

CHAPTER 3 G BLOCK AREA

3-1 Location of the Survey Area

As shown in Fig. 2, G block is located in the eastern part of the project area, 40 km west from Matupa City.

3-2 Survey methods

During the Phase III, the following surveys were carried out within the G block area.

3-2-1 Geochemical survey

(1) Field survey

The Phase III soil geochemical survey was performed within 200m x 100m spacing grid and by using the same method adopted in the Phase II survey. A concomitant geological survey was also carried out in G block during the geochemical survey. Fig. II-3-1 shows the location of the soil geochemical survey.

(2) Sample collection and sample preparation

Geochemical sampling lines were arranged in the survey area as shown in Fig. II-3-4. The soil samples were taken from a depth of 1m that corresponds approximately to the bottom of the B-horizon. The approximate weight of soil samples was 1 Kg and the sample lists for soil and the respective description in field are shown in the Appendix 18. When necessary, the location of soil samples was determined by using pocket compass and GPS equipment.

Sample preparation was carried out at Intertek Testing Services (ITS) located in Luziania, Goias. The samples were initially crushed under 10 mesh size and after separation, they were milled under 150 mesh size.

(3) Chemical Analysis

The soil samples were analyzed for Au plus 17 elements considered to be related to the gold mineralization. The analyzed elements were Au, Ag, Cu, Pb, Zn, Fe, As, Sb, Hg, Bi, Cd, Co, Ni, V, Mn, Mo, K and W.

For the Au analysis, it was adopted a digestion method by F.A. and measured by ICP that has a detection limit of 1 ppb Au. For the analysis of the remaining elements of Ag, Cu, Pb, Zn, Fe, As, Sb, Hg, Bi, Cd, Co, Ni, V, Mn, Mo, K and W, it was adopted an Acqua regia digestion method and measured by ICP.

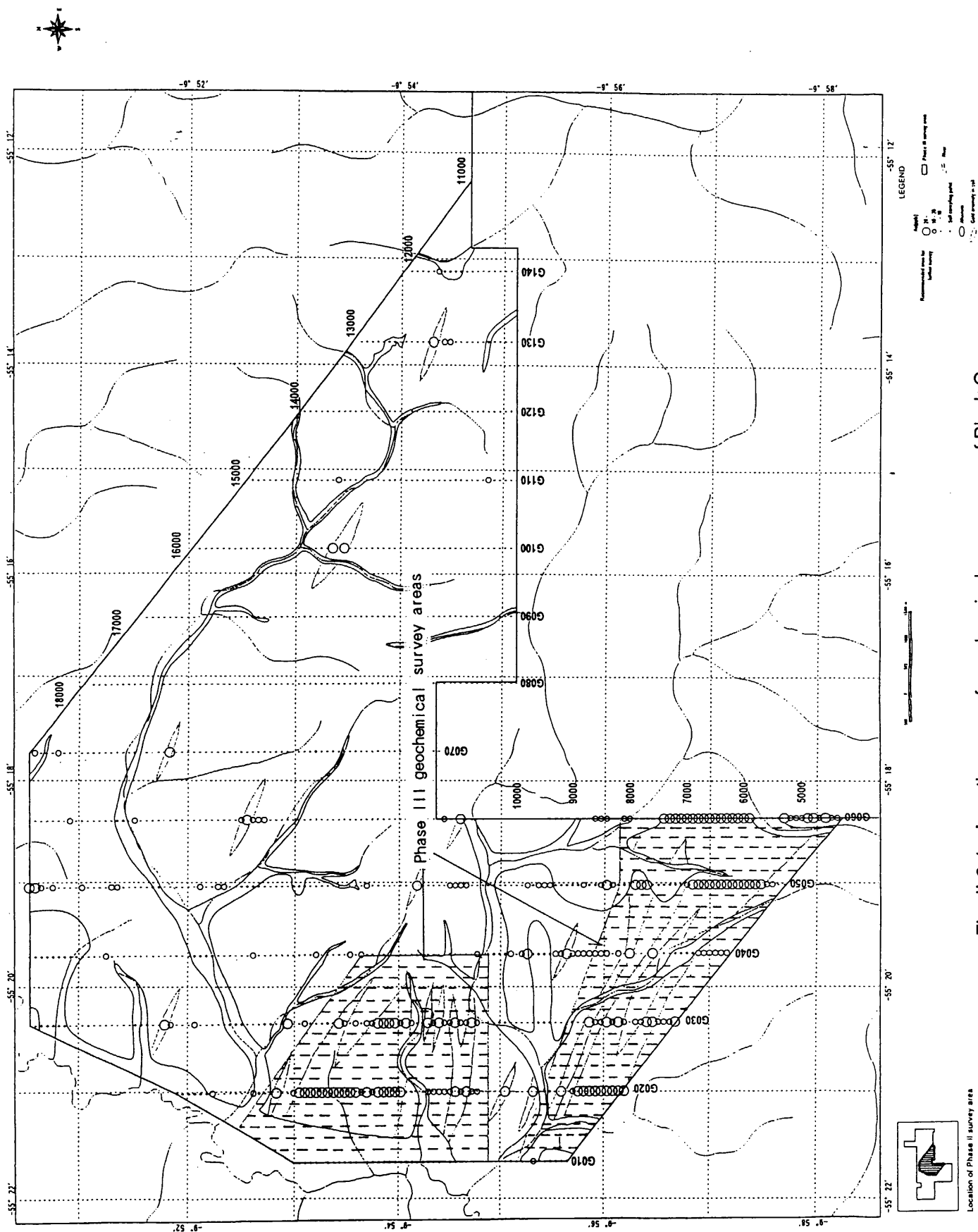


Fig. II-3-1 Location map of geochemical survey area of Block G

The chemical analyses were carried out at two laboratories located respectively in Canada and Japan. In Canada, the samples were analyzed at Intertek Testing Service (ITS), and in Japan, at Geolaboratory of Mitsubishi Material Natural Resources Development Corporation. The results of chemical analysis are shown in Appendices 18.

(4) Interpretation Methods

Excluding alluvial samples, the results from geochemical samples were also statistically analyzed, and their results are shown in the Appendices 20.

A half value of detection limit was used for samples indicating values of less than the detection limit. Based on statistical processing, computerized distribution maps were drawn for every element. The correlation matrices among the elements were also calculated and the Exploratory Data Analysis (EDA) method was applied to define the threshold values (anomalous values) for each element.

Factor analysis studies were also utilized for the processing of geochemical data, and the results are shown on computerized maps.

3-2-2 Drilling survey

A reverse circulation drilling (RC) program was conducted in G block in order to clarify the distribution of soil gold anomalies at depth by acquiring geological and tectonic information related to the gold mineralization. Three total coring drilling (DD) holes were also conducted to check the continuity in depth of the gold anomalies detected by RC.

(1) Drilling sites

Based on the distribution of soil gold anomalies detected on Phase III survey, a total of three RC drilling lines were planned as shown in Fig. II-3-9 and Fig. II-3-10. The distance between these parallel lines is 400m. The RC drilling sites located on these lines were spaced 50m. The DD drilling sites were located based on the observation of chips from RC drilling.

(2) Drilling survey method

A list of the drilling machine and equipments used in this survey is annexed on Appendix 8. A reverse circulation-drilling (RC) program was initially conducted and later a total coring drilling (DD).

(3) Sampling and Sample Preparation

1) RC drilling

Samples from RC drilling survey were collected every 2m intervals and with a weight of 2 Kg per

sample. Later, the collected sample was split in 2 samples of 1 Kg each, to send one of them to the laboratory and the other to Metamat.

2) DD drilling

The drilling cores were stored in wood boxes at METAMAT laboratory in Cuiaba. Core samples from DD drilling were taken at 1m spacing starting from the top until the bottom. The collected core samples were crushed to -10 mesh size and sent to the Lakefield Geosol laboratory. During the core description, test samples were taken for Thin Section, Polished Section, Fluid Inclusion and X-ray analyses.

3-2-3 Laboratory tests results

Laboratory tests samples were taken at DD drilling cores during the Phase III. These tests included thin section analysis, polished ore analysis, X-ray analysis, fluid inclusion analysis and chemical analysis of ore samples. Results of these tests are presented from Appendix 1 to Appendix 7 and from Appendix 12 to Appendix 17. The locations of the samples are shown on Plate II-3-1.

3-3 Geology

The Phase III geological survey was carried out along geochemical survey lines and the geology of the area can be described as follows:

(i) Stratigraphy

The geology of G block is composed from Middle Proterozoic Pre-Uatuma, Middle Proterozoic Uatuma Group, Dykes and Quaternary sediments. The Iri Formation and Teles Pires type granite represent the Uatuma Group. The geologic map and sketch of mineral showing is shown respectively on Fig.II-3-2 and Fig.II-3-3.

The Pre-Uatuma Granite is composed from gneissose granite and it is widely distributed in the G block area. The granite is fine to medium grained biotite granite that shows gneissose texture. Thin section analysis results (Appendix-1, sample A2404) showed alteration minerals as sericite, chlorite and epidote.

Iri Formation of the Uatuma Group is represented by altered andesite, intercepted by DD drilling MJBA-26.

The dikes are composed of diabase (Di) with many of them intercepted by DD drilling.

The Quaternary (Qa) consists mainly of alluvial deposits that are distributed in the rivers flat.

(ii) Geological structure

Shearing zones with WNW-ESE trends were confirmed in the western part of the area.

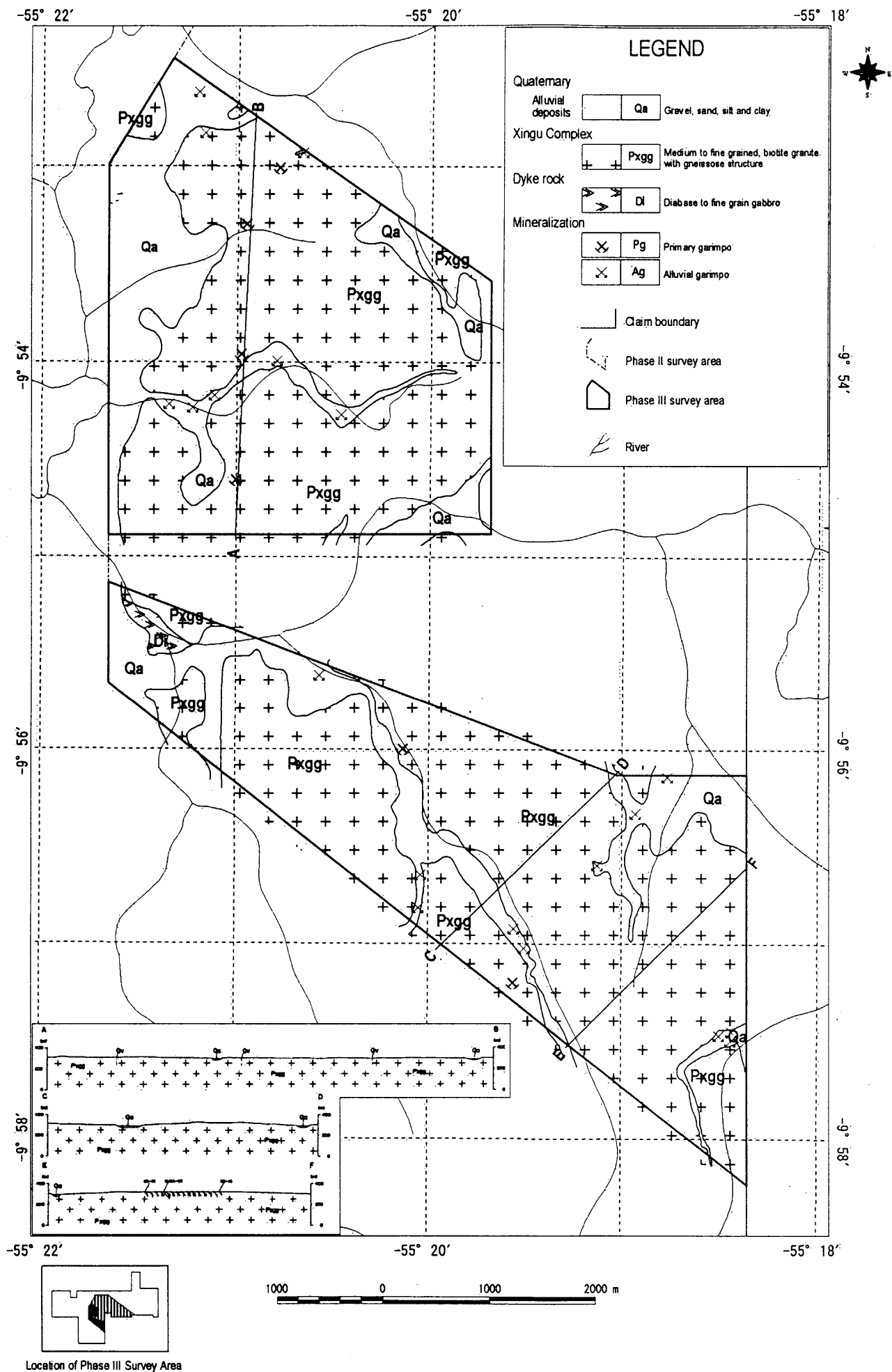


Fig. II-3-2 Geological map and cross section of Block G

(iii) Mineralization

During the Phase II and Phase III survey many gold garimpo were surveyed. The garimpo named Agostinho, located at southern part of G block, was surveyed during Phase III and its sketch is shown on the Fig. II-4-3. The garimpo has 200m lengths and its host rock consists of strongly weathered granitic rock. At the center of the pit, there is a fault with N20W direction and width of 30cm. The gold mineralization seems to be related to quartz veinlets oriented E-W. In the outcropped quartz veinlets, hematite and limonite were observed and sericite and kaolinite were locally observed.

(iv) Discussion

Geological survey results indicate that a NW-SE trending shearing zone is present in the G block area and some gold garimpos are intruded within the shearing zone.

Two big gold garimpo, named Luizao garimpo and Pezao garimpo, are observed in the area and located in the southeastern part and central part of G block, respectively.

The gold mineralization of garimpo Pezao is pyrite-disseminated ore type filling sheared granite and the ore analysis indicated gold values between 0.65 g/t and 35.71g/t and Cu between 0.34 % and 0.86%.

The garimpo Luizao is located within two mica granitic batholith with blastoporphyratic texture, presenting a strong K alteration and rich in fluorine. The batholith was strongly sheared, locally mylonitized, altered and associated with the shearing process. The ore is disseminated type with gold, pyrite, chalcopyrite and bornite, generally brecciated, sulphide rich and some shows quartz veins or veinlets filling shearing plane.

The Zanete garimpo is a single gold vein trending E-W direction in granitic rock and gold analysis of four quartz veins presented excellent gold values, between 28.73 g/t and 45.06g/t.

Garimpo Edmar presents also disseminated pyrite in silicified granite and gold anomalies of ore samples indicated values between 0.01 g/t and 60.45g/t.

3-4 Survey results

3-4-1 Geochemical Survey

(1) Background and Objectives

Detailed soil geochemical survey was carried out in G block in order to clarify the extension and distribution of the soil geochemical anomalies detected during the Phase II survey which indicated a broad zone of high potentiality for gold mineralization in G block.

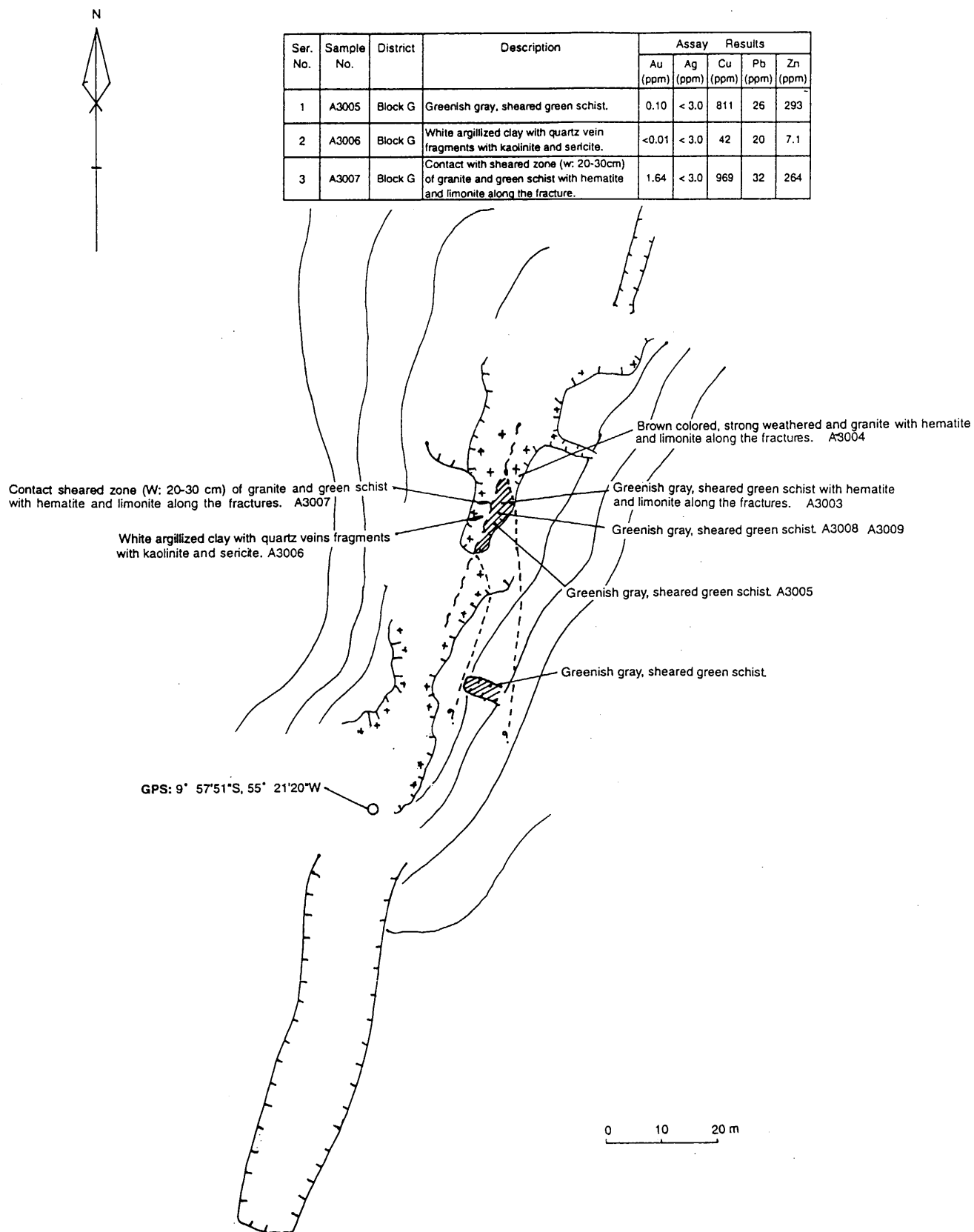


Fig. II-3-3 Sketch of mineral showing G6

(2) Survey area and Amounts

The area where the soil geochemical survey was located is shown in Fig. II-3-1. The total amount of soil samples was 1,127 samples. Their locations are shown in Fig. II-3-3 and Plate II-3-2 and their description indicated in Appendix 18.

(3) Results of statistical data treatment

The analytical data of collected soil samples are shown in Appendix 19 and their statistical data treatment are shown in Appendix 20.

Four elements (Ag, Sb, Cd, W and Mo) indicated values less than the detection limit for most of the samples.

Correlation coefficients were calculated in order to clarify the relation among elements. The elements showing high correlation coefficient (more than 0,500) are as follows:

Cu-Zn, Cu-Fe, Cu-V, Cu-Ni, Cu-Mn, Zn-Co, Zn-Ni, Zn-V, Zn-Mn,
Fe-Bi, Fe-V, Fe-Mn, Bi-V, Bi-Mn, Bi-Mo, Co-Ni, Ni-Mn

The only element showing correlation coefficient with Au was Cu which indicated a correlation of 0.279.

(4) Single element analysis

Based on the results of statistical data treatment, the threshold values were determined by cumulative frequencies, EDA methods and cumulative frequencies as shown in Appendix 38. The threshold values calculated are as follows.

Au : 20 ppb,	Ag : 0.2 ppm,	Cu : 50 ppm,	Pb : 53 ppm,
Zn : 41 ppm,	Fe : 7 %,	As : 20 ppm,	Sb : 2 ppm ,
Hg : 200 ppb,	Bi : 9 ppm,	Cd : none	Co : 10 ppm,
Ni : 32 ppm,	V : 300 ppm,	Mn : 440 ppm,	Mo : 9 ppm,
K : 0.51 %,	W : 10 ppm		

Anomalies of Au, Ag, Cu, Pb, Zn and V are compiled in Fig. II-3-5.

(a) Gold anomaly

An anomalous map for gold was elaborated by using threshold values of 20 ppb, 50ppb and 100ppb. The Fig II-3-5, which indicates soil gold anomalies, shows three broad concentration of gold anomalies in soil (threshold value of 20ppb) in the Northern, Southern and Southeastern part of the surveyed area.

(b) Others elements anomalies

An overlapping map with anomalies of Au+Cu+Pb+Zn+Ag+W is shown in Fig. II-3-6. From the

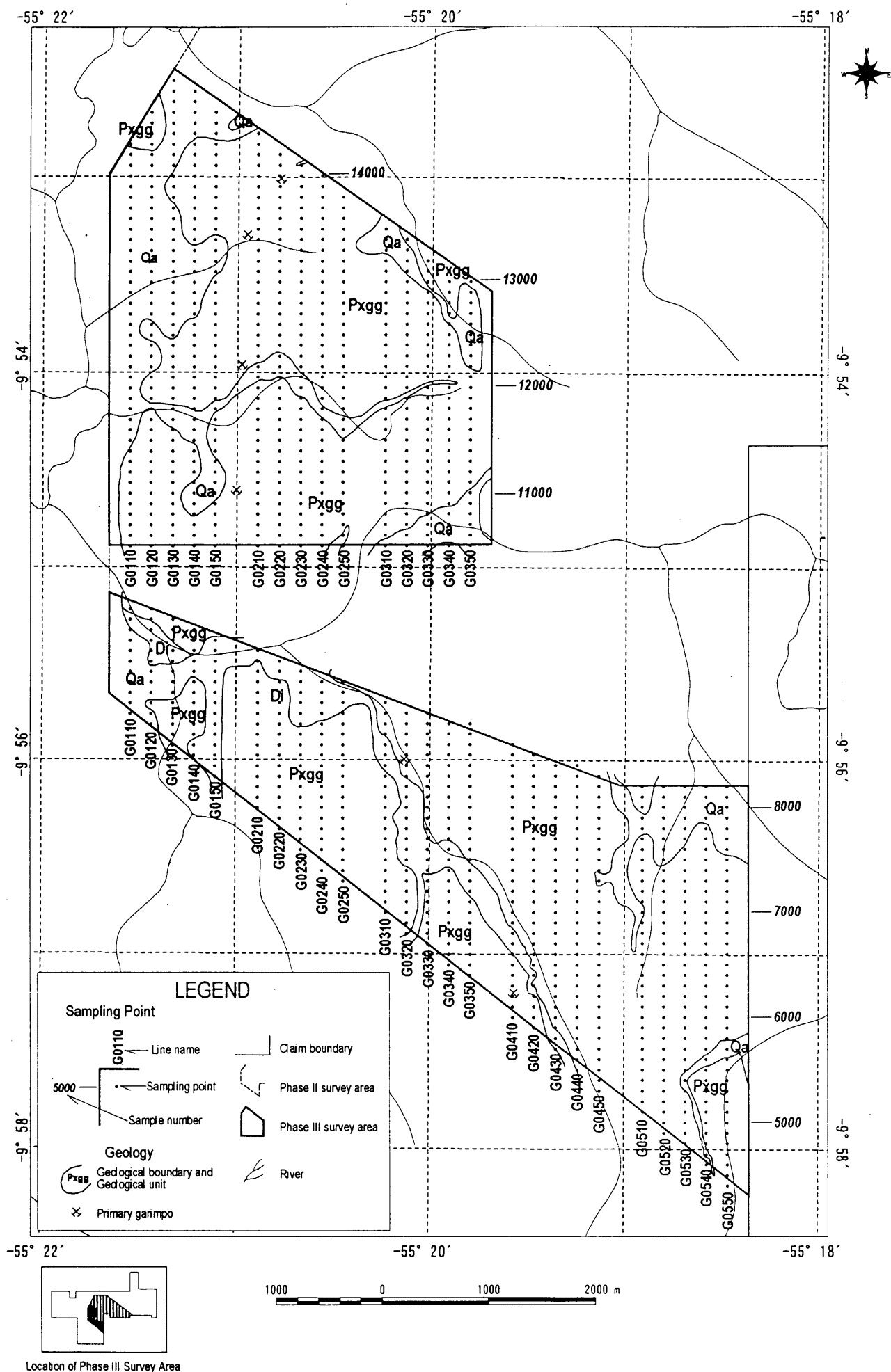


Fig. II-3-4 Location map of soil samples in Block G

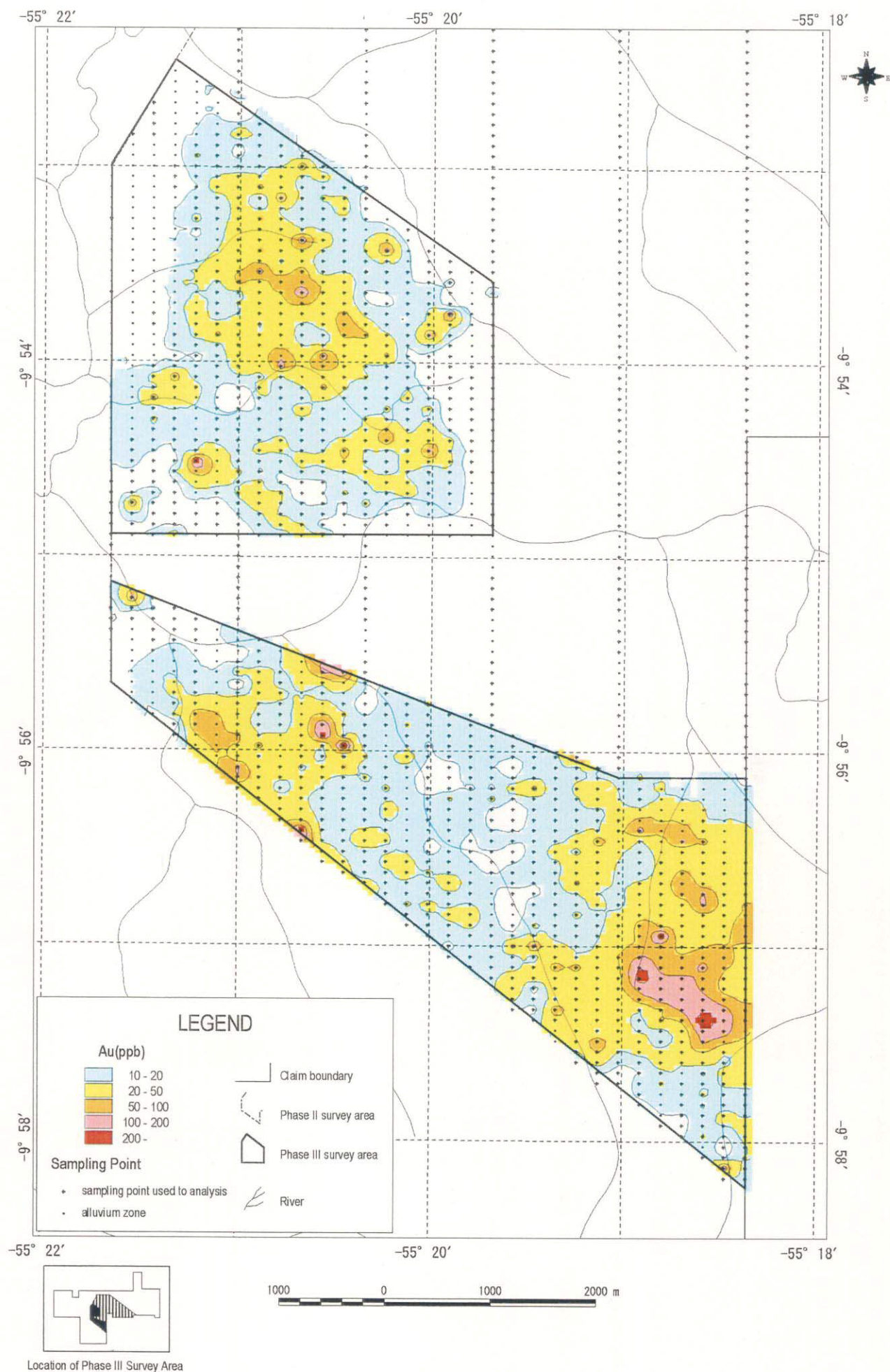


Fig. II-3-5 Distribution map of Au anomaly in Block G

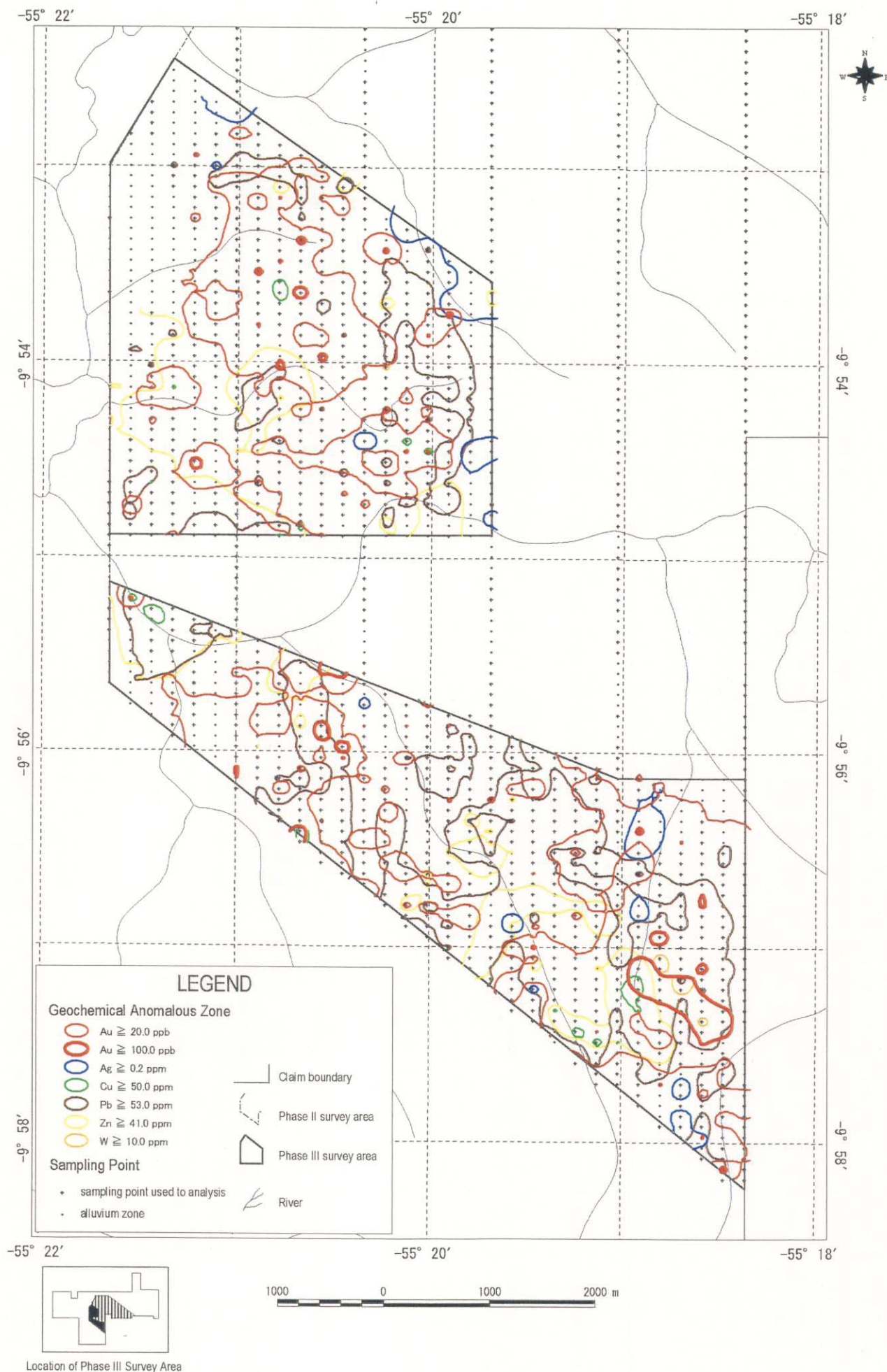


Fig. II-3-6 Distribution map of other element anomalies in Block G

overlapping anomalies map, it was inferred the following considerations:

- a) The anomaly of gold relatively overlaps the anomalies of Cu, Zn and W.
- b) Lower anomaly of copper with 22ppm overlap well with the anomalies of Au.
- c) The anomaly of Zn, Fe, Ni and Mn shows a circular distribution in the southeastern portion of G block.

(5) Multi element analysis

Factor analysis were examined by multi element analysis in G block. The results of factor analysis are given in Appendix 20. The following relationships between elements and factors were extracted by the factor analysis:

Factor 1 : Cu-V-(Pb)-Mn-Zn-Fe-Bi

Factor 2 : (Cu)-Co-Zn-Ni-Mn

Factor 3 : Bi-Mo

Factor 4 : Au-(Cu)

Among these factors, three factors: Factors 1, 2 and 4 were selected and a distribution map of factor score was prepared by allocating three different colors for each factor (Fig. II-3-7). Following colors show the three factors:

Factor 1 : blue Factor 2 : yellow Factor 4 :red

The distribution tendency of these factors can be summarized as follows:

Factor 1: This factor shows strong correlation of Cu- (Pb)-Zn-Fe-Bi-V-Mn. High factor scores are widely distributed in central western part and in the southeastern part it shows a circular form.

Factor 2: This factor shows strong correlation of (Cu)-Zn-Ni-Co-Mn. High factor scores are widely distributed in the central western part and southwestern part of block G.

Factor 4: This factor shows correlation of Cu and Au. High factor scores are distributed with NW-SE direction in the northern part.

(6) Discussion

The compiled map of block G (Fig. II-3-8) shows the results of the geological and geochemical surveys. The results of soil geochemical analysis are as follows.

The elements showing high correlation coefficient for Au were not detected and Cu shows low correlation coefficient for Au of 0.279.

By overlapping maps with anomalies of Au+Cu+Pb+Zn+Ag+W, it was inferred the following considerations:

- a) The anomaly of gold relatively overlaps with anomalies of Cu, Zn and W.
- b) Lower anomaly of copper with 22ppm overlaps well with anomalies of Au.

c) The anomaly of Zn, Fe, Ni and Mn shows a circular distribution in the southeastern portion of G block.

An anomalous map for gold was elaborated by using threshold values of 20 ppb, 50ppb and 100ppb. The Fig II-3-5 that indicates the soil gold anomaly, shows three broad concentration of gold anomalies in soil with threshold values of 20ppb in the Northern, Southern and Southeastern part of the surveyed area.

3-4-2 Drilling Survey

(1) Background and Objectives

A reverse circulation drilling (RC) program was conducted in G block in order to understand the distribution and the continuity in depth of gold mineralization detected by geochemical survey in the southeastern part of block G (Fig. II-3-5) by collecting geological and tectonic information related to the gold mineralization. A total coring drilling (DD) was later conducted to check the gold mineralization detected by RC.

(2) Survey areas and Amounts

(i) RC drilling

RC drilling survey was conducted in a large soil geochemical anomaly at the southeastern part of G block. A total of 3 drilling lines, named G1 line to G3 line, were located within the soil geochemical anomaly, as shown in the Fig. II-2-9 and Fig. II-2-10.

As indicated below, the total amount of survey consisted of 43 boreholes with a total drilling length of 2,150m.

Drilling line	Direction	Inclination (deg.)	Drilled Length
G1 Line (12 holes)	N45E	-50	600m
G2 Line (16 holes)	N45E	-50	800m
G3 Line (15 holes)	N45E	-50	750m
Total 43 holes			2,150m

(ii) DD drilling

DD drilling survey was conducted to check the continuity in depth of the gold anomalies detected by RC. The totals of boreholes were 3, numbered from MJBA-24 to MJBA-26, as shown in the Fig II-2-9 and in detail in the Fig II-2-10. As indicated below, the drilling length was 301.95m.

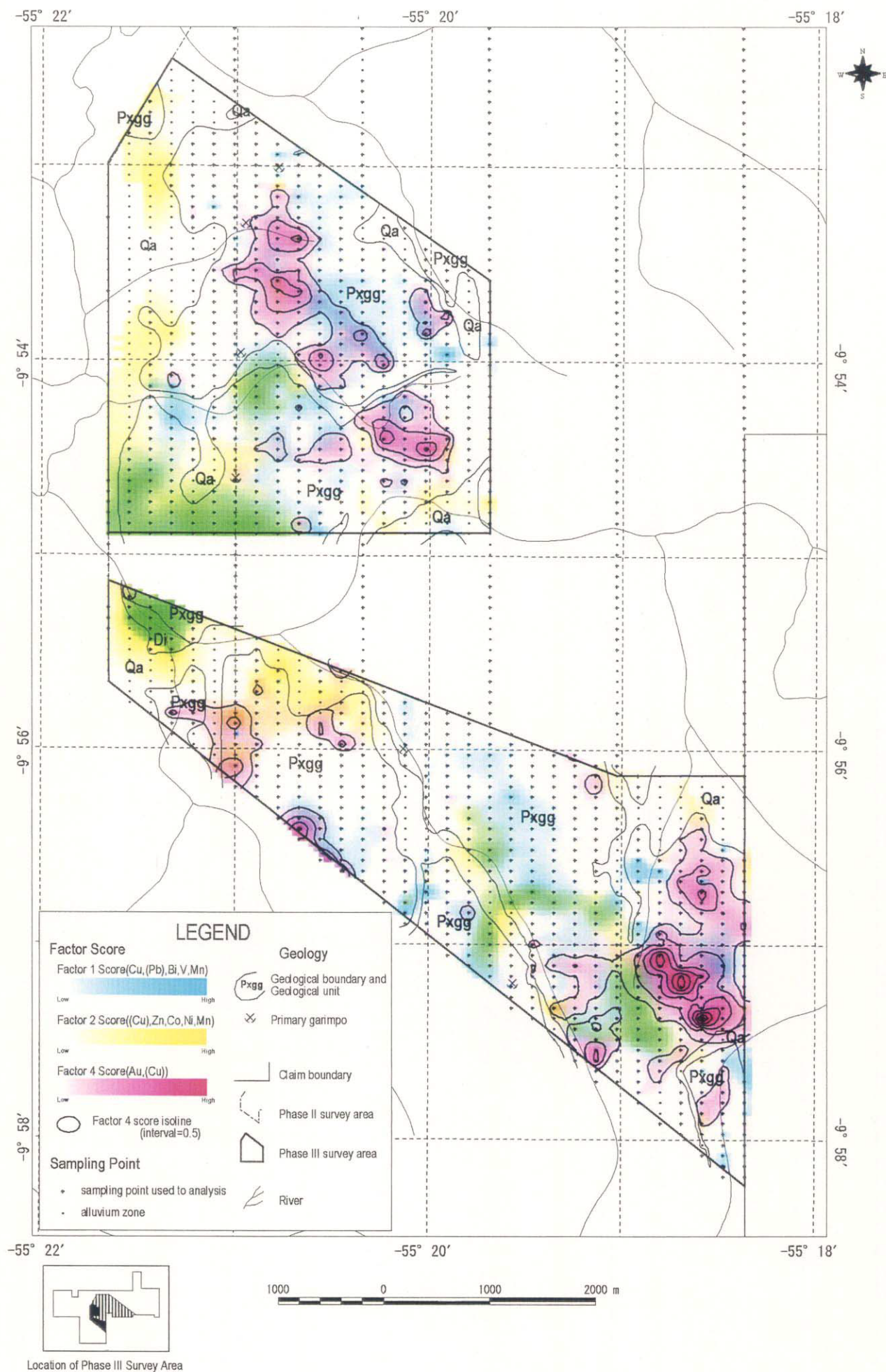


Fig. II-3-7 Distribution map of factor scores in Block G