

## CHAPTER 1 B BLOCK AREA

### 1-1 Location of the Survey Area

As shown in Fig. 2, the survey area is located at the northwestern part of the Alta Floresta region, approximately 20 Km north from Apiacas city. The Phase II survey was carried out in the B block area within a large area that presented concentration of gold anomalies of above 25 ppb in soil. Based on statistical calculations of soil geochemical data carried out during Phase I survey, the values above 25 ppb were considered to represent anomalous values.

### 1-2 Survey Methods

During the Phase II, the following surveys were carried out within a large soil gold anomaly recommended in Phase I:

- i) A semidetailed soil geochemical survey
- ii) Based on newly identified soil anomalies determined from i), a hand auger survey and some scout drillings were carried out.

#### 1-2-1 Geochemical survey

For this survey, both the semidetailed soil geochemical survey and the hand auger survey were considered as parts of the geochemical survey.

##### (1) Field survey

The Phase II survey was carried out within the B block area in a large area delineated by concentrations of gold anomalies in soil above 25 ppb, as shown in Fig.II-1-1.

The semidetailed geochemical soil survey was carried out by taking samples every 100m along lines spaced 200m.

The locations of hand auger survey lines were determined on the basis of the gold analytical results obtained from the semidetailed geochemical survey. The hand auger survey lines were set at varied intervals, however, the samplings were taken by digging holes of 6 m depth holes spaced 50m along the lines.

##### (2) Sample collection and sample preparation

As mentioned above, the soil samples spacing were based on a grid of 200m x 100m. The samples were taken from a depth of 1m because they represent approximately the bottom of the B-horizon. The soil samples weight about 1 Kg.

The average depth of hand auger holes was 6m. The samples were taken from the top to the bottom of the holes at intervals of 1m per sample. The Appendices 14 and 19 show the lists of the soil and

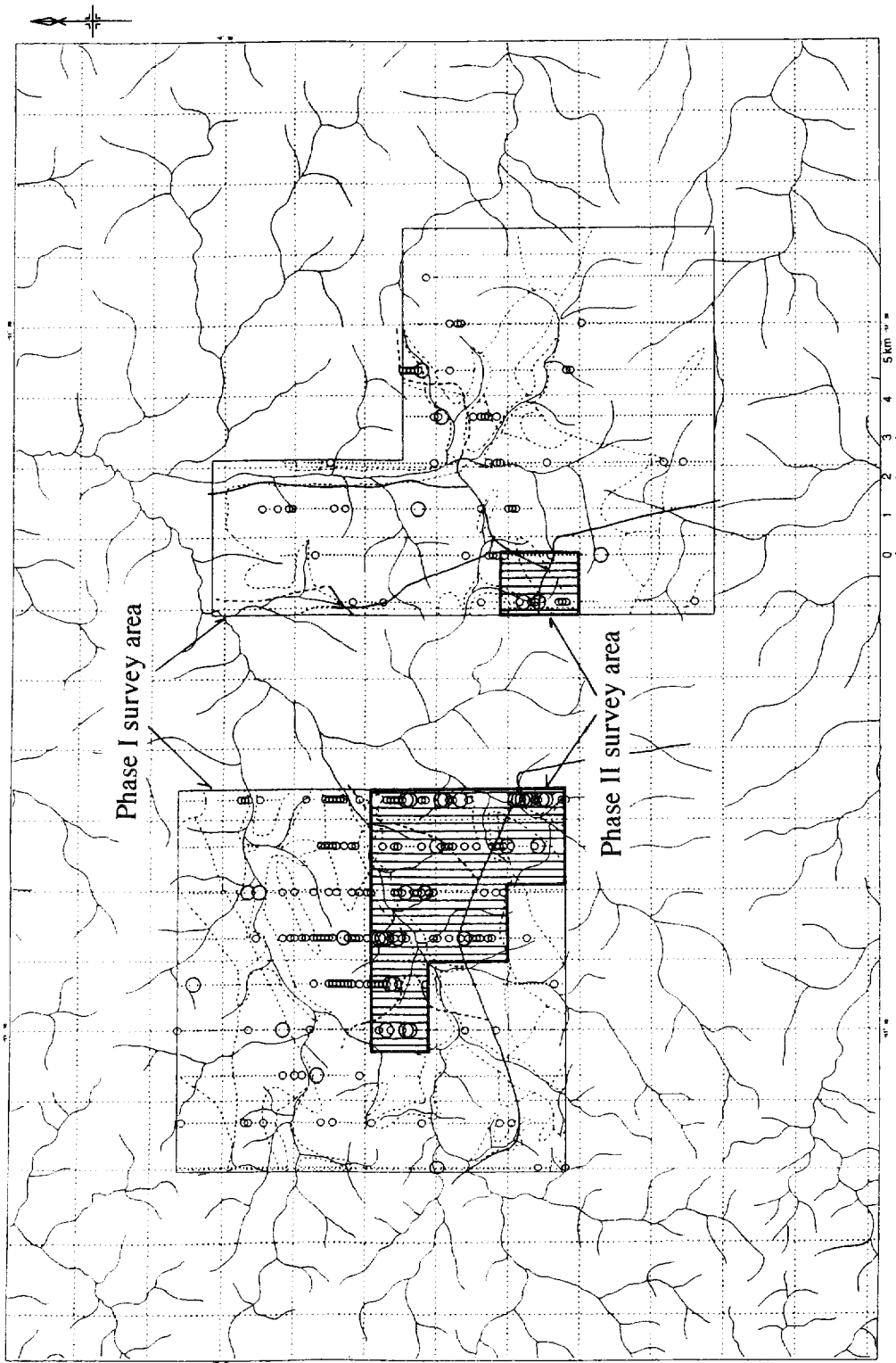


Fig. II-1-1 Geochemical survey area of Block B

hand auger samples including their descriptions in the field. When necessary, the location of soil samples and hand auger holes were determined by using pocket compass and GPS equipment.

Sample preparation was carried out at Intertek Testing Services (ITS) located in Luziania, Goias.

Before the sending of the samples to the laboratories, they were initially crushed under 10 mesh and after separation, they were milled under 150 mesh.

### **(3) Chemical Analysis**

The soil samples and hand auger 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 guarantee 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.

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.

For checking purposes, 100 samples were selected and they were reanalyzed by crosschecking in both laboratories. The results of chemical analysis are shown in Appendices 15 and 22, while the results from check analysis are shown in Appendix 15.

### **(4) Interpretation Methods**

Excluding alluvial samples, the results from geochemical samples were also statistically analyzed, and their results are shown in the Appendices 17 and 21.

A half value of detection limit was used for samples indicating values 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.

### **1-2-2 Drilling survey**

In order to acquire geologic and tectonic information at depth, a total coring drilling were conducted for Phase II scout drilling survey.

### **(1) Drilling sites**

The sites for drilling were defined based on Phase II soil geochemical survey results. The sequence of surveys, started with a semidetained soil geochemical survey within an area recommended in the Phase I survey. Later, a hand auger survey and a scout drilling survey were performed.

### **(2) Drilling survey method**

A list of the drilling machine and equipments used in this survey is annexed on Appendix 7. During the core description, test samples were taken for Thin Section, Polished Section and X-ray analyses. Core samples for chemical analysis were taken at 1m spacing from top to the bottom. The results of chemical analysis are annexed on Appendix 13, while the drilling core descriptions at 1:200 scale are annexed on Appendix 9. The drilling cores were stored in wood boxes and deposited at METAMAT laboratory in Cuiaba.

### **1-2-3 Laboratory tests results**

Laboratory tests samples were taken at several locations during the Phase II survey and their locations were plotted on their respective Location Maps annexed to this report. These tests included thin section analysis, polished ore analysis, X-ray analysis, fluid inclusion analysis, U-Pb method datation and chemical analysis of ore samples. Results of these tests are presented from Appendix 1 to Appendix 5.

## **1-3 Geology**

### **1-3-1 B block**

The B block area is located approximately at 20 Km Northwest from Apiacas city.

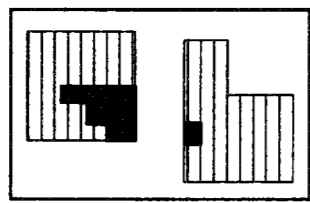
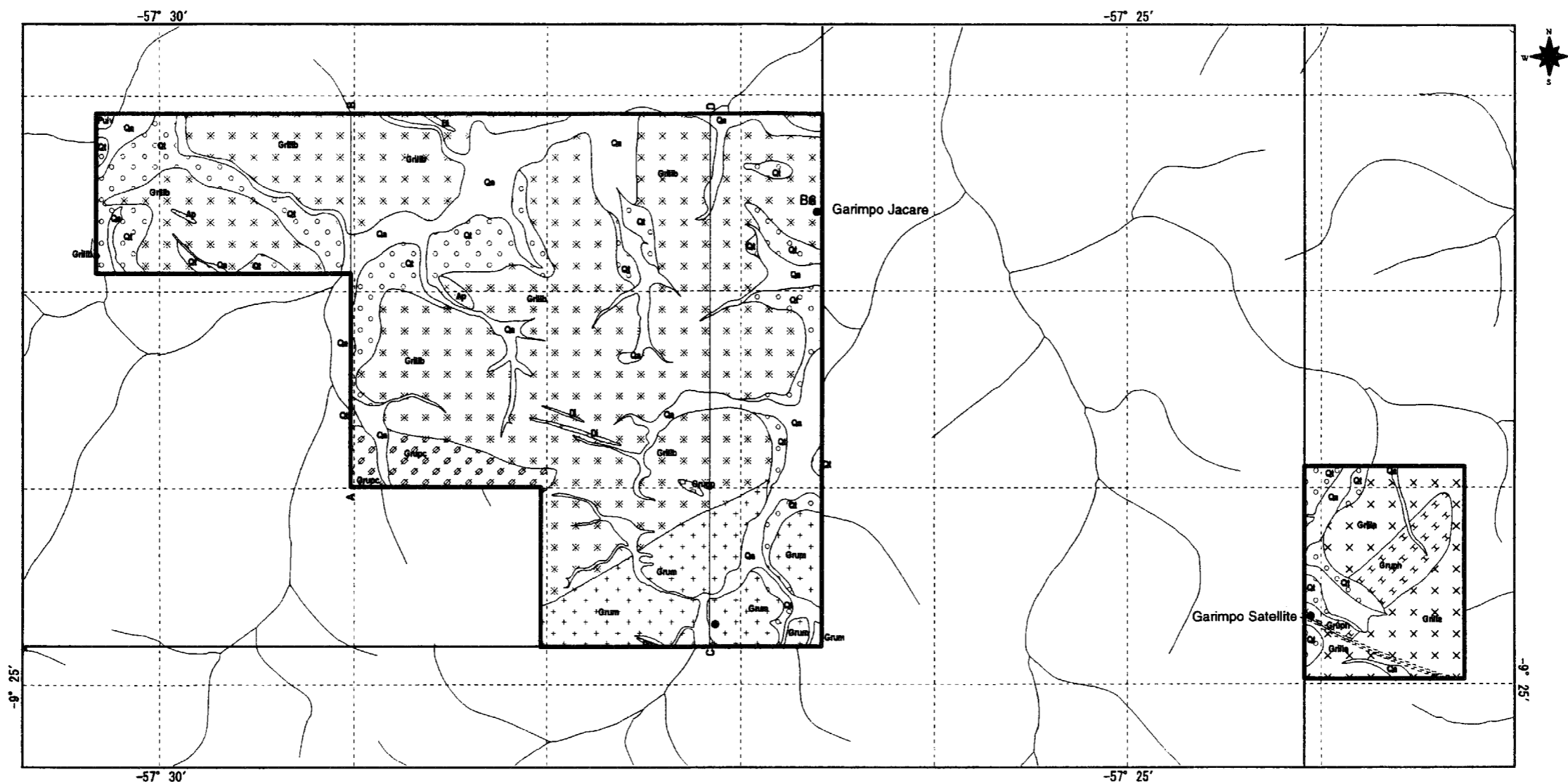
#### **(1) Geology**

The survey area included two areas located in the western and eastern part of the B block area. The geological map and geological profile are presented on Fig II-1-2.

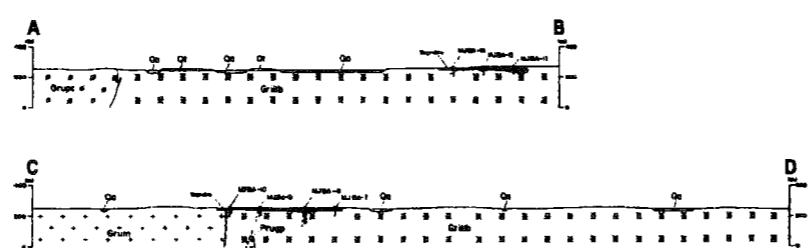
The geology of the area can be described as follows:

#### **(i) Stratigraphy**

The geology of B block is composed from Lower Proterozoic Pre-Uatuma Granite, Middle Proterozoic Uatuma Group, Dykes and Quaternary sediments. The Iri Formation and Teles Pires



Location of Phase II survey area



LEGEND

<b>Quaternary</b>			
Alluvial deposits	Ca	Gravels, sand, silt and clay.	
Terrace deposits	Ct	Gravels, sand, silt and clay.	
<b>Uatuma Group</b>			
Teles Pires Granite	Grupc	Coarse, pinkish, potassium feldspar porphyritic, granite porphyry like, biotite granite.	
	Grum	Medium grained, biotite granite.	
	Gruph	Coarse grained, quartz and potassium feldspar porphyritic, hornblende bearing biotite granodiorite.	
	Grupp	Biotite granite porphyry	
Ini Formation	Puv	Acidic volcanic rocks: biotite rhyolite and dacite.	
<b>Pre-Uatuma Granite</b>			
	Grlla	Medium grained, hornblende bearing biotite granite	
	Grllb	Medium grained, pinkish, potassium feldspar porphyritic, biotite granite.	
<b>Dyke rock</b>			
	Ap	Aprite to fine granite.	
	Di	Diabase.	
<b>Structure</b>			
		sheared zone.	
<b>Mineralization</b>			
	Pg	Primary garimpo.	
	Ag	Alluvial garimpo.	
		Claim boundary	
		Phase II survey area	
		River	

Fig. II-1-2 Geological map and cross section of Block B

Granite characterize the Uatuma Group.

① Pre-Uatuma Granite

The Granite is composed of hornblende bearing biotite granite (GriIIa) and biotite granite (GriIIb). The hornblende bearing biotite granite (GriIIa) is widely distributed in the western part of the survey area. The granite shows medium grains and includes feldspar, quartz, biotite and hornblende. According to the results of the microscopic observation (J2225 in Appendix 1), the granite shows granoblastic texture and includes alteration mineral as chlorite and epidote.

The biotite granite (GriIIb) is distributed widely in the central part of the survey area. The granite shows medium pinkish color and includes feldspar, quartz, biotite and hornblende. According to the microscopic observations of the sample (J2103), the granite shows weak cataclastic texture and includes alteration minerals of chlorite and epidote.

② Iri Formation

Iri Formation is distributed at the western part of the survey area and it is represented by acidic volcanic rocks (Puiv).

The acidic volcanic rocks (Puiv) consist of gray, rhyolitic lava, tuff breccia and tuff.

③ Teles Pires Granite

The Granite is composed of hornblende bearing biotite granite (Gruph), medium grained biotite granite (Grum), coarse grained biotite granite (Grupc) and granite porphyry (Grupg).

The hornblende bearing biotite granite (Gruph) is distributed in the eastern part of the survey area. The granite mainly includes medium grained feldspar, quartz and biotite and rarely hornblende. Porphyritic potassium feldspars and quartz occurs in the granite. The biotite is not recrystallized and segregated in the granite. By the microscopic observation (H1012), the granite shows equigranular texture and includes alteration minerals of chlorite and epidote.

The medium grained biotite granite (Grum) is distributed from central part to the southern part of the survey area. The small biotite gathering is recrystallized and segregated in the granite. From the microscopic observation (E2053), the granite shows equigranular texture and includes alteration minerals of sericite, chlorite and epidote.

The coarse-grained porphyritic biotite granite (Grupc) is distributed in the southwestern part of the survey area. The granite shows pinkish color and includes medium-grained feldspar, quartz and biotite. Microscopic observation at sample E2943 indicated an equigranular texture and includes alteration mineral of chlorite and epidote.

The granite porphyry (Grupg) is distributed in the central part of the survey. The granite shows white

color and includes porphyritic quartz. From the microscopic observations on sample E2052, the granite shows a porphyritic texture and includes alteration mineral of chlorite and epidote.

#### ④ Dykes

The dikes are composed of aplite (Ap) and diabase (Di).

The aplite is present in the northwestern part of the survey area and the diabase is present at the central part of the survey area. The dikes show in general an elongated structure along WNW-ESE direction.

#### ⑤ Quaternary

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

#### (ii) Geological structure

The shearing zones are the most important geological structure observed in the survey area and some of the primary gold garimpo are located inside these shearing structures. Examples of gold garimpo related to shearing structure are the Jacare garimpo and Satellite garimpo, both with a WNW-ESE shearing trend.

#### (iii) Mineralization

Gold alluvial garimpo are found widespread in the survey area, confirming the presence of a large alluvial gold mineralization in the survey area. The source of primary gold are thought to come from a disseminated or vein / veinlets types gold mineralization. Satellite garimpo located at southeastern side and Jacare garimpo located at northern side are examples of vein / veinlets type primary gold mineralization.

#### ① mineral showing B7

Mineral showing B7 is also named Jacare garimpo (Fig. II-1-3) and it is located at the northern side of the survey area. The gold mineralization is probably related to quartz veinlets and sheared planes within the shearing structure.

The host rock consists of a strongly weathered silicified biotite granite that presents chlorite as well as epidote alteration. The gold mineralized veinlets present a sub-vertical WNW-ESE trending and locally rich in limonite and goethite.

X-ray diffraction tests results from various samples (A2126 to A2141) are shown on Appendix 3. The tests detected alterations such as, silicic, sericite, chlorite, kaolin and calcite. Kaolin is interpreted as a weathering mineral.

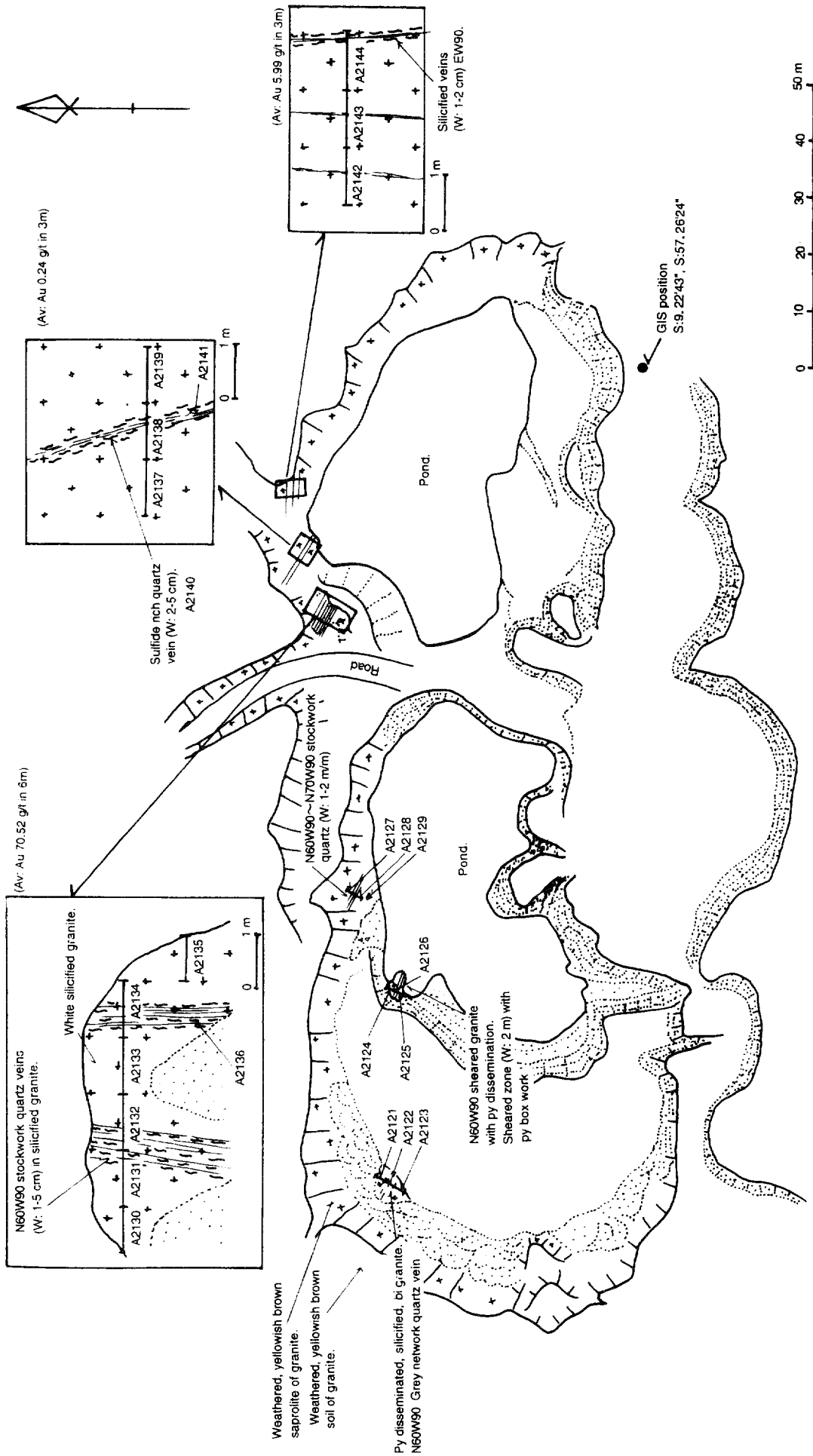


Fig. II-1-3 Sketch of Mineral showing B6 (Garimpo do Jacare)



Table II-1-1 Ore assay of Garimpo do Jacare in Block B

Ser. No.	Sample No.	Description	Assay Results									
			Au (ppm)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Fe (%)	As (ppm)	Bi (ppm)	Cd (ppm)	Mn (ppm)
1	A2121	argillized, oxidized rock Py dissemination (50 cm)	0.04	<0.2	21	257	54	0.78	4.7	1.7	<0.2	447
2	A2122	silicified, sheared rock with Py dissemination (20 cm)	0.44	<0.2	38	631	67	1.18	12.5	7.1	<0.2	1271
3	A2123	argillized, silicified rock with Py dissemination (50 cm)	0.27	<0.2	22	295	50	0.79	6.7	2	<0.2	446
4	A2124	sheared, silicified granite with Py dissemination (1m)	0.02	<0.2	33	224	107	0.84	5.7	2.3	<0.2	544
5	A2125	sheared, silicified granite with Py dissemination (1m)	0.08	<0.2	56	443	46	1.70	25.3	6.2	<0.2	720
6	A2126	spot sample of sheared, silicified granite with Py dissemination (20 cm x 20 cm x 10 cm)	0.12	<0.2	44	363	35	1.43	17.2	12.8	0.3	184
7	A2127	sheared, silicified granite with Py dissemination (1m)	1.64	<0.2	99	619	123	3.37	31.4	12.4	<0.2	1173
8	A2128	sheared, silicified granite with Py dissemination (1m)	0.59	<0.2	60	235	55	1.45	18.6	8.5	<0.2	336
9	A2129	float sample of quartz vein (20 cm x 30 cm x 30 cm)	0.01	0.7	3	10	6	0.37	<1	<0.2	<0.2	17
10	A2130	sheared, silicified granite with Py dissemination (1m)	0.02	<0.2	17	296	51	0.59	4	2.4	<0.2	555
11	A2131	sheared, silicified granite with Py dissemination (1m)	379.36	21.4	75	256	50	0.93	16	17.3	<0.2	352
12	A2132	sheared, silicified granite with Py dissemination (1m)	0.20	<0.2	56	664	119	1.58	18.3	9.8	<0.2	1121
13	A2133	sheared, silicified granite with Py dissemination (1m)	42.77	14.9	1584	492	393	9.62	157	139	0.8	204
14	A2134	sheared, silicified granite with Py dissemination (1m)	0.76	<0.2	21	301	165	0.81	5.7	1.1	<0.2	288
15	A2135	sheared, silicified granite with Py dissemination (1m)	0.01	<0.2	24	94	194	0.93	3	<0.2	<0.2	488
16	A2136	spot sample of goethite rich vein (10 cm x 10 cm x 30 cm)	1.13	1.1	319	830	181	4.08	64	45	0.3	702
17	A2137	sheared, silicified granite with Py dissemination (1m)	0.03	<0.2	36	493	227	1.12	5.2	6.5	<0.2	613
18	A2138	sheared, silicified granite with Py dissemination (1m)	0.66	0.9	760	844	510	10.00	114	102	<0.2	863
19	A2139	sheared, silicified granite with Py dissemination (1m)	0.02	<0.2	19	467	275	0.99	2.5	1.1	<0.2	941
21	A2140	spot sample of sulphide rich quartz vein (10 cm x 10 cm x 30 cm)	1.30	6.9	923	499	167	10.00	181	142	<0.2	30
22	A2142	sheared, silicified granite with Py dissemination, including silicified vein (1m)	0.02	<0.2	28	404	108	1.07	4	5.5	<0.2	1308
23	A2143	sheared, silicified granite with Py dissemination, including silicified vein (1m)	1.49	0.6	85	144	137	1.68	20.4	10.3	<0.2	192
24	A2144	sheared, silicified granite with Py dissemination, including silicified vein (1m)	16.46	4.4	93	524	147	2.47	25	36	<0.2	813

The results of ore analysis are listed on Table II-1-1 and Appendix 6. Analysis of the ore samples, numbered from A2121 to A2144, taken from this mineral showing indicated innumerable samples with high gold contents with a maximum value of 379.36 g/t of Au. Also, a 6m wide channel sampling presented an average grade of 70.52g/t Au and 6.05g/t Ag. The analytical results also indicated that the contents of bismuth roughly follow the gold values.

Results of fluid inclusions on Appendix 5, indicate that an average for homogenization temperatures ranges between 225.3°C and 232.3°C and for the salinity, between 8.8% and 9%.

## ② Others

Some of the quartz veins samples taken at random during the geochemical survey presented anomalous gold contents as listed on the Appendix 6.

Quartz veins sample taken at the site B06403200 and named as E2041 showed gold content of 1.45g/t. The sampling site showed a strong silicification and a shearing along a WNW-ESE direction.

## (2) Discussion

The geology of block B is composed of Lower Proterozoic Pre-Uatuma Granite, Middle Proterozoic Uatuma Group, Dykes and Quaternary sediments. The Iri Formation and Teles Pires Granite represent the Uatuma Group.

The shearing zones are the most important geological structure observed in the survey area and some of the primary gold garimpo are located inside these shearing zones. One of them is the Jacare garimpo with a gold mineralization related to quartz veinlets and shearing planes. The results of gold analysis presented innumerable samples with high gold contents and with a maximum value of 379.36 g/t of Au. Also, a 6m wide channel sampling presented an average grade of 70.52g/t Au and 6.05g/t Ag.

### 1-3-2 Area South of B block

This area is located to the west of Apiacas City at a distance of approximately 20Km, as shown on the Fig.2 and on the Landsat TM image indicated in the Fig II-1-4.

#### (1) Geology

The geological map and geological profile is presented on Fig II-1-5.

##### (i) Stratigraphy

The geology of the area to the south of B block consists of Lower Proterozoic Pre-Uatuma granite, Middle Proterozoic Uatuma Group granite, Dykes and Quaternary sediments.

#### ① Pre-Uatuma Granite

The Granite is composed of hornblende bearing biotite granite (GriIIa) and biotite granite (GriIIb). The hornblende bearing biotite granite (GriIIa) is widely distributed in the northern part of the survey area. The granite shows medium grains and includes feldspar, quartz, biotite and hornblende and locally presents large porphyry feldspar.

The biotite granite (GriIIb) is distributed widely in the southern part of the survey area. The granite shows medium pinkish color and includes feldspar, quartz, biotite and hornblende. From microscopic observation of the sample (J2103), it can be said that the granite shows weak cataclastic texture and includes alteration minerals of chlorite and epidote.

#### ② Iri Formation

Acidic volcanic rocks (Puiv) from Iri Formation are distributed at the western part of the survey area. The acidic volcanic rocks (Puiv) consist of gray, rhyolitic lava, tuff breccia and tuff.

#### ③ Teles Pires Granite

The Granite is composed of hornblende bearing biotite granite (Gruph), medium grained porphyritic biotite granite (Grupm) and granite porphyry (Grupg).

The hornblende bearing biotite granite (Gruph) is distributed in the eastern part of the survey area. The granite mainly includes medium grained feldspar, quartz and biotite and rarely hornblende. Porphyritic potassium feldspars and quartz occur in the granite. According to the microscopic observation (A2505), the granite shows equigranular texture and includes alteration mineral of sericite.

Medium grained porphyritic biotite granite (Grupm) is distributed in the central part of the survey area. The granite shows pinkish color and heterogeneous and includes medium grained feldspar, quartz and biotite. Microscopic observation on the sample (A2517) indicates that the granite shows alteration mineral of chlorite and silicification and dissemination of pyrite.

The granite porphyry (Grupg) is distributed in the northern end of the survey area. The granite shows whitish color and includes porphyritic quartz. Microscopic observation on sample E2052 indicates that the granite shows a porphyritic texture and includes alteration mineral of chlorite.

#### ④ Dykes

The dikes are composed of hornblende gabbro (Gb) and diabase (Di).

The hornblende gabbro and diabase are present mostly in the southeastern part of the survey area. They are also present at the northwestern and northeastern part of the survey area.

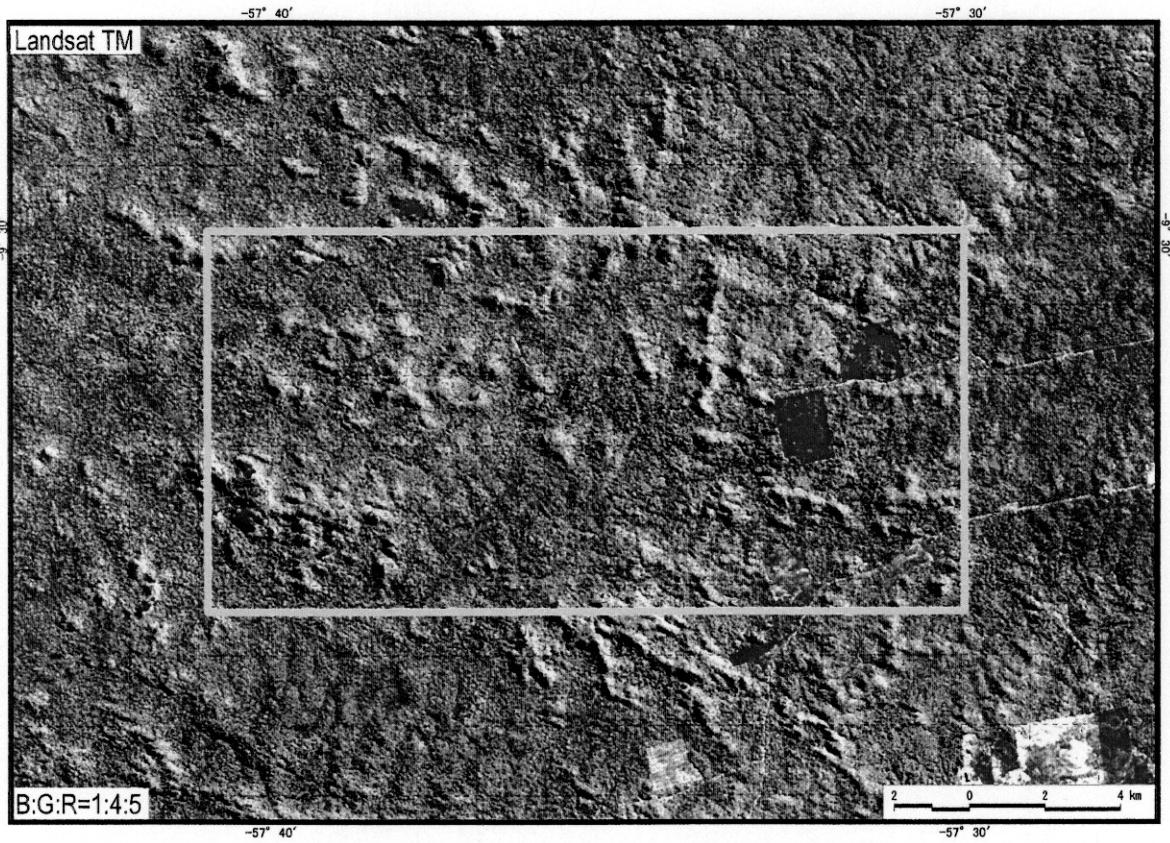


Fig. II-1-4 Geological survey area of Block B South

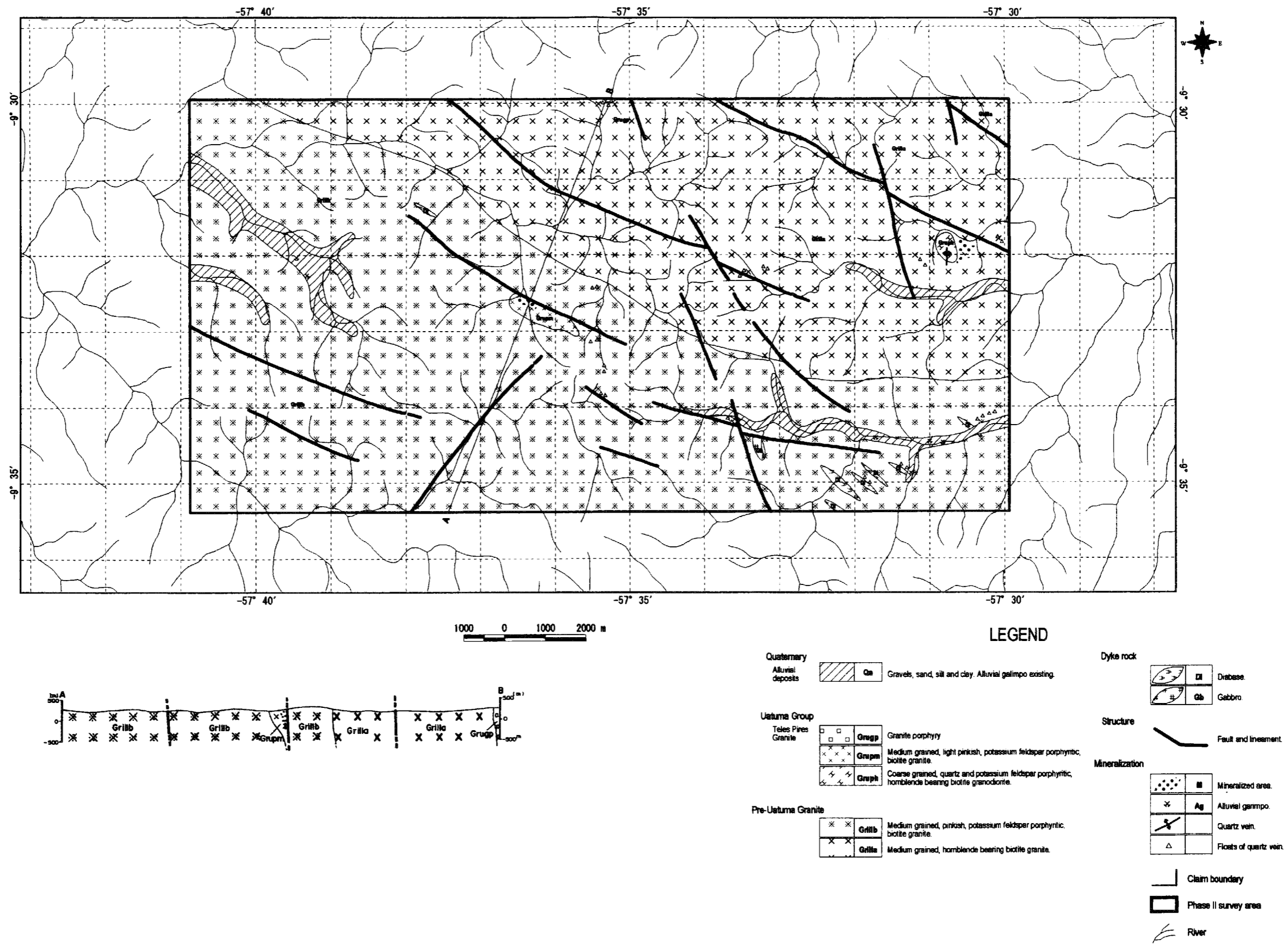


Fig. II-1-5 Geological map and cross section in Block B South

## ⑤ Quaternary

The Quaternary (Qa) consists mainly by alluvial deposits distributed in the rivers flat. In the survey area are present two major rivers named Rio Melechete and Rio das Primas.

### **(ii) Geological structure**

The shearing zones are the most important geological structure observed in the survey area. Three major shearing zones are observed along the directions WNW-ESE, NW-SE and NE-SW, respectively. Gold barren quartz veins frequently fill these structures.

### **(iii) Relation with airborne geophysical results**

As shown in Fig. II-1-6, the potassium contents shows relatively high values in the zones of hornblende bearing biotite granite (GriIIa) and medium grained porphyritic biotite granite (Grupm), and low values in the zones of biotite granite (GriIIb).

The total magnetic field shown in Fig. II-1-7 indicates relatively low values at northern part of the survey area, where the hornblende bearing biotite granite (GriIIa) outcrops. It indicates also high values at the southern part where the biotite granite (GriIIb) outcrops.

### **(iv) Mineralization**

Gold alluvial garimpo are seen widespread in the survey area, indicating the existence of primary gold source within the survey area. However, the geological survey presented no indications of primary gold garimpo in the survey area. Besides, some mylonitic rock samples and quartz veins samples taken within the shearing zone presented only a weak gold mineralization.

## **(2) Discussion**

The geology of the area to the south of B block is composed from Lower Proterozoic Pre-Uatuma granite, Middle Proterozoic Uatuma Group granite, Dykes and Quaternary sediments.

The shearing zones are the most important geological structure observed in the survey area. Three major shearing zones are observed along the directions WNW-ESE, NW-SE and NE-SW. Gold barren quartz vein frequently fills these structures.

Gold alluvial garimpo are widespread in the survey area, indicating the existence of primary gold source within the survey area, however, during the geological survey, no primary gold garimpo were found in the survey area. Besides, some mylonitic rock samples and quartz veins samples taken within of the shearing zone presented only a weak gold mineralization.