(Appendix-3)

FIG. II-2-1 GEOLOGIC MAP WITH LOCALITY OF MINERAL OCCURRENCE OF MANTRI AREA, SEMPORNA PENINSULA, SABAH

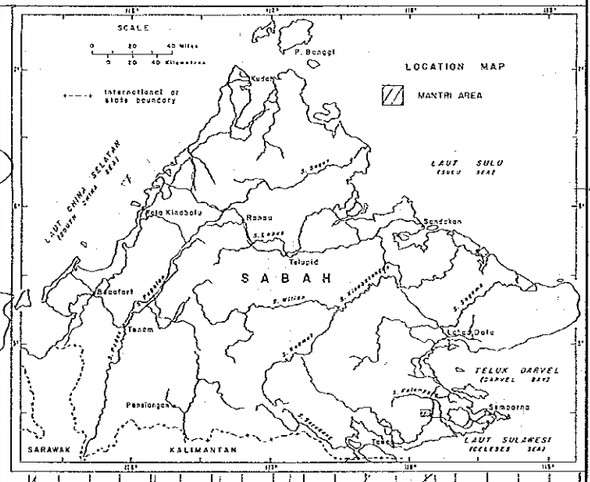
Scale 1 : 10,000

0 0.5 1.0 km

LEGEND

- Kalumpang Formation, predominately clastic
- Kalumpang Formation, predominately volcanic
- Hydrothermally altered acidic-intermediate volcanic and pyroclastic rocks
- Andesite
- ⊗ M-1 Locality of mineral occurrence

(Modified from Lim, et. al, 1983)



4° 08'

4° 10'

4° 27'

S. Mantri

G. Wullersdorf

Wullersdorf
1,282

qv

Kf

d

W-11

W-4

W-3

W-1

U

D

1600
1400
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1200
1100
1000
900
800
700
600
500
400
300

(Appendix-4)

FIG. II-2-2

GEOLOGIC MAP WITH LOCALITY OF MINERAL OCCURRENCE OF WULLERSDORF AREA, SEMPORNA PENINSULA REGION, SABAH

Scale 1 : 10,000

LEGEND

SEDIMENTARY AND VOLCANIC ROCKS

QUATERNARY

RECENT ALLUVIUM: Unconsolidated clay, sand and silt.

HIGH LEVEL ALLUVIUM: Tuffaceous sand, volcanic boulder beds, ash, clay and organic remains

PLIOCENE-MIOCENE

gv — Hydrothermally altered acidic to intermediate volcanic and pyroclastic rocks

TERTIARY

MIDDLE-UPPER MIOCENE

bf — BALUNG FORMATION: Volcanic ash, mudstone, tuff, shale, thin coal seams and abundant plant remains

LOWER-MIDDLE MIOCENE

Kf — KALUMPANG FORMATION: Tuff, tuffite, shale, tuffaceous sandstone, mudstone, conglomerate and limestone

INTRUSIVE ROCKS

Intermediate intrusive rock (dyke)

GEOLOGICAL SYMBOLS

Geological boundary (defined, approximate, inferred)

Bedding (inclined, vertical)

Fault : Observed or reasonably certain

: Inferred

: Observed fault with dip of fault plane (U = upthrown side, D = downthrown side)

Flow layering in volcanics (inclined)

Anticline with plunge angle

Location and reference number of mineral occurrence ⊗ W-1

TOPOGRAPHICAL SYMBOLS

Road

Contours (interval 100 feet)

Trigonometrical station (tertiary) with height in feet

River

Kampong (village) Kpg

Sungai (river) S.

Gunung, Bukit (mountain, hill) + G. Bt.

(Modified from "Geologic Map of Wullersdorf Area, Sabah, Malaysia" by Lim P.S., 1981)

LOCATION MAP

WULLERSDORF AREA

SABAH

LAUT SULU (SULU SEA)

LAUT SULAWESI (CELEBES SEA)

KALIMANTAN

SARAWAK

P. Banggi

Kudat

Kota Kinabalu

Ranau

Sandakan

Telupid

Beaufort

Tenom

Lahad Datu

Gn. TELUK DARVEL (DARVEL BAY)

Semporna

S. Balung, K. Kanan

W-1 W-3 W-4 W-11

4°08

4°10

23'

25'

(Appendix-5)

FIG. II-2-3

GEOLOGIC MAP WITH LOCALITY OF MINERAL OCCURRENCE OF G. POCK AREA, SEMPORNA PENINSULA REGION, SABAH

Scale 1 : 10,000

0 0.5 1.0 km

⊗ P-10 Locality of mineral occurrence

Strongly silicified zone

Fault

Geological boundary

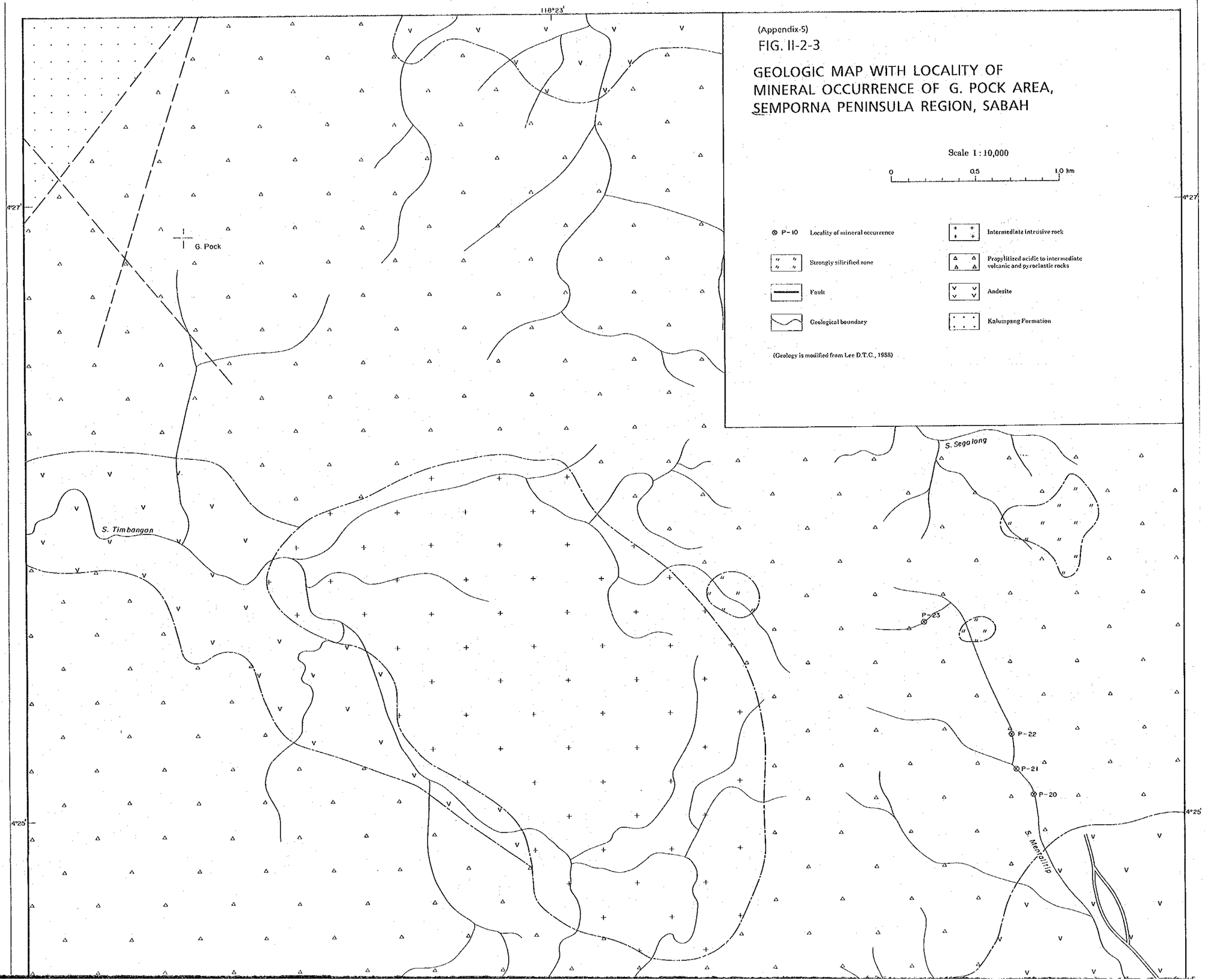
Intermediate intrusive rock

Propylitized acidic to intermediate volcanic and pyroclastic rocks

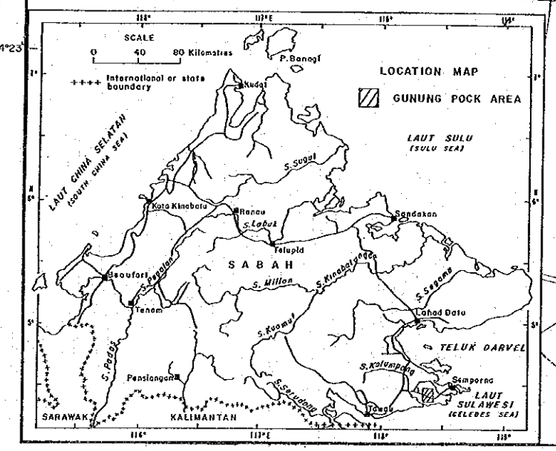
Andesite

Kalumpang Formation

(Geology is modified from Lee D.T.C., 1988)



P-22
P-21
P-20
P-13
P-10
P-15
P-14
S. Mentiritip
4°25'
4°23'
118°23'



(Appendix-6)

FIG. II-2-4 GEOLOGIC MAP WITH LOCALITY OF MINERAL OCCURRENCE OF G. NAGOS AREA, SEMPORNA PENINSULA REGION, SABAH

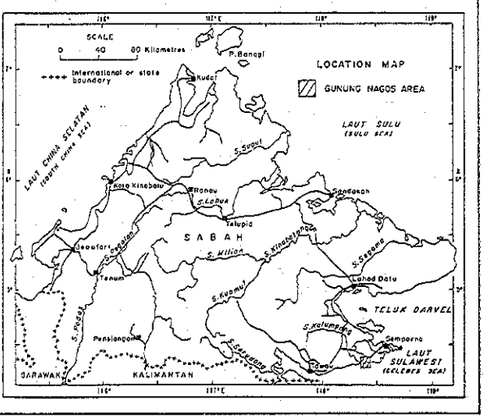
Scale 1 : 10,000

0 0.5 1.0 km

LEGEND

- Alluvium
- Hydrothermally altered andesite
- Silicified and argillized andesitic tuff, agglomerate, lava and minor volcanic breccia
- Inferred fault from photo lineament
- Opaline silica
- Intense silicification + Hydrothermal brecciation
- Silicified zone + Argillized zone
- ⊗N – 1 Locality of mineral occurrence with number

(Modified from Yan A.S.W., 1991)



118° 00'E

05'

10'

4° 30'N

25'

Bt. Mantri

G. Pyramid

S. Mantri

Bt. Muul

Bt. Bald

Bt. Quoin

Kpg Batung

Wuttersdorf 1282

G. Wuttersdorf

S. Batung K. Kiri

S. Batung K. Kanan

Bt. Kawa

an

av

bf

ba

Kf

d

(Appendix-7)

FIG. II-2-5 SAMPLE LOCALITY MAP WITH GEOLOGY OF MANTRI-WULLERSDORF AREA, SEMPORNA PENINSULA, SABAH

Scale 1 : 25,000

0 0.5 1 1.5 2 2.5 Miles
0 1 2 3 4 Kilometres

SEDIMENTARY AND VOLCANIC ROCKS

QUATERNARY

- RECENT ALLUVIUM: Unconsolidated clay, sand and silt.
- INLAND VALLEY DEPOSITS: Mainly silty mudstone, volcanic detritus and organic remains
- HIGH LEVEL ALLUVIUM: Tuffaceous sand, volcanic boulder beds, ash, clay and organic remains
- ba — Basalt lava erupted from Bukit Quoin
- an — Andesite lava, probably erupted from Bukit Quoin
- da — Dacite lava and tuff erupted from Gunung Maria

TERTIARY

PLIOCENE-MIOCENE

- av — Hydrothermally altered acidic to intermediate volcanic and pyroclastic rocks
- an — Andesite lava, agglomerate and tuff.

MIDDLE-UPPER MIOCENE

- bf — BALUNG FORMATION: Volcanic ash, mudstone, tuff, shale, thin coal seams and abundant plant remains

LOWER-MIDDLE MIOCENE

- kf — KALUMPANG FORMATION: Tuff, tuffite, shale, tuffaceous sandstone, mudstone, conglomerate and limestone

INTRUSIVE ROCKS

- mg — Stocks of microgranodiorite porphyry
- d — Intermediate intrusive rock

GEOLOGICAL SYMBOLS

- Geological boundary (defined, approximate, inferred)
- Fault: Observed or reasonably certain
- : Inferred
- : Observed fault with dip of fault plane (U = upthrown side, D = downthrown side) — 70 U / D
- Locality of sample with number — ⊗ M-R-1-A

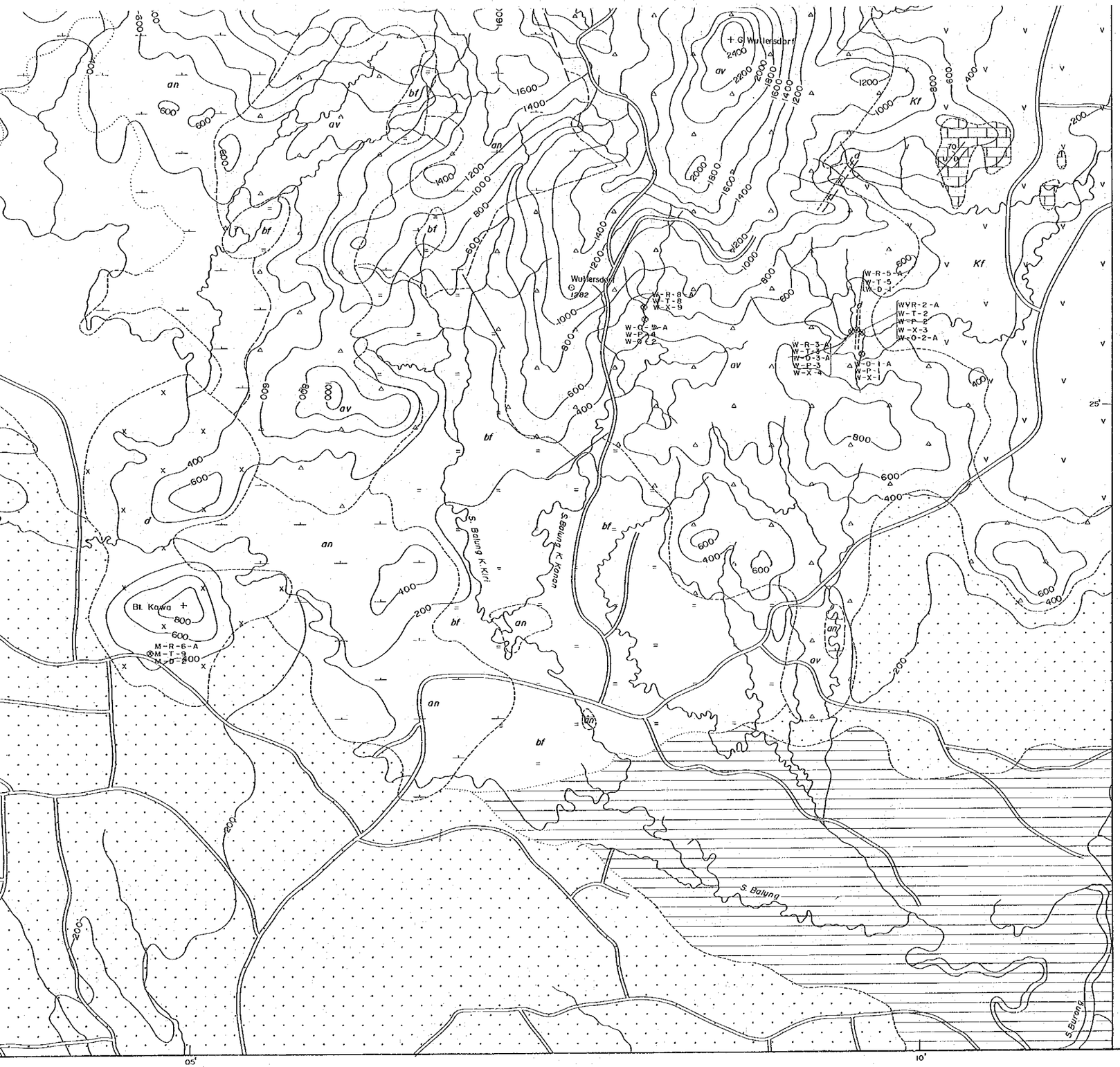
TOPOGRAPHICAL SYMBOLS

- Road
- Contours (interval 200 feet) — 200
- Crater (size exaggerated)
- Trigonometrical stations (tertiary) with height in feet — ⊙ 324
- River
- Kampong (village) — Kpg
- Sungai (river) — S.
- Gunung, Bukit (mountain, hill) — G. Bt.

05' 10' 15' 4°30' N 25'

Mantri Pyramid Wullersdorf 1782 Bt. Kana

Bt. Baid
Bt. Quoin
Bt. Muul
Bt. Kawa
Kpg Balung
Wullersdorf
G. Wullersdorf
S. Ayer Kentoi
S. Abas Karan
S. Balung K. Kiri
S. Balung K. Kanan
S. Balung
S. Burung
M-R-7-A M-T-10 M-D-3
M-R-8-A M-T-11 M-D-4
M-R-9-A M-T-12 M-D-5
M-R-6-A M-T-9 M-D-2
W-R-8 W-T-9 W-X-5
W-Q-5-A W-P-4 W-R-2
W-R-5-A W-T-5 W-D-1
W-R-3-A W-T-3-A W-O-3-A W-P-3 W-X-4
W-R-2-A W-T-2 W-P-2 W-X-3 W-O-2-A
W-O-1-A W-P-1 W-X-1
1282
Kf
av
an
bf
ba
da
mg
25'
05'
10'
116°00'E



SEDIMENTARY AND VOLCANIC ROCKS

QUATERNARY

- RECENT ALLUVIUM: Unconsolidated clay, sand and silt.
- INLAND VALLEY DEPOSITS: Mainly silty mudstone, volcanic detritus and organic remains
- HIGH LEVEL ALLUVIUM: Tuffaceous sand, volcanic boulder bed, silt, clay and organic remains
- ba — Basalt lava erupted from Bukit Quoin
- an — Andesite lava, probably erupted from Bukit Quoin
- da — Dacite lava and tuff erupted from Gunung Maria

TERTIARY

PLIOCENE-MIOCENE

- av — Hydrothermally altered acidic to intermediate volcanic and pyroclastic rocks
- an — Andesite lava, agglomerate and tuff.

MIDDLE-UPPER MIOCENE

- bf — BALUNG FORMATION: Volcanic ash, mudstone, tuff, shale, thin coal seams and abundant plant remains

LOWER-MIDDLE MIOCENE

- Kf — KALUMPANG FORMATION: Tuff, tuffite, shale, tuffaceous sandstone, mudstone, conglomerate and limestone

INTRUSIVE ROCKS

- mg — Stocks of microgranodiorite porphyry
- d — Intermediate intrusive rock

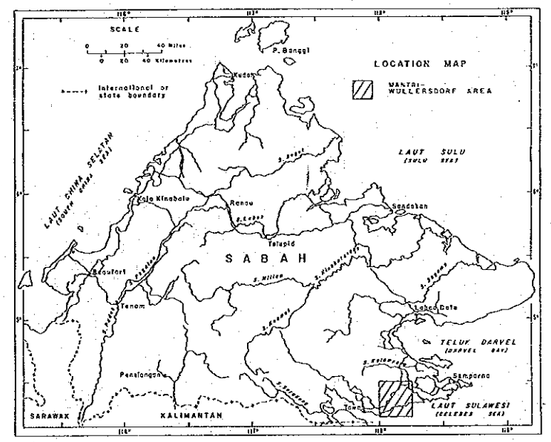
GEOLOGICAL SYMBOLS

- Geological boundary (defined, approximate, inferred)
- Fault: Observed or reasonably certain
- : Inferred
- : Observed fault with dip of fault plane (U = upthrown side, D = downthrown side) — 70 U / D
- Locality of sample with number — ⊗ M-R-1-A

TOPOGRAPHICAL SYMBOLS

- Road
- Contours (interval 200 feet) — 200
- Crater (size exaggerated)
- Trigonometrical stations (tertiary) with height in feet — ○ 324
- River
- Kampong (village) — Kpg
- Sungai (river) — S.
- Gunung, Bukit (mountain, hill) — ✛ G. Bt.

(Geology is modified from "Geologic Map of Wulfersdorf Area, Sabah, Malaysia" by P.S. Lim, 1981)



118° 15'

1°30'

20° E

25'

25'

S. Pangeran

To Tawau

S. Liper

S. Pinang

S. Pinang Besar

S. Nanoi

S. KALUMPANG

S. Gading Gading

S. Timbangan

S. Jepun

S. Sing Sing

S. Segalong

Tawau – Semporna Highway

G Sigalona

G. Pock

G. Singil

Kf

ba

an

Pv

P-R-6-A
P-T-6
P-D-6

P-R-5-A
P-T-5
P-D-5

P-R-3-A
P-T-3
P-D-3
P-X-3

P-R-4-A
P-T-4
P-D-4

P-R-11-A
P-T-11
P-D-1
P-X-1

P-R-2-A
P-T-2
P-D-2

P-R-9-A
P-T-9
P-D-8

P-R-7-A
P-T-7
P-D-7

P-O-9-A

P-O-8-A
P-X-18
P-O-5

P-O-7-A
P-R-6
P-X-17
P-O-4

P-R-15-A
P-T-15
P-O-6-A
P-P-5
P-X-16

P-R-14-A
P-T-14
P-X-15

P-R-11-A
P-T-11
P-X-8

P-R-12-A
P-T-12
P-O-2-A
P-X-9

P-O-1-A
P-P-1
P-X-6

P-O-3-A
P-P-3
P-X-10
P-O-2

P-R-13-A
P-T-13

250
500
750
1000
1250
1500

FIG. II-2-6 SAMPLE LOCALITY MAP WITH GEOLOGY OF G. POCK
(Appendix-8) AND G. NAGOS AREAS, SEMPORNA PENINSURA, SABAH

SEDIMENTARY AND VOLCANIC ROCKS

QUATERNARY

~ RECENT ALLUVIUM: Mainly clay, silt, sand and peat materials

≈ HIGH-LEVEL ALLUVIUM: Mainly gravel, sand, silt, clay, ash and plant remains

TERTIARY

PLIOCENE-MIOCENE

pv Propylitised acidic to intermediate volcanic and pyroclastic rocks

an Andesite lava, agglomerate, breccia and tuff

bo Basaltic andesite lava, agglomerate and breccia

MIOCENE

kf KALUMPANG FORMATION: Sandstone, shale, tuff, tuffite and minor amount of limestone

INTRUSIVE ROCKS

d Intermediate intrusive rock

Scale 1 : 25,000 0 0.5 1 1.5 2km

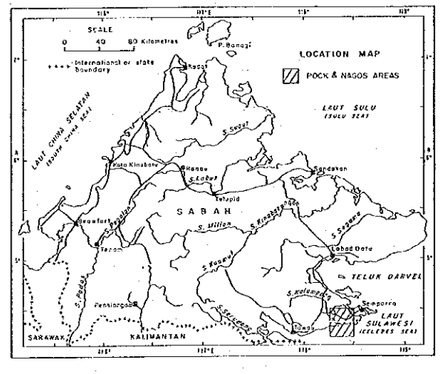
GEOLOGICAL SYMBOLS

- Geological boundary (approximate)
- Fault (Observed, inferred from airphoto) F——F f——f
- Strongly silicified zone
- Sample locality with sample number ⊗ P-R-I-A

GEOGRAPHICAL SYMBOLS

- Road
- Contour (Interval 250 feet) 500
- Trigonometrical station 971
- Gunung (Mountain) Bukit (Hill) G. Bt.
- Pulau (Island) P.
- Tanjong (Headland) T.
- Sungai (S) (River)

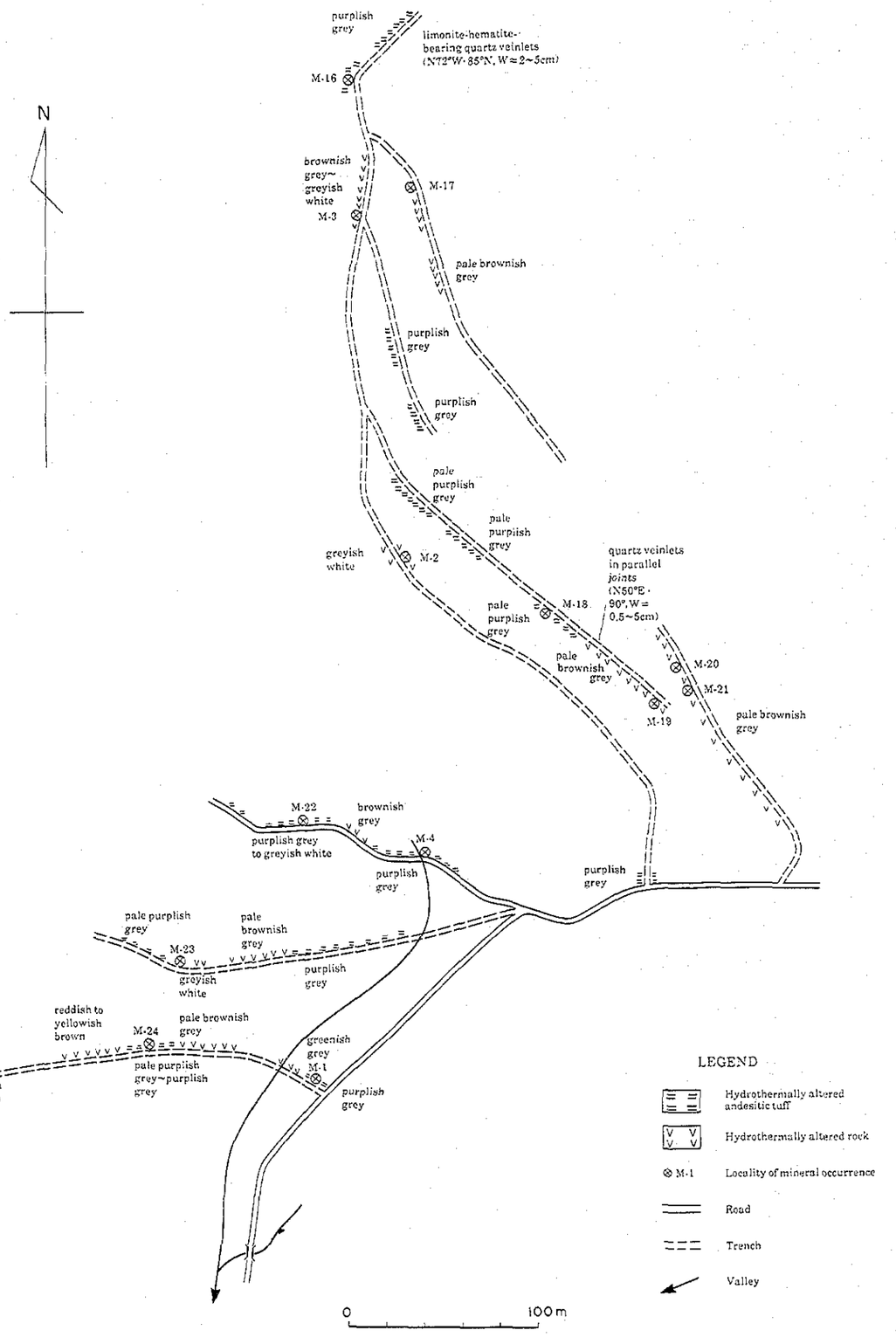
(Geology is modified from "Geologic Map of Gunung Pock Area, Semporna Peninsula, Sabah" by D.T.C. Lee, 1988)



(Appendix-9)

Fig. II-2-17 Route Map of the Mantri Area

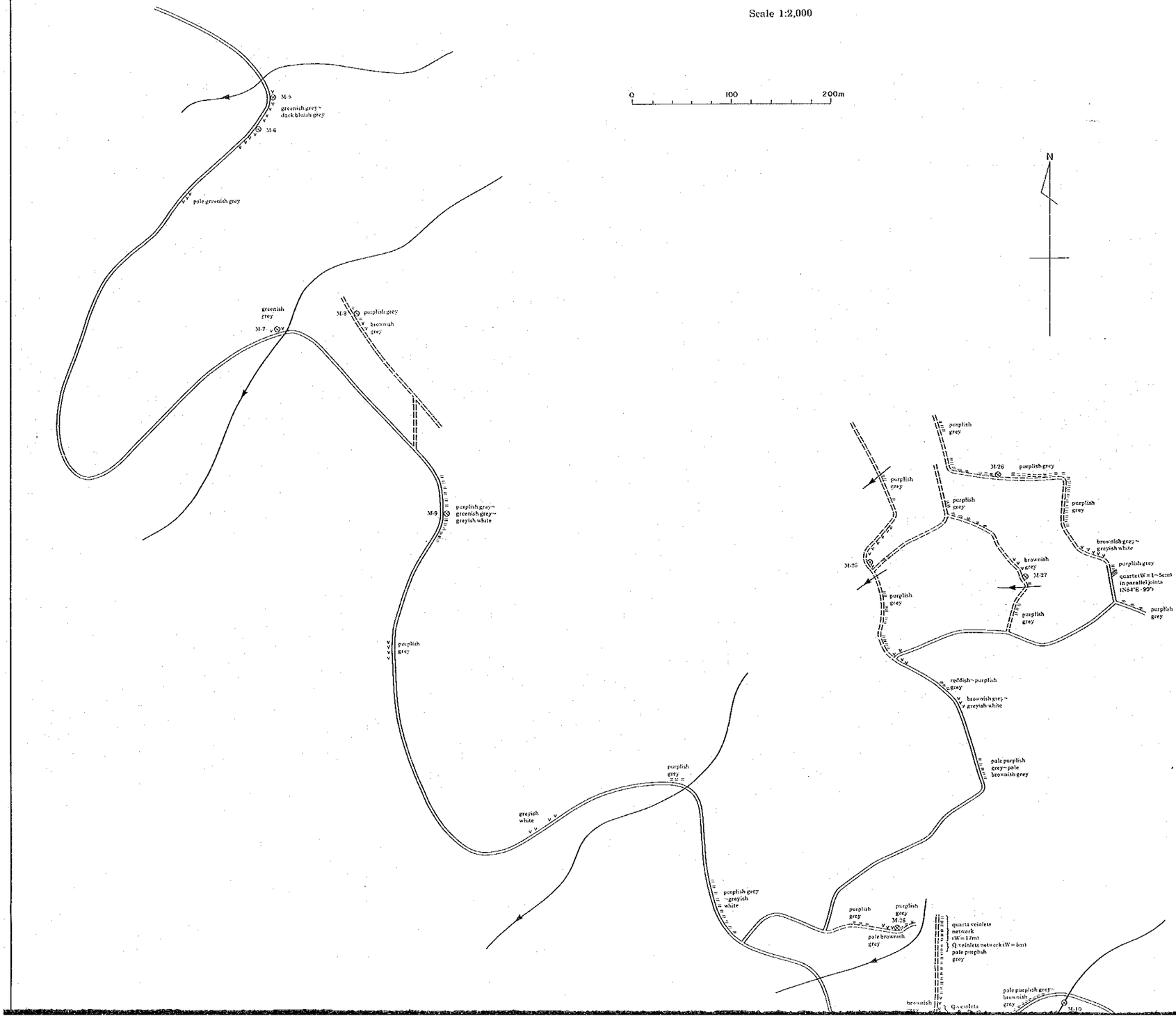
Scale 1:2,000



(Appendix-10)

Fig. II-2-18 Route Map between Mantri & Wullersdorf

Scale 1:2,000



pale greenish grey

greenish grey

M-7

M-8

purplish grey

brownish grey

M-9

purplish grey~ greenish grey~ greyish white

purplish grey

purplish grey

purplish grey

M-26

purplish grey

purplish grey

purplish grey

brownish grey~ greyish white

M-25

brownish grey

M-27

purplish grey

quartz veinlets (W = 1~5mm) in parallel joints (N54°E - 90°)

purplish grey

purplish grey

reddish~purplish grey

brownish grey~ greyish white

pale purplish grey~pale brownish grey

purplish grey

greyish white

purplish grey ~greyish white

purplish grey

M-28

purplish grey

pale brownish grey

quartz veinlets network (W = 17cm)

Q-veinlets network (W = 5cm)

pale purplish grey

brownish grey

Q-veinlets network (W = 4cm)

pale purplish grey~ brownish grey

M-10

Q-veinlets (W = 6cm) network (N17°E)

purplish grey

greyish white

M-29

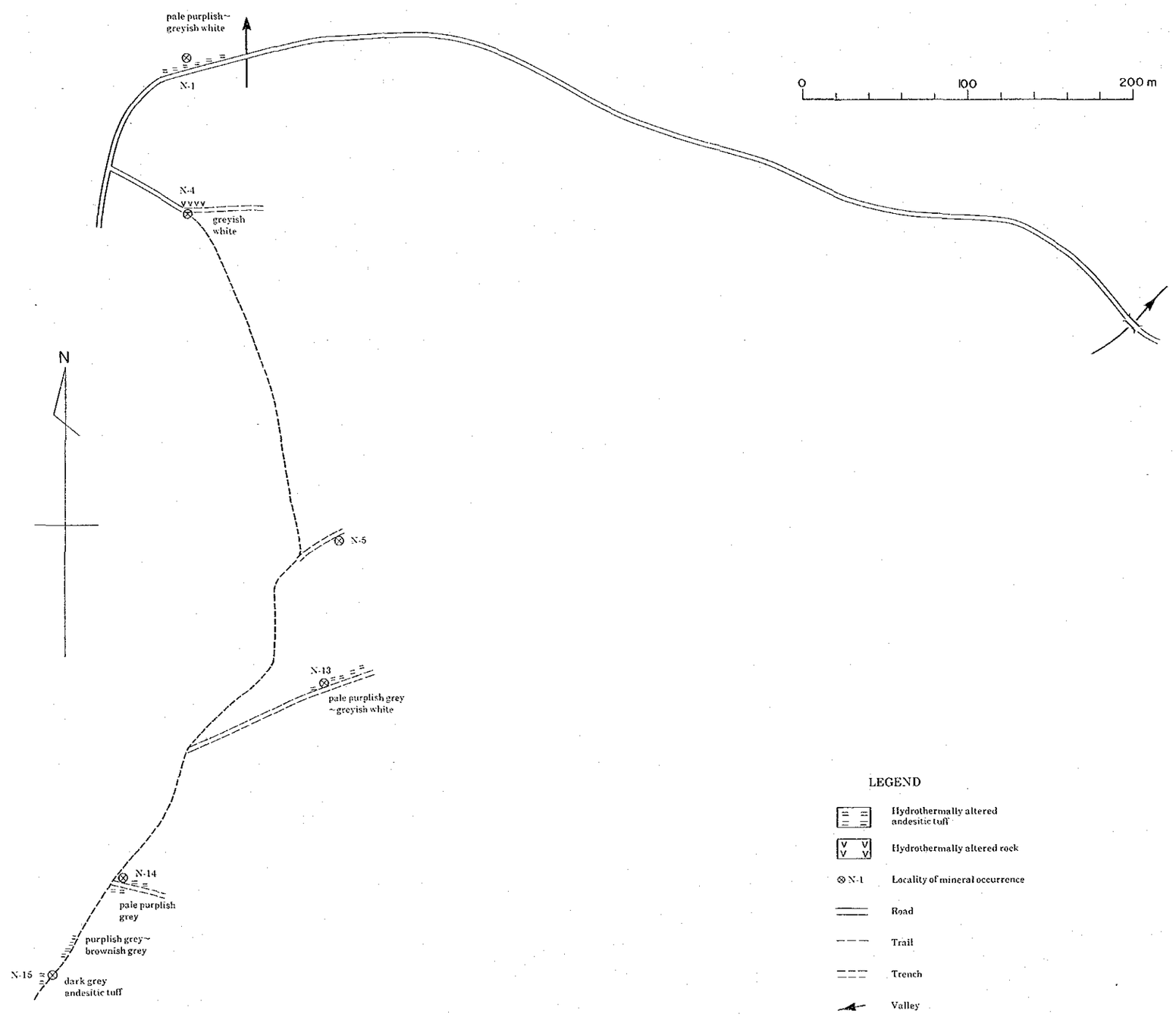
LEGEND

- Hydrothermally altered andesitic tuff
- Hydrothermally altered rock
- M-10 Locality of mineral occurrence
- Road
- Trench
- Valley

(Appendix-11)

Fig. II-2-26 Route Map of the Nagos Area

Scale 1:2,000



JICA