Figure Ⅱ－9　Histograms of Homogenization Temperature for Fluid Inclusion in Quartz (BT-1-Q, BT-7-Q, BT-10-Q, BT-11-Q)

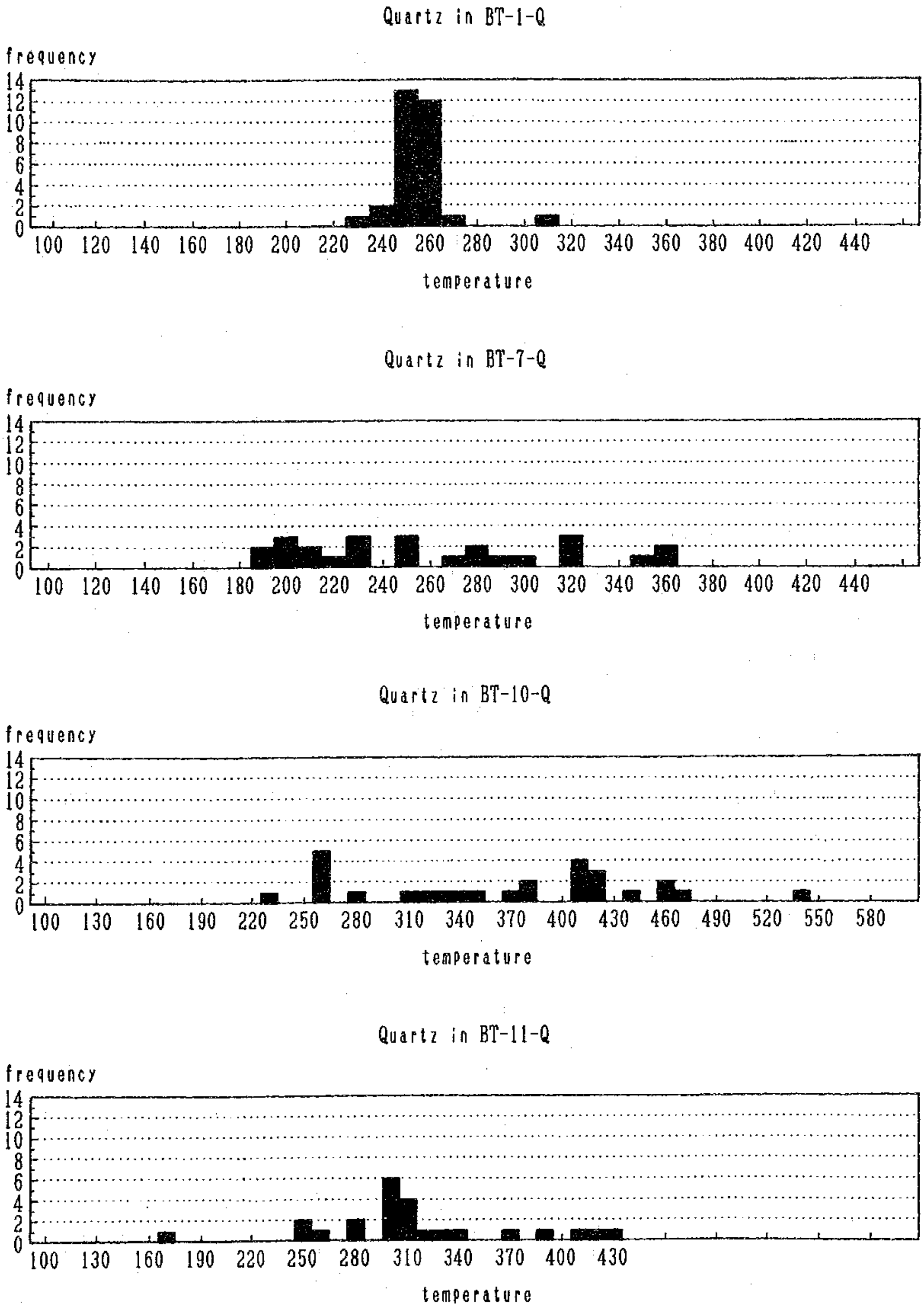
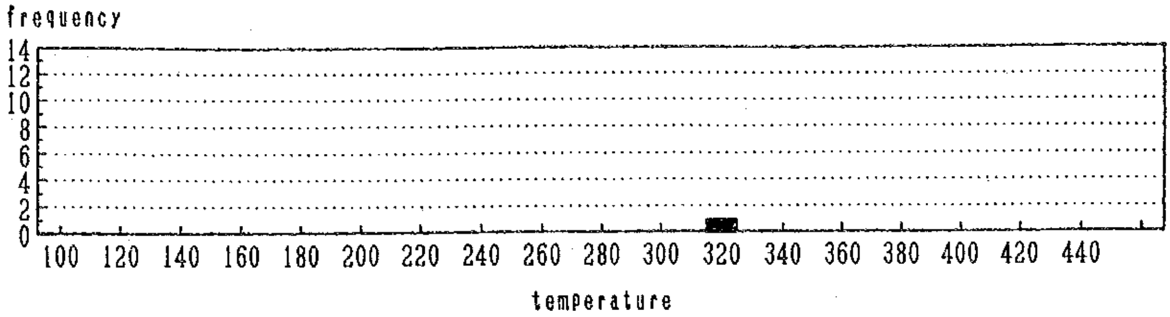
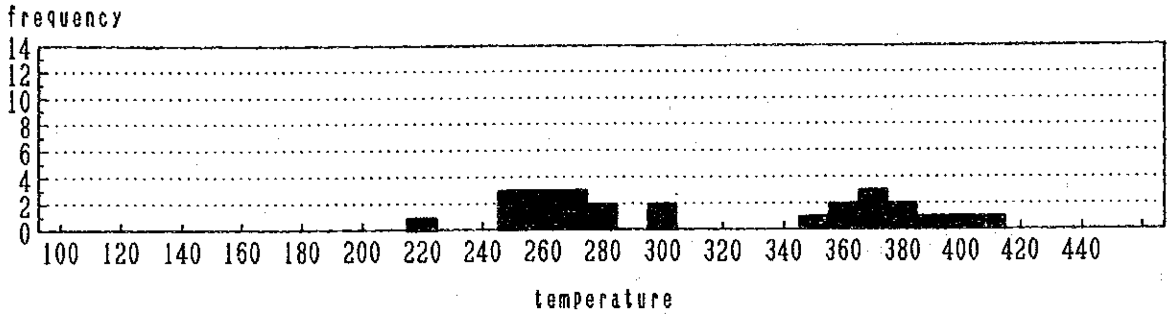


Figure II-10 Histograms of Homogenization Temperature for Fluid Inclusion in Quartz (BT-13-Q, BT-14-Q, BT-15-Q, BT-16-Q)

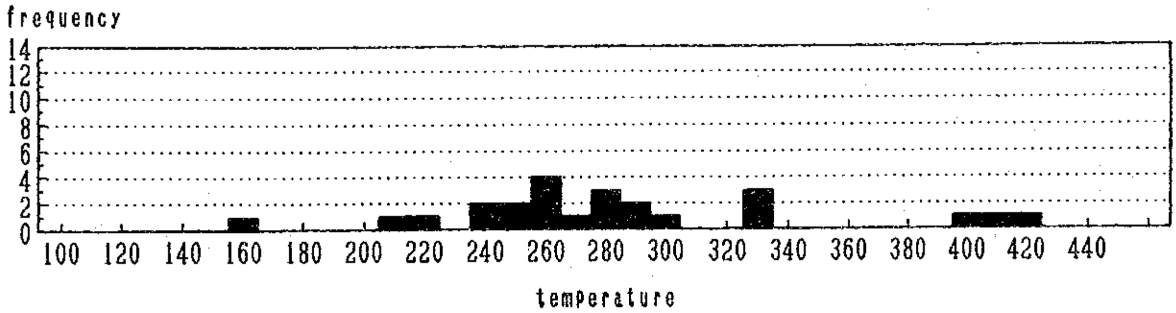
Quartz in BT-13-Q



Quartz in BT-14-Q



Quartz in BT-15-Q



Quartz in BT-16-Q

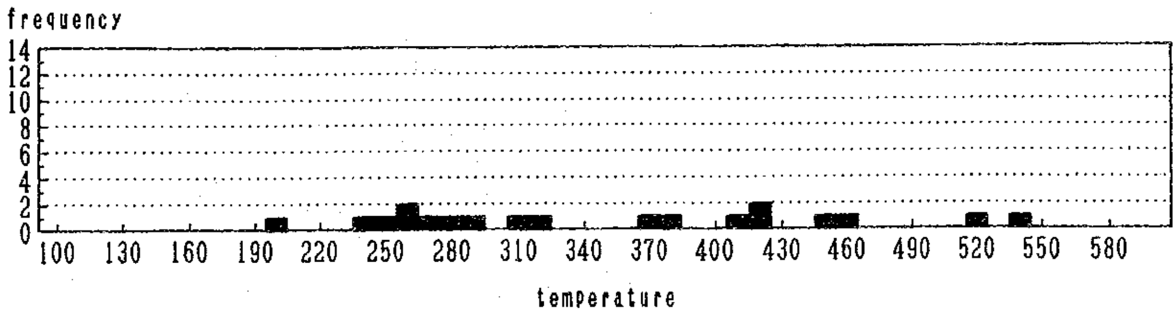
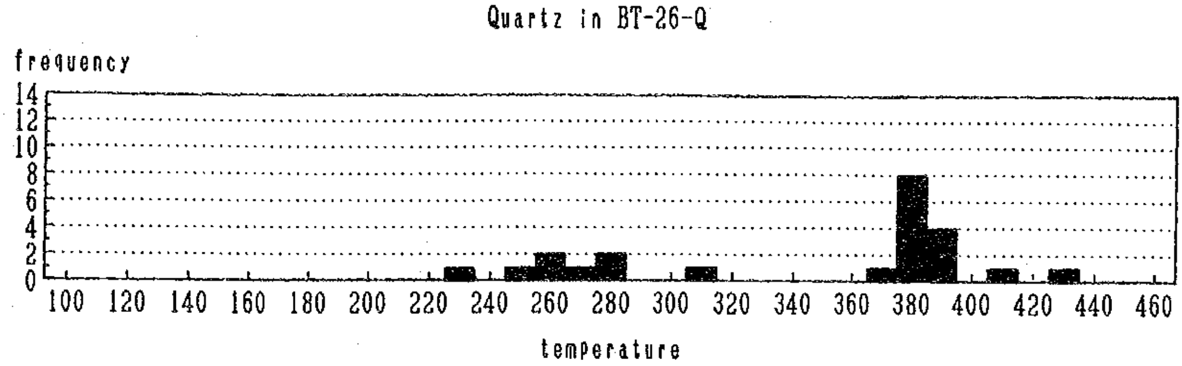
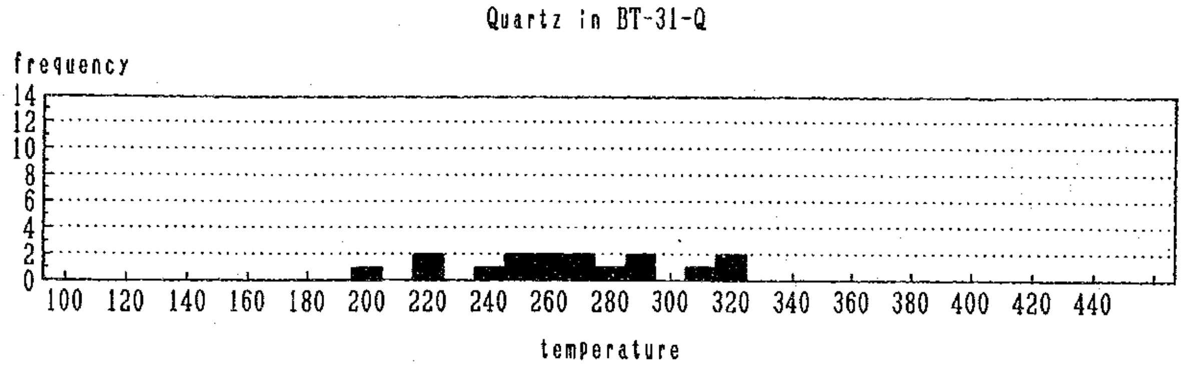
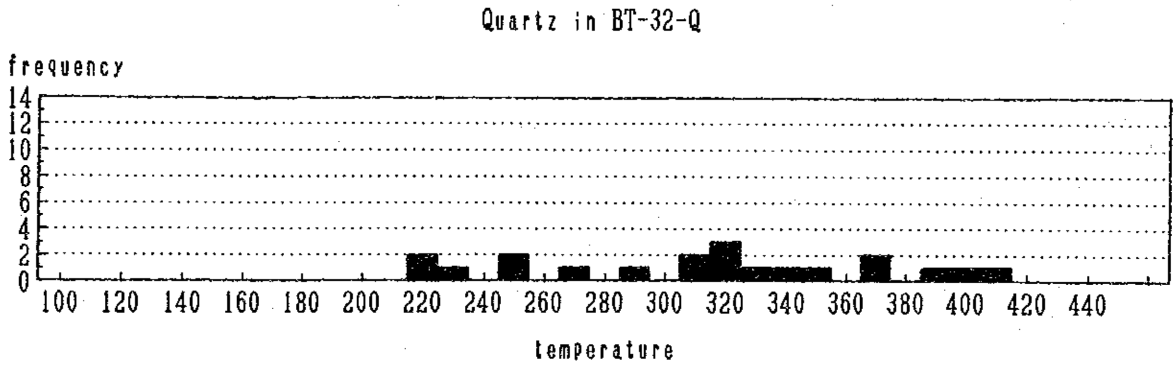


Figure II-11 Histograms of Homogenization Temperature for Fluid Inclusion in Quartz (BT-26-Q, BT-31-Q, BT-32-Q, BT-37-Q)







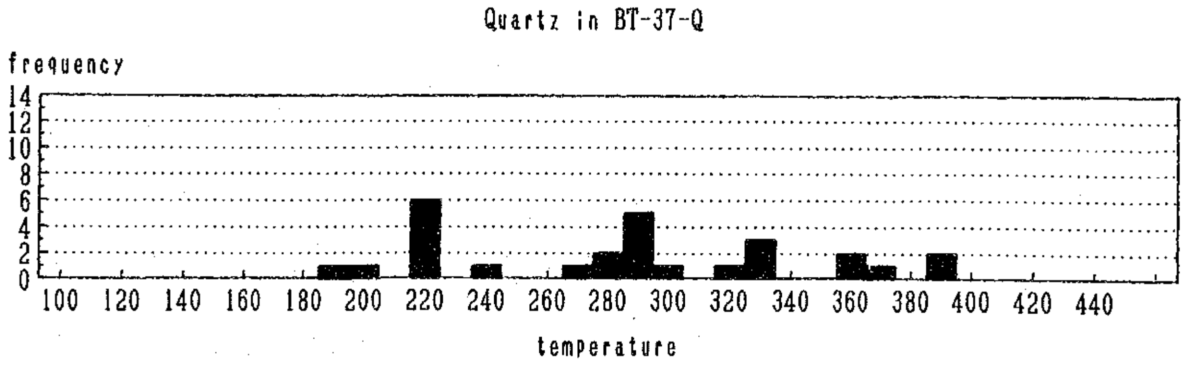
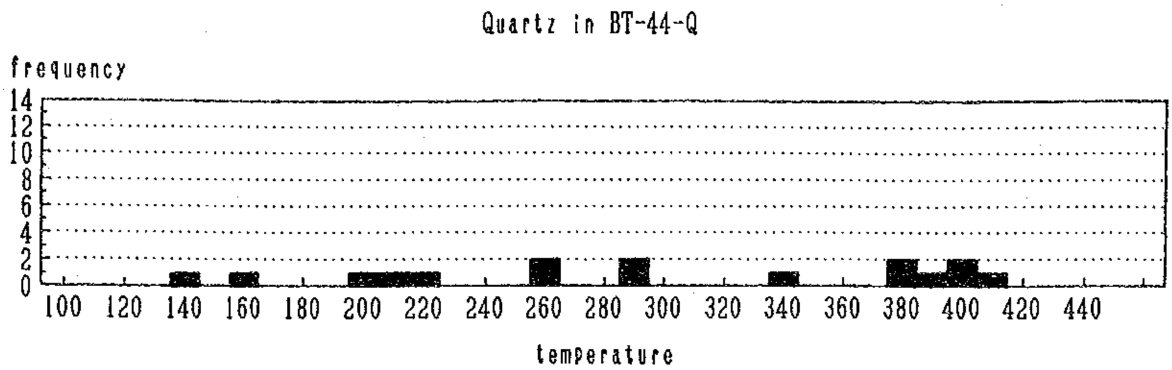
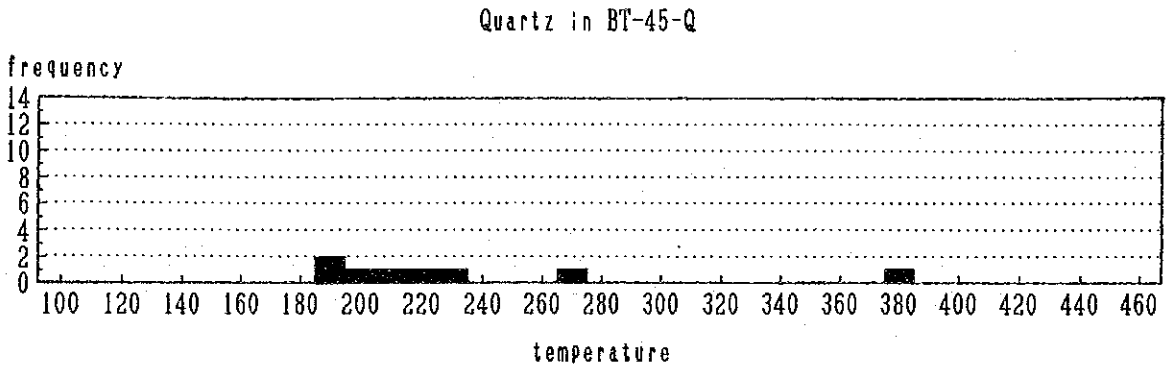


Figure II-12 Histograms of Homogenization Temperature for Fluid Inclusion in Quartz (BT-44-Q, BT-45-Q, BK-12-Q)





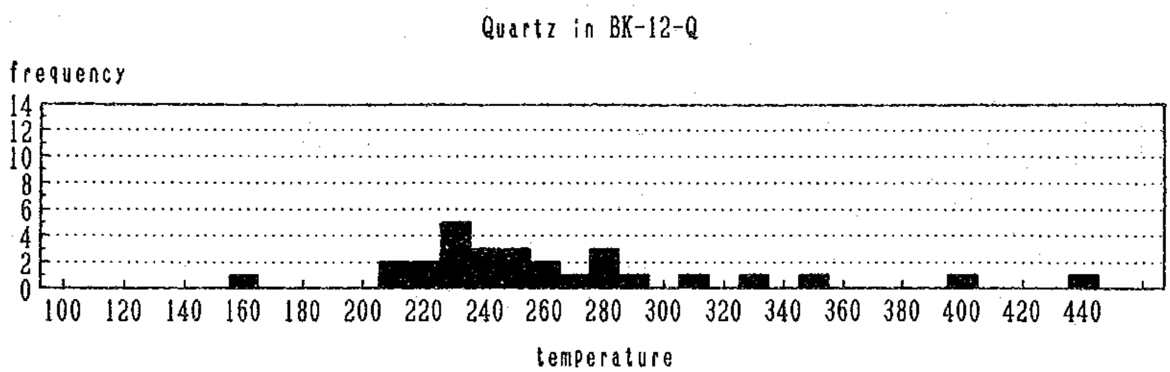
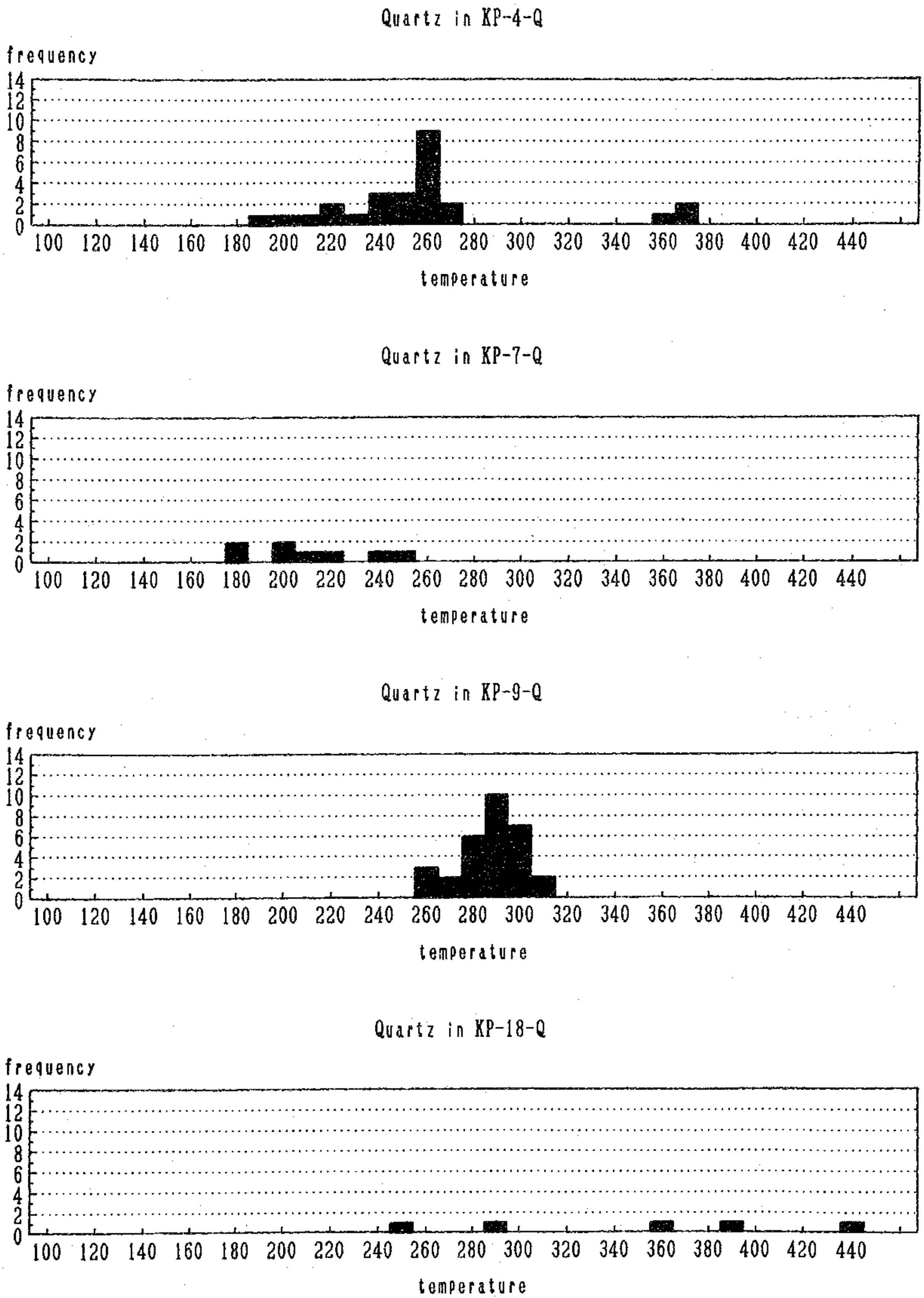


Figure II-13 Histograms of Homogenization Temperature for Fluid Inclusion in Quartz (KP-4-Q, KP-7-Q, KP-9-Q, KP-18-Q)



CHAPTER 4 CONSIDERATION

The results of the investigation of the localities of mineral occurrence, accompanied by geological survey, in the Langanan, Bangkud, and Luhan basins and the laboratory works on the samples of rock, ore, quartz, and so on taken at the time of the investigaton, for 1993, are summarized as follows:

(1) Ten localities (BT-1, BT-2, BT-5, BT-6, BT-11, BT-13, BT-14, BT-43, BT-45, BT-58), where gold over 0.1 g/t is contained (0.10 to 2.48 g/t), 4 localities (BT-6, BT-7, BT-10, BT-11), where copper over 0.1% is contained (0.22 to 0.64%), and 6 localities (BT-1, BT-2, BT-6, BT-10, BT-12, BT-43), where arsenic, which accompanies generally gold mineralization together with mercury, over 1,000 ppm is contained (1,175 to 5,063 ppm), are distributed on the southern and eastern hillsides of Bt. Tampang, especially on the southern hillside (BT-1, BT-2, BT-5, BT-6, BT-7, BT-10, BT-11, BT-12, BT-13, BT-14, BT-58), out of 42 localities of mineral occurrence investigated.

(2) Quartz veinlets (3 localities), quartz networks (6 localities), veins of silicified zone (2 localities), and silicified and argillized zones (2 localities), found at above 13 localities of mineral occurrence on the southern and eastern hillsides of Bt. Tampang, consist mainly of quartz with subordinate amounts of limonite, pyrite, and in places hematite or chalcopyrite (BT-10, BT-11).

(3) Host rocks at above 13 localities are hydrothermally altered sandstone (5 localities) and acidic to intermediate tuff (5 localities) and strongly altered rock (3 localities) and have almost been subjected to strong silicification, sericitization, and in places adularization.
The mineral assemblage of these hydrothermal alteration zone (quartz-sericite-kaolinite) seems to represent that of the hydrothermal alteration zone accompanying epithermal gold deposit of the intermediate type between the adularia-sericite and acid sulfate types (Hayba et al., 1986; Heald et al., 1987) or between the low sulfidation and high sulfidation types (Hedenquist, 1987).

(4) Nine quartz samples from quartz veinlets and networks found at the localities of mineral occurrence on the southern and eastern hillsides of Bt. Tampang are

divided into two groups in terms of the homogenization temperature of fluid inclusion in quartz, namely five samples (BT-1-Q, BT-7-Q, BT-11-Q, BT-15-Q, BT-45-Q) which have relatively low homogenization temperature (184° to 353°C, average 203° to 292°C) and four samples (BT-10-Q, BT-14-Q, BT-16-Q, BT-44-Q) which have wide range of homogenization temperature (131° to 536°C, average 289° to 360°C) and have the low temperature zone (193° to 340°C, average 241° to 289°C) and high temperature zone (344° to 467°C, average 371° to 413°C). Three samples out of five samples of relatively low temperature contain 0.22 to 1.27 g/t of gold.
The rativeIy low homogenization temperature of five samples falls within the range of 135° to 350°C of adularia-sericite type epithermal gold deposit related to the volcanic activity in the Western Pacific Island Arcs after Sillitou (1988).

(5) The result of the K-Ar age determination on representative rocks taken in the survey area reveals that acidic intrusive rocks, namely granite (one sample), granodiorite (one sample), and quartz diorite porphyry (two samples), and hydrothermally altered tuffs (two samples) have been dated as 6.73±0.42 to 8.03 ±0.59 Ma (Late Miocene) and 7.34±0.48 to 7.44 to 0.46 Ma (Late Miocene) respectively and are about the same in age, whereas sandstones have been dated as 7.70±0.56 to 8.01±0.64 Ma (Late Miocene), 13.8±1.0 to 14.2±1.0 Ma (Middle Miocene), 35.3±4.2 to 38.4±4.2 Ma (Early Oligocene), and 112±7.0 Ma (Early Cretaceous) and have wide range of age. It seems that the K-Ar age of hydrothermally altered tuff indicates probably the age of hydrothermal alteration, to which tuff was subjected, judging from that tuff underwent strongly sericitization.

(6) The analyses of 7 rock samples, namely 3 samples of hydrothermally altered acidic to intermediate tuff, 3 samples of acidic to intermediate volcanic rock, and 1 sample of intermediate dyke rock, out of 40 rock samples assayed, have been plotted on the $FeO+Fe_2O_3$-Na_2O+K_2O-MgO, SiO_2-$FeO+Fe_2O_3/MgO$, $FeO+Fe_2O_3$-$FeO+Fe_2O_3/MgO$ diagrams. The result reveals that seven rock samples belong to the calc-alkaline rock series.

(7) It seems that quartz veinlets, quartz networks, veins of silicified zone, and silicified and argillized zones found at the localities of mineral occurrence on the southern and eastern hillsides of Bt. Tampang form a big quartz networks zone as a whole.

(8) Judging from that the mineralized zone of gold found on the southern and eastern hillsides, especially southern hillside, of Bt. Tampang has been embedded in hydrothermally altered sandstone which is thought to belong to the Crocker Formation and felsic tuff overlying unconformably sandstone, it seems that the mineralization has been probably controlled by the surface of unconformity.

(9) Considering the above conclusions, it seems that the mineralized zone of gold found on the southern and eastern hillsides of Bt. Tampang is epithermal gold-bearing quartz networks formed by intermediate hydrothermal fluid related to the volcanic activity of the calc-alkaline rock series in late Miocene.

Part III Conclusion and Recommendation

PART III CONCLUSION AND RECOMMENDATION

CHAPTER 1 CONCLUSION

The follow-up survey in 1993, namely the investigation of locality of mineral occurrence accompanied by geological survey, which was conducted in the Langanan, Bangkud, and Luhan basins, where anomalies of gold were detected in 1992 by geochemical survey employing stream sediment, including Bt. Tampang area, where mineral occurrence of epithermal gold deposit was discovered by the investigation of locality of mineral occurrence in 1992, in order to discover new locality of gold occuurrence and clear up the possibility of the emplacement of gold deposit in the survey area, reveals that pyrite・gold (0.10 to 2.48 g/t)・copper (0.22 to 0.64%)・arsenic (1,175 to 5,063 ppm)・mercury (1,399 to 38,785 ppb)-bearing quartz veinlets, quartz networks, veins of silicified zone, and silicified and argillized zones, which seem to form a low grade gold-bearing big quartz networks zone as a whole, are distributed concentratedly on the southern and eastern hillsides, especially on the southern hillside, of Bt. Tampang.

These mineralized zones are hosted in sandstone belonging probably to the Crocker Formation, belsic tuff overlying unconformably sandstone, and strongly altered rock of unknown origin, all of which have been strongly subjected to hydrothermal alteration consisting mainly of silicification, sericitization, and kaolinization.

The alteration mineral assemblage (mainly quartz-sericite-kaolinite) of the hydrothermal alteration zone) seems to represent that of the hydrothermal alteration zone accompanying epithermal gold deposit of the intermediate type between the adularia-sericite and acid sulfate types (Hayba et al., 1986; Heald et al., 1987) or between the low sulfidation and high sulfidation types (Hedenquist, 1987).

Considering that felsic tuff seems to have undergone hydrothermal alteration probably 7.34±0.48 to 7.44±0.46 Ma ago (late Miocene) which was indicated by the age determination of hydrothermally altered felsic tuff by means of the K-Ar method and that acidic to intermediate pyroclastic and volcanic rocks found in the are to the east of Kpg. poring belong to the calc-alkaline rock series, low grade gold-bearing quartz networks zone found on the southern and eastern hillsides of Bt. Tampang seems to be epithermal gold deposit formed by intermediate hydrothermal fluid related to the volcanic activity of the calc-alkaline rock series in late

Miocene.

Therefore, there is a possibility that higher grade gold-bearing quartz networks or gold-bearing quartz veins of the bonanza-type (vein-type) are present under this low grade gold-bearing quartz networks zone.

CHAPTER 2 RECOMMENDATION FOR THE FUTURE

As mentioned in the above "CHAPTER 1 CONCLUSION", there is a possibility that higher grade gold-bearing quartz networks or gold-bearing quartz veins of the bonanza-type (vein-type) are present under the low grade gold-bearing quartz networks zone found on the southern and eastern hillsides of Bt. Tampang.

Therefore, the following exploration works are recommended in order to confirm the above possibility.

(1) The trenching on the southern and eastern hillsides of Bt. Tampang and on the ridge and the systematic sampling at the trench and assaying of the sample for the purpose of clarifying the detailed distribution of gold grade on the surface are proposed.

(2) In case the emplacement of higher grade portion of gold below the low grade gold-bearing quartz networks zone is expected as the result of trenching, sampling, and assaying of the samples, the diamond drilling aiming at the higher grade portion expected are proposed.

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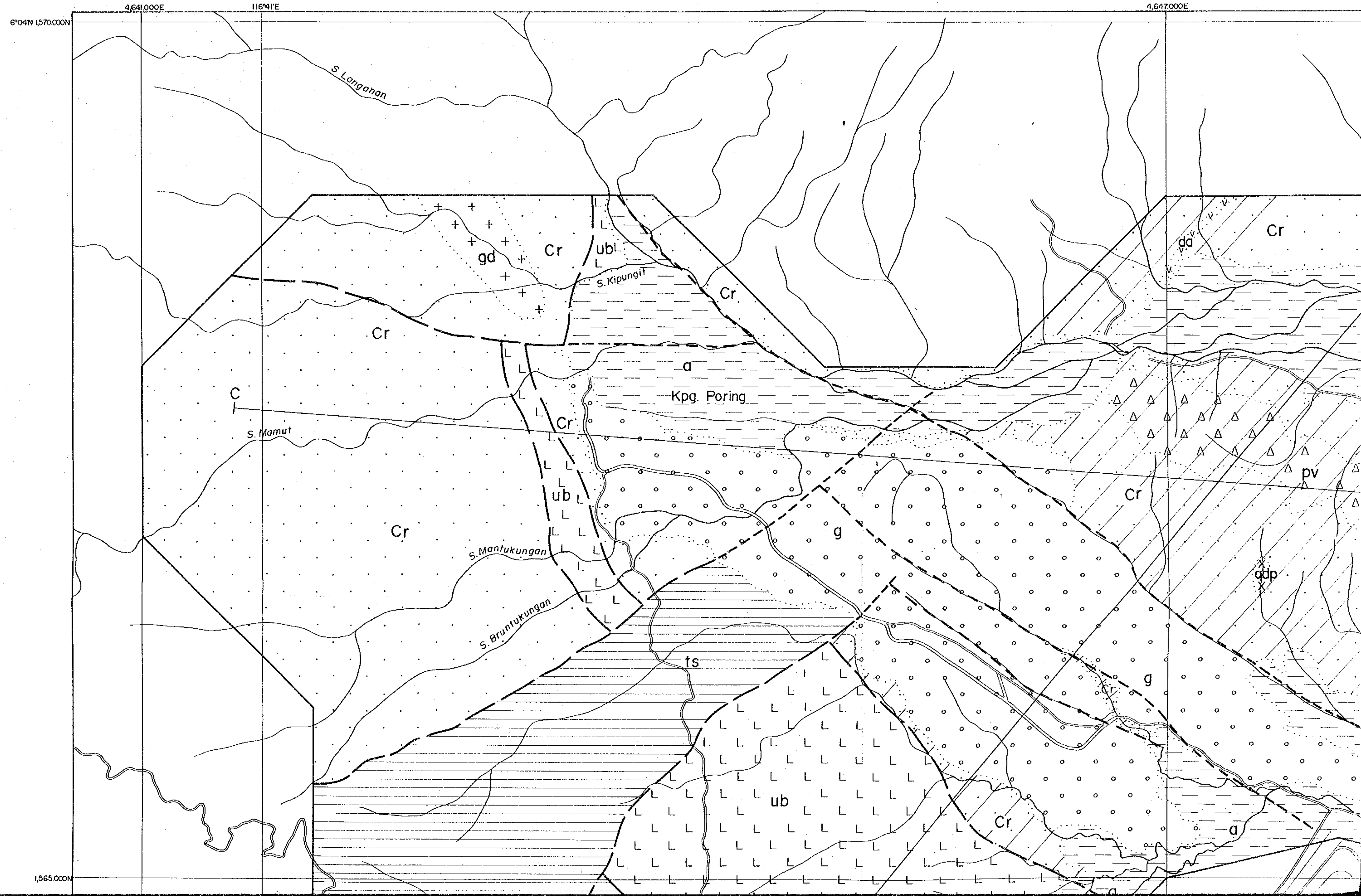

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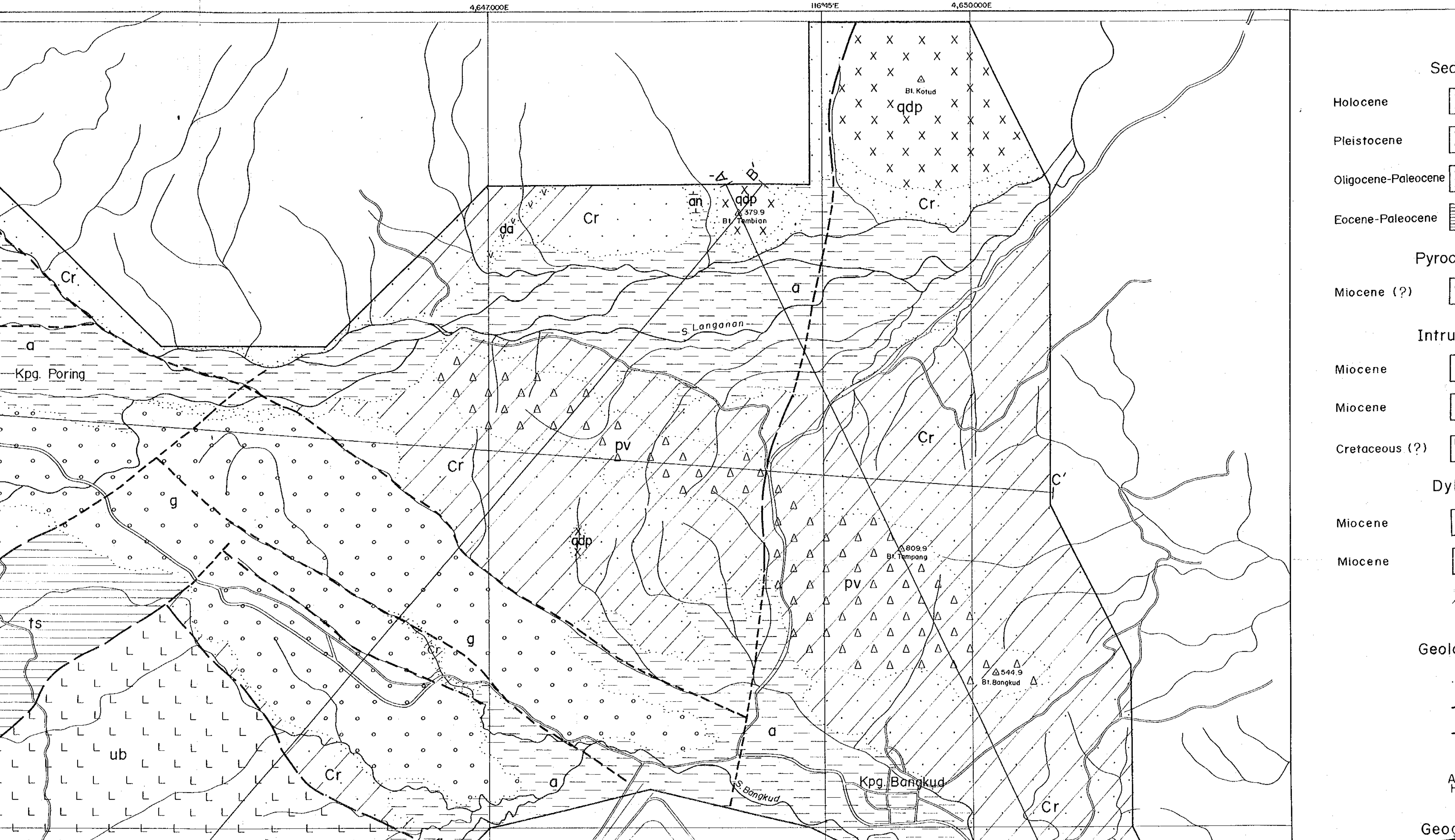
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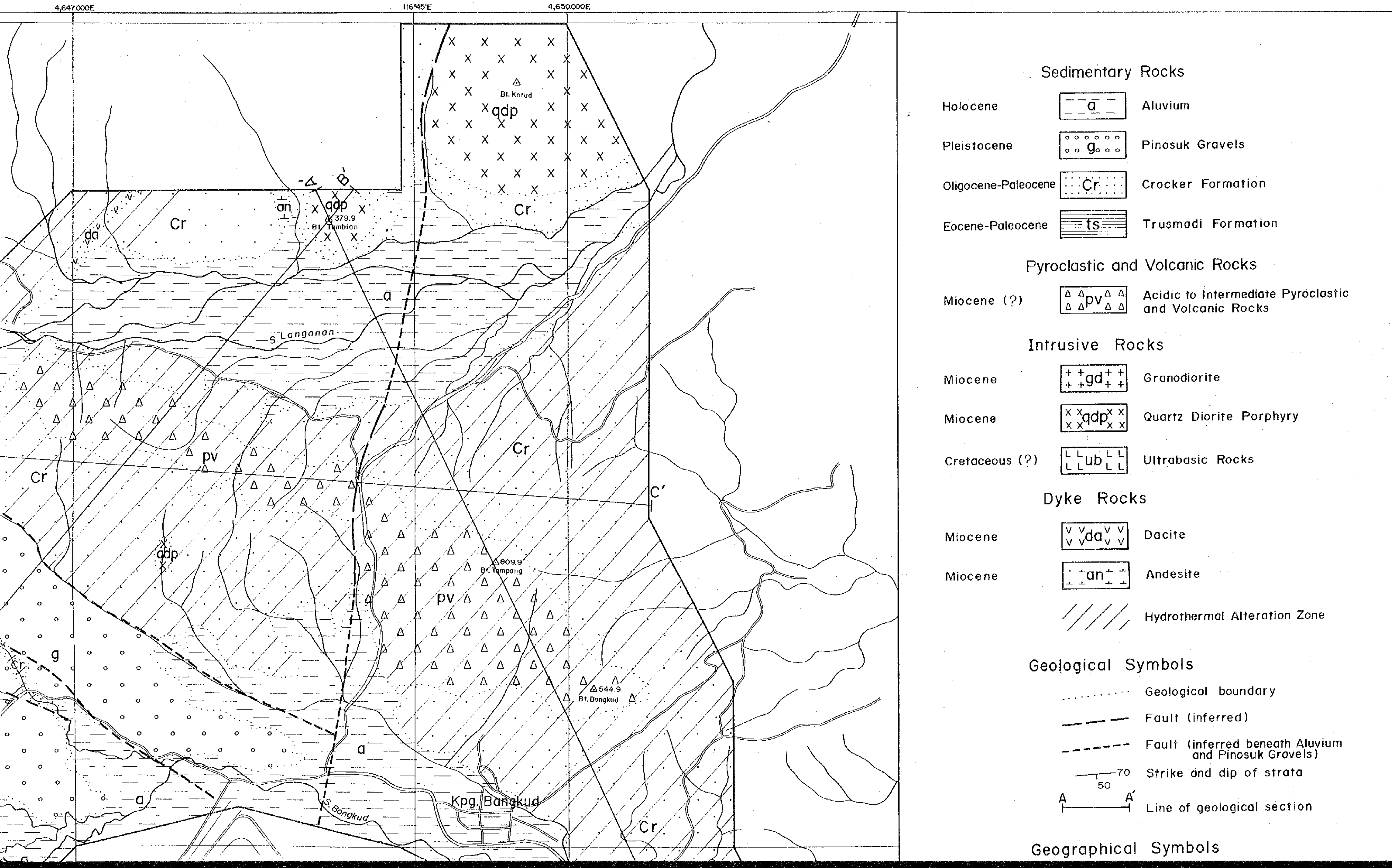
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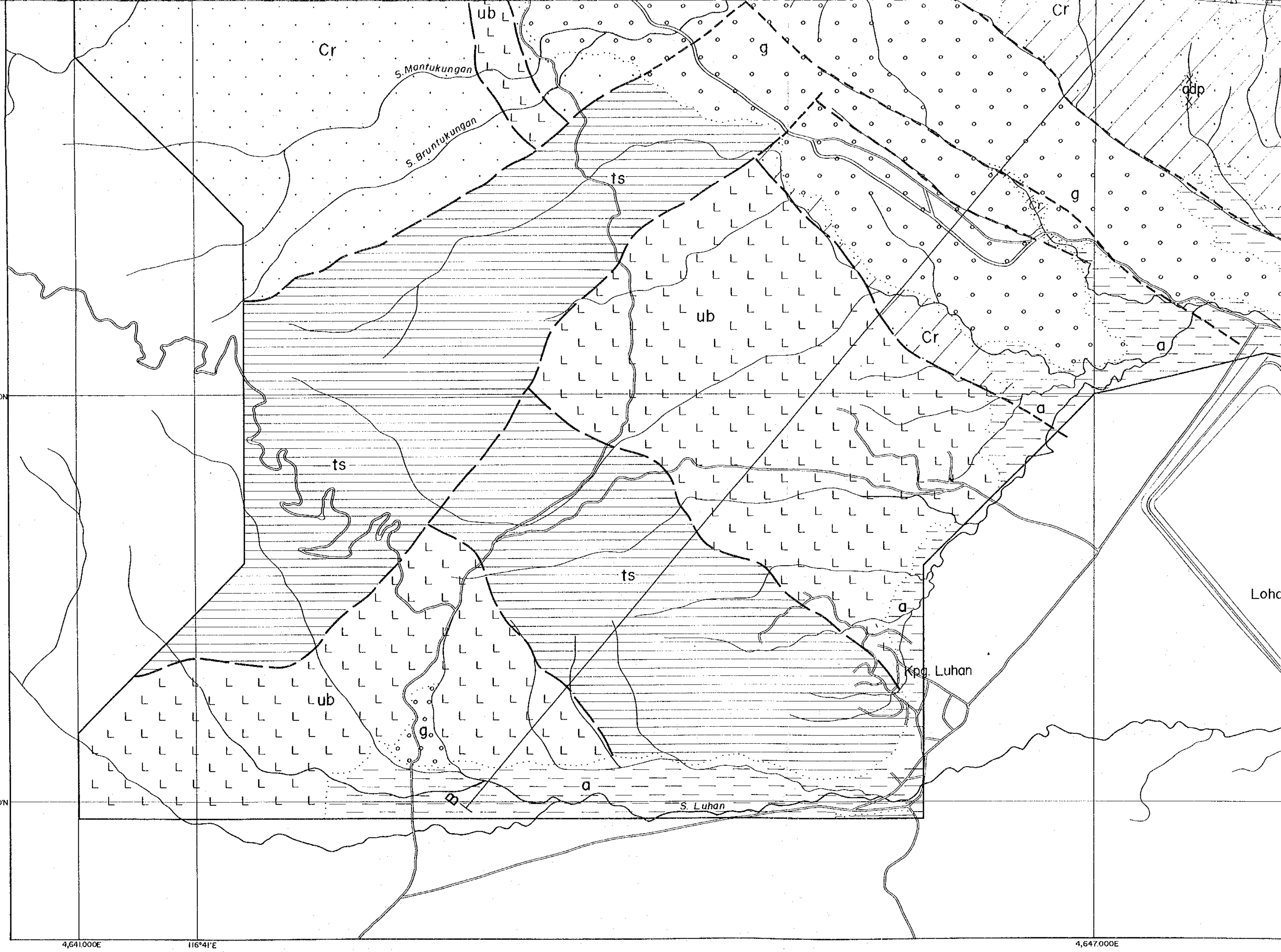
Kpg. Bangkud
S. Bangkud
Sedimentary Rocks
Holocene
a
Aluvium
Pleistocene
g
Pinosuk Gravels
Oligocene-Paleocene
Cr
Crocker Formation
Eocene-Paleocene
ts
Trusmadi Formation
Pyroclastic and Volcanic Rocks
Miocene (?)
pv
Acidic to Intermediate Pyroclastic and Volcanic Rocks
Intrusive Rocks
Miocene
gd
Granodiorite
Miocene
qdp
Quartz Diorite Porphyry
Cretaceous (?)
ub
Ultrabasic Rocks
Dyke Rocks
Miocene
da
Dacite
Miocene
an
Andesite
Hydrothermal Alteration Zone
Geological Symbols
Geological boundary
Fault (inferred)
Fault (inferred beneath Aluvium and Pinosuk Gravels)
70
50
Strike and dip of strata
A
A'
Line of geological section
Geographical Symbols



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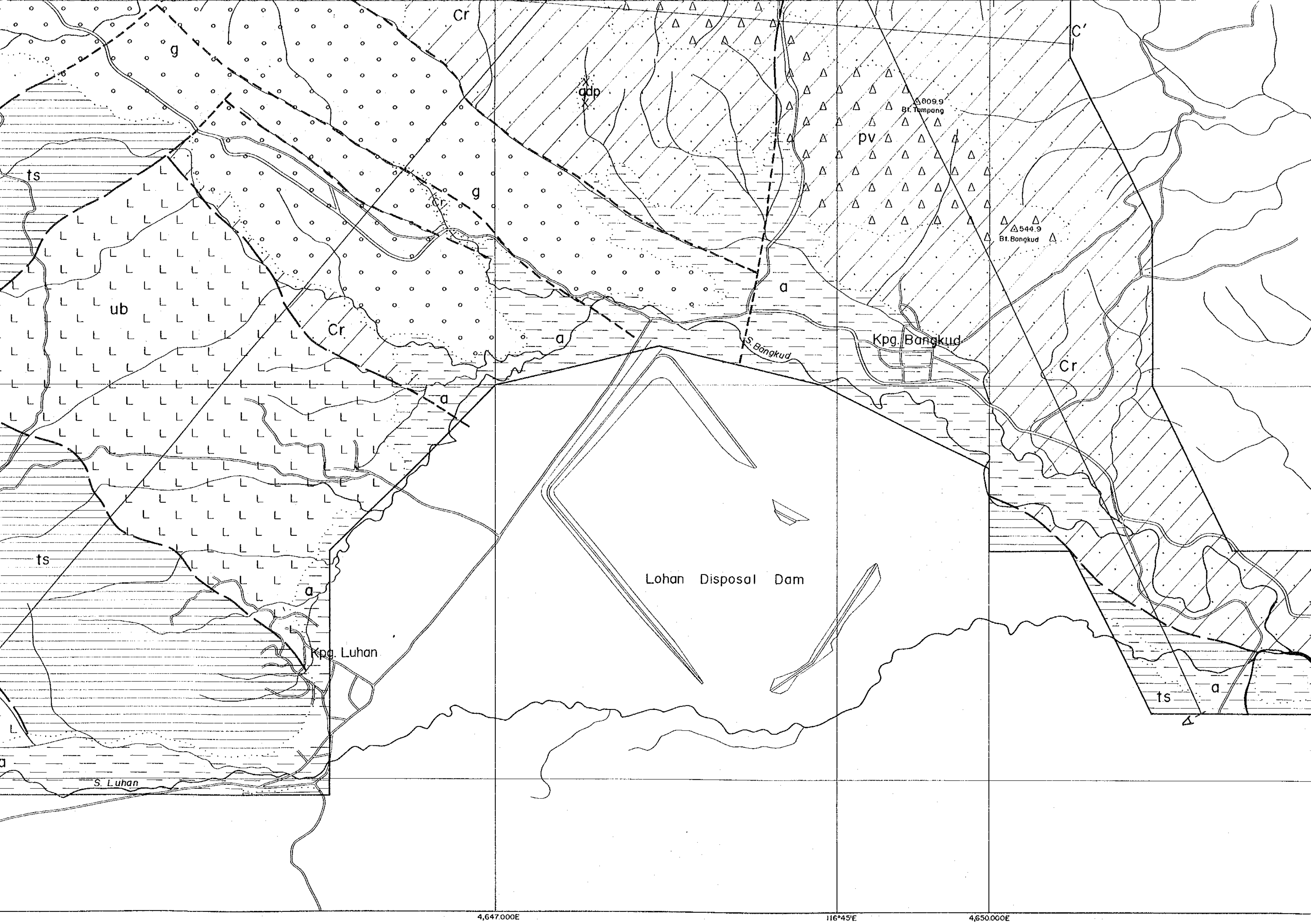


Cretaceous (?)

Dyk

Miocene

Miocene

Geolo

Geog

Fig. II-1 Geol

Bt.

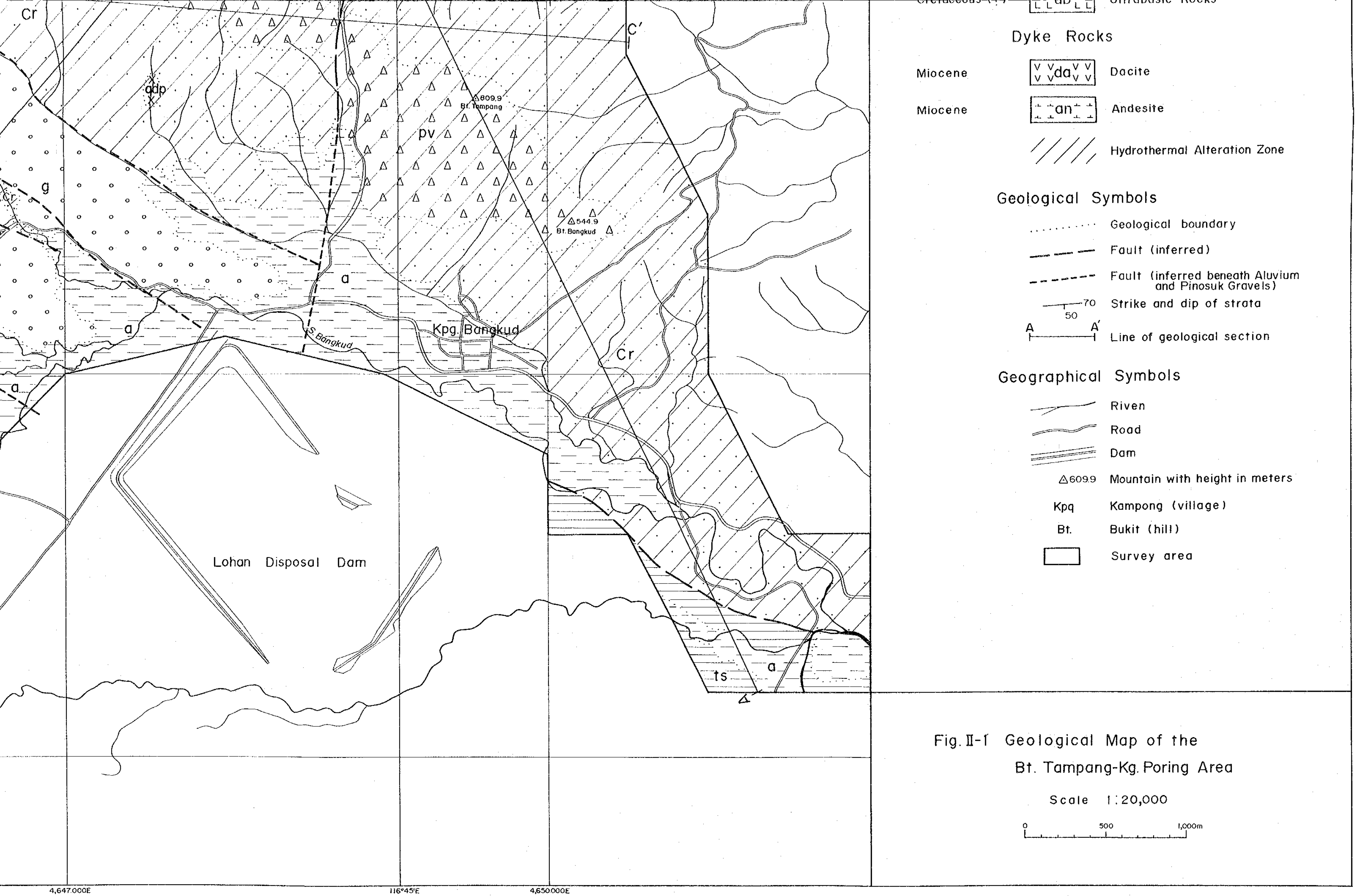


Fig. II-1 Geological Map of the Bt. Tampang-Kg. Poring Area

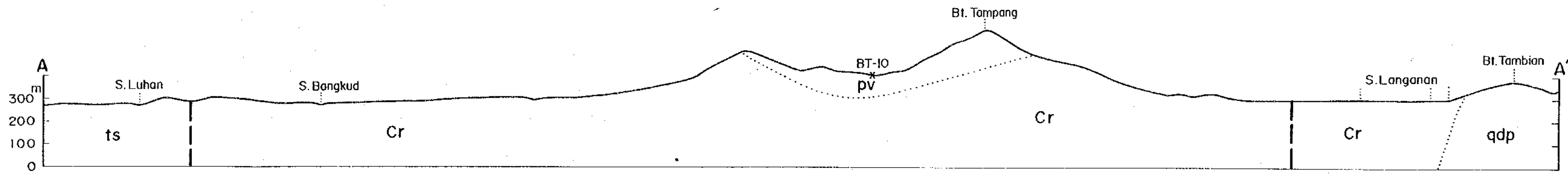
Scale 1:20,000

0 500 1,000m

Fig. II-2 Diagrammatic Geological Sections (Alluvium omitted)

Horizontal and vertical scale 1 : 20,000

A – A′ Section



B – B′ Section

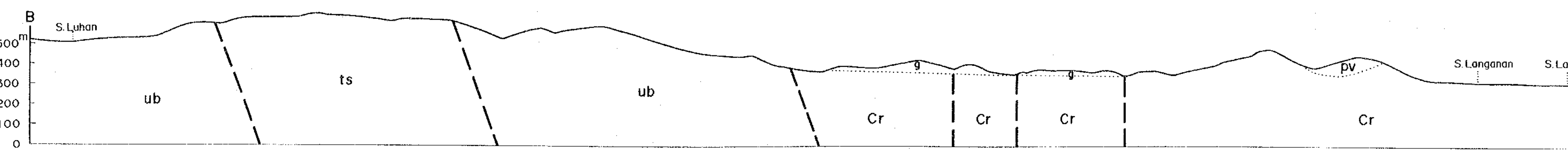
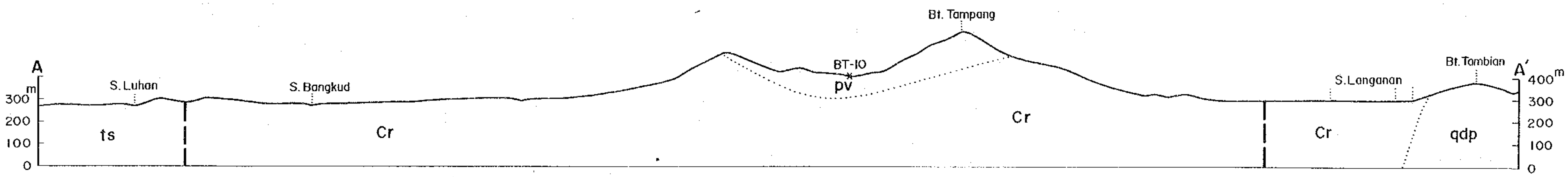


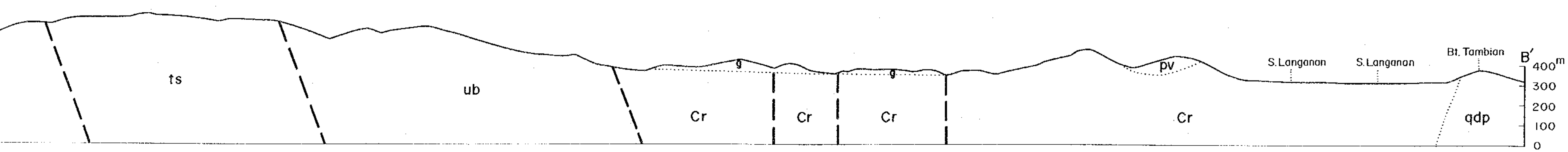
Fig. II-2 Diagrammatic Geological Sections (Alluvium omitted)

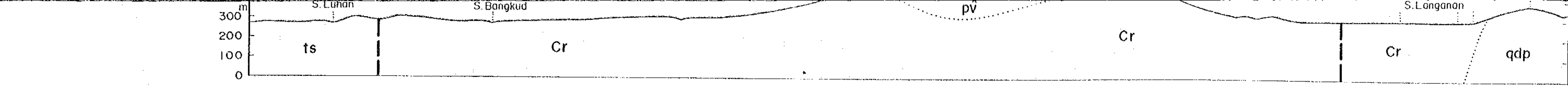
Horizontal and vertical scale 1 : 20,000

A – A′ Section

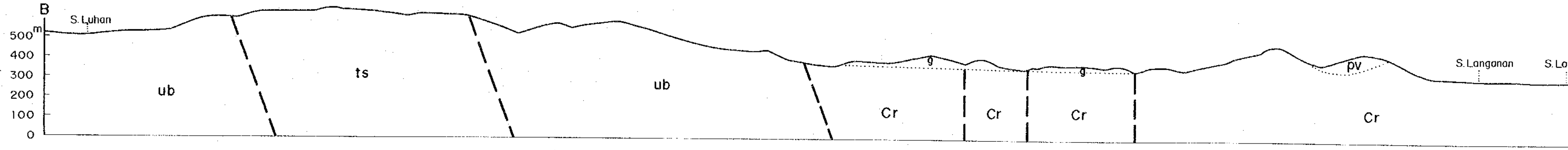


B – B′ Section

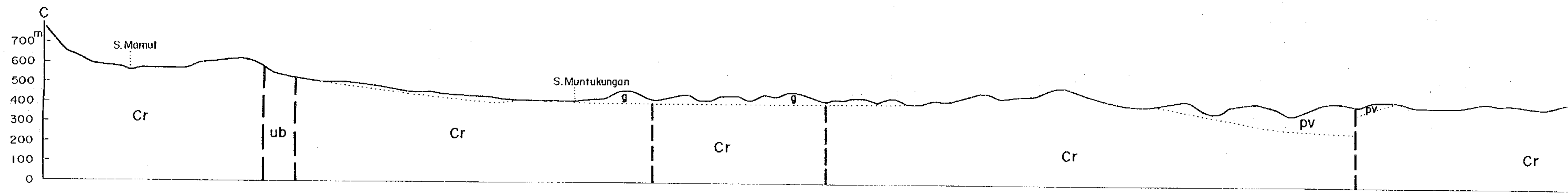




B – B′ Section



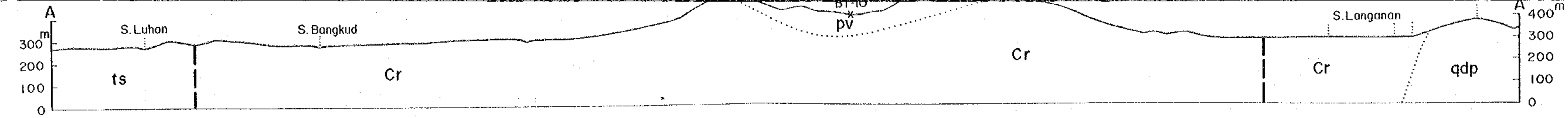
C – C′ Section



ts : Trusmadi Formation

Cr : Crocker Formation

g : Pinosuk Gravels



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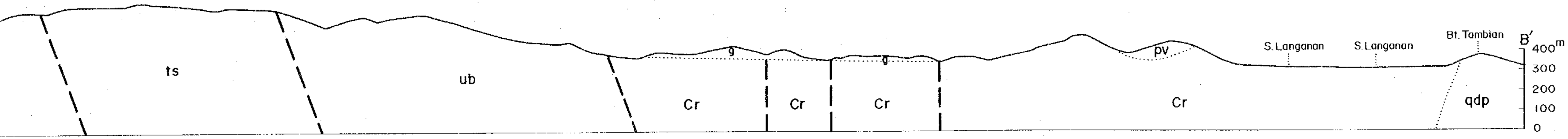

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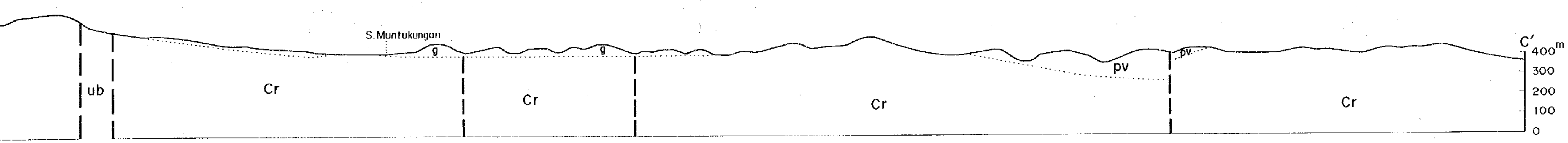
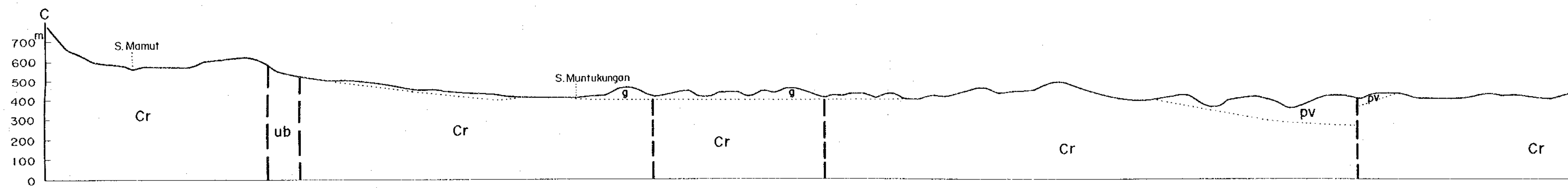


ts : Trusmadi Formation

g : Pinosuk Gravels

C – C′ Section



ts : Trusmadi Formation

Cr : Crocker Formation

Ub : Ultrabasic Rock

Pv : Acidic to Intermediate Pyroclastic and Volcanic Rocks

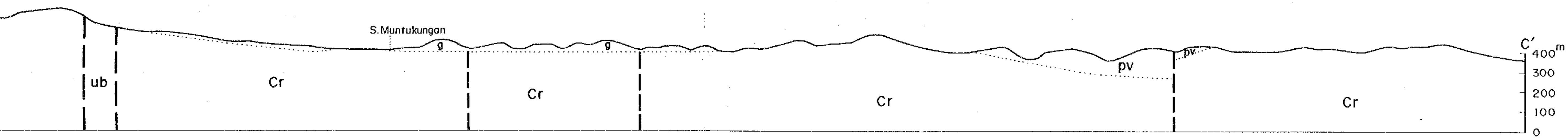
g : Pinosuk Gravels

qdp : Quartz Diorite Porphyry

: Fault (inferred)

: Glological Boundary

C – C′ Section



ts : Trusmadi Formation

Cr : Crocker Formation

Ub : Ultrabasic Rock

Pv : Acidic to Intermediate Pyroclastic and Volcanic Rocks

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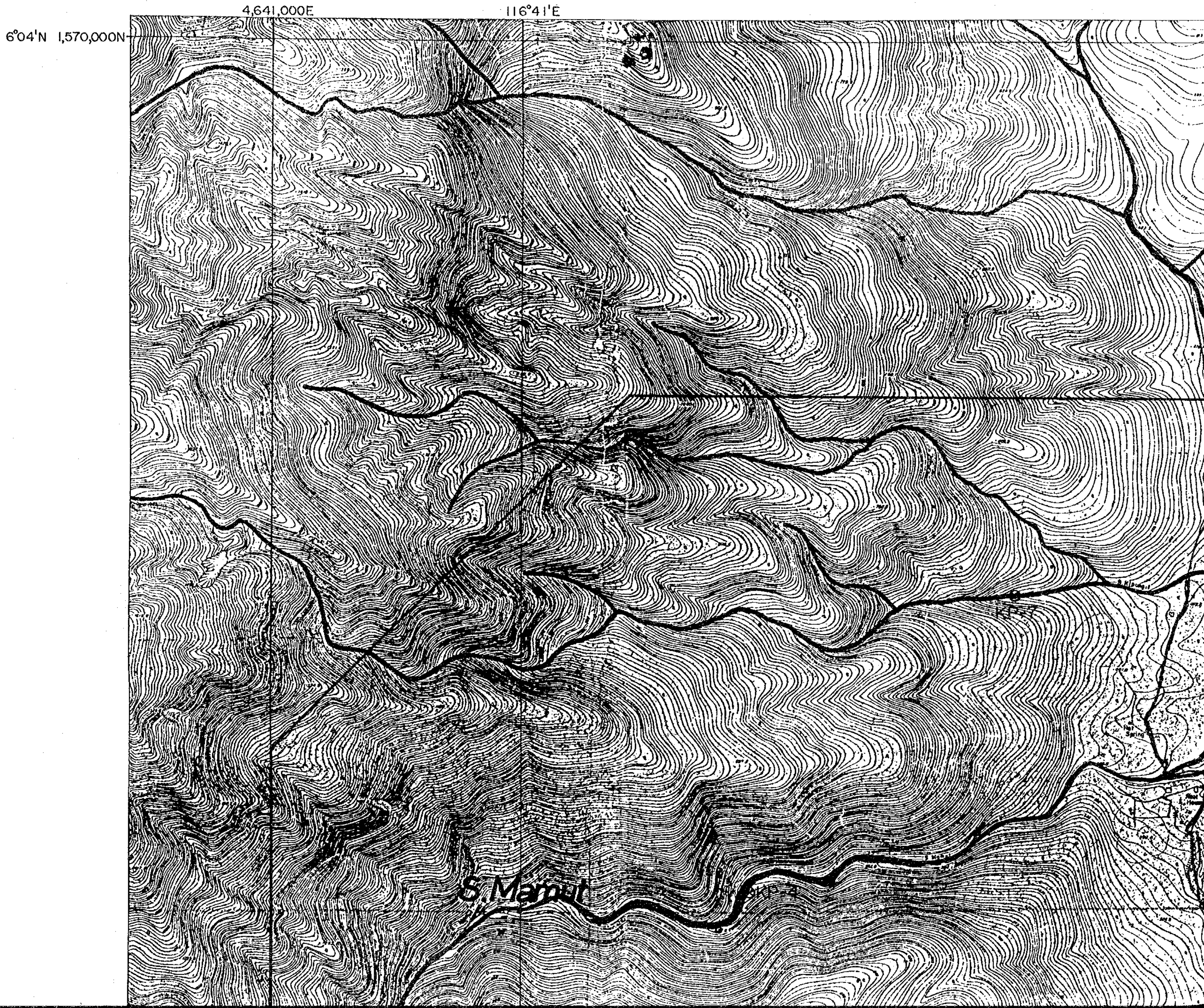
qdp : Quartz Diorite Porphyry

: Fault (inferred)

: Glological Boundary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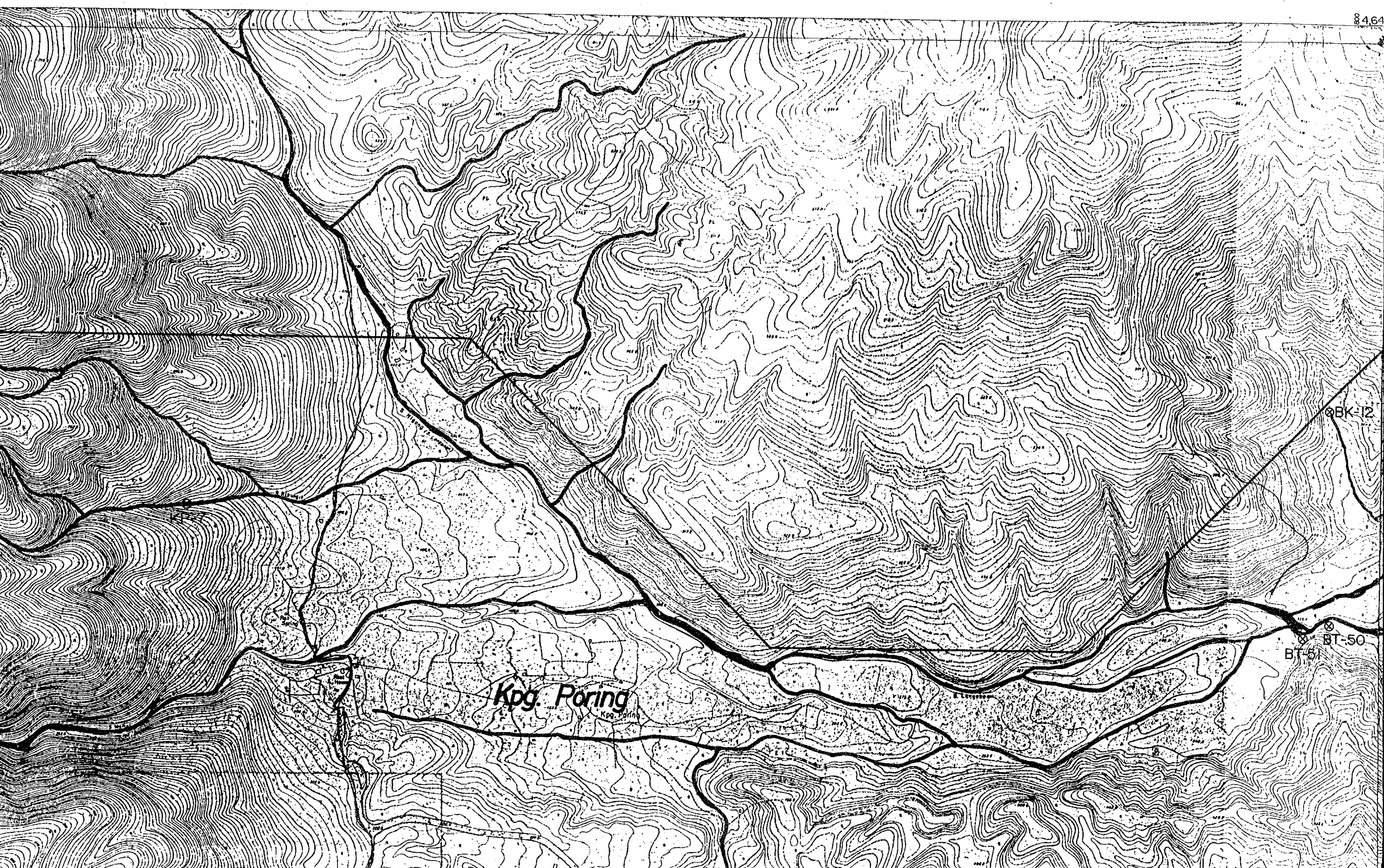
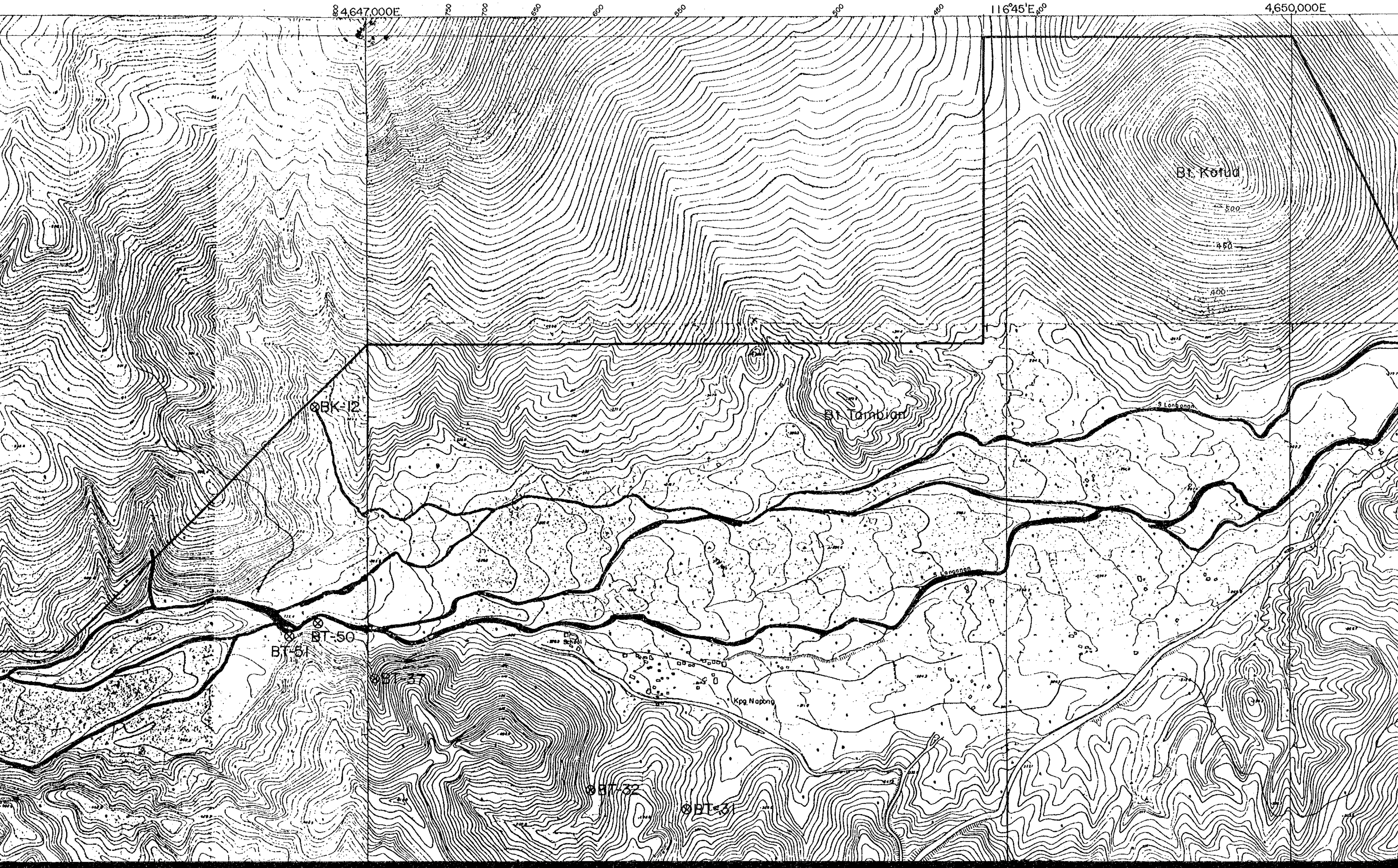
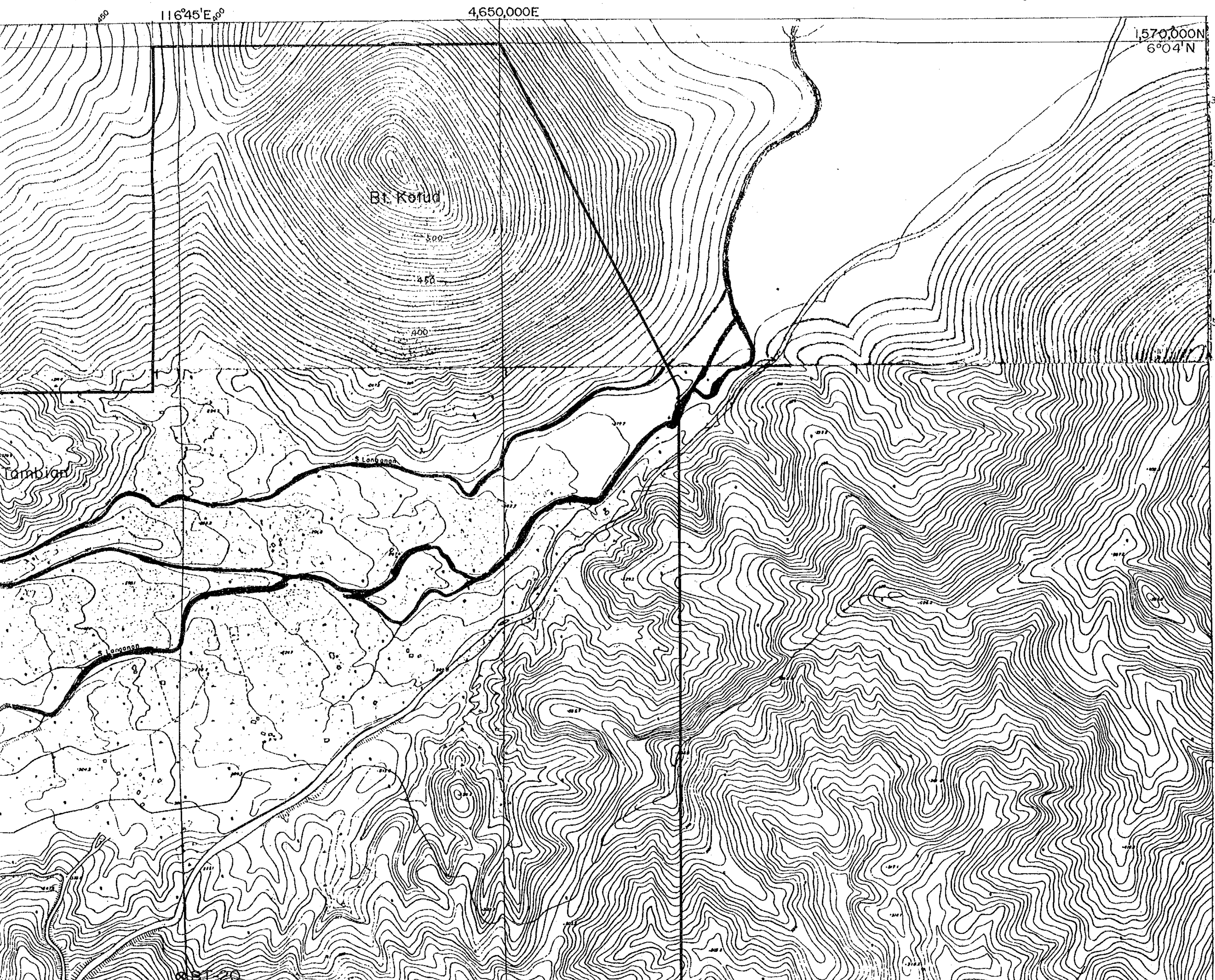
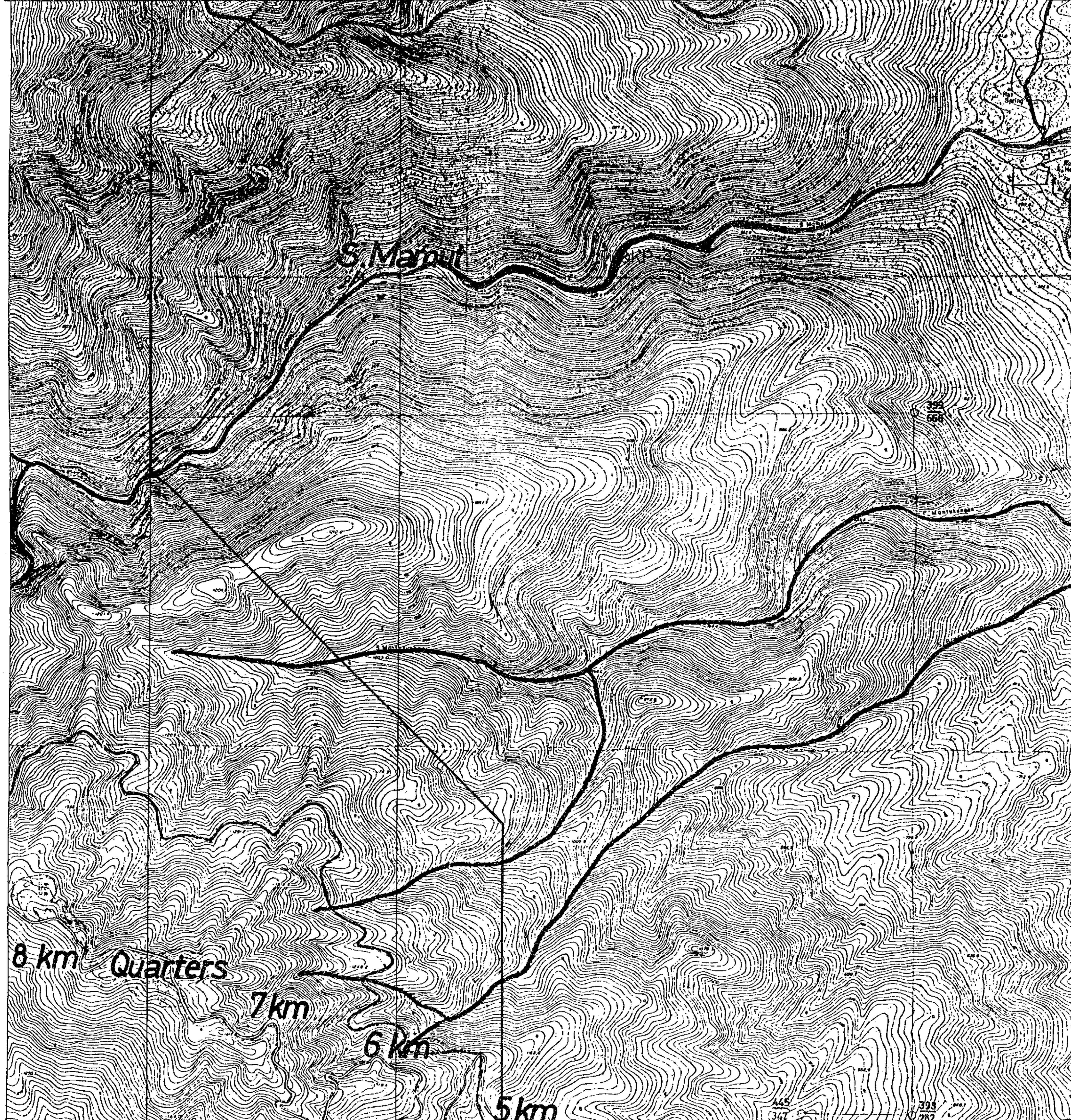
6°04'N 1,570,000N
S.Mamut

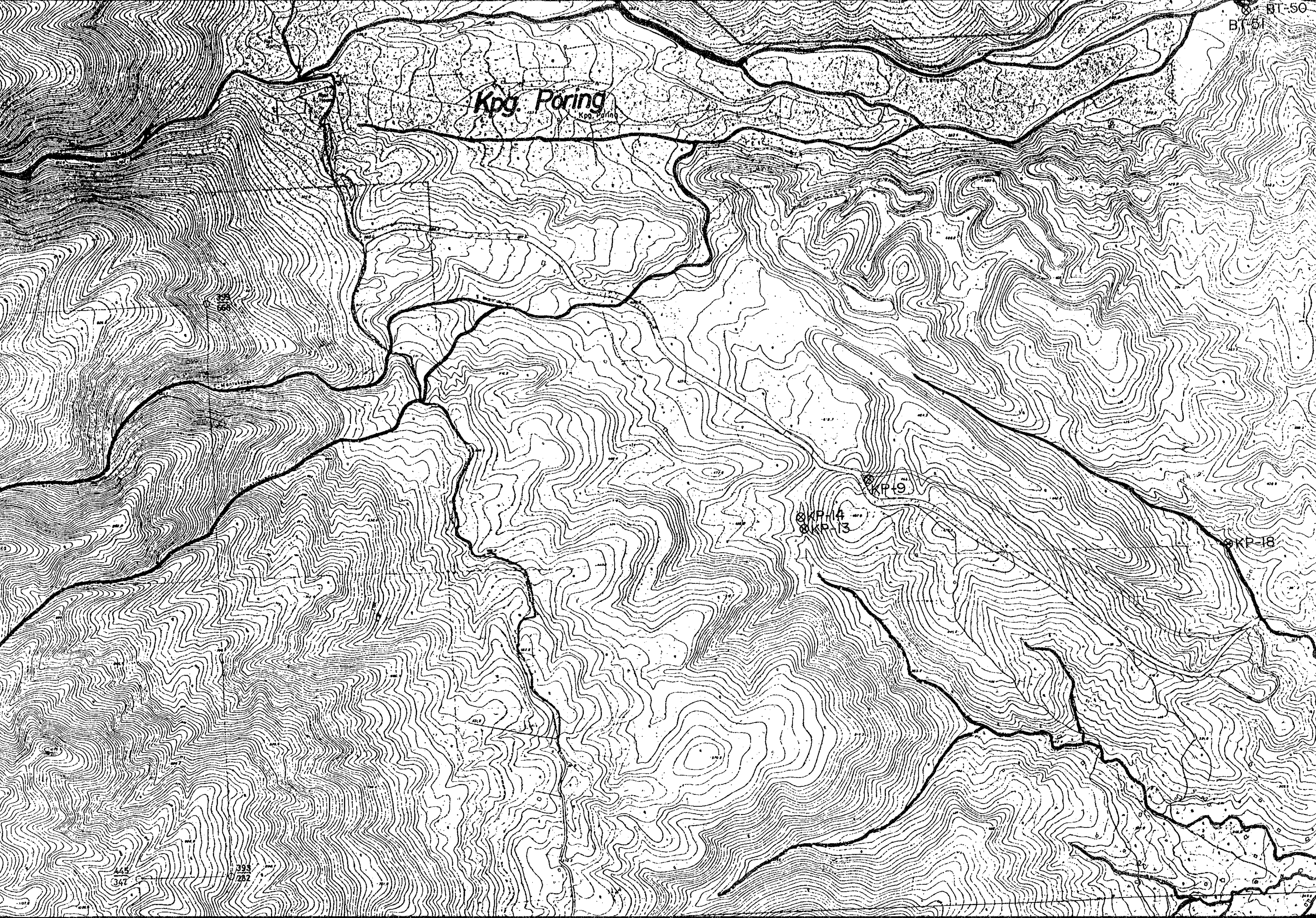


4,64
BK-12
KP-7
Kpg. Poring
Kpg. Poring
BT-50
BT-51


4,647,000E
116°45'E
4,650,000E
Bt. Kofud
500
450
400
Bt. Tambian
S. Langanan
BK-12
BT-51
BT-50
BT-37
BT-32
BT-31
Kpg. Napong
School


116°45'E
4,650,000E
1,570,000N
6°04'N
Bt. Kolud
500
450
400
Tambian
300
350
400
450
500


8 km
Quarters
7 km
6 km
5 km


BT-50
BT-51
Kpg. Poring
KP-9
KP-14
KP-13
KP-18
393
668
445
347
393
282