GOLD PROSPECTING NATIONAL PROGRAM
Subject and Methodology

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GOLD PROSPECTING NATIONAL PROGRAM
SUBJECT AND METHODOLOGY

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This report on Mineral Resources intends to systematize and divulge CPRM technical activity results on the fields of Economic Geology, Prospecting, Exploration and Mineral Economics. Results are shown in various kind of maps, bibliographic articles, reports and studies.

Due to the nature of these subjects, there are eight different series of reports, as listed below and at the end of this report:

1. PGE and Associates Series;
2. Gold Thematic Maps Series, 1:250.00 scale;
3. Gold Series – General Information;
4. Agricultural Mineral Resources Series;
5. Gemstones Series;
6. Mineral Economics Series;
7. Mineral Opportunities Series – Updated Projects Revision;
8. Several Series.
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1 - Gold and gold prospecting importance
Program's justification

The Brazilian gold potential is undeniable due to the fact that the nation has 3,900,000 km² of its territory, about 46%, constituted by Pre-Cambrian rocks of recognized geological and metallogenetetic importance, where several sequences of greenstone belts, old conglomerates, metavolcanic suites and frequent sheet-like veins swarm inserted in shear zones are to be detached as very promising geological environments.

The high number of occurrences, deposits, mines and old and recent prospects spread in several regions, confirms this potentiality for gold, which is also demonstrated by three centuries of production of the yellow metal. It is worthwhile to emphasize that Brazil was, in the eighteenth century, the most important gold producer in the world.

On the other hand, the prospecting campaigns held up to now have been absolutely incompatible with the enormous and indisputable potential already known.

The value of the world gold production reached, in 1996, the sum of US$ 29.24 billions in regard to 2,345.5 ton. The Brazilian gold production, including that informal resulting from “garimpos” reached 64.2 ton, representing US$ 0.801 billion, which is only 2.74% of the world total production. This is extremely small if one considers the Brazilian gold potentiality. Brazil holds a modest 10th place, preceded by South Africa, USA, Russia, Australia, Canada, China, Indonesia, Uzbekistan and Peru. Taking into consideration only the production from gold mines, excluding that from “garimpos”, the Brazilian participation in the gold world production lowers to only 25 ton.

The Brazilian gold deposits, known and yet to be found, urgently need to be prospected in order to accelerate the processes of utilization and generation of hard currencies. Gold is an extremely important gift from nature but it only becomes valuable, it only contributes to the economic and social development if prospected, evaluated and produced.

Gold is unlimitedly convertible into any currency at the international market price. It can be exchanged, without any major difficulty, into goods and services produced anywhere, further to being used, without any restrictions, in the payment of Brazilian external engagements and to increase the monetary reserves of the country.

Historical experience shows that all currencies are, at a higher or lower degree, affected by inflation, whilst gold, for thousands of years, has maintained and even increased its relative value. There are no indications that this value increasing process may be reverted.

The Government has been centering its efforts on the basic geological mapping of the country, while private companies have been investing on the detailed exploration and evaluation of areas already reasonably known (aiming at the delimitation or improvement of the reserves), mainly on the opening of new mines or in the improvement or modernization of the existent ones.

However, a more effective action is still lacking in the middle section of the gold mines generation process, namely in the gold prospecting. The latter, even in the more developed capitalist countries, has been mostly carried out by the public sector. In a poor country such as Brazil, where there is a great lack of capital for investment in the private sector, governmental action is even better justified.

Knowing the relevant importance of the production of gold in Brazil, CPRM - Companhia de Pesquisa de Recursos Minerais has planned – and put into effect the Gold Prospecting National Program - PNPO (“Programa Nacional de Prospecção de Ouro”), encompassing the whole national territory.
Under these circumstances and understanding as irreversible the option of the Government for greater private enterprise economy, the present Program aims at evaluating potential areas and targets to be afterwards explored by private enterprise which will then be able to develop procedures to discover new deposits or substantially increase the existent ones. This will create the necessary conditions for the exploitation of new gold mines and, consequently, increase the national gold production.

The laws which deal with the creation and transformation of CPRM into a Geological Survey, allow the implementation of government gold prospecting programs, bearing in mind its social achievements.

On the other hand, it is important to stress the syntonization of the program objectives with the federal Government's main guidelines, in order to supplement the performance of private enterprise.
2 - Objectives to be achieved

Objectives of the Program are as follows:

a) To define the national geological and economic gold potential, distinguishing the more attractive areas.

b) To stimulate discovery of deposits and to develop economic exploitation of gold, supplementing private enterprises activities.

c) To contribute significantly to the upgrading of the national primary gold production thus making possible an increase in the hard currencies cash reserves of the country, which is of recognized economic importance in foreign trade.

d) To offer to whom it may concern a better knowledge of the national potentialities for gold exploration, through a set of special maps and a data processing bank.

Help to increase gold production by means of non-polluting methods thus cooperating in land reclamation.
3 - Main characteristics and operation guidelines

The Program was elaborated in 1991. The operational activities started in 1992, they were developed in 1993 and came into full execution in 1994. They are, in principle, permanent. It presently encompasses 10 projects located at several regional units of CPRM all over Brazil and a coordinating and supervising center in Rio de Janeiro. Altogether 20 geologists work full-time on this Program, further to experts in data processing.

Treasury funds are the institutional support to the Program.

Operational segments of the Program are as follows:

a) Acquisition, interpretation and systematization of all main information concerning economic geology, prospecting and gold exploration in Brazil. Such information is registered on a detailed and specialized filing card, known as FIBO (Gold Bibliographic Information Form), the elaboration of which is based on published and unpublished geological reports and research and mining special reports from DNPM (National Mineral Production Department) and mining companies reports. The FIBO's information meant to help in the evaluation of the indexes, execution of specialized maps and towards the data processing of the Program, as described in the topics 5, 6 and 7;

b) Gitology-index and Prospectivity-indexes evaluation;

c) Drawing of gitology and prospectivity indexes Maps;

d) Program data processing;

e) Prospective field works;

f) Maps and data availability to the mineral community;

g) Divulgation of the results.
The Program intends to cover all Brazilian gold bearing areas. One hundred and two areas were selected, covering an area of 1,142,366 km², meaning 13% of the national territory (Figure 1).

Figure 1 – Map of work areas
5.1 Quantitative Gitology

The geological science state of the art points to a conjunction of factual elements with quantitative factors. On one hand one tries to base the knowledge on unchangeable concepts such as mineralogy, petrography nature, morphology, etc. and on the other hand on quantitative elements such as width, volume, contents, production, reserves, indexes etc. This is the concept of each time more to quantify the geological accidents and moderate or even minimize the interpretations of phenomena which are generally changeable and inconstant and sometimes unreliable. This is a way to avoid the "I think" in the decision making process which should be based more on quantitative elements and less on subjective or just qualifying ones such as those expressions commonly used "this area is hot", "violent anomaly", "there are too much sulfides", "the pan yellowed"... amongst other.

Gitology is the study of ore-deposits, including its geological environment in the broadest sense and also its economic value. Quantitative Gitology is concerned with the measurement of the economic importance of the various types of ore-deposits, through indexes and parameters based on reserves and on production of a given mineral good.

Through the application of the quantitative gitology concepts, CPRM geologists involved in the Program, made a comparative table of the Standard Quantitative Gitology encompassing the varied geological environment related to the main gold deposits in the world, with the definition of gitologic types, to which are attributed the values of production and gold reserves at world level (Table 01). Fourteen (14) gitologic types were distinguished, classified by geological environment category and characterized by the following elements: host rocks, morphology of the ore body, mineralogical association, texture and chemism of the ore, further to examples of deposits in the world and in Brazil.

5.2 Quantitative Gitology Index - IGQ

The identification and characterization, on a map, of the host environments for gold deposits related to gitologic types defined in Table 1 and the quantification of the degrees of previous prospectivity and demanded prospectivity of selected targets are the major assignments of the Program. In order to reach these aims, gitology index and prospectivity indexes were defined.

- Standard Quantitative Gitology Factor (FGQP), varying from 0 to 70, were reached taking into consideration the accumulated production plus reserves of each gitologic type, related to the words total, and

- Mineralization Factor (FM), varying from 0 to 30, was reached in function of the "status" of already existing gold mineralizations that were identified in the area.

As a matter of fact, both are directly proportional to the geological favourability.

A direct dependence of the value of the gitologic Index on the two conditioning factors becomes evident.

5.3 Previous Prospectivity Index—IPP

Is a number which indicates how and to what extent a given area has already been prospected. It varies from 0 to 100 and is reached through the sum of the values of the following factors: Geological Mapping Factor (FMG), Airborne Geophysics Factor (FAG), Geochemical Prospecting Factor (FPG), Ground Geophysics Factor (FGT),
Pits and Trenches Factor (FPT) and Drilling Factor (FSO). The variation intervals of the values of each IPP conditioning factor are established by observing a direct proportionality of the prospective importance of the kinds of fieldwork already carried out.

5.4 Demanded Prospectivity Index – IPD

Is a number which indicates the relative importance that a given area presents to be prospected. It varies from 0 to 100 and is reached through the conjugation of the IPP in such a way that for the result obtained there is an inverse proportionality between the value of IPP and the value of IPD, and a direct proportionality between the value of IGQ and that of the IPD. Thus, an area or a zone characterized as of high IGQ and low IPP, will show an high IPD, whilst another area characterized as of low IGQ and high IPP will present a low IPD.

5.5 Systematics for the Indexes Values Calculation

a) IGQ = Quantitative Gitology Index: varies from 0 to 100

IGQ = FGQP + FM

- FGQP = Standard quantitative Gitology Factor: varies from 0 to 70, depending on its gitologic types position on the Standard Quantitative Gitology Table (Farina & Matos, 1994).

- FM = Mineralization Factor, according to the following FM Values Table

<table>
<thead>
<tr>
<th>KNOWLEDGE ABOUT GOLD MINERALIZATION IN THE AREA TO BE EVALUATED</th>
<th>FM VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without anomalies</td>
<td>0</td>
</tr>
<tr>
<td>With gold showing – geochemical anomalies and/or gold pits</td>
<td>4</td>
</tr>
<tr>
<td>With occurrence, including active or inactive “garimpo” without production or reserves data</td>
<td>10</td>
</tr>
<tr>
<td>With deposit (ore-body), including active “garimpo” with production and/or reserves data</td>
<td>15</td>
</tr>
<tr>
<td>With economical deposit (evaluated ore-body) or mine:</td>
<td></td>
</tr>
<tr>
<td>&lt; 10 ton</td>
<td>21</td>
</tr>
<tr>
<td>≥10 to 50 ton</td>
<td>24</td>
</tr>
<tr>
<td>&gt;50 to 100 ton</td>
<td>27</td>
</tr>
<tr>
<td>&gt;100 ton</td>
<td>30</td>
</tr>
</tbody>
</table>

b) IPP = Previous Prospectivity Index: varies from 0 to 100

IPP = FMG + FAG + FPG + FGT + FPT + FSO
### IPP FACTORS VALUES VARIATION TABLE

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>VALUES VARIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMG – Geological Mapping Factor</td>
<td>0 – 20</td>
</tr>
<tr>
<td>FAG – Airborne geophysics Factor</td>
<td>0 – 10</td>
</tr>
<tr>
<td>FPG – Geochemical Prospecting Factor</td>
<td>0 – 25</td>
</tr>
<tr>
<td>FGT – Ground Geophysics Factor</td>
<td>0 – 10</td>
</tr>
<tr>
<td>FPT – Pits and Trenches Factor</td>
<td>0 – 10</td>
</tr>
<tr>
<td>FSO – Drilling Factor</td>
<td>0 – 25</td>
</tr>
</tbody>
</table>

### FMG VALUES TABLE

<table>
<thead>
<tr>
<th>GEOLOGICAL MAPPING SCALE</th>
<th>FMG VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1: 250,000</td>
<td>0</td>
</tr>
<tr>
<td>1: 250,000</td>
<td>5</td>
</tr>
<tr>
<td>1: 100,000</td>
<td>10</td>
</tr>
<tr>
<td>1: 50,000</td>
<td>15</td>
</tr>
<tr>
<td>≥ 1: 25,000</td>
<td>20</td>
</tr>
</tbody>
</table>

### FAG VALUES TABLE

<table>
<thead>
<tr>
<th>AREA WORKS ALREADY DONE</th>
<th>FAG VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without airborne geophysics</td>
<td>0</td>
</tr>
<tr>
<td>With regional airborne geophysics (gamma-ray-spectrometry, magnetometry)</td>
<td>5</td>
</tr>
<tr>
<td>With detailed airborne geophysics (input, etc)</td>
<td>10</td>
</tr>
</tbody>
</table>
### FPG VALUES TABLE

<table>
<thead>
<tr>
<th>AREA WORKS ALREADY DONE</th>
<th>FPG VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without geochemical prospecting</td>
<td>0</td>
</tr>
<tr>
<td>With stream sediments prospecting (SC)</td>
<td></td>
</tr>
<tr>
<td>a) Density of 1 sample/more than 10 till 50 km²</td>
<td>2</td>
</tr>
<tr>
<td>b) Density of 1 sample &gt; 5 till 10 km²</td>
<td>4</td>
</tr>
<tr>
<td>c) Density of 1 sample ≤ 5 km²</td>
<td>5</td>
</tr>
<tr>
<td>With Pan Concentrates Prospecting (CB)</td>
<td></td>
</tr>
<tr>
<td>a) Density of 1 sample/more than 10 up to 50 km²</td>
<td>4</td>
</tr>
<tr>
<td>b) Density of 1 sample &gt; 5 till 10 km²</td>
<td>8</td>
</tr>
<tr>
<td>c) Density of 1 sample/≤ 5 km²</td>
<td>10</td>
</tr>
<tr>
<td>Soil (L) and/or rock (R)</td>
<td>10</td>
</tr>
</tbody>
</table>

### FGT VALUES TABLE

<table>
<thead>
<tr>
<th>AREA WORKS ALREADY DONE</th>
<th>FGT VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without ground geophysics</td>
<td>0</td>
</tr>
<tr>
<td>With magnetometry</td>
<td>3</td>
</tr>
<tr>
<td>With IP or similar methods</td>
<td>7</td>
</tr>
</tbody>
</table>

### FPT VALUES TABLE

<table>
<thead>
<tr>
<th>AREA WORKS ALREADY DONE</th>
<th>FPT VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without pits or trenches</td>
<td>0</td>
</tr>
<tr>
<td>With exploratory pits and/or trenches</td>
<td>5</td>
</tr>
<tr>
<td>With detailed net pits and/or trenches</td>
<td>10</td>
</tr>
</tbody>
</table>

### FSO VALUES TABLE

<table>
<thead>
<tr>
<th>AREA WORKS ALREADY DONE</th>
<th>FSO VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without drilling</td>
<td>0</td>
</tr>
<tr>
<td>With exploratory drillings</td>
<td>15</td>
</tr>
<tr>
<td>With detailed drilling</td>
<td>25</td>
</tr>
</tbody>
</table>
IPD = Demanded Prospectivity Index, varies from 0 to 100

\[ IPD = \frac{IGQ(200 - IPP)}{200} \]

5.6 Gitology Index Map and Prospectivity Indexes Maps

Each one of the 102 areas of the Program will have 04 (four) kinds of special self explanatory maps, all of them in 1:250,000 scale, with an updated simplified geological background. They will be presented as digitalized, georeferenced colour maps. They are described as follows:

a) GOLD MINERALIZATION MAP – With the location of all gold mineralizations, they are qualified accordingly to their status (showing occurrence, deposit (ore-body), economic deposit (evaluated ore body) or mine).

b) QUANTITATIVE GITOLGY INDEX MAP – Shows the zones of each one of the calculated IGQ values in the area. Such zones, presented by means of colors and symbols, indicate different degrees of favourability of the gold potential geological environments.

c) PREVIOUS PROSPECTIVITY INDEX MAP – Through symbols and colors, it individualizes zones of IPP different values. These zones indicate different levels of geological and prospecting knowledge.

d) DEMANDED PROSPECTIVITY INDEX MAP - Individualizes IPD different values zones, using colors and symbols, which indicate different degrees of relative importance for additional prospective works and, as a consequence, the relative favourability for related investments.

5.7 Map of Gold Reserves and Production of Brazil

Add to the above mentioned Maps of gitology index and prospective indexes, a colour digitalized Map of Reserves and Production of Brazil, at the scale 1:7,000,000, is available to those concerned. It indicates the main deposits (ore-bodies), economic deposits (evaluated ore bodies) and mines with their production, reserves, concession companies and “garimpos” as well the gitological types they are hosted upon.

5.8 Data Processing

Program’s data recording encompasses the whole universe of already know data and information regarding geology, prospection, exploration, reserves and gold production covering all Brazilian territory.

Selection a assessment of informations are made using the FIBO (Gold Bibliographic Information File) that includes the following items:

1. Geographic localization (coordinates and federation units)
2. Real area extension
3. Area name or mineral toponomy
4. Consulted bibliographic references (authors and title)
5. Key words
6. Names of mineralized sites
7. Legal status (DNPM) – documentation and concessionaires
8. Regional geology
9. Field works already done
10. Analyses already done
11. Geochemical signature and/or of mineralogical prospecting
12. Geophysical signature
13. “Garimpos” areas characterization
14. Mineralization status
15. Gitologic types (classification according to PNPO)
   15.1. Classification in accordance to the bibliographic reference
   15.2. Gold Mineralizations localization
   15.3. Geotectonic environment
   15.4. Stratigraphic units
   15.5. Host-rocks
   15.6. Mineralization conditioning
   15.7. Gold by-products
   15.8. Mineralization geochemical association
   15.9. Ore-body geometrical relations
   15.10. Hydrothermal alterations
   15.11. Mineralization genetical relations
   15.12. Ore-body morphology
   15.13. Mineralization Structure and texture
   15.14. Age of the Mineralization
   15.15. Supergenic alterations
   15.16. Reserves
   15.17. Annual production
   15.18. Accumulated production

16. Other observations

The data processing system that stores this information is interactive with other CPRM systems (geological mapping, geochemical, geophysical system, etc) allowing the company to generate a wide range of products which will be made available to the users.

5.9 Products Availableness

The following products are available, through the Program, to the national and international community:

1. Special maps (including digitized maps in a magnetic environment)

2. Technical documentation generated in a magnetic environment – are the result of a number of consultations.

3. Specific technical reports

These products are available in paper, magnetic media (diskettes or CD-ROM), direct access to CPRM computers or in the CPRM Internet home page in the following address: http://www.cprm.gov.br.
6 - Program's Present Stage

Working Areas Map (Figure 1) shows the state of the art of the thematic maps at scale 1:250,000 CPRM will, periodically, let the public know all new information that will result from the works continuity.

The Brazilian Gold Reserves and Production Map is already available.

Data and information already stored in the system, corresponded, on 12.31.97, to 473 FIBO (Gold Bibliography Information File)
7 - Program’s Staff

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Roberto Felício Maluof
Luiz Alves Marçal
Patrícia Alves Junqueira

5. Support Staff
Aífeu Zanon
Lupe da Motta C. da Silveira
8 - Bibliography


Standard Quantitative Gitology Table
<table>
<thead>
<tr>
<th>GEOLOGICAL ENVIRONMENTS CATEGORY</th>
<th>TYPE</th>
<th>HANGING AND FOOTWALL/ HOST ROCK</th>
<th>ORE BODY MORPHOLOGY</th>
<th>ORE PARAGENESIS</th>
<th>ORE TEXTURE</th>
<th>ORE CHEMISM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latirite/ saprolite</td>
<td>I - Residual/supergenic</td>
<td>Latirite, gossan, eluvium and variegated rocks</td>
<td>Stratiform and/or irregular</td>
<td>Native gold, iron and manganiferous oxide, pyrite</td>
<td>Concretionary, botryoidal and disseminated</td>
<td>Au, Pd</td>
</tr>
<tr>
<td>II - Sulphide rich ophiolite</td>
<td></td>
<td>Pillowed tholeiitic basalt with sedimentary pelagic-carbonated rocks</td>
<td>Lenticular</td>
<td>Pyrite, chalcopyrite and sphalerite</td>
<td>Massive</td>
<td>Cu, Au</td>
</tr>
<tr>
<td>III - Marine volcano-sedimentary rocks with dominance of a bimodal volcanic suite (tholeiitic to calc-alkaline series) and less sedimentary components</td>
<td></td>
<td>Rhyolite, dacite andesite and less basaltic and sedimentary rocks</td>
<td>Lenticular</td>
<td>Pyrite, chalcopyrite, pyrrhotite, sphalerite, galena, tetraedrite, bornite and barite</td>
<td>Massive</td>
<td>Zn, Pb, Cu, Ag, Au or Zn, Cu, Pb, Ag, Au</td>
</tr>
<tr>
<td>IV - Sulphide mineralization predominantly associated to sedimentary rocks with less volcanic components</td>
<td></td>
<td>Shale, claystone and conglomeratic turbiditic sequences</td>
<td>Stratiform</td>
<td>Pyrite, pyrrhotite, galena, sphalerite, chalcopyrite and barite</td>
<td>Massive</td>
<td>Pb, Zn, Ag, Au</td>
</tr>
<tr>
<td>Medium to low metamorphosed folded sequences</td>
<td>V - Greenstone Belts and similar</td>
<td>Basic, intermediate and acid volcanic rocks, volcanoclastic and chemical metasedimentary rocks, mainly cherts and iron formations</td>
<td>Lenticular</td>
<td>Pyrite, pyrrhotite, chalcopyrite and sphalerite</td>
<td>Massive</td>
<td>Zn, Cu, Ag, Au</td>
</tr>
<tr>
<td>Association with volcanic rocks</td>
<td>VI - Subaerial volcanic, related to subduction zone. Bimodal calc-alkaline andesite to rhyolitic suite. Cenozoic age</td>
<td>Andesite, rhyolite, trachyte, tuffs, volcanic breccias, aphanitic andesite, siltstones and conglomerates</td>
<td>Stringers and discordant lodes</td>
<td>Native gold, electrum, argentite, tetraedrite, tennantite, pyrargyrite, pyrargyrite, galena, pyrite and chalcopyrite</td>
<td>Massive</td>
<td>Au, Ag, Zn, Pb</td>
</tr>
<tr>
<td>VII - Porphyry copper</td>
<td></td>
<td>Intrusive porphyritic acidic rocks, including tonalites, granodiorites and granitic to monzogranitic rocks</td>
<td>Stockworks</td>
<td>Pyrite, chalcopyrite, bornite, molybdenite, calcosite, galena, sphalerite and native gold</td>
<td>Disseminated</td>
<td>Cu (Au-Mo)</td>
</tr>
<tr>
<td>VIII - Skarn</td>
<td></td>
<td>Pure or calc-silicate rocks of chemical or clastic origin</td>
<td>Stratiform and/or stringers</td>
<td>Enargite, chalcopyrite, pyrite, sphalerite, argentite, tetraedrite, galena, pyrargyrite, Pb-Ag sulfides</td>
<td>Disseminated</td>
<td>Ag, Au, Cu, Zn, Pb</td>
</tr>
<tr>
<td>IX - Quartz-anfierous loads in contact with intrusive rocks of intermediary to acid composition</td>
<td></td>
<td>Sedimentary, metamorphic, volcano-sedimentary and magmatic rocks, including granodiorites, monzinite, diorites, acidic volcanic, calc-alkaline anodeses and pyroclastic rocks</td>
<td>Stringers, stockworks and/or irregular (breccia pipes)</td>
<td>Native gold, electrum, pyrite, argentite, chalcopyrite, galena, sphalerite, tetraedrite, Ag sulfides</td>
<td>Vuggy, crustifications, colloform structures and rarely disseminated</td>
<td>Cu, Ag, Pb, Zn</td>
</tr>
<tr>
<td>Unmetamorphosed</td>
<td>X - Recent placers</td>
<td>Alluvium</td>
<td>Stratiform and/or lenticular</td>
<td>Gold, diamond</td>
<td>Disseminated</td>
<td>Au</td>
</tr>
<tr>
<td>Very low grade metamorphism</td>
<td>XI - Carbonaceous-carbonated rock sequences</td>
<td>Silicic or argillous carbonated sequences, carbonated sequences and turbiditic sequences</td>
<td>Stratiform</td>
<td>Native gold, stibnite, cinnabar, arsenopyrite, magnetite, chalcopyrite</td>
<td>Disseminated</td>
<td>Au, Ag, As, Sb</td>
</tr>
<tr>
<td>Low to median grade metamorphism</td>
<td>XII - Intrusive to manganeseiferous carbonated levels</td>
<td>Ferriferous to manganeseiferous layers in banded iron formations</td>
<td>Stratiform</td>
<td>Native gold, uraninite, pyrite, Fe-Pt and Os-Ir, sperrylite, pentlandite, sphalerite, chromite, cobaltite</td>
<td>Disseminated, massive or banded</td>
<td>Au</td>
</tr>
<tr>
<td>XIII - Paleoplacers of archean to lower proterozoic</td>
<td></td>
<td>Mature ophiolitic conglomerates, polymictic conglomerates with haematitic matrix, and sericite-quartzites</td>
<td>Lenticular</td>
<td>Native gold, uraninite, pyrite, Fe-Pt and Os-Ir, sperrylite, pentlandite, sphalerite, chromite, cobaltite</td>
<td>Disseminated</td>
<td>Au, Ag, U, EGP</td>
</tr>
<tr>
<td>XIV - Quartz-anfierous loads related to large crustal lineaments (including faults and shear zones)</td>
<td></td>
<td>Rocks of variegated nature</td>
<td>Stringers, stockworks and irregular</td>
<td>Native gold, Au-Ag tellurides, pyrite, pyrrhotite, arsenopyrite, tetraedrite, tennantite, ag-sulfides, argentite, chalcopyrite and galena</td>
<td>Massive and disseminated</td>
<td>Au, Ag</td>
</tr>
<tr>
<td>EXAMLES IN THE WORLD</td>
<td>EXAMPLES IN BRAZIL</td>
<td>ACCUMULATED GOLD PRODUCTION (1493-1991)</td>
<td>RESERVES IN 1991 + ACCUMULATED PRODUCTION UNTIL 1991</td>
<td>QUANTITY OF CONSIDERED GOLD DEPOSITS AND MINES</td>
<td>STANDARD QUANTITATIVE GITOLOGY FACTOR</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------</td>
<td>----------------------------------------</td>
<td>-------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Pueblo Viejo (Dom. Rep.), Los Cacaos (Dom. Rep.), Boddington (Australia)</td>
<td>Serra Pelada (PA), Cuaibá (MT), Saliamangone (AP), São Bento (MG)</td>
<td>62 0,1</td>
<td>625 0,4</td>
<td>9 2,3</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Skouriotissa (Chypre), Ergani Maden (Turkey), Morgul (Turkey), Anyox (Canada)</td>
<td></td>
<td>128 0,1</td>
<td>327,6 0,2</td>
<td>14 3,5</td>
<td>5</td>
<td></td>
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<tr>
<td>Kuroko (Japan), Shasta (USA), Buchans (Newfoundland), Beashi (Japan), Granduc (Canada), Borealis (USA)</td>
<td>Camaquã (RS), Bico de Pedra (MG)</td>
<td>152 0,1</td>
<td>2.367,5 1,5</td>
<td>24 6,1</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Sullivan (USA), Meggen (Germany), Rammelberg (Germany), Cobar (Australia), Jerome (USA)</td>
<td></td>
<td>281 0,3</td>
<td>440 0,3</td>
<td>7 1,7</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Millerbank (Canada), Iron King (USA), Kolar (India), Noranda (Canada), Val D’Or (Canada), Porcupine (Canada), YellowKnife (Canada), Berberon Mountain (South Africa)</td>
<td>Morro Velho (MG), Passagem (MG), São Bento (MG), Cuiabá (MG), Faz. Brasileiro (BA), Faz. Maria Preta (BA), Crixás (GO)</td>
<td>24.193,7 21,8</td>
<td>28.276,7 17,6</td>
<td>179 45,3</td>
<td>65</td>
<td></td>
</tr>
<tr>
<td>Comstock (USA), Round Mountain (USA), Guanajuato (Mexico), Emperor Mine (Idjii), Iwato (Japan)</td>
<td></td>
<td>11.834 10,7</td>
<td>13.318,3 8,2</td>
<td>39 9,8</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Chuquicamata (Chile), Bisbee (USA), Ok Tedi (Papua New Guinea)</td>
<td></td>
<td>2.252 2,0</td>
<td>9.442 5,8</td>
<td>42 10,6</td>
<td>40</td>
<td></td>
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<tr>
<td>Tintic (USA), Hedley (Canada), Marvel Loch (Australia), Lupin Deposit (Canada)</td>
<td></td>
<td>822 0,7</td>
<td>1.035 0,6</td>
<td>11 2,8</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Rossland (Canada), Butte (Canada), Charsters Towers (Australia), Alma (USA)</td>
<td>Tapaçós (PA)</td>
<td>1.729 1,6</td>
<td>2.389,5 1,5</td>
<td>22 5,5</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Kio Moto (Zaire), Bendigo Ballarat (Australia), Sinturbo (Borneo), Morobe (New Guinea)</td>
<td>Tapaçós (PA), Jequitinhonha (MG), Madeira (RO)</td>
<td>19.485 17,6</td>
<td>24.508,3 15,2</td>
<td>- -</td>
<td>5</td>
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<tr>
<td>Carlin (USA), Gold Quarry (USA), Jemitt Canyon (USA), Queen Charlotte (Canada)</td>
<td>Morro do Ouro (MG), Rio Saisa (BA), Luzânia (GO), Rio do Carmo (GO)</td>
<td>446 0,4</td>
<td>1.973,5 1,2</td>
<td>16 4,0</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Caué (MG), Congo Socó (MG), Conceição (MG), Pitangu (MG)</td>
<td>86 0,1</td>
<td>96,4 0,1</td>
<td>4 1,0</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Rand (South Africa), Tjiwa (Gana), Elliot Lake (Canada), Blind River (Canada)</td>
<td>Jacobina (BA), Moeda (MG)</td>
<td>43.816 39,5</td>
<td>65.929 41,7</td>
<td>11 2,8</td>
<td>70</td>
<td></td>
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<tr>
<td>Mother Lode (USA), Bendigo (Australia), Le Chatelet (France), Bourmex (France), Olympic Dam (Australia), Big Bell (Australia), Consort (South Africa)</td>
<td>Cumaru (PA), Saliamangone (AP), Serra do Emilio (PA), Faz. Ouro Fino (MG), Brusque (SC), Pontes e Lacerda (MT), São Francisco (RN)</td>
<td>5.467,3 5,0</td>
<td>9.407,2 5,7</td>
<td>17 4,6</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>110.756</strong></td>
<td><strong>160.156</strong></td>
<td><strong>395</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

FARINA AND MATOS, 1994 - CPRM
LISTAGEM DOS INFORMES DE RECURSOS MINERAIS

SÉRIE METAIS DO GRUPO DA PLATINA E ASSOCIADOS

Nº 01 - Mapa de Caracterização das Áreas de Trabalho (Escala 1:7.000.000), 1995.

SÉRIE MAPAS TEMÁTICOS DE OURO - ESCALA 1:250.000

Nº 01 - Área GO-09 Aurilândia/Anicuns - Goiás, 1995.
Nº 03 - Área RO-01 Presidente Médici - Rondônia, 1996.
Nº 04 - Área SP-01 Vale do Ribeira - São Paulo, 1996.
Nº 05 - Área PA-15 Inajá - Pará, 1996.
Nº 06 - Área GO-05 Luziânia - Goiás, 1997.
Nº 12 - Área GO-03 Niquelândia - Goiás, 1997.
Nº 17 - Área RO-06 Guaporé/Madeira - Rondônia, 1997.
Nº 27 - Área PA-03 Cuiaipucu/Caraará - Pará/Amapá, 1997.
Nº 31 - Área PB-01 Cachoeira de Minas /Itajubatiba/Itapetim - Paraíba/Pernambuco, 1997.
Nº 34 - Área PA-02 Ipitinga - Pará/Amapá, 1997.
Nº 35 - Área PA-17 Caraciol - Pará, 1997.
Nº 38 - Área PA-08 São Félix - Pará, 1997.
Nº 41 - Área TO-01 Almas/Natividade - Tocantins, 1996.
SÉRIE MAPAS TEMÁTICOS DE OURO - ESCALA 1:250.000 (cont.)
Nº 45 - Área MT-03 Serra de São Vicente - Mato Grosso, 1998.

SÉRIE OURO - INFORMES GERAIS
Nº 01 - Mapa de Reservas e Produção de Ouro no Brasil (Escala 1:7.000.000), 1996.
Nº 02 - Programa Nacional de Prospeção de Ouro - Natureza e Métodos, 1998.
Nº 03 - Mapa de Reservas e Produção de Ouro no Brasil (Escala 1:7.000.000), 1998.
Nº 04 - Gold Prospecting National Program - Subject and Methodology, 1998.

SÉRIE INSUMOS MINERAIS PARA AGRICULTURA
Nº 01 - Mapa Sintese do Setor de Fertilizantes Minerais (NPK) no Brasil (Escala 1:7.000 000), 1997.

SÉRIE PEDRAS PRECIOSAS

SÉRIE OPORTUNIDADES MINERAIS - EXAME ATUALIZADO DE PROJETO
Nº 01 - Níquel de Santa Fé - Estado de Goiás, 1996.
Nº 02 - Níquel do Morro do Engenho - Estado de Goiás, 1996.
Nº 03 - Cobre de Bom Jardim - Estado de Goiás, 1996.
Nº 04 - Ouro no Vale do Ribeira - Estado de São Paulo, 1996.
Nº 05 - Chumbo de Redenção - Estado da Bahia, 1996.
Nº 06 - Turfa de Caçapava - Estado de São Paulo, 1996.
Nº 10 - Zinco (Chumbo e Cobre) de Palmeirópolis - Estado de Goiás, 1997.

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