floating pumice (fifteen to twenty feet in diameter) very hot and emitting vapour.

Explosions at irregular intervals within the active area hurled jets of black ash and lapilli several hundreds of feet into the air, each explosion resulting in a considerable increase in steam emission.

At night a faint glow was practically continuously maintained, at several points just above sea level, within the active area. Sudden intensification of this glow in each case being followed by a clearly audible explosion.

The presence of several incandescent areas and the apparent wandering of the focus of ejection, visible by day, suggested that several vents were operative.

This mode of activity persisted with gradually diminishing intensity until on the 5th July only a low steam cloud hung over the area, to be pierced at protracted intervals by explosive ejections of fragmental material and steam. No further visible or audible activity was manifest at this centre after 5 p.m. on the 6th July.

A true fix of the focus of eruption is somewhat difficult as the plotted positions of the islands are at variance with their actual positions. However, it appears to coincide with the northern edge of the shoal area plotted on the Admiralty chart.

Seismic Activity.

Premonitory seismic activity was of such minor intensity as to be imperceptible to the inhabitants of the surrounding islands. During the eruption perceptible seismic activity was only of a minor nature, both in frequency and intensity. A marked correlation between tremors and explosions at the vent was evident.

Emitted Vapours.

The emitted vapour was mainly steam, however, faint traces of sulphur dioxide were discernible when close to the hot floating pumice blocks.

Solid Ejectamenta.

The only fragmental material recovered was that which floated away from the active area and was of course pumiceous. One block about two feet in diameter when broken, open, revealed a gradation from a small black massive lava core to a pale grey extremely pumiceous periphery.

Summary.

This eruption is considered to be a re-activation of a minor vent within the caldera and is probably analogous to the 1878 eruption of Baluan (Vulcan) in Blanche Bay. However, whereas Vulcan Island was formed as a result of the 1878 eruption, an aerial inspection of St Andrew Strait on the 3rd August failed to reveal any sign of the recently active vent.

MANAM ISLAND.

Introduction.

Manam Island, the second most active and probably the most picturesque of the Territory's volcanoes, is separated from the New Guinea coast by the 10 mile wide Stephan Strait. It rises to a height of approximately 5,350 feet above sea level, more than 11,000 feet above the general sea floor level, is roughly circular in plan and about 32 square miles in area.

Physiography and Structure.

The central portion of the island consists of a cone-shaped edifice, deeply scarred by several large avalanche valleys. Thick rain forest is developed over most of the island, however, the upper part of the cone is devoid of vegetation. A narrow coastal flat, traversed by numerous lava flows and drainage channels, extends out from the base of the cone and two small parasitic cones are developed on this flat near the coast one to the north and one to the south of the main cone.

Manam is a typical strato-volcano composed of basic lavas. Remnants of the original cone are evident up to about 4,500 feet and consist of inter-bedded flows and pyroclasts up to 7 or 8 feet in thickness.

Within the blasted and shattered crest of the original cone, subsequent activity has erected a secondary cone deeply dissected on the northern, eastern and south-eastern flanks. The surface of the western side of this cone consists of a thick deposit of loose ash, scoria and lapilli lying very near the angle of repose (average dip on the upper portion of the cone is $37\frac{1}{2}^{o}$). The core of this cone, exposed by an avalanche valley on the South-east flank, is seen to consist of massive lava strongly buttressed by numerous dykes and sills.

This secondary cone contains two contiguous craters (aligned North-South) both of which, due to breaching of their eastern walls, appear as cirque-like depressions at the head of large avalanche valleys.

One large fumarole is developed in each crater and numerous areas of hot ground and minor fumaroles are dispersed through both craters.

Past Activity.

Fisher (1939) states: "About 1917 boulders were hurled some distance into the air. The most severe eruption on record occurred on the 11th August, 1919. It is said that a stream of lava actually flowed down the mountainside into the sea while dust, ash and lapilli were thrown out to the accompaniment of a cloud of black "smoke". Native gardens were destroyed and the finer dust carried long distances.

In March, 1921, according to the New Guinea Handbook, the volcano emitted large quantities of steam, dust and debris, with occasional flows of lava.

Another fairly severe eruption took place in September/October, 1936, notably on 17th, 25th and 31st October, when stones and dust were thrown up for a considerable height and flows of lava occurred around the upper part of the mountain. Little damage was done on this occasion to native gardens. A similar outbreak occurred on 15th March, 1937."

Towards the end of 1946 an eruption even more severe than that of 1919 commenced and continued intermittently until September, 1947. During this eruption a large AA flow spilled out from below the crest on the south-east side of the cone and flowing down a broad avalanche valley, bifurcated near its outer extremity and overran the coast in two places between the villages of Dugulava and Warisi. Thick deposits of ash and lapilli covered most of the island rendering unproductive many of the native gardens. The native inhabitants refused to leave the island, the only assistance they required being augmentation of their food supply until such time as their gardens were once again productive. There were no casualties.

Recent Activity and Investigations.

For the past twelve months reports of increased activity at Manam have been received at irregular intervals. This increased activity has been manifest as luminous effects at the crest of the mountain, greatly increased emitted vapour cloud or a considerable darkening of the emitted vapour cloud.

Two ground surveys, one in April and one in August, have failed to obtain definite temperatures or temperature trends. The disposition of the two large active fumaroles are such that attempts to reach them have been unsuccessful, consequently the only temperatures obtained were those of steam seeps near the crater rim and are not considered significant.

The vapour cloud rising from the northern fumarole is emitted without audible effects and billows up effectively blanketing the greater portion of the crater all the time.

The southern vent is much more active explosions from within the vent at fairly frequent intervals (half minute to one minute) perceptibly shake the crest and hurl swirling clouds of vapour high in the air. The emitted vapour is predominantly steam with a fair concentration of sulphur dioxide.

Significant results were not obtained from tilt readings taken at several points on the island during the second investigation, the reason being that readings in any one place were not of sufficient duration.

Summary.

It is obvious that Manam is at an elevated potential, however, the absence of previous reports prevent the determination of whether these conditions are normal or abnormal for this centre. The writer is of the opinion that little change was manifest between the April and August inspections, however, as this is based mainly on intangibles it must remain just an opinion.

In view of the seeming inaccessibility of the main thermal vents, it appears that future investigations at this centre must be of a protracted nature and concentrate on the recording of seismic activity and tilt movements. It is hoped that the Wilmore type seismograph at present on order will be of inestimable value in this type of investigation.

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TERRITORY OF PAPUA AND NEW GUINEA.

Vulcanological Observatory
RABAUL,
20th October, 1953.

Notes on the Volcanological Observatory, Rabaul, N.G.

The Volcanological Observatory at Rabaul is built on the northern rim of the Blanche Bay caldera, 600 feet above sea level. The site is an ideal one, overlooking the township of Rabaul and affording an excellent view of the various craters within Blanche Bay.

The Observatory was completed shortly before the capture of Rabaul (early 1942) by the Japanese, subsequently, the upper portion of the building together with all records were destroyed, and all instruments and fittings removed from the instrument cellar.

In December, 1951, work was commenced on the reconstruction of the Observatory. The upper portion of the building was restored and now contains a laboratory, records room and office, as well as temporary accommodation for staff. Upon the erection of permanent housing for staff, these living quarters will be converted for use as a museum, photographic dark room and workshop.

The instrument cellar 25 feet long, 15 feet wide and 9 feet deep is concrete lined and set into the ground so that the roof of the cellar forms portion of the floor of the upper building. Access is gained by a flight of stairs leading down from the laboratory whilst a 3 feet square manhole for handling bulky equipment is located in the north-west corner of the ceiling of the cellar.

Four concrete instrument piers, three, 3-feet square and the fourth 3-feet by 5-feet, are disposed as depicted in the plan.

The base of the piers are set well down below the floor of the cellar and a three inch gap left between the floor and the piers. This gap has been loosely filled with soil and covered with tarred paper to prevent rodents, etc., gaining access to the cellar.

Each pier is enclosed by a timber framed wallboard covered cabinet, the two western cabinets having fixed glass windows.

The most western cabinet contains two Tiltmeters oriented north-south and east-west. The cabinet east of this contains the Benioff seismograph recorder whilst the most eastern cabinet houses the three Benioff seismometers. The fourth cabinet is being used temporarily as a dark room, but is destined to house an earthquake announcer.

The concrete piers were designed for use with the pre-war Weichert seismograph and are only 6 inches above floor level. This was found to be too low for comfortable operation of the Benioff recorder and thus this portion of the instrument was housed in a separate cabinet on a rigid waist high platform, firmly attached to the concrete pier.

Storage space for film, tools and accessories is provided by a bench along the northern wall of the cellar, beneath which are drawers and cupboards. Further storage space is provided by a wall cupboard above the bench. To the eastern end of the wall cupboard is affixed an extension speaker, connected to a radio receiver housed upstairs. Just east of this a Synchronome electric clock is firmly attached to the wall.

Ventilation is provided by two air inlet ports, one on the northern wall and one on the southern, earthenware sullage pipes connect these ports to the outer atmosphere. An exhaust air-port is located in the western wall above the entrance to the small room under the stairs and discharges into the upper portion of the stair well. An electric exhaust fan is atta hed to the inner side of this port.

A small dehumidifying unit recently received has been experimentally installed on the roof of the cabinets. To date it has extracted an average of $4\frac{1}{2}$ litres of water per day from the cellar atmosphere.

Light proofing of the cellar has been obtained by fitting galvanised iron hoods over the outer ends of the air inlet ports and by affixing a wooden light baffle over the exhaust air-port.

Double light proof curtains at the foot of the stairs in conjunction with the cellar door provide an effective light trap at this point.

Both white and red safe lights are fitted in the cellar, the white lights being disposed as follows, one above the entrance door, one in the base of the wall cabinet above the bench and one in each of the cabinets.

The white lights are duplicated with red safe lights at the entrance, over the bench and in the Benioff recorder and temporary dark room cabinets. In addition a red safe light is susponded just above the face of the electric clock and another in the light trap outside the entrance door, to indicate where safe lights are being used in the cellar.

Rapindik Instrument Station.

At Rapindik, about $3\frac{1}{4}$ miles south-east of the Observatory an Omari type seismograph was installed in May 1950. This instrument, housed in a small hut on the northern shore of Croet Harbour, is a two component, low magnification, mechanical recording type, and is so placed to detect seismic activity of volcanic origin at the active centres in Blanche Bay. A radio receiver is also installed here in order to apply time corrections to the Thomas Mercer Chronometer used for time control of the Omari record.

Observatory Routine.

The difficulties experienced post-war in re-establishing the Observatory plus the repeated absence of staff from the Observatory on investigations of other active areas have delayed the implementation of much that should be, by now, routine.

Seismic Records.

At present seismic control is maintained by continuous recording with the Omari type seismograph, the record of which is changed every twenty-four hours and the readings of which are compiled in monthly Bulletins for distribution to Australian seismological stations and also to Pasadena, California.

When recording with the Benioff commences (at present held up through lack of accessories) it is intended to extend the distribution of this Bulletin.

Temperatures.

Temperatures of hot springs, wells, fumaroles and solfataras (51 points in all) at various points in Blanche Bay are taken weekly and recorded graphically. In the event of an upward trend in temperature occurring, the frequency of these recordings would be increased.

Tidal Records.

The Commonwealth Department of Works operates a Stevens continuous recording water gauge in Simpson Harbour and the Volcanological staff have access to this instrument for any information required. In addition tide poles are installed at selected points around Blanche Bay and are read weekly.

Tilt.

The two tiltmeters installed at the Observatory are normally read daily and the readings plotted, graphically.

Outstation Reports.

An arrangement exists with the Radio Telecommunications branch of the Administration of Papua and New Guinea whereby all outstations report by radio any seismic disturbance or increase in volcanic activity in their area.

This service is in the process of being extended and to this end a special form for earthquake and volcanic activity reporting has been drafted and is at present in the hands of the Government Printer. This form will be made up in books containing twelve duplicate copies and will be issued to all Government outstations as well as those private individuals selected as Observers for the various active volcanic centres. The recipients will be requested to record the incidence of any seismic activity and/or increased volcanic activity in their province, such information to be recorded immediately after it is manifest. At the end of each month the original copy is to be removed from the book and forwarded to this office, the duplicate being retained at the station.

Gas Analysis.

Gas analysis of volcanic exhalations is to become established routine, being done jointly with the weekly temperature recordings.

Photographic Records.

Photographic records of selected fumaroles and other thermal points are also to become a routine feature.

Outside Investigation.

A systematic investigation is to be made of all volcanic areas in the Territory of Papua and New Guinea and eventually regular inspections made of the more active members. Preliminary investigations of a number of areas have already been made, however, a lot yet remain to be investigated.

(J.G. Best)
A/Volcanologist,
Rabaul.

N.B. Plan of cellar being forwarded under separate cover.

The Chief Geologist,
Bureau of Mineral Resources,
Turner Hostel,
CANBERRA, A.C.T.

Dear Doctor,
Due to a misunderstanding the original copy of this was forwarded before I checked it (I was away at [illegible] [illegible] [illegible] at the time).
The plan has been posted together with this so you should get them both together. JGB