3. Plan of 1-D resistivity structure

Plans of 1-D Resistivity Structure were prepared for depths of 100 meter and 300 meter from the land surface based on the resistivity structure obtained by conducting 1-D analysis for each measuring point. (See Figs. II-5-30 to II-5-33.)

1) Area I

(Depth 100 m)

The contour of resistivity distribution is the same as indicated in Plan of Apparent Resistivity (1,280 Hz) with a characteristic of long extended distribution in the south to north direction (the direction of quartz vein). In the vicinity of stations No.18 to 19 on Lines C and D, a high resistivity area is noted to correspond with the distribution of quartz vein. A high resistivity area extending in the south to north direction at stations No.18 to 20 on Lines G to L was interpreted to reflect the extension of the depth of quartz veins (9), (10), and (14) noted on the land surface. The high resistivity area in the vicinity of stations No.10 to 11 on Lines T and V was also interpreted to reflect a series of quartz veins noted in these positions.

(Depth 300 m)

Relatively low resistivity area of 1,000 Ω·m or less scattered in the high resistivity area of 1,000 to 2,000 Ω·m or more which is distributed in almost the entire survey area. This low resistivity area is considered to correspond with the fracture zone in diorite of relatively large scale. Others similarly show high resistivity, and identification of geological factors is considered difficult.

2) Area II

(Depth 100 m)

The plan of 1-D structure resistivity in depth of 100 m shows a similar distribution as indicated in Plan of Apparent Resistivity of 1,280 Hz. In almost the entire area resistivity area of 2,000 Ω·m or less are distributed. In particular, low resistivity area of 500 Ω·m or less are widely distributed. A resistivity area slightly higher than that of surrounding points which is noted in the vicinity of stations No.4 to 7 on Lines C to F may have reflected the existence of quartz veins distributed in these positions. No other distinctive correspondence is noted.

(Depth 300 m)

In the entire area resistivity bands of 500 Ω·m or more are distributed. No resistivity area slightly higher than the surrounding points which existed in the depth of 300 m in the vicinity of Survey lines C to F is noted in this depth.

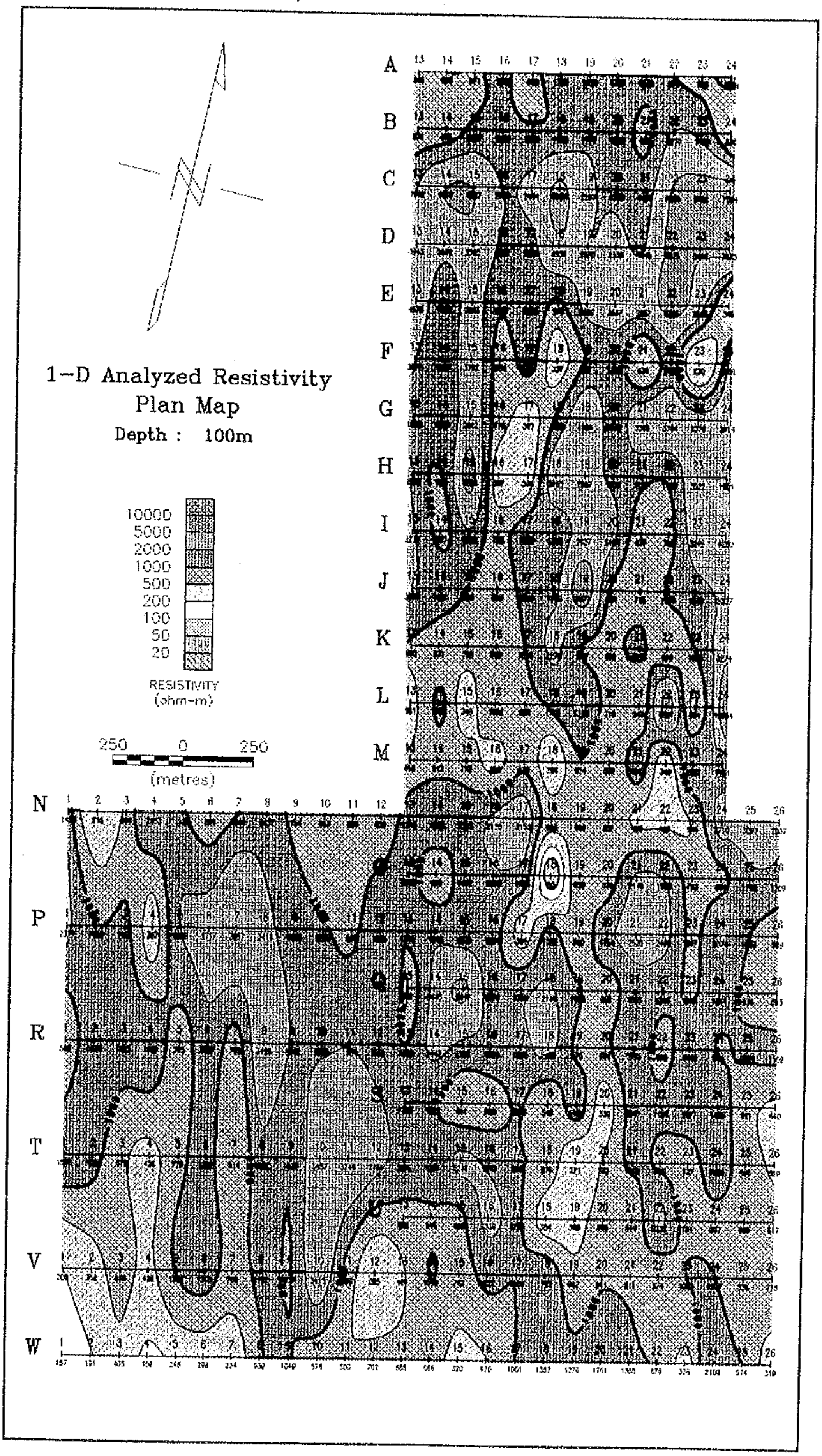

Fig. II-5-30 Plan of 1-D Resistivity Structure (Area I, Depth 100m)

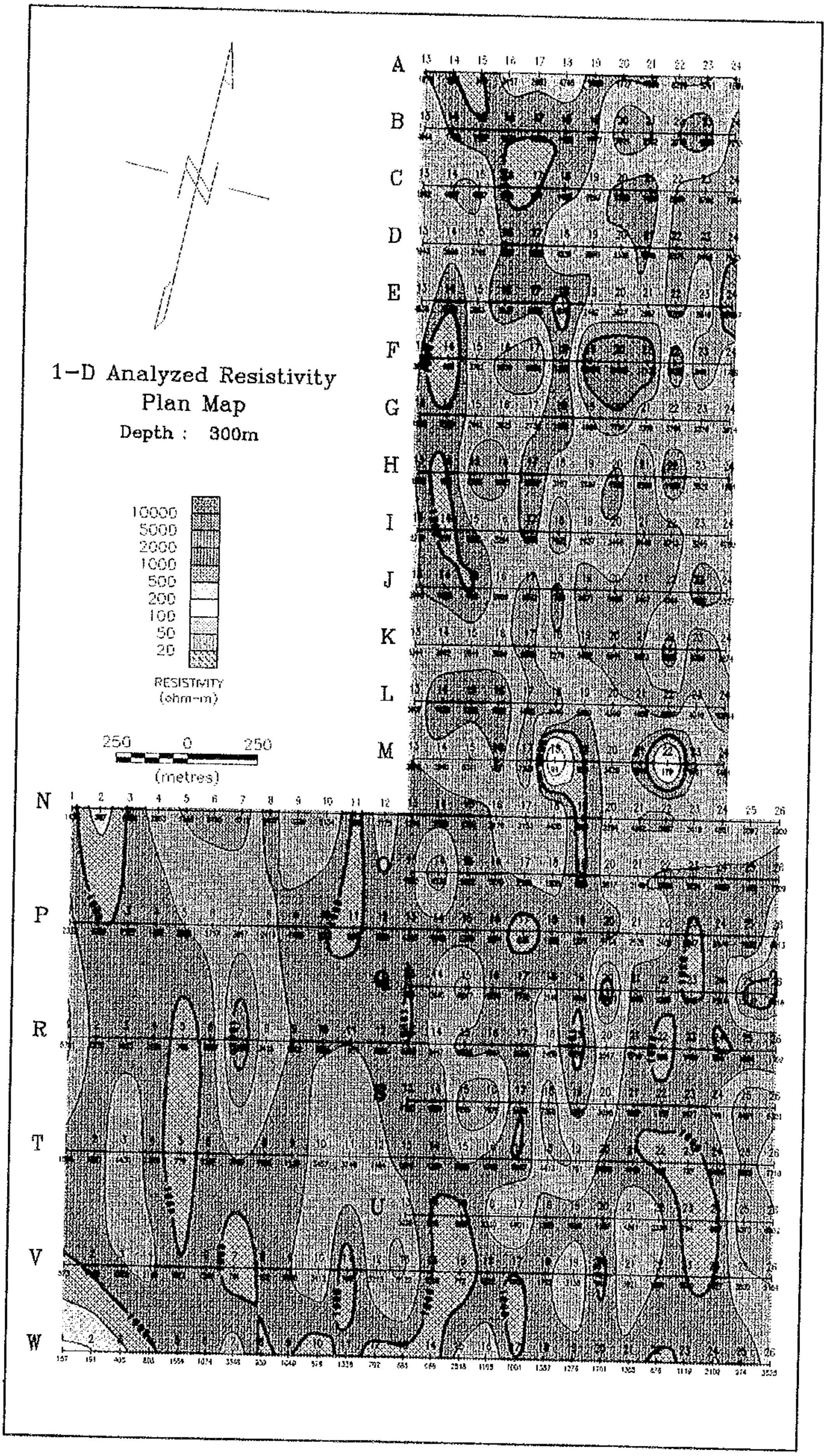

Fig. II-5-31 Plan of 1-D Resistivity Structure (Area 1, Depth 300m)

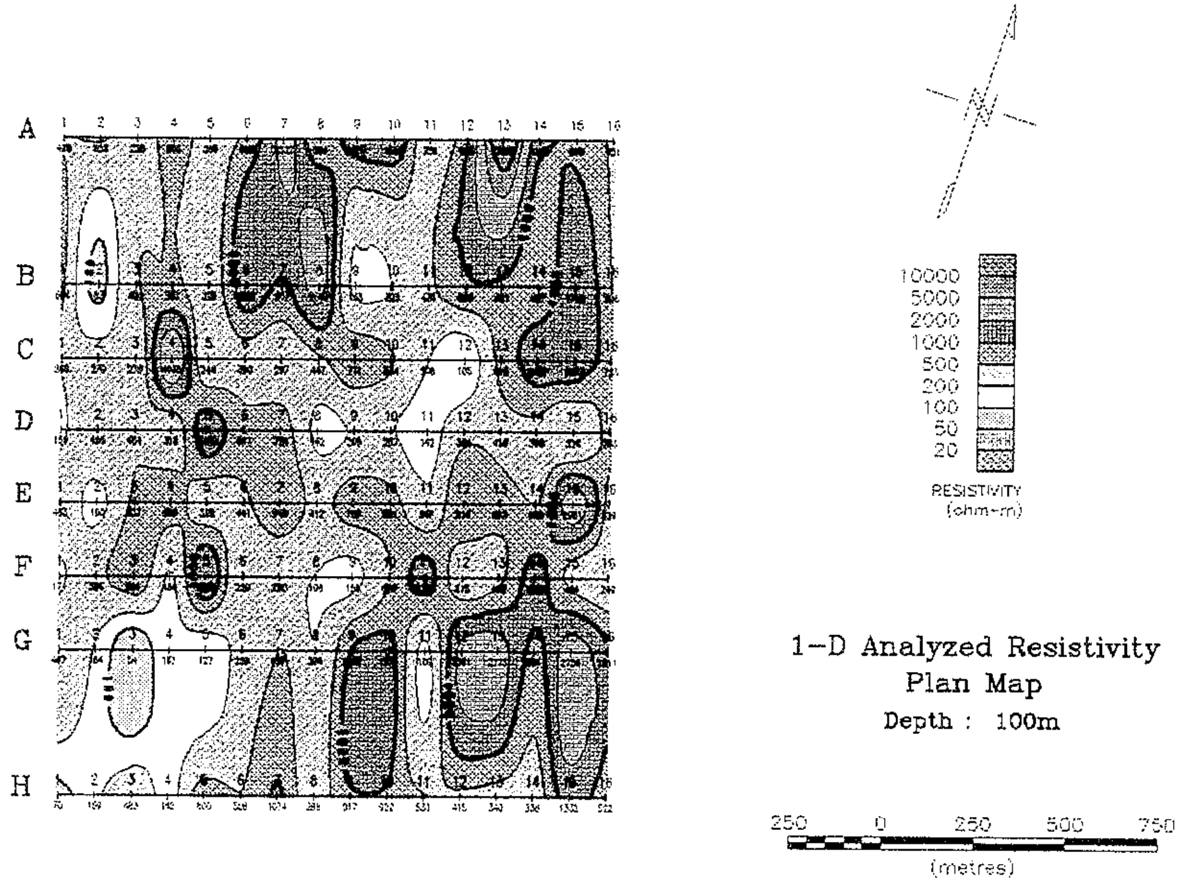

Fig. II-5-32 Plan of 1-D Resistivity Structure (Area II. Depth 100m)

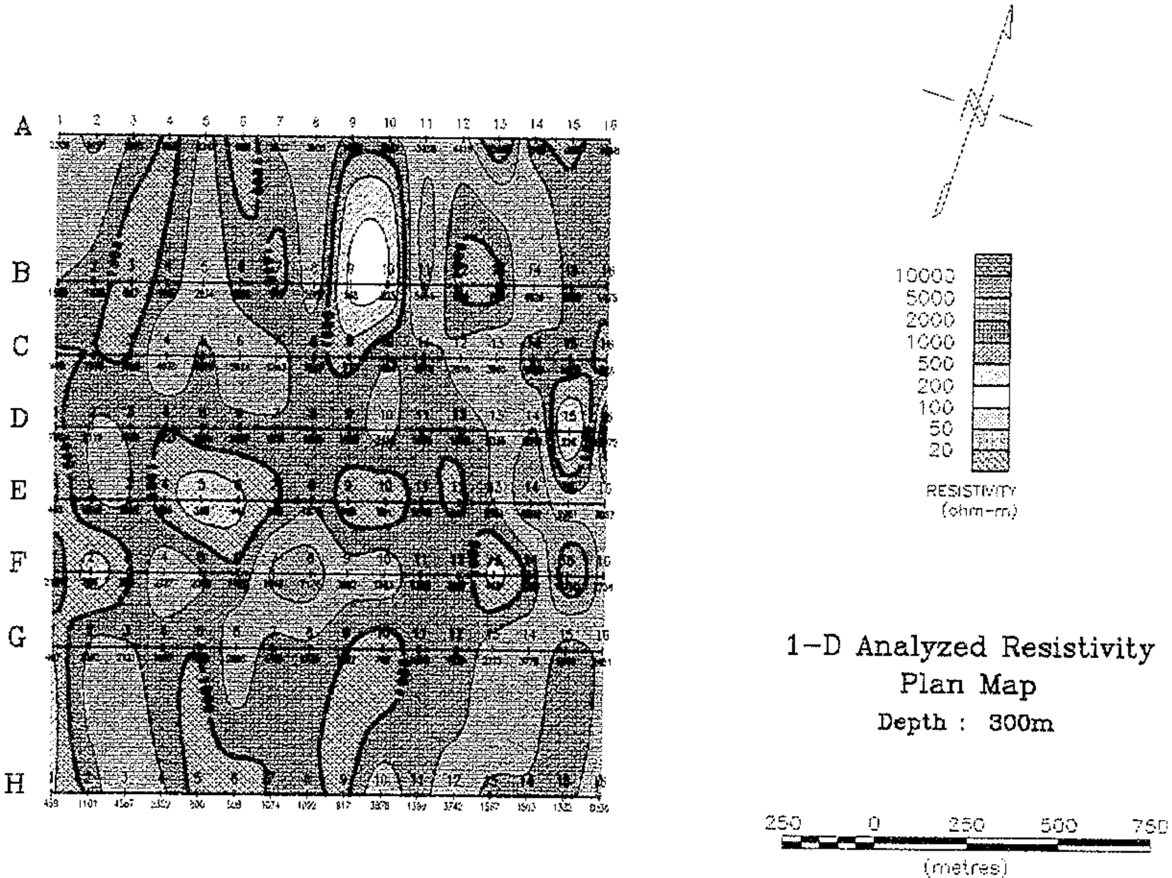

Fig. II-5-33 Plan of 1-D Resistivity Structure (Area II. Depth 300m)

4. Panel diagram of 2-D resistivity structure

Figs. II-5-34 and II-5-35 show panel diagrams based on the results of 2-D resistivity structure analysis.

As a result of 2-D resistivity structure analysis, the followings were clarified:

1)Area I

a)In the resistivity structure of this area the relatively low resistivity layers of 2,000 Ω·m or less are distributed on the subsurface. Beneath the subsurface layer, the high resistivity layers (2,000 to 10,000 Ω·m or more) are distributed.

b)The thickness of the low resistivity layer on the subsurface is around 250 m. In some places the thickness is found to reach the depth of 600 m. This low resistivity layer has a tendency to be thick on the west side and thin in the east side.

c)The high resistivity layer has a tendency to be higher in the depth. On the north side of Line L the resistivity has a notable tendency to be higher in the depth on the east side of the Survey line.

d)No distinctive correspondence is noted between quartz vein and distribution of resistivity.

2)Area II

a)As in the case of Area I, relatively low resistivity layers of 2,000 Ω·m or less are distributed on the subsurface of the resistivity structure of this area. Beneath the subsurface layer high resistivity layers (2,000 to 10,000 Ω·m or more) are distributed.

b)In this area the thickness of the low resistivity layer on the subsurface is large to reach 300 m or more compared with Area I.

c)The layer beneath the subsurface with high resistivity has a tendency to have higher resistivity in the depth.

d)No high resistivity is noted to correspond with quartz vein.

5-4 Evaluation

Figs. II-5-36 and II-5-37 indicate the result of comprehensive analysis.

Plan distribution of resistivity in this area shows a strike in the south to north direction corresponding to the direction of ore vein structure. Resistivity values are high in general (1,000 to 10,000 Ω·m) reflecting the geological features (consisting of granodiorite - diorite, and gneiss) of this area.

According to the results of 1-D and 2-D analyses, the resistivity structure of this area shows two-layered structure in general. In Area I, the resistivity of the surface layer is around 1,000 Ω·m and beneath the subsurface a high resistivity of 2,000 Ω·m or more is noted.

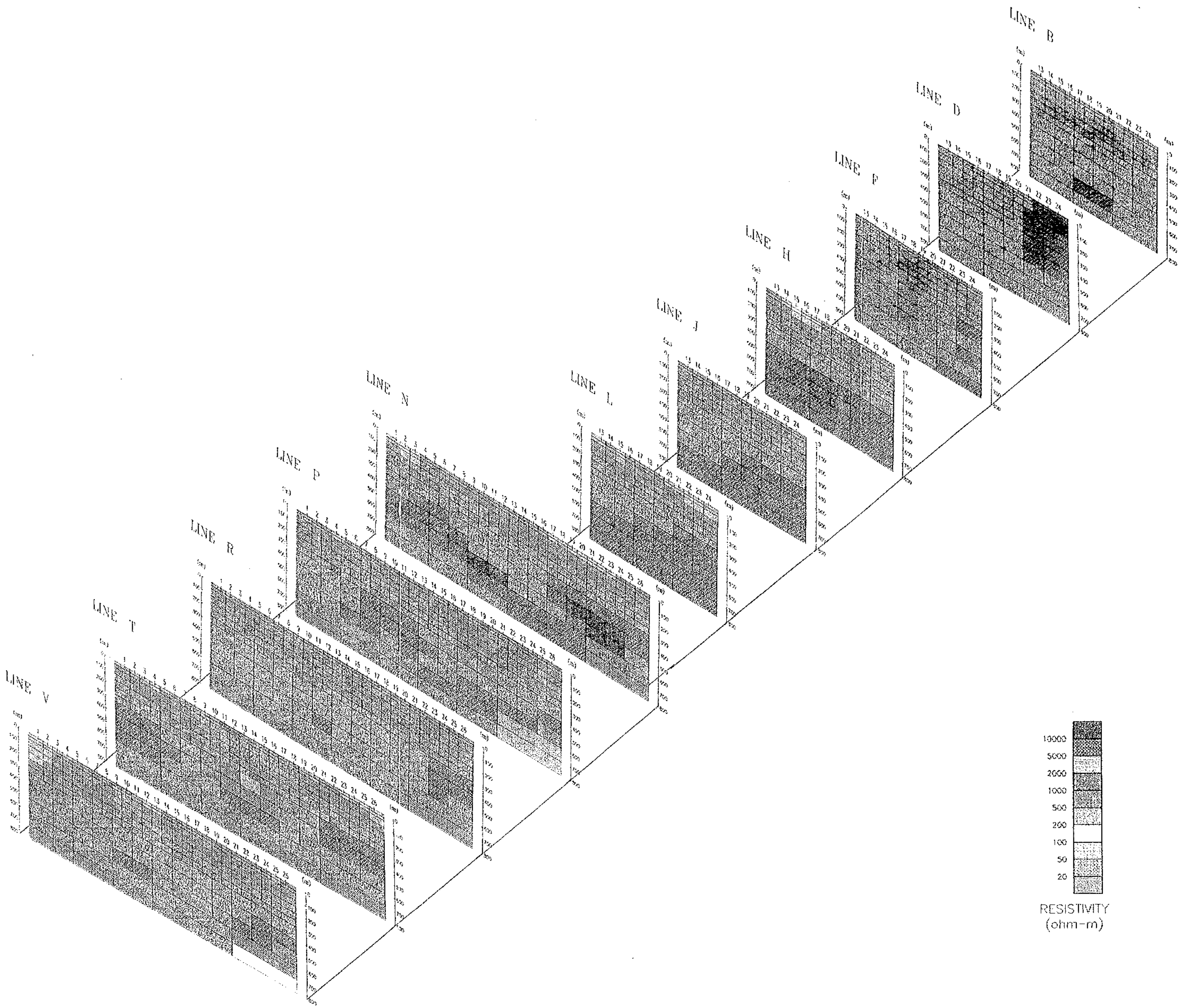

Fig. II -5-34 Panel diagram of 2-D Resistivity Structure (Area I)

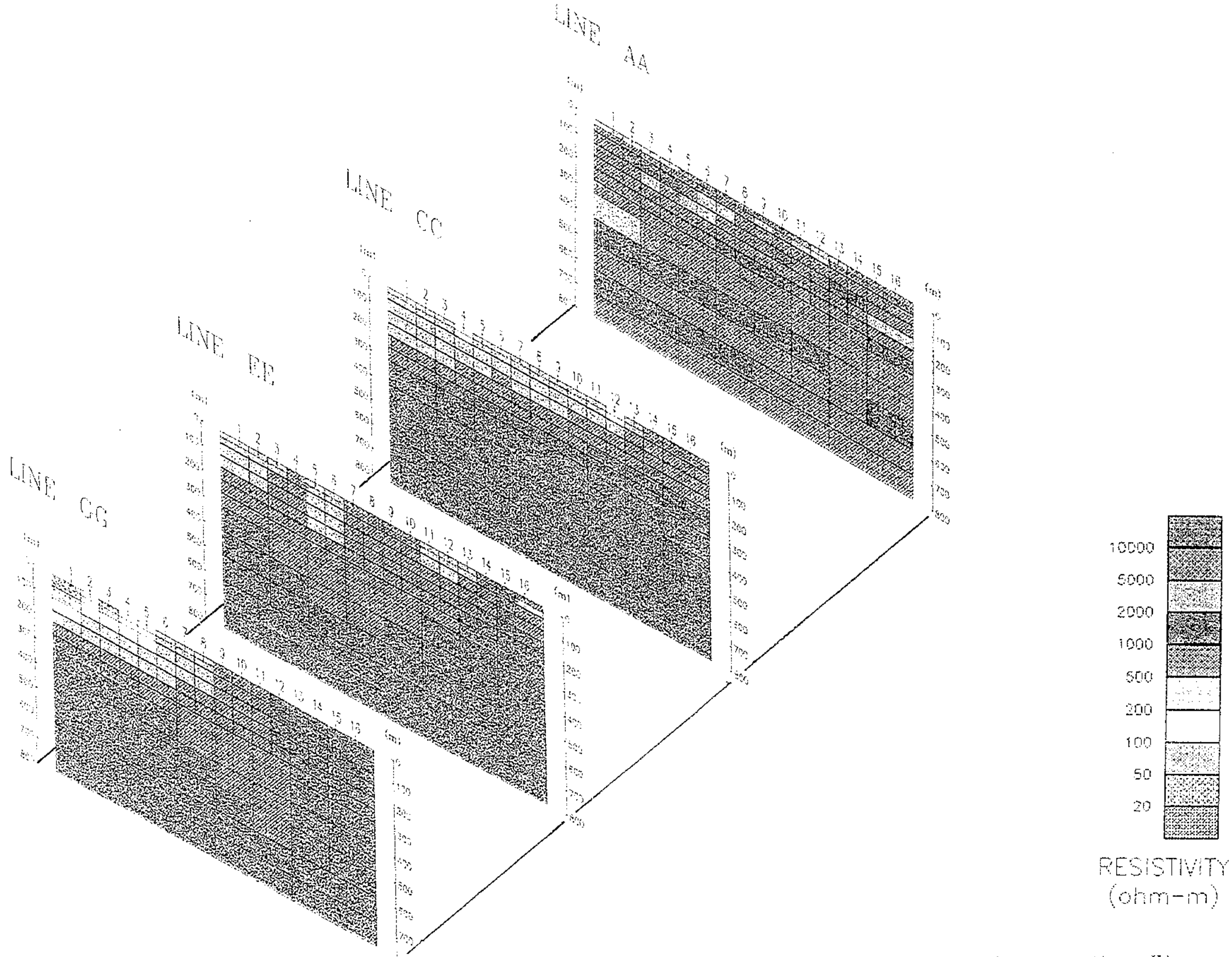

Fig. II-5-35 Panel diagram of 2-D Resistivity Structure (Area II)

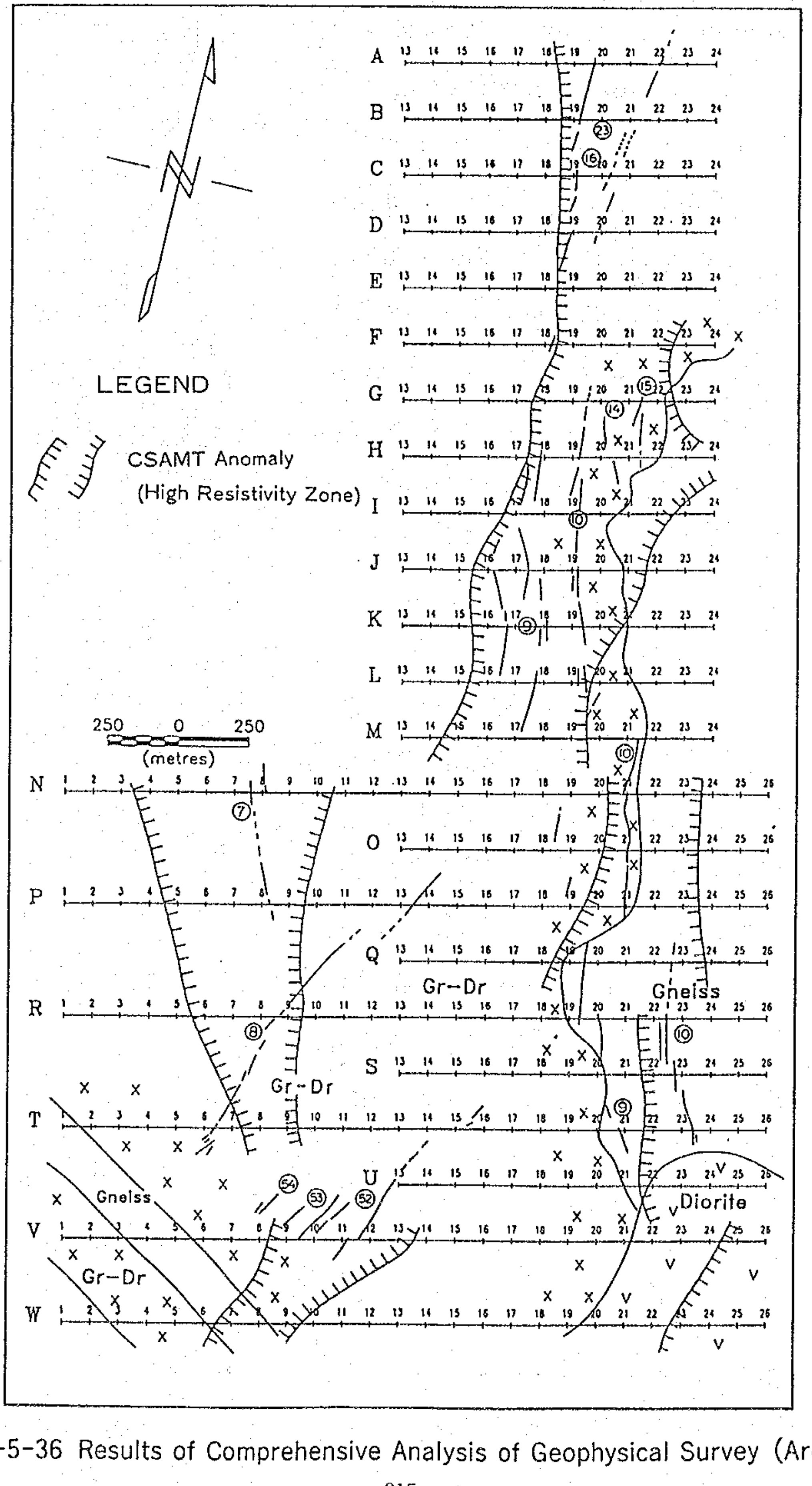

Fig. II-5-36 Results of Comprehensive Analysis of Geophysical Survey (Area I)

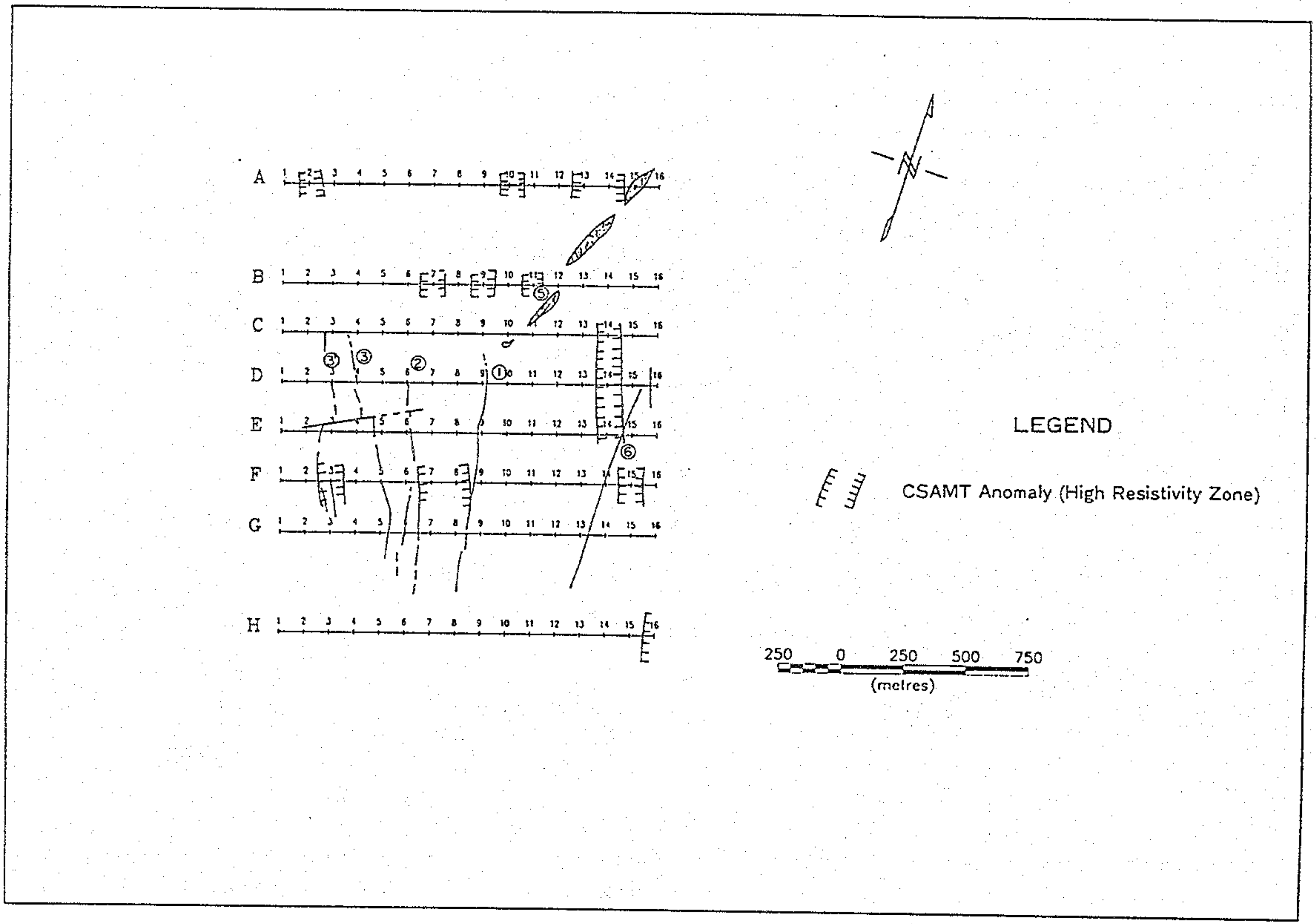

Fig. Ⅱ-5-37 Results of Comprehensive Analysis of Geophysical Survey (Area Ⅱ)

Although there is a similar resistivity structure in Area II, the resistivity values on the surface layer are 200 to 1,000 Ω·m which are lower than those of Area I.

According to the result of 1-D analysis, resistivity varied (a resistivity area which is slightly higher than that of surrounding points) in the place where quartz veins was gathered. In the depth no distinctive correspondence is noted between quartz vein and high resistivity layer; no abnormally low resistivity to suggest mineralization and alteration is noted, either.

Physical property test revealed high resistivity which were similar among granodiorite, gneiss, and quartz vein. Among them quartz vein indicate a slightly higher resistivity value. Resistivity values of drill core are higher compared with those of surface samples.

According to the drilling survey (MJMT - 2) conducted in Area II, in various depths up to approx. 250 m of granodiorite cracks caused by oxidation are developed, and slight alteration is noted in almost all the depths. Fault fracture zones are noted in eleven places. Alteration caused by argillization and clay vein accompanying these conditions also existed. However, their distribution is noted only at random, and no relation between such distribution and quartz vein is noted.

From the results of our measurement by Array CSAMT Method, physical property test, and 1-D/2-D analyses, the following points of evaluation were induced:

1) The distribution of resistivity in this area was found to have a strike of south to north direction reflecting the distribution of quartz vein.
2) Low resistivity noted on the subsurface of Area II was interpreted to reflect cracks and alteration caused by cracks.
3) High resistivity in the depth was considered to reflect the existence of more solid rocks compared with those existed in the subsurface layer.
4) The high resistivity area as analyzed on the subsurface and in the middle deep layers where quartz vein gathered may have reflected the distribution of quartz veins.
5) In some cases the second layer was analyzed as a high resistivity layer in the area where outcrop of quartz vein is recognized. It was presumed that in case granodiorite as wall rock were to be fresh in the middle and deep layers, then the contrast of resistivity between granodiorite and quartz vein would be smaller. Although careful consideration may be necessary to conclude that the high resistivity area in the middle and deep layers had some relationship with the existence of quartz vein, it may be pointed out that most of the positions where outcrop of quartz vein were confirmed on the land surface existed in the high resistivity area(a zone whose second layer was analyzed through 1-D analysis as a high resistivity layer of 5,000 Ω·m or more. See Fig. II-5-36.).

Part III Conclusion and Recommendation

Part III Conclusion and Recommendation

Chapter 1 Conclusion

The following conclusion is obtained from the present investigation results .

1) The geology of survey area consists of a) metamorphic rocks, b) biotite adamellite, c) two-mica granodiorite, d) diorite, and e) quartz porphyry f) lamprophyre. Item b) was intruded in Devonian period and item c) was intruded in Permian period and both serve as the host rock of quartz veins.

2) A quartz vein consists of tens of stripes and consists of the NNW-SSE system, NE-SW system, and E-W system. Veins predominant in mineralization and scale belong to the NNW-SSE system. In the case of the average of four veins among these veins, the vein width is 20 to 40 cm, the gold content is 6 to 22 g/t, and the length is 900 to 2,800 m. The extended distance of them is equal to the total length in which a single quartz vein continues while repeating expansion and contraction or being arranged like an echelon. The mineralization of every section in the single quartz vein greatly fluctuates.

3) Ore minerals include natural gold, chalcopyrite, galena, tetrahedrite, and moreover slight tellurium minerals (e.g. sulfide mineral and oxide mineral). They are closely related to each other. Their occurrence is like scattered points but a striped or banded structure is not recognized.

4) It is considered that mineralization relates to post-magmatism of two-mica granodiorite and it is controlled by a fissure system formed under a regional stress condition at that time.

5) The precipitation temperature of gold estimated from the homogenization temperature of fluid-inclusion is lower than a expected temperature.

6) As the result of drilling of two holes in this fiscal year (the vein Nos. 1 and 10 are purposed), no mineral symptom is detected except that a very small amount of sulfide minerals (galena and sphalerite) is confirmed in the west vein of the vein No. 10 at a position 150 m deep from the ground surface. However, judging from the characteristic of occurrence of ore minerals in this area, the possibility is also left that mineral symptom cannot be detected even in a mineralized zone by core samples.

7) The one-dimensional analysis plane in the geophysical survey (array-type CSAMT) shows a N-S resistivity structure harmonious with a major vein structure up to a depth of approx. 500 m. A high-resistivity zone in the structure may correspond to a zone of a quartz vein with a relatively high distribution frequency.

8) Potential cannot be evaluated only by the mineralization of the ground surface and the drilling results of two holes. However, as the result of calculating the amount of gold of five veins (Nos. 1, 2, 3, 6, and 10) with predominant mineralization (when assuming a length to the lower side of a vein as 150 m), the gold amount comes to 6.5 t.

Chapter 2 Recommendation for the Phase II

According to the investigation results in this fiscal year, the author proposes to apply drilling survey to the vein Nos. 1, 2, 3, and 10 whose mineralization is predominant on the ground surface. According to the drilling results in this fiscal year, purpose to confirm the continuity at a relatively shallow portion of each vein from the viewpoint that the mineral vein deposit in this area is a small-scale mineral deposit with a small continuity to the lower side of a mineral symptom portion. Survey will be performed for the high grade sections (blocks) under the following conditions in principle, interval between survey points: 100 m, number of holes at each point: 2 (holes), drifting depth:100 to 150 m/hole, and ore intersection depth: positions 50 m and 100 m deep from the ground surface. Evaluate mineral vein deposit through these surveys and study future development method and scale.

TableⅡ-6-1 Result of ore reserve(Au)calculation

No. of vein	Block range	Thickness (m)	Length (m)	Depth (m)	Volume (m^3)	Specific gravity	Weight (t)	Gold content (g/t)	Metal content (kg)	
1	No. 4 ～ 16	0.20	230	150	6,900	2.6 *	17,940	14.53	260.7	* same value with old east Germany
1	14 ～ 26	0.22	330	150	10,890	2.6	28,314	32.68	925.3	
1	27 ～ 30	0.25	90	150	3,375	2.6	8,775	5.70	50.0	
1	31 ～ 32	0.10	40	150	600	2.6	1,560	5.55	8.7	
	Sub total		690		21,765		56,589	22.00	1,244.7	
2	No. 36 ～ 53	0.29	440	150	19,140	2.6	49,764	8.21	408.6	
2	59 ～ 77	0.10	400	150	6,000	2.6	15,600	10.37	161.8	
2	80 ～ 81	0.10	80	150	1,200	2.6	3,120	376.90	1,175.9	
	Sub total		920		26,340		68,484	25.50	1,746.3	
3	No. 85 ～ 93	0.25	220	150	8,250	2.6	21,450	9.00	193.1	
3	119 ～130	0.21	260	150	8,190	2.6	21,294	17.58	374.3	
	Sub total		480		16,440		42,744	13.27	567.4	
6	No. 149～155	0.13	260	150	5,070	2.6	13,182	3.93	51.8	
6	158～163	0.28	150	150	6,300	2.6	16,380	4.07	66.7	
	Sub total		890		11,370		29,562	4.01	118.5	
10	No. 319～330	0.35	400	150	21,000	2.6	54,600	12.28	670.4	
10	348～352	0.40	200	150	12,000	2.6	31,200	12.86	401.2	
10	366～376	0.50	200	150	15,000	2.6	39,000	18.15	707.8	
10	377～382	0.45	110	150	7,425	2.6	19,305	56.75	1,095.6	
	Sub total		910		55,425		144,105	19.95	2,875.0	
	Total	0.225	3,890	150	131,340	2.6	341,484	19.19	6,551.9	

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Appendices

A-1 Microphotographs of thin section

Abbreviations of mineral names in the plate

Qz : quartz

Pl : plagioclase

Kf : potassinm feldspar

Bi : biotite

Ms : muscovite

Ho : hornblende

Au : augite

Hy : hypersthene

Ol : olivine

Cc : calcite

Ser : sericite

Chl : chlorite

Ep : epidote

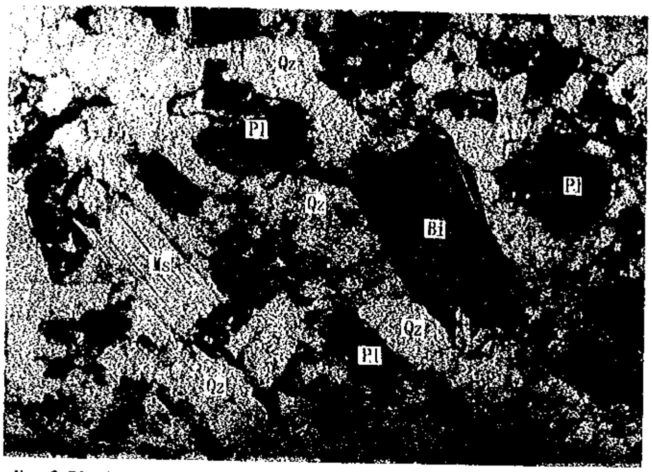
Gt : garnet

Sph : sphene

Apt : apatite

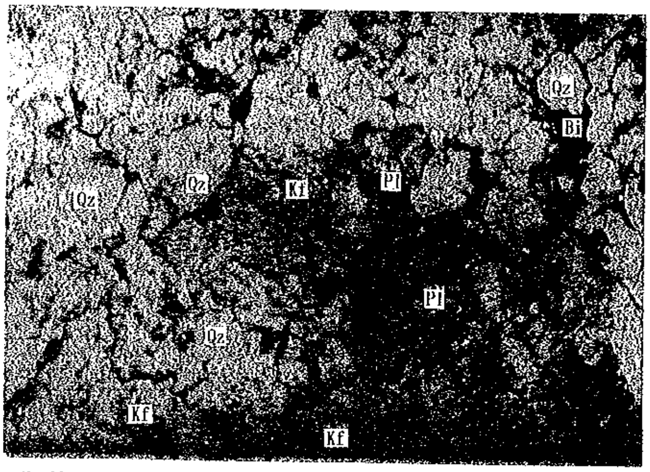
Opq : opaque mineral

A−1 Microphotographs of thin section



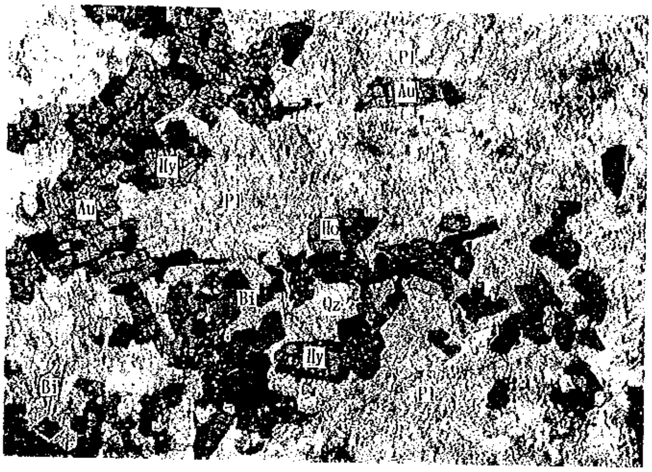
No. 8:Biotite-muscovite granodiorite Open nicol 1 mm
[GPS cordinate: 46° 8′ 11 N, 100° 9′ 42 E]

Cross nicol 1 mm



No. 32:Muscovitebearing biotite adamellite Open nicol 1 mm
[GPS cordinate: 46° 8′ 42 N, 100° 12′ 84 E]

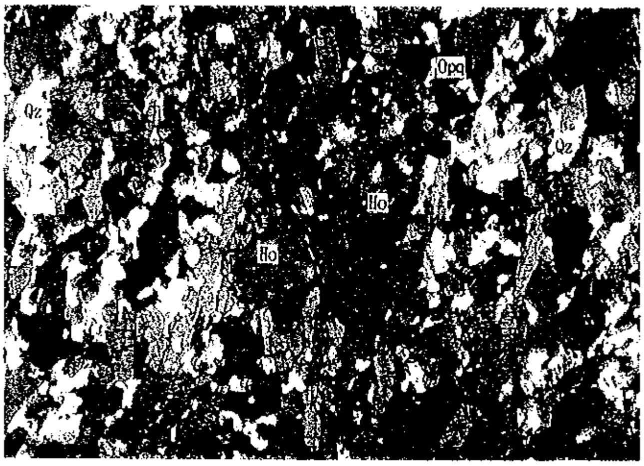
Cross nicol 1 mm

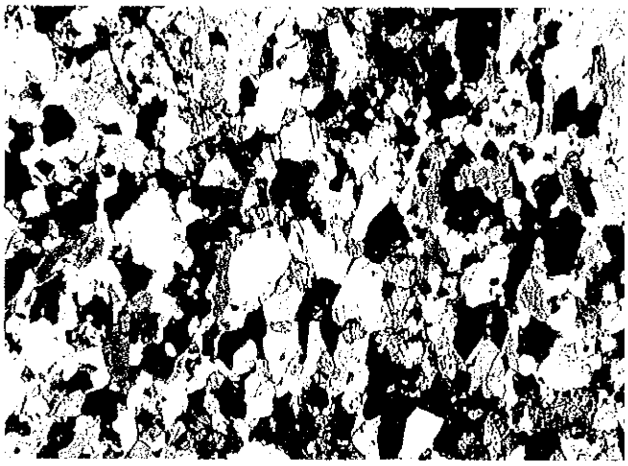


No. 22:Diorite Open nicol 1 mm
[GPS cordinate: 46° 6′ 61 N, 100° 12′ 22 E]

Cross nicol 1 mm

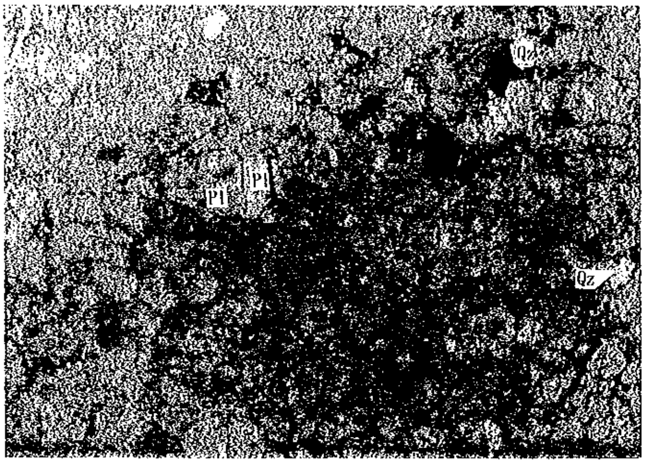
A-1 Microphotographs of thin section

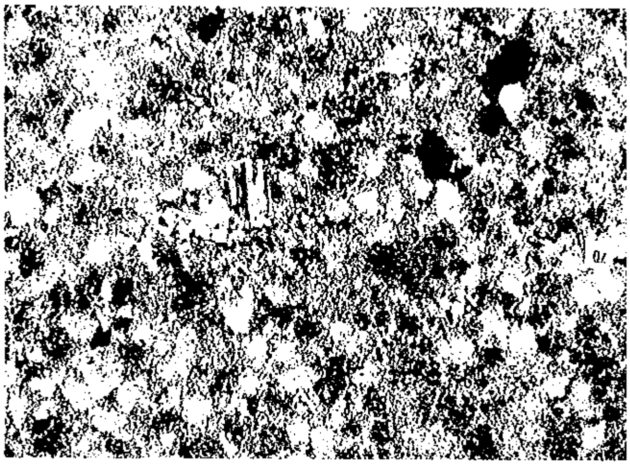




No. 45:Amphibolite Open nicol 1 mm
[GPS cordinate: 46° 8′ 51 N, 100° 6′ 43 E]

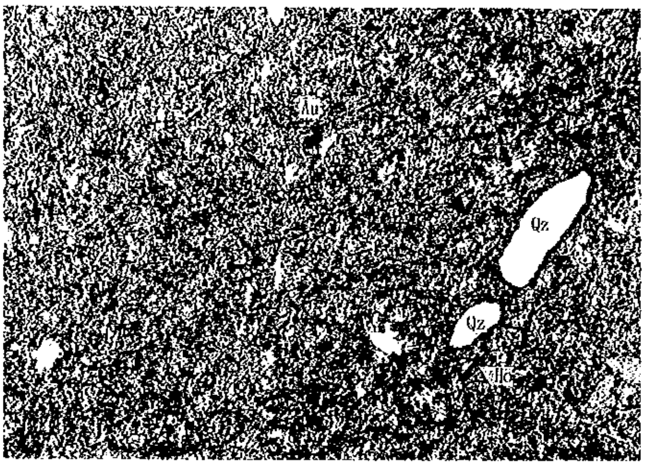
Cross nicol 1 mm

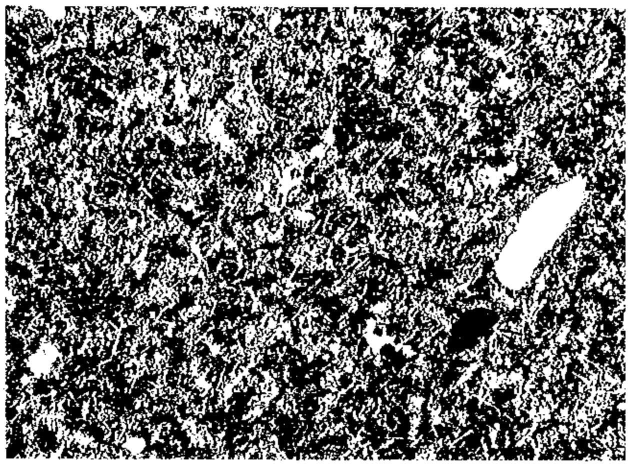




No. 24:Quartz potphyry Open nicol 1 mm
[GPS cordinate: 46° 7′ 27 N, 100° 11′ 04 E]

Cross nicol 1 mm

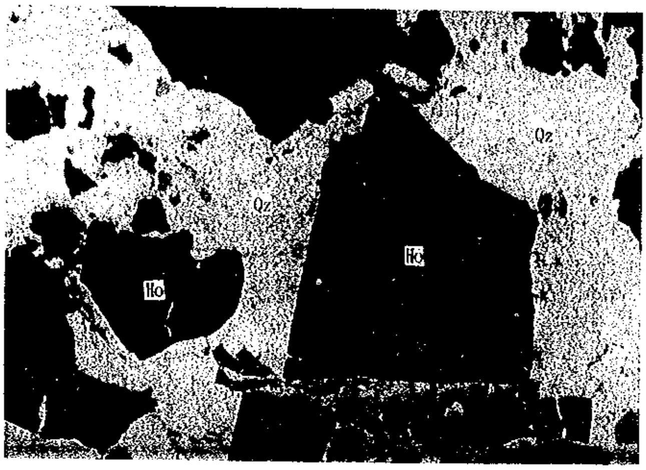




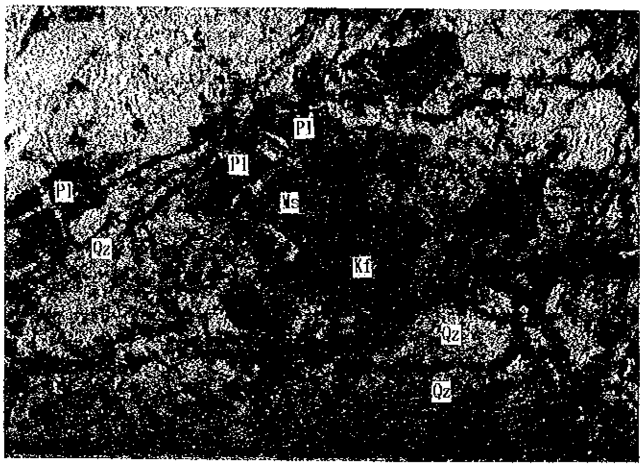
No. 27:Lamprophyre Open nicol 1 mm
[GPS cordinate: 46° 8′ 45 N, 100° 10′ 72 E]

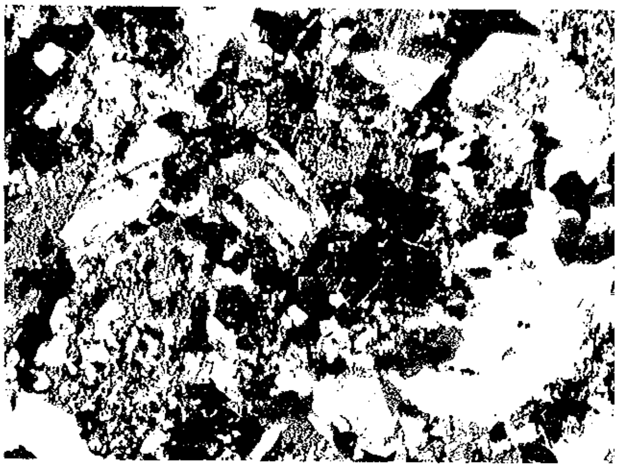
Cross nicol 1 mm

A-1 Microphotographs of thin section

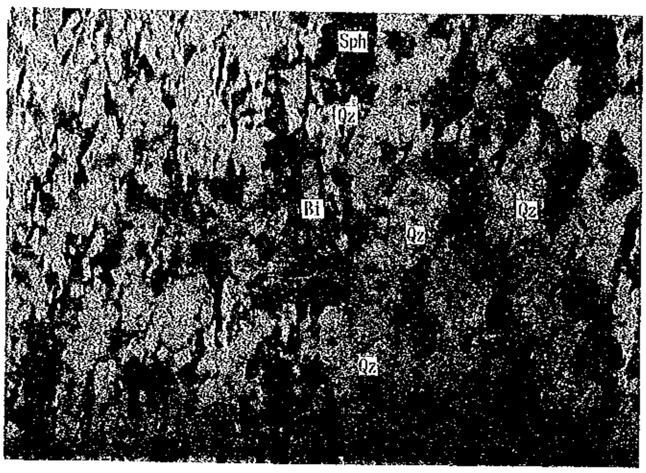


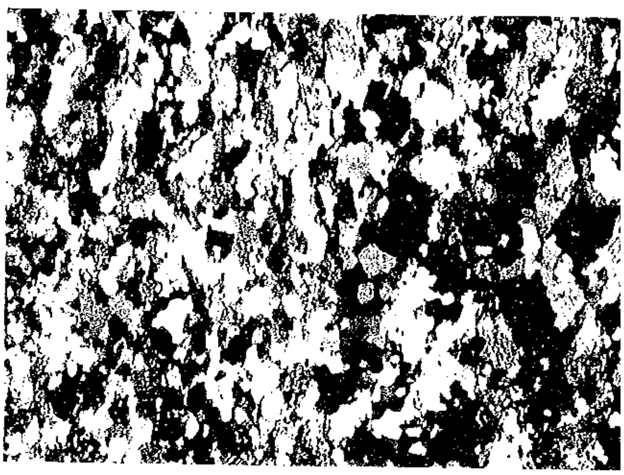
No. 7:Pegmatite dyke Open nicol 1 mm Cross nicol 1 mm
[GPS cordinate: 46° 8′ 43 N, 100° 6′ 04 E]





No. 3:No.5 Quartz vein Open nicol 1 mm Cross nicol 1 mm
altered vein, silicified granodiorite
[GPS cordinate: 46° 8′ 45 N, 100° 9′ 51 E]



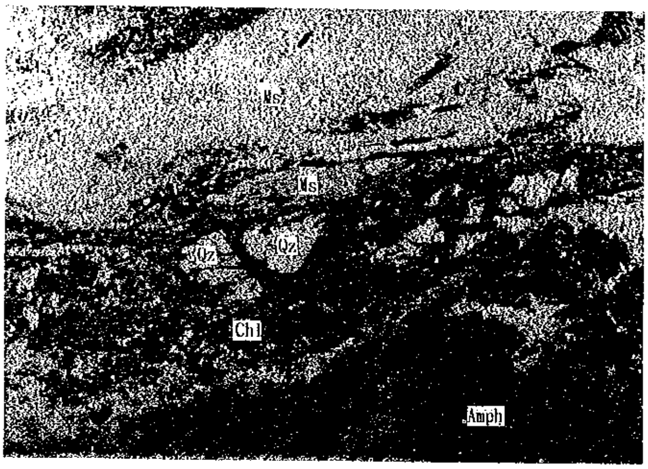


No. 38:Psammitic gneiss Open nicol 1 mm Cross nicol 1 mm
[GPS cordinate: 46° 6′ 07 N, 100° 11′ 47 E]

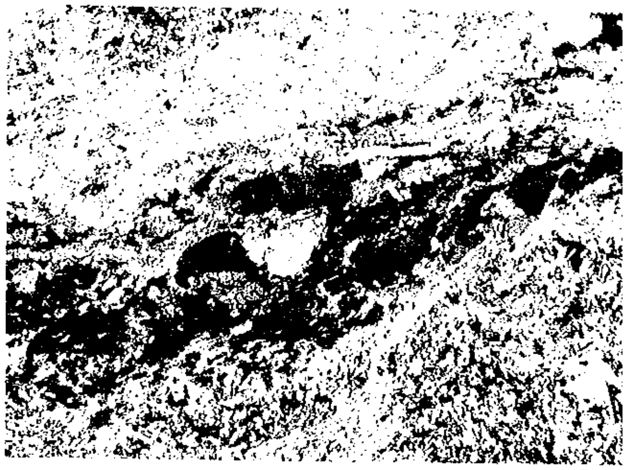
A-1 Microphotographs of thin section

No. 43:Crystalline limestone(Marble) Open nicol 1 mm
[GPS cordinate: 46° 7' 61 N, 100° 9' 14 E]

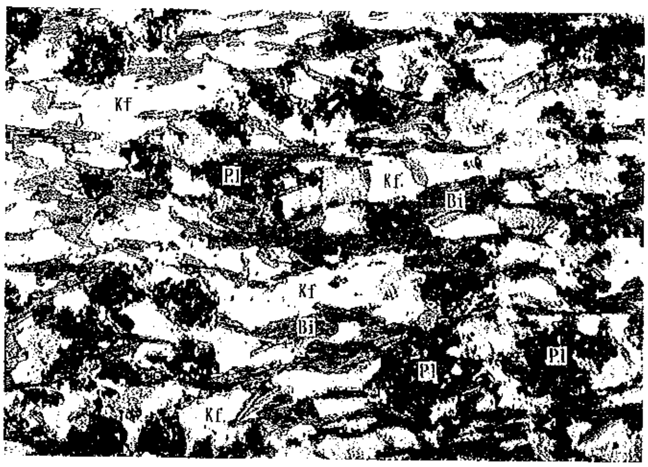
Cross nicol 1 mm



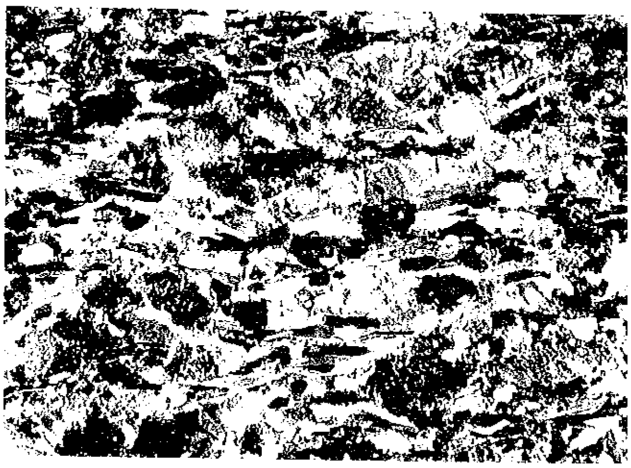
No. 46:Pelitic gneiss Open nicol 1 mm
[GPS cordinate: 46° 8' 44 N, 100° 6' 38 E]



Cross nicol 1 mm



Core No. 7: Tuffaceuos? gneiss Open nicol 1 mm
[MJMT-1. 229.0m]



Cross nicol 1 mm

A-2 Microphotographs of polished section

Abbreviations of mineral names in the plate

Au : native gold

Cp : chalcopyrite

Py : pyrite

Gn : galena

Sp : sphalerite

Tet : tetrahedrite

Alt : altaite

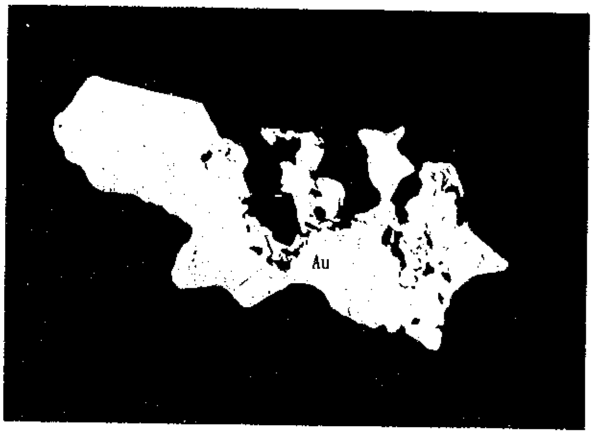
Cv : covelline

Go : goethite

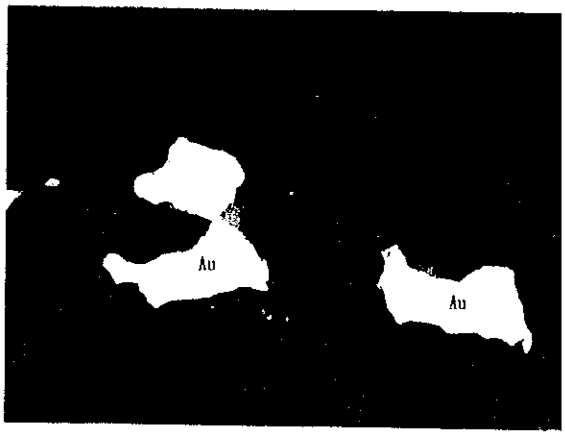
Tlo : unknown tellurium oxide

Tls : unknown tellurium sulphide

A-2 Microphotographs of polished section

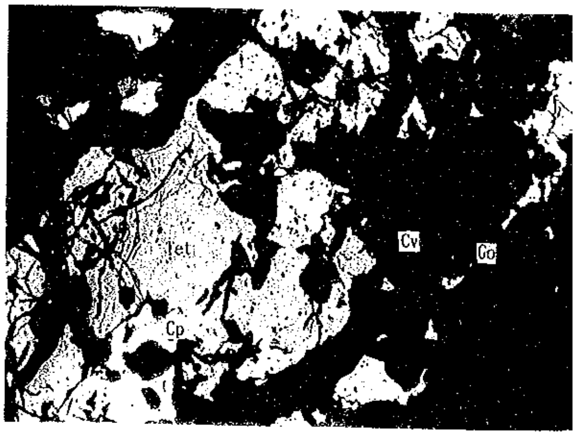


No. 13: No. 6 Quartz vein
[GPS cordinate: 46° 7′ 92 N, 100° 9′ 85 E]
0.2 mm

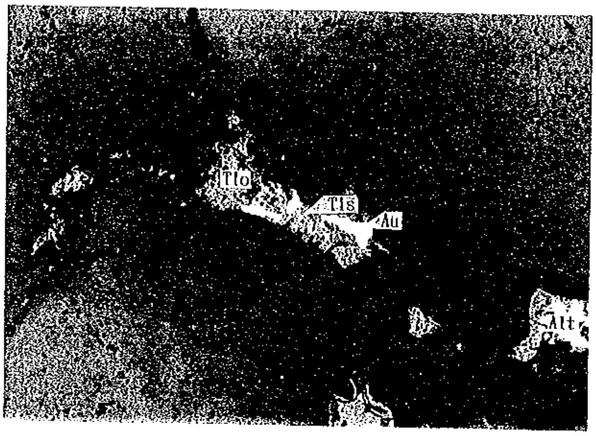


No. 19: No. 9 Quartzvein
[GPS cordinate: 46° 7′ 41 N, 100° 11′ 83 E]
0.1 mm

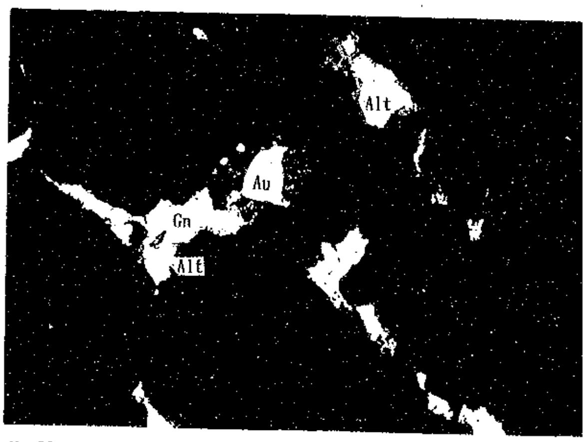
No. 3: No. 2 Quartzvein
[GPS cordinate: 46° 7′ 75 N, 100° 9′ 39 E]
0.2 mm



No. 7: No. 3 Quartzvein
[GPS cordinate: 46° 7′ 81 N, 100° 9′ 25 E]
0.2 mm



No. 21: None No. Quart zvein
[GPS cordinate: 46° 6′ 41 N, 100° 12′ 30 E]
0.2 mm



No. 22: No. 10 Quartz vein
[GPS cordinate: 46° 8′ 09 N, 100° 11′ 60 E]
0.2 mm