CONE
MINE EXPLORATION

1 - INTRODUCTION

1.1 – OBJECTIVE

The follow present report has an objective to describe the accomplished works in offices and fields for the geologic and economic description of the area referring to the Palma Project of the Cone Mine Exploration. This work has a main goal elaborate an evaluation of the bauxite reserves in the area of the process, quantifying and qualifying them with accuracy.

1.2 – MINERAL LEGISLATION IN BRAZIL

The laws that conduct the mining activities in Brazil established that the subsoil belongs to the federal government. That way, activities of prospection, exploration and exploitation just are possible with the government authorization through of its department DNPM (National Department of Mineral Production).

Each process of mineral exploration is evaluated by the DNPM based in

technique criteria and the authorizations are granted in two stages: Exploration License and The Mine Work Concession.

The authorization holder of DNPM has full and exclusive rights about the work execution, as well about the commercialization of the area.

1.3 – MINING IN BRAZIL

Brazil stands out worldwide as one of the main producers of the minerals goods.

The mining industry in Brazil has a highest technology level and technique, being forward of a several obtained innovations in this area in the last decades.

In all regions of the country exists an extensive web of education for the formation of professional that attempt to the mining's demand. The high workforce qualification, together to good infra-structure and low productive cost becomes the mining in Brazil object of a great interest by the part of the foreign and national investors.

Brazil is the second bigger producer of the iron ore (approximately 20% of worldwide production) and the third bigger producer of bauxite (approximately 13% of the worldwide production). Data of the IBRAM (Brazilian Institute of Mining) presented that in 2008 the Brazilian mineral sector employed 161 thousand people in the mine work activity and the value of the commercialized national production was US$ 29 billion.

Adding the commercialized rude ore production to the production of the sector of mineral transformation, the mining of Brazil generated in 2008 US$ 42 billion, what represents 5.7% of the GIP. The positive scene reflects in the investments of the sector that are foreseen in US$ 47 billion between 2009 and 2013.

1.3.1 – CURRENT SCENERY OF THE BAUXITE IN BRAZIL

The recent report of the DNPM (National Department of Mineral Production) aim to a total bauxite production of 24,7Mt in the year of 2007. These total, 5,8 Mt were destined to the exportation.

The main bauxite consumer market is the refining industry that produces alumina (Al_2O_3). Due to the good energy infra-structure of Brazil, in many cases the option for integrated or semi-integrated operations mine-plant is adopted, generating an aggregate value of the product (alumina) of an order 10 times superior to the processed bauxite in mine.

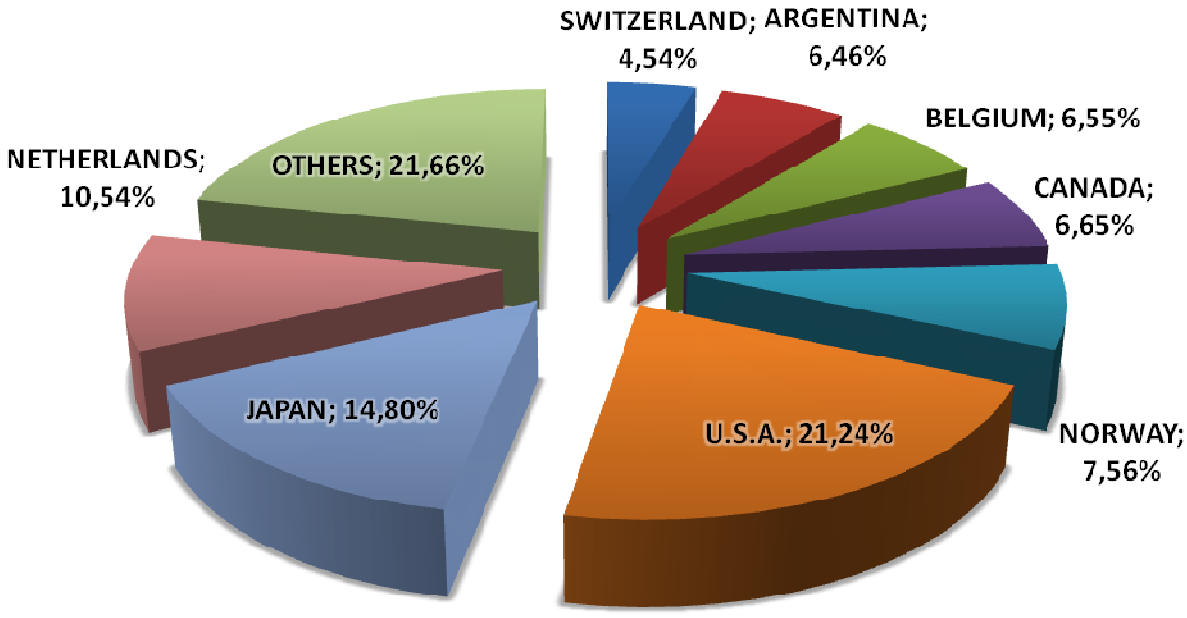

Chart 1 - Destination of the Bauxite's Exportations – Year of 2005 – Source DNPM 2009

The aluminium value and parallel of its mineral inputs had an accented growth from 2004 with an increase of the accumulated price of more than 65%.

Due the crisis of 2008, the aluminium value returned to the platform of 2003, however with the consumption's retaken in the main bauxite consumers' countries the expectancy is that the prices' trends become to the normal with superior value of US$ 2,500.00 / ton.

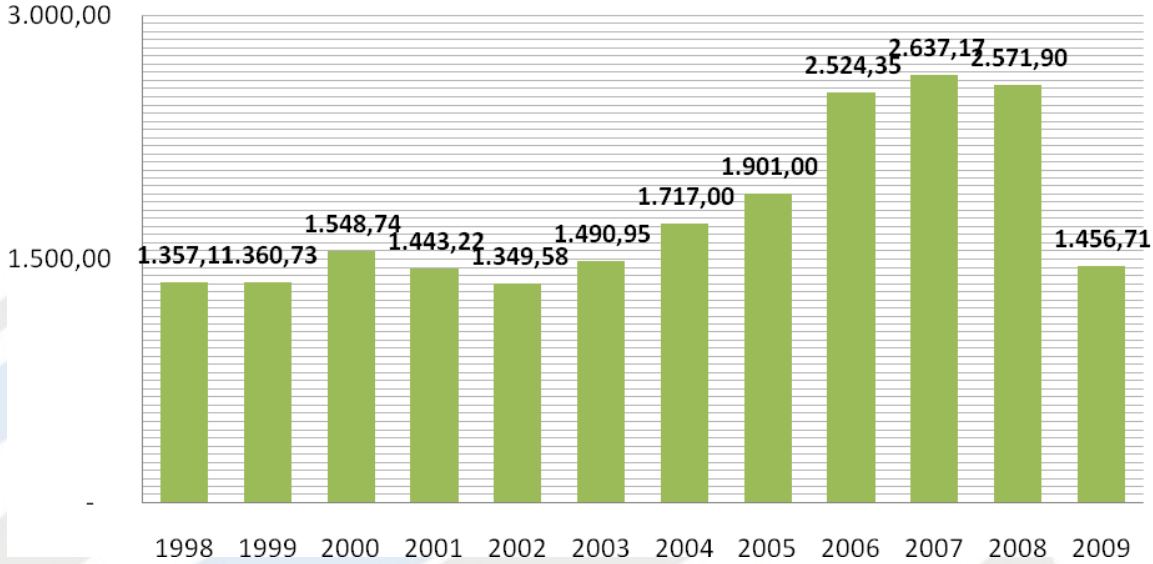

Chart 2 - Average Price LME (London Metal Exchange) (cash buyer) – Source DNPM 2009

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1.4 – BAUXITE OF THE ZONA DA MATA OF THE MINAS GERAIS

The region of the Zona da Mata in Minas Gerais corresponds to the Mantiqueira geologic province, being the region extremely rich in bauxite and with highest potential to the new coal beds.

Formed for the lateríticos deposits, the bauxites coal beds of the Zona da Mata have low costs of work mine and processing. The existence of others bauxite's mines in the region make abundant the specialized workforce and make possible operational levels without parallel in the world, due the accumulated experience in the region as one of the main producers center of the lateritica bauxite in the world.

The physical proximity with the brazilian coast and with the ports of the states of Rio de Janeiro and Espírito Santo results in low extra-mine logistic costs with total operational costs with highest national and international competitiveness.

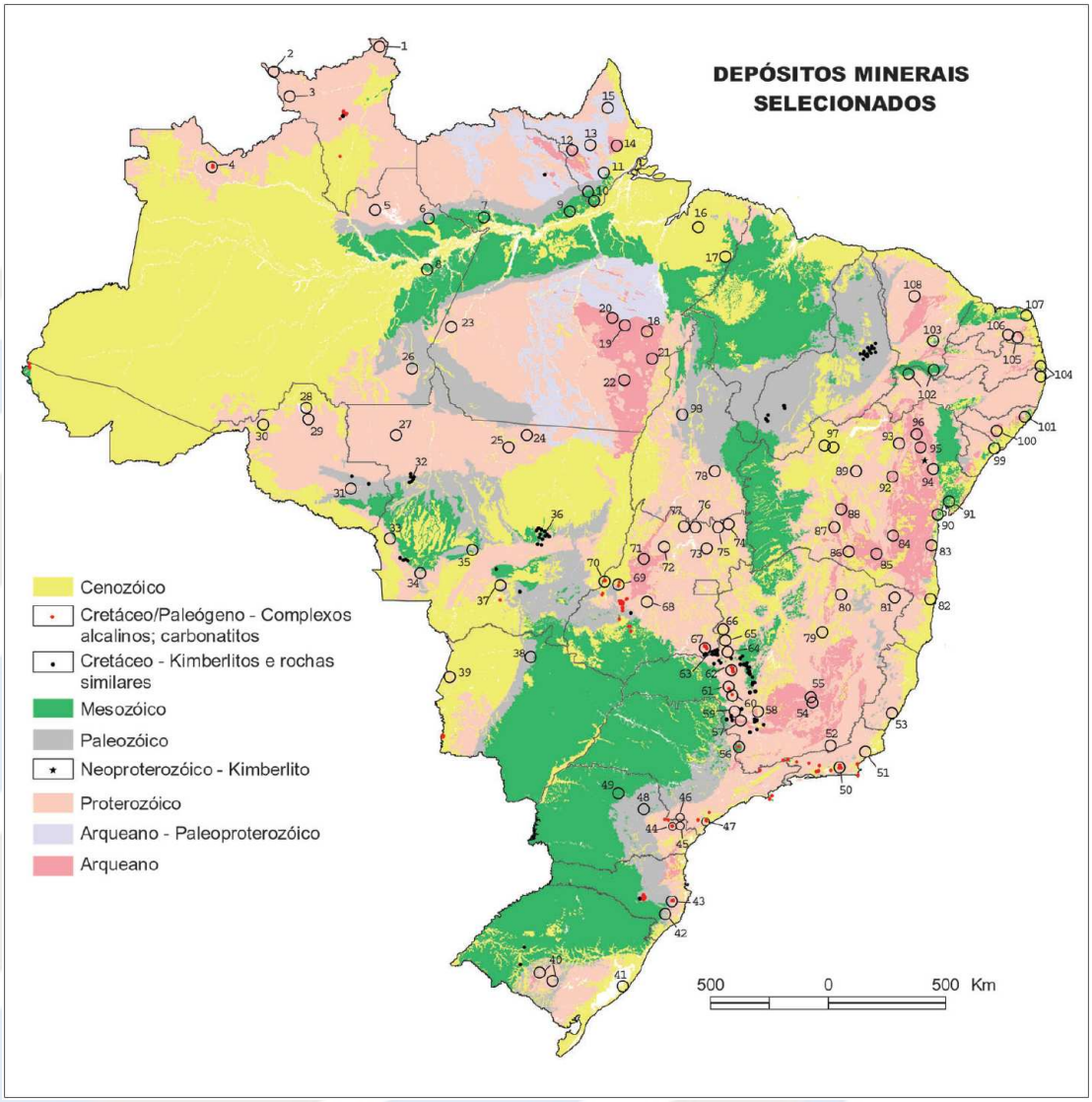

Image 1- Selected mineral Deposits of Brasil. CPRM 2003.

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1.4.4 – New investments in the Region

It is already under construction the Barra do Braúna Hydroelectric Power Plant. Initiative of the company Brookfield Renewable Power, which is specialized in hydroelectric of a small range, the Hydroelectric Power Plant is located about 8 km from the area of the process and will started to work with 39 MW of power.

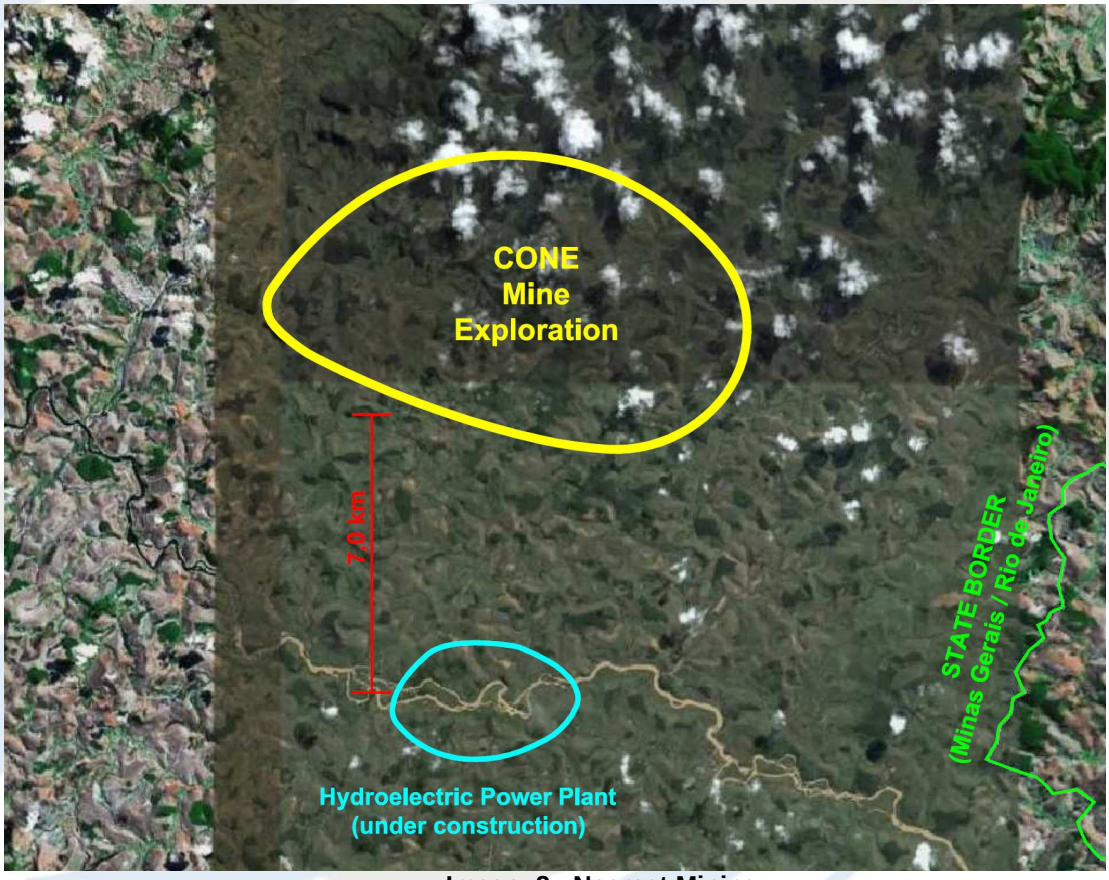

Image 2 - Nearest Mining

Image 3 - Dam construction of the Barra do Braúna Hydroelectric Power Plant. July/2009.

The availability of electric power is essential to the aluminium metallurgic refined and the implantation of this new plant open the possibility of the local refine process creation, minimizing the logistic costs to leak the rude bauxite.

The prevision to start the operation is from the 2010.

http://www.brascanenergy.com.br/

http://www.brookfieldpower.com/

1.5 – ALLOCATION

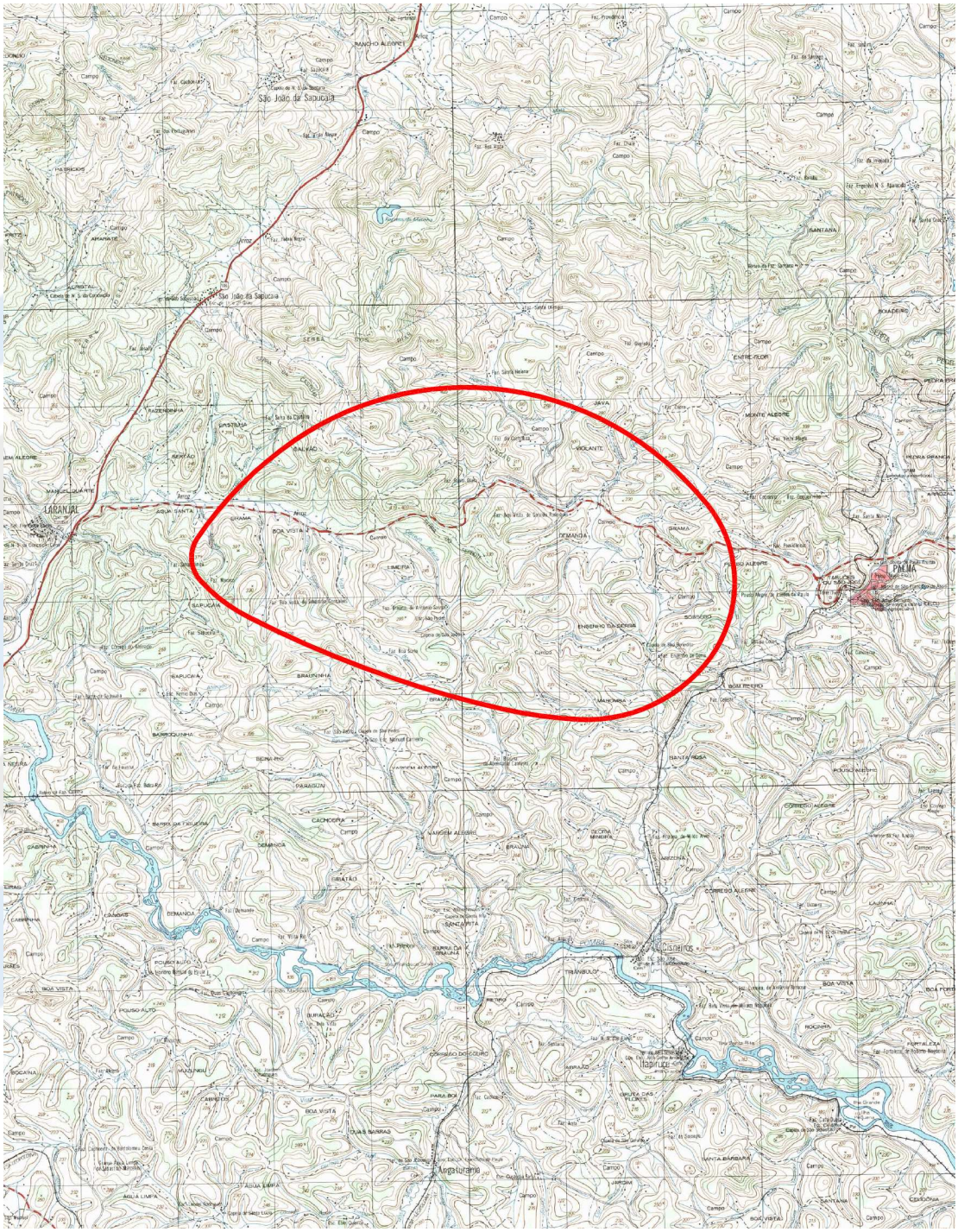

Image 4 - Allocation (Base – IBGE)

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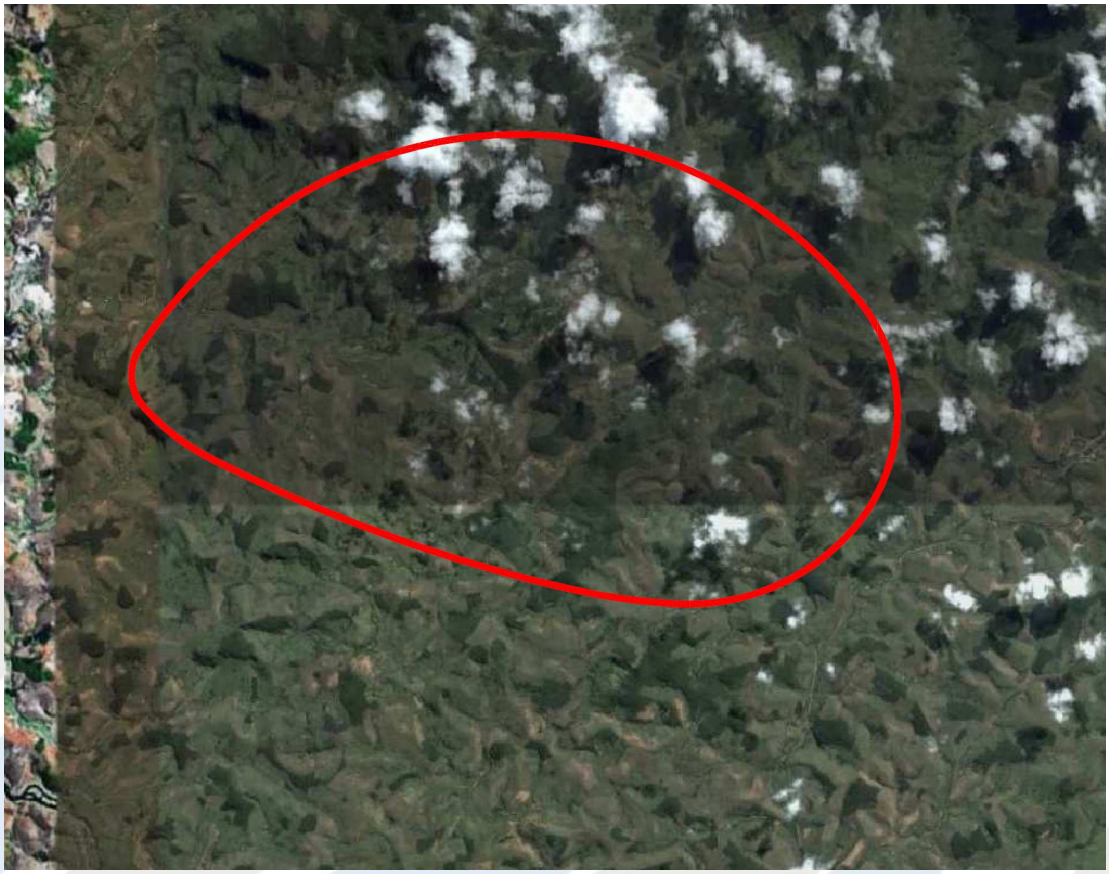

Image 5 - Allocation

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1.6 – THE PALMA COUNTY

1.6.1 – Characterization

Area: 316,73 Km2
Altitude:
maximum: 785 m
place: Serra da Pedra Negra
minimum: 112 m
place: Ilha dos Ferreiras
Central point of the city: 160 m

Temperature:

Average annual:	23,5 C
Maximum average annual:	31 C
Minimum average annual:	18,2 C

Average Annual Rainfall: 1564 mm **Relief:**

Topography	%
Flat:	10
Wavy:	5
Mountainous:	85

Main Rivers:
RIBEIRAO ENGENHO DA SERRA
RIBEIRAO CAPIVARA

Bay: RIO PARAIBA DO SUL BAY
Sources: Institute of Applied Geosciences - IGA
Brazilian Institute of Geography and Statistics - IBGE

1.6.2 Population

YEARS	URBAN	RURAL	TOTAL
1970	3.795	5.408	9.203
1980	3.757	4.094	7.851
1991	4.155	2.899	7.054
2000	4.864	1.696	6.560
2005			6.252

Source: Brazilian Institute of Geography and Statistics - (IBGE)

(1) Preliminary Data

1.6.3 Transport

Road

Approximate Distances to the main centers (Km):

Belo Horizonte: 368
Rio de Janeiro: 288
São Paulo: 631
Brasília: 1.075
Vitória: 307

Main Highways that connects to Belo Horizonte:

BR-040, BR-267, BR-116, MG-285

Main Highways that connects to the county:

BR-040, BR-267, BR-116, MG-285

Boundaries Counties:

BARAO DO MONTE ALTO
LARANJAL
RECREIO
MURIAE

Railroad

Distances to the main centers (Km):

Belo Horizonte: 521
Rio de Janeiro: 342
São Paulo: 641
Brasília: 1.666
Vitória: 432

Sources: Department of Highways of the State of Minas Gerais
Ferrovia Centro Atlântica – FCA
Railway Vitória Minas
Management of Electronic and Flight Protection / Ministry of Aeronautics

1.7 – THE LARANJAL COUNTY

1.7.1 – Characterization

Area: 204,63 Km2

Altitude:

maximum: 760 m
place: Serra Monte Redondo
minimum: 225 m
place: Foz Corrego Sao Joaquim

Central point of the city: 174,96 m

Temperature:

Average annual:	23,5 C
Maximum average annual:	31 C
Minimum average annual:	18,2 C

Average Annual Rainfall: 1564 mm **Relevo:**

Topography	%
Flat:	10
Wavy:	20
Mountainous:	70

Main Rivers:

RIO SAO JOAO
RIO POMBA

Bay: BAY OF RIO PARAIBA DO SUL
Sources: Institute of Applied Geosciences - IGA
Brazilian Institute of Geography and Statistics - IBGE

YEARS	URBAN	RURAL	TOTAL
1970	2.027	4.476	6.503
1980	3.058	3.086	6.144
1991	3.488	2.460	5.948
2000	4.211	1.916	6.127
2005(1)			6.238

Source: Brazilian Institute of Geography and Statistics - (IBGE)

(1) Preliminary Data

1.7.3 Transport

Road

Approximate Distances to the main centers (Km):

Belo Horizonte: 348
Rio de Janeiro: 270
São Paulo: 613
Brasília: 1.055
Vitória: 374

Main Highways that connects to Belo Horizonte:

BR-040, BR-267, BR-116

Main Highways that connects to the county:

BR-040, BR-267, BR-116

Boundaries Counties:

MURIAE

SANTANA DE CATAGUASES
CATAGUASES
LEOPOLDINA
RECREIO
PALMA

Sources: Department of Highways of the State of Minas Gerais
Ferrovia Centro Atlântica – FCA
Railway Vitória Minas
Management of Electronic and Flight Protection / Ministry of Aeronautics

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2 – LOGISTIC AND ACCESSIBILITY

2.1 – HOW TO ARRIVE

Leaving from Rio de Janeiro, through the red line (President João Goulart Highway), northbound, through by the Washington Luiz Highway (BR-040) and following by the President João Goulart Highway and Rio-Bahia Highway (BR-116). After about 215 km on the BR-116, take to the right onto Highway MG-285, in the city of Laranjal –MG.

In the MG-285, continue for more 11 km up to the area of the process which is on the right (south edge) of the highway.

2.2– MAIN HIGHWAYS OF ACCESS

The main access routes to the area of the process are made through the BR – 116, MG – 285, MG – 454, RJ – 200 and RJ – 116, besides the vicinal roads next to the process area.

2.3 – AIRPORTS

The main airport next to the area of the process is the Galeão International Airport (Antônio Carlos Jobim), located in the State of Rio de Janeiro. The Galeão airport is the second more active airport of the country in international flights of passengers and received in 2008 more than 10 million of passengers. It is located about 270 km of the area. Also in Rio de Janeiro there is another airport for the domestic flights.

In the city of Juiz De Fora, it is the Airport of Juiz De Fora (Serrinha), that operates flights of small and middle range with regular flights to Belo Horizonte, São Paulo and Rio De Janeiro. The Airport of Juiz De Fora is about 150 km of the area of the process.

Image 6 - Partial View of the Vista Antônio Carlos Jobim International Airport

2.4 – RAILROADS

Exists in the local, access to the network of the Railway Centro-Antlântica (FCA) and possibility of swilling with the line of the MRS in Três Rios – MG.

The line in Palma – MG is currently ineffective, however, due to the infrastructure already installed is a viable alternative to the leaking with low

investments in the reactivation in partnership with its controller.

Image 7 - Railways – Ministry of Transportation (modified)

2.5 – PORTS

2.5.1 Port of Itaguaí – RJ

The port of Itaguaí, situated at 553 km of distance (railway line) of the load terminal of Sarzedo, present an area of 10 million square meters by flat area, a channel of access with up to 20m by depth and ranks of docking in sheltered waters, with industrial logistic infrastructure and technology in telecommunication and supply, multimodal accesses and facilities of transports. Itaguaí port will offer immediately cost reduction for the user in an international level of productivity. The Itaguaí Port, modernized to follow the competitiveness of the national and international port trade, will be the 1st HUB PORT of the South Atlantic. In a distance of 500 km are located productive agents responsible by the formation around 70% of the Brazilian GDP (Gross Domestic

Product). It is a singular port between the Brazilian and Latin-American ports. With competitive physics characteristic, have a maritime access to receive big and updated ships above of 6.000 TEUs.

Terminal of Ore – To assist the crescent demand of its ore, the Vale do Rio Doce Company is developing in the Itaguaí Port an investment of US$ 120 million dollars. With that it will be enable to export, in the future, from 15 to 20 million tons of iron ore. In the future it will assist ships with up to 230 thousand DWT, in a pier with depth of 18,7m. Its modern equipments allow the ship's loading in a rate up to 10 thousand tons/hour. For the second stage, after additional dredging for 20 meters of depth, the Terminal of Ore Exportation will load super bulkers with up to 230.000 DWT, so assisting the tendency prevailed in the transoceanic trade of the bulks. Through the MRS railroad capable to move up to 70 million tons of iron ore per year.

The MRS has exclusive access to the terminal of the Itaguaí Port, among them the Sepetiba Tecon (Containers), CSN Tecar (Bulks) and CPBS - CVRD (Iron Ore Exportation).

Image 8 - Partial View of the Itaguaí Port.

2.5.2 BRAZORE – Port Terminal in the Sepetiba Bay - RJ

An Adriana Resources Inc. through its subsidiary in Brazil, the BRAZORE, is developing an iron ore port in the Brazilian coast, which will operate initially with a capacity of twenty million tons per year with prevision of expansion to the fifty million tons through the development of the deep sea port terminal.

The port area is located 70 kilometers west-bound Rio de Janeiro in the Sepetiba Bay in Brazilian coast, and have direct access to the extensive railway and transportation network. The property consists in 857.575 square meters of low area in the east of Itacuruça Channel. The MRS Logistic Railway passes through the northen edge of the property. The Highway BR-101 runs parallel to the railway, and the Highway RJ-14 runs next to the western side of the property. The Ingussu River forms the eastern boundary and a smaller river called Rio do Papai runs through the property near the western boundary.

The port potential building should start in 2009, and should take from 18 to 24 months to be ready. The fast-start installation will consist of railway wagon receiving, storage, recovery and equipment of barge loading. The iron ore will be loaded in a transfer barge Seabulk of shallow draft “lighters” which will carry and load it directly on the oceanic vessels employees in the transport and maritime trade of iron ore. This transshipment will occur in a deeply place approximately distant 8 nautical miles from the port. With the processed quantity increase, the installation of the terminal will be expanded and will become more efficient with addition of collector forklift stacker-reclaimers and a second anchorage for loading. The maritime capacity will be expanded and will become efficient with the integration of storage floating and transfer vessel permanently anchored near the coast.

Image 9 - Illustration of the transshipment vessel.

Competitive Advantage

‘The port site is located 70 kilometers west-bound Rio de Janeiro in the Sepetiba Bay in Brazilian coast, and have direct access to the extensive railway and transportation network.

- The port will provide access to the global steel market for the iron producers and minimized the bottleneck in the iron ore exportation in Brazil.
- Strategic partners ArcelorMittal, Worldlink Resources Ltd and Athena Resources LLC.
- Opportunity to determine the strategic working relations with significant number of independently iron mines, and also with deposit of iron ore and mines acquires recently by big mining company, with or without port limited access.
- The urbanization, globalization and industrialization in China, Índia and others emerging countries indicates the needs to expand the capacity of the iron ore exportation.
- The Iron Quadrangle, located in the Minas Gerais States in Brazil, provides access to some of the largest iron coal bed unexplored in the world.

The Company is evaluating iron ore projects in Brazil, especially in Minas Gerais with a view to obtaining participation on this project of the iron ore or mine development, being the increase of the metals demand, specifically iron ore, in countries that are developing as China and India has created some of the best infrastructure in the last years.

The opportunity of infrastructure in Brazil to the independent iron ore port, become an excellent opportunity to capitalize the restricted market of the many small and medium iron ore producers located in the Minas Gerais State.

Image 10 - Proposed place for anchorage of the transshipment vessel.

Link : http://www.adrianaresources.com/splash/

2.5.3 LLX – Southeast Port– RJ

The Southeast Port is a privative terminal of mixing use located in the Itaguaí County, Sepetiba Bay, Rio de Janeiro, next to the public port of Itaguaí.

With a depth of 20 meters, the Southeast Port will be able to receive ships capesize, and will be used for shipment of iron ore.

With an internal area of 52,1 hectares, the Southeast Port will shelter court to stockage and handling of iron ore with storage capacity of 25 million of tons per year (mtpa), in a first phase, may expanding its capacity to 50 million (mtpa) in a 2nd phase. The LLX have already got the previous environmental license for 2 cradles with total of 50 millions tons per year.

Image 11 - Artistic Conception of the port in operation.

With a privileged allocation, the Southeast Port will going to benefit of the infra-structure of terrestrial and maritime access already existent. Its integration with railroad MRS (MRS Logistic S.A) will allow that the Southeast Port attend some of the main miners regions located in Minas Gerais. Besides that its connection with the future Anel Rodoviário of Rio de Janeiro will allow an easy access to the metropolitans region of Rio de Janeiro and São Paulo.

The Southeast Port will start the operations around the second semester of 2011, with the goal to accomplish the iron ore loading proceeding from the State of Minas Gerais of the MMX Southeast mines and of the other independent miners, than exploring its contiguous privileged condition to the Sepetiba Port. In the first phase, the project will have 1 cradle of mooring, which may, in the second phase, reach 2 cradles of mooring with capacity of 50 million tons per year.

Link: http://www.llx.com.br

3 – COSTS

3.1 EXPLORATION

To defining the economic possibilities of the area to explore, will be accomplished the necessary works of prospection that will consist, in the beginning of the following listed steps. However, having the currently existing data, these can not be considered as definitive.

3.1.1 Base-Map Elaboration

The cartographic base to the programming, register and analysis of the exploratory work will be obtained by the restitution of the air photograph, available at 1:40.000 and 1:20.000 in recent images.

The plan will have scale 1:10.000, adjusted with field topographical control and spaced level curves in 5 m

3.1.2. Opening and Conservation of Roads

The field exploration implantation should be preceded of recovery works and improvements in the stream bed of the secondary roads that cut the area, opening of new routes, in order to facilitate the access to the distant places.

3.1.3. Geologic Mapping 1: 10.000

It is essential the execution of the basic geological mapping, aiming to the identification and cartography of the levels potentially mineralized, as noted above. So, the whole lithological suite in the area should be identified petrographically, with delimitation as accurate as possible from the contacts of the marked units.

The accurate definition of contacts, and petrographic characterization of the emerging lithology, may eventually require the opening of the trenches, in order to expose the rocky substratum to the geologist observation.

The resulting geological map, as mentioned previously, should be presented at scale 1:10.000. To it will be integrated obtained information posteriorly, during the exploration with the execution of trenches, boring and galleries.

3.1.4. Geophysical Prospection

The geophysical survey will analyze the underground structures using GPR for determination of the deposit's global geometry.

3.1.5. Digging

It will be executed exploration's digging, aiming at to obtaining information of sub-surface and to propitiate the exposition of the mineralized bodies for the description of the points and posterior sample collection.

Opted for the execution of the manholes for the characteristics' determination of the mineralized bodies, once that these ones present partially emerging and in an area of difficult access and mechanical equipment. The works will be supervised by the responsible technician.

3.1.6. Chemical Analysis

The chemical analysis will be executed in a specialized laboratory and will include the grades of Fe, FeO, Mn, SiO_2, Al_2O_3, CaO, MgO, TiO_2, S, P and others elements traces.

3.1.7. Mineralogical Analysis

For the identification of the Bohemite, Gibbsite and Diaspore phases, will be executed analysis through the methods of x-ray diffractometry in an specialized laboratory.

3.1.8. Technological Analysis

Samples will be analyzed in an specialized laboratory for studies of granulommetry analysis, liberation studies and geomecanic tests.

3.1.9. Final Report

Completed the exploration, the final report will be in charge of the petitioner's technician team, under the technician responsibility of the works' chief geologist and bunched the whole list of the executed activity, the

methodology and the reached results. It should be conclusive as to the reserves existence, its dimensions and the ore characterization, and will have all the elements indispensable to the technician, business and politics decisions which will be followed.

3.1.10. Budget

It is considerer on this study the reference Exchange rate as being US$1.00 = R$1,85

For the execution of the exploration works described above, it is esteem a total cost of **US$ 81,400.00**.

3.2 MINE WORK AND PROCESSING

The cost with the mine work of iron ore for monthly production estimate in 100.000 tons and its respective processing are presented as follow:

3.2.1. Production Datas (Monthly Estimates)

					Production rate	
Mines' extraction	9	h/day	26	day/month	**427**	**t/hour**
Processing	9	h/day	26	day/month	**384**	**t/hour**

Monthly Production of the Extracted Ore = 100.000 tons

Monthly Production of the Processed Ore = 90.000 tons

*P.S..: Considering a recovery of 90% in the process.

Considering the relation sterile/ore = 1/1

3.2.2 Cost of the Mine work (Monthly Estimates)

Cut and ROM Load (R$0,50/t) = R$ 60.000,00

ROM Transport = R$ 100.000,00

Drilling and Dismounting = R$ 200.000,00

Road Maintenance = R$ 20.000,00

Sterile Transport (R$1,00/t) = R$ 100.000,00

Cut and Load of Sterile (R$0,50/t) = R$ 50.000,00

General Expenses = R$ 30.000,00

Unit Cost = R$ 5,60 / ton (US$ 3.03)

MONTHLY TOTAL (USD) = US$ 302,702.70

3.2.3 Cost of the Processing (Monthly Estimates)

Material/Maintenance = R$25.000,00

Crusher Feeding (R$70,00/h) = R$16.380,00

Attrition Cell (scrubber) (R$150,00/h) = R$35.100,00

Electric Energy = R$ 15.000,00

General Expenses = R$ 23.000,00

Quality Control = R$5.000,00

Unit Cost = R$ 1,32 (US$ 0.72) / ton of product

MONTHLY TOTAL (USD) = US$ 64,583.78

3.3 ROAD TRANSPORT

The considered road transport is in relation to the distance between the area and the old station of the Palma. The estimative base is about R$0,1875/km/ton of fines in dump trucks of 30 tons

Mine-terminal distance: 10km

Unit Cost = R$ 1,88 (US$ 1.01) / ton

MONTHLY TOTAL (USD) = US$ 91,216.22

3.4 STORAGE AND LOADING – LOAD TERMINAL

The whole receiving, weighing, handling, storage, transshipment and loading, besides the whole relative documentation to these operations, will be making in the Load Terminal of Sarzedo. So for a monthly estimate, we have:

Unit Cost = R$ 10,17 (US$ 5.50) / ton

MONTHLY TOTAL (USD) = US$ 495,000.00

3.5 RAILROAD TRANSPORT

The cost of the railroad transport is esteemed to the integration FCA-MRS with the mesh already in operation.

Unit Cost = R$ 18,07 (US$ 9.76) / ton

MONTHLY TOTAL (USD) = US$ 878,842.68

3.6 PORT

The port costs involve unloading, stockage and loading in ships. The estimated average cost for ports in Rio de Janeiro is about R$27,75/ton of fine ore.

Unit Cost = R$ 27,75 (US$ 15.00) / ton

MONTHLY TOTAL (USD) = US$1,350,000.00

4 – ECONOMIC POTENTIAL OF THE ENTERPRISE

4.1 METALURGIC BAUXITE

Verifying the exploration positive result according to the accomplished estimates, the enterprise will make possible the commercialization of the ore FOB (Rio de Janeiro) to the monthly cost of **US$ 3,182,345.37** to 90 thousand commercialized tons, equivalent of **US$35.36/ton**.

This represents a rude profit potential of **US$ 4.64/** commercialized **ton**, equivalent of **13% of a profit over the total cost** of the productive chain.

Consideration: Exchange: US$1.00 = R$1,85 and sale's value of the ore =US$ 40.00)

4.2 METALLIC ALUMINIUM

Considering a total consumption of refining metallic aluminium of 15000KWh/ton at a cost of US$30.00/MW and a mass bauxite relation: aluminium of 4:1 (25% of the logistic's costs), it is esteemed that a plant installed in the place of the mine would have a capacity to produce aluminium at a cost of **US$1,847.60 / ton** FOB Rio de Janeiro.

At a market price of US$2,500.00, this aluminium would generate a profit of US$652.40 / ton, equivalent of **35% of a profit over the total cost** of the productive chain.

Consideration: Exchange: US$1.00 = R$1,85.