COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF SUPPLY AND SHIPPING.

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS.

REPORT No. 1948/47

(GEOPHYSICAL REPORT NO. 6)

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REPORT

ON

DETONATION OF EXPLOSIVES

TADJI, NEW GUINEA

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DETONATION OF EXPLOSIVES - TADJI, NEW GUINEA

This report discusses the proposed detonation of surplus R.A.A.F. bombs at Tadji, New Guinea.

A visit was made to the bomb area in March 1948, to observe the problems involved in detonating the bombs en masse for the purpose of a seismological study of the crustal layering of the island.

Various localities in New Guinea, Papua and the neighbouring islands were visited to estimate the practicability of installing temporary seismic stations to record the detonation. -x-

1. GENERAL

(a) Physiography. Tadji lies on the northern coast of New Guinea (long 142° 21') in a great triangular area of alluvial silts and clays, which forms a coast plain in the western half of the Bewani - Pual depression. For the most part of this area is lowlying, swampy and covered by rain forest.

Rising abruptly from the southern limits of the coastal plain, the foothills of the Torricelli Mts. form a wide belt of broken and dissected country rising 700 - 900' and gradually increasing in height southward to the Torricelli Mts.

The Torricelli Mts. form the central part of the mountain system that separates the western half of the Sepik - Markham depression from the north coast.

(b) Climate. The average annual rainfall of the area is about 100". The wet season on the whole coincides with the N.W. Monsoon December to April. In the S.E. season there is appreciable rain, but there is a greater frequency and incidence of downpours in the months of the N.W. winds. The driest month is September (Av. -4.8") with a gradual rise to the December average of 10.8".

The area is not unduly hot but the high relative humidity tends to produce a lassitude in unacclimatised persons. The best working hours are from 0500 to 1000 hours.

(c) Health. This area has higher malarial endemicity than the average for the territory of New Guinea. The incidence of scrub typhus is believed to be low.

(d) Native Population. Approximately 1500 natives live within a radius of 7 miles of Tadji. The population is divided into two main groups, the insular people on the islands of Tumleo, Ali, Seleo and Angel and the coastal people in the villages Pro, Vokau and Lemieng.

(i) The Insular people. The insular people number about 1100 with Ali I supporting 500, Tumleo I 400, Angel I 120 and Seleo I about 75 people. These people supplement the food grown on the islands from mainland gardens and planations. (Map 2).

(ii) The Coastal people. Of the coastal people Lemieng supports about 250 people and Pro and Vokau about 140. These three villages, comprising about 100 huts, depend on nearby gardens and plantation for their food.

-x- Data for this section was obtained from a locality study of Aitape - Wanimo area, Terrain Study No. 77 prepared by the Allied Geophysical Section, S.W. Pacific Area and published 6th March, 1944. Information of the native population came from A.D.O. R. H. Boyan, Civil Admin., N.G. - This information is to be revised.

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Apart from these centres of native population the rest of the area within a 7 mile radius of Tadji is virtually uninhabited. The Chinapelli natives however, have moved from their old site and their present whereabouts is not known. Kapaom village lies on the edge of the 7 mile perimeter.

Map 2 shows the distribution of the native population, gardens and plantations.

2 BOMB DISPOSAL

(a) Location and distribution. The bomb area lies immediately north of a large embayment area which ajoins the eastern end of the fighter runway. The fighter runway is 1200 yds from the coast and bears 103° 30' mag.

(i) Bombs located. Approximately 2230 tons of bombs containing 888 tons of explosive material, are distributed in 7 dumps over an area of about 3/4 of a square mile, 4/5 of them concentrated in 5 dumps covering an area of about 1/4 of a square mile. Map 1. shows the distribution of bombs, and the gross explosive tonnage in each of the 7 dumps.

Dumps 2, 3A, 3 & 5 lie in a swampy area with dump 2 showing free water (March 1948). This lowlying ground would probably be free from water during the drier S.E. season. The dumps are separated by thick rain forest and open onto a well packed north - south road which connects the bomb area to the fighter runway.

(ii) Bombs not located. R.A.A.F. stock sheets assess the tonnage of bombs at Tadji to be approximately 2939 tons. The tonnage not accounted for amounts to 709 tons. It is unlikely that this tonnage was overlooked in the recent survey.

(b) Detonation.

(i) Detonation en masse within a confined area. Map 1. shows the 900 square yard area within which the bombs could be stacked to satisfy the seismological purpose of detonation. Approximately 1190 gross tons of bombs containing 427 tons of explosive material are known to lie within this area, and 1040 gross tons containing 461 tons of explosive material have been observed to lie outside it. The tonnage lying outside the area is comprised of the following bombs -

1000 lb	1495)	
500 lb	655)	
250-260 lb	1128)	-------- (1)
100 lb	1001)	
20-23 lb	5646)	

-x-

It is estimated that it would take 6 weeks to move these bombs into the confined area. The tracks in the neighbourhood appear to be in fair condition. Table I shows the distribution of these bombs among the dumps.

1. 1000 lbs, 500 lbs, & 250 lb Bomb

(i) Equipment: 2 mobile cranes, 2 tractors, 8 bomb trolleys.

(ii) Personnel: 2 crane drivers, 2 tractor drivers, 1 loading supervisor, 1 unloading supervisor & native labourers.

(iii) Removal: (Assuming 1 tractor pulling 4 bomb trolleys carrying 1 bomb load moves 16x1000 lb or 16x500 lb or 32x250 lb bombs)

(a) Loading time - 1 hr)
Unloading " - 1 hr) 2½ hrs
Transport " - ½ hr)

(b) Hours worked per day - 6 hrs
Hours " " week - 36 hrs

(c) Total time to move 1495x1000lb + 655x500 lb + 1128x250 lb bombs + 6 weeks.

2. 100 lb bombs and smaller

(i) Equipment: X 1 x 4 ton truck

(ii) Personnel: 1 truck driver & native labourers.

(iii) Removal: (Assuming truck moves 2 tons of bombs each load)

(a) Loading time-1hr)
Unloading time-1hr) 2½ hrs
Transport time-½hr)

(b) as in 1

(c) total time to move 1001 x 100 lb + 5646x20.23 lb bombs - 3 wks 3 days.

X - Footnote on Page 3

According to R.A.A.F. stock sheets the 709 gross tons of bombs not found comprise -

1000 lb	935)	
500 lb	684)	
300 lb	117)	---------- (2)
250- 260 lb	556)	
100 lb	473)	

If these bombs were found it would take 4 weeks 2 days to transport them into the confined area.

Detonating en masse would necessitate the temporary evacuation of natives within a 7 mile radius of the bomb area. The duration of evacutation of the insular people to the mainland west of Aitape may take up to 1 month depending upon the number of canoes available. Accommodation in huts or tents may have to be provided for some of these people. The coastal natives would evacuate eastwards in the direction of Paup. This evacuation should last 1 day only for the inhabitants of Vokau and the eastern hamlets of Lemieng. Pro and the western hamlets of Lemieng however, may sustain slight damage and their evacuation may last 1 week - the nearest hamlet is 3/4 of a mile away and separated from the bomb area by thick rain forest. Accommodation may have to be provided in some instances.

Where natives are unable to gain access to their gardens they may have to be rationed. A native ration amounts about 15 lbs of foodstuffs per week and 10 - 15 tons may be needed to feed those who can not obtain their own food. Neither native gardens, plantations nor Mission property should be damaged by the explosion.

The Civil Administration of New Guinea would be the Government Department concerned with the evacuation and care of the natives. Further information on the evacuation of natives will be given later.

(ii) Detonating in time with the seismic wave. This method of detonation could be recorded satisfactorily by seismographs. The details of the method are not yet fully known but it is certain to involve less labour in preparation for detonating than method (1).

The natives would have to be evacuated as in (1).

(iii) Detonating en masse in Situ. The wide distribution of the bombs may not give a satisfactory seismic record if the dumps are detonated by this means.

The evacuation of natives would be the same as in (1) and (ii).

(iv) Detonating dump by dump. It is considered practical by R.A.A.F. personnel to dispose of the bombs by this means without the hazard of sympathetic detonation. It is unlikely however that this method would be of any use for seismic investigations except for recordings within a limited radius of Tadji.

The biggest dump (No. 5) contains 414.5 tons of explosive material distributed along 1/2 a mile of an east - west road.

X - (1) Equipment - Page 2. -------

This equipment (with the exception of bomb trolleys) could be had by arrangement with W.R. Carpenters a New Guinea Company who hold disposal stocks near Tadji. They would need to be supervised. They are short of equipment such as plugs, distributor caps, rocker arms, batteries, H.T. wire, vulcanisers and tubes. The stocks Carpenters hold include a S.k.V.A. electric welder, battery chargers and a compressor for tyres.

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Natives within a radius of 4 miles of the bomb area would have to be evacuated. This would effect the 500 people inhabiting the coastal villages of Pro, Vokan and Lemieng. The damage to native huts will be much less that that expected in (i), (ii) and (iii) and the time of evacuation shorter.

In the normal course of events the R.A.A.F. would dispose of the bombs by this means.

3. SEISMOLOGICAL

Investigation of sites for seismic stations is incomplete and will be the subject of a separate report to be written at a later date.

TABLE I

DUMP	BOMBS LOCATED														BOMBS NOT LOCATED						
	TYPE					Gross Tonnage	Exp Tonnage	OUTSIDE SQUARE AREA							TYPE						
								TYPE					Gross Tonnage	Exp Tonnage							
	1000 lb	500 lb	250-260 lb	100 lb	20-23 lb			1000 lb	500 lb	250-260 lb	100 lb	20-23 lb			1000 lb	500 lb	300 lb	250-260 lb	100 lb	20-23 lb
1	130	1775	40	-	-	459	146	-	-	-	-	-	-	-							
2	239	588	-	-	-	238	99	-	-	-	-	-	-	-							
3	352	-	416	935	5646	298	138	352	-	416	935	5646	298	138							
3A	-	588	-	-	-	131	53	-	-	-	-	-	-	-	955	684	117	556	473	-	
4	-	329	160	66	-	94	17.5	-	329	160	66	-	94	17.5							
5	1475	326	2052	-	-	970	414.5	1055	326	552	-	-	608	285.5							
6	88	-	-	-	-	40	20	88	-	-	-	-	40	20							
Total	2284	3606	2668	1001	5646	2230	888	1495	655	1128	1001	5646	1040	461	709 tons						

Total gross tonnage of Tadji Dump according to RAAF Stock Sheets = 2939

* Figures are approximate.

Financial.

Assuming (i) each seismic party weight 1000 lb. with equipment
(ii) R.A.A.F. flies each party from Melbourn using 3 Dakotas, 5 parties in each. Pay load of Dakota = 5000 lb., cost to run = £30 per hour. Do for Catalina.

	£
15 parties from Melb. to Pt. Moresby and back	2400
To place 3 Gulf parties in position & back (Kesema, Lake Murray, Daru)	200
To place 5 parties at Mudang, Lae, Wabag, Ambunti, Wewak and back	400
To place 4 parties at Vanimo, Sissano, Malts, Mormote and back	1500
To place 3 parties at Abau, Lumi, But and back	700
Hiring equipment to move bombs	400
Native evacuation (food, compensation etc.) and labour	900
Cost of detonating bombs in confined Area	1500
	£8000

N.B. It should not cost any more - it may cost £3000 less.

Say Expected cost £5000-8000.

MAP 1.

TADJI

BOMB AREA

1000 lb
No. 6, 20 Tons
1000 lb
N
500 lb
No. 4, 17·5 Tons
100 lb
250 lb
500 lb
1000 lb
1000 lb
No. 5, 414·5 Tons 129 Tons
500 lb
260 lb
500 lb
No. 3A, 53 Tons
53 Tons
1000 lb
23 lb
20 lb
100 lb
No. 3, 138 Tons
250 lb
Pyrotechnic depots
1000 lb
No. 2,
99 Tons
99 Tons
500 lb
1000 lb
1000 lb
250 lb
No. 1,
146 Tons
146 Tons
500 lb
Existing building
Fighter runway
50 yds
Scale: ~~1" = 50 yds~~.

Explanatory

A

1. All Tonnage refers to explosive content.
2. Tonnage in each dump written thus: 100 Tons
3. Tonnage within square area written thus: 100 Tons
4. Area of square area = 9000 sq. yds
5. Green area represents rain forest.
6. Shaded portion of square area represents rain forest to be cleared.
7. Approx. 10 bombs represented thus: I

B

Figures approximate.

		Tons	
1. Within square area	Gross bomb wt. = [redacted]		1190
	Exp. content wt. =	427	
2. Outside square area	Gross bomb wt. = [redacted]		1040
	Exp. content wt. =	461	
		Number	
3. Outside square area	No. of 1000 lb bombs = [redacted]		1495
	No. of 500 lb bombs =	655	
	No. of 250-260 lb bombs = [redacted]		1128
	No. of 100 lb bombs = [redacted]		1001
	No. of bombs < 100 lbs = [redacted]		5646
4. Gross wt. bombs unaccounted for 14·4·1945 = [redacted] Tons		709	

ALTERATIONS	ALTERATIONS

OPERATION:

DRAWN	
TRACED	
CHECKED	
PASSED	
APPROVED	
SCALE:	

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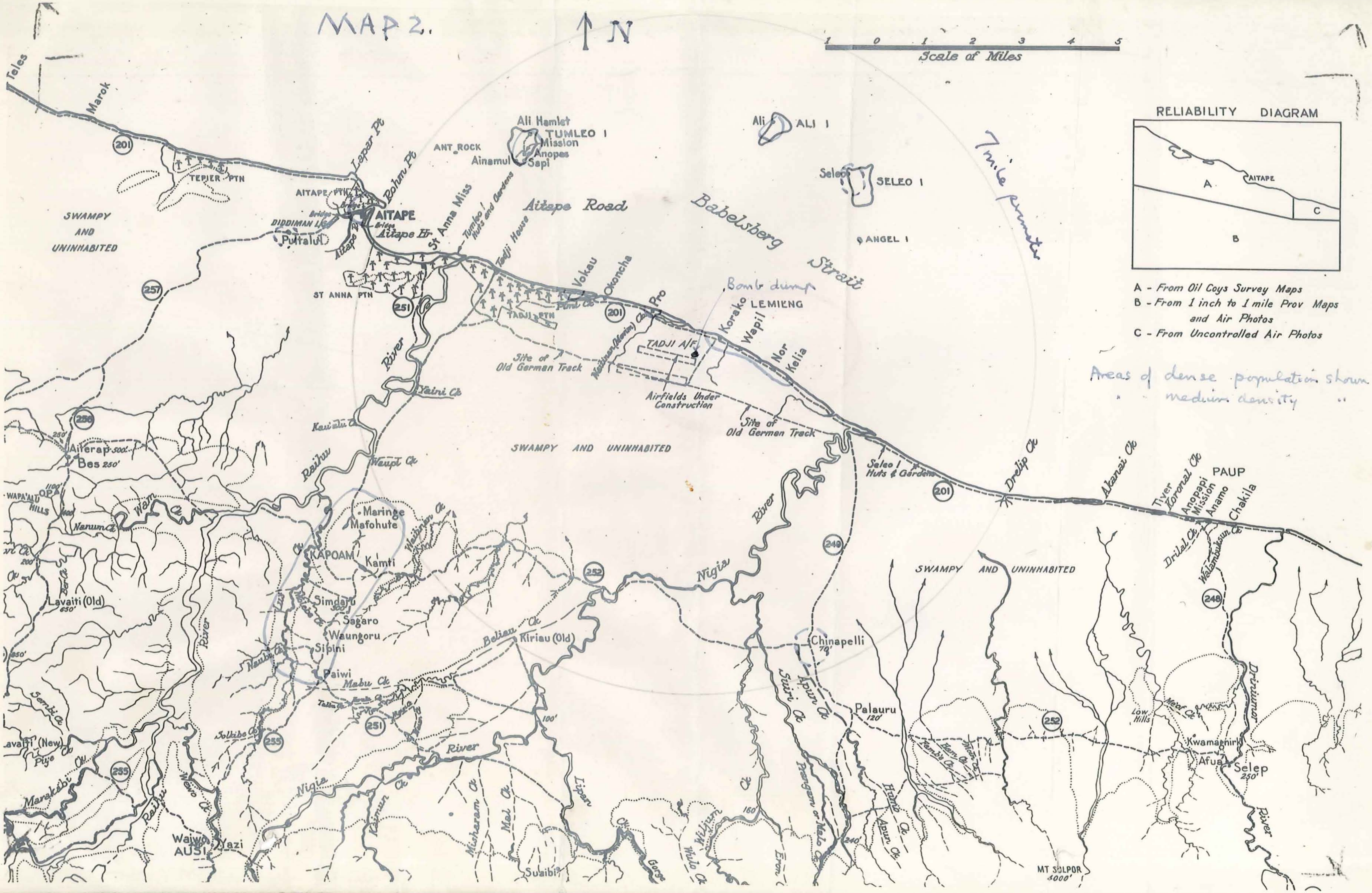
GUN AMMUNITION PRODN. DIRECTORATE

EPX—

REFERENCE:

ISSUE

MAP 2.


N
Scale of Miles
1 0 1 2 3 4 5
RELIABILITY DIAGRAM
A
B
C
AITAPE
A - From Oil Coys Survey Maps
B - From 1 inch to 1 mile Prov Maps and Air Photos
C - From Uncontrolled Air Photos
Areas of dense population shown (
medium density "
7 mile perimeter
Bomb dump
Teles
Marok
201
Lepar Pt
Rohm Pt
TEPIER PTN
AITAPE PTN
AITAPE
Aitape Hr
DIDDIMAN
Puitalul
SWAMPY AND UNINHABITED
ST ANNA PTN
St Anna Miss
Tumleo! Huts and Gardens
Tadji House
Aitape Road
Babelsberg Strait
ANT ROCK
Ali Hamlet
TUMLEO I
Mission
Anopes
Ainamul
Sapi
Ali
ALI I
Seleo
SELEO I
ANGEL I
TADJI PTN
Vokau
Okoncha
Pro
LEMIENG
Korako
Wapil
Nor
Kelia
TADJI A/F
Site of Old German Track
Airfields Under Construction
251
257
256
252
249
248
255
River
Yaini Ck
Raihu
Weupt Ck
Aiterap 500'
Bes 250'
OPA
WAPA'ALU HILLS
Nanum Ck
Maringe
Mafohute
KAPOAM
Kamti
Simdaru
Sagaro
Waungoru
Sibini
Paiwi
Mabu Ck
Belien Ck
Kiriau (Old)
Lavaiti (Old) 650'
Lavaiti (New)
Nigia River
SWAMPY AND UNINHABITED
Seleo I Huts & Gardens
Drelip Ck
Akansi Ck
PAUP
Tiver
Koronal Ck
Anopapi Mission
Anamo
Chakila
Drilal Ck
Walambukum Ck
Chinapelli 70'
Palauru 120'
Suiri Ck
Apun Ck
Low Hills
Kwamagnirk
Afua
Selep 250'
Driniumor River
Nigia
Kaiman Ck
Misharam Ck
Mel Ck
Lipan
William Ck
Wulo Ck
Eron Ck
Harn Ck
Apun Ck
MT SOLPOR 5000'
Suaibis
Gorge
Waiwo
AUSI
Yazi
Marakabi Ck
Pije Ck
Raihu
Solkibe Ck

3. Seismological.

The localities visited during March and May-June 1948 are conveniently grouped into five areas x :-

(a) Papuan Gulf area,

(b) Central Highlands area,

(c) Sepik R. area,

(d) North coast area,

(e) Island area.

(a) Papuan Gulf area. West of the Turama River and south from the central highlands to Torres strait, this area is generally a broad flat and low lying region extending into Dutch New Guinea. Two major relief features lie in this province, the Fly-Digoel depression, and the Torres watershed in the extreme S.W. Both features form part of a plateau believed to extend almost continuosly over the area as a piedmont alluvial plain formed during pleistocene times by erosion products from the Central Highlands, and pyroclastic material from volcanic activity in the north east. A broad downwarp developed during these times and determined the drainage into two systems, the Fly-Digoel system showing the lower reaches of these rivers flowing along the axis of the downwarp, and the Torres Watershed system with its rivers flowing south into Torres strait. Sinking of the southern part of the Fly-Digoel depression is still taking place as evidenced by the estuarine nature of its river mouths. The rivers of the Torres Watershed also indicate subsidence although in the east there may have been some local recent uplift. At Mabaduam and Duaun I there is evidence of intrusive igneous activity.

To the east of the Turama River the south coast of Papua shows little low flat coastal country except for the Kikori-Purari coast which forms a large coastal embayment area of recent alluvium. This coastal area too, shows slow subsidence. Upper Tertiary deposits and recent alluvium embayment areas form the coastline to Pt. Moresby where Lower Tertiary strata outcrops.

The localities visited in this area lie within the following radii from Tadji, between the 200 and 300 mile radii, Lake Murray
300 and 400 mile radii, Kikori
400 and 500 mile radii, Duaun I, Kerema, Yule I.

(i) Lake Murray • lies north of the junction of the Fly and Strickland Rivers in the centre of the Fly-Digoel depression. A permanent Civil Administration post lies at the north end of the Lake. It is controlled by a Patrol Officer who spends an aggregate of about 8 months of the year away from the post.

The area in the neighbourhood of the post, is flat, lowlying and swampy. There are no outcrops of consolidated rock. A soil profile shows loam to 18" underlain by a heavy red clay sub-soil. The age of the sediments is thought to be pleistocene.

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x Geological discussions of these areas and localities lying in them were prepared from "Explanatory Notes to accompany a Geological sketch map of New Guinea" by J.N. Montgomery, N. Osborne and M.F. Glaessner (A.P.C. Melbourne); information received from Geological personnel A.P.C. Pt. Moresby; field observation.

• Accomodation problems of parties is discussed in an appendix.

Radio reception good; no activity[e]; abundant water. This locality is accessible by Catalina only - the catalina alights about 1-2 miles from the post.

(ii) Kikori is situated on the west bank of the Kikori River, about 20 miles from the Gulf of Papua. It lies on deposits of recent alluvium carried down from the Central Highlands to form the large coastal embayment area of the Kikori-Purari coast. There is a large Civil Administration post here with a resident District Officer.

Limestone hills to the north appear from the air to be inaccessible. It was reported however, that ½ day's launch trip Upper up the river would bring a party to Tertiary limestone on which it would be practical to pitch a tent and hence probably suitable for setting up seismic equipment.

Inland to the west about 20 minutes walk from the station lies an 18' x 18' concrete slab, the remains of a factory site. It has been in position for about 30 years. This slab rests on recent alluvium with a profile of clay loam overlying heavy clay. It is considered that this may form a suitable seismic site.

The topography of the area is moderately hilly. Radio reception reported to be good; no activity; natives available to transport equipment.

Kikori is accessible only by Catalina which alights close to the station.

(iii) Duaun I lies 5 miles west of Saibai I and about 10 miles off the Papuan coast. There are natives only on the island which is controlled, with Saibai I, by the Directorate of Native Affairs, Queensland State Govt.

Duaun I is an island of granite, 2 miles x 1 mile, rugged but can be traversed along the east coast without much difficulty. The northern part of the island is flat and appears to be the best place to set up a seismic station. Native people could be hired to carry equipment from the landing beach to this site. The western half of the island was not visited. Radio reception probably good; slight surf activity; abundant water reported.

Duaun I is accessible only by native sailing boat from Saibai I. Saibai I is accessible by Catalina only, the alighting area lying near the settlement. This settlement is run by a Queensland Govt. representative.

(iv) Kerema on the southern Papuan coast west of Long. 146°, has a large Civil Administration station in charge of an Assistant Upper District Officer. The station lies on an extensive area of Tertiary sediments. An old jeep road to Cupola plantation (southerly direction from station) shows small outcrops of fine grained Tertiary sandstone. The largest outcrop lies across the track, at the beginning of Cupola plantation and 45 minutes walk from Kerema. - it would be practical to use this outcrop as a site. 10 minutes further on, Tertiary sandstone outcrops on a knoll to right of trade, 50' above track level and 200-300' above the sea. A house woned by a Mr. Rio stands on the knoll. This place overlooks the Gulf and is not sheltered from the wind but may be considered as an alternative site.

Topography hilly to rugged. Radio reception at possible sites unknown. No activity; native porters available to carry equipment.

Kerema is accessible by Catalina only which alights near the station.

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e No activity - means that seismic recording will not be disturbed by the activities of the civil population etc.

(v) Yule I lies 60 miles N.W. of Pt. Moresby and 2 miles of the coast. The island is composed almost entirely of N.E. dipping Miocene sediments. On the east side limestone outcrops at the sea's edge; these beds overly sandy limestone which is underlain by an argillaceous-calcareous sandstone. The weathered products of the sandstone compose the western beaches. In the centre of the island there is evidence of sub-recent volcanic activity. The island is small 3 miles x 1 mile, and a suitable seismic site could be found of its eastern side.

Moderately hilly topography, radio reception should be good. No activity.

Yule I is accessible by Catalina which alights at the S.E. edge of the island.

(b) Central Highlands area.

The central highlands form a continuous mountain system extending the length of the island. It divides the north from the south flowing drainage by a complexity of ranges of restricted length which are separated in places by broad upland valleys, some 4000-6000' above sea level. The principal units all reach 10,000' or more and vary physiographically according to their geological character. The foothills zones vary along both the northern and southern flanks, with their greatest development in Western Papua to their vistual absence in the Owen-Stanleys. In the north there is a gradual descent from the Schrader and Behrmann Mts. to the Sepik plain. East of these ranges the Bismark Ra. rises steeply from the Markham-Ramu valley.

The three biggest rivers in New Guinea have their sources in the Central Highlands near the geographic center of the island. Two flow in British Territory, the Sepik in northern New Guinea and the Fly in Papua.

In this area the localities visited lie between the following radii from Tadji: between the 100 and 200 mile radii, Kelafoman (Ifitamin), Wabag.
200 and 300 mile radii, Mt. Hagan, Chimbu
300 and 400 mile radii, Lae.

(i) Kelafoman, lies at about 6000' in a broad upland valley of the Hindenburg Ra. Now in uncontrolled territory it has been reported certain to come under Civil Administrative control before September, 1948. The locality was flown over only - the strip is in good condition and probably long enough to take a Dakota. Three to four miles and 300°W from the strip Upper Tertiary limestone outcrops - it is probable that the greater part of the valley is river alluvium.

Topography rugged, radio reception unknown. No activity. Many natives in the area who could act as porters. There are no water difficulties in the central highlands.

The locality is accessible by Auster, Dragon and probably Dakota. Austers or Dragons might have to fly in from Wewak rather than Lae.

(ii) Wabag, lies about 20 miles north of the geographic centre of the eastern half of the island. A permanent Civil Administration outpost controls Wabag and the surrounding district.

In a narrow upland valley about 6000' above sea level the settlement rests on volcanic sediments showing andesitic pebbles and boulders. The surrounding mountains are of Upper Tertiary age but outcrops are covered by erosion products and dense growth. No outcrops in vicinity have been seen by the present Patrol Officers although limestone is reported to be in the neighbourhood. The seismic party would have to search for a suitable site. About 5

miles S.E. (?) of Wabag a Dakota landing strip is being made at Wabanamunda. Wabanamunda was not visited and no first hand knowledge of it was obtained.

Topography rugged, radio reception unknown; no activity. Native labour available.

Wabag is accessible by Auster and Dragon.

(iii) Mt. Hagan, about 40 miles S.E. of Wabag, is one of the largest Civil Administration centres in the Central Highlands. It lies at 5,500' in a broad valley composed of dark volcanic (?) soil of Pleistocene age. To the east Mesezoic rocks characterise the country. Limestone caves reported to lie at 8000', 4½ miles by jeep plus 2 hrs walk from settlement; according to the Geology map there is no limestone outcropping within 20 miles of Mt. Hagan, which indicates sandstone of Mesezoic age.

Topography of country flanking valley, rugged; wireless reception probably good; no activity; native labour available.

Mt. Hagan is accessible by Auster, Dragon and Dakota.

(iv) Chimbu lying 50 miles east and 10 miles south of Mt. Hagan is controlled by the Civil Administration. This place was not visited but it has been favourably reported. According to the geological information available Chimbu lies on Lower Tertiary, Mesezoic or intrusive igneous rocks. Limestone is said to outcrop at Kundiawa and Kananagau, stations which lie in the district. It should not be difficult to find a suitable site in this area.

Topography rugged, radio reception unknown, no activity. Native labour is available.

Chimbu is accessible by Auster and Dragon - it is not known whether a Dakota is able to land on the strip.

(v) Lae, at the mouth of the Markham River on its east bank, is one of the principal Civil Administration centres in New Guinea.

Lae lies at the southern tip of the Sepik-Markham depression, on a Pliocene or Pleistocene terrace flanked to the north by rocks of Upper Tertiary age which are covered by dense jungle and unsuitable as a site for seismic investigations. On the west bank of the Markham R., 8 miles from the barge crossing at its mouth, Markham Pt. on the Bulolo road shows metamorphic schists (?). The flooding Markham prevented this place from being visited and no reliable information could be learned. Red Hill on the Bulolo road is reported to show consolidated rock (probably metamorphic) under 1 ft. of soil - reported about 13 miles from river mouth.

Topography of Markham pt. hilly; quarry activity - 8 miles from Lae strip where incidence of aircraft 40 per day, planes circle on take off and probably in vicinity of point; radio reception at Lae good. Native labour and jeep transport available.

Lae is accessible by Dakota.

(c) Sepik River area.

The Sepik River flows from its source in the Central Highlands north west to the Dutch border and thence west along the Sepik-Markham depression to the Pacific coast. It is bordered on the south by foothills of the Central Highlands and on the north by the foothills zones of the Bewani, Torricelli and Prince Alexander mountains.

The Sepik-Markham depression forms the eastern half of an extensive sunkland that extends from Geelvink Bay, Dutch New Guinea, to Lae on the Huon Gulf, interupted only by the Border Range at the

Dutch border. According to David© the great depth of the Sepik R. suggests that the present day alluviation is unable to keep pace with the subsidence.

In this area the localities visited lie within the following radii from Tadji; between the 30 and 50 mile radii, Lumi, Maimai
50 and 100 mile radii, Maprik, Ambunti, Abau
100 and 200 mile radii, Angoram Marienberg.

(i) Lumi, Long.142°3', Lat.3°29' lies about 30 miles S.W. of Tadji on Upper Tertiary sediments in the Torricelli foothills zone. There is a Franciscan Mission Station at Lumi but no Civil Administration post.

Mudstone (?) outcrops in rugged country ½ hrs. walk north of strip. Agglomerate (?) in creek bed immediately north of strip showing sub-angular to round fragments of limestone and basic rock consolidated in sub-angular to angular basic matrix overlying dark greenish bedded mudstone. Geological information received indicates metamorphic rocks outcropping about 2 miles to S.W.

Topography rugged but not mountainous, radio reception should be good; no activity. Native labour is available.

Lumi is accessible by Auster - the strip is not level and a Dragon is able to land only in a down wind.

(ii) Maimai, Long.142°24', Lat. 3°44',about 40 miles south of Tadji on Upper Tertiary sediments in the Torricelli foothills zone. Maimai lies in controlled area but there is no Civil Administration post there.

The area was flown over only - the strip is overgrown with kunai grass and would require cutting for a landing to be made. Many accessible kunai ridges near Maimai but no outcrops of country rock observed. It has been reported that oil search has been conducted at Maimai.

Topography low hilly, radio reception should be good; no activity. Native labour should be available.

Maimai would be accessible by Auster when the strip is cut.

(iii) Maprik lies on the Screw River about 40 miles west of Wewak in the foothills zone of the Prince Alexander Range. An Assistant District Officer is in charge of Maprik Civil Administration station.

Near the station the Screw River cuts through slightly dipping Upper Tertiary mudstone; 2½ hrs. walk up the Screw River granite is reported to be outcropping at Bell's mining camp. Granite is also reported to be outcropping near Ellis's mining camp on the Parchee R., 1½ hrs. walk from Yamil. Yamil is about 12 miles east of Maprik and has a landing ground in serviceable condition. 2 hrs. walk from Maprik lies a Dakota strip at Hayfield - there are no rocks outcropping at Hayfield. In a W.N.W. direction from the Dakota strip a native mud track to Maprik shows floating water-worn acidic and basic pebbles of igneous and metamorphic origin, limestone modules, granitic and highly felspathic boulders.

Maprik topography hilly, radio reception should be good; no activity. Native labour is available.

Maprik is accessible by Auster and Dragon or by Dakota via Hayfield.

© "Notes to Geological map of Australia" by T.W. edgeworth David published by C.S.I.R. 1932.

(iv) Ambunti lies on the Sepik R. in the Ambunti Hills, the outermost foothills of the Central Highlands. Here an outlying police post borders uncontrolled territory about 80 miles S.S.W. of Tadji. It is in charge of a Patrol Officer who spends an aggregate of 8 months of the year away from the post patrolling the Ambunti district.

Ambunti station stands 200' above the river on a hill of clay, the weathered product of metamorphic schists. Across the river is an extensive area of recent alluvium with a background of hills of metamorphic origin. Virgin schist outcrops about 1 mile from the station on the north bank of river on a bearing 98° (mag.). This outcrop is covered by dense growth. At the native village of Marloo, ½ hr. canoe journey downstream from Ambunti, metamorphic schist outcrops on the southern bank of the river. Although Marloo village is built on a steep hillside a suitable seismic site could be found in its vicinity.

Topography at Marloo rugged, radio reception unknown; no activity. Native labour would be available.

Ambunti is accessible by Auster - Marloo by canoe from Ambunti.

(v) Abau lies in the western extremity of the Sepik-Markham depression, on the western end of Pleistocene 'island' in recent alluvium. It is in uncontrolled territory 3 miles north of the Hauser R., tributary of the Sepik, and about 9 miles east of the Dutch border.

Abau was flown over only; the strip is at present unserviceable. The Pleistocene 'island' is a flat denuded quartz-gravel plain 5 x 1 mile which should form a suitable base for seismic recording. The Civil Administration does not propose opening up this district yet but private individuals have interests here and it has been reliably reported that Abau will be opened up shortly by their resources.

Topography flat for a 10 mile radius, radio reception should be good; no activity. Local native labour may not be available.

Abau will be accessible by Auster when the strip has been serviced.

(vi) Marienberg, headquarters of the S.V.D. mission in the Sepik district, lies at 150' on the north bank of the Sepik R. about 40 miles from its mouth.

Upper Tertiary limestone outcrops near Robertson's house about 300 yds from the mission. A more substantial outcrop occurs at Boman village 2 miles from the station and accessible by a diesal rail trolley. The outcrops near Robertsons however were not fully surveyed and may prove suitable for seismic recording.

Topography low hilly, radio reception should be good; no activity. Native labour available.

Marienberg is accessible by launch from Angoram.

(vii) Angoram, on the north bank of the Sepik R., ½ day's Launch trip upstream from Marienberg, is one of the chief Civil Administrations posts in the Sepik Division. It lies on the northern limit of the Sepik-Markham depression in an area of recent alluvium. There are no outcrops of consolidated rock in the vicinity.

Topography flat, radio reception good; no activity. Native labour is available.

Angoram is accessible by Auster and Dragon.

(d) North Coast area.

All the localities in this area lie on the northern coast of New Guinea, from Vanimo near the Dutch border to Finschhafen on the tip of the Huon peninsula.

In the north west the Oenake and Serra Mts. rise immediately behind the north coast; they are separated from the Southern Bewani Mts. by the Bewani-Pual depression which ranges eastwards from Dutch territory to fan out and meet the coast from Sissano Lagoon to a point about 40 miles east of Tadji. Swampland in the Bewani-Pual depression indicates that it is subject to downward movement.

West of the Bewani Mts. the Torricellies follow a west-east alignment until they meet the relatively low Prince Alexander Mts. running parallel to the coast as far as the swamplands of the Lower Sepik and Ramu Rivers; these swamplands also show evidence of subsidence. Farther along the coast the Adelbert Mts. standing little more than 3000', rise abruptly from the surrounding foothill country. On the Huon peninsula the high and extremely rugged Finisterre and Saruwaged Mountain chains fall steeply to the sea north and east, and to the Ramu and Markham Rivers in the south west.

The frequency of earthquakes, particularly in the Torricelli and Bewani mountain region, indicates that mountain building movements are still taking place in northern New Guinea, and parts of the coast, for example the raised coral limestone benches between Madang and Finschhafen, suggest uplifting.

The localities visited in this area lie between the following radii from Tadji; between the

30 and 50 mile radii, Sissano, Suain, But
50 and 100 mile radii, Dagua, Wewak, Vanimo
100 and 200 mile radii, Nubia
200 and 300 mile radii, Alexishafen, Madang
400 and 500 mile radii, Finschhafen

(i) Sissano, 30 miles SNW of Tadji, lies in the east of the Bewani-Pual depression about 2 miles NW of Sissano Lagoon. There is no Civil Administration post at Sissano but the natives here are under the direct influence of two Australian S.V.D. missionaries.

About ½ mile SW of Sissano a knoll of Upper Tertiary limestone stands out from the surrounding recent alluvium, part of the extensive coastal plain including Tadji. It is readily accessible from Sissano village.

Topography flat, radio reception should be good; no activity. Native labour is available.

Sissano Lagoon is accessible by Catalina; Sissano is accessible by canoe from Arop village 7 miles to the SE. The Catalina alights by Arop. It has been reported that an Auster strip is being made at Sissano.

(ii) Suain lies on coast 40 miles SSE of Tadji. There is no Civil Administration post here.

The locality was flown over only; it lies on a narrow coastal plain (probably of recent alluvium) covered by rain forest. Three parallel ranges of hill rise behind Suain forming the eastern extension of the Torricelli Mts. Native village is reported to be in the vicinity but it was not seen from the air.

Topography flat, radio reception should be good; no activity. Native labour is probably available.

So far as it is known Suain is accessible by boat only from Wewak - this journey would take one day by Launch.

(iii) But, lying on the coast about 50 miles SSE of Tadji, has a Civil Administration post and an S.V.D. mission station.

A steep 500-700 ft ridge running parallel to the coast rises within 100 yds of the shoreline. A small stream flowing down the ridge behind the Mission station cuts through diorite. A site for a seismograph could be found on this diorite but radio reception might be poor without a high aerial. The narrow coastal plain in front of this ridge shows unconsolidated sediments. It was reported that granite boulders lie at the mouth of the Linihole River, east of Kauk village, and about 4 miles from But, but this location was not visited.

Topography rugged, radio reception might be poor at site on diorite; no activity. Native labour is available.

But is accessible by Auster and Dragon from Wewak. The strip is about 1½ miles east of But proper. But is also accessible by Launch from Wewak.

(iv) Dagua, about 6 miles east of But and 25 miles NW of Wewak. So far as it is known there are no Europeans at Dagua but the locality lies in controlled area.

Dagua was flown over only; it lies on a much longer and deeper coastal plain than But. This coastal plain too, is formed probably of recent alluvium. Behind Dagua four lines of hills in alignment with the Torricelli Mts rise parallel to the coast 50-500'; either composed of Upper Tertiary sediments or intrusive igneous rocks, they appear easily accessible. The air-strip is about 1 mile north of these hills.

Topography behind Dagua low hilly at edge of coastal plain, radio reception should be good; no activity. Native labour is probably available from some nearby village.

Dagua is accessible by Auster or Dragon, or by Launch from Wewak.

(v) Wewak lies on a point jutting out from the coast about 24 miles SE of Dagua. It is the Civil Administration centre of the Sepik Division.

The point is flat topped and rises precipitously from the sea to about 100'; it is connected to the mainland by a short, swampy, tidal ishmus. Pleistocene coral limestone characterises the geology of the point; it is not known what underlies the lime-stone, for instance there may be thick deposits of coral mud. Upper Tertiary limestone outcrops in the mainland hills near Kremendring village (300') and higher, along an old jeep road, which connects with Wewak about 5 miles distant. The road is in good condition.

Topography on point, flat; radio reception good; little activity. On the Upper Tertiary topography hilly, radio reception unknown but should be satisfactory with a high aerial; no activity. Native labour is available at both places.

Wewak is accessible by Dakota; the headquarters of Gibbes Sepik Airways are at Wewak and his Austers were charted during this visit.

(vi) Vanimo. About 85 miles SNW of Tadji and 20 miles east of the Dutch border Vanimo lies on Daumtings Bay at the base of a small promontory connected to the mainland by a short ishmus. This promontory gives Vanimo Harbour protection from south easterly winds.

There is a Civil Administration post and a European trader at Vanimo.

About 3 miles behind the station the Upper Tertiary Oenake Mts rise in places to 4000' and are accessible by native tracks. South of the Oenake and north of the Bewani Mts the Bewani-Pual depression lies on a west-east alignment. The promontory at Vanimo is formed of coral limestone of pleistocene age but it is not known what underlies it. On the southern shore of Vanimo Harbour Upper Tertiary limestone outcrops about 4 miles east of Vanimo (A.P.C. information). This outcrop was not visited; it is probably covered by dense growth but would be accessible by canoe. This area would be probably the best place for a Seismic site.

Topography in the vicinity of Vanimo, flat to moderately hilly; radio reception should be good; no activity. Native labour is available.

Vanimo is accessible by Catalina which alights in the harbour or by Auster. This Auster strip is being built on the ishmus.

(vii) Nubia lies about 106 miles NW of Madang on the western shore of Hansa Bay. There is a European plantation owner only at Nubia.

Three-quarters of a mile inland from the southern shore of the bay and 6 miles from Nubia, a small outlying hill of the Adelbert mountain system rises to about 100'. According to geological information this hill should be formed of Upper Tertiary sediments, but no outcrops were observed on the short visit. At the base of the hill the vegetation is thick but further up this is displaced by kunai grass where walking is easy. An old jeep road which skirts the shore of the bay runs past the foot of the hill.

Topography moderately hilly, radio reception should be good; no activity. Native labour is available.

Nubia is accessible by Catalina which alights in the lee of Lang I. Lang I stands in the centre of Hansa Bay 3½ miles off the western shore. In the early morning a Catalina is able to alight within a quarter of a mile of the southern shore of the bay.

(viii) Alexishafen-Madang. Alexishafen lies near the coast 12 miles north of Madang. There are S.V.D. mission stations at Alexishafen and at Halopa, 3 hrs walk to 1200' from Alexishafen. Between Alexishafen and Madang there are Lutheran missions at Nagader, Amron and Nob Nob.

Halopa, Amron and Nob Nob lie in the Upper Tertiary of foothills of the Adelbert Mts which run parallel to the coast about 3 miles inland. Between the foothills and the coast recent coral forms a raised coral reef extending northwards from Madang for 60 or 70 miles as a narrow coastal strip of uniform width. Madang and Alexishafen are built on this coastal strip and connected by a good road. Amron or Nob Nob appear to be the most suitable of these places to set up a seismic station. They were not visited but reported to be accessible from the Madang-Alexishafen road. Nagader is the headquarters of the Lutheran missions and should be visited by the sesmic party for discussion.

Topography moderately hilly in the vicinity of Amron and Nob Nob, radio reception should be good; no activity. Native labour is available.

Amron and Nob Nob are accessible by road from Madang. Madang is accessible by Catalina or Dakota.

(ix) Finschhafen lies on the western extremity of the Huon peninsula 60 miles to the east from Lae. This locality was not visited, but according to geological information it lies on or very near to the Upper Tertiary of the Cromwell Ra, an eastern continuation of the Saruwaged Mts. It was reported that there is a mission station only at Finschhafen.

About 10 miles south of Finschhafen lies Finschhafen air strip, also shown as Finschhafen on R.A.A.F. Navigation charts. Civil Administration and Commonwealth Govt. departments are stationed along a good road 2-3 miles from the air strip, the direction is not known but information can be had from the control tower at the strip. It was reported that a good road connects Finschhafen (air-strip) to Finschhafen proper. Finschhafen (a/s) lies on a recently raised coral reef 3-4 miles east of Upper Tertiary mountains. From a geological viewpoint the best site would be found probably on the Upper Tertiary near Finschhafen proper.

Topography at Finschhafen (air strip), flat - at Finschhafen proper, unknown; radio reception good at Finschhafen (a/s) - at Finschhafen proper, unknown; little activity at Finschhafen (a/s) - aircraft incidence about 5 per week, no activity at Finschhafen proper. Native labour is available at both places.

Finschhafen proper is accessible by road from Finschhafen (a/s) or by road from Finsch Harbour which lies half way between the two Finschhafens. Finschhafen (a/s) is accessible by Dakota. Finsch Harbour is accessible by Catalina - the navy have a Base here and the R.A.A.F. a Catalina refuelling depot.

(e) Island area.

The Island area discussed in this section lies in the Bismark Archipelago off the northern coast of New Guinea.

New Britain is the largest island of the Archipelago and lies south of the inner Volcanic arc (see map). This volcanic arc extends from Rabaul in the east of New Britain to Cape Gloucester in the west and thence along a chain of volcanic islands off the northern coast of New Guinea, to the Shouten Islands about 35 miles NW of Wewak. Here are several active volcanoes lying along this inner arc. The outer volcanic arc of the Bismark Archipelago lies of the northern coast of New Ireland and extends westward to the Admiralty Is.

The localities visited in this area lie within the following radii from Tadji, between the 100 and 200 mile radii;

Pelluluhu Is

300 and 400 mile radii;

Los Negros I

400 and 500 mile radii;

Cape Gloucester.

(i) Pelluluhu Is. Forming a large atoll about 7 miles across with its islands connected by coral reef the Pelluluhu Islands lie about 190 miles NW of Tadji. There are two main islands, Palitolla I in the north and Ahaltin I in the SW. These islands and the southern Ninigo islands are associated with active submarine volcanoes. The Pelluluha Is. were not visited. They are accessible however by Catalina which alights on the large expanse of water in the centre of the atoll.

(ii) Los Negros, a western island of the Admiralty group separated by a narrow channel from the main island, Manus. At present the Civil Administration headquarters of this island group lies at Inrin on the north coast of Manus, 16 miles from Momote, but it is proposed to move it to Lorengau, war-time Naval base of Manus. Momote is a R.A.A.F. base in the SW of Los Negros.

There are no known rocks in the Admiralties older than the pleistocene volcanic rocks on the north and south coasts of Manus.

The east and west coasts of Manus and the rest of the island group are of recent age and mainly formed of raised coral reefs. The most suitable place for setting up a seismograph is the strip, which has a hard and compact coral surface. Lorengau has been reported unaccessible, however it is the centre activity involving the removal of allied equipment from Manus by the Chinese Government and has no geological advantage over Momote. The future of Momote is obscure, at present the R.A.A.F. have a station there but this may not be permanent.

Topography of Momote, flat; radio reception should be good. Activity dependant on movements of Chinese who are moving heavy equipment from Momote also. Native labour should be available from the Mission station at Papitalai (Father Kelly) across Lemendrol creek about 3 miles S NW of Momote.

(iii) Cape Gloucester lies on the north coast in the western end of New Britain. So far as it is known there are no Europeans residing here.

The locality was flown over only. The air strip lies about 10 miles north of an active volcano, on an extensive flat area of recent volcanic deposits. These recent volcanic deposits occupy the western end of the island. High mountainous country rising to 6600' lies immediately behind Cape Gloucester. A suitable seismic site could be found on the air strip.

Topography at strip, flat, elsewhere hilly to mountainous; radio reception should be good. No activity; native labour potential is unknown.

Cape Gloucester is accessible by Dakota, by Auster from Madang or by Dragon from Lae.

3A. Further geological information.

Since the writing of section 3 some later geological information has become available and is discussed in this sub-section.

The Fly-Digoel depression is now considered as a shallow shelf area, the northern areas of which dip into a trough or foredeep that flanks the central highlands probably as far eastward as Pt. Moresby. This shelf area is not a geosyncline and is probably no deeper than 6000 ft. in its deepest part. The trough however shows true geosynclinal characters and lies in juxtaposition to the strongly folded southern ranges of the Central Highlands. Elsewhere the Central Highlands do no show strong folding - granite outcrops in many places indicating a shallow basement underlying the Central Highland chain.

The Sepik area of the Sepik-Markham depression is thought to be a mobile shelf overlying shallow basement rock with the northern Upper Tertiary (Pliocene) forming an old shore line. Thus the Rift valley theory, which supposes a sunkland extending from Geelvink Bay to the Huon Gulf that is formed as a result of the northerly movement of the Torricelli-Bewani chain and its Dutch New Guinea extensions, is not accepted as explaining this depressive area.

North and parallel to the Sepik-Markham depression, the strongly folded Bewani-Torricelli mountains are believed to lie in the real Geo.-tectonic area of the island. Here mountain building movements are probably still going on. On the northern flank of this mountain chain lies the Bewani-Pual depression, now regarded as true geosyncline covered by a considerable thickness of sediments.

The major mountain building epoch occurred in Pliocene times when the strong folding of the Bewani-Torricelli mountains and the southern ranges of the Central Highlands took place.

G. B. Clarke

APPENDIX 1

Accommodation of Seismic parties.

In the majority of cases each Seismic party will have to be self-sufficient in most requirements other than actual hut accommodation. At Pt. Moresby mosquito nets can be supplied on loan from the Civil Administration but blankets and camp stretchers are insufficient for their own needs. Pt. Moresby, Lae and Madang are the only places in Papua and New Guinea where tinned foods can be bought in quantity.

In most places some sort of hut could be built by natives to shelter the seismic equipment.

The following table shows the available resources in each locality visited; battery chargers, wireless transmitters and receivers were not subject of specific enquiry.

Locality	Available	To be supplied by Seismic party
Port Moresby	Accommodation in R.A.A.F. Mess by arrangement R.A.A.F. Melbourne; probably limited accommodation D.C.A. & Civil Admin. Messes. Wireless transmitter & receiver.	
Lake Murray	Hut*; meat, fish, vegetables; drinking water; battery charger. Wireless trans. & rec.	Supplementary tinned food; blankets; mosquito nets.
Duaun I	Drinking water.	Everything else to be supplied.
Kikori	Hut; vegetables, probably meat; drinking water; batt. charg. doubtful. Wireless trans. & rec.	Sup. tin. food; blkts; mos. nets; probably battery charger.
Kerema	Hut; vegetables, probably meat; drinking water; probably batt. charg. Wireless trans. & rec.	Sup. tin. food; blkts; mos. nets.
Yule I	Hut; probably vegetables; drinking water; probably batt. charg. Wireless trans. & rec.	Sup. tin. food; blkts; mos. nets.
Kelafoman	Drinking water	Everything else to be supplied.
Wabag	Hut; vegetables; drinking water; probably batt. charg. Probably wireless trans. & rec.	Sup. tin. food; blkts; mos. nets.
Mt. Hagan	Hut; vegetables; drinking water; probably batt. charg. Wireless trans. & rec.	do
Chimbu	Probably hut available; vegetables; drinking water; probably batt. charg. Probably trans. & rec.	do

* Hut in this column means living quarters

Locality	Available	To be supplied by Seismic party
Lae	Limited Civil Admin. mess accommodation; tinned food; probably vegetables; probably batt. charg. Wireless trans. & rec.	Blkts; mos. nets; probably tent fly ■
Lumi	Probably Hut; drinking water; perhaps vegetables; batt. charg. doubtful	Tin. food; blkts; mos. nets; probably batt. charg.
Maimai		So far as it is known everything to be supplied
Maprik	Hut; vegetables; drinking water; probably batt. charg. Uncertain wireless trans. & rec.	Sup. tin. food; blkts; mos. nets.
Ambunti	Hut; drinking water.	Everything else to be supplied.
Abau		So far as it is known everything to be supplied
Marienberg	Hut; drinking water; vegetables; battery charger doubtful.	Sup. tin. food; blkts; mos. nets; probably batt. charg.; probably ten fly
Angoram	Hut; vegetables; drinking water; probably batt. charg. Wireless trans. & rec.	Sup. tin. food; blkts; mos. nets.
Sissano	Hut; vegetables; fish; drinking water.	Sup. tin. food; blkts; mos. nets; batt. charg.
Suain		So far as known everything to be supplied.
Dagua		do
But	Hut; vegetables; drinking water	Sup. tin. food; blkts; mos. nets; batt. charg.
Wewak	Hut; vegetables; drinking water; probably batt. charg. Wireless trans. & rec.	Sup. tin. food; blkts; mos. nets; probably tent fly.
Vanimo	Hut; drinking water; perhaps vegetables	Sup. tin. food; blkts; mos. nets; batt. charg.
Nubia	Drinking water	Everything else to be supplied.
Alexishafen-Madang	Hut; vegetables; meat; tinned food; batt. charg. Wireless trans. & rec.	Blkts; mos. nets; probably tent fly.
Finschhafen	Limited mess accommodation through D.C.A.; probably batt. charg. Wireless trans. & rec.	Blkts; mos. nets; probably tent fly.
Pelluluhu I		So far as known everything to be supplied
Momote		do
Cape Gloucester		do

■ tant fly suggested to be part of equipment where difficulty may be experienced in getting built quickly a hut to shelter seismograph.

APPENDIX 2.

1. Native evacuation.

Tadji lies in the Civil Administration's Sepik Division, controlled by a District Officer at Wewak, N.G. Further information on the evacuation of natives from within a 7 mile radius of the bomb dump was obtained from the District Office, Wewak in June 1948.

The responsibility of evacuating, emergency rationing and housing of the natives would be undertaken by the Civil Administration acting on the authority of the Department of External Territories. Since the resources available at Tadji for the transportation of the 1100 natives living on the islands Tumleo, Seleo, Ali and Angel are limited to canoes, the problems of temporary housing and emergency rationing could be acute. These would be minimized by chartering the L.C.T. M.V. "Wewak" which could remove and replace the insular people within one week. The "Wewak" is owned by W.R. Carpenters & Co. Ltd. and their Australian agents have offices at 16 O'Connell St., Sydney. This L.C.T. could be chartered from Wewak for about £50 per day (estimate by D.O., Wewak) with the total cost approximating £350.

The hamlets of the coastal natives (Vokau, Pro & Lemieng) may be damaged more than at first thought. According F/O Banks's report on Chartres Towers demolition, shrapnel from 1000 lb bombs may be hurled as far as 1½ miles; this observation brings Pro, the western hamlets of Lemieng within the shrapnel area and increases the probability of damage and subsequent rebuilding.

2. Equipment for stacking bombs.

In section 2 of this report it was stated that most of the equipment needed for stacking the bombs could be hired by arrangement with W.R. Carpenters & Co. who hold disposal stocks near Tadji. Since then it has been learnt that Carpenters equipment will have been removed from Tadji by September 1948. There seems little prospect of hiring equipment from any other source except perhaps from Carpenters disposal stocks near Wewak. However even if equipment was available from here the hire charge would be probably prohibitive - in the neighbourhood of £3-£5 per day per vehicle.

GEOLOGICAL SKETCH MAP OF EASTERN NEW GUINEA

1 : 2,500,000

EQUATORIAL SCALE

0 20 40 60 80 100

MILES

(Mercator Projection)

Prepared by
DIRECTORATE OF RESEARCH
L.H.Q. Melbourne Dec 44.
from information supplied by
J.N.Montgomery, N.Osborne, M.F.Glaessner
(Geologists of A.P.C.Melbourne)

Drawn & Reproduced by
LHQ Cartographic Coy, Aust Svy Corps, Mar 45

MAJOR RELIEF FEATURES OF EASTERN NEW GUINEA

OUTER VOLCANIC ARC OF THE BISMARCK ARCHIPELAGO
CYCLOPS-SERRA MTS
BEWANI PUAL DEPRESSION
BORDER RANGES
NORTHERN
SEPIK
MARKHAM
RANGES
DEPRESSION
INNER VOLCANIC ARC OF THE BISMARCK ARCHIPELAGO
MOUNTAINS OF THE BISMARCK ARCHIPELAGO
CENTRAL
HIGHLANDS
FLY-DIGOEL DEPRESSION
TORRES WATERSHED
CB = COASTAL EMBAYMENTS
AND CONTINUATIONS

LEGEND

- 1 Recent — *Alluvium, swamp*
- 2 Recent — *Raised coral reefs*
- 3 Recent — *Volcanic deposits*
- 4 Pleistocene — *Marine deposits, lake and river deposits,*
- 5 Pleistocene — *Raised coral limestones*
- 6 Pleistocene — *Volcanic deposits*
- 7 Upper Tertiary — *Limestone (where known)*
- 8 Upper Tertiary — *Volcanic deposits*
- 9 Lower Tertiary
- 10 Mesozoic
- 11 Metamorphic rocks *(schists, etc)*
- Intrusive igneous rocks *(granites, diorites, etc)*

In barred areas the geologic age and type of the rocks are uncertain.

Definite boundary ————

Indefinite boundary — — — —

13 Volcanoes (Dormant and Extinct)

14 Active Volcanoes

L.H.Q./MISC/9588