PART II SURVEY RESULTS

CHAPTER 1 B BLOCK AREA

B Block area is located in the northwestern part of the Alta Floresta area about 20 km north from Apiacas City. In this block geological, geochemical and drilling surveys were carried out.

1-1 Geology and Mineralization

The survey area included two areas located in the western part (western block) and eastern part (eastern block) of the B Block area. The geological maps and geological profiles are presented in Fig II-1-1 and Fig II-1-2.

The geology of the area can be described as follows:

(1) Geology

The geology of B Block is composed of pre-Uatuma Granite of early Proterozoic, Uatuma Group of middle Proterozoic, dike and Quaternary. The Uatuma Group consists of Iriri Formation and Teres Pires Granite.

The Pre-Uatuma Granite is composed of hornblende bearing biotite granite (GriIIa) and biotite granite (GriIIb). In the eastern block, the hornblende bearing biotite granite (GriIIa) is distributed in central part to western part. The granite shows cataclastic texture and includes alteration mineral of chlorite. The biotite granite (GriIIb) is distributed widely in central part to western part in the western block and in central part to northeastern part of the eastern block. The granite shows weak cataclastic texture and includes alteration minerals of chlorite, epidote and sericite.

The Iriri Formation of Uatuma Group is distributed widely in northern part and southern part in the western block and in eastern part of the eastern block. The formation is mainly composed of acidic volcanic rocks (Puiv) and rarely of quartzose sandstone (Puis).

The Teres Pires Granite of Uatuma Group is composed of hornblende bearing biotite granite (Gruph), coarse to medium grind porphyritic biotite granite (Grupb), medium grained biotite granite (Grum), coarse-grained biotite granite (Grupc), medium grained porphyritic biotite granite (Grupm), fine-grained biotite granite (Gruf) and granite porphyry (Grup).

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

The Quaternary (Qa) is distributed along the present rivers and composed of stream sediments and alluvial deposits. The stream sediments are soft and consist of gravels, sand, silt and clay. The alluvial deposits are slightly solidified and consist of gravels, sand, silt and clay. Many gold alluvial garimpos exist along the rivers.

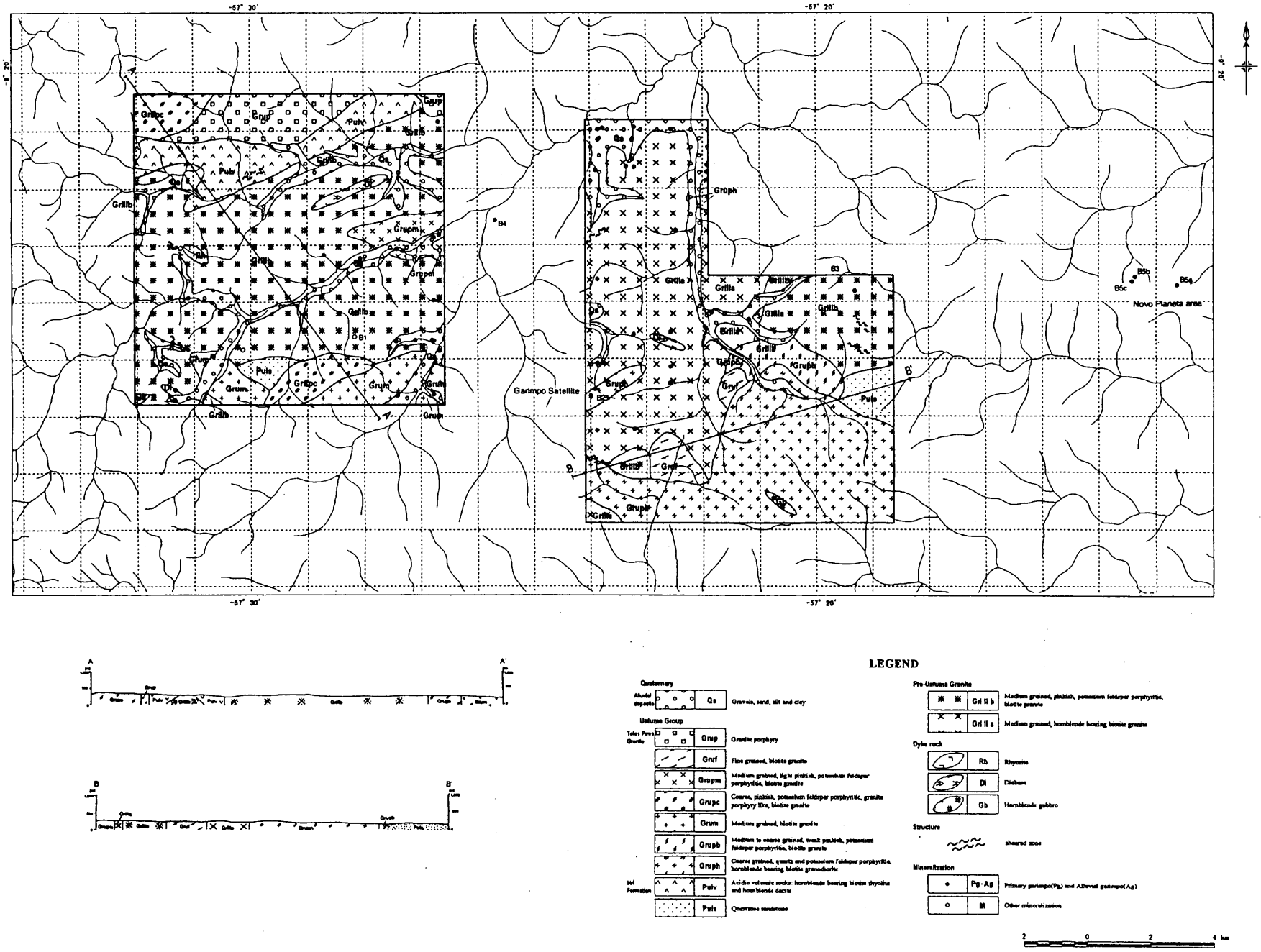


Fig. II-1-1 Geological map of Block

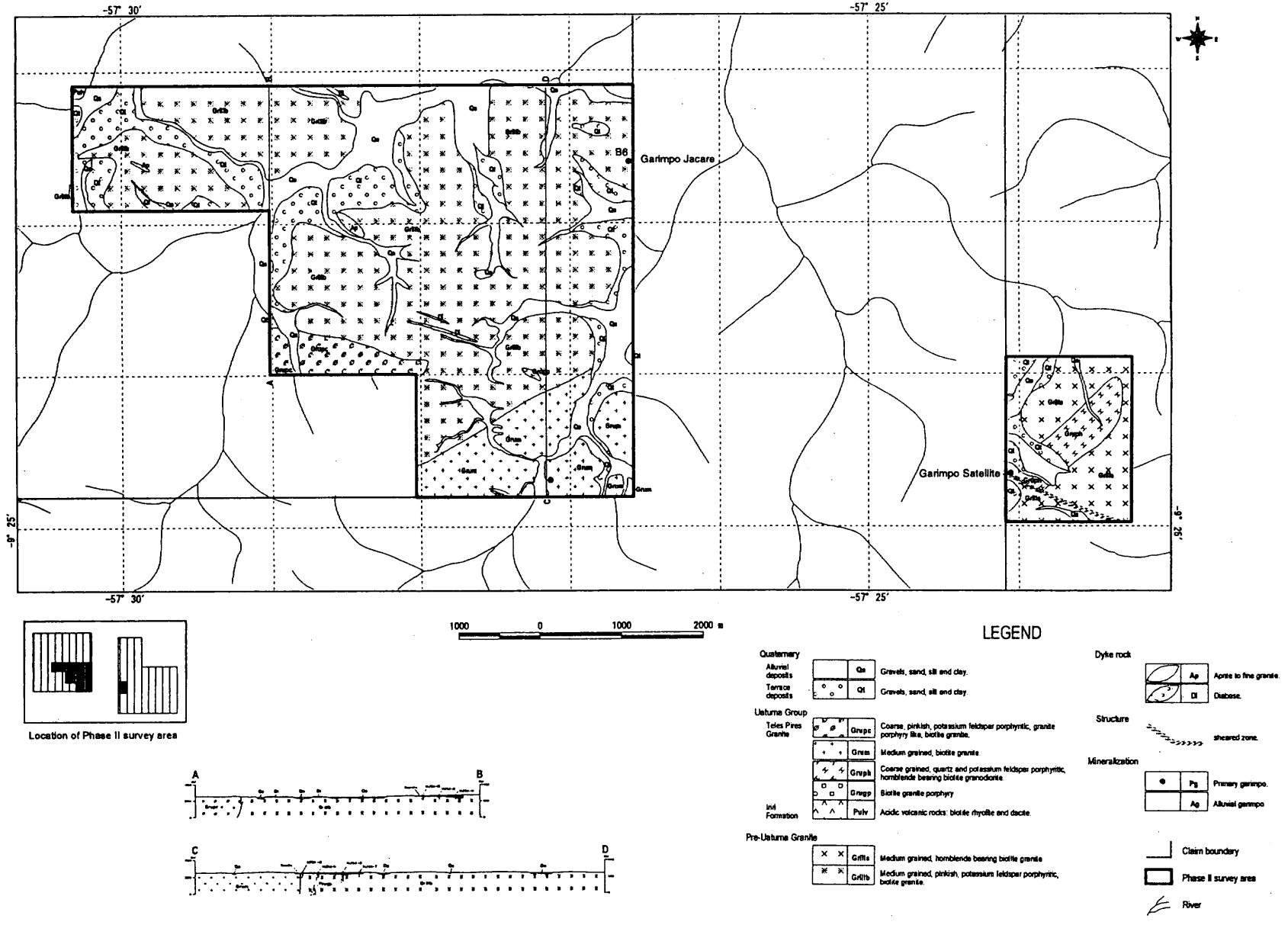


Fig. II-1-2 Geological map of the selected area in Block B

(2) Geological structure

Sheared zones are developed in the western block and in the eastern block. In the western block, two sheared zones are developed along ENE-WSW and WNW-ESE respectively, and include quartz veins within the granites. In the eastern block, two sheared zones are developed along the NE-SW and NW-SE directions and include quartz veins in the granites.

(3) Mineralization

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 in the B Block are the Jacare garimpo, Satellite garimpo and Paulao garimpo and all of them present a WNW-ESE shearing trend. Jacare garimpo with a gold mineralization related to quartz veinlets and shearing planes presented 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. Satellite garimpo and Paulao garimpo show gold mineralization in quartz vein filling shearing zone and the results of analysis in quartz vein of Paulao garimpo presented 100g/tAu, 127.2g/tAg and 3.86%Cu.

The above sampling results are a strong indication that B Block hold high-grade gold mineralization and open a good perspective of finding a major gold deposit related to shearing structure in the area.

1-2 Survey Results

1-2-1 Geochemical Survey

In this area, regional soil geochemical survey, semi-detailed soil geochemical survey and auger geochemical survey were carried out. The results of geochemical survey of Phase I and Phase II are shown in Fig.II-1-3.

As the results of Phase I survey, the threshold value for gold calculated from analytical results of geochemical soil sampling was 25 ppb and by using this value, it is possible to interpret continuous geochemical anomalies along WNW-ESE and NW-SE directions. These linear anomaly zones are not related to any lithological distribution, but they are considered to show evidence of geological structures representative of shear zones. The distribution of these anomalies suggests either a shear zone of quartz vein-hosted type or a stockwork type gold mineralization. The selected area and lines from semi-detailed geological survey are shown in Fig. II-1-3.

The results of Phase II survey (Fig. II-1-4) confirmed that most of the gold mineralization in B Block is strongly controlled by a shearing structure. The three large gold anomaly zones detected

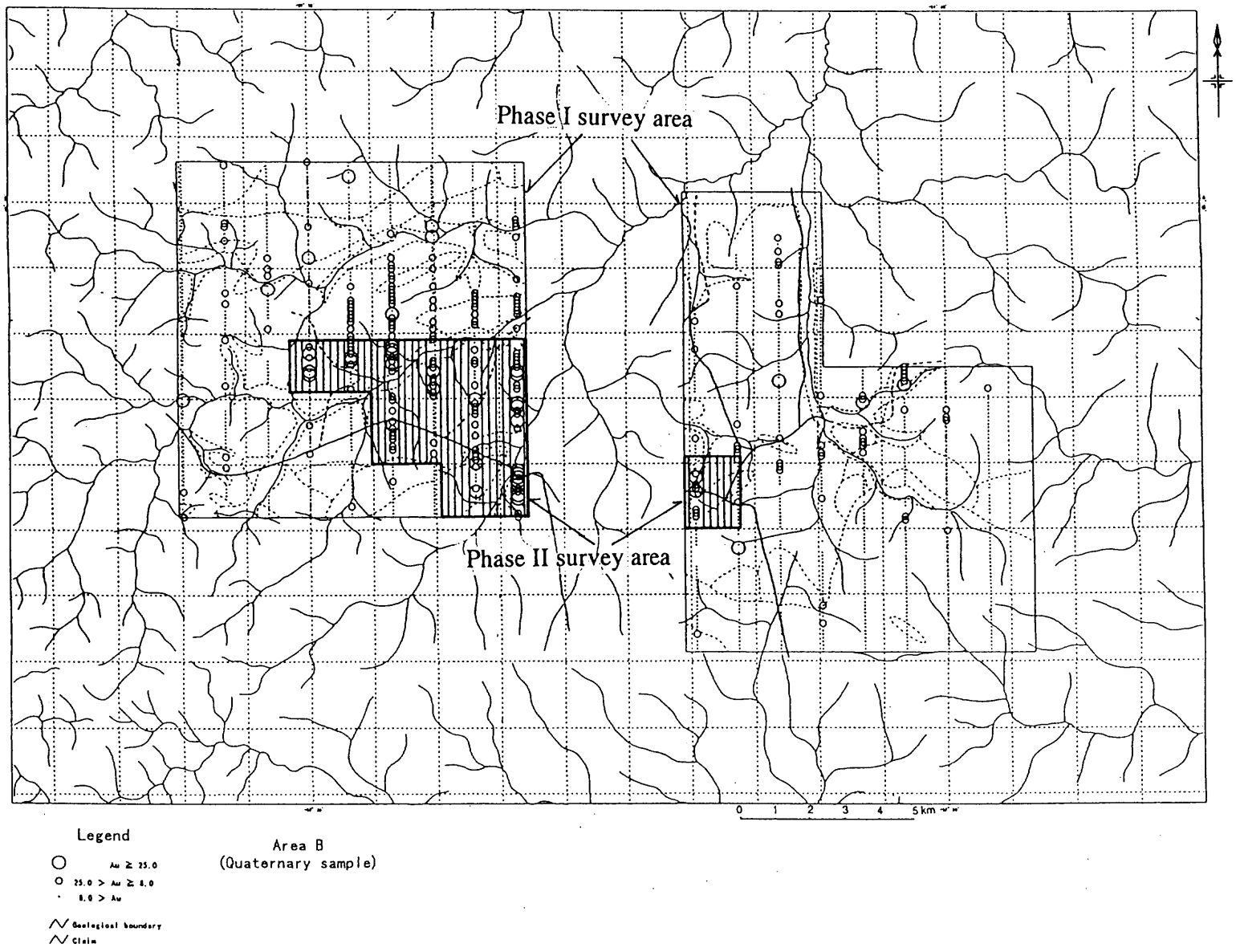


Fig. II-1-3 Geochemical survey area and Au soil anomalies in Block B

during the soil geochemical survey present elongation patterns trending along the direction NW-SE that suggest the existence of a shearing structure along this direction. The geochemical data treatment indicated a weak relation between Au and Cu and the factor analysis showed the following metal signatures: The Factor 1 showed a relation between Pb-Zn-Fe and reflecting probably a gold mineralization distant from the intrusive center. The Factor 2 showed a relation between As-Fe-Cu, while Factor 5 showed a relation between Au-Cu. It is likely that association such as, Arsenium and Copper or Gold and Copper reflect gold mineralization adjacent to intrusive center.

Auger survey (Fig.II-1-5) performed within the above gold anomaly zones indicated that even though the gold anomaly in soil has a relative great size, the gold distribution in the saprolite is narrow with spots of high gold grade. Field observation suggested that the gold mobility within saprolite is mostly vertical with a very low lateral mobility.

1-2-2 Geological Survey

The regional geological survey was carried out in the area of east-west 20 km and north-south 10 km where is located on southwest area of the survey area.

(1) Regional geology

The B Block south area is located approximately 20 km west from Apiacas city. 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-1-6.

(a) Geology

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.

The Pre-Uatuma Granite is composed of hornblende bearing biotite granite (GriIIa) and biotite granite (GriIIb). The Teles Pires Granite of Uatuma Group granite is composed of hornblende bearing biotite granite (Gruph), medium grained porphyritic biotite granite (Grupm) and granite porphyry (Grugp). The dikes are composed of hornblende gabbro (Gb) and diabase (Di).

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

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.

(b) Mineralization

Gold alluvial garimpo are widespread in the survey area, indicating the existence of primary

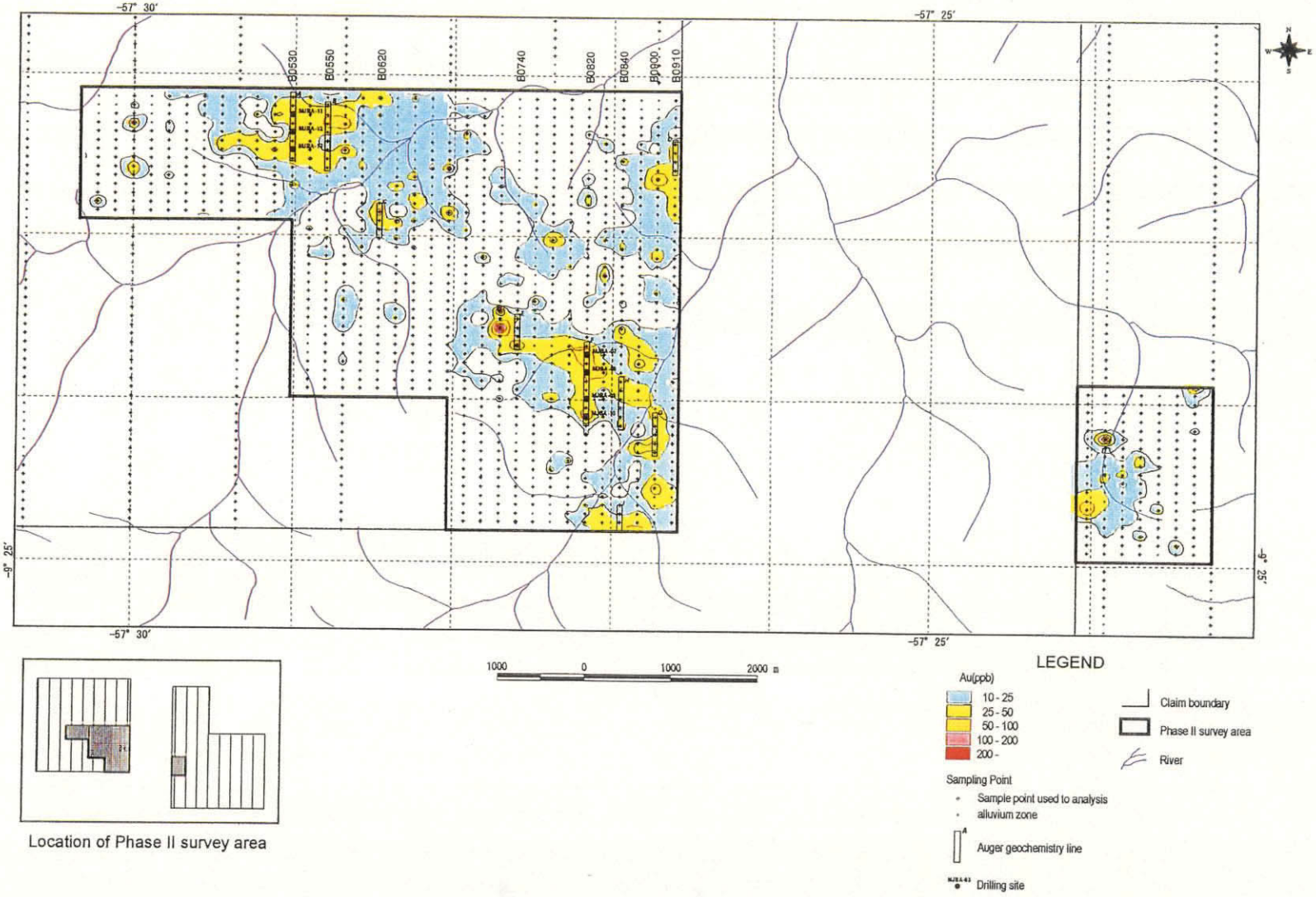


Fig. II-1-4 Distribution map of Au soil anomalies, location of auger survey line and drilling site in the Phase II survey area in Block B

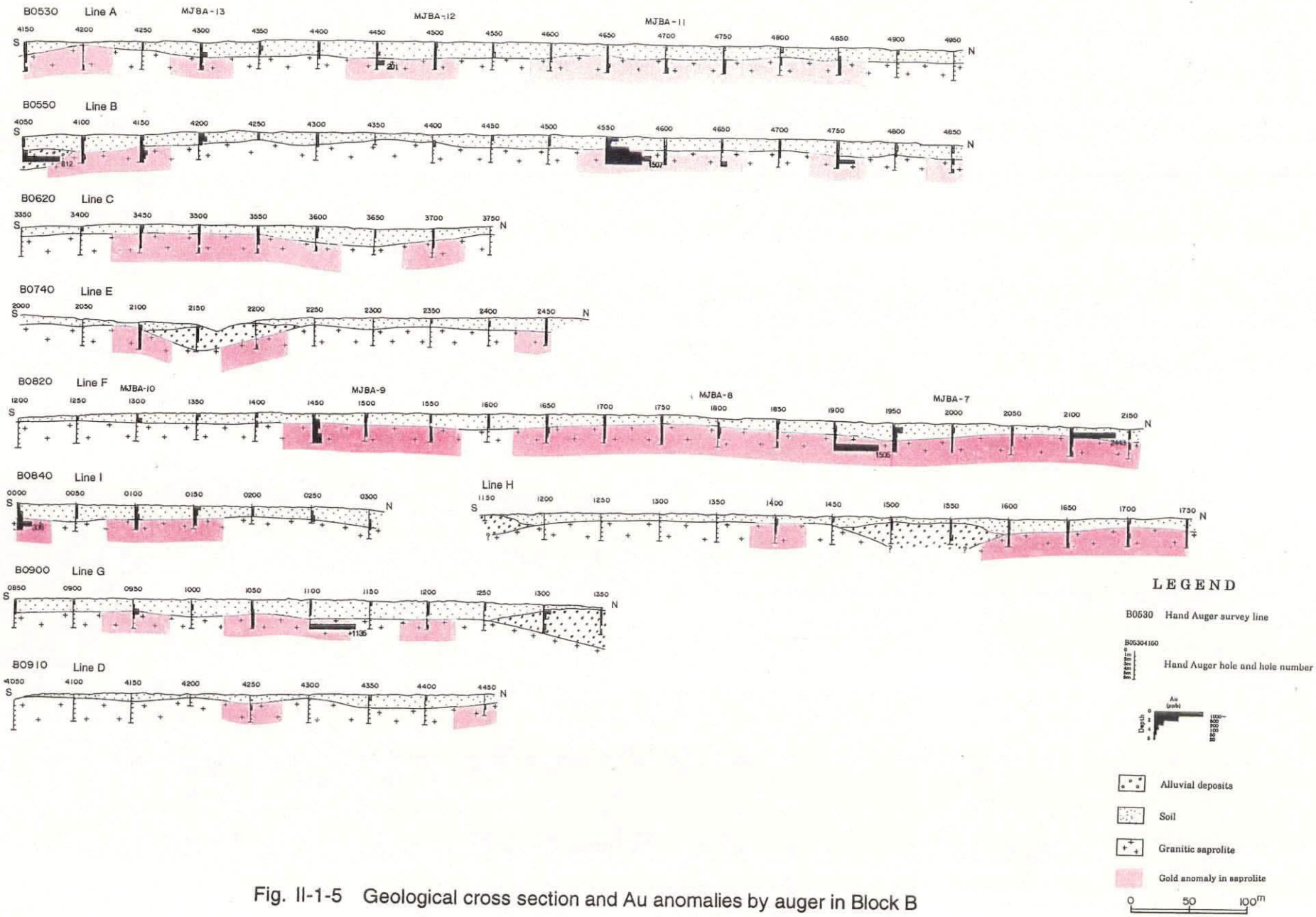


Fig. II-1-5 Geological cross section and Au anomalies by auger in Block B

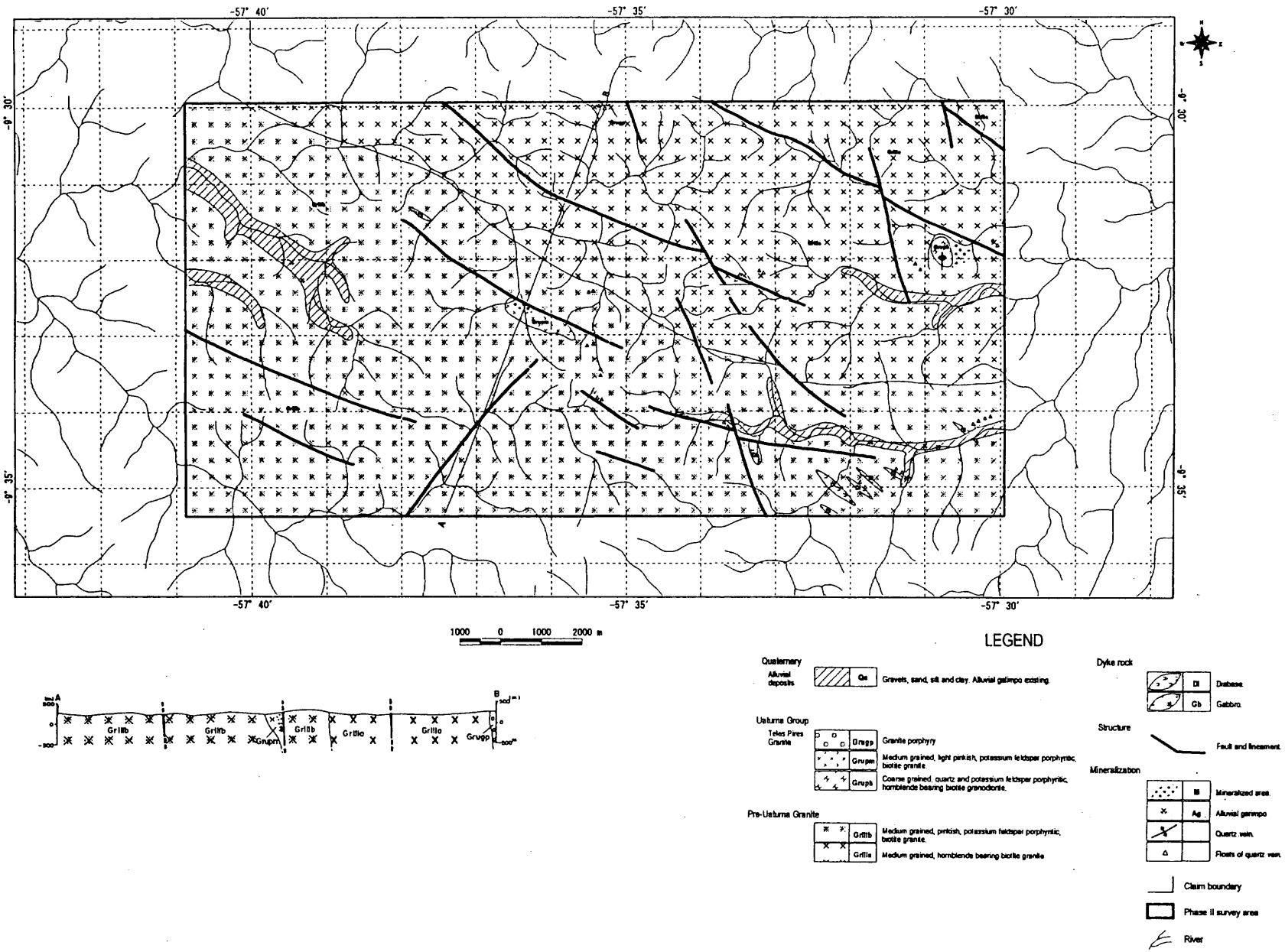


Fig. II-1-6 Geological map of Block B South

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 the shearing zone presented only a weak gold mineralization.

(2) Trench survey in B Block

A geological survey by trenching was carried out in the B Block area in order to uncover a hidden mineralized structure within the large soil gold anomaly. The clarification of the mineralized structure was helpful to define the direction of the drilling.

The trench B1 showed a 3m wide sericite rich mylonitic structure filled by low angle quartz veins, showing pyrite films and cubic pyrite dissemination. The shearing presents E-W to N80W direction and dips South 30 to 68 degrees. Another shearing structure, between 84 and 85m, shows lens type quartz veins along N80W direction and dipping south from vertical to 58 degrees. Results from 2m wide saprolite sample presented gold content of Au1.51g/t between 40 and 42m as well as high gold grade of Au1.15g/t and 1.01g/t between 58 and 64m. These high gold anomalies are associated to gold mineralization within broad shearing zone with strong pyrite dissemination.

The trench B2 shows a strong shearing structure between 4m and 8m, at 24m and again between 36m and 46m. This shearing structure of unknown width, shows lens type quartz veinlets that dips south between 56 and 80 degrees and with veins directions ranging between N80W and N45W. Results from 2m wide saprolite sample showed gold content of Au0.58g/t between 20 and 22m.

Analytical results of trenches indicated broad intervals with gold results above 0.1g/t in saprolite. The N45E direction for the drilling in B Block was defined on the basis of the results of the trench.

1-2-3 Drilling Survey

In this block, five RC drilling survey lines were planned and 75 holes with total length 3,750m were drilled. Eleven holes for DD drilling with total length 808.05m were drilled.

(1) Drilling survey of Phase II

The drilling survey, as shown Fig.II-1-7, confirmed that gold is present in hard core and in saprolite, but the best intercepts were obtained in 4 boreholes, i.e., MJBA-8, MJBA-11, MJBA-12 and MJBA-13. Gold mineralization in borehole MJBA-8 is closely related to sub-vertical shearing zones. The most sheared section was detected in the borehole MJBA-8 between 43.00m and 69.00m, for which the analytical gold results within this 26m interval presented an average of 0.21g/tAu and a maximum gold value of 0.73g/t. Others boreholes such as, MJBA-11, MJBA-12 and MJBA-13, presented gold mineralization related probably to sub-vertical shear zones. MJBA-11 presented a

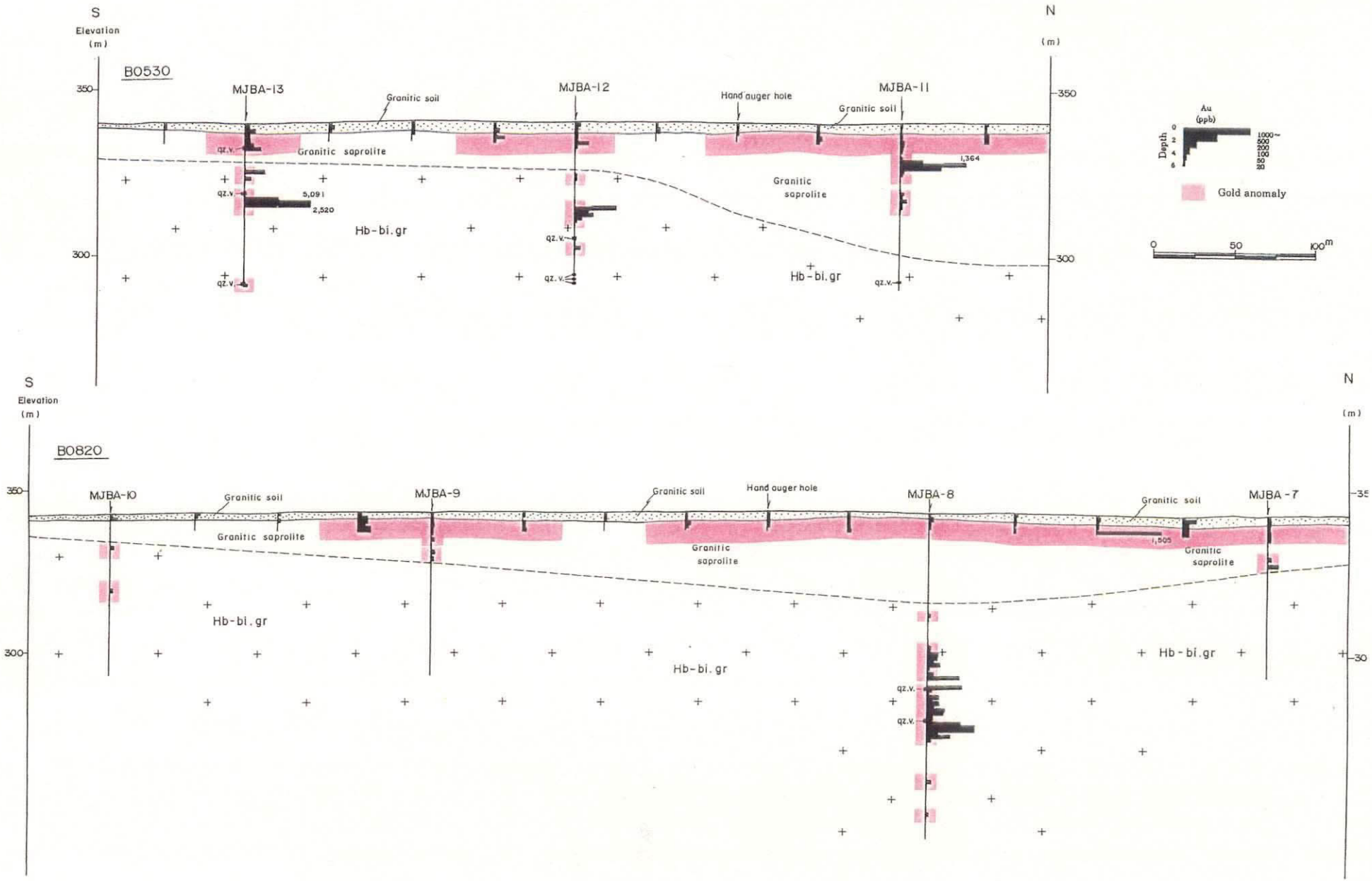


Fig. II-1-7 Geologic cross section of borehole site of Phase II in Block B

gold average of 0.78g/t between 11.00m and 14.00m, MJBA-12 with 0.32g/t between 26.00m and 30.00m and MJBA-13 with 2.71g/t between 22.00m and 25.00m.

(2) Drilling survey of Phase III

A reverse circulation drilling (RC) program were conducted in B Block in order to understand the vertical distribution of gold anomalies detected by geochemical survey by acquiring geological and tectonic information related to the gold mineralization. A total coring drilling (DD) program was later conducted to confirm the continuity in depth of the gold anomalies detected by RC. RC drilling lines and DD drilling holes are shown in the Fig II-1-8.

Geological sections with drilling data are shown from Fig.II-1-9 to Fig.II-1-13 and the gold distribution map is shown at Fig.II-1-14 and Fig.II-1-15. From RC and DD drilling carried out in B Block it was clarified that the thickness of soil is thin and that the thickness of granitic saprolite averages 30m. Shearing structure was also observed within saprolite and fresh granite and associated with alteration as silicification, potassification, epidotization and chloritization. Abundant gold mineralization was detected by both RC and DD drillings, proving that the gold mineralization extend continuously from saprolite to the fresh rock. By comparison between results from RC and DD drilling it was confirmed location of some sites with slight enrichment of gold along the boundary with the fresh rock. It can be interpreted as gravitational process acting on high-density mineral that concentrates gold particles along boundary zone. According to the analytical results of RC drilling holes, four samples of more than Au 1 g/t were confirmed in the B5 lines with maximum value of Au 4.42 g/t. One sample of more than Au 1 g/t was confirmed in the B3 lines with a maximum value of Au 2.54 g/t. According to the analytical results from DD drilling holes, seven samples of more than Au 1 g/t were confirmed in the four holes with a maximum value of Au 5.09 g/t. Two samples with more than Au 1 g/t were confirmed in the holes of the B3 lines and obtaining a maximum value Au 1.64 g/t. Gold mineralization detected is small in scale with low to moderate ore grade, and narrow in width.

The shearing zones observed in the survey area present a WNW-ESE shearing trend. Some of the primary gold garimpo, as Jacare garimpo, Satellite garimpo and Paulao garimpo, are located inside these shearing structures.

The Jacare garimpo with gold mineralization of quartz veinlets type presented high gold contents with a maximum value of 379.36 g/t of Au. A 6m wide channel sampling presented an average grade of 70.52g/t Au. Satellite garimpo and Paulao garimpo show gold mineralization in quartz vein filling shearing zone and the results of analysis in quartz vein of Paulao garimpo presented 100g/tAu, 127.2g/tAg and 3.86%Cu.

The Satellite garimpo is correlated with the quartz vein type with high gold contents within the sheared zones. The Jacare garimpo is correlated with the stock work gold mineralization, as Novo Planeta gold deposits.

According to the results of the drilling survey, economical gold deposits can be found neither in the northwest soil anomalous zone nor in the southeast soil anomalous zone. However, another soil anomalous zone with Jacare garimpo still exists in the northeastern part ob the area. The stockwork type mineralization with high gold contents may exist in the soil anomalous zone.

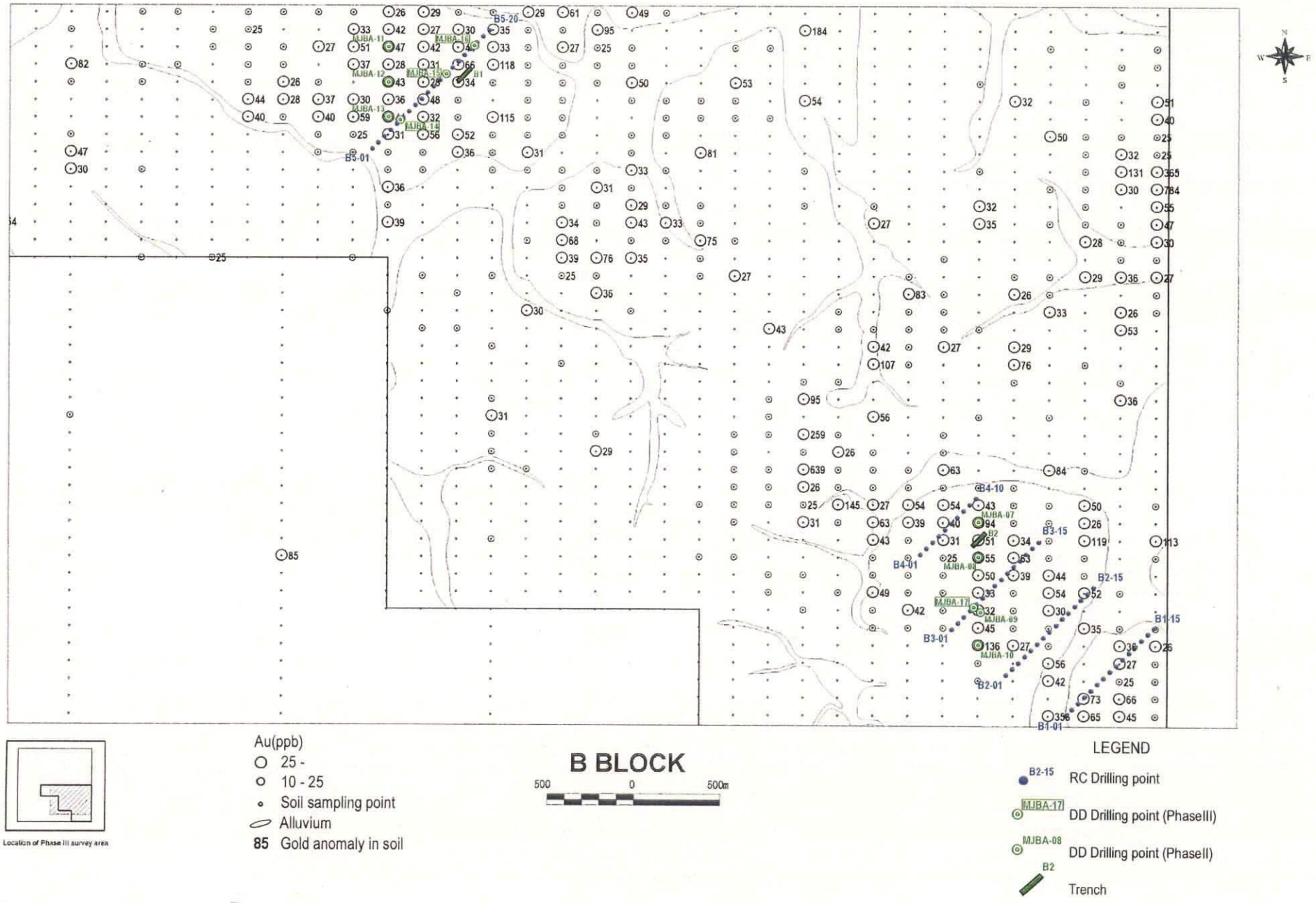


Fig. II-1-8 Location map of RC drilling line, DD holes and Trenches in Block B

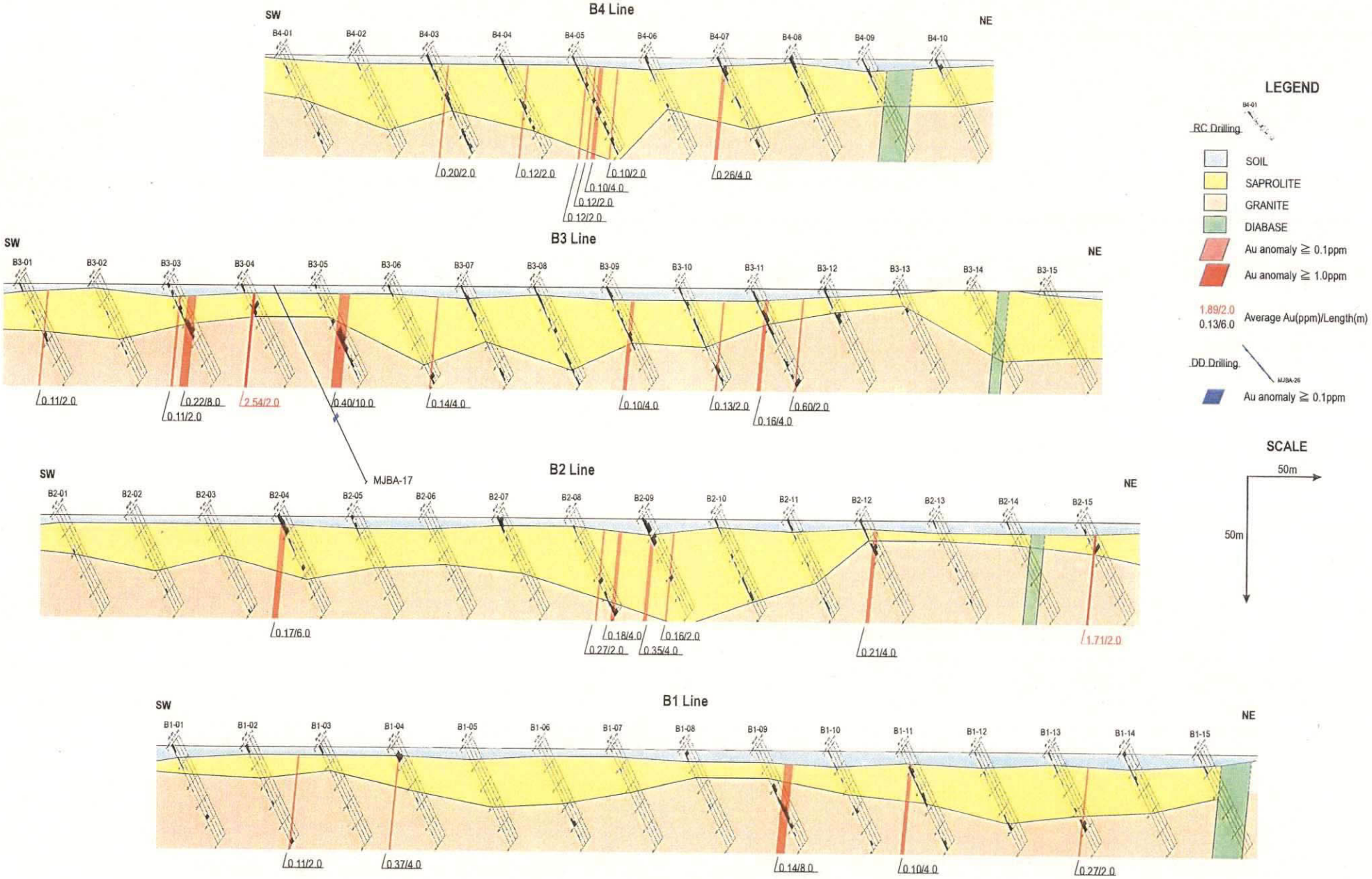


Fig. II-1-9 Geologic cross section of RC drilling survey in Block B (1)

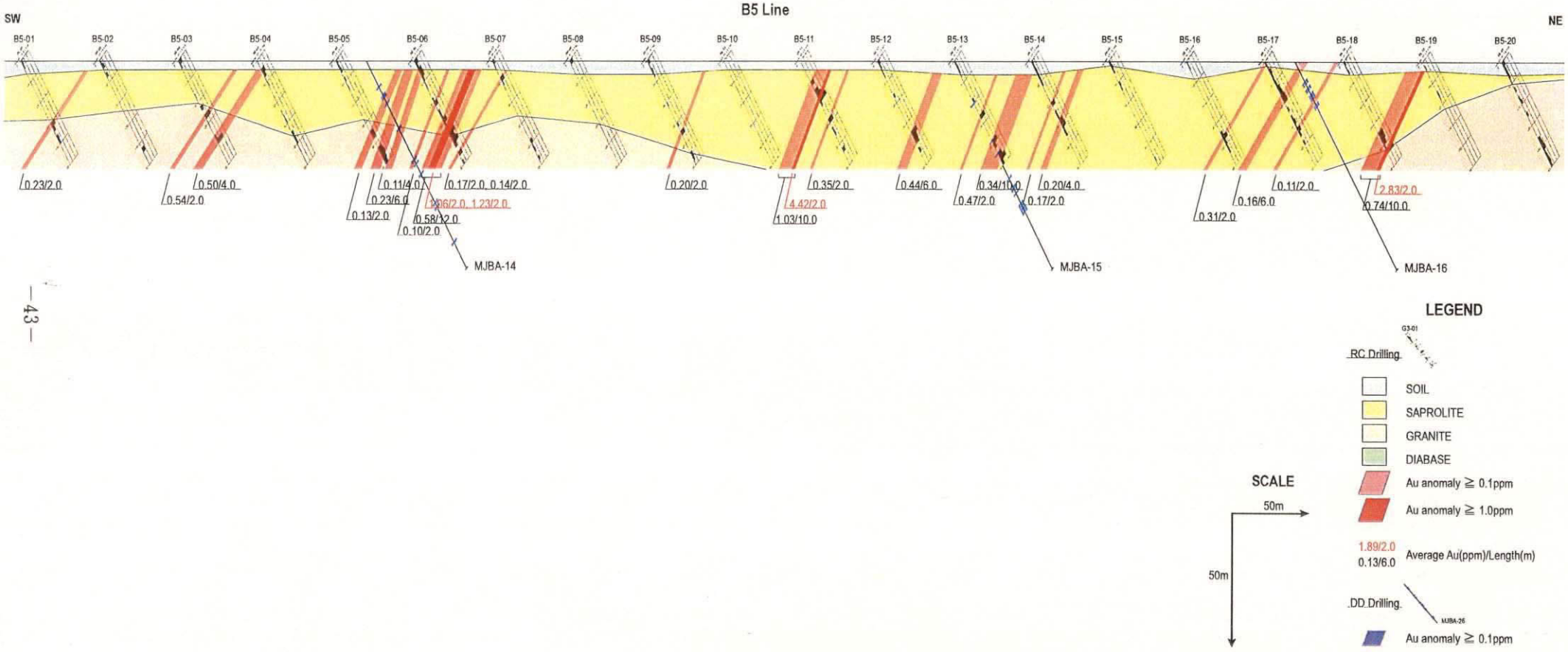


Fig. II-1-9 Geologic cross section of RC drilling survey in Block B (2)

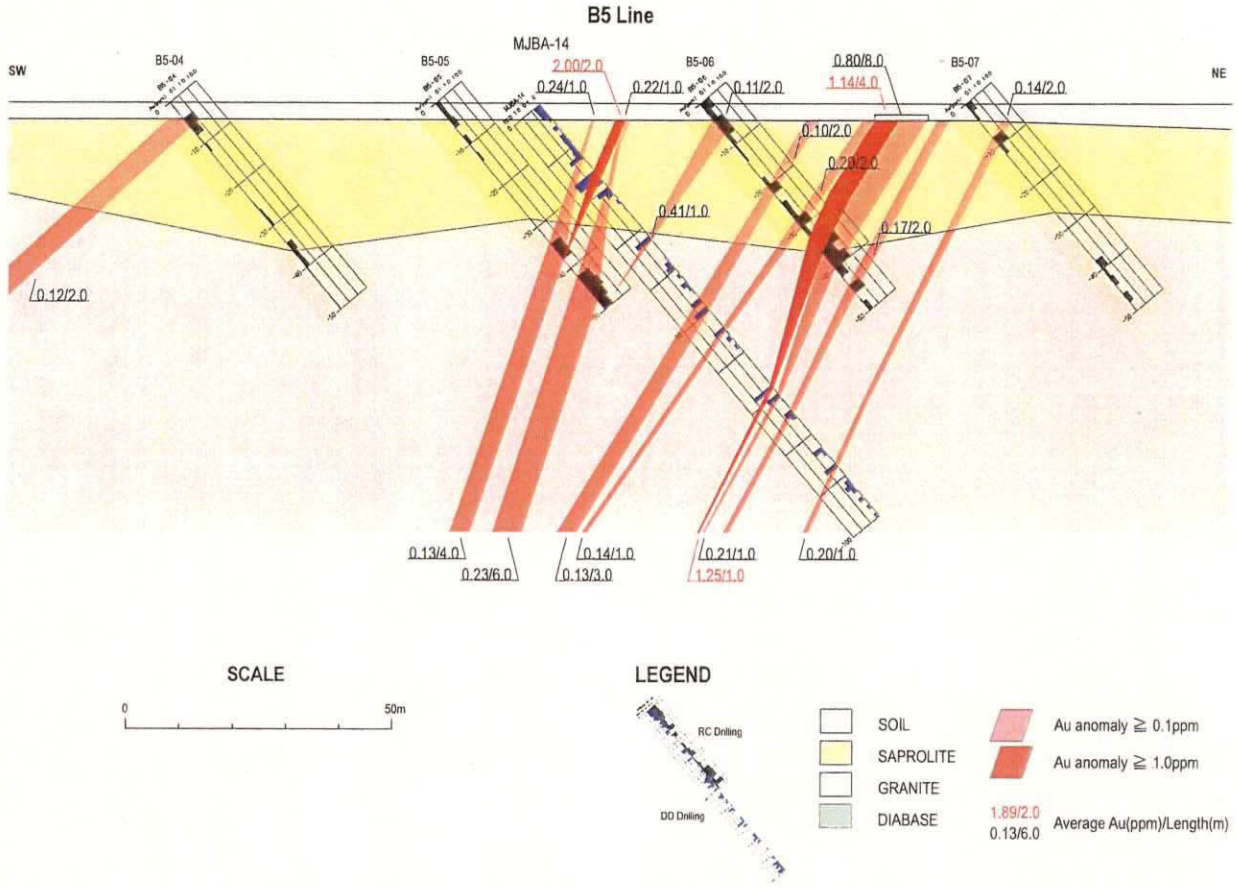


Fig. II-1-10 Geologic cross section of boreholes MJBA-14

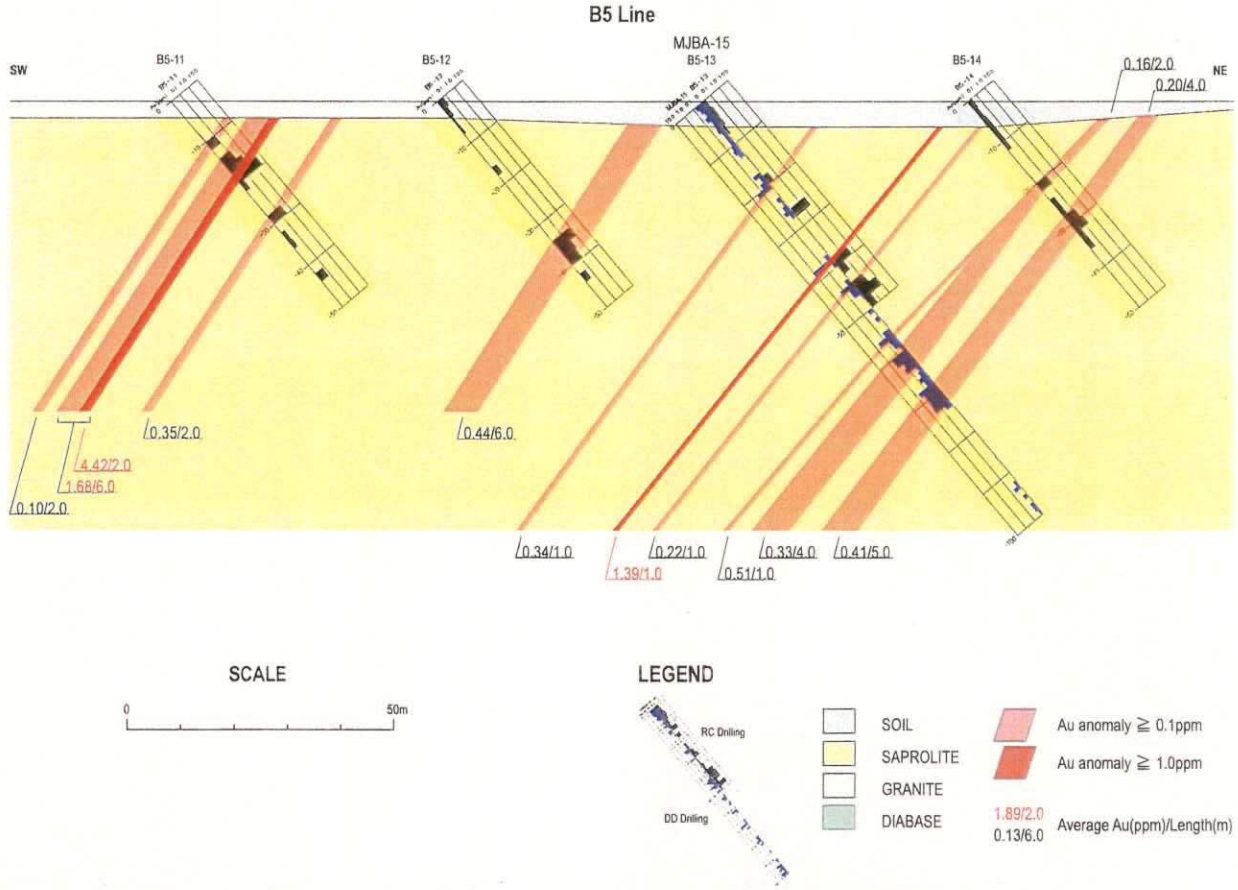


Fig. II-1-11 Geologic cross section of boreholes MJBA-15

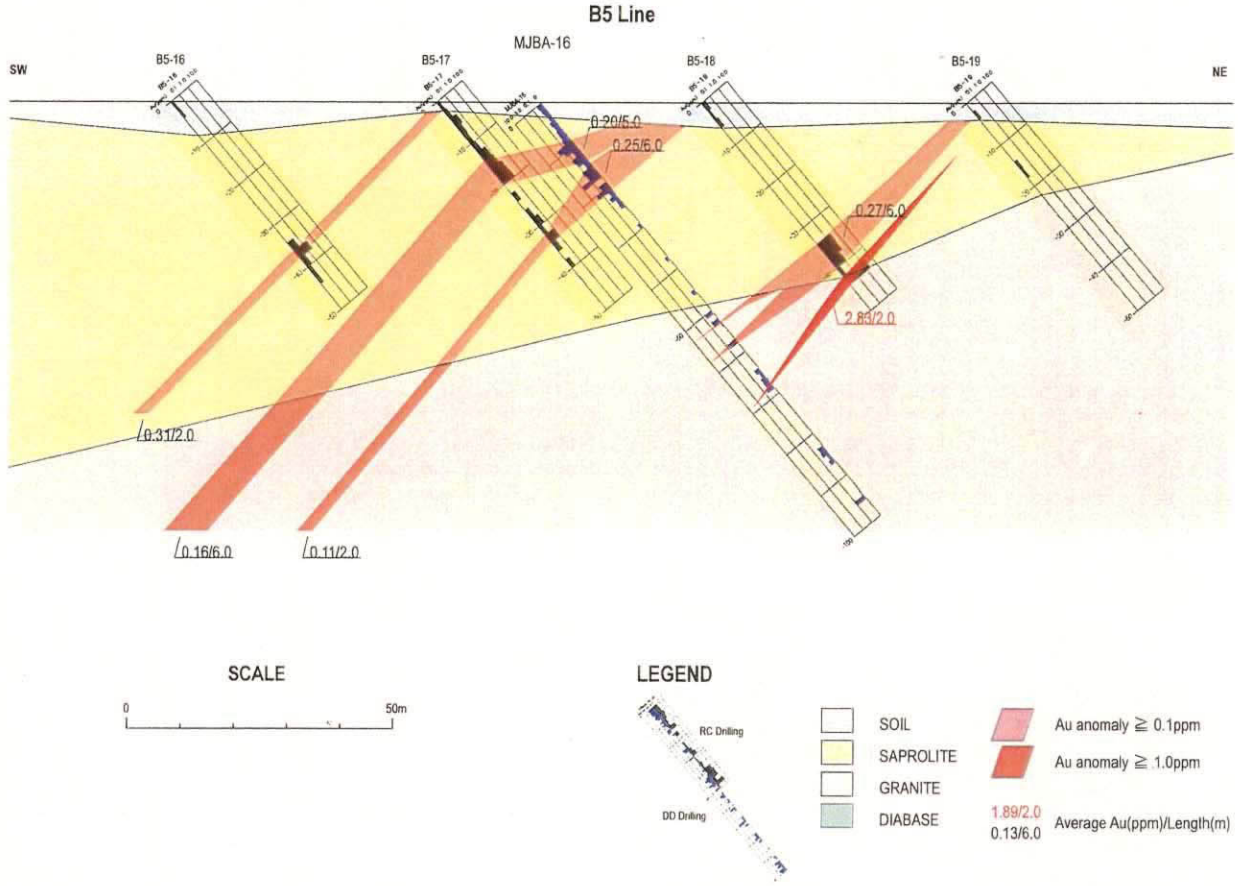


Fig. II-1-12 Geologic cross section of boreholes MJBA-16

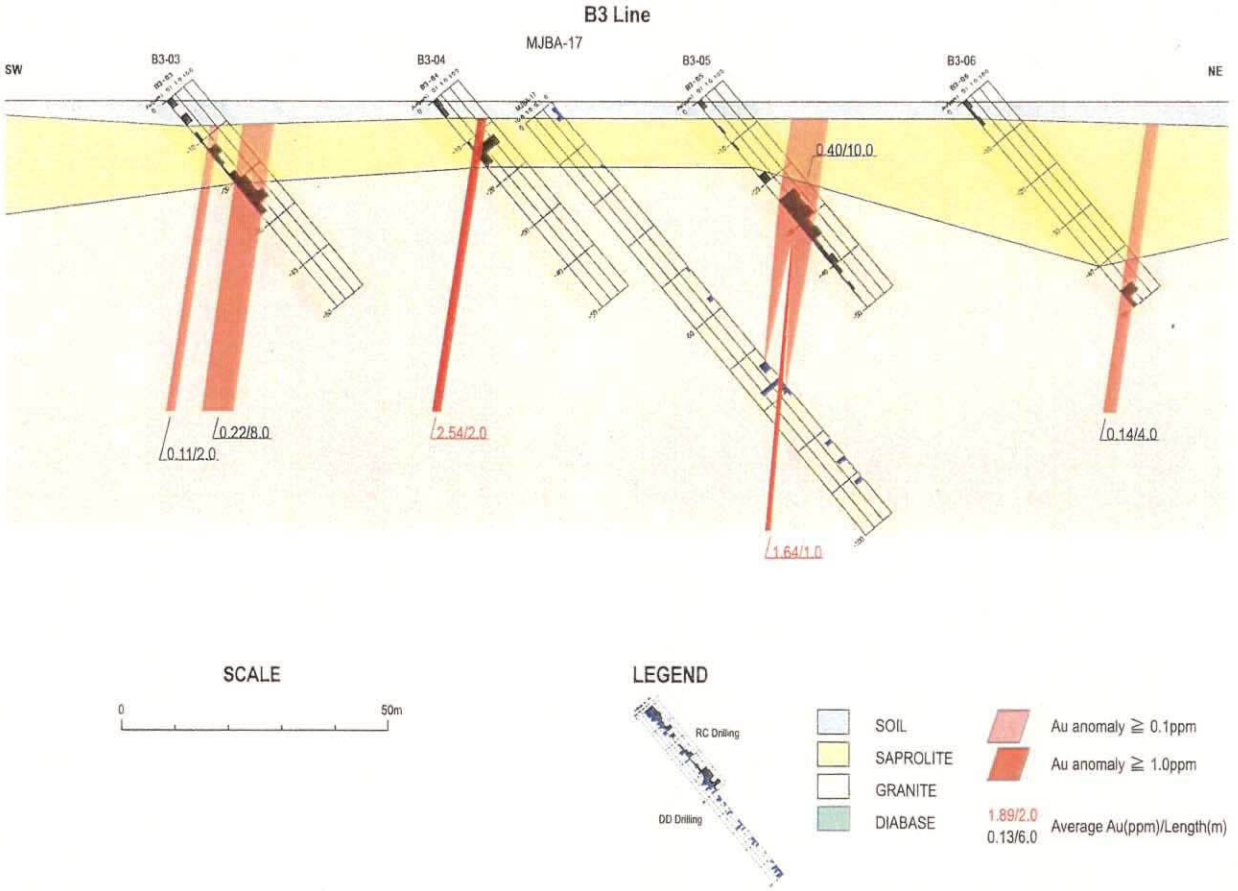


Fig. II-1-13 Geologic cross section of boreholes MJBA-17

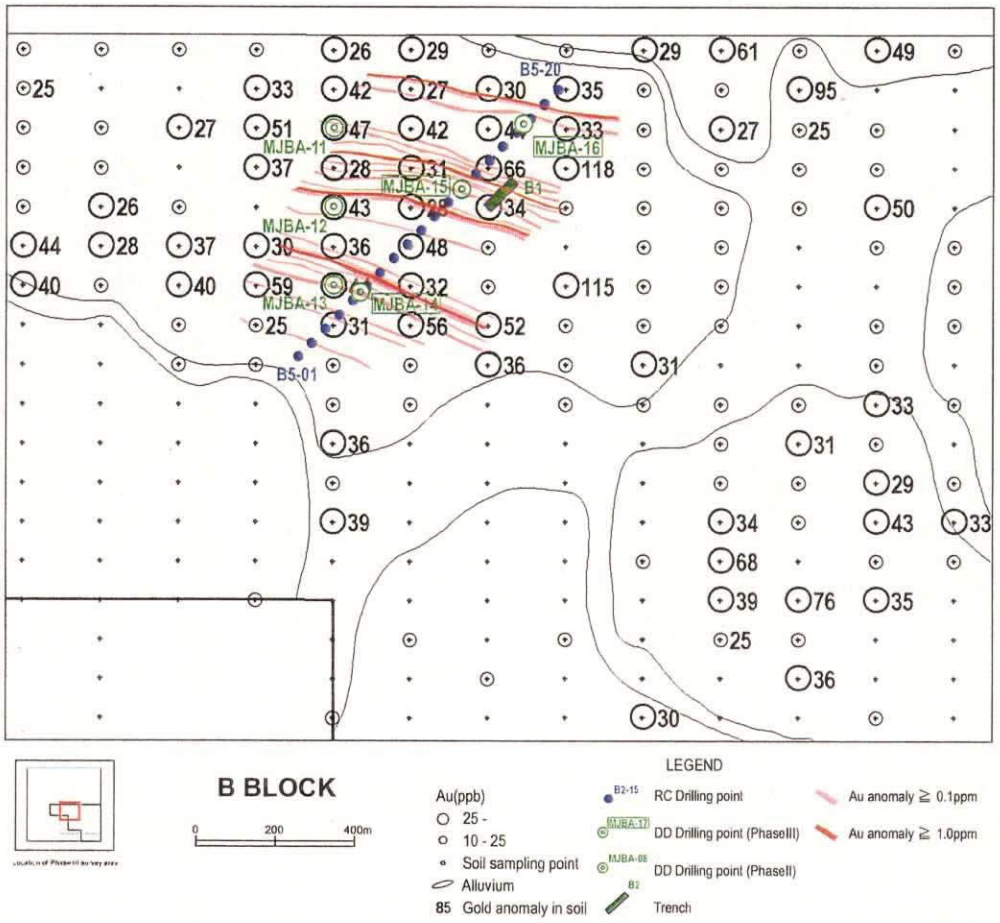


Fig. II-1-14 Interpretation map from drilling survey of Phase III in northwest area of Block B

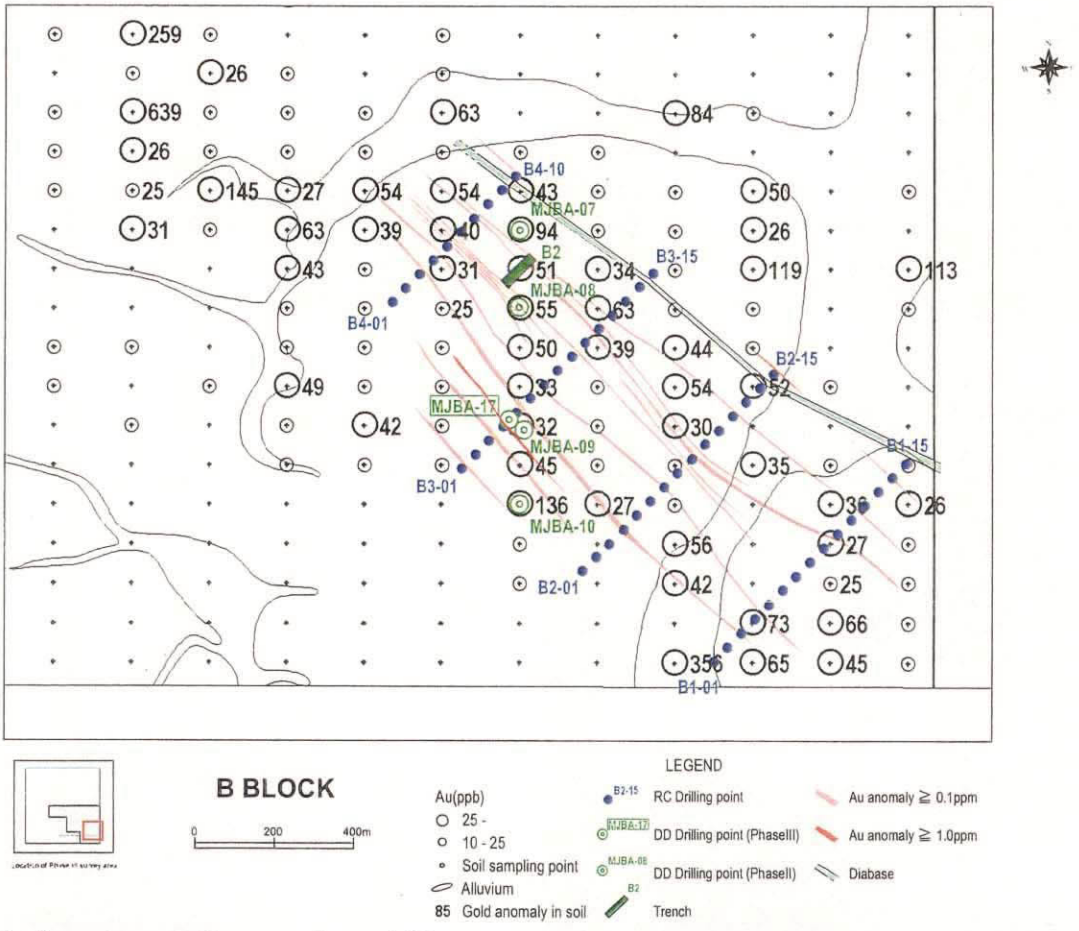


Fig. II-1-15 Interpretation map from drilling survey of Phase III in southeast area of Block B

CHAPTER 2 C BLOCK AREA

C Block is located in the northern part from central area at 20 km northwest from Paranaita City. In this block, geological, geochemical and drilling surveys were carried out.

2-1 Geology and Mineralization

The geological map and geological profile are presented on Fig II-2-1 and Fig II-2-2.

(1) Geology

The geology of C Block is composed of pre-Uatuma Granite of early Proterozoic, Uatuma Group of middle Proterozoic, Dykes and Quaternary sediments. The Uatuma Group consists of Iriri Formation and Teles Pires Granite.

The Pre-Uatuma Granite is composed of biotite granite (GriIIb).

The Iriri Formation of Uatuma Group is mainly distributed in eastern part and rarely at northeastern part and southern part. It is mainly composed of acidic volcanic rocks (Puiv) and rarely of quartzose sandstone (Puis). The acidic volcanic rocks (Puiv) are distributed in the western part. The quartzose sandstone (Puis) is distributed in northern end and southern end of the area along WNW-ESE direction and as a decolorized rock.

The Teres Pires Granite of Uatuma Group is composed of hornblende bearing biotite granite (Gruph) and medium grained porphyritic biotite granite (Grupm).

The dikes are composed of rhyolite (Rh), dolerite (Di) and hornblende gabbro (Gb).

The Quaternary (Qa) is distributed along the present rivers and composed of stream sediments and alluvial deposits. The stream sediments are soft and consist of gravels, sand, silt and clay. The alluvial deposits are slightly solidified and consist of gravels, sand, silt and clay. Many gold alluvial garimpos exist along the rivers.

Sheared zones are developed in biotite granite (GriIIb) and medium grained porphyritic biotite granite (Grupm). The direction of sheared zone is mainly NW-SE and partly ENE-WSW. It is concordant with the arrangements of medium grained porphyritic biotite granites (Grupm).

(2) Geological structure

The shearing zone is the most important geological structure within C Block. The main shearing trend along NW-SE is observed in some of the primary gold garimpo. Quartz veins are developed along the sheared zones in the primary garimpos.

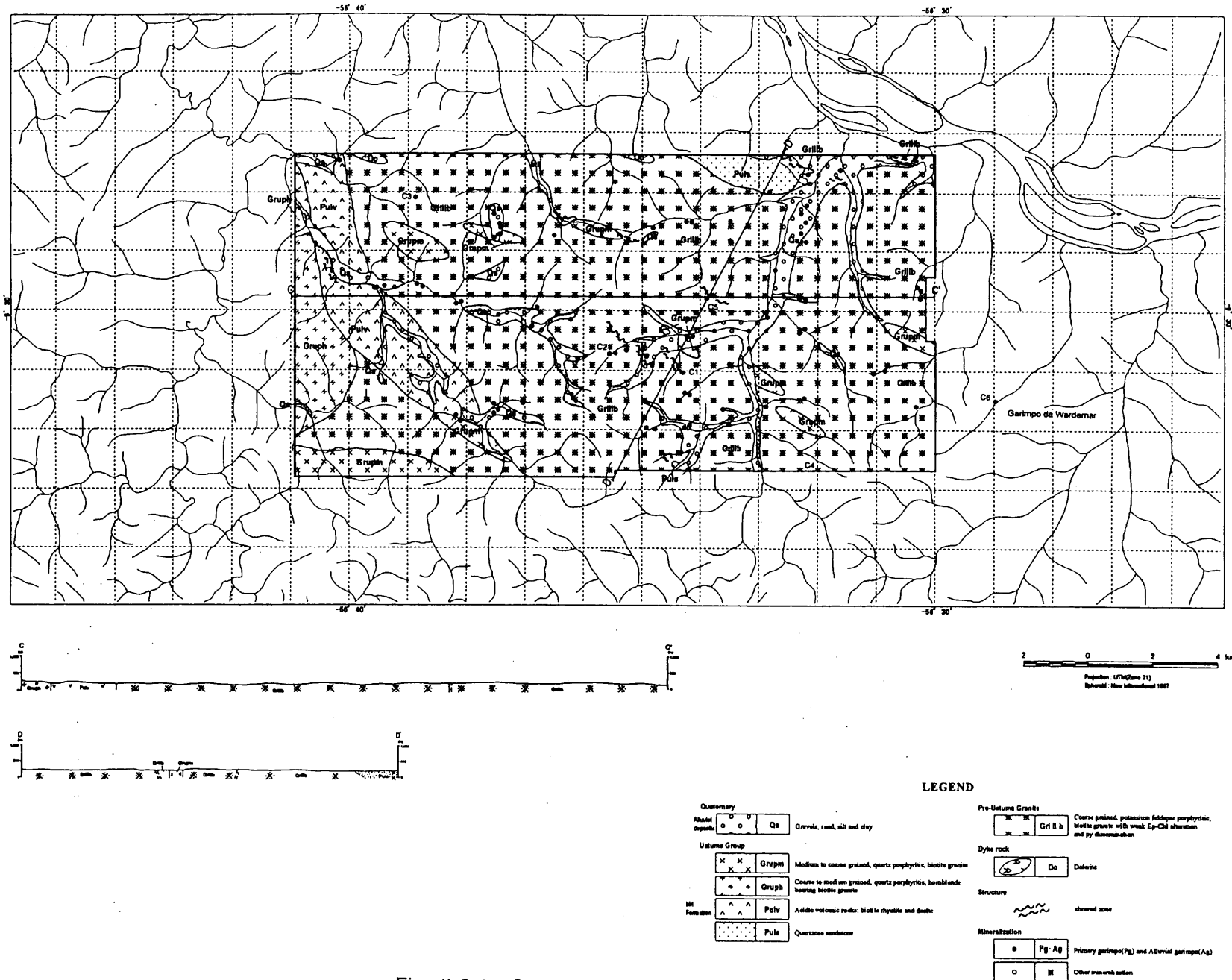


Fig. II-2-1 Geological map of Block C

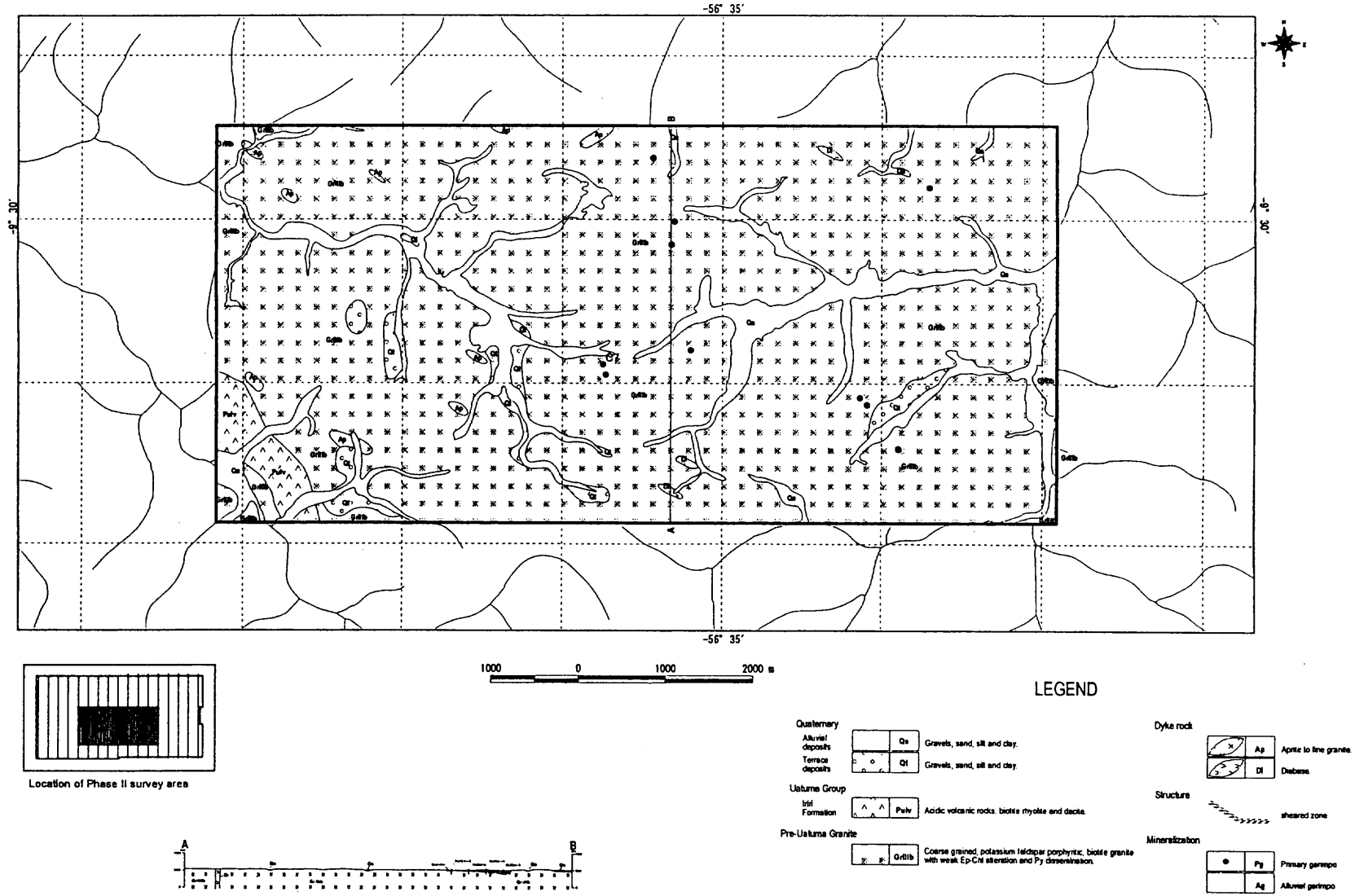


Fig. II-2-2 Geological map of the selected area in Block C

(3) Mineralization

There are many gold placer deposits along the rivers where garimpeiros had been doing mining activities. Widespread gold alluvial garimpo in the survey area also confirms the presence of primary source in the proximity. The source of alluvial gold is thought to be a disseminated type or vein / veinlets type gold mineralization embodied in shearing structure.

Shear zones with NNW-SSE trend was confirmed in the C7 gold garimpo (Fig.II-2-3). The gold mineralization in C7 garimpo is related to quartz vein with a width of 30cm that fills a 30-degree dip-shearing zone. The results of ore analysis showed 113.44g/t of Au, 194.3g/t of Ag and a high content of Bismuth. Anomalous values of Cu, Pb and Zn were also confirmed. Quartz vein samples taken from garimpo do Waldemar and located outside and to the east of block C presented gold values of 174.00 g/t, 40.4 g/t of silver and 0.40% of copper.

In general, gold mineralization with dissemination of pyrite, chalcopyrite and chalcocite is observed in places where the alteration of host rock is accompanied by sericite, chlorite and epidote.

2-2 Survey Results

2-2-1 Geochemical Survey

A semi-detailed soil geochemical survey recommended in Phase I was carried out within the C Block area in a large zone that presented concentrations of gold anomalies above 25 ppb in soil. Based on the above-mentioned results, a hand auger survey and a scout drilling survey were carried out on the basis of new detected anomalies as shown Fig. II-2-3.

According to the results of the regional soil geochemical survey, the threshold value for gold calculated from analytical results of geochemical soil sampling was 25 ppb and by using this value, it was possible to infer the distribution of continuous anomalies along WNW-ESE, NW-SE, ENE-WSW and E-W directions. These anomaly zones are not related to any lithologic distribution, but considered to give evidences of geological structures representative of shear zones. The soil geochemical gold anomaly located in the central part of C Block is wide, elongated to E-W and showing a horseshoe shape.

According to the results of the semi-detailed soil geochemical survey (Fig.II-2-4), although the main shearing direction in the survey area is supposed to be along NW-SE direction, shearing zones along ENE-WSW and NNW-SSE directions were also observed. The NW-SE direction shear zone is well represented by the elongated distribution along NW-SE direction of gold anomaly in soil. Results of factor analysis indicated the following metal signatures: the factor 1 related with Pb-Zn-Fe-Cu is largely distributed in all survey area. The factor 3 related to Cu-Fe-Au is mostly distributed along the Rica and Buriti rivers that are the most important alluvial garimpo in the whole

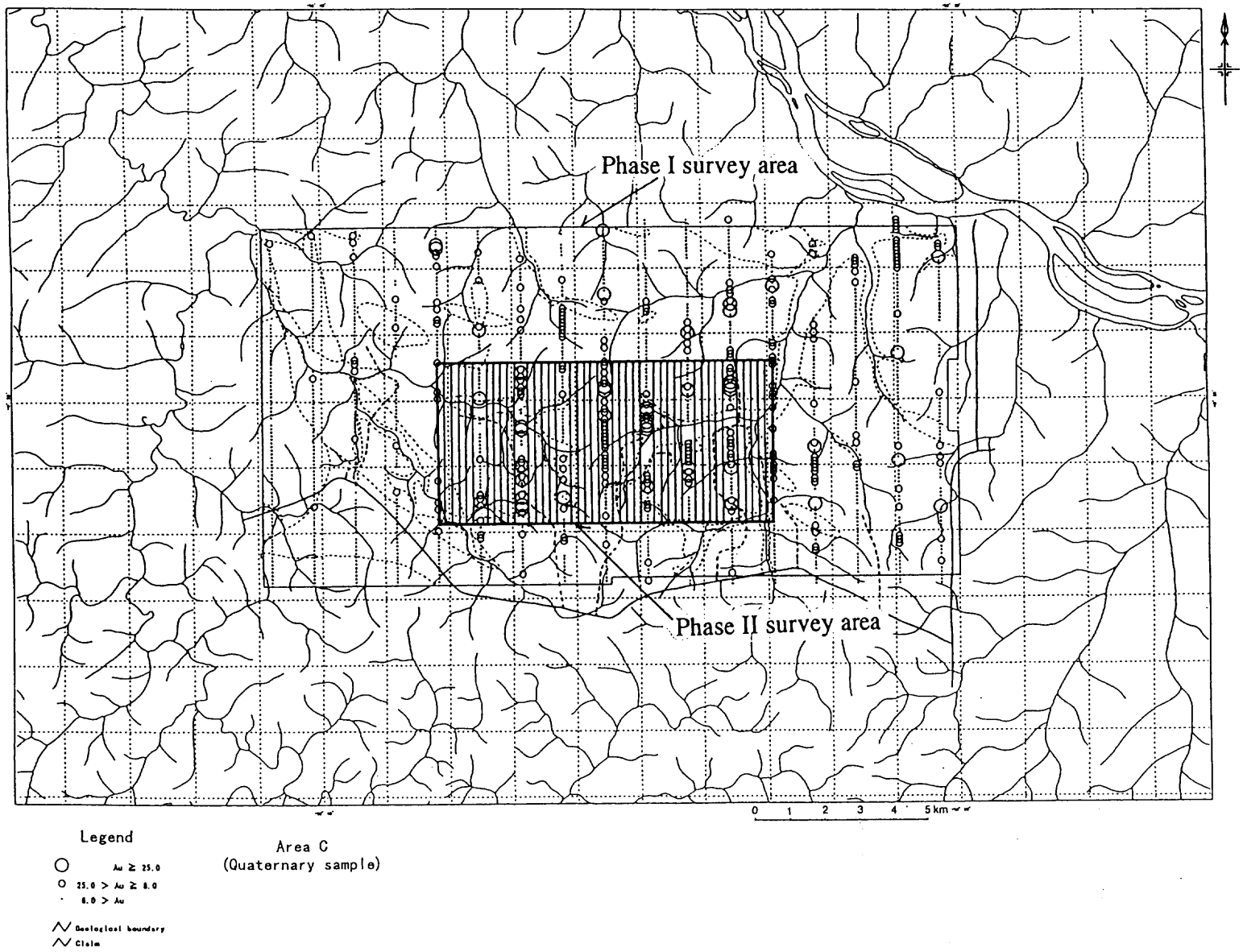


Fig. II-2-3 Geochemical survey area and Au soil anomalies in Block C

area. It is likely that metal associations such as, Copper, Gold and Iron reflect a gold mineralization adjacent to the intrusive center. Results of auger geochemical survey in C Block bears (Fig.II-2-5) a similarity with the results of B Block. The gold anomalies within saprolite were also narrow by localized distributions containing some high gold values.

2-2-2 Geological Survey

The survey area consisted of two blocks with 20Km long and 10Km wide. The geology of the area is as follows:

(1) Regional geology

The geology of the C Block is composed of pre-Uatuma Granite of early Proterozoic, Uatuma Group of middle Proterozoic, dike and Quaternary. Uatuma Group consists of Iriri Formation and Teles Pires Granite.

(a) Geology

The geology of C block is composed of Lower Proterozoic Pre-Uatuma Granite, Middle Proterozoic Uatuma Group, Dykes and Quaternary sediments. Shearing zones with NW-SE, NNW-SSE and ENE-WSW trends were confirmed in the primary gold garimpo of the survey area.

(b) Mineralization

Gold alluvial garimpo found widespread in the survey area is an indication that exist primary gold source within the survey area. One of primary gold source is the mineral showing C7 where it was detected that the gold mineralization is related to 30-cm wide quartz vein that fills a 30-degree dip within a shearing zone trending along NNW-SSE direction. Results of ore analysis showed values as 113.44g/t of Au and 194.3g/t of Ag. The ore analysis confirmed also anomalous values of Cu, Pb and Zn.

(2) Trench survey in C Block

A geological survey by trenching was carried out in the B Block area in order to uncover a hidden mineralized structure within the large soil gold anomaly. The clarification of the mineralized structure was helpful to define the direction of the drilling. Analytical results from trenches proved that some of the surveyed geological structure was related to gold mineralization in C Block and based in the information from these structures, it was possible to define the S45W direction for the drilling in the C Block.

Geological structure observed in the trench C1 consists of silicified zone, shearing zone

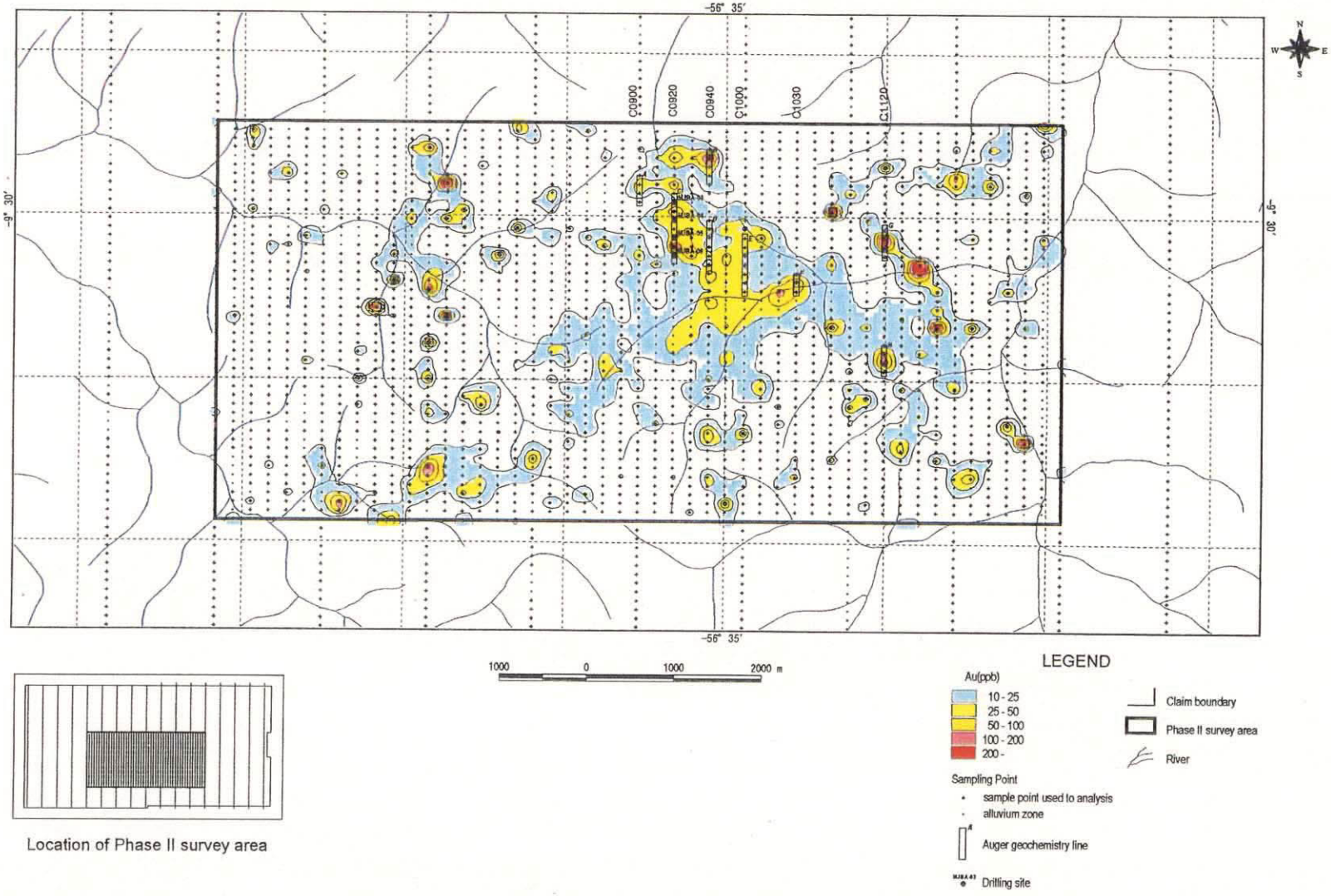


Fig. II-2-4 Distribution map of Au soil anomalies, location of auger survey line and drilling site in the Phase II survey area in Block C

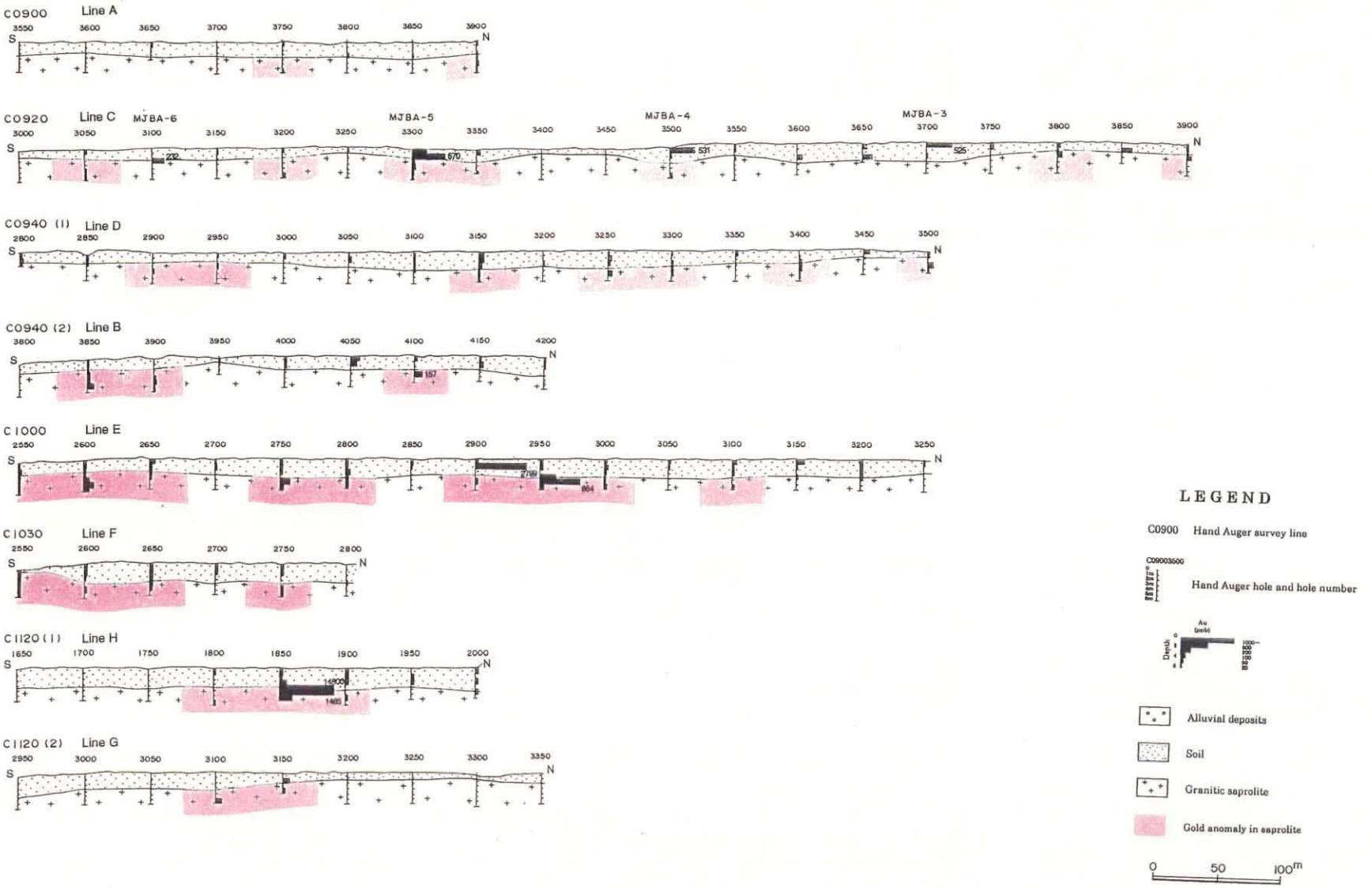


Fig. II-2-5 Geological cross section and Au anomalies by auger in Block C

and quartz vein and trenching between N55W and E-W with a low dip between 30 and 35 degrees to NE. Trench C2 showed quartz veins filling shearing zone at three sites, and its direction had a range between N10W and N50W and dips between 43 and 60 degrees. Results from channel sample taken in the bottom of the trenches proved that this geological structure was related to gold mineralization in C Block. Gold content above Au0.1g/t were commonly observed in this structure with a maximum value of Au51.7g/t in 25cm wide quartz vein filling shear zone.

2-2-3 Drilling Survey

RC drilling survey with 68 holes and total length of 3,400m and DD drilling survey with 10 holes and total length of 804.55m were carried out during the Phase I and Phase II in the C Block.

(1) Drilling survey of Phase II

Result of Phase II drilling survey (Fig.II-2-6) indicated a thickness average for the saprolite of 26m, and a maximum thickness of 44m as confirmed in the borehole MJBA-3. The drilling cores showed shearing structure with varied inclinations. Gold mineralizations were found within sheared sections of the drilling core, confirming that gold mineralization is strongly controlled by shearing structure. The shearing inclination in the drilling cores varied from 10 degrees to 80 degrees. Gold in hard cores as well as in saprolite were intercepted in MJBA-3, MJBA-4 and MJBA-5. The borehole MJBA-3 presented the best intercepts, showing gold values such as 0.1g/t and 0.55g/t within granitic saprolite. Some of these gold values presented oxidized pyrite.

(2) Drilling survey of Phase III

In order to understand the distribution of gold anomalies, detected by geochemical survey, in depth and also to acquire geologic and tectonic information related to the gold mineralization, a reverse circulation drilling (RC) program was conducted in C Block, and later a total coring drilling (DD) was conducted to confirm the continuity in depth of the gold anomalies detected by RC. Locations of RC drilling and DD drilling holes are shown in the Fig II-2-7.

Geological sections with drilling data are shown from Fig.II-2-8 to Fig.II-2-12. From RC and DD drilling carried out in C Block it was learned that the thickness of soil is thin and the thickness of granitic saprolite average 20m. Also, it was learned that the weathering in C Block is mild and show a thin saprolite layer in comparison with B Block area. Thin zone with shearing was observed in saprolite and fresh granite, and it was associated with alteration as silicification, potassic, epidote and chlorite. Abundant gold mineralization was detected by both RC and DD drilling and its results proved that the gold mineralization extends continuously from saprolite to the fresh rock. Accordingly to the analytical results of RC drilling holes, seven

samples of more than Au 1 g/t were confirmed in the C1, C2, C3 and C4 lines and maximum values were Au 1.92 g/t, Au 3.38 g/t, Au 4.04 g/t and Au 3.06 g/t. As the analytical results of DD drilling holes, some samples of more than Au 1 g/t were confirmed in the two holes of C3 line with a maximum value of Au 2.72 g/t. Gold mineralization detected is small in scale with low to moderate ore grade and narrow in width.

Survey in the primary garimpo showed that gold bearing quartz veins are located within shearing zone. The gold mineralization observed in C7 garimpo was related to quartz vein with a width of 30cm. Ore analysis results showed 113.44g/t of Au and 194.3g/t of Ag. Quartz vein samples taken from Waldemar garimpo that is located outside at eastern part of C Block presented values of 174.00 g/t of Au, 40.4 g/t of Ag and 0.40% of Cu.

The garimpo C7 and garimpo do Waldemar are thought to be related to the shearing zone hosting high gold grade quartz veins type. The gold mineralization detected by drilling survey was interpreted as stock work type gold mineralization.

Gold mineralizations intercepted by drilling survey show strong association with pyrite dissemination and/or pyrite films in shearing structure and quartz veins. The mineralizations widths are in the general very thin and from low to intermediate gold grade. The spatial distribution of these gold mineralizations is relatively continuous, but it shows large gold barren section between mineralized parts.

Continuous soil gold anomalies (Fig.II-2-13) are still present outside of the drilled area with gold grade many times higher than that broad gold anomaly drilled during this year. The possibility to find a high-grade gold mineralization type related to shearing zone, exemplified by Paraiba gold mine, exists below this soil anomaly.

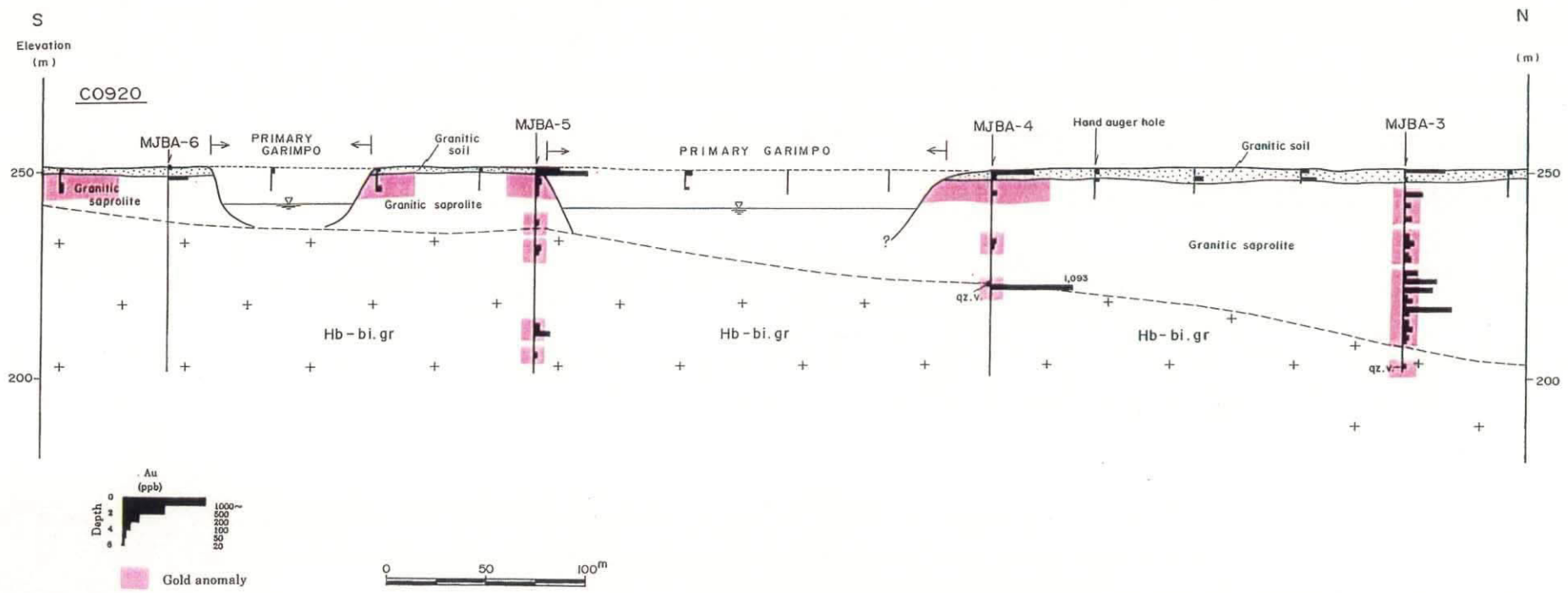


Fig. II-2-6 Geologic cross section of borehole site of Phase II in Block C

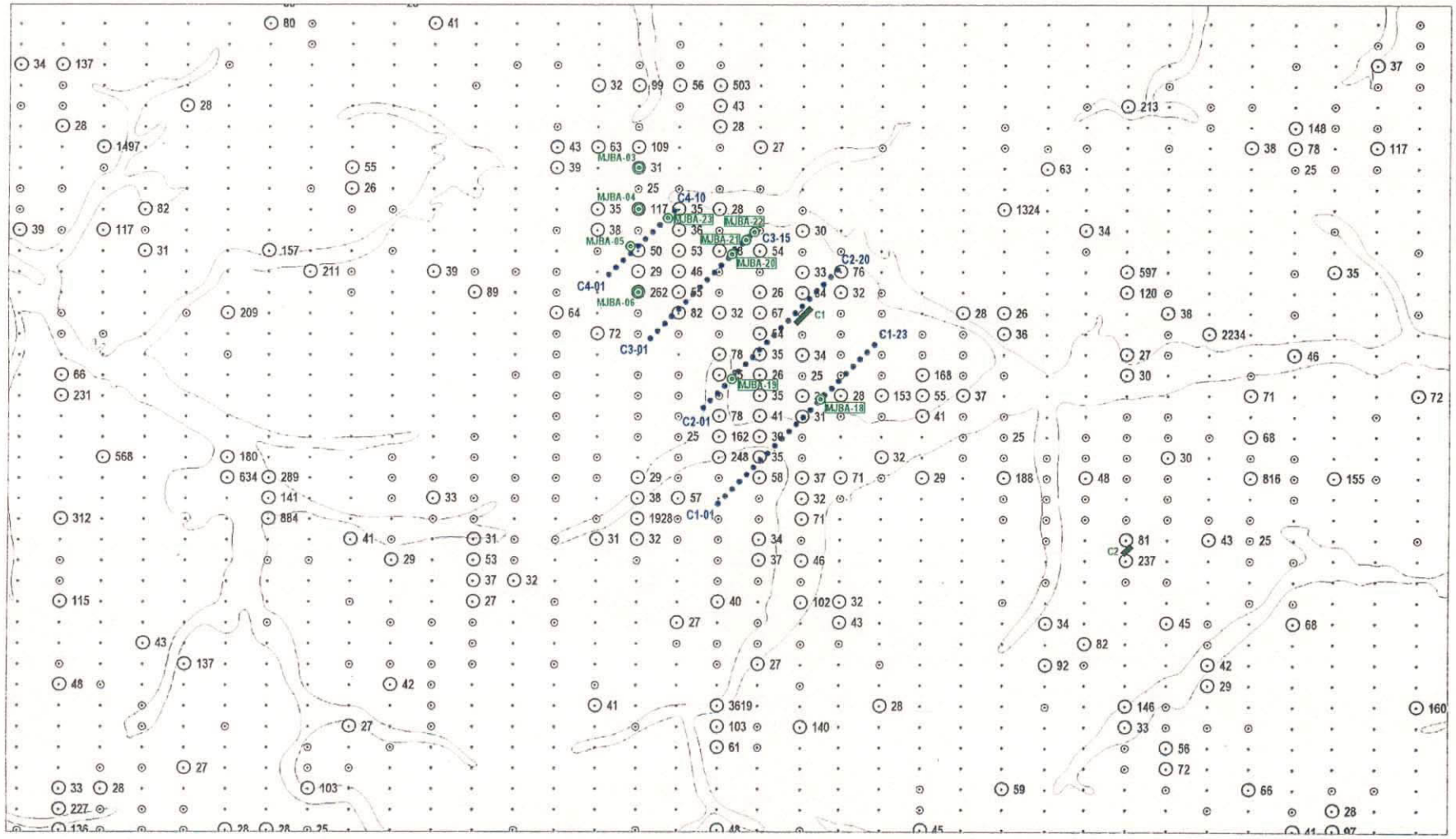


Fig. II-2-7 Location map of RC drilling line, DD holes and Trenches in Block C

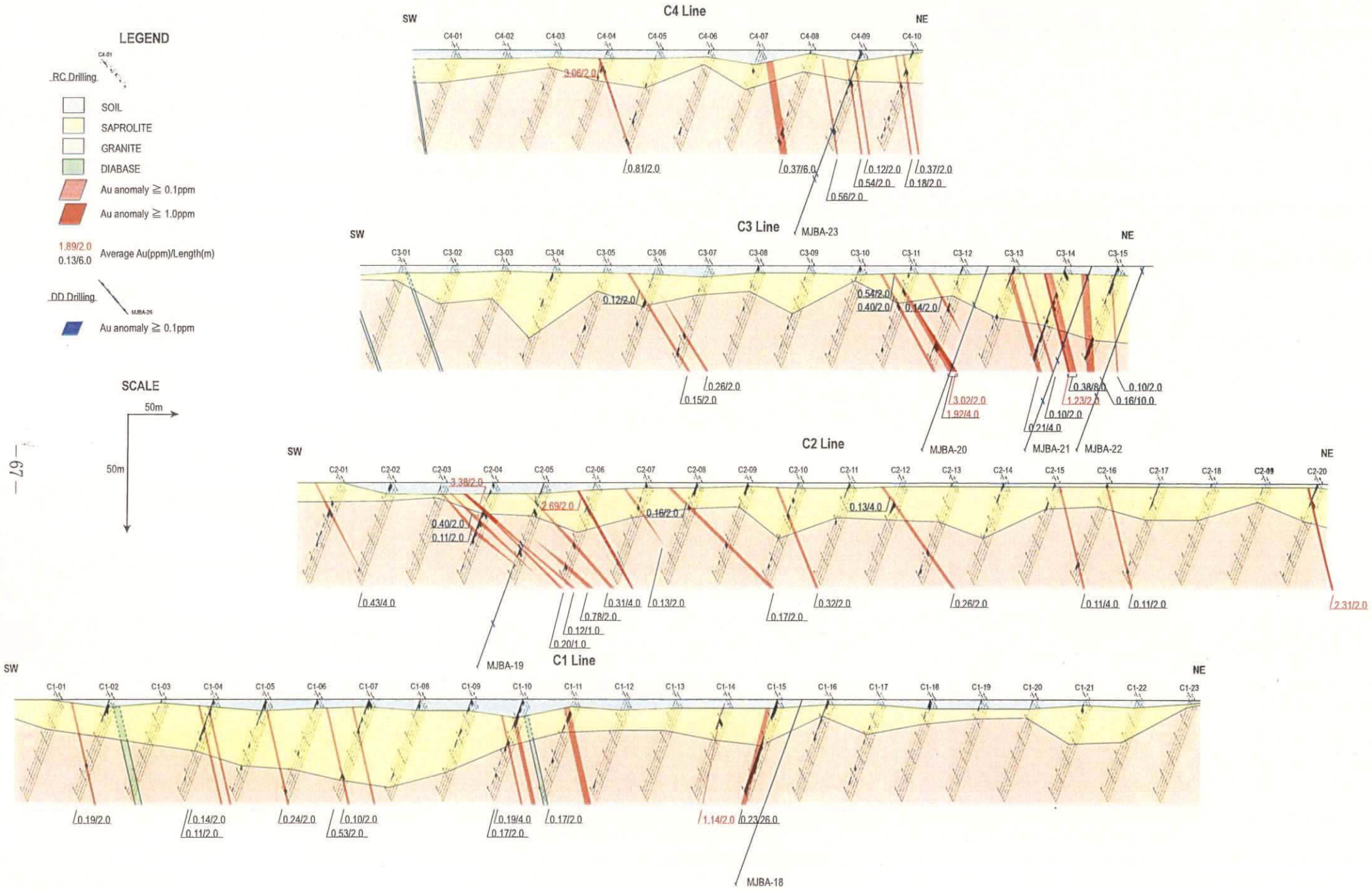


Fig. II-2-8 Geologic cross section of boreholes in Block C

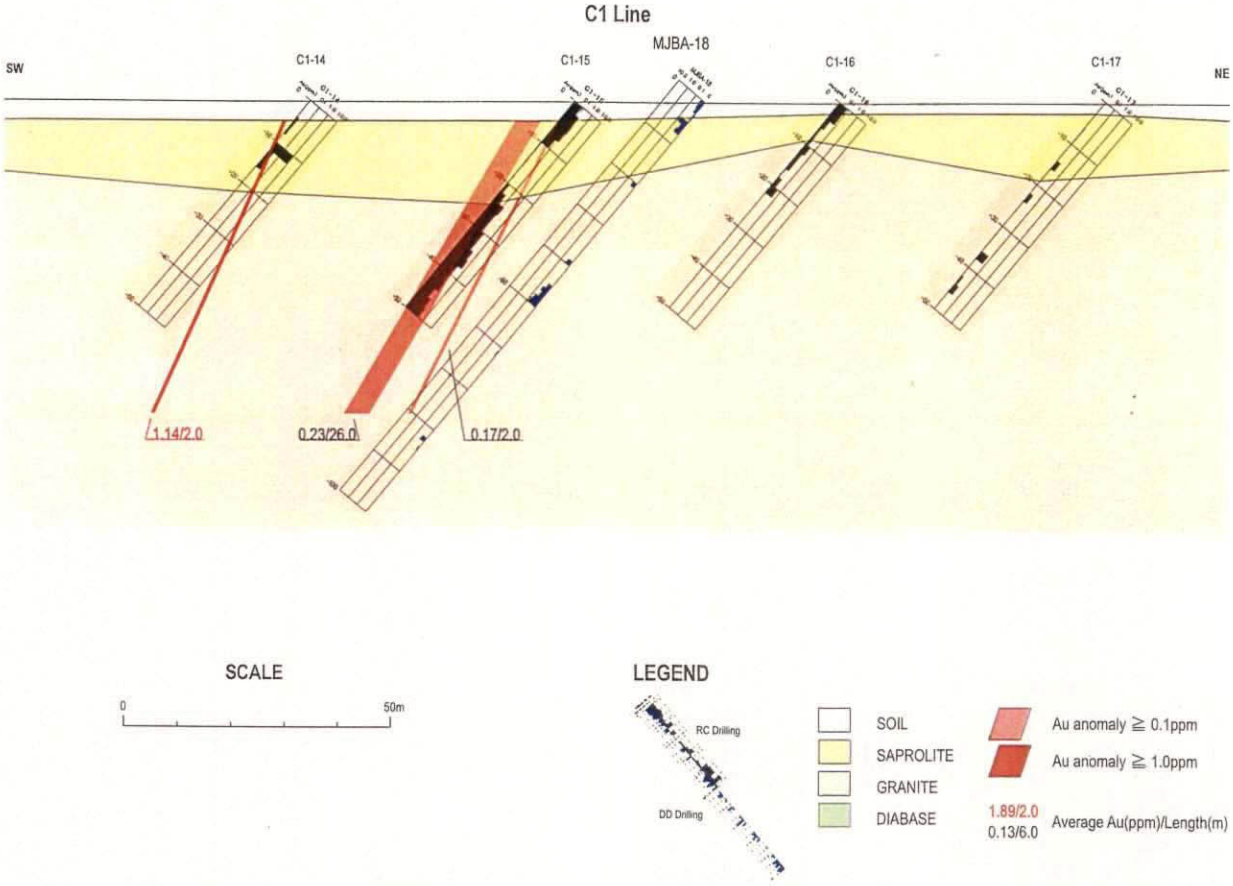


Fig. II-2-9 Geologic cross section of boreholes MJBA-18

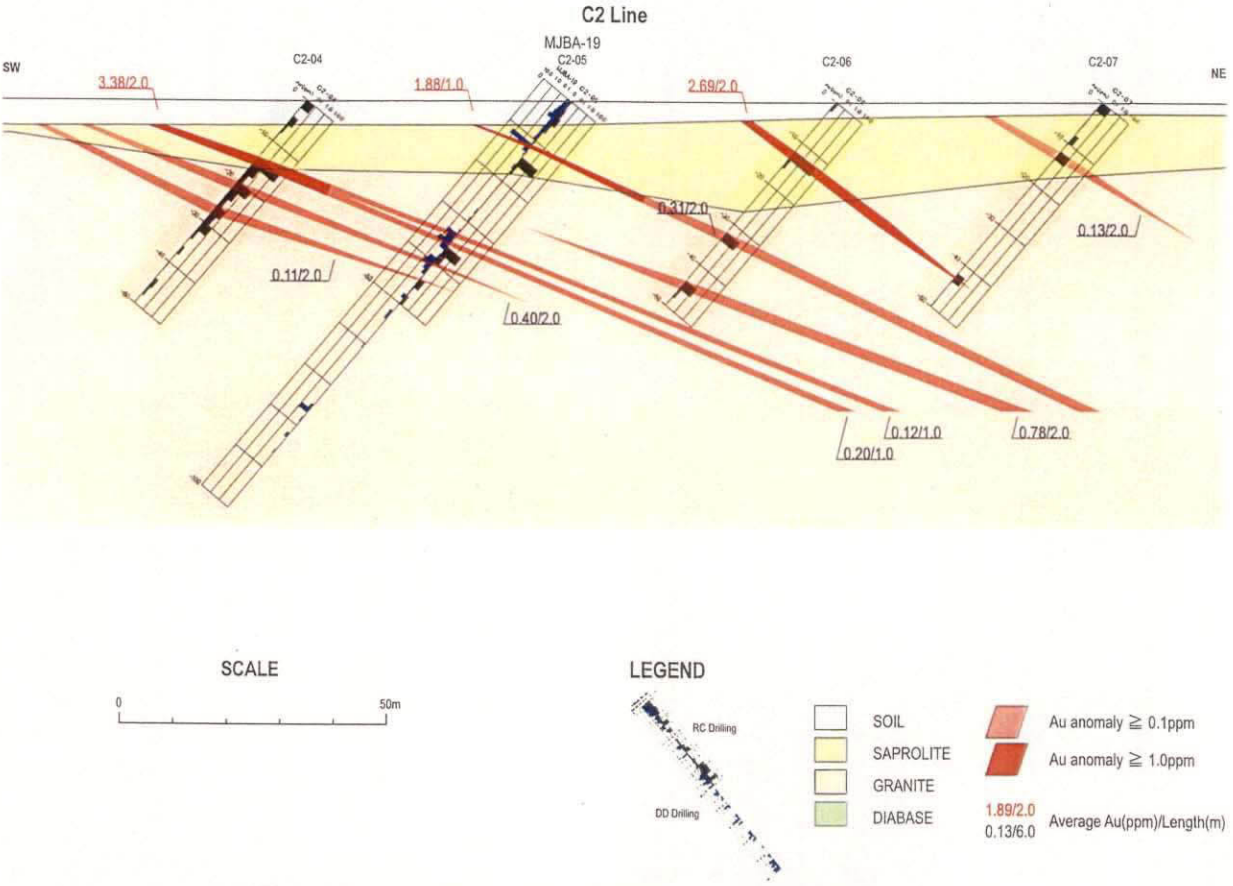


Fig. II-2-10 Geologic cross section of boreholes MJBA-19

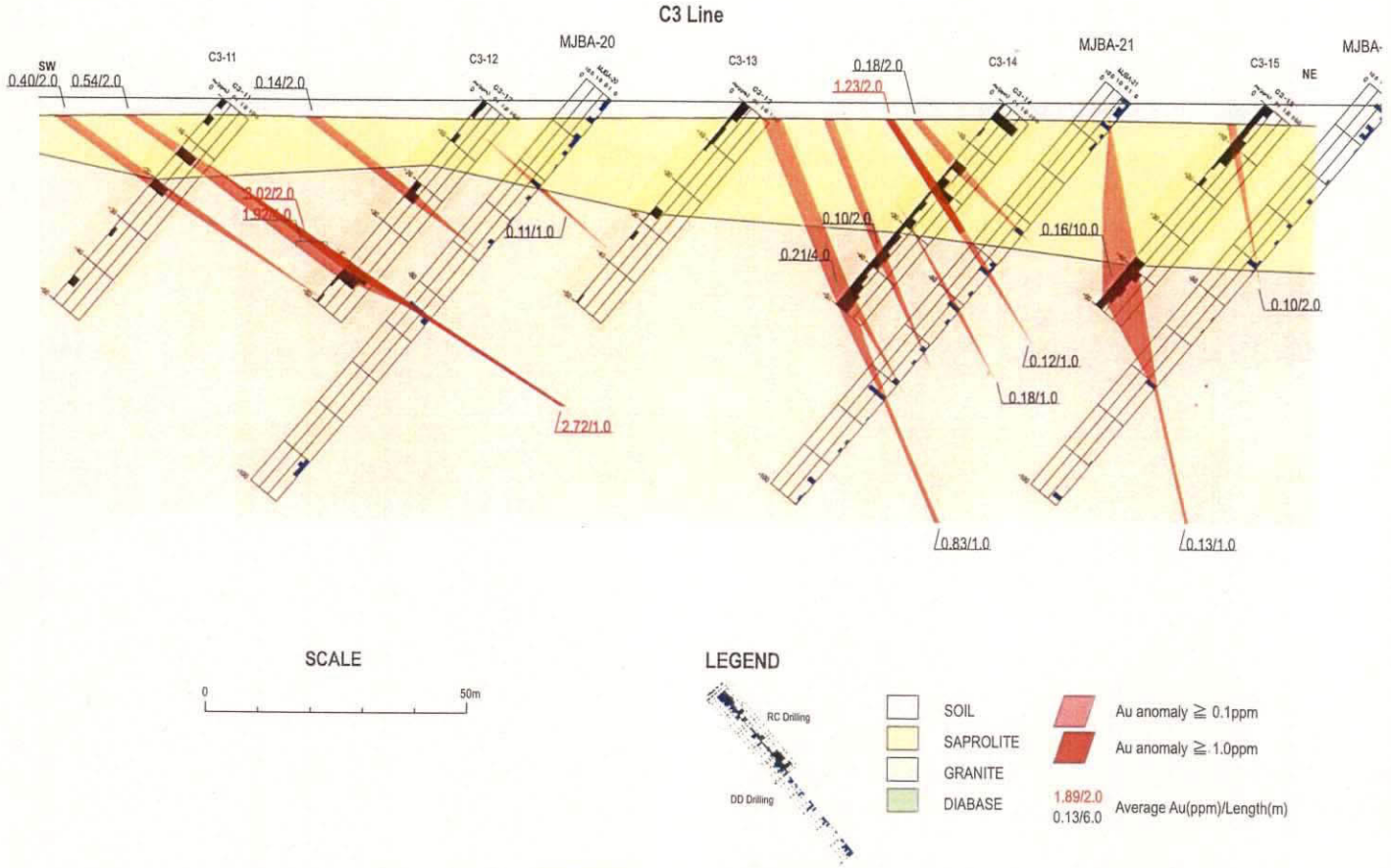


Fig. II-2-11 Geologic cross section of boreholes MJBA-20. 21and 22

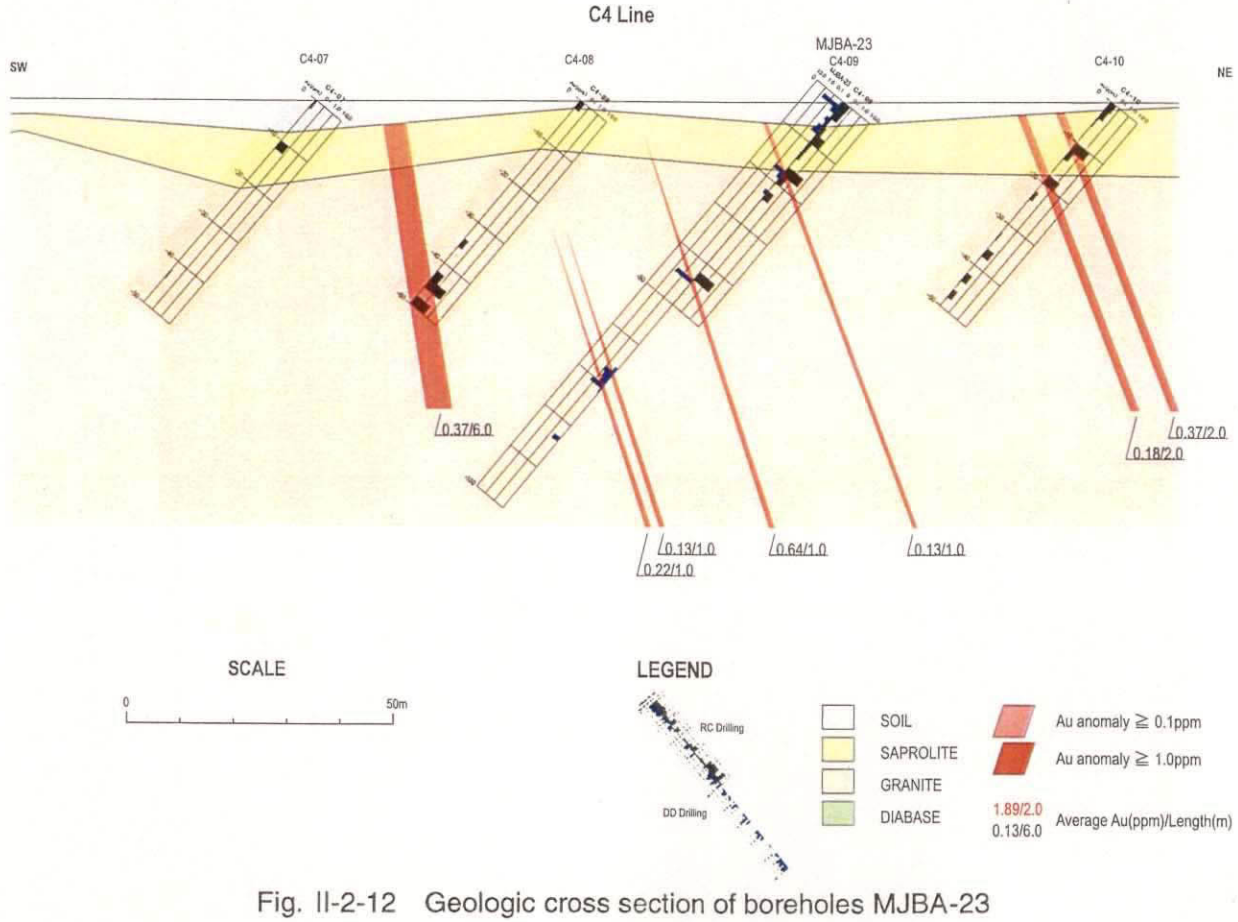


Fig. II-2-12 Geologic cross section of boreholes MJBA-23

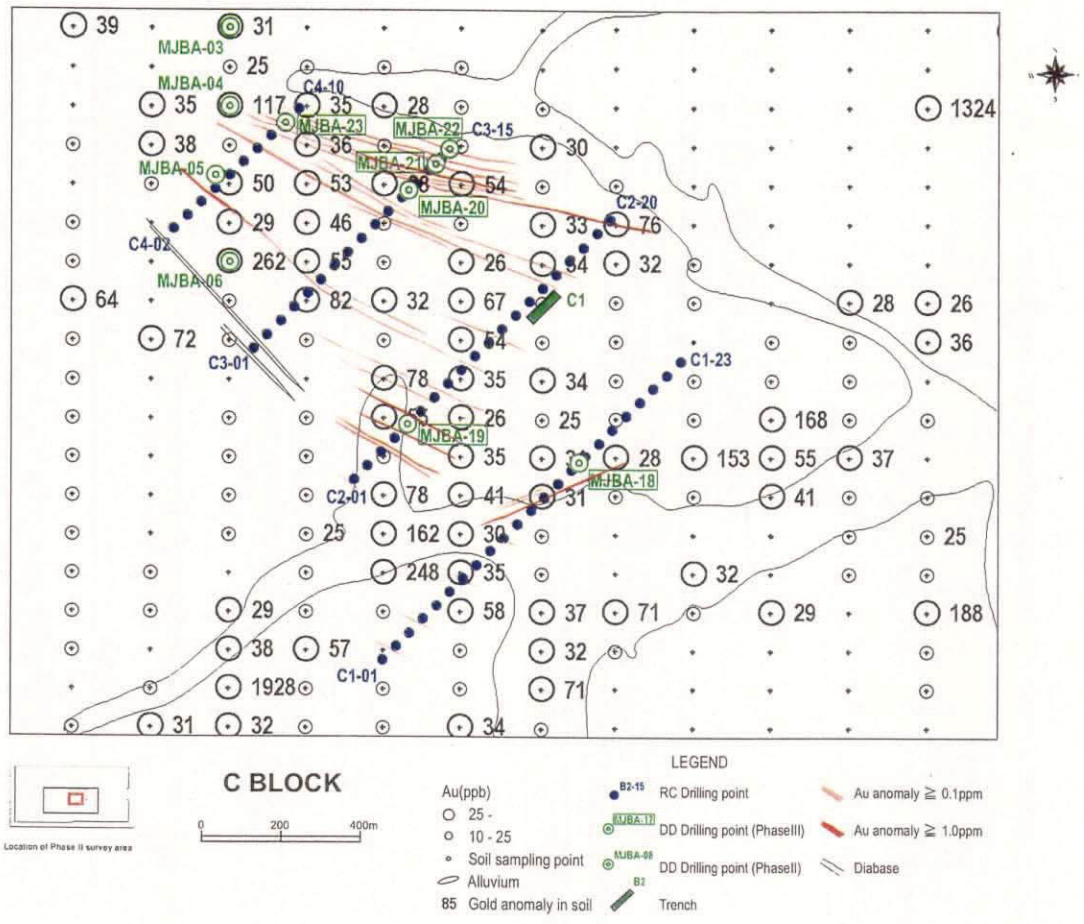


Fig. II-2-13 Interpretation map from drilling survey of Phase III in Block C

CHAPTER 3 E BLOCK AREA

E Block is located at south-southeast part of Alta Floresta city. Due to the leveled topography, outcrops are rarely found but they are more frequently seen in the low-hill slopes oriented northwest. The garimpo named Cabeca is considered as the most important garimpo and it is located 8 km to the west of E Block.

3-1 Survey Results

Only a regional geological survey was carried out in the E block.

3-1-1 Geological Survey

(1) Geology

The geologic map and the sites of gold mineralization are shown in Fig. II-3-1. The region of E block is represented by the following geologic units: Xingu Complex (Px), Pre Uatuma, granite (GrI), Iriri Formation and Granite of Uatuma Group (Pui), Middle Proterozoic Basic intrusive (Gb), Tertiary age Residual Sediment (Trs), Dykes (Db) and Quaternary age Recent alluvium.

The Xingu Complex unit (Px) is represented by gneiss, augen gneiss, granite gneiss, schist, amphibolite and BIF. They are all oriented along the northwest regional trend. The schist outcrops with a regional northwest trending at regular intervals within a wide zone of gneissic rocks that suggest an alternation of thin schist band within wider gneissic bands. The Pre Uatuma Granite (GrI) is composed of a foliated hornblende biotite-granodiorite presenting a weak mylonitization. The granite was interpreted as an older granitic intrusion possibly related to Juruena type granodiorite. In the southwest edge of E block of the Xingu Complex, the schist zone is covered by volcanic rocks of acid composition and correlated to the Iriri Formation. The volcanic outcrops present a W-NW trend and composed mainly by rhyolite showing flux structure, rhyodacite and locally dacitic tuff.

The basic Intrusive (Gb) is composed of a large gabbroic body that is intruded in gneiss and granite gneiss of Xingu Complex.

The Tertiary age Residual sediment (Trs) is composed of residual sediments and distributed in the southwestern portion of E block.

The dykes (Db) that are essentially of diabase composition, cut most of the unit in the E block area.

(2) Mineralization

The Cabeca alluvial garimpo is by far the biggest alluvial gold mineralization in the E block

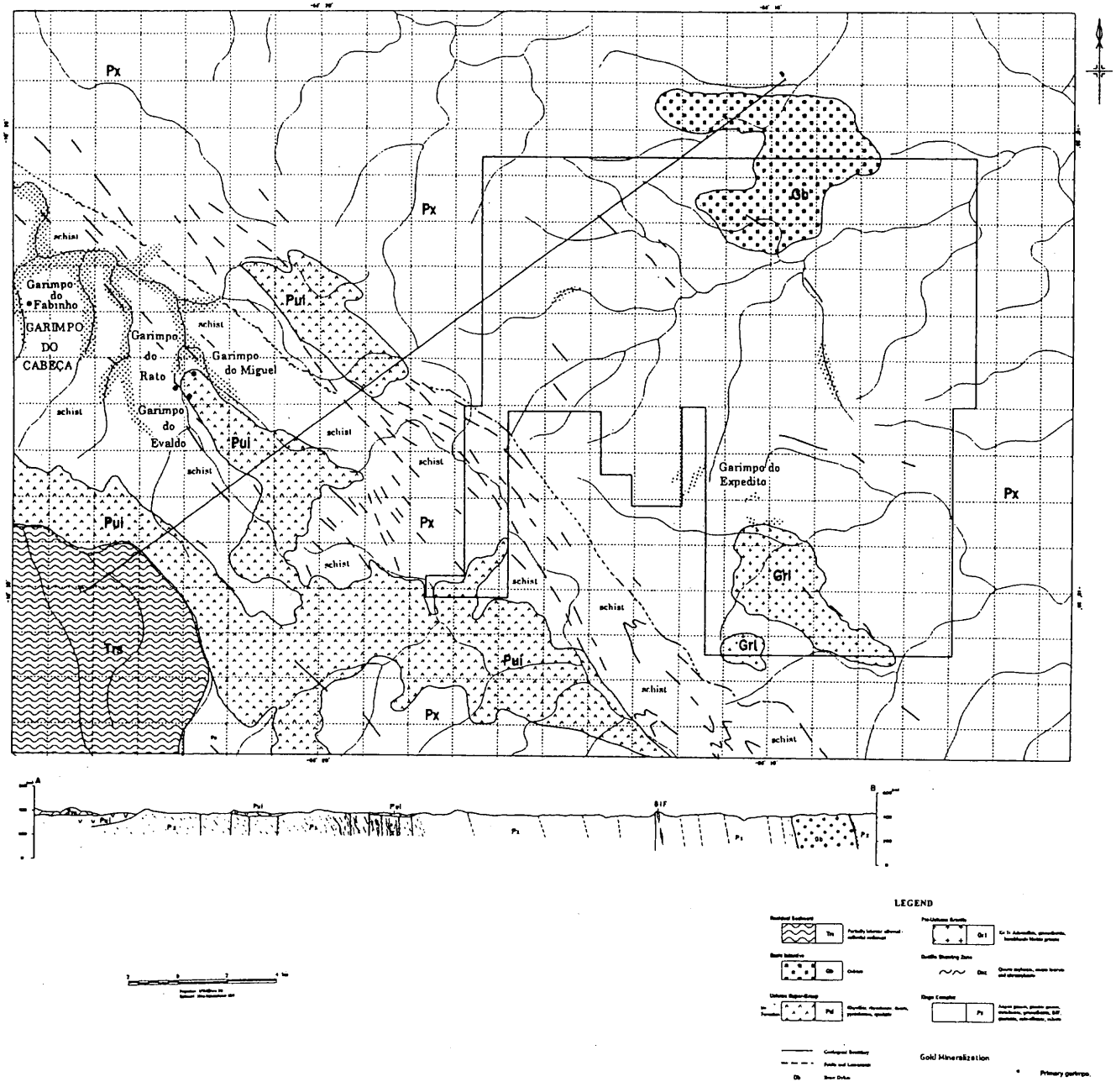


Fig. II-3-1 Geological map of Block E

region. The source of the Cabeca alluvial gold mineralization is probably related to quartz veins and veinlets that fill the ductile shearing with N70W to N80W direction. In spite of that, it is still unknown any large primary mineralization in the Cabeca alluvial garimpo region. An evaluation survey carried out by Metamat in 1994 in 5 small primary garimpos of the Cabeca alluvial garimpo area, indicated that gold bearing quartz vein filling mylonitized garnet-quartz-sericite schist represents one of the gold sources for the Cabeca alluvial garimpo.

The gold grade values in these quartz veins resulted in values up to 30 g/t with vein thickness between 15 cm and 150 cm. The mylonitic trend was N75W, however, the gold rich quartz veins were formed by filling secondary fracturing systems of N20E~N30E and N5W~N15W directions.

The survey results carried out within E block, clearly indicated that the area related to E block does not present any favorable geological or tectonic condition to host a major gold deposit and consequently, the potentiality of this block is considered to be low.

CHAPTER 4 F BLOCK AREA

F Block with a surface area of 10,000 Ha is located far away to the east of Alta Floresta city and very close to the Guaranta do Norte city.

In this block, geochemical survey, geological survey and drilling survey were carried out in the locations indicated in the Fig. II-4-1.

4-1 Geology and Mineralization

Geological survey was carried out concomitant to soil geochemical survey. The geologic map is shown on Fig. II-4-2.

(1) Geology

Archean to Lower Proterozoic Xingu Complex (Px), Dykes and Quaternary sediment compose the geology of F block.

The Xingu Complex (Px) outcrops in the entire area of F block, and it is represented by varied metamorphic units, as biotite-gneiss (Pxgn) and schist (Pxsch), granitic rocks as biotite granite (Pxmg), granite with gneissose structure (Pxgg) and porphyry granite (Pxgp) and volcanic rocks as andesitic tuff (Pxv).

The biotite-gneiss (Pxgn) confirmed by thin section sample A2338, outcrops at the southwestern end of F block area. The schist (Pxsch), outcrops with a WNW-ESE elongated exposition at the vicinities of the Serrinha do Guaranta garimpo area, in the southwestern part of F block.

The biotite granite (Pxmg) is medium to coarse grained, and present a porphyritic potassic feldspar texture. The granite with gneissose structure (Pxgg) outcrop at the southern part of the survey area, and it was confirmed as medium to fine grained. The porphyry granite (Pxgp) outcrops at the Eastern part of the survey area.

The volcanic rocks represented by andesitic tuff (Pxv) outcrops at 3 sites in the central part of the survey area.

The dykes are composed of a wide diabase dyke that outcrops at the southwestern part of the F block. The diabase presents a weak dissemination of pyrite and the gneissose host rock present alteration as dissemination of pyrite and hematite and silicification.

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

The shearing zones are the most important geological structure observed in the survey area and some of the primary gold garimpo, as Aluizio garimpo, are located inside these shearing structures. The main shearing direction observed in F block is WNW-ESE structure and the Aluizio garimpo is within of this shearing trend.

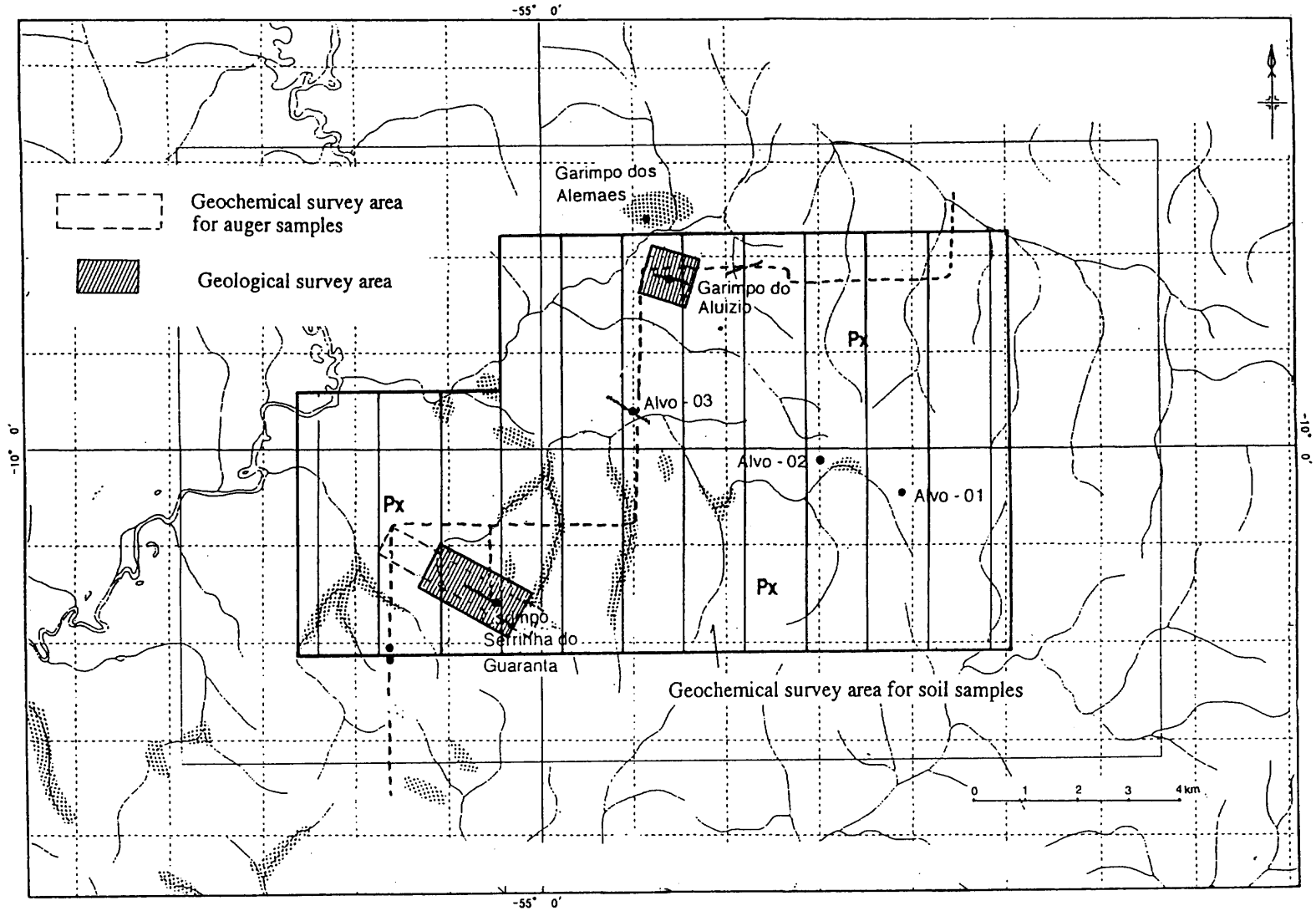


Fig. II-4-1 Location map of geochemical and geological survey areas in Block F

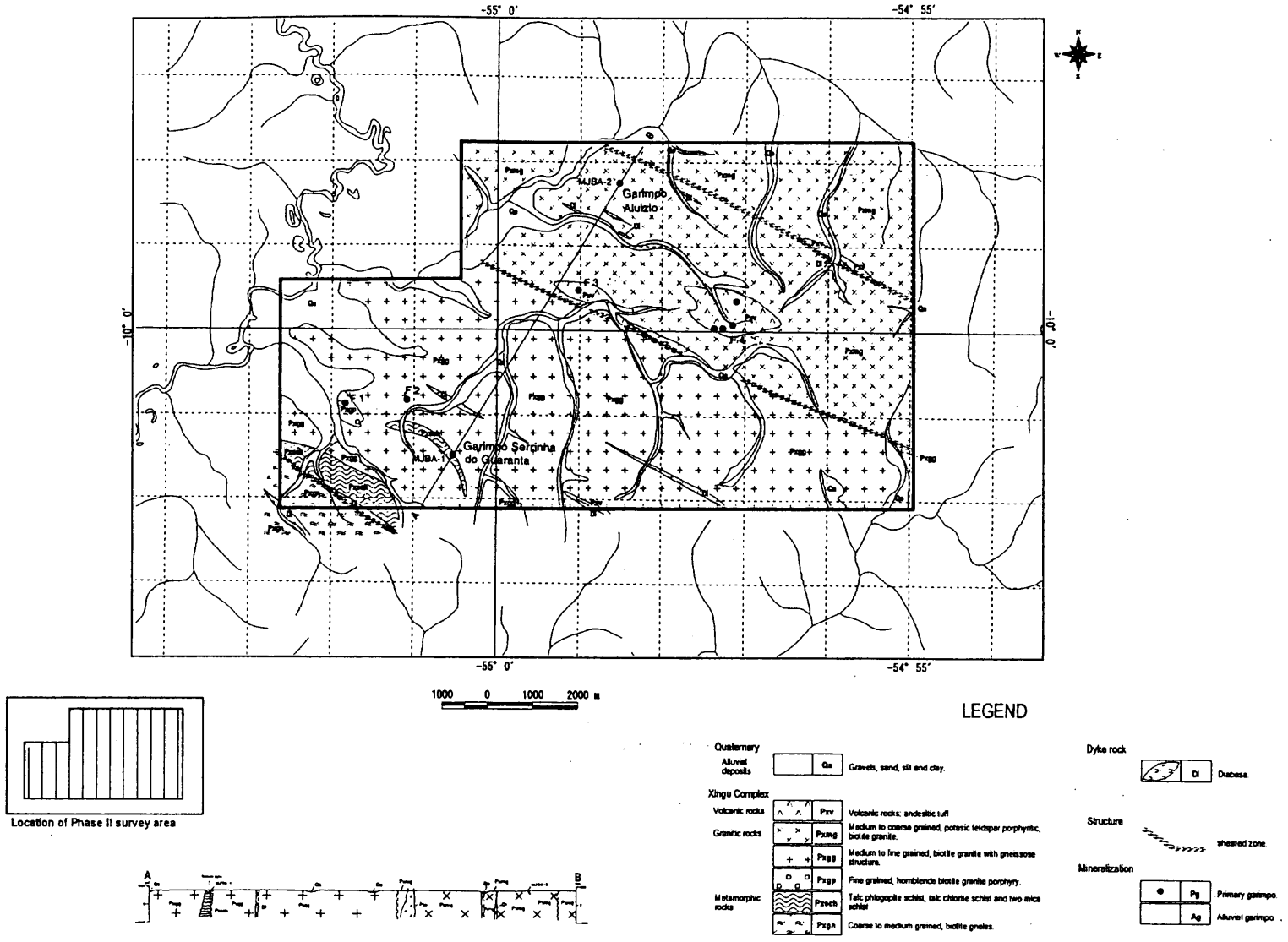


Fig. II-4-2 Geological map of Block F

(2) Mineralization

The most important primary gold garimpo in the survey area are the Serrinha do Guaranta garimpo (located in the southwestern part of block F area) and Aluizio Garimpo (located in the northern part of the same area). Others gold garimpo within shearing zones presented very low gold grades.

4-2 Survey Results

A regional soil geochemical survey was carried out in the entire area of the F Block. A detailed geological survey was carried out in two areas including the Serrinha do Guaranta garimpo and Aluizio Garimpo. An auger geochemical survey was carried out at the vicinities of Serrinha do Guaranta garimpo. Drilling survey was carried out in two garimpo areas selected during the detailed geological survey.

4-2-1 Geochemical Survey

The Phase II soil geochemical survey was recommended by the results of the Phase I geological survey. The main objective of the geochemical survey was to identify gold mineralization in places others than Serrinha do Guaranta and Aluizio within F block.

(1) Regional soil geochemical survey

Result of soil geochemical survey confirmed the presence of two major trends for the gold anomalies in the F block, as observed in the compiled map on the Fig. II-4-3. NW-SE gold anomalies trend was observed in the southwestern part while a WNW-ESE trend was observed in the central part and central north part of F block. These gold anomaly trends were interpreted as reflecting gold mineralization strongly controlled by shearing structures. The gold anomaly at the central north part of F block embodies the Aluizio garimpo that show the same above mentioned shearing direction. The southwest gold soil anomaly that embodies the Serrinha do Guaranta garimpo area was interpreted as controlled by both, shearing structures and lithology.

The multi element analysis indicated an association between Au and Cu in the southwestern gold soil anomaly and this metal signature possibly is reflecting gold mineralization adjacent to the intrusive center.

(2) Auger geochemical survey

After investigating the previous exploration data, the auger geochemical survey lines were planned in the Serrinha do Guaranta area in order to clarify the relation of the geochemical anomalies

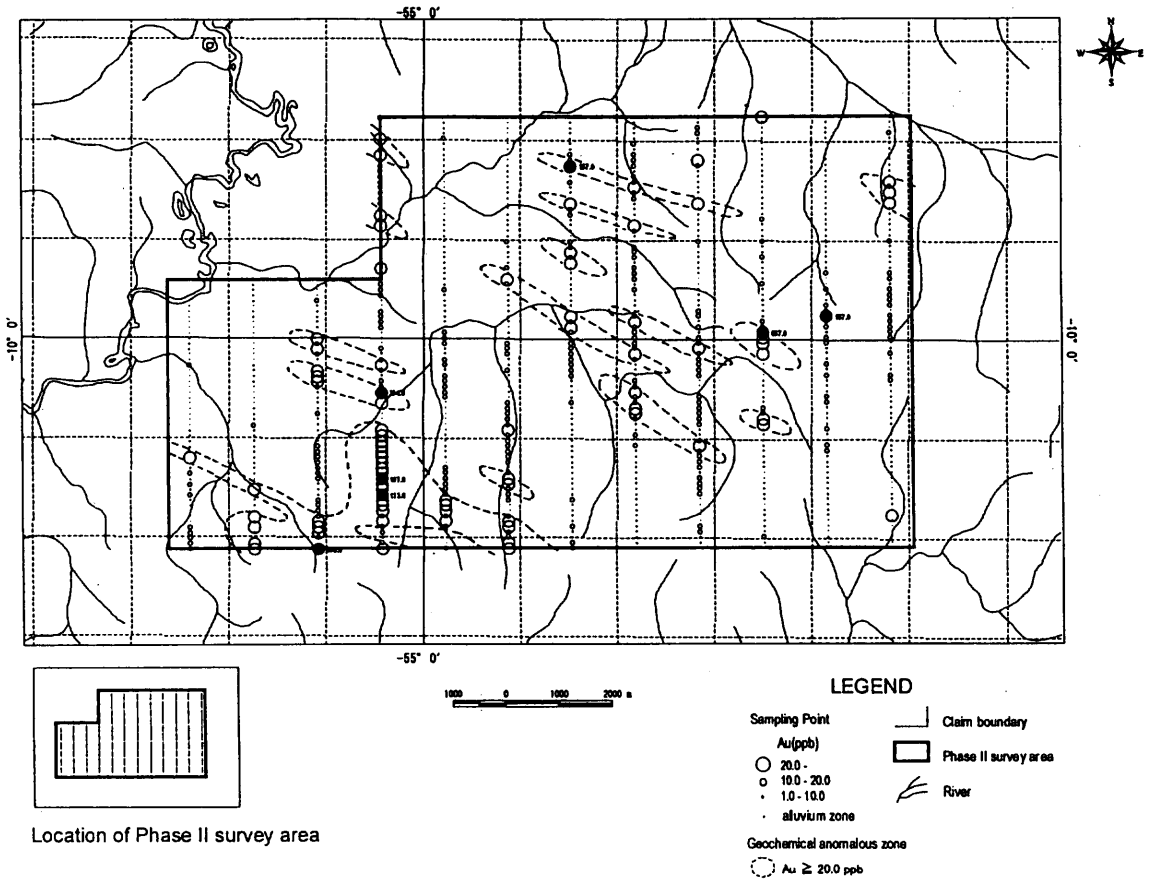


Fig. II-4-3 Au soil anomalies in Block F

and the geology. 16 survey lines of auger geochemical survey were planned as shown in Fig. II-4-4.

The auger survey (Fig.II-4-5) confirmed that the gold anomaly in soil and in saprolite extends toward north and its results confirmed the wide gold anomaly in soil obtained by the regional geochemical survey. The auger survey also showed that the gold mineralization of Serrinha do Guaranta is not continuous and probably presents a form of boudinage structure.

Interpretation of analytical results samples confirmed that the gold anomalies in soil show a large distribution of low gold grade, however, the gold anomalies in saprolite are narrow and locally presenting high gold values. In the Serrinha do Guaranta garimpo area, it is impossible to prepare a original distribution map because the detritus gold the gold anomaly is related to the garimpo tailing and the existing gold was mined one time. The distribution of higher gold values has an erratic spatial distribution. The gold anomaly showed a NNW trend zone confirmed to be longer than 2 Km.

4-2-2 Geological Survey

The survey area for Phase II geological survey was selected based on the survey results of Phase I survey. Results of Phase I survey indicated gold and copper anomalies in Serrinha do Guaranta garimpo area and gold anomaly in Aluizio garimpo area. The objective of this survey was to clarify the geological structure related to the gold mineralization. Two borehole sites were selected within these garimpo areas.

(1) Serrinha do Guaranta garimpo area

The geological map of the garimpo area is shown on Fig. II-4-6.

Archean to Lower Proterozoic Xingu Complex (Px), Basic Dykes and Quaternary sediment compose the geology of Serrinha do Guaranta area. The Xingu Complex (Px) outcrops in the entire survey area and it is represented by metamorphic units, as biotite-gneiss (Pxgn) and schist (Pxsch) and intrusions as biotite granite (Pxmg) and basic dykes. Diabase dyke is commonly intruded within the shearing zone.

Borehole MJBA-1 showed diabase and rhyolite dykes intruded in schist (Pxsch). A weak dissemination of pyrite was observed in diabase and dissemination of pyrite and hematite and silicification were observed in gneissose host rock. The quaternary (Qa) is mainly alluvial deposits that are distributed in the rivers flat.

Shearing zones are present in the survey area and the primary gold garimpo of Serrinha do Guaranta are located inside these shearing structure. The main shearing direction in the survey area is NW-SE and present ductile and brittle-ductile deformation and locally strong brecciation. The direction of the deformation is NW-SE and inferred to be parallel to the schist outcrop.

The Archean unit is intensely affected by shearing zones and filled by basic dykes. Alteration

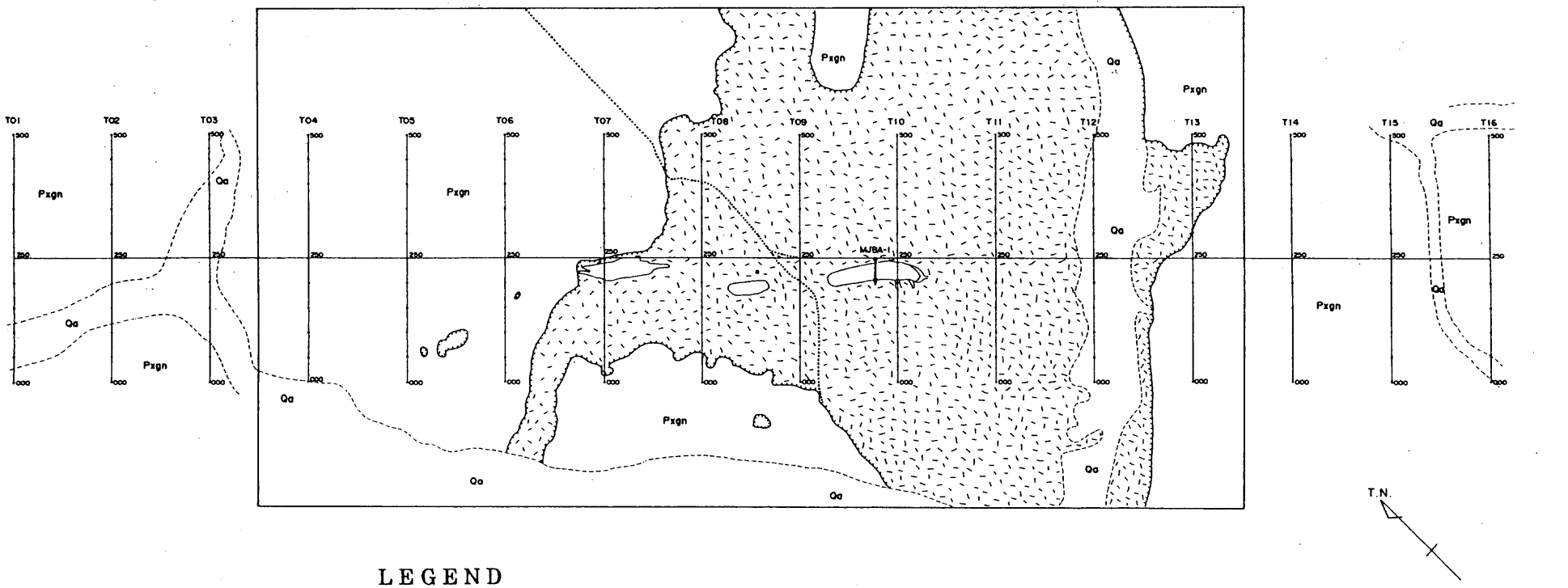


Fig. II-4-4 Location map of auger samples and drilling site in Block F

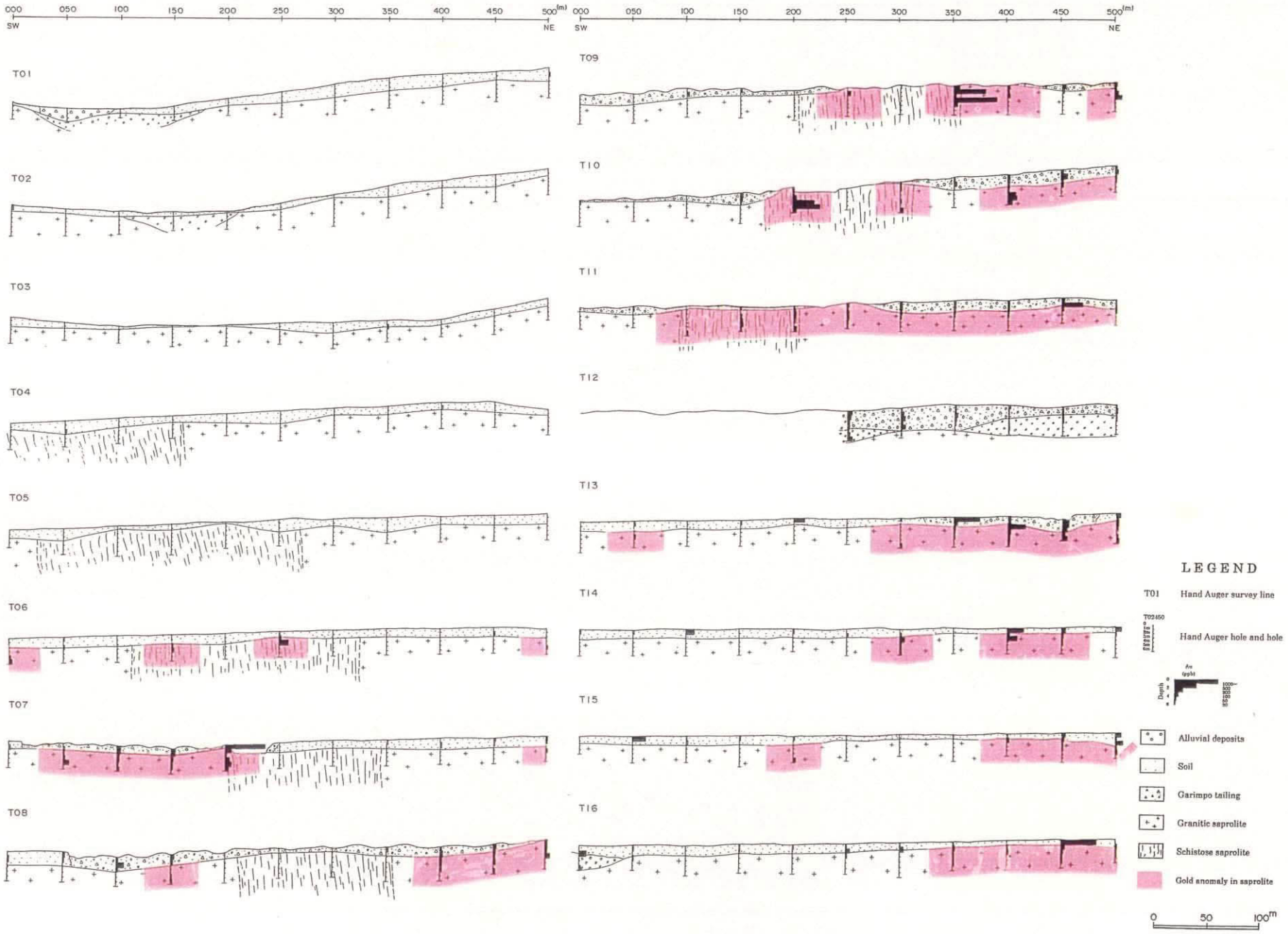


Fig. II-4-5 Geological cross section and Au anomalies by auger in Serrinha do Guaranta area

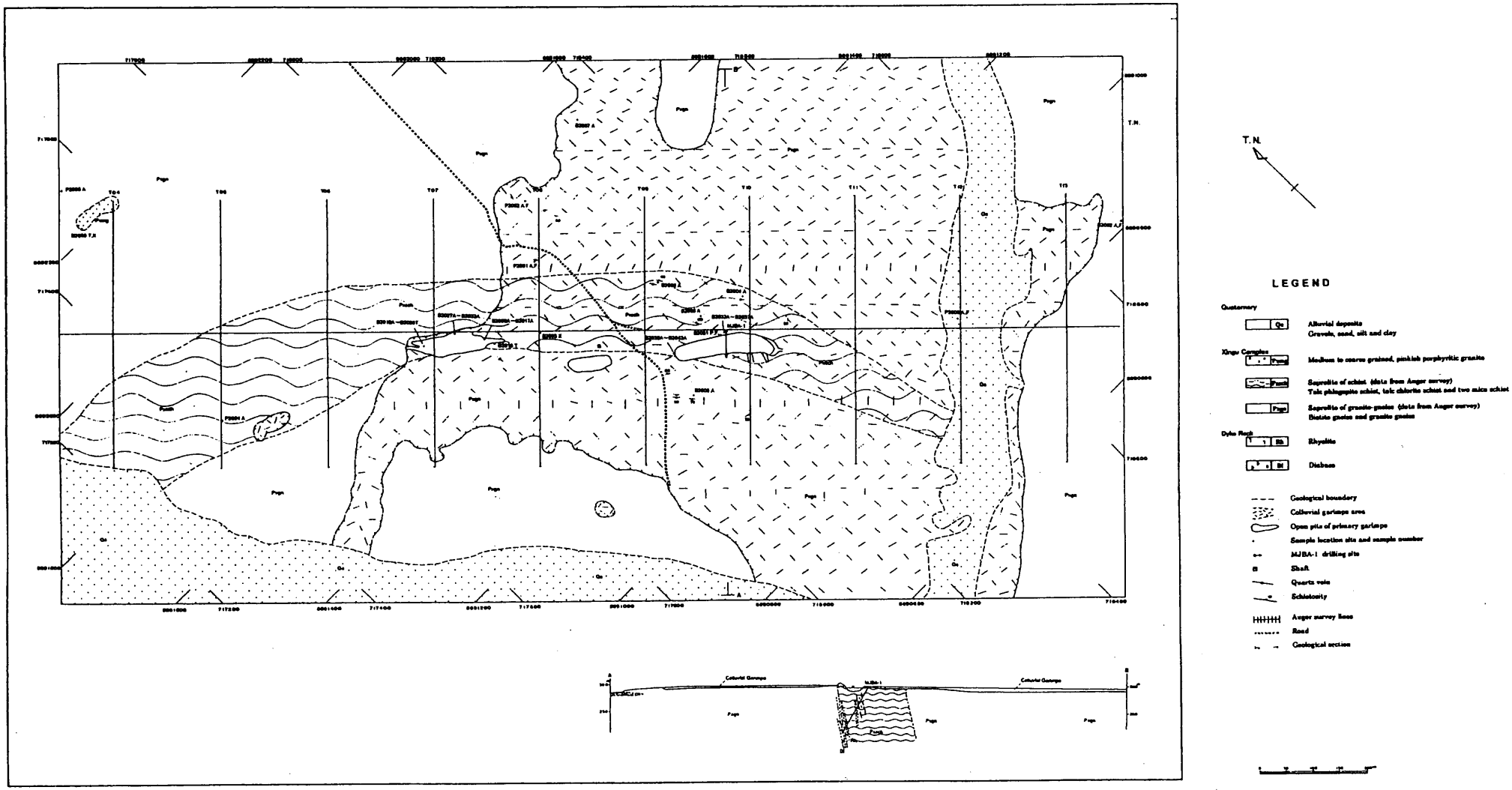


Fig. II-4-6 Geological map of Garimpo Serrinha do Guaranta area

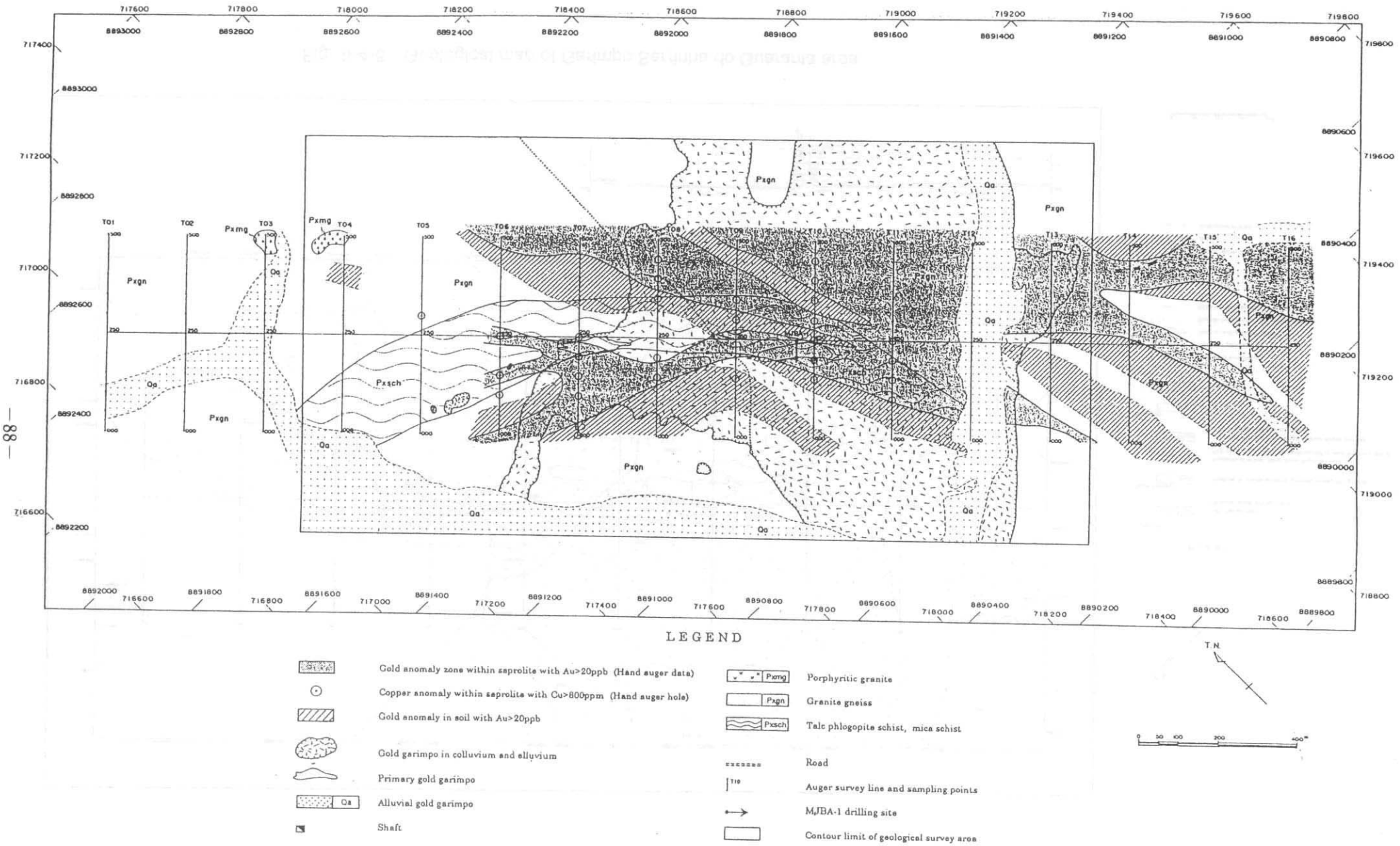


Fig. II-4-7 Compiled map of geology and auger geochemical gold anomalies in Garimpo Serrinha do Guaranta area

minerals detected in the mineralized area are composed of quartz, albite, chlorite, talc, tremolite, calcite and dolomite. Primary garimpo open pits are located inside these shearing structures. The main direction of shearing in the survey area is NW-SE and show ductile and brittle-ductile deformation with local strong brecciation. Two garimpo open pits were surveyed by channel sampling in Serrinha do Guaranta. At the southeast garimpo open pit, it was detected a weak gold mineralization in surface, with maximum gold value of 0.32g/t and a copper average grade of 0.25%. Results from channel samples at the northwest garimpo open pit in Serrinha do Guaranta confirmed a weak gold and copper mineralization with maximum Au0.29g/t and an average Cu0.09%.

(2) Aluizio garimpo

The geological map of the garimpo area is shown on Fig. II-4-8.

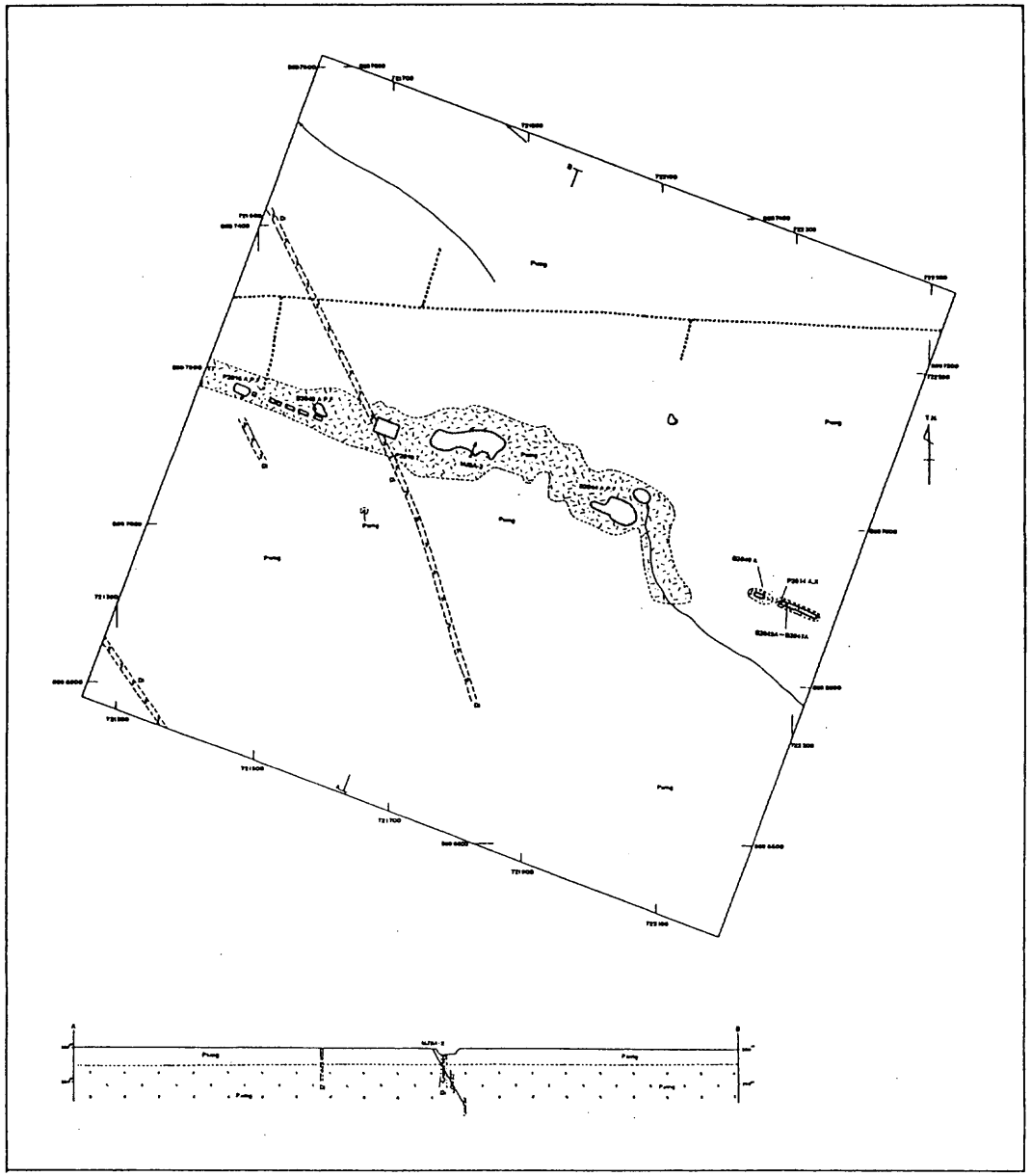
Archean to Lower Proterozoic Xingu Complex (Px), Basic Dykes and Quaternary sediment compose the geology of Aluizio area. Xingu Complex (Px) outcrops in the entire survey area and it is represented by granitic rock as biotite granite (Pxmg) and basic dykes. Diabase dykes has a general NW-SE direction and it is intruded in granite. Borehole MJBA-2 confirmed the presence of 5 diabase dykes intruded in sheared granite (Pxmg). A weak dissemination of pyrite was observed in the diabase. The quaternary (Qa) is mainly alluvial deposits that are distributed in the rivers flat.

Shear zone with NW-SE shearing direction is present in the survey area and the primary gold garimpo of Aluizio is located inside this shearing structure. Analytical results for four-sulfide rich quartz veins filling shear zone, provided gold content between Au1.55g/t and Au12.45g/t. Analytical results indicated an average gold grade of 0.32g/t in 6 meters.

4-2-3 Drilling Survey

Results of Phase I geological survey indicated promising results for gold mineralization in Serrinha do Guaranta and Aluizio garimpo. Drilling survey was recommended in these garimpo areas, during Phase II, aiming to clarify the geological structure associated to gold and copper mineralization in Serrinha do Guaranta and also to evaluate the gold mineralization at depth in Aluizio area. The location of borehole MJBA-1 and MJBA-2 were presented in the Fig II-4-6 and Fig II-4-8.

The borehole MJBA-1 confirmed that the gold mineralization in Serrinha do Guaranta garimpo area is related to quartz vein filling sub-vertical shearing zone (Fig.II-4-9). It also confirmed that the copper mineralization is confined within black schist, but the primary source of copper anomaly was not clarified. Thin section and polished section could not identify any mineral associated to the copper anomaly. Analytical results from borehole MJBA-1 showed a gold grade of 1.76g/t between 15.00m and 16.00m and an average gold grade of 2.51g/t between 24.00m and 28.00m. The 4m wide gold grade of 2.51g/t were related to strongly brecciated schist, mixed with quartz fragments. The



LEGEND

Xingu Complex

Pamg — Medium grained hornblende biotite granite (Soil and saprolite)

Pamg — Medium grained hornblende biotite granite (Outcrop)

Dyke

Di — Soil and saprolite of diabase

Geological boundary

Garimpo tailing

Open pits of primary garimpo

Sample location site

MJDA-2 drilling site

Road

Drainage

Geological section

Fig. II-4-8 Geological map of Garimpo Aluizio area

borehole MJBA-1 also presented an average gold grade of 1.24g/t between 38.00m and 40.00m and this value was related to pyrite rich quartz. The MJBA-1 showed strongly anomalous copper values. The average copper grade between 0.00m and 8.00m was 0.38% and between 15.00m and 26.00m was 0.24%. The highest copper grade was observed, with an average of 1.41% Cu.

The borehole MJBA-2 showed that the gold anomaly in Aluizio is not widely distributed and associated to quartz veins filling shearing zone (Fig.II-4-10). The gold average grade confirmed by MJBA-2 is low, presenting 0.87g/t between 9.00m and 11.00m and 0.61g/t between 30.00m and 33.00m. Weak pyrite dissemination and innumerous thin quartz veins were observed between 25.20m and the hole bottom (100.55m). Pyrite, chalcopyrite, hematite, calcocite and covelite were observed between 30.70m and 32.70m. Strong to medium chlorite alteration, epidote alteration and potassic alteration were observed. Strong silicification was observed.

The drilling results confirmed a low grade and narrow gold mineralization in Aluizio garimpo and in Serrinha do Guaranta garimpo.

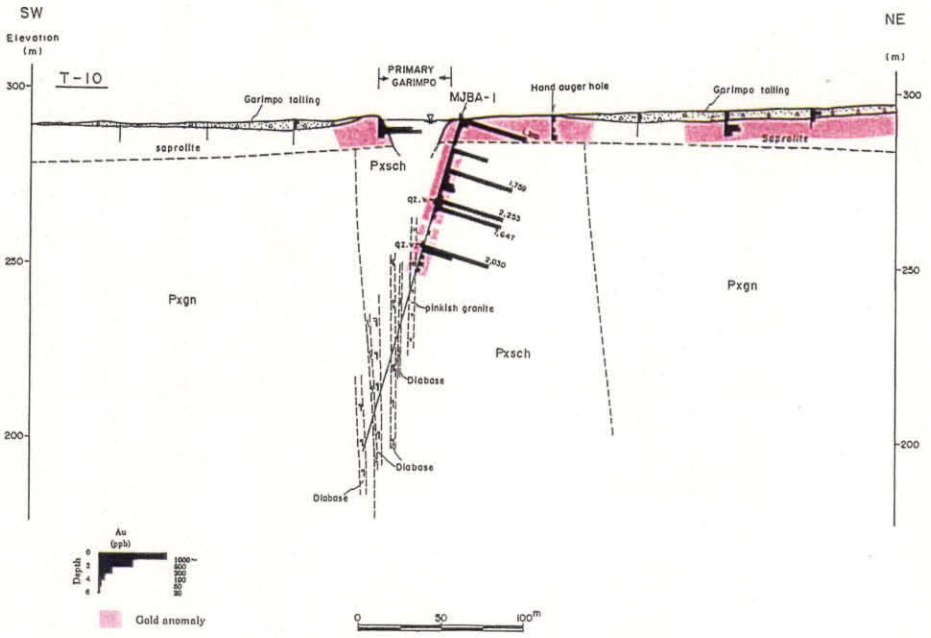


Fig. II-4-9 Cross section of borehole site in the Serrinha do Guaranta area

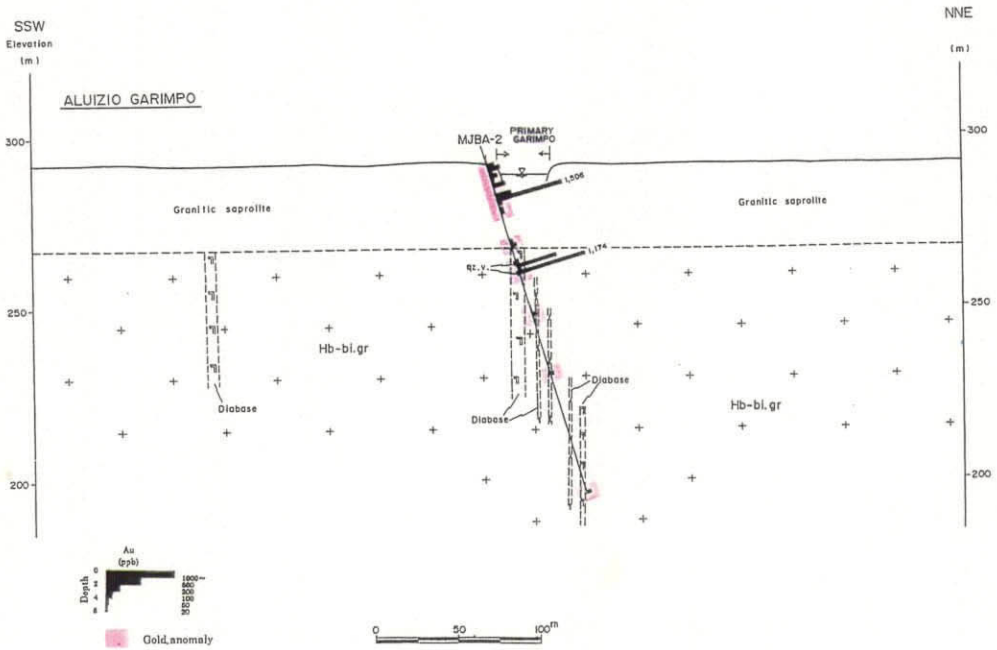


Fig. II-4-10 Cross section of borehole site in the Garimpo Aluizio area

CHAPTER 5 G BLOCK AREA

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

Geological survey, geochemical survey and drilling survey were carried out in the G Block area.

5-1 Geology and mineralization

A geological survey was carried out along the sampling lines during the soil geochemical survey and their results are described in the geological map shown on the Fig.II-5-1, Fig.II-5-2 and Fig.II-5-3.

(1) Geology

The block G region is represented by the following geologic units: Xingu Complex (Px), Pre-Uatuma granite (GrII and GrIII), Teles Pires granite from Uatuma Supergroup (Gru), Middle Proterozoic Beneficente Group (Pb), Dykes (Db) and Quaternary age Recent alluvium.

The Xingu Complex (Px) unit outcropping in the entire block G area is intruded by several granitic batholiths of different ages and oriented in conformity with the regional trend of E-W and WNW-ESE directions. Within the shear zone, the granite gneiss and gneiss show evidence of mylonitization and recrystalization of quartz as well as injections of K-feldspar rich solution within gneissic foliation. These solutions, composed mainly by quartz and K-feldspar present fluorine as well as dark mica (biotite) and light mica (muscovite). Pre-Uatuma granite (GrII and GrIII) is distributed in the southwest and south of the block G area. The boundary of the Gr II granite with the gneissic rocks was not observed, but it is supposed to have a transitional boundary with the gneissic units of the Xingu Complex. In the southwestern portion of the survey area, a large batholith of syenitic-biotite granite was classified as Gr III type pre-Uatuma Granite. A slight orientation of biotite was observed in outcrops as well as a sericite rich veins, similar to greisen, along of the boundary with the Xingu Complex unit. The Teles Pires granite (Gru) is intruded in homogeneous. The Teles Pires-type granite was cited by Silva et al. (1980) as mainly intruded along the southern margin of the Cachimbo graben zone. The dykes are essentially of diabase composition and they cut most of the unit in the block G area.

(2) Mineralization

The Zanete garimpo and Pezao garimpo are two of the principal gold primary garimpo found in G block. Edmar garimpo and Luizao garimpo are two others big garimpo located outside at the vicinities of the survey area.

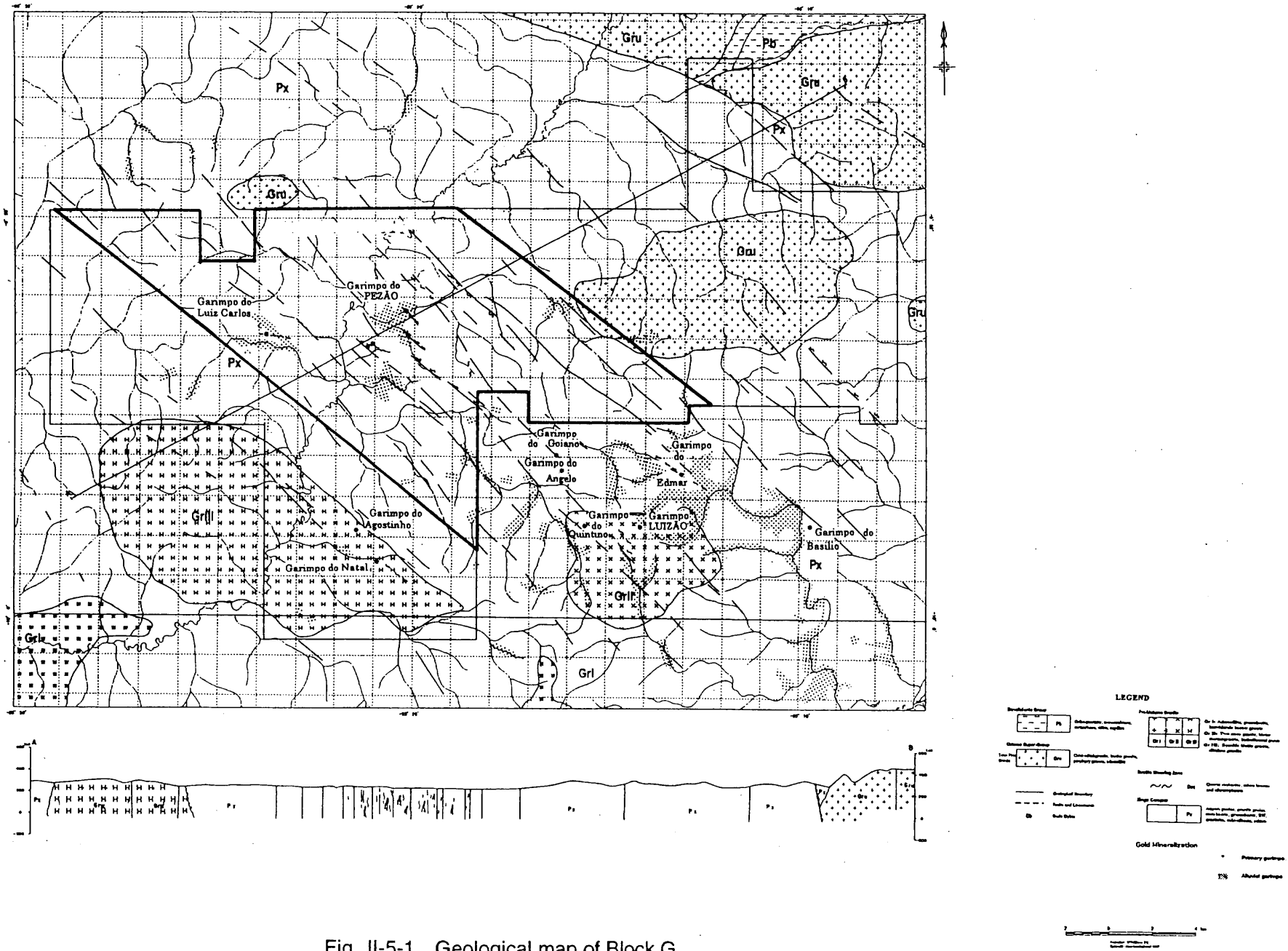


Fig. II-5-1 Geological map of Block G

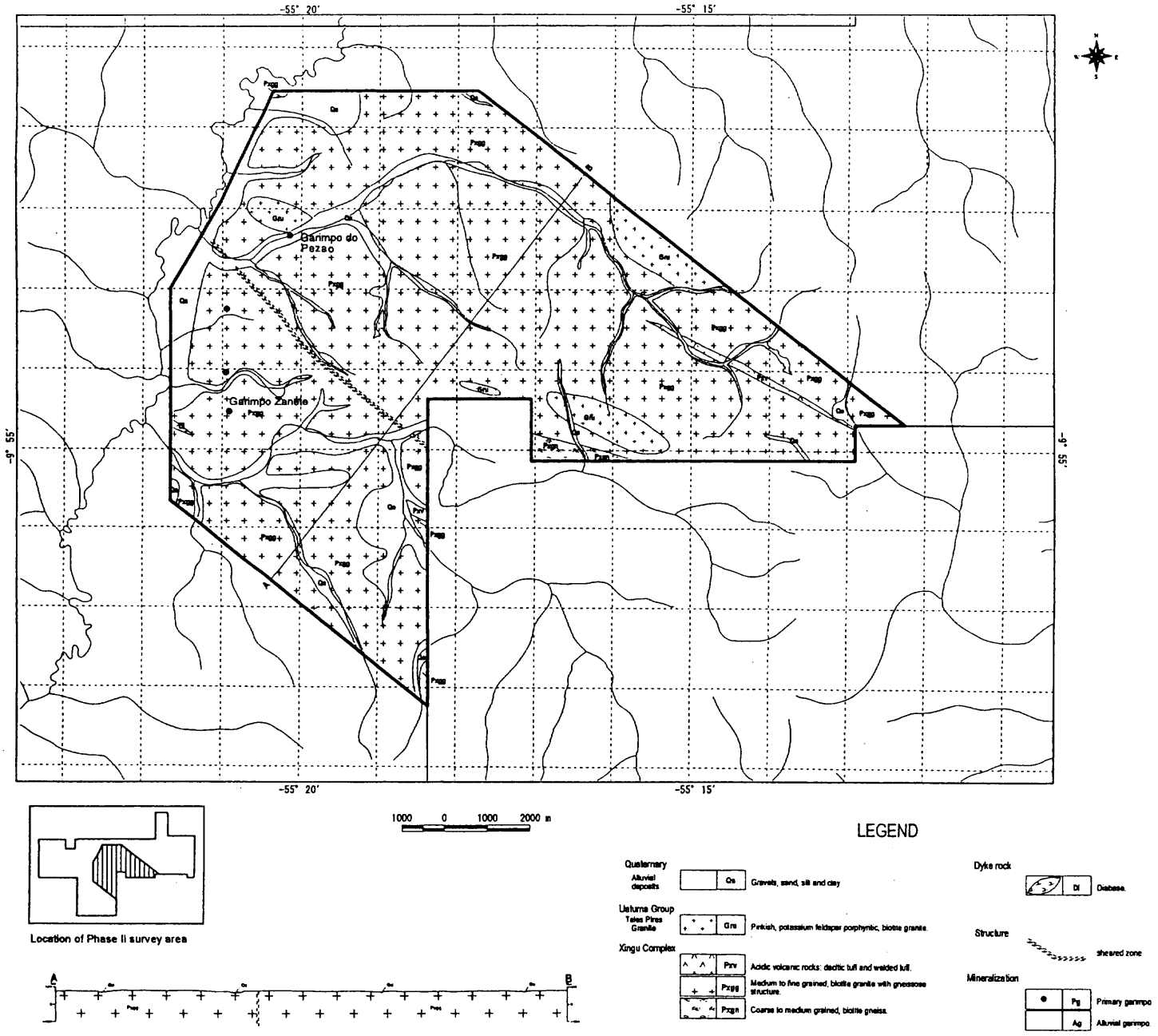
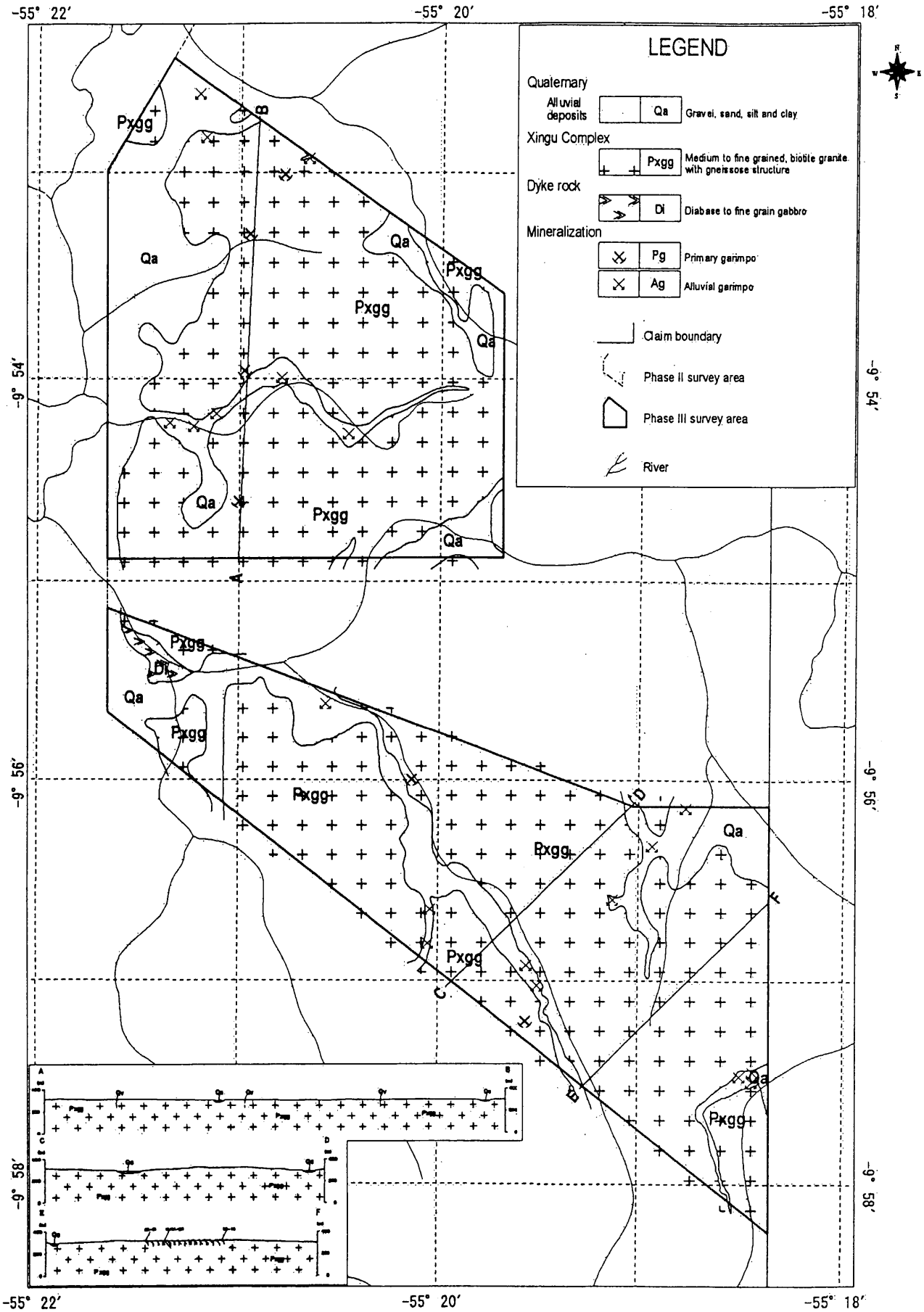
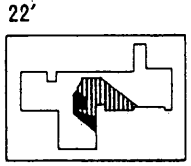


Fig. II-5-2 Geological map of the selected area in Block G





Location of Phase III Survey Area

Fig. II-5-3 Geological map of the Phase III in Block G

In the Zanete garimpo, gold results between Au28.73g/t and Au45.06g/t were obtained in quartz veins. The sulfide rich silicified rock of the Pezao garimpo presented gold values between Au0.65g/t and Au35.71g/t. The Edmar garimpo presented gold results between Au0.01g/t and Au60.45g/t in pyrite rich altered granite. The sulfide rich altered granite from Luizao garimpo presented Au6.49g/t. The above results are a strong indication that G block hold high-grade gold mineralization and opened a good perspective of finding a major gold deposit in the area.

5-2 Survey Results

5-2-1 Geochemical survey

Regional soil geochemical survey and semi-detailed soil geochemical survey were carried out in the G Block and its results are shown on the Fig.II-5-4 and Fig.II-5-5.

(1) Regional soil geochemical survey

Results of Phase I geological survey indicated a high potentiality for gold mineralizations in the G block and a regional geochemical survey was carried out during Phase II survey. The soil geochemical survey was carried out in order to clarify the relationship between soil gold geochemical anomalies, geology and mineralization.

As the results of statistical data treatment, the only element showing some correlation with Au was Cu. The threshold value of Au is 20 ppb. The single element analysis of soil geochemical data indicated a large gold anomaly zone in the southwestern portion of G (Fig.II-5-4). The anomalies of Au, Pb, Zn and V are overlapped in the southwestern area. The multi element analysis showed that Au is associated to Cu within gold anomaly zone. The distribution form of soil gold anomalies is broadly concordant with the direction of regional shearing and that suggests a shearing structure control for the gold mineralization of G block. The Zanete garimpo is the biggest gold garimpo within the large gold anomaly.

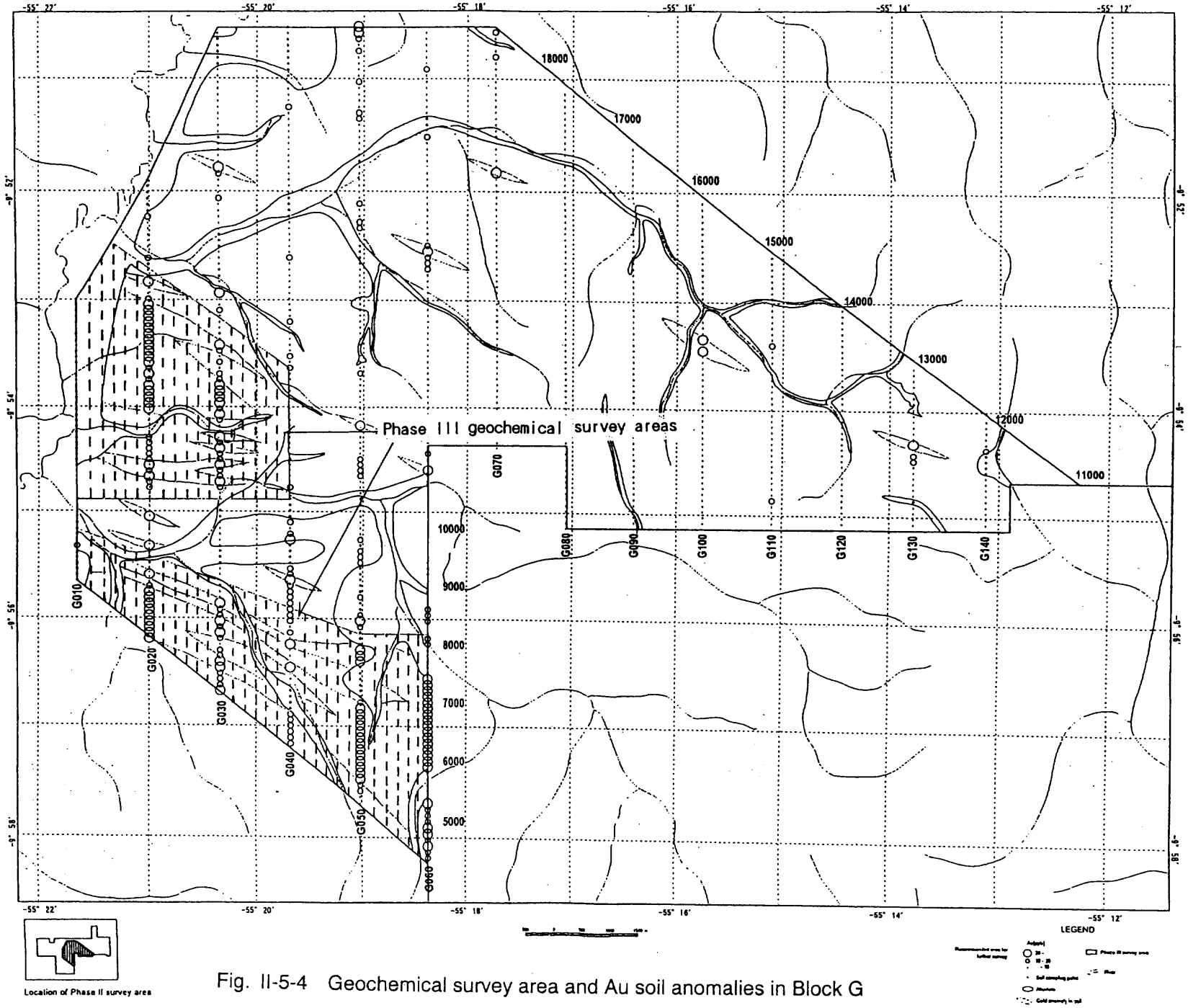
(2) Semi-detailed soil geochemical survey

Detailed soil geochemical survey was carried out in G block (Fig. II-5-4) in order to clarify the extension and distribution of the soil geochemical anomalies detected during the Phase II survey.

The compiled map of block G (Fig. II-5-5) shows the results of the geological and geochemical surveys. The results of soil geochemical analysis are though to be as follows.

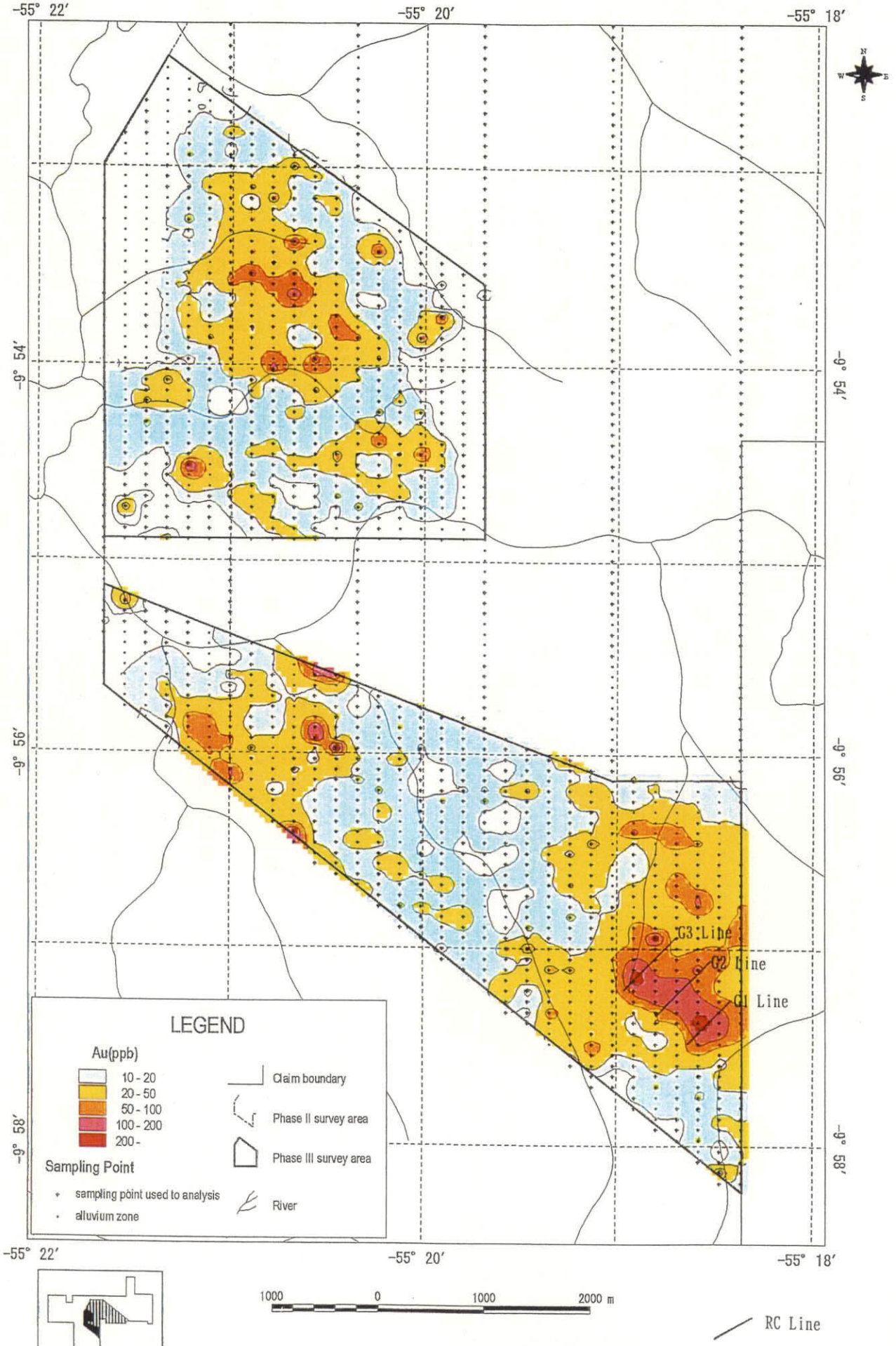
No elements were detected showing high correlation coefficient for Au and only Cu shows low correlation coefficient with Au.

From overlapping map with anomaly of Au+Cu+Pb+Zn+Ag+W, were inferred the following



Location of Phase II survey area

Fig. II-5-4 Geochemical survey area and Au soil anomalies in Block G



Location of Phase III Survey Area

Fig. II-5-5 Distribution map of Au anomaly and RC drilling lines of Phase III in Block G

considerations:

a) The anomaly of gold relatively overlaps with anomalies of Cu, Zn and W.

b) Lower anomaly of copper with 22ppm overlap well with anomalies of Au.

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

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

5-2-2 Drilling Survey

In order to understand the distribution and the continuity in depth of gold mineralization detected by geochemical survey at the southeastern part of block G (Fig. II-5-6) and also to acquire geologic and tectonic information related to the gold mineralization, a reverse circulation drilling (RC) program were conducted in G block, and later a total coring drilling (DD) were conducted to check the gold mineralization detected by RC.

The drilling survey indicated a thick granitic saprolite in the C block area with an average thickness of 40m and it also shows broad structures with strong shearing and brecciation in saprolite (Fig.II-5-7 to Fig.II-5-11). The shearing structure was also observed in fresh granite and in it were confirmed rock alteration as silicification and potassification and also pyrite dissemination and films.

A total of 43 drilling holes with total length of 301.95m were conducted in the survey area, and most of them intercepted gold mineralization with a maximum gold result of Au6.89g/t in 2m sample, but its results were not conclusive to define the direction and dip of the mineralized bodies intercepted by drilling.

Gold mineralizations were frequently associated to brecciated or sheared porphyry granite with dissemination and films of pyrite and also to quartz veins and veinlets filling granite. The section of drilling with higher gold grade seems to be closely associated to sites with high dissemination of pyrite or to sites with high concentration of pyrite films.

Based on drilling survey results, the following gold mineralization types are probably present in the Alta Floresta area.

1) A disseminated type with disseminated pyrite in shearing zone is likely for Pezao garimpo and Edmar garimpo. Pezao garimpo also presents quartz veinlets network and pyrite dissemination of different stages and alteration mineral as quartz and sericite. There is a possibility that Pezao garimpo is a central part of a porphyry gold mineralization type.

2) Both, garimpo Luizao and the gold mineralization intercepted by drilling in the G block area have similarities with Matupa type porphyry gold mineralization. These similarities between Matupa type gold mineralization and G block type gold mineralization are as follow;

a) Host rock type similarities,

b) Association of gold mineralization with pyrite dissemination,

c) Alteration type related to gold mineralization,

d) Fluid inclusion similarities,

e) Gold associatiated to weak copper mineralization.

3) Zanete garimpo is a type of high-grade gold mineralization associated to quartz vein.

A porphyry gold mineralization type is likely to exist at others soil gold anomalies detected in G block.

There exists the possibility that Pezao garimpo is a central part of a porphyry gold mineralization type because Pezao garimpo presents quartz veinlets network and pyrite dissemination of different stages and alteration mineral as quartz and sericite.

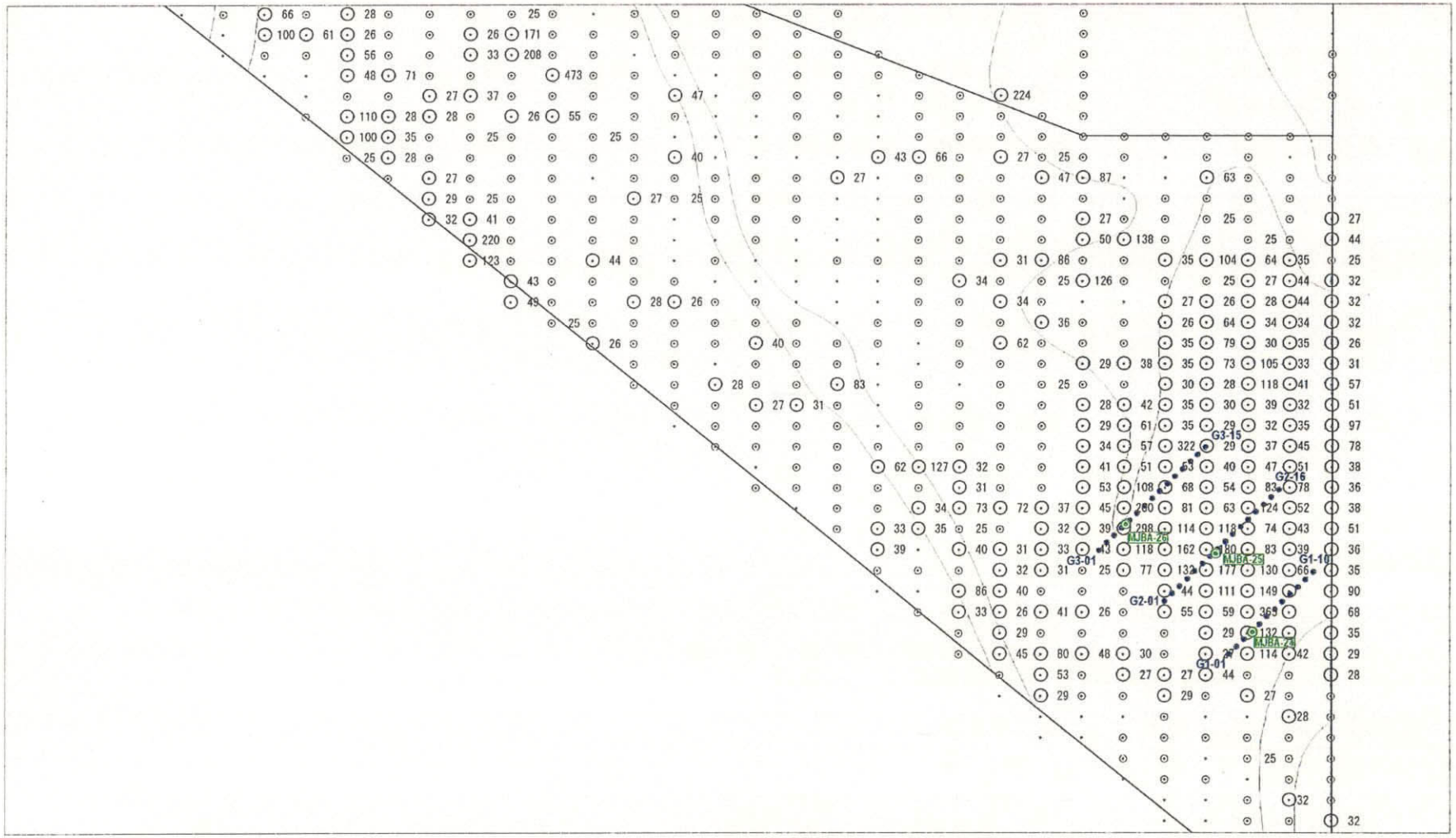


Fig. II-5-6 Location map of RC drilling lines and DD holes in Block G

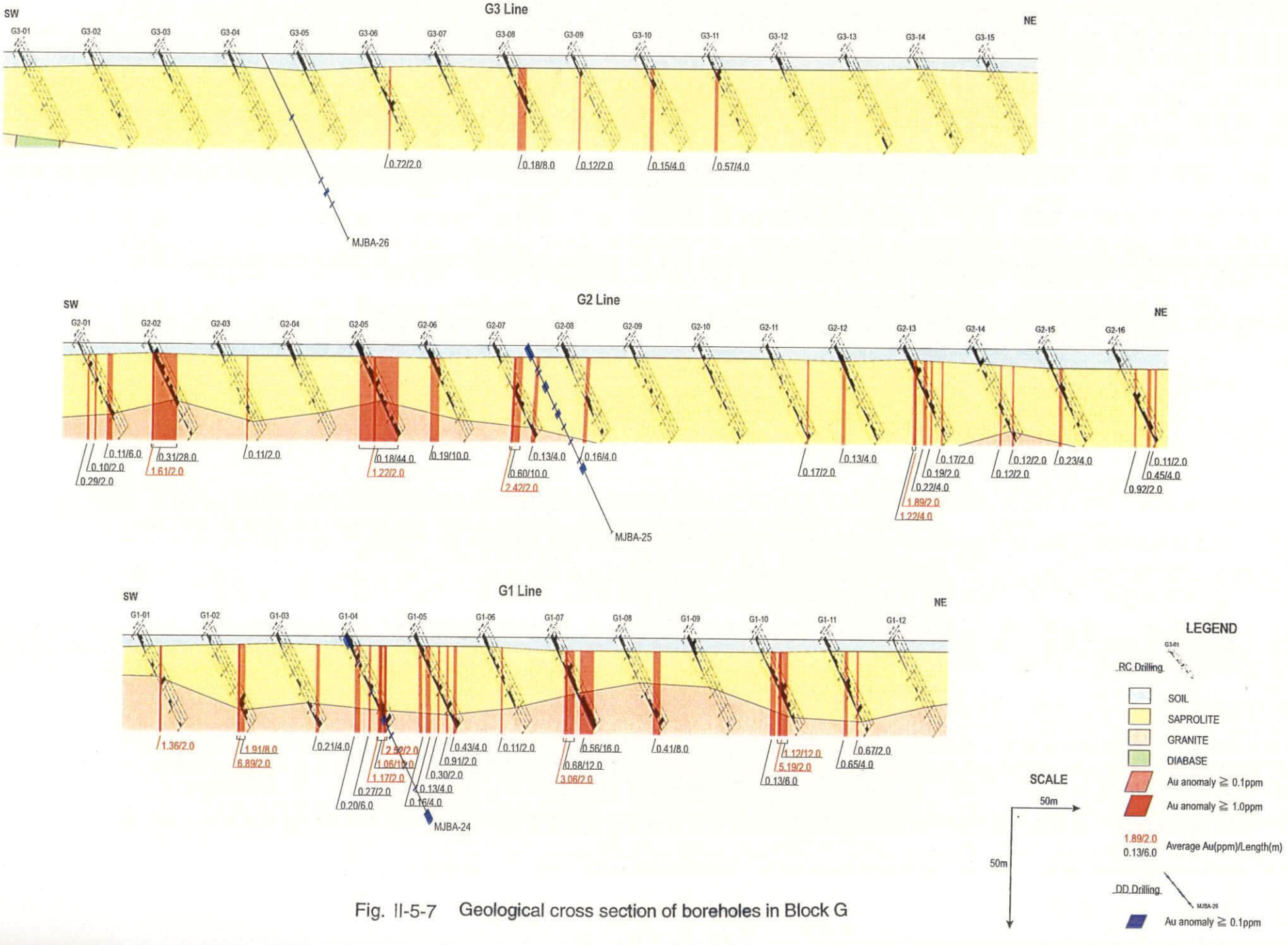


Fig. II-5-7 Geological cross section of boreholes in Block G

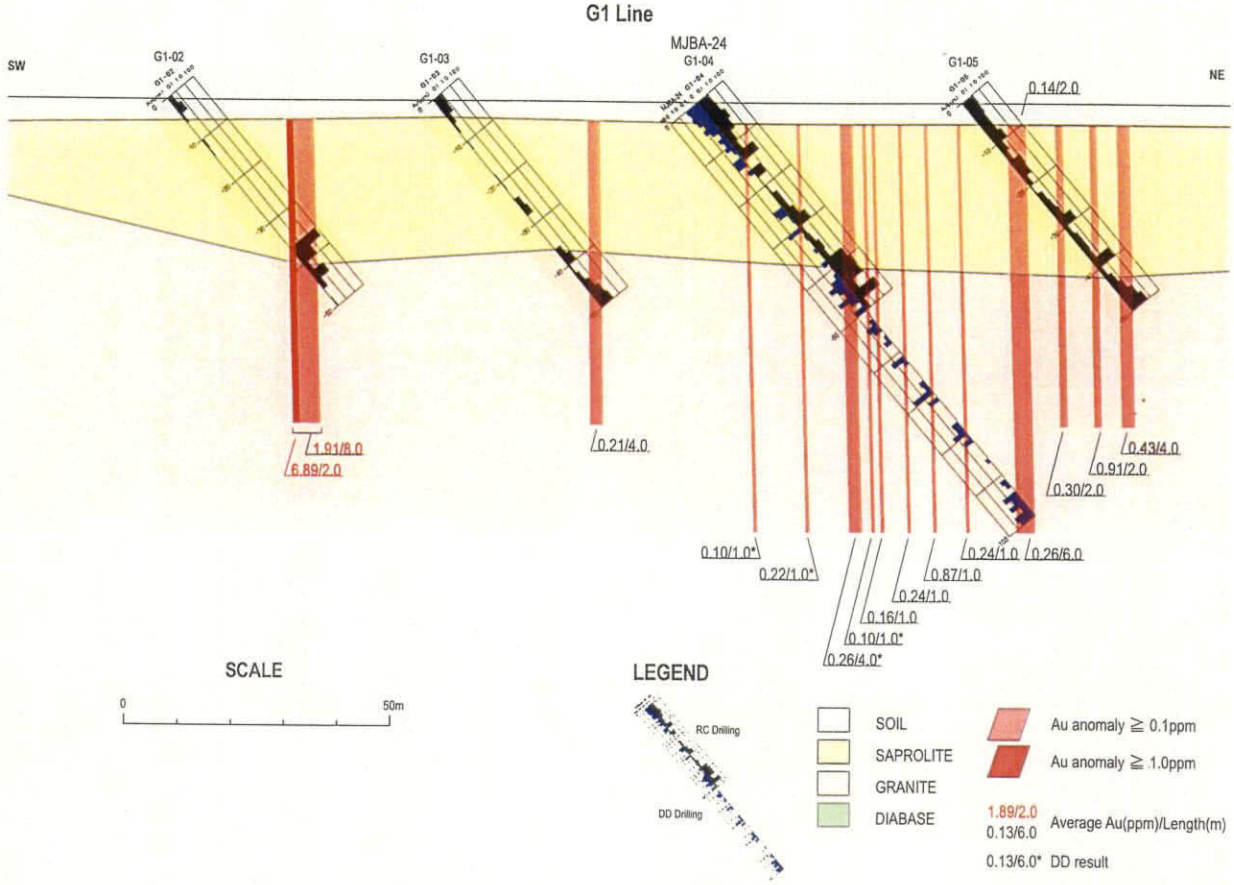


Fig. II-5-8 Geologic cross section of borehole MJBA-24

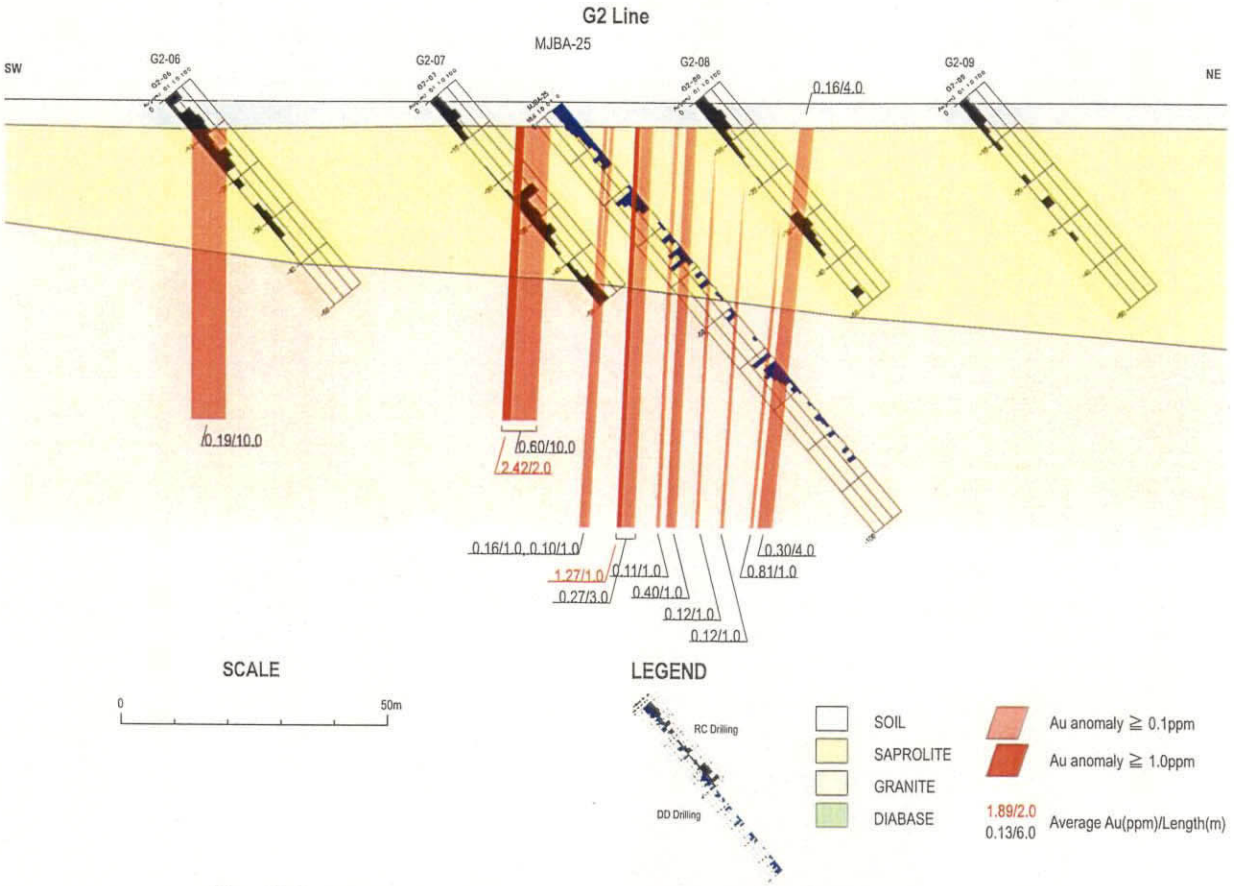


Fig. II-5-9 Geologic cross section of borehole MJBA-25

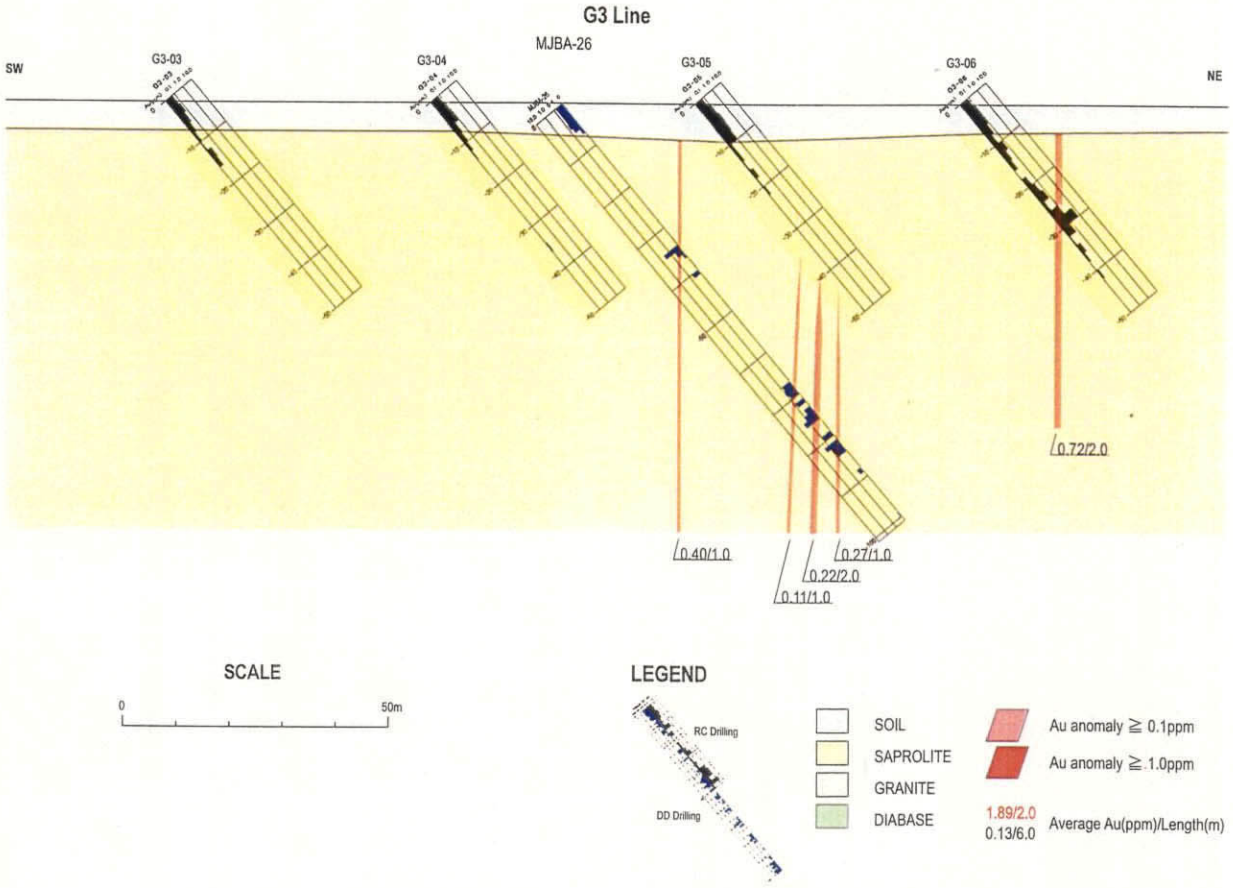


Fig. II-5-10 Geologic cross section of borehole MJBA-26

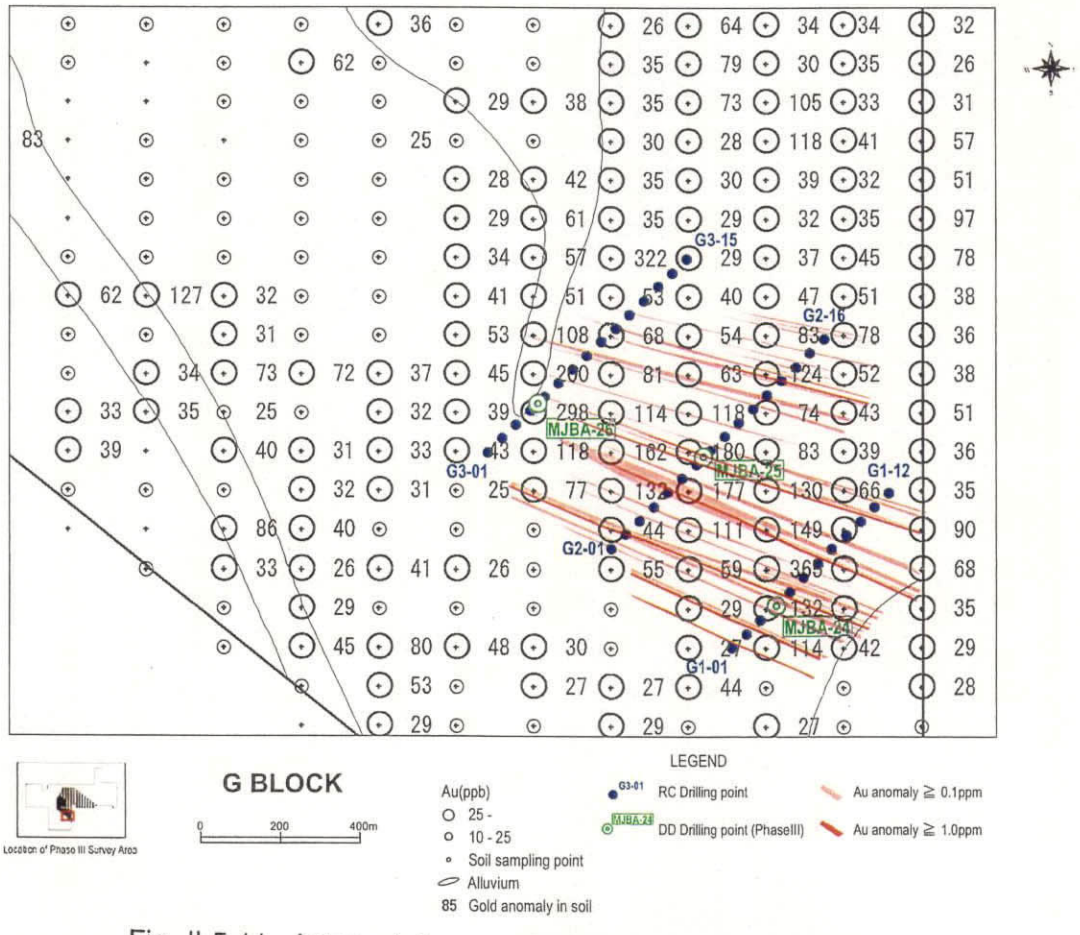


Fig. II-5-11 Interpretation map from drilling survey in Block G

CHAPTER 6 H BLOCK AREA

H block is located 30 km northeast of Alta Floresta City. The topography in the eastern part of the survey area is leveled, but in the western part it is uneven due to the outcrops of Teles Pires granite and Beneficiente Group sediments. The main garimpo activities in the survey area was due to the alluvial garimpo in the Teles Pires and Rochedo rivers as well as to another alluvial garimpo located in drainages of the central part of the area. The existence of a primary garimpo inside the H Block area is unknown.

6-1 Survey Results

Only a regional geological survey was carried out in H block.

6-1-1 Geological Survey

(1) Geology

Fig. II-6-1 shows the geological map and sites of gold mineralization in H block. H Block region is represented by the following geological units: Xingu Complex (Px), Pre Uatuma granite (GrI), Uatuma Group Iriri Formation (Pui) and Teles Pires Granite (Gru), Dykes (Db) and Quaternary age Recent alluvium (Qa).

The Xingu Complex (Px) covers half of the survey area and rarely found outcrops of granodiorite and granodioritic composition terrains confirmed it. The Pre Uatuma, granite (GrI) is distributed in the southeast and southwest of the survey area and the Xingu Complex unit is intruded by granitic batholith considered as Juruena type. Outcrops of volcanic rocks from Iriri Formation (Pui) could not be confirmed due to the poor access within the area, however, its presence was mostly interpreted by means of Landsat Image and airborne radiometric data. The Teles Pires Granite (Gru) shows the circular structure and was identified by Landsat Imagery in the central part of the survey area. The granite characteristically presents high airborne potassium anomalies. It was classified as hornblende biotite porphyritic granite. The dykes are essentially of diabase composition and they cut most of the unit in the block.

(2) Mineralization

Alluvial gold garimpo is found in Rochedo River and Teles Pires River, as well as in the rivers of the central part of H Block. A strong silicic, sericitic and hematitic alteration were observed in sheared rocks at two sites in the northeastern part of the survey area. Similar altered rocks were observed as gravel of the alluvial garimpo in the central part. In the western part of the survey area,

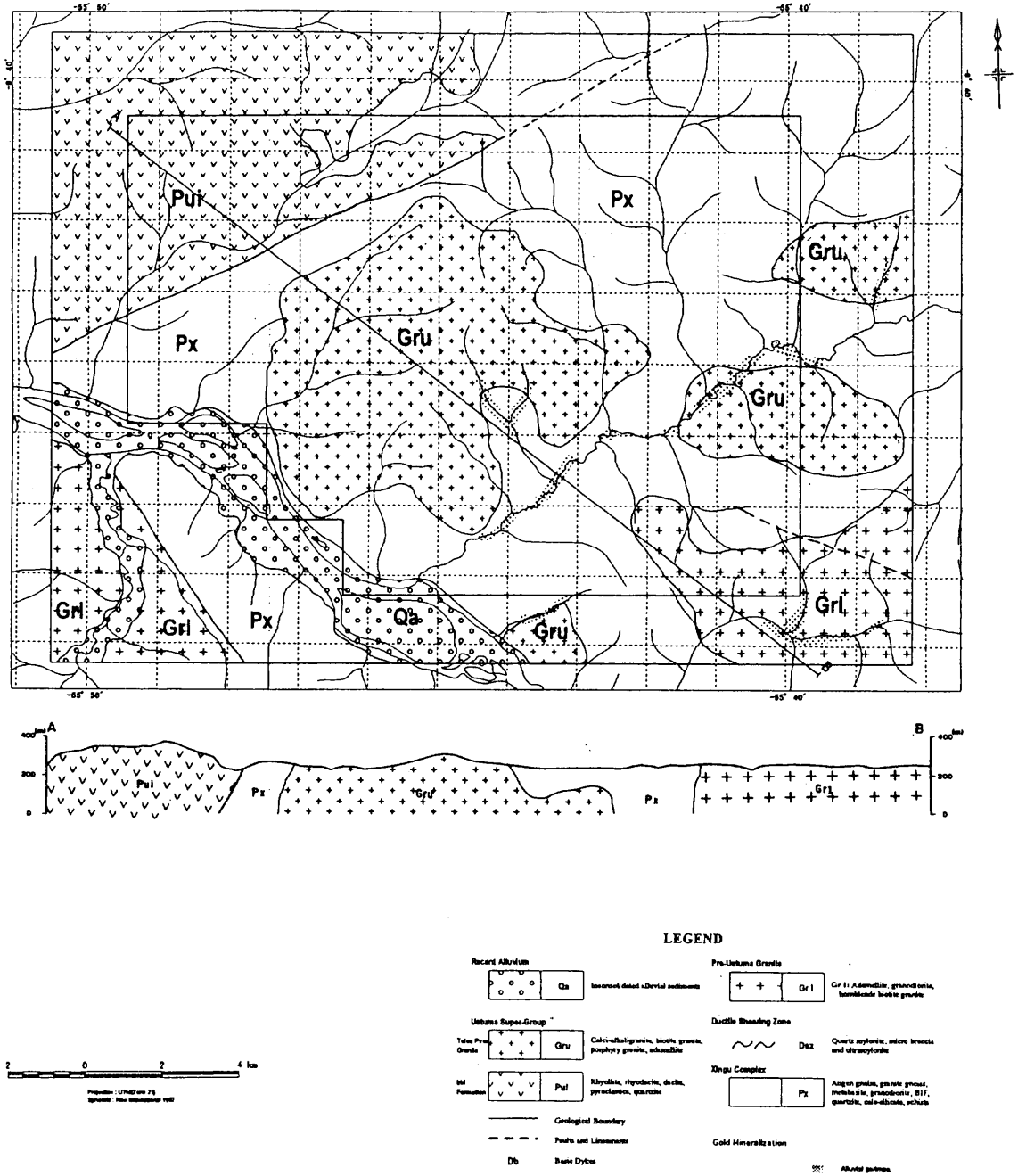


Fig. II-6-1 Geological map of Block H

a chlorite-epidote-pyrite alteration was observed in equigranular monzogranite, however the analytical results of a quartz vein sample taken from altered monzogranite was confirmed to be barren. Analytical results indicated neither anomalies for gold nor anomalies for others elements.

Judging from the geological survey results, the potentiality for hosting gold mineralization within H block can be considered as very low. The ore sampling results did not either indicates any gold anomaly within H block area that can be considered as target for additional survey.

According to the results of the geological survey in H block, no large-scale gold mineralization is expected in the area and in consequence, no additional survey in H block was considered.

CHAPTER 7 DISCUSSION ON SURVEY RESULTS

7-1 Gold mineralizations types in Alta Floresta area

Both alluvial and primary gold mineralizations are widely distributed with WNW direction along the southern border of the Cachimbo graben.

Primary Gold Mineralizations exist in many tectonic environments through the Amazonian craton. For instance, in the Alta Floresta area mainly three Gold Mineralization types were identified, as follow:

(I) Porphyry (disseminated) Gold type, e.g. Serrinha do Matupa Gold Deposit;
(II) Shear Zone hosted quartz veins type, e.g. Paraiba Vein type;
(III) Stockwork type, e.g. Novo Planeta garimpo area.

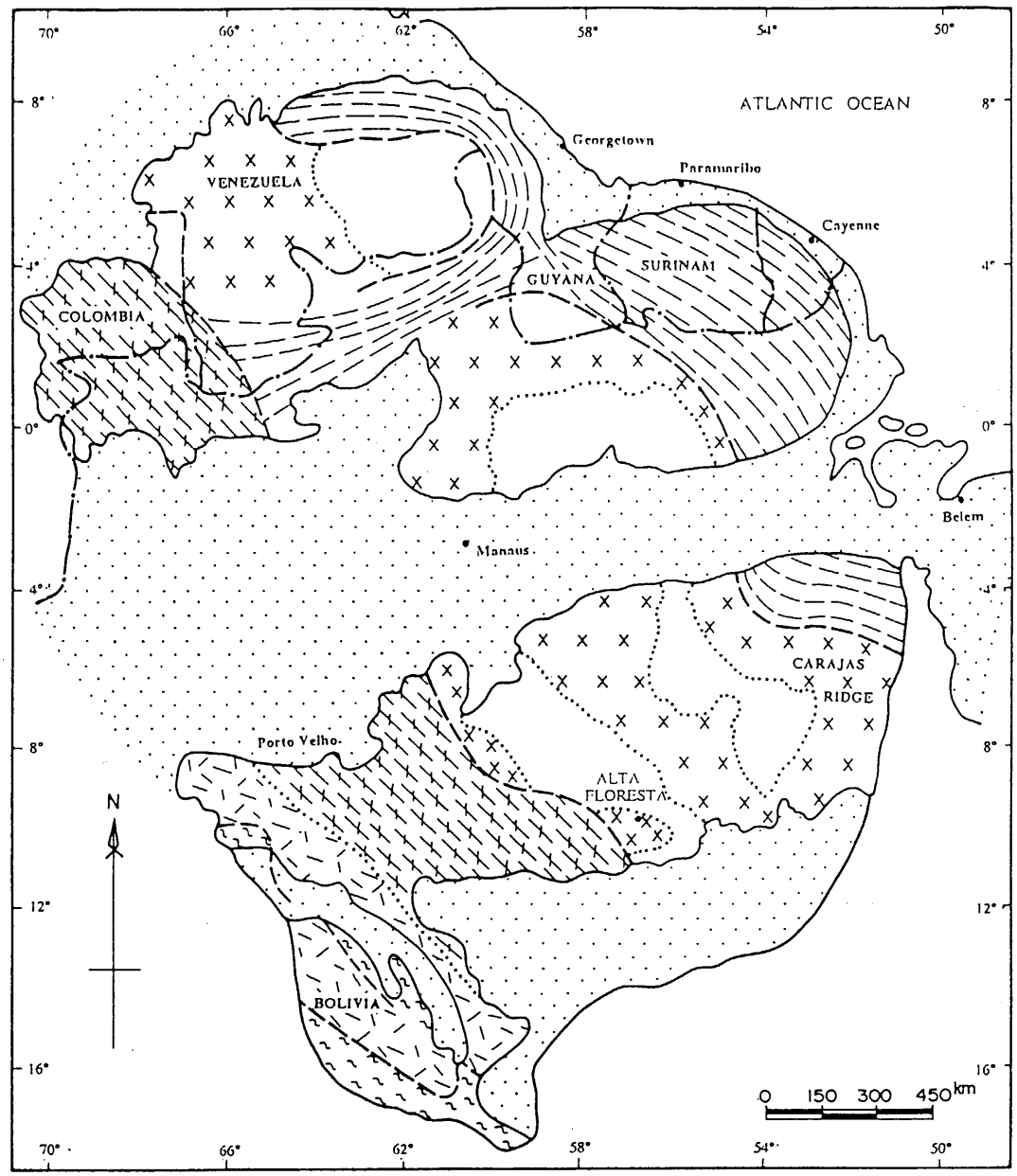
Sample of gold bearing quartz veins showed the age of 1,76Ga in C block and a younger age of 1,56Ga was showed by ore sample taken within shearing zones of G block. The dating results from pyrite of ores, by Pb-Pb method suggest a co-magmatic origin of the lead in the pyrites, and the age of 1.76Ga is approximately the crystallization ages obtained in volcanic rock of the Alta Floresta region (Fig. II-7-1).

(1) Porphyry Gold type

Botelho et al. (1998) associate the gold mineralization of the Alta Floresta region with oxidized type I calc-alkaline plutons, with characteristic either of volcanic arc or post-collision granites. The gold either occurs in small high-grade vein-type deposits or is disseminated in widespread hydrothermal zones with alteration such as sericitization, feldspathization and pyritization. This granitic massif is a homogeneous, undeformed, equigranular to porphyritic monzogranite, with geochemical characteristics either of volcanic arc granites or of post-collisional granites generated in the presence of an oceanic lithosphere (Moura et al. 1997a). The presence of hydrothermal magnetite in association with pyrite, sulphur isotope data and the petrological data for the Matupa Monzogranite in the Serrinha deposit are also characteristics of porphyry copper-molybdenum and copper-gold deposits (Sillitoe, 1997).

(2) Shear zone hosted quartz veins type

A regional NW-SE direction ductile shear zone crosses the Alta Floresta region. This shear zone has a width of several kilometers and 36 majors gold lodes and hundred of minor gold quartz veinlets zones were recognized inside of the shear zone (Abreu Filho et al., 1992; Barros,



Source: Teixeira et. al. (1989) modified

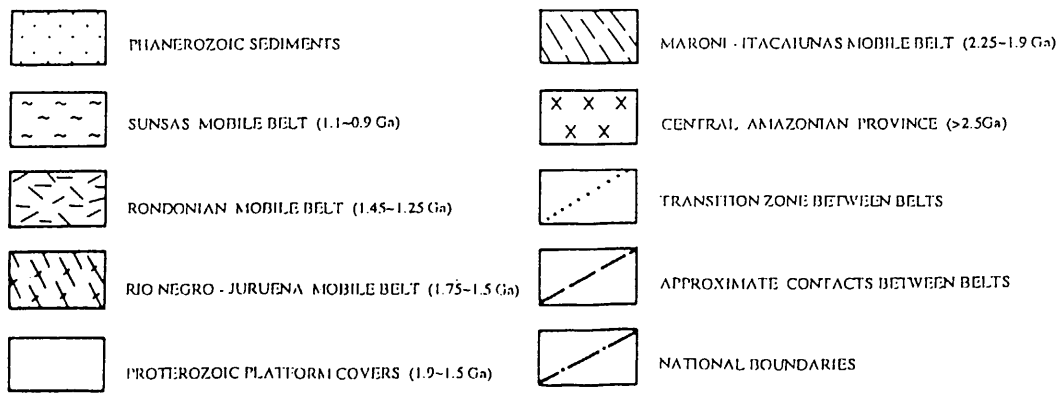


Fig. II-7-1 Tectonic geocronologic Map of the Alta Floresta area

1993). These quartz veinlets zones and lodes display preferential directions along N20-60E, NNE, N30-60W and E-W. The Paraiba gold mine is the only known lode deposit and it has been considered as the most important shear zone hosting lodes in the Alta Floresta area. The Paraiba lode presents gold and copper bearing quartz veins network, showing parallel bands with different amount of sulphides.

(3) Stockwork type

The stockwork type gold mineralization is generally related and controlled by regional lineaments or local shearing structure. The Novo Planeta garimpo is the most studied stockwork type gold mineralization in the Alta Floresta area. The gold mineralization in Novo Planeta garimpo is related to Teles Pires type granite.

7-2 Genesis of Gold Ore Deposits

Teixeira et al. (1989) divided the Amazonian Craton in several provinces showing similar geochronologic ages complemented by structural, petrological and geochemical information (Fig.II-7-1). Following the schema proposed by these authors, an old Archean core is distinguished in the central part of the Amazonian Craton (Central Amazonian Province). This Archean core grow up during the Transamazonian Cycle with the development of the Maroni-Itacaiunas mobile-belt on its northeastern and northern margins, during the Paleoproterozoic (Maroni-Itacaiunas Province, 2.25-1.9 Ga). Afterwards, three tectonic provinces border the western and southern margins of the Archean core: the Rio Negro-Juruena mobile belt (1.75-1.5 Ga), the Rondonia mobile belt (1.45-1.25 Ga), and the Sunsas mobile belt (1.1- 0.9 Ga).

The Alta Floresta area is located at the southwestern margin of the Central Amazonian Province, at the limit with the Rio Negro-Juruena Province.

A dating of rocks by K/Ar method was carried out during the Phase I survey, and further dating by U/Pb and Pb/Pb methods was carried out during the Phase II and Phase III survey as shown on Table I-3-1.

Dating of granitic rocks presented an age between 1,816Ga to 1,820Ga in B B Blocketween 1,802 to 1,803Ga in C Block and an age of 1,817 in G block. Dating of volcanic rock, i.e. a rhyolite sample showed an age of 1,786Ga in C Block. Gneissose granitic rock from F block and B Block, showed respectively ages of 1,894 and 1,937Ga.

Dating of pyrite by Pb/Pb method, made during Phase III, in ore samples from C Block and G block, showed respectively, ages of 1,76 and 1,56Ga.

From the above dating results it is supposed that, the host rock of Alta Floresta region is composed by 1.894Ga to 1.937Ga age gneissose granitic rocks. At around 1.85Ga it is also supposed

that started the development of the Rio Negro – Juruena orogeny in the Alta Floresta region (Fig. II-7-2). Teixeira et al. (1989) suggests a mantle-derived magmatic arch evolution, which collided with the Central Amazonian Province, as the result of an eastward-directed subduction. This subduction modeling explains the existence of innumerous granitic intrusions that were dated at around 1.802Ga to 1.820Ga age and the age of 1,786Ga from rhyolite of the survey area.

The subduction model also explains the distribution pattern of alluvial gold garimpo and the existence of several primary gold garimpos aligned in WNW-ESE direction trend. Sample of gold bearing quartz veins showed the age of 1,76Ga in C Block and a younger age of 1,56Ga in ore sample taken within shearing zones of G block. The dating results from pyrite of ores, by Pb-Pb method suggest a co-magmatic origin of the lead in the pyrites, and the age of 1.76Ga is approximately the crystallization ages obtained in volcanic rock of the Alta Floresta region.

Fluid inclusion results showed a temperature between the range of 225℃ to 356℃ in samples from B Block, 292℃ to 313℃ in samples from C Block and 226℃ to 259℃ in samples from G block. The salinity showed a range between 1.9% and 19.0%, but the most common range is between 2% and 8%, showing a general low salinity. The above data confirm that the gold mineralization were emplaced at upper to intermediate depth, and so, it is expected the following gold mineralization types in Alta Floresta area; Porphyry Gold type, Shear zone hosted quartz veins type and the Stockwork type gold mineralization.

7-3 Geological Ore Reserve

A Gold geological reserve was calculated only in G block and presented in the Table II-7-1. Gold geologic reserve calculation for B and C block were not carried out, because the drilling results in these blocks showed a low grade, narrow gold mineralized zones and a large spacing between mineralized zones. Results from drilling survey of G block indicated wider and continuous mineralized zones with higher gold grade average in comparison with B and C blocks.

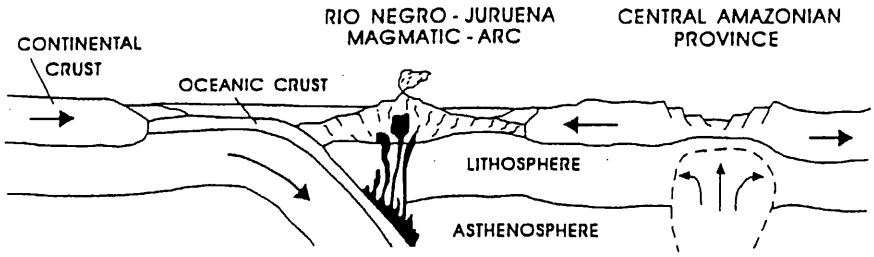
Reserves were calculated by means of a rectangle method and using all data from 43 RC drilling holes that totalized 1,075sample. Some of the data for this calculation are as follow:

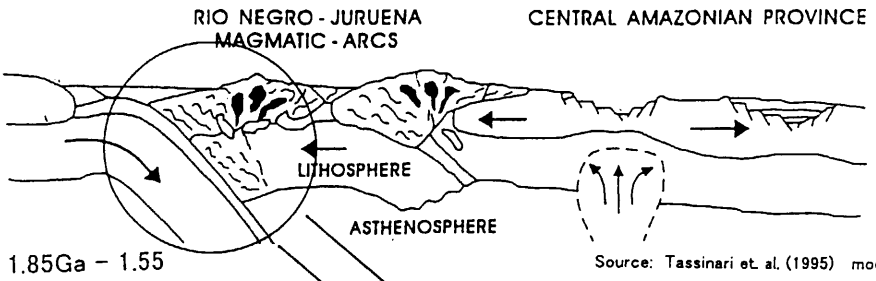
1) Cut off grade

The cut off grade was Au 0.1g/t and the.

2) Ore density

The density value was 1.95. This value was calculated using the proportional thickness of saprolite and fresh rock. The total length of RC drilling was 50m and the average thickness of saprolite was 40m and the fresh rock was 10m. A density value of 1.76 for granitic

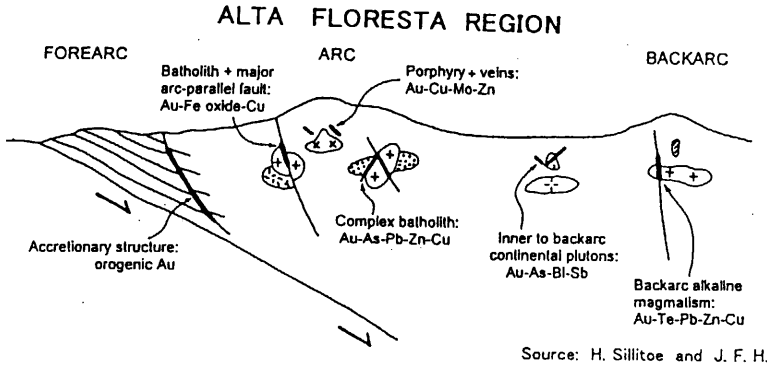




1.85Ga – 1.55

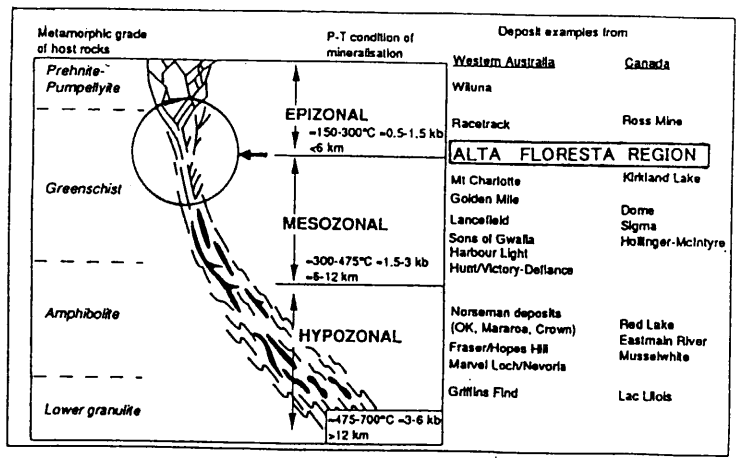
Source: Tassinari et. al. (1995) modified

Diagrammatic Sections of the Tectonic Model for the Development of the Rio Negro – Juruena Orogeny in the Amazon Craton



Source: H. Sillitoe and J. F. H. Thompson

Schematic tectonic settings of intrusion-related and orogenic vein gold deposits formed in back-arc terranes, with position of orogenic gold deposits.



Source: D. I. Groves(1993)

Schematic section showing the crustal continuum of gold deposits from shallow crustal-level to the lowermost end level.

Fig. II-7-2 Tectonic model for the development of the Rio Negro - Juruena orogeny and related gold mineralization

Table II-7-1 Geological Ore Reserve calculation

Line	Hole No.	Au Grade (g/t)	Width (m)	Depth (m)	Length (m)	Density (g/t)	Au Content (Kg)
G1 Line	G1-01	1.36	1.29	75	400	1.95	102.28
	G1-02	1.91	5.14	75	400	1.95	574.57
	G1-03	0.21	2.57	75	400	1.95	31.59
	G1-04	0.20	3.86	75	400	1.95	45.12
	G1-04	0.27	1.29	75	400	1.95	20.31
	G1-04	1.06	6.43	75	400	1.95	398.59
	G1-05	0.16	2.57	75	400	1.95	24.07
	G1-05	0.13	2.57	75	400	1.95	19.55
	G1-05	0.30	1.29	75	400	1.95	22.56
	G1-05	0.91	1.29	75	400	1.95	68.44
	G1-05	0.43	2.57	75	400	1.95	64.68
	G1-06	0.11	1.29	75	400	1.95	8.27
	G1-07	0.68	7.71	75	400	1.95	306.84
	G1-07	0.56	10.28	75	400	1.95	336.92
	G1-08	0.41	5.14	75	400	1.95	123.34
	G1-10	0.13	3.86	75	400	1.95	29.33
	G1-10	1.12	7.71	75	400	1.95	505.38
	G1-11	0.65	2.57	75	400	1.95	97.77
	G1-11'	0.67	1.29	75	400	1.95	50.39

Geological Ore Reserve: 4,136,289ton **Ore grade: 0.68g/t**
Gold content: 2,829Kg

Line	Hole No.	Au Grade (g/t)	Width (m)	Depth (m)	Length (m)	Density (g/t)	Au Content (Kg)
G2 Line	G2-01	0.29	1.29	75	400	1.95	21.81
	G2-01	0.10	1.29	75	400	1.95	7.52
	G2-01	0.11	3.86	75	400	1.95	24.82
	G2-02	0.31	18.00	75	400	1.95	326.39
	G2-03	0.11	1.29	75	400	1.95	8.27
	G2-05	0.18	28.28	75	400	1.95	297.81
	G2-06	0.19	6.43	75	400	1.95	71.44
	G2-07	0.60	6.43	75	400	1.95	225.62
	G2-07	0.13	2.57	75	400	1.95	19.55
	G2-08	0.16	2.57	75	400	1.95	24.07
	G2-11	0.17	1.29	75	400	1.95	12.78
	G2-12	0.13	2.57	75	400	1.95	19.55
	G2-13	1.22	2.57	75	400	1.95	183.50
	G2-13	0.22	2.57	75	400	1.95	33.09
	G2-13	0.19	1.29	75	400	1.95	14.29
	G2-13	0.17	1.29	75	400	1.95	12.78
	G2-14	0.12	1.29	75	400	1.95	9.02
	G2-14	0.12	1.29	75	400	1.95	9.02
	G2-15	0.23	2.57	75	400	1.95	34.59
	G2-16	0.92	1.29	75	400	1.95	69.19
	G2-16	0.45	2.57	75	400	1.95	67.68
	G2-16	0.11	1.29	75	400	1.95	8.27

Geological Ore Reserve: 5,489,983ton **Ore grade: 0.27g/t**
Gold content: 1,501Kg

Line	Hole No.	Au Grade (g/t)	Width (m)	Depth (m)	Length (m)	Density (g/t)	Au Content (Kg)
G3 Line	G3-06	0.72	1.29	75	400	1.95	54.15
	G3-08	0.18	5.14	75	400	1.95	54.15
	G3-09	0.12	1.29	75	400	1.95	9.02
	G3-10	0.15	2.57	75	400	1.95	22.56
	G3-11	0.57	2.57	75	400	1.95	85.73

Geological Ore Reserve: 752,052 ton **Ore grade: 0.30g/t**
Gold content: 225Kg

Summarized results:

(cut off grade: 0.1g/t)

Total Ore Volume (t): 10,378,325 ton
Ore Grade (g/t): 0.439 g/t
Ore Reserve (Kg Au): 4,556 Kg

saprolite and 2.72 for fresh granite were adopted.

3) Calculation of the mineralized zone area

In accordance with the principle of the zones of influence, the mineralized zone was calculated as follow:

a) Length: As the drilling lines were spaced in 400m, a mineralized zone length of 400m was used.

b) Width: The mineralized zone is vertical and the RC drilling was 50 degrees, so a real width was calculated for each intercepted mineralized zones.

c) Depth: The depth value was 75m.

4) Gold grade

All gold values above 0.1g/t in each intercepted mineralized zones was used.

From the above data, it was estimated a geological ore reserve of 10.4 million tons with an average ore grade of 0.439g/t, that totalize 4.5 tons of gold in G block.

7-4 Discussions

The gold mineralizations in the survey area are composed from placer deposits, residual soil deposits and primary deposits. Survey results including geological survey, geochemical survey and drilling survey were compiled and theirs results are presented below. Mineralizations characteristic for B Block, C Block, F Block and G Block are shown on Table II-7-2 and a summary of survey results for these four blocks are shown on Table II-7-3.

(1) B Block

The shearing zones are the most important geological structure observed in the survey area and the primary gold garimpo are located inside these shearing structures, as exemplified by Jacare garimpo, Satelite garimpo and Paulao garimpo. Jacare garimpo has a gold mineralization related to quartz veinlets and it presents 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. Satelite garimpo and Paulao garimpo also show gold mineralization in quartz vein filling shearing zone and results of quartz vein from Paulao garimpo presented 100g/tAu, 127.2g/tAg and 3.86%Cu.

Auger survey performed within gold anomaly zones indicated that even though the gold anomaly in soil has a relatively great size, the gold distribution in the saprolite is narrow with spots of high gold grade

Results from drilling survey indicated a broad shearing structure in fresh rock and in saprolite with alteration as, silicification, epidotization, chloritization and potassification. Gold

Table II-7-2 Characteristics of mineralization for each block

Survey Area	Name of Mineral showing	Host Rock	Ore mineral										Alteration									Fluid Inclusion		Gold occurrence	Ore assay	Max. Bi (ppm)
			py	pyr	mt	il	cp	cv	sp	ga	bis	gold	qz	k	ab	ser	chl	ep	kao	cal	dol	tal	Temperature	Salinity			
Block B	Satellite garimpo	Grilla	●			●	●		●				●			●		●	●				334.5℃ to 356.2℃	23.8% NaCl	sheared quartz vein in sheared granite with pyrite dissemination	maximum: Au4.81g/t, Ag3.0g/t in 20cm	
	Jacare garimpo	Grillb	●		●			●		●			●	●		●		●	●	●	●		225.3℃ to 232.3℃	8.8% to 9.0% NaCl	goethite vein and quartz veinlets in granitic saprolite	maximum: Au379.36g/t, Ag21.4g/t in 1m	142ppm
	Southeast anomalous zone	Grillb	●		●		●						●	●	●	●		●		●					sheared zone with pyrite dissemination in granite	maximum: Au1.64g/t in 1m	
	Northwest anomalous zone	Grillb	●	●	●		●		●				●	●	●	●	●	●		●					sheared zone with pyrite dissemination in granite	maximum: Au5.09g/t in 1m	
	Novo Planeta garimpo	Grilla	●		●		●					●	●	●	●	●		●							quartz veinlets in granitic saprolite	maximum: Au11.70g/t, Ag1.2g/t in 15cm	
	Paulao garimpo	Grilla	●		●		●		●			●	●	●	●	●		●							pile of quartz vein with sulphide in silicified granite	maximum: Au100.00g/t, Ag127.2g/t, Cu3.86% in 15cm	
Block C	C5 mineral showing	Grillb	●				●	●					●			●		●							quartz and goethite veinlets in granitic saprolite	maximum: Au11.20g/t, Ag4.2g/t in 15cm	
	C7 mineral showing (17.6Ga)	Grillb	●	●			●	●	●	●		●	●	●		●		●	●	●	●		292.8℃ to 313.4℃	11.9% to 19.0% NaCl	pile of sulphide rich quartz veinlets in granitic saprolite	maximum: Au113.44g/t, Ag194.3g/t in 1m	370ppm
	Garimpo do Anta	Grillb	●		●		●						●	●		●		●	●				297.4℃	8.4% NaCl	goethite and quartz veinlets in granitic saprolite	maximum: Au130.00g/t, Ag6.5g/t in 10cm	
	Central anomalous zone	Grillb	●	●		●	●	●	●	●	●	●	●	●	●	●		●	●						sheared zone with pyrite dissemination in granite	maximum: Au2.72g/t in 1m	
	Waldemar garimpo	Grillb	●				●	●				●	●			●		●							pile of sulphide rich quartz veinlets in Grillb	maximum: Au174.00g/t, Ag40.4g/t in 20cm	
Block G	Luizone garimpo	Pxgg										●	●	●		●		●	●						dissemination and sulphide rich vein in granitic saprolite	maximum: Au71.20g/t in 20cm	
	Pezao garimpo	Pxgg	●				●	●					●	●		●		●					259.1℃ to 226.2℃	2.9% to 9.5% NaCl	dissemination and veinlets in altered granite	maximum: Au35.71g/t, Ag19.1g/t, Cu0.86% in 1m	37.7ppm
	Edimar garimpo (15.6Ga)	Pxgg	●		●		●						●			●		●	●				258.8℃	1.9% NaCl	dissemination and veinlets in altered granite	maximum: Au60.45g/t, Ag74.5g/t in 1m	987ppm
	Janet garimpo	Pxgg					●						●			●		●					234.8℃	7.5% NaCl	quartz vein in granitic saprolite	maximum: Au32.07g/t, Ag5.2g/t in 30cm	15.7ppm
	Southeast anomalous zone in south area	Pxgg	●		●		●		●				●	●	●	●	●	●	●						dissemination and quartz vein in porphyritic granite	maximum: Au1.27g/t in 1m	
Block F	Garimpo do Aluizio	Pxmg	●		●		●	●	●				●		●			●			●		216.8℃ to 226.5℃	2.6% to 7.9% NaCl	quartz vein in Pxmg	MJBA-2: 2m core length: average Au0.87g/t, 3m core length: average: Au0.61g/t	20ppm
	Garimpo do Serrinha do Guaranta	Pxsch			●		●						●	●	●		●	●	●	●		●	225.4℃ to 260.7℃	9.0% to 11.8% NaCl	quartz veinlets in Pxsch	MJBA-1: 3m core length: average Au3.34g/t, 10m core length: average: Au0.27g/t, Cu1.41%	7.4ppm

py: pyrite, pyr: pirrhotite, mt: magnetite, il: ilmenite, cp: chalcopyrite, cv: covellite, sp: sphalerite, ga: galena, bis: bismuthinite, gold: gold
qz: quartz, k-f: potassium feldspar, ab: albite, ser: sericite, chl: chlorite, ep: epidote, kao: kaolinite, cal: calcite, dol: dolomite, tal: talc

Table II-7-3 Summary of survey results for each block

Area	Soil Geochemistry					Results of auger survey	Results of drilling survey			
	Anomalous zone	Geology	Size of soil anomaly	Anomalous elements	Gold mineralization type		RC hole No.	Au grade (2 m core length) (above Au 1.00 g/t)	DD hole No.	Au grade (1 m core length) (above Au 1.00 g/t)
Block B	Northwest area (threshold value: 25 ppb)	Griiib	1.8 km × 0.8 km	Au, Pb, Zn	Alluvial garimpos	High grade value existing in saprolite (max: 1,507 ppb)	B5-06 B5-11 B5-18	Au 1,06 g/t, Au 1.23 g/t Au 4.42 g/t Au 2.83 g/t	MJBA-11 MJBA-13 MBJA-14 MBJA-15	Au 1.36 g/t Au 5.09 g/t, Au 2.52 g/t Au 2.06 g/t, Au 1.94 g/t, Au 1.25 g/t Au 1.39 g/t
	Southeast area (threshold value: 25 ppb)	Griiib, Grugp	12.0 km × 0.6 km	Au, Cu, Pb, Zn, Mo, W	Alluvial garimpos	High grade value existing in saprolite (max: 2,443 ppb)	B3-04	Au 2.54 g/t	MJBA-08 MJBA-17	maximum gold grade: 0.73 g/t Au 1.64 g/t
	Northeast area (threshold value: 25 ppb)	Griiib	0.8 km × 0.4 km	Au, Pb, Zn	Alluvial garimpos, Primary garimpo					
Block C	Central area (threshold value: 25 ppb)	Griiib	1.2 km × 1.2 km	Au, Ag, Pb, Fe	Alluvial garimpos, Primary garimpo	High grade value existing in saprolite (max: 860 ppb)	C1-07 C1-14 C2-04 C2-06 C3-12 C3-14 C4-04	Au 1.92 g/t Au 1.14 g/t Au 3.38 g/t Au 2.69 g/t Au 3.02 g/t Au 4.04 g/t Au 3.06 g/t	MJBA-04 MJBA-19 MJBA-20	Au 1.09 g/t Au 1.88 g/t Au 2.72 g/t
	East area (threshold value: 25 ppb)	Griiib	1.8 km × 0.5 km	Au, Fe	Alluvial garimpos, Primary garimpo	High grade value existing in saprolite (max: 14,800 ppb)				
	Northeast area (threshold value: 25 ppb)	Griiib	1.0 km × 0.3 km	Au, Pb, Fe	Alluvial garimpos					
	West area (threshold value: 25 ppb)	Griiib, Ap	1.2 km × 0.2 km	Au, Ag, Pb, Fe	Alluvial garimpos					
	Southwest area (threshold value: 25 ppb)	Griiib, Ap	0.5 km × 0.3 km	Au, Ag	Alluvial garimpos, Primary garimpo					
Block F	Serrinha do Guaranta area (threshold value: 20 ppb)	Pxsch, Pxgg, Di	3.5 km × 1.5 km	Au, Pb, Zn, V, etc.	Alluvial garimpos, Primary garimpo	High grade value existing continuously in saprolite (max: 1,431 ppb)			MJBA-01	Au 1.31 g/t, Au 1.76 g/t, Au 2.25 g/t, Au 7.67 g/t, Au 2.03 g/t
	Aluizio area (threshold value: 20 ppb)	Pxmg, Di	3.5 km × 0.1 km	Au, As	Alluvial garimpos				MJBA-02	Au 1.51 g/t, Au 1.17 g/t
	Central area (threshold value: 20 ppb)	Pxmg, Pxv, Di		Au, Cu, As etc.						
Block G	North area (threshold value: 20 ppb)		2.5 km × 1.5 km	Au, Cu, Pb	Primary garimpo					
	West of south area (threshold value: 20 ppb)		2.0 km × 1.5 km	Au, Cu, Pb	Alluvial garimpos					
	East of south area (threshold value: 20 ppb)		3.0 km × 3.0 km (above 100ppb: 1.3 km × 0.4 km)	Au, Ag, Cu, Pb, Zn, W	Alluvial garimpos		G1-02 G1-04 G1-07 G1-09 G1-10 G2-02 G2-07 G2-13	Au 6.89 g/t Au 1.17 g/t, Au 2.52 g/t Au 3.06 g/t Au 2.14 g/t Au 5.19 g/t Au 1.61 g/t Au 2.42 g/t Au 1.89 g/t	MJBA-25	Au 1.27 g/t

mineralization was present within shearing structure and it was associated with disseminated pyrite and pyrite films. RC drilling showed in 5 intervals gold average above 1g/t in 2m and the best intercept was Au4.42g/t. DD drilling results showed in 7 intervals gold average above 1 g/t in 1m, and the best intercept was 5.09 g/t.

Gold mineralizations intercepted by drilling survey are from low to intermediate grade and its width is in the general very thin. The spatial distribution of these gold mineralizations is relatively continuous, but it shows large gold barren section between mineralized parts.

(2) C Block

The main shearing trend in C block is NW-SE observed in some of the primary gold garimpo. Shear zones with NNW-SSE trend was confirmed in the C7 gold garimpo. The gold mineralization in C7 garimpo is related to quartz vein with a width of 30cm that fill a 30-degree dip-shearing zone. The results of ore analysis showed 113.44g/t of Au, 194.3g/t of Ag and a high content of Bismuth. Also were confirmed anomalous values of Cu, Pb and Zn.

Auger survey performed within gold anomaly zones indicated that even though the gold anomaly in soil has a relatively great size, the gold distribution in the saprolite is narrow with spots of high gold grade. Trench survey carried out aiming to check one of the gold anomalies detected by Auger survey, demonstrated an average gold grade of Au3.11g/t in 2m.

The drilling survey showed that the shearing structure present alteration as silicification, potassification, epidotization and chloritization and some of them were related to gold mineralizations. Gold mineralizations intercepted by drilling survey also showed a strong association with pyrite dissemination and pyrite films filling shearing structure and quartz veins. The gold mineralizations widths are in general very thin and show low to intermediate gold grade. The spatial distribution of gold mineralizations is relatively continuous, but it shows large gold barren section between mineralized parts.

(3) F Block

A detailed geological survey carried out in Serrinha do Guaranta garimpo confirmed that gold bearing sulfide rich quartz vein fills a NW direction subvertical ductile shearing in talc-chlorite schist. Previous survey had indicated the presence of a large copper dissemination within talc chlorite schist of Serrinha do Guaranta area. Analytical results from 32 meters of channel sampling in weathered talc chlorite schist showed a lateral average grade of 0.43% Cu. Gold results in the same 32 meters presented low grade gold values and the best values in 2m average were 2.33 ppm, 0.52 ppm and 0.13 ppm. The borehole MJBA-1, confirmed that gold bearing sulfide rich quartz vein fills the NW direction subvertical ductile shearing in talc-chlorite schist. It also confirmed copper mineralization within schist and a maximum average grade of 1.41% Cu in 10m coring was obtained.

A detailed geological survey in Aluizio Garimpo confirmed gold mineralization in parallel, sulfide rich quartz veins that fill a N80W direction-shearing zone. The parallel quartz veins with strong dissemination of pyrite are inserted in a shear zone that averages 8 meters width and a confirmed length of more than 500 meters. Most of quartz veins were low gold grade, however results, as 25.40 ppm Au is also present. The borehole MJBA-2 confirmed that gold was associated to quartz veins and a maximum gold grade of 1.5g/t Au was obtained in 1m coring.

(4) G Block

The Zanete garimpo and Pezao garimpo are two of the principal gold primary garimpo found in G block. Edmar garimpo and Luizao garimpo are two others big garimpo located outside at the vicinities of the survey area. Evaluation survey made in these 4 garimpo, presented the following results. In the Zanete garimpo, gold results between 28.73g/t and 45.06g/t were obtained in quartz veins. The sulfide rich silicified rock of the Pezao garimpo presented gold values between 0.65g/t and 35.71g/t. The Edmar garimpo presented gold results between 0.01g/t and 60.45g/t in pyrite rich altered granite. The sulfide rich altered granite from Luizao garimpo presented 6.49g/t Au.

A detailed soil geochemical survey followed by RC drilling survey and DD drilling survey were carried out in the G block area. Results from soil geochemical survey showed three broad concentration of gold anomaly with threshold value of 20 ppb, 50ppb and 100ppb, at Northern, Southern and Southeastern part of the surveyed area.

The drilling survey showed broad structures with strong shearing and brecciation and it was confirmed rock alteration as silicification and potassification as well as pyrite dissemination and films. A total of 43 RC drilling holes were conducted in the survey area, and most of them intercepted gold mineralization with a maximum gold result of Au6.89g/t in 2m sample, but its results were not conclusive to define the direction and dip of the mineralized bodies intercepted by drilling. Gold mineralizations were frequently associated to brecciated or sheared porphyry granite with pyrite dissemination and films and also to quartz veins and veinlets filling granite. The section of drilling with higher gold grade seems to be closely associated to sites with high dissemination of pyrite or to sites with high concentration of pyrite films.

The characteristics of the gold mineralization observed in the drilling site of G block show similarities with gold mineralization described as Matupa type and Luizao type that is thought by RTZ to be a porphyry type gold mineralization. The similarities between them include host rock type, association with pyrite, alteration type, fluid inclusion type and gold association with weak copper mineralization. The Pezao garimpo is thought to be a disseminated high-grade gold mineralization filling shearing zone, but it is also likely to be a central part of a porphyry gold type mineralization and further drilling survey is recommended to check these possibilities.

PART III CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 1 CONCLUSIONS

During the Cooperative Mineral Exploration in the Alta Floresta area that lasted 3 years from 1998 to 2000, the following surveys were carried out: geological, geochemical and drilling surveys in the B Block, C Block, F Block and G Block, and geological survey in the E Block and H Block.

The results obtained during these studies can be summarized as follows:

(1) B Block:

Two trenches confirmed the strike and dip of structures bearing gold mineralization in B Block area and based on these results, it was possible to decide the N45E direction of the drillings located in the B Block. A total of 75 RC holes (total length of 3,750m) and 11 DD holes (total length of 808.05m) were then drilled by using RC and DD methods (Fig. II-1-8 to -15). Trench survey results confirmed that SW dipping structures, such as shearing and quartz veins, controls the existing gold mineralizations in the area. According to the drilling survey carried out in this area, the spatial distribution of the gold mineralizations are relatively continuous, but showing large gold barren section between mineralized sections of low to intermediate gold grade. The results of the overall survey showed that although many gold mineralizations exist in the drilled area, not any economically potential target could be found for further drilling. However, the geochemical survey indicated a quite continuous soil geochemical anomaly at the eastern edge of the B Block, around Jacare garimpo. Also, a 6m wide gold mineralization of sheeted quartz veinlets type was extracted by the geological survey in the garimpo Jacare, suggesting the presence of a stockwork type or sheeted quartz veinlets type gold mineralization below the soil anomaly.

(2) C Block:

Two trenches confirmed the strike and dip of structures holding gold mineralization in C Block. This information was used to decide the S45W direction of the drilling in the C Block. A total of 68 RC holes (total length of 3,400m) and 10 DD holes (total length of 804.55m) were drilled by the RC and DD method during the drilling survey. Results from drilling survey showed that within drilled area, the gold mineralizations are relatively continuous, but its spatial distribution shows large gold barren sections between mineralized sections (Fig. II-2-13). From the results of the overall survey carried in this area it can be concluded that, although abundant gold mineralization exists in the drilled area, there is not clear indication of detecting any economically potential target for further drilling. In spite of these results, the geological survey in the garimpo area confirmed quartz vein holding high-grade gold mineralization in the C7 mineral showing and in the Waldemar garimpo. The geochemical survey found also continuous soil anomalies with high-grade gold in the vicinities of the drilled area and as a result, it can be expected quartz veins with high gold grade below these

soil anomalies.

(3) E Block:

The most important gold mineralization in the region is the alluvial garimpo named Cabeca, located outside of the E Block. Though the geological survey carried out inside the E Block showed quartz veins and pegmatoid veins along N60W direction and intruded in the gneissic rocks, no gold mineralizations could be confirmed. The absence of a favorable geological unit or a trap structure to host a major gold deposit and the absence of any younger granitic intrusion, are both indications that the Block E area has indeed very low potential to host major gold deposits.

(4) F Block:

From the results of the soil geochemical survey it was concluded that the presence of two major trends for the gold anomalies, i.e., NW-SE and WNW-ESE trends, reflect the existence of a gold mineralization strongly controlled by shearing. The Auger survey showed that the gold mineralization of Serrinha do Guaranta garimpo is not continuous and presents probably, a boudinage form structure. Two boreholes with a total length of 200.70mt were performed to confirm the continuity at depth of two gold mineralizations located below garimpo working of Serrinha do Guaranta garimpo and Aluizio garimpo. The drilling confirmed that these gold mineralizations are found inserted within a high angle-shearing zone conforming a narrow mineralization with low to medium gold grade.

(5) G Block:

Detailed soil geochemical survey along 108.2 linear Km and 1,127 samples showed three broad concentrations of gold anomalies in the Northern, Southern and Southeastern part of the G Block area. The drilling survey, by using RC and DD method, demonstrated by the results of the 43 RC holes (total length of 2,150m) and 3 DD holes (total length of 301.95m) that the gold mineralizations are associated to brecciated porphyry granite and to rock alteration, such as silicification, potassification and pyrite dissemination and films, quartz veins and veinlets. Most of drilling intercepted gold mineralizations but the intercepts with higher gold grade are inferred to be closely associated to sites with high dissemination of pyrite or to high concentration of pyrite films. Characteristics of the gold mineralization in G Block show similarities with the gold mineralization described as Matupa type and Luizao type, which according to RTZ, this kind of mineralization corresponds to a porphyry type gold mineralization. From drilling data, it was estimated a geological ore reserve of 10.4 million tons and an average ore grade of 0.439g/t, totalizing 4.5 tons of gold.

(6) H block:

From the results of the geological survey, an alluvial garimpo of unknown gold origin is inferred in the central part of this block. Analytical results of ore samples taken in the H Block area showed very low gold and base metal grades, proving that promising gold mineralization is not likely to be detected within block area

CHAPTER 2 RECOMMENDATIONS

From the overall survey results obtained in the B Block, C Block, E Block, F Block, G Block and H block, the following recommendations are suggested.

(1) B Block

No additional work will be necessary within the large gold anomalous area surveyed by drilling during this year. But, further survey would be needed to evaluate the eastern edge of the B Block, around Jacare garimpo, where a quite continuous soil geochemical anomaly is present and it is still open to the east of the area. There exists the possibility to find a stockwork type or sheeted quartz veinlets type gold mineralization below this soil anomaly.

(2) C Block

No additional work is recommended to carry out within the large gold anomalous area surveyed by drilling during this year. However, further survey is recommended in order to evaluate some of the soil gold anomalies located outside of the drilled area. These soil gold anomalies are continuous and present gold grade much higher than the broad gold anomaly drilled during this year. There exists the possibility that below the above mentioned anomaly, it can be found a high-grade gold mineralization type related to shearing zone, as exemplified by Paraiba gold mine.

(3) G Block

Further drilling survey is recommended in the vicinities of the area drilled during this third year survey aiming to confirm the continuity and the type of the detected gold mineralization, assumed to be a porphyry gold type. Porphyry gold type mineralization is also inferred to exist below others gold anomalies detected during soil geochemical survey in the G Block area and for this reason; further drilling survey is recommended to clarify these anomalies. The Pezao garimpo has been assumed to be a disseminated high-grade gold mineralization filling shearing zone, but there exists the possibility that it corresponds to the central part of a porphyry gold type mineralization and accordingly, additional drilling survey is recommended to further clarify the above mentioned characteristics.

(4) E Block, F Block and H block

No further works are recommended in the E Block, F Block and H block.

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