REPORT
ON
THE MINERAL EXPLORATION
IN
THE ALTA・FLORESTA AREA
FEDERATIVE REPUBLIC OF BRAZIL

(PHASE Ⅲ)

MARCH 2001

JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

PREFACE

In response to the request of the Government of the Federative Republic of Brazil, the Japanese Government decided to conduct a Mineral Exploration Project in the Alta Floresta Area and entrusted the project to the Japan International Cooperation Agency (JICA) and the Metal Mining Agency of Japan (MMAJ).

JICA and MMAJ sent to Brazil a survey team composed by 4 members from July 2000 to November 2000.

The team exchanged views with the officials concerned of the Government of Brazil and conducted a field survey in the Alta Floresta area. After the team returned to Japan, further studies were made and the present report has been prepared. This report includes the survey results of geological, geochemical and drilling surveys carried out during Phase III.

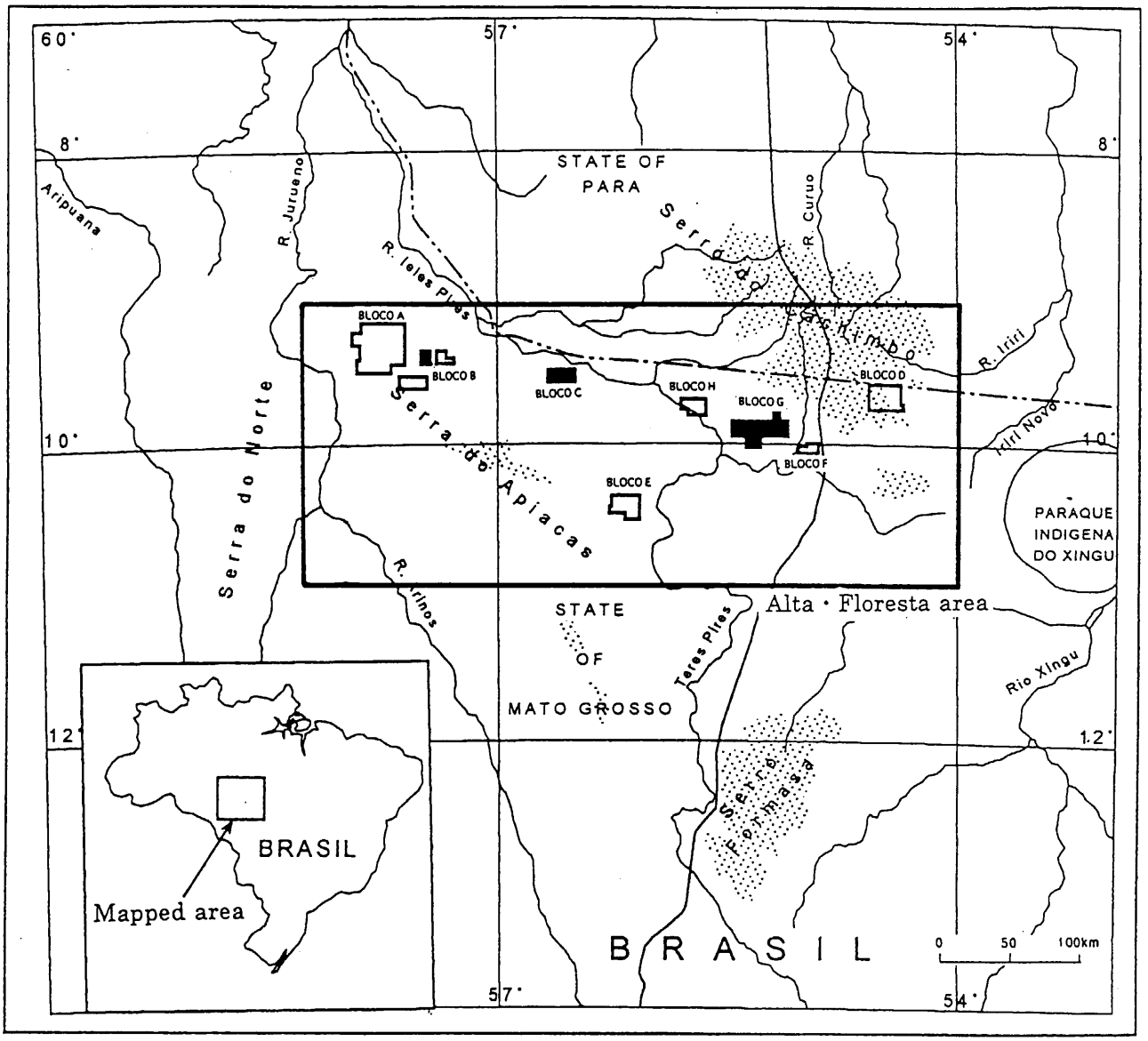
We hope that this report will be useful for the development of the mineral resources in Brazil and contribute to the promotion of friendly relations between Japan and Brazil.

We wish to express our deep appreciation to the officials concerned of the Government of Brazil for their close cooperation extended to the team.

March 2001

Kunihiko Saito
President
Japan International Cooperation Agency

Naohiro Tashiro
President
Metal Mining Agency of Japan



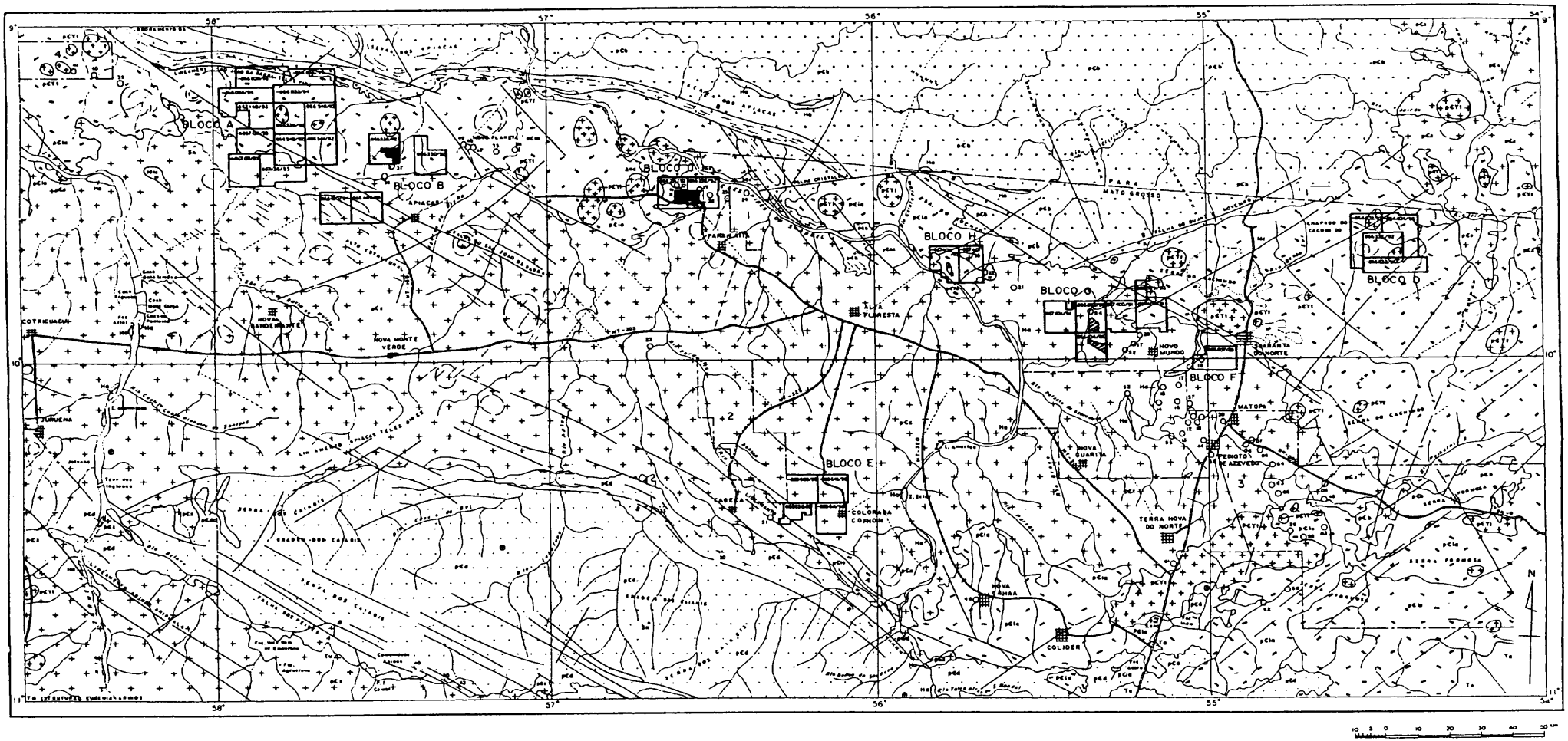
LEGEND

Alta · Floresta area

Phase III survey area

Mining claim area

Fig. 1 Location map of the phase III survey area in Brazil.



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The area for geological survey and drilling survey

The area for geochemical survey and drilling survey area

Fig. 2 Location map of the survey areas in the Alta Floresta area.

ABSTRACT

In accordance with the Scope of Work signed on 6th July 1998 between the Governments of Japan and the Federative Republic of Brazil, a mineral exploration project was carried out in Alta Floresta, Brazil in order to discover a new ore deposits in the survey area.

This project started in 1998, with duration of three years, and the present report describes the survey results of the third year (Phase III).

According to survey results from the second year, the good potentiality for gold deposits detected in the blocks B, C and G led to the decision to carry out geological and drilling surveys in B and C blocks and geochemical and drilling surveys in the G block.

The following results were obtained from the third year surveys.

B block area: Two trenches were opened aiming to confirm the strike and dip of structures holding gold mineralization in B block area, as shown in the Fig. II-1-1 and Fig. II-1-2. RC drilling was distributed in 5 drilling lines and 75 holes with a total length of 3,750m, as shown in the Fig II-2-1 and Fig. II-2-2. On the basis of the above results, 4 diamonds drilling were conducted with a total length of 401.00m as shown in the Fig II-1-1 and Fig II-1-2. Trench survey results confirmed that gold mineralization in this area was controlled by structures as shearing and quartz veins dipping SW. Results from drilling survey demonstrated that the spatial distribution of the gold mineralizations is relatively continuous, but with large gold barren sections intercalated by low to intermediate gold grade mineralizations.

C block area: Two trenches were made in order to clarify the strike and dip of structures holding gold mineralization in C block area, as shown in the Fig. II-2-1 and Fig. II-2-2. RC drilling was distributed in 4 drilling lines and 68 holes with a total length of 3,400m, as shown in the Fig II-2-1 and Fig. II-2-2. The DD drilling survey with 6 boreholes and total length of 602.45m were carried out, as shown in the Fig II-2-1 and in detail in the Fig II-2-2. Trench survey results confirmed that shearing structures controlled the gold mineralization in this area and that quartz veins are found dipping NE. Drilling survey confirmed that the gold mineralizations are relatively continuous distributed so that large gold barren sections are intercalated between mineralized sections.

G block area: Detailed soil geochemical survey was carried out along 108.2 linear Km in G block where 1,127 samples were collected, as shown in Fig. II-3-3 and Plate II-3-2. RC drilling survey was carried out along 3 drilling lines by drilling 43 boreholes with a total drilling length of 2,150m as shown in the Fig. II-2-9 and Fig. II-2-10. Based on these results, three DD drilling holes were conducted with a total length of 301.95m, as shown in the Fig II-2-9 and in detail in the Fig II-2-10.

Results from soil geochemical survey showed three broad concentrations of gold anomalies with threshold value of 20 ppb, 50ppb and 100ppb located in the Northern, Southern and Southeastern part of the G block area. The above mentioned drilling survey indicated that gold mineralization was associated to brecciated porphyry granite. Gold mineralizations were also associated to rock alteration as silicification, potassification and pyrite dissemination and films, and quartz veins and veinlets filling porphyry granite. Most of the drilling holes intercepted gold mineralizations and a maximum gold grade of Au6.89g/t was confirmed. Drilling holes that intercepted high gold grades were closely associated to sites with high dissemination of pyrite or to high concentration of pyrite films. However, the drilling results were not conclusive to define the direction and dip of the gold mineralization. Characteristics of the gold mineralization in G block show similarities with gold mineralization described as Matupa type and Luizao type. RTZ considered this mineralization to be a porphyry type gold mineralization.

The following further surveys are recommended for B, C and G blocks in the Alta Floresta region.

(1) B Block.

- Further survey is recommended to evaluate the possibility of stockwork type or sheeted quartz veinlets type gold mineralization around Jacare garimpo. Additional work is not considered necessary within the large gold anomalous area surveyed by drilling

(2) C Block.

- Further survey is recommended to evaluate the possibility of high-grade gold mineralization below soil anomalies with higher gold grade. Additional work is not necessary within the large gold anomalous area surveyed by drilling

(3) G Block

- Further survey oriented to target the possibility of porphyry gold type mineralization is recommended.

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PART I GENERALITIES

PART II SURVEY RESULTS

PART III CONCLUSIONS AND RECOMMENDATIONS

PART I GENERALITIES

CHAPTER 1 INTRODUCTION

1-1 Background

In accordance with the Scope of Work signed on 6th July 1998 between the Governments of Japan and the Federative Republic of Brazil, a mineral exploration project was carried out in Alta Floresta, Brazil.

This project started in 1998 with duration of three years and aimed at discovering new mineral deposits in Alta Floresta area (Fig.1).

Survey results from previous works indicated a good potentiality to find gold deposits in the B, C and G blocks. For this reason, it was considered during this fiscal year to carry out geological and drilling surveys in the B and C blocks as well as geochemical and drilling surveys in the G block.

1-2 Conclusions and Recommendations from Phase II

1-2-1 Conclusions from Phase II

(a) B Block

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

The shearing zones are the most important geological structure in the survey area, being some of the primary gold garimpo, as Satelite garimpo and Jacare garimpo, located inside these zones. Jacare garimpo presented high gold contents with maximum values of 379.36 g/t of Au and besides, a 6m wide channel sampling presented an average grade of 70.52g/t Au and 6.05g/t Ag.

The single element analysis on soil geochemical data indicated the existence of three large gold anomaly zones in the Block B, namely, Northwest zone, Southeast zone and Northeast zone.

Auger geochemical survey results showed that the gold anomaly in soil is distributed within a large area but with a low gold grade. However, the gold anomalies in saprolite are distributed in a narrow area, but presenting high gold anomalies at a local level. This result confirms that the auger method is very useful to narrow considerably the gold anomaly and giving a more coherent anomalous halo than the broad gold anomaly resulted from soil geochemical survey.

During the diamond drilling survey, 7 holes were conducted with a total drilling length of 403.05m, confirming the detection of gold in hard core and in saprolite, with the best intercepts obtained in 4 boreholes. The borehole MJBA-08 intercepted gold mineralization between 43.00m and 69.00m, with an

interval of 26m and presenting a gold average of 0.21g/tAu and a maximum gold value of 0.73g/t

The geology of the area to the south of B block is similar to that of B block area. Three major shearing zones were observed with gold barren quartz vein fills these structures. Gold alluvial garimpo is found widespread, but no primary gold garimpo was detected in the survey area.

(2) C Block

The geology and the geological structure of block C are similar to that of the block B, but beyond the main shearing direction of NW-SE direction, shearing zones along ENE-WSW and NNW-SSE directions were also observed. Gold garimpo C7, located inside a shearing zone of NNW-SSE direction, indicated samples with gold values of 76.74g/t to 113.44g/t and silver values of 158.0g/t and 194.3g/t. The soil gold anomaly represented by gold values of 25 ppb and 10 ppb presents an elongated pattern along NW-SE direction with 5 gold anomalies in the area and suggesting that a shearing structure exist in this direction.

Results of auger geochemical survey in C block bears a similarity with the results of B block. The gold anomalies within saprolite were also narrow and localized distributed but containing some high gold values, as exemplified by the value of 14.8ppm Au detected in one sample.

Gold mineralization related to shearing zones of varied inclination was found in hard cores as well as in saprolite in the boreholes MJBA-3, MJBA-4 and MJBA-5. The evidence of a relationship between shearing structure and gold mineralization open a good perspective for finding major gold deposits related to shearing structures in the survey area.

(3) F Block

The geology of the F block is composed of Archean to Lower Proterozoic Xingu Complex (Px), Dykes and Quaternary sediment. Some primary gold garimpo, as exemplified by the Aluizio garimpo, are observed in shearing zones along WNW-ESE direction that represents the main geological structure of F block. Result of soil geochemical survey confirmed the presence of two major trends for the gold anomalies in the F block.

The auger survey confirmed that the gold anomaly in soil and in saprolite extends toward north. Its results confirmed the wide gold anomaly in soil obtained by the regional geochemical survey.

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 with a maximum average grade of 1.41% Cu in 10m coring.

The borehole MJBA-2 confirmed that gold mineralization in Aluizio Garimpo is associated to quartz veins. Core analysis indicated an average gold grade of 0.87g/t between 9.00m and 11.00m and 0.61g/t between 30.00m and 33.00m.

(4) G Block

The geology of G block is represented by Archean to lower Proterozoic Xingu Complex, middle Proterozoic Teles Pires Granite and Basic dykes.

The WNW-ESE direction shearing zones are widespread in the survey area, being some of the primary gold garimpo located inside these zones as Zanete garimpo and Pezao garimpo. Edmar garimpo and Luizao garimpo are also two big garimpos located outside at the vicinities of the G block.

Evaluation survey made in these 4 garimpos, presented the following results. In the Zanete garimpo, gold results from 28.73g/t to 45.06g/t were obtained from 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 py rich altered granite. The sulfide rich altered granite from Luizao garimpo presented 6.49g/t Au.

The single element analysis of soil geochemical data indicated a large gold anomaly zone in the southwestern portion of G Block.

1-2-2 Recommendations for the Phase III Survey

For the B and C blocks, it was recommended at first, further grid auger geochemical survey to narrow the broad gold anomaly detected in soil during Phase II. A grid RC drilling was recommended in the narrowed gold anomalies to confirm the continuity of the gold mineralization at depth. To further clarify the results, it was recommended a DD drilling program targeting the gold orebody.

In the southern area from B block, a geochemical survey was recommended in the central part of the area in order to detect the source of the alluvial gold mineralization.

In the F block, further grid soil geochemical survey and auger geochemical survey was recommended in the vicinities of Serrinha do Guaranta garimpo and a RC drilling was recommended to confirm the continuity of the gold mineralization in depth.

In the G block, further grid soil geochemical survey and auger geochemical survey were recommended at southwest area, within of the large gold anomaly zone. RC drilling was also recommended to confirm the continuity of the gold mineralization in depth.

1-3 Generalities of the Phase III Survey

1-3-1 Survey area

The Phase III survey was carried out in the B, C and G blocks located as shown in Fig. 2. The B block is located at northern part from Apiacas City. The C block is located at northwestern part from

Paranaita City. The G block is located at northwest from Novo Mundo City.

1-3-2 Objectives of the survey

The survey aimed at discovering new mineral deposits in the Alta Floresta(Fig. 1) by clarifying the geological setting and characteristics of mineral deposits.

The geological survey by means of trenching was carried out in B and C blocks aimed to clarify in more detail, the dip and strike of some gold bearing quartz vein within saprolite. The dip and direction of drilling was defined based on that information. The geochemical survey conducted in G block aimed to detail the gold anomaly detected by a prior survey using a wide spaced survey.

The drilling survey aimed to confirm gold and copper anomalies in depth that were detected by geological survey and geochemical survey

1-3-3 Content and amount of work

v During Phase III, Geological survey and drilling survey was carried out in B and C block. Geochemical survey and drilling survey was conducted in G block

Results from geological survey, geochemical survey and drilling survey are presented in Table I-1-1, and the laboratory work results are presented in Table I-1-2.

1-3-4 Survey Members of the Project

The following members participated in the project:

Table I-1-1 Contents and amount of works

Area and Content	Amount of work
Geological Survey (Trench survey)	Areas : Blocks B and C. Contents : Total length : 350m Trench B 1 (length 100m) Trench B 2 (length 100m) Trench C 1 (length 100m) Trench C 2 (length 50m) Direction : N45°E Depth : 3m
Geochemical Survey (Soil sampling)	Area : Block G Line length: 108.2 km Number of samples: 1,127 samples
Drilling Survey (RC drilling	Total length: 9,300m (186 holes×50m), dip 50° Note: drill direction will be decided by results of geological survey. Block B : length 3,750m(75 holes ×50m) B1 Line (15 holes ×50m) B2 Line (15 holes ×50m) B3 Line (15 holes ×50m) B4 Line (10 holes ×50m) B5 Line (20 holes ×50m) Block C : length 3,400m(68 holes ×50m) C1 Line (23 holes ×50m) C2 Line (20 holes ×50m) C3 Line (15 holes ×50m) C4 Line (10 holes ×50m) Block G : length 2,150m(43 holes ×50m) G1 Line (12 holes ×50m) G2 Line (16 holes ×50m) G3 Line (15 holes ×50m)
(DD drilling survey)	Total length 1,305.40m (13 holes ×100m), dip 50° Note: Location and direction will be decided by results of RC drilling survey. Block B: MJBA-14 (length 100.05 m) MJBA-15 (length 100.50 m) MJBA-16 (length 100.30 m) MJBA-17 (length 100.15 m) Block C: MJBA-18 (length 100.15 m) MJBA-19 (length 100.30 m) MJBA-20 (length 100.30 m) MJBA-21 (length 100.55 m) MJBA-22 (length 100.75 m) MJBA-23 (length 100.40 m) Block G: MJBA-24 (length 100.30 m) MJBA-25 (length 100.30 m) MJBA-26 (length 101.35 m)
(Complementary work)	(Block B) Repairing road : length 11,700m × width 5m New road construction : length 3,700m × width 5m Construction of drilling sites : 75 sites (Block C) Repairing road : length 3,700m × width 5m New road construction : length 3,200m × width 5m Construction of drilling sites : 68 sites (Block G) Line cutting length : 118.0km (line 108.2km+base line 9.8km) New road construction : length 2,000m × width 5m Construction of drilling sites : 43 sites

Table I-1-2 Laboratory works

Survey Contents	Laboratory work	
Geological survey and geochemical survey	Thin section	15 samples
	Polished section	16 samples
	X-ray diffraction analysis	19 samples
	Chemical analysis for ore assay	201 samples
	Chemical analysis for soil samples (18 elements)	1,127 samples
	Pb/Pb Dating	2 samples
	Fluid inclusion	4 samples
Drilling Survey		
(RC drilling survey)	Chemical analysis (Au) : (25 samples of them for check analysis)	4,680 samples
(DD drilling survey)	Thin section	16 samples
	Polished section	17 samples
	X-ray diffraction analysis	18 samples
	Chemical analysis for ore assay(18 elements)	1,301 samples
	Fluid inclusion	4 samples

Elements of chemical analysis (18 elements) : Au, Ag, Cu, Pb, Zn, Fe, As, Sb, Hg, Bi, Cd, Co, Ni, V, Mn, Mo, K, W

(1) Field work

Japanese counterpart		Brazilian counterpart	
Motomu Goto	Team Leader	Nilson Batista de Souza Principal geologist	(DNPM/MT)
Junichi Yamagata	Drilling survey and Geological survey	Amóss de Melo Oliveira Geologist	(DNPM/MT)
Soichiro Kageyama	Geochemist	Jair de Freitas Geologist	(DNPM/MT)
Masaharu Kaedei	Geochemist	Emanuel Teixeira de Queiroz Chief	(DNPM/BRS)
		Carlos Schobbenhaus Chief	(DNPM/BRS)
		Jose da Silva Luz Chief	(DNPM/MT)
		Gercino Domingos da Silva Geologist	(METAMAT)
		Isaias Mamore de Souza Geologist	(METAMAT)
		Jesue Antonio da Silva Geologist	(METAMAT)
		Wanderlei Magalhães de Resende Director	(METAMAT)

DNPM: Departamento Nacional de Produção Mineral
METAMAT: Companhia Matogrossense de Mineração

(2) Field Inspection

Japanese counterpart	
Tadashi Itoh	(MMAJ)
Takeshi Harada	(MMAJ)
Takashi Kamiki	(MMAJ)

MMAJ: Metal Mining Agency of Japan

1-3-5 Survey Period

The Phase III survey were conducted in Brazil during the following period:

Geochemical survey: 17th July to 6th October 2000
Geological survey: 27th July to 9th September 2000
Drilling survey: 27th July to 22nd December 2000

CHAPTER 2 GEOGRAPHY OF THE SURVEY AREA

2-1 Locations and Access

The Federative Republic of Brazil, accounting as the biggest country in South America, has an area of approximately 8.540.000 km^2. The population is about 157 million and its capital city is Brasilia.

Alta Floresta area is located in the northern part of the Mato Grosso State at about 800 km north from capital Cuiaba (Fig.1).

The main road that accesses the survey area is the BR163, which connects the capital Cuiaba with Santarem City in the Para State. The BR163 crosses the eastern part of the survey area at the city of Matupa. It takes about 12 hours by vehicle for 790 km from Capital Cuiaba to Alta Floresta City. From Alta Floresta City to Apiacas City it take about 6 hours by vehicle for about 180 km of gravel road.

2-2 Topography and Drainage System

The Alta Floresta region, including all the survey areas, is located in a residual plateau known as Depressoes da Amazonia Meridional. The topography of the region is almost flat but present at northern and southern portion a continuous range of high topographic relief. The high topography is related to two graben structures that run along WNW-ESE direction. The altitude at the central part of the area has an elevation of 150 m to 350 m and it forms gentle hills within the area. The elevations at the northern and southern portion are higher than 500 m.

The main river that runs in Alta Floresta region is the Rio Teles Pires with many tributaries as Rio Apiacas and Rio Paranaita.

2-3 Climates and Vegetation

The survey area belongs to Amazon tropical rain forest that presents high temperature and high humidity. Original forest is still present at the northern part of the Alta Floresta region. But at the southern part, cattle farms and large plantations are widely distributed.

In the survey area there are two well-defined seasons i.e., dry season from April to October and rainy season from November to March.

CHAPTER 3 EXISTING GEOLOGICAL DATA

3-1 General Geology of the Surrounding Area

The Fig. I-3-1 that shows the study area is an interpretation map from Landsat TM Imagery and its generalized stratigraphic column is shown in the Fig I-3-2.

In the survey area, the basement is built up by high to medium-grade metamorphic rocks including granitoids. These rocks are overlain by slightly to nonmetamorphic and widely distributed platform cover, deposited between about 1.9 Ga to 1.0 Ga, which was in turn intruded by anorogenic granitoids and, locally, by basic and alkaline rocks.

The oldest unit present in the Alta Floresta area is represented by a granite-gneiss-migmatite terrain referred by Silva et al. (1974) to as the Xingu Complex of archean to paleoproterozoic age.

During the Mesoproterozoic, the Amazonian Craton was a scenario of a widespread granitic and volcanic event, called the Uatuma Magmatism (Uatuma Supergroup).

After Uatuma Magmatism, Mesoproterozoic platform sediments of the Beneficente and Dardanelos groups that are interpreted as deposited within graben system named Caiabis and Cachimbo overlie the rocks of the Xingu Complex and the Uatuma Supergroup.

(a) Xingu Complex

The Xingu Complex is composed mostly of gneiss, schist, granodiorite, quartz-diorite, tonalite, migmatite, BIF and intrusives granitoids. The granitoids are widely intruded in the Xingu Complex and clearly present distinctive characteristics between intrusive ages and genesis.

(b) Pre Uatuma Granites

As shown in Fig.I-3-2, the pre-Uatuma granites were divided into three types, as follows:

(1) Type I

Based in certain similarity observed in field, the type I was associated with Juruena types granitoid. The type I granitoid shows a variety of lithologic types: tonalitic granite, granodiorite, adamelitic monzonite, quartz-monzodiorite, quartz-diorite and quartz-syenite, with predominance of adamellite or granodiorite. It was defined as a massif composed of porphyritic rocks, generally gneissic rocks, and coeval with the Transamazonian Orogeny. Dating analysis by Rb/Sr resulted in 1947 Ma. (Santos & Reis Neto, 1982).

(2) Type II

The type II was associated with hydrothermally altered granite as exemplified by Matupa type granitoid.

The Matupa granite, as the Juruena granodiorite, has been poorly studied, however, it is not seen correlated with the anorogenic magmatism of the central Amazonian Province. As dated as 1872 Ma by the Rb/Sr method, it has been defined as a type I undeformed and homogenous biotite monzogranite (Botelho et al, 1997). Geochemical data indicate that either a volcanic arc or post-collisional emplacement took place soon after the Transamazonian Orogeny (Moura et al, 1995).

(3) Type III

The type III includes the alkaline granite and syenitic biotite granite described in the Alta Floresta region.

(c) Uatuma Group

The Uatuma magmatism is represented in the Alta Floresta area by low metamorphosed acid to intermediate volcanics of the Iriri Formation (~1650 Ma by Rb/Sr), also called Teles Pires volcanic, and Teles Pires granitic intrusive (~1600 Ma by Rb/Sr).

The volcanic rocks, which show a calc-alkaline tendency, were genetically generated in the mantle or lower crust by partial fusion giving an initial basaltic magma. The differentiation to rocks of felsic composition, like dacite, rhyodacite and rhyolite are interpreted as generated by gradual fractioning during crystallization (Montalvao, 1982).

(d) Beneficente Group

More than 1,000 m in thickness of the Beneficente Group was deposited between 1.6-1.4 Ga. in a SE-NW direction oriented continental rift. Morphologically, the Chapada do Cachimbo represents a unit of very large and uniform regional expression that occurs in the northern/northwestern sector of the Alta Floresta area.

(e) Dardanelos Group

This unit occurs in the southern part of the Alta Floresta area and is also represented, like the Beneficente Group, by a very uniform regional morphology known as Serra dos Caiabis. The undeformed sediments deposited in the Caiabis graben represent the Dardanelos Group, composed mostly by arkosic sandstone showing cross-stratification and horizontal bedding. Two different basaltic flows occur intercalated in the Dardanelos sediments, being the lower flow dated 1.4 Ga and the upper one, 1.2 Ga by the Rb/Sr method (Tassinari, 1981).

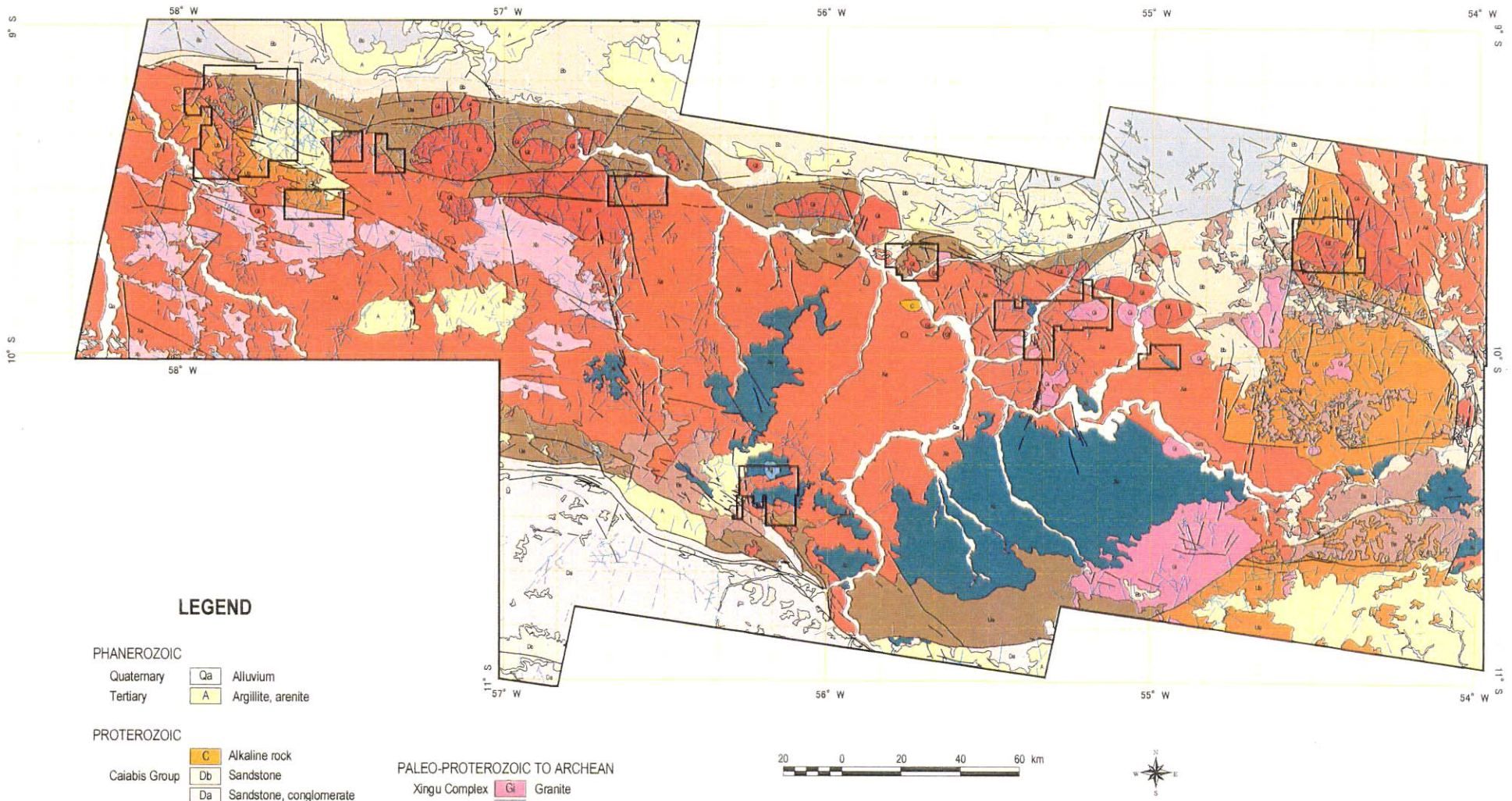
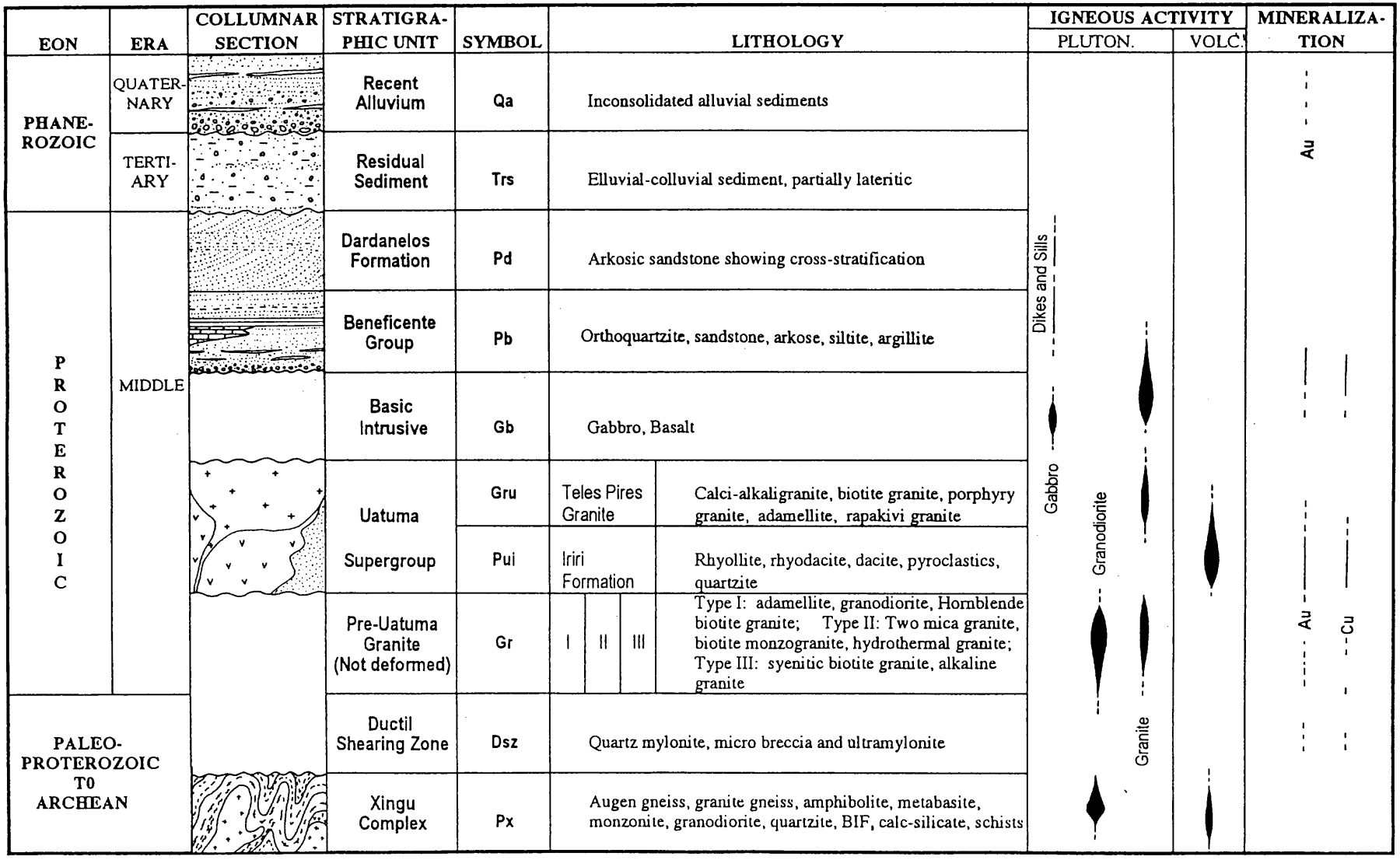


Fig. I-3-1 Geological interpretation map of the Alta Floresta area by Landsat images



Stratigraphy in accordance with: Schobbenhauss et al., 1981 and Antonio Joao P. Barros, 1994; modified.

Fig. I-3-2 Generalized stratigraphic columnar section in the project area

(f) Basic dikes and sills and alkaline intrusions

The Central Amazonian Province was affected by several magmatic episodes of basic nature, which occurred in the time interval of 1.55 Ga and 1.0 Ga and associated to lineaments like the Tapajos (NE-SW) and the Abacaxis and Canama (NW-SE). Diabase dikes and sills of olivine-gabbro composition, which cut all the above-described units, represent the basic magmatism.

The Alta Floresta area is located at the southwestern margin of the Central Amazonian Province. The Province is composed by an undeformed and unmetamorphosed volcanics and sedimentary sequences, deposited between about 1.9 Ga. to 1.0 Ga., which was in turn intruded by anorogenic granitoids and, locally, by basic and alkaline rocks.

The granites of the Amazonian craton have been tentatively grouped, and the most complete classification of granites has been summarized by Dall`Agnol et al. (1987) as follows:

①Archean granites (>2.5Ga);

②Paleoproterozoic (Transamazonian age) granitoids (2.1-1.9Ga);

③Mesoproterozoic (1.8-1.4Ga) anorogenic granites of the Central Amazonian Province;

④Mesoproterozoic (1.7-1.4 or 1.2Ga) granites of the Rio Negro-Juruena Province; and

⑤Meso- to Neoproterozoic (1.4-0.9Ga) anorogenic granites of the Rio Negro - Juruena, Rondonian and Sunsas Provinces.

A datation of rocks by K/Ar method was carried out during the Phase I survey in order to confirm the above classification summarized by Dall`Agnol et al.

Further datation by U/Pb and Pb/Pb methods was carried out during the Phase II and Phase III survey and its results are shown on Table I-3-1.

3-2 Mineralization and Mining Activities

3-2-1 Mineralization

The gold mineralization in the survey area is composed from placer deposits, residual gold deposits in soil and primary gold mineralization in saprolitic rock and hard rock.

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

(1) Porphyry Gold type

Botelho et al. (1998) associated the gold mineralization of the Alta Floresta region with oxidized

Table I-3-1 Dating results in Alta Floresta area

Geology and Minealization		Existing Data	MMAJ (1999)	MMAJ (2000)	Phase III
Dardanelos Formation		1.4 Ga (Rb/Sr method)			
Beneficiente Group		1.6 to 1.4 Ga			
Basic Intrusive					
Uatuma Group					
	Teles Pires Granite	1.6 Ga	1.104 to 1.341 Ga (K/Ar method)		
	Iriri Formation	1.65 Ga (Rb/Sr method)	1.414 to 1.538 Ga (K/Ar method)	1.786 Ga (U/Pb method)	
Pre-Uatuma Granite					
	Grillb (Block C)			1.802 to 1.803 Ga (U/Pb method)	
	Grillb (Block B)			1.816 Ga (U/Pb method)	
	Grilla (Block B)			1.820 Ga (U/Pb method)	
	Grill			1.823 Ga (Pb/Pb method)	
	Grillll			(U/Pb method)	
	(Gru, Block F)			1.894 Ga (U/Pb method)	
	(Xingu, Block F)			1.937 Ga (U/Pb method)	
	(Xingu, Block G)			1.817 Ga (U/Pb method)	
	Matupa Granite	1.872 Ga			
	Juruena Granite	1.947 Ga			
Gold Minealization					
	Sheared Zone and Dissemination Type (Block G)				1.56 Ga (Pb/Pb method)
	Vein Type (Block C)				1.76 Ga (Pb/Pb method)

type I calc-alkaline plutons, with characteristics either of volcanic arc or post-collision granites. The gold either occurs in small high-grade vein-type deposits or as 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, 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 by local shearing structures.

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.

3-2-2 Outlines of the Mining Activities

The mining activities in the region started in 1966 with gold discovery by garimpeiros in the Juruena River. Only in 1978, due to the opening of the road BR-163 that connects the state capital Cuiaba and the Santarem city of Para state, that the garimpo activity spread to Peixoto de Azevedo and Alta Floresta areas. The garimpo activities increased sharply after 1978, with the discoveries of Novo Planeta, Novo Satelite and Novo Astro alluvial garimpos and in 1979, with the discoveries of Jau, Ze Vermelho and Ze da Onca alluvial garimpos.

The garimpo gold production in the period between 1982 and 1995 was officially reported in 53.0 ton in the Peixoto de Azevedo area and 58.8 ton in the Alta Floresta area, totaling 111.8 ton of gold in

the garimpos of the Alta Floresta Region.

The primary vein of the Paraiba gold garimpo was discovered by garimpeiros in 1980, and it was manually mined down to a depth of about 20 to 30 m. In 1990, the first shaft of 60m depth was open and Mineracao Mivale in association with garimpeiros drilled 8 holes

TP Mineracao S.A., mining company, shared by BUMBRAS of Canada and CMP, surveyed the Teles Pires main river during 1983 and developed a mining operation from 1984 until 1989.

Jaruana Mineracao Ind. e Com. S.A. carried out an exploration survey in the Juruena area alluvial deposit from 1981 to 1982 with successful results.

Grupo Eluma S.A. Ind. e Comercio surveyed the Braco Norte and Terra Nova areas during 1981 and 1984 aiming alluvial and elluvial-colluvial deposits with good results.

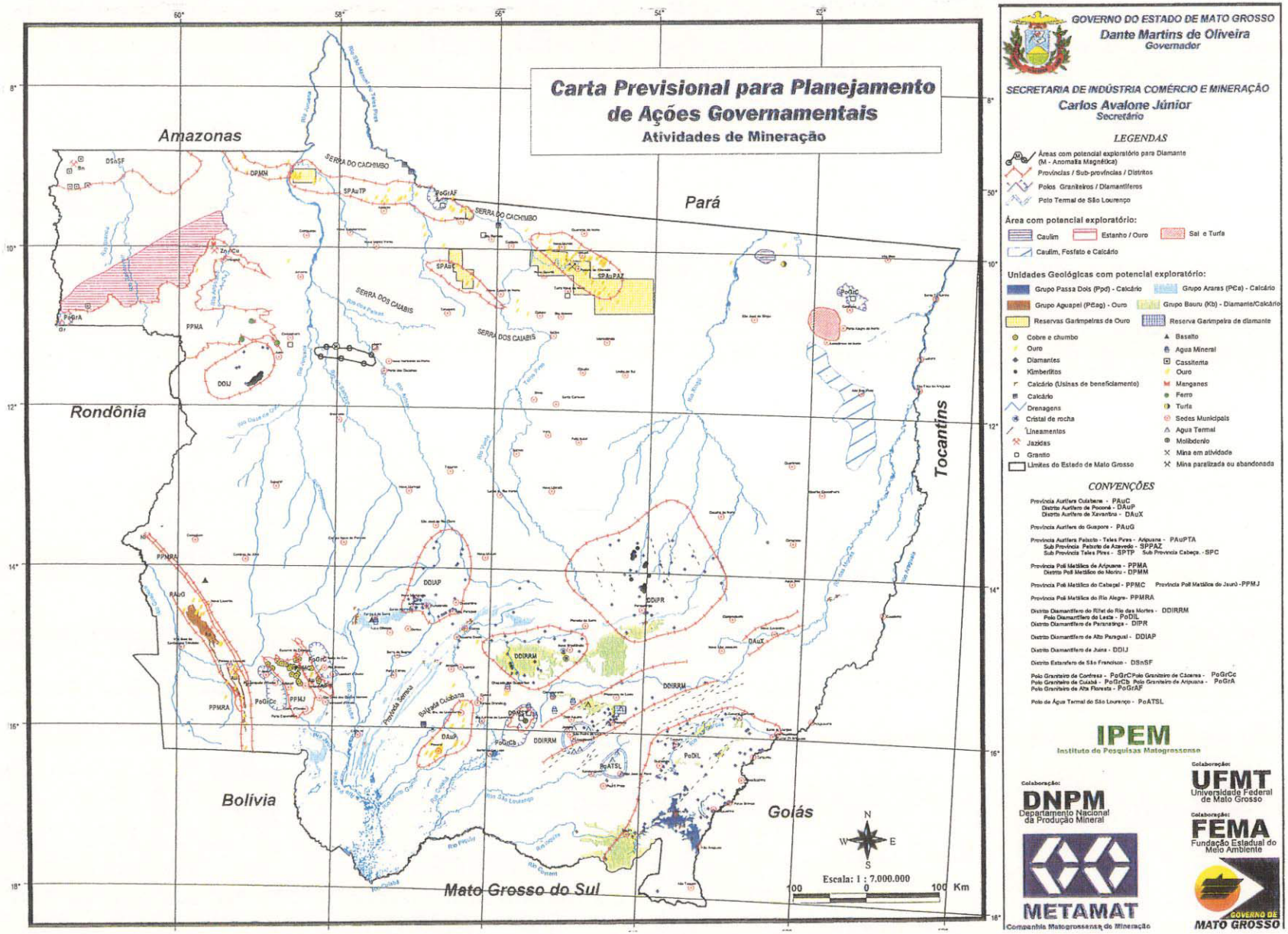


Fig. I-3-3 Generalized mineral location map in Mato Grosso State

CHAPTER 4 SUMMARY OF THE PHASE III SURVEY RESULTS

4-1 Correlation between Mineralization and Geological Setting

Teixeira et al. (1989) divided the Amazonian Craton in several provinces showing similar geochronologic ages complemented by structural, petrological and geochemical information (Fig.I-4-1). Following the schema proposed by these authors, an old archean core can be distinguished in the central part of the Amazonian Craton (Central Amazonian Province). This archean core grew up during the Transamazonian Cycle with the development of the Maroni-Itacaiunas mobile-belt on its notheastern 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.

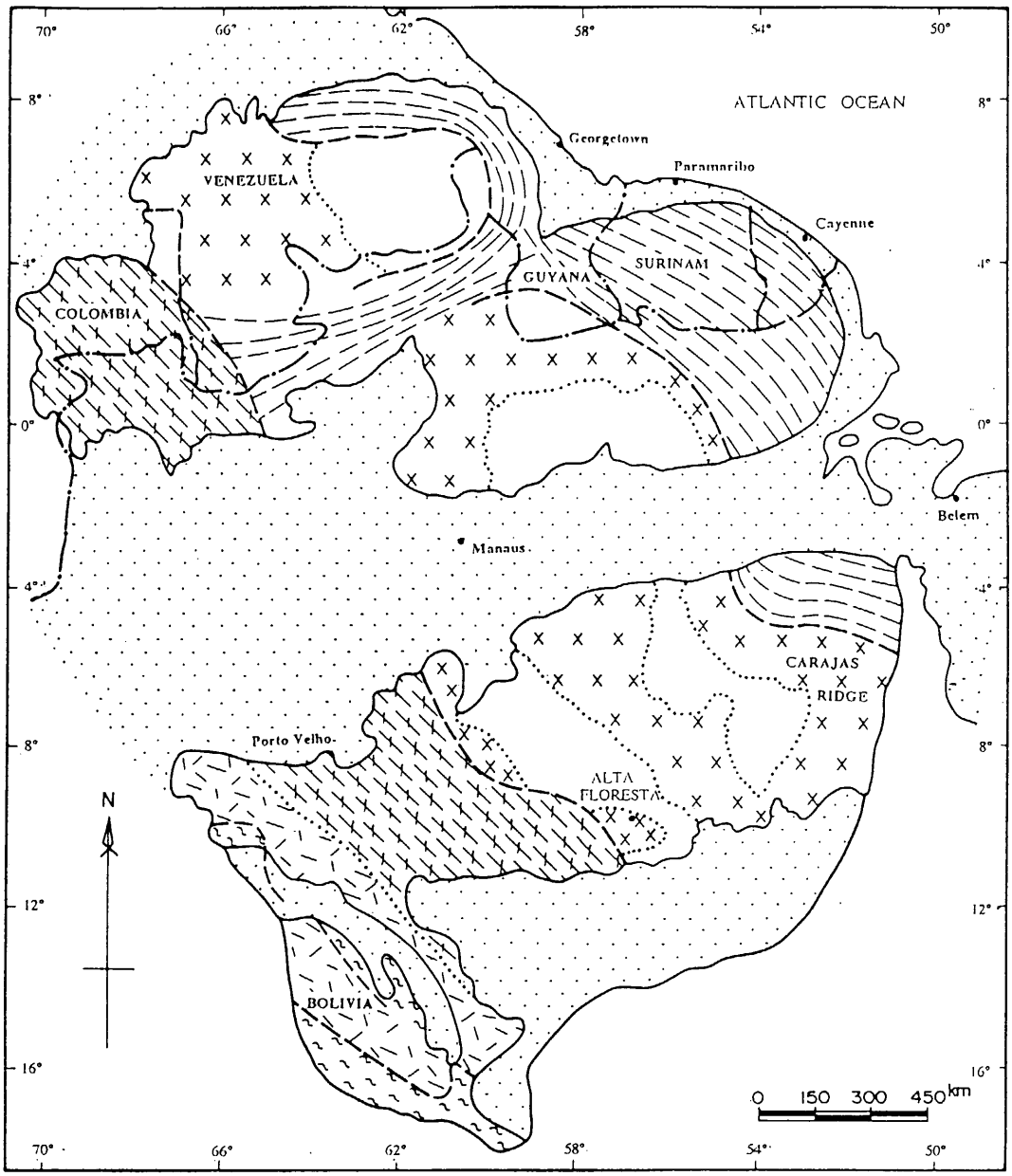
A dating of rocks by K/Ar method was carried out during the Phase I survey, and further dating by U/Pb and Pb/Pb methods was carried out during the Phase II and Phase III survey as shown in Table I-3-1.

Dating of granitic rocks presented an age between 1,816Ga to 1,820Ga in B block, between 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 assumed that the host rock of Alta Floresta region is composed of 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. I-3-4). 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 along WNW-ESE direction. 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



Source: Teixeira et. al. (1989) modified

PHANEROZOIC SEDIMENTS

SUNSAS MOBILE BELT (1.1~0.9 Ga)

RONDONIAN MOBILE BELT (1.45~1.25 Ga)

RIO NEGRO - JURUENA MOBILE BELT (1.75~1.5 Ga)

PROTEROZOIC PLATFORM COVERS (1.9~1.5 Ga)

MARONI - ITACAIUNAS MOBILE BELT (2.25~1.9 Ga)

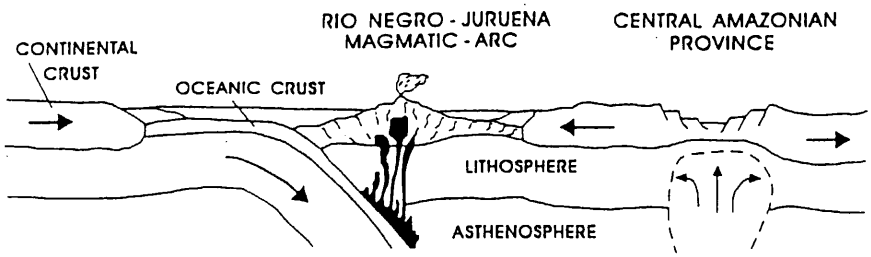
CENTRAL AMAZONIAN PROVINCE (>2.5Ga)

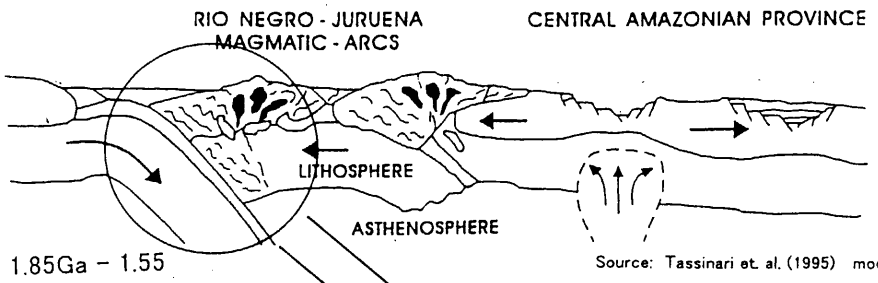
TRANSITION ZONE BETWEEN BELTS

APPROXIMATE CONTACTS BETWEEN BELTS

NATIONAL BOUNDARIES

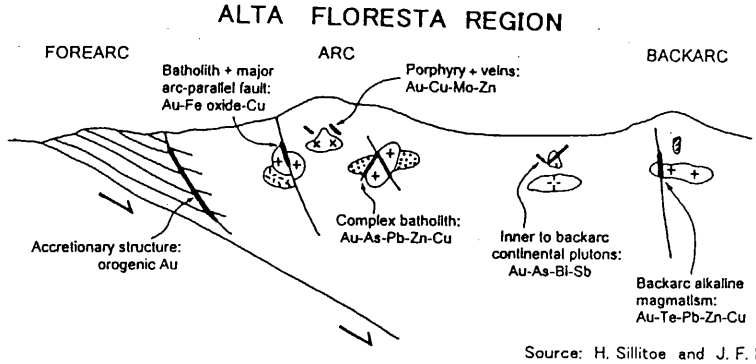
Fig. I-4-1 Tectonic geocronologic Map of the Alta Floresta area





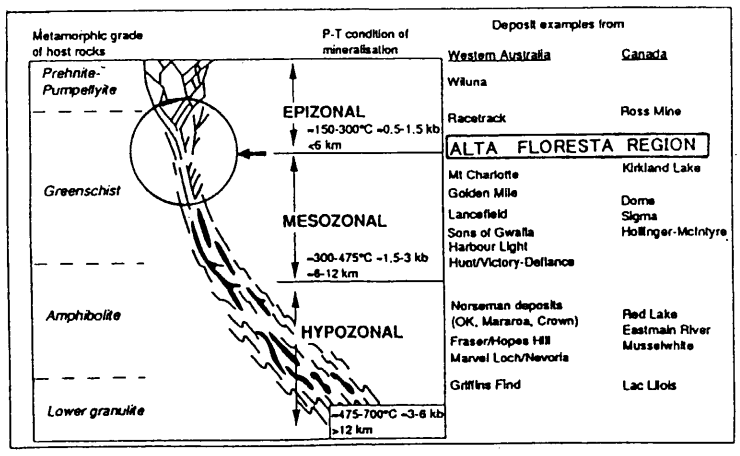
Source: Tassinari et. al. (1995) modified

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. I-4-2 Tectonic model for the development of the Rio Negro - Juruena orogeny and related gold mineralization

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 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 in general, a low salinity. The above data confirm that the gold mineralization were emplaced from upper to intermediate depth, and therefore, it is expected the following gold mineralization types in Alta Floresta area: Porphyry Gold type, Shear zone hosted quartz veins type and Stockwork type gold mineralization.

4-2 Preliminary Evaluation of Mineral Potentiality

The mineralization characteristic for gold mineralization in B, C and G block are described below and a compilation of mineralization characteristic for each block is shown in Table I-4-1 and Table I-4-2.

(1) B Block

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, Satelite garimpo and Paulao garimpo, all along a WNW-ESE shearing trend. Jacare garimpo with a gold mineralization related to quartz veinlets and shearing planes, indicates 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 Au 70.52 g/t and Ag 6.05 g/t. Satelite garimpo and Paulao garimpo show gold mineralization in quartz vein filling shearing zone. Results of analysis in quartz vein of Paulao garimpo presented Au 100 g/t, Ag 127.2 g/t and Cu 3.86 %.

Results from drilling survey indicated a broad shearing structure in fresh rock and in saprolite. Silicification, epidotization, chloritization and potassicification were found within the shearing structure. Gold mineralization is also present within the shear structure and associated with disseminated pyrite and pyrite films. RC drilling showed in 5 intervals gold average values above Au 1g/t in 2m and the maximum value of Au 4.42g/t. DD drilling results showed in 7 intervals gold average above Au 1 g/t in 1m, and the maximum value of Au 5.09 g/t.

(2) C Block

The shearing zone is the most important geological structure within C block. The main shearing trend is NW-SE, observed in some of the primary gold garimpo. Shear zones with NNW-SSE trend

Table I-4-1 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 (1.76Ga)	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 (1.56Ga)	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	

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

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.

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.

Drilling survey indicated that the gold anomalies detected within saprolite present continuity down to the hard rock. Drilling survey indicated a narrow shearing structure in fresh rock and in saprolite. Silicification, epidote, chloritization and potassification were found within the shearing structure. Gold mineralization is also present within the shear structure and associated with disseminated pyrite and pyrite films. RC drilling showed in 7 intervals gold average above 1g/t in 2m and with a maximum value of Au 4.04 g/t. DD drilling results showed in 2 intervals gold average above Au 1 g/t in 1m, and a maximum of Au 2.72 g/t.

(3) 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 of the G block area at the vicinities of the survey area.

Evaluation survey made in these 4 garimpos, presented the following results. In the Zanete garimpo, gold results between Au 28.73 g/t and Au 45.06 g/t were obtained in quartz veins. Sulphide rich silicified rock of the Pezao garimpo presented gold values between Au 0.65 g/t and Au 35.71 g/t.

The Edmar garimpo presented gold results between Au 0.01g/t and Au 60.45 g/t in pyrite rich altered granite. The sulphide rich altered granite from Luizao garimpo presented 6.49g/t Au.

Results from drilling survey indicated a broad shearing structure in fresh rock and in saprolite and a strong brecciation were observed in the core of DD drilling. Alteration as, silicification, epidotization, chloritization and potassicification were detected within the shearing structure. Results of RC drilling showed in 7 intervals gold average values above Au1g/t in 2m and a maximum of Au 6.89 g/t. DD drilling also showed gold average in 1m interval of above Au 1 g/t, and a maximum of Au 1.27 g/t.

4-3 Correlation between Geochemical Anomaly and Mineralization

Results of the geochemical and drilling surveys are shown in the Table I-4-2.

Table I-4-2 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 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

(1) G Block

Geochemical survey results confirmed three large gold anomalies at northern, central and southeastern part of the surveyed area in block G.

Results from southeastern part indicated a NW-SE trending soil geochemical anomaly with gold above 100 ppb. The geochemical data treatment indicated a weak relation between Au and Cu and the factor 4 showed a correlation between Au and Cu in the northern part and in the southeastern part of the surveyed area. Gold primary garimpo in the vicinities of the surveyed area were detected in Pezao garimpo at the northern part, Luizao garimpo and Edmar garimpo at the eastern part and the Zanete garimpo inside of the surveyed area. The Zanete garimpo presents an E-W direction quartz vein and it shows gold grades between Au 28.73g/t and Au 45.06g/t.

Results from drilling survey indicated a broad shearing structure in fresh rock and in saprolite and a strong brecciation were observed in the core of DD drilling. Alteration as, silicification, epidotization, chloritization and potassicification were found within the shearing structure. Gold mineralization is also present within the shear structure and associated with disseminated pyrite and pyrite films.

Three ameba form gold anomalies were detected by soil geochemical survey and supposed to be a target area for a future survey.

4-4 Geological reserve calculation in G block

A Gold geological reserve was calculated only in G block as presented in the Table I-4-3. Gold geologic reserve calculation for B and C block were not carried out due to the drilling results in these blocks that showed a low grade, narrow gold mineralized zones and a large spacing between mineralized zones. Results from drilling survey of G block indicated wide and continuous mineralized zones with higher gold grade average in comparison with B and C blocks.

Reserve calculation was by means of rectangle method and were used all data from 43 RC drilling holes that totalized 1,075sample. Some of the data for this calculation was as follow.

1) Cut off grade

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

2) Ore density

The density value of 1.95 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 saprolite and 2.72 for fresh granite were adopted.

3) Calculation of the mineralized zone area

Table I-4-3 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

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 oriented 50 degrees, 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.

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

5-1 Conclusions

During this third year survey, a geological survey and drilling survey (Fig. II-1-2 and Fig. II-2-2) were conducted in B and C block, and a detailed soil geochemical survey and drilling survey (Fig. II-3-2) were carried out in G block. The survey results can be summarized per area as follows:

(1) B Block

The trench survey, carried out as part of the geological survey, demonstrate that the weathering section in the B block area can be divided into A, B, A/B and C-horizons. Channel sample taken from C-horizon indicated broad anomalies with gold grade above 0.1 g/t, and at 3 sites were observed gold results above 1g/t. Trench survey also confirmed quartz veins and shearing zones within granitic saprolite and these structures showed different strike as E-W, N45W and N80W and dips to SW with 30 to 80 degrees.

The drilling survey indicated that the granitic saprolite in the B block area had a thickness between 30m and 50m and it showed wide shearing structure in it. This shearing structure was also observed in the fresh granite and in it were confirmed rock alteration as silicification, potassification, epidotization and chloritization. In many parts within these shearing structure were confirmed gold mineralization and in these mineralized parts were observed the presence of pyrite in the form of dissemination and films.

Trench survey and drilling survey proved that lateritic soil is not present in the B block area, and consequently lateritic type gold deposits are not likely in the area.

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. These results show that further survey is not needed within the drilled area of B block area due to the possibility to find an economical gold mineralization to be very low.

(2) C Block

The trench survey, carried out as part of the geological survey, demonstrated that the weathering section in the C block area can be divided into A, B, A/B and C-horizons. Channel sample taken from C-horizon indicated some intervals with gold anomalies above 0.1 g/t and in one of them was observed Au3.11g/t. Trench survey also confirmed quartz veins in shearing zones within granitic saprolite and the strike of these structures varied as E-W, N10W and N55W and dips to NE with 30 to 60 degrees.

The drilling survey indicated that the granitic saprolite in the C block area is thin with an average

thickness of 20m and it locally shows some structures with strong shearing. The shearing structure is continuous until the fresh granite and in it were confirmed rock alteration as silicification, potassification, epidotization and chloritization and some of them were related to gold mineralizations.

Trench survey and drilling survey proved that lateritic soil is not present in the C block area, and consequently lateritic type gold deposits are not likely in this area.

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. From these results it was concluded that further survey is not needed within the drilled area of C block area

(3) G Block

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 indicated that none of the analyzed elements show high correlation coefficient with Au, and only Cu shows low correlation coefficient with Au of 0.279. As shown on anomalous map in the Fig II-3-5, the soil geochemical survey showed three broad concentration of gold anomaly with threshold value of Au 20 ppb, Au 50 ppb and Au 100 ppb, at Northern, Southern and Southeastern part of the surveyed area.

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. 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 were conducted in the survey area, and most of them intercepted gold mineralization with a maximum gold result of Au 6.89 g/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.

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

5-2 Recommendations for further survey

The following further surveys are recommended for B, C and G blocks in the Alta Floresta region.

(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.

The possibility to find a stockwork type or sheeted quartz veinlets type gold mineralization exist below this soil anomaly.

(2) C 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 some of soil gold anomalies that are still present outside of the drilled area. These soil gold anomalies are continuous and present 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.

(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 of detected gold mineralization and also to confirm the type of gold mineralization that is thought to be a porphyry gold type. Porphyry gold type mineralization is also thought to exist below others gold anomalies detected during soil geochemical survey in the G block area and further drilling survey are recommended to check these possibilities.

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 are recommended to check these possibilities.