

CONE

MINE EXPLORATION



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1 - INTRODUCTION

1.1 - Objective

The report presented below aims to describe the work done in office and on the field for the economic and geological description of the area relating to the Iguai Project of the Cone Mine Exploration. This work has as main goal to draw up an assessment of potential ore reserves iron, copper, nickel, titanium, vanadium and manganese in the area of process, quantifying and qualifying them with precision.

1.2 - Mineral Legislation in Brazil

The laws governing mining activities in Brazil state that the subsoil belongs to the federal government. Thus, activities of prospecting, exploration and exploitation are possible only with permission of the government through its local authority DNPM (National Department of Mineral Production).

Each process mining exploration is evaluated by DNPM based on technical criteria and permits are granted in two stages: Exploration Permit and Mining Concession.

The authorization holder DNPM has full and exclusive rights on the works, as well as on the sale of these rights.

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1.3 - Mining in Brazil

The Brazil stands out globally as a leading producer of mineral commodities.

The mining industry in Brazil has very high technical and technological level, ahead of many of the innovations achieved in this area in recent decades.

In all regions of the country there is an extensive network of education for the training of professionals that meet the demands of mining. The high qualification of the workforce, coupled with good infrastructure and low production costs makes mining in Brazil object of great interest from domestic and foreign investors.

Brazil is the second largest producer of iron ore (approximately 20% of world output), the second largest producer of manganese (18%) and third largest producer of bauxite (approximately 13% of the world).

The accelerated pace of growth in Brazil has generated considerable increase in demand for nickel, titanium and vanadium for the production of ferro-alloys in recent years, creating a potential market hungry for these minerals. This generates stability in consumption, making the mining of these resources is unlikely to fluctuations in international trade.

Data from IBRAM (Brazilian Mining Institute) show that in 2008 the Brazilian mineral sector employed 161 000 people in mining activity and the value of domestic production sold was \$ 29 billion.

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Adding to the production of raw ores sold the production sector of mineral processing, mining of Brazil in 2008 generated \$ 42 billion, representing 5.7% of GDP. The positive outlook reflects investments in the sector which are forecast at \$ 47 billion between 2009 and 2013.

1.3.1 - Investment in the Region

In Ilhéus, natural channel flow of production of iron ore Project Iguai, was established in 1989 a ZPE (Export Processing Zone – Free Trade Zone). This is an export-oriented industrial district under the incentive scheme and tax free exchange.

On April 6, 2009 President Luiz Inacio Lula da Silva was the law that regulates the procedure of taxation and foreign exchange administration of ZPEs, which enabled the creation of the ZPE of Ilheus for the region and attracting the attention of the mineral processing industry.

The tax incentive for the deployment of pellet plant and steel plant in the ZPE of Ilheus fed by iron ore Iguai creates a unique opportunity to add value and vertical targeting the foreign market.

The Brazilian ZPEs have its format based in the International Free Trade Zones:

* Possibility of keeping 100% of revenue from exports outside of Brazil.

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* Legal security with guaranteed stability for up to 20 years (renewable for the same period).

* Tax exemption on purchase of inputs (domestic or imported) and exemption from taxes on production.

Besides the ZPE, a broad project of upgrading the port of Ilheus provides fast and reliable port operations, which increases the security of the enterprise.

In view of the mineral potential of southern Bahia, investment in infrastructure and incentives for the deployment of integrated mine-steel, the area is being stage for new investments.

As an example is Bahia Mineração, a joint venture between foreign investors, who will begin the extraction of iron ore in Caetité-BA and the new venture of Votorantim in partnership with Chinese investors to extract iron ore in Urandi-BA and produce pellets.

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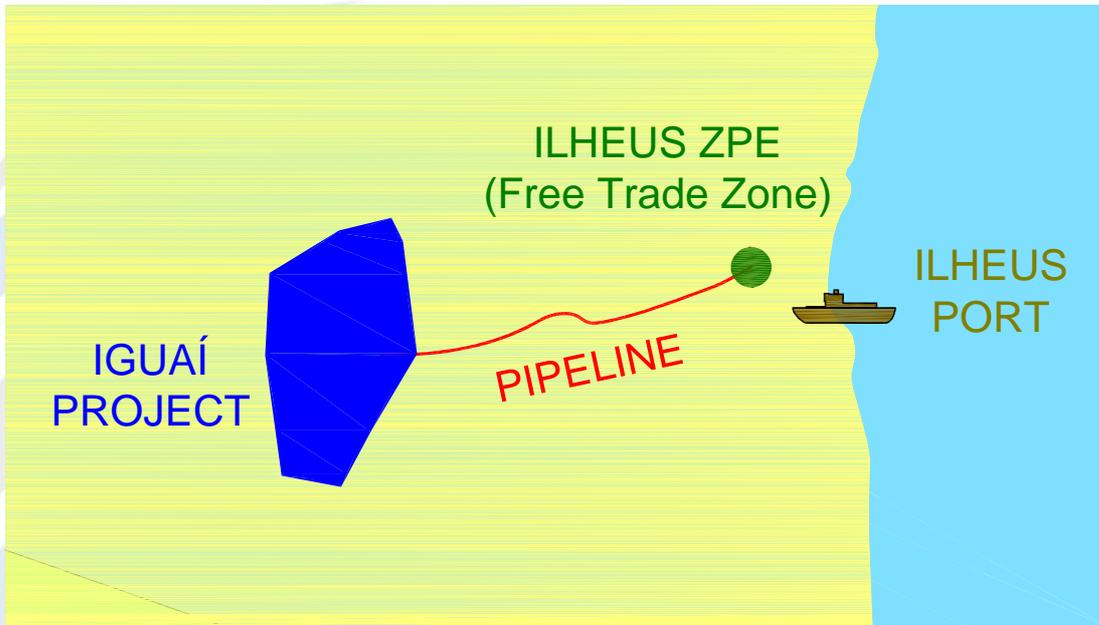


Image 1 - Integration with ZPE - Ilhéus

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1.3.2 - Nearest Mining

In the vicinity of the Project Iguai, there are several investments in mineral exploration under the responsibility of large companies such as CVRD, Votorantim and Rio Tinto and the Companhia Bahiana de Pesquisa Mineral (a company controlled by the Government of Bahia, which specializes in exploration of new deposits), and Base Metal Exploration, a *joint venture* of Votorantim specialized in prospecting new deposits, as well as several smaller projects.

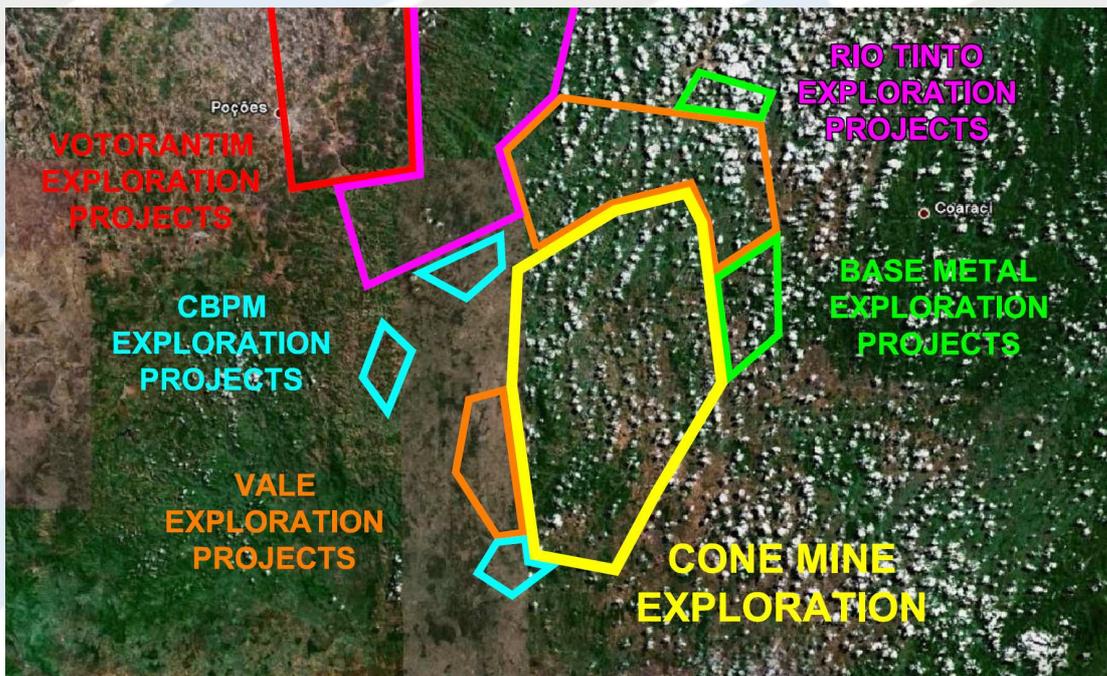


Image 2 - Nearest mining

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1.4 - Location

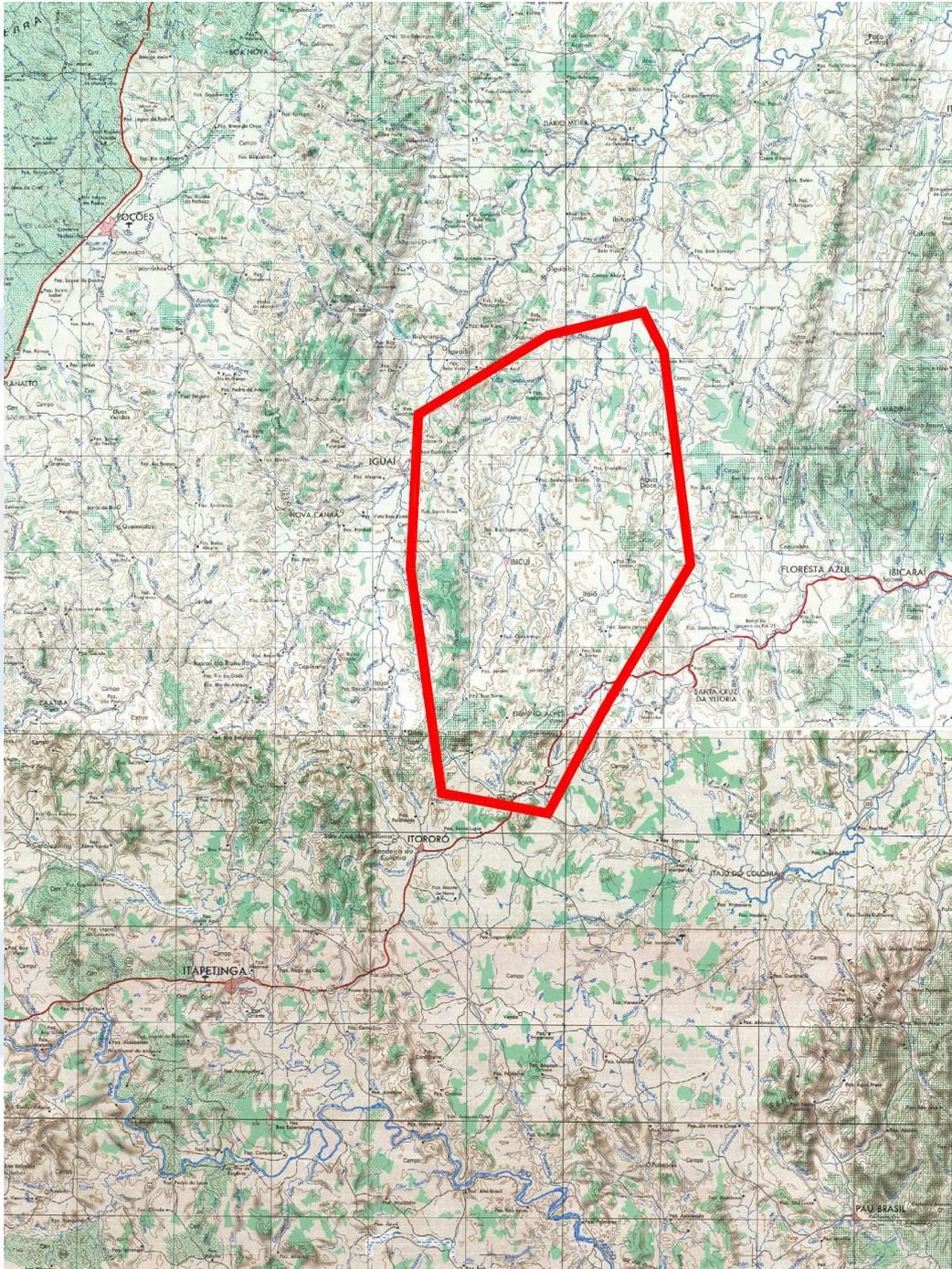


Image 3 - Location (Base - IBGE)

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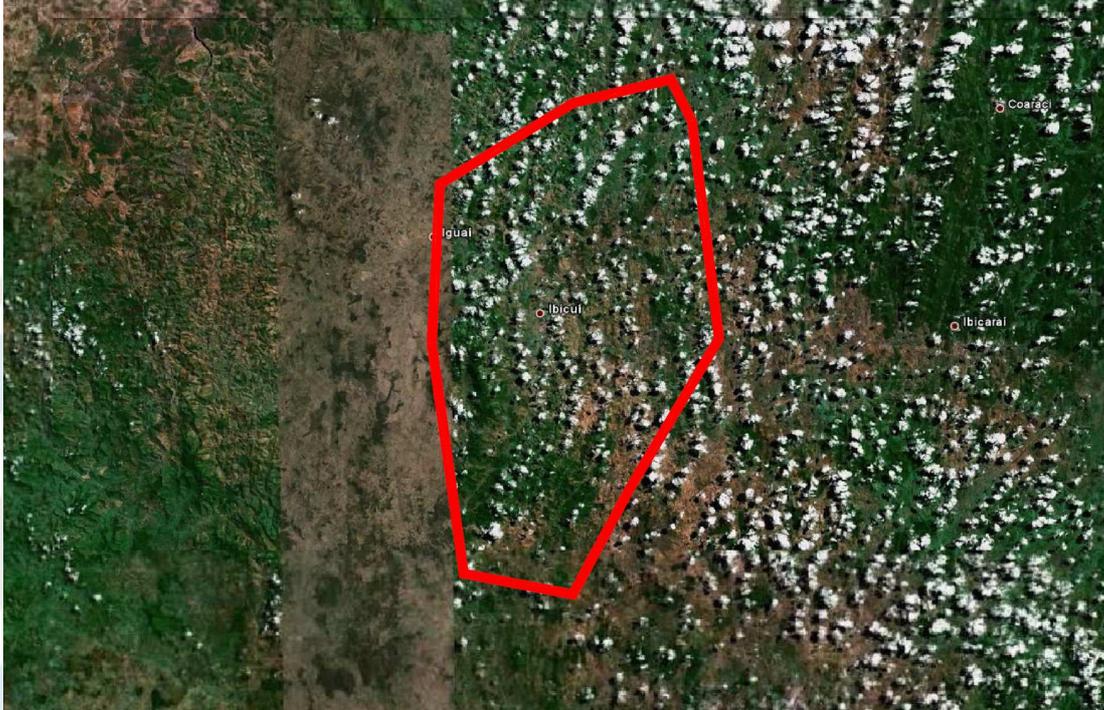


Image 4 - Location

1.5 - Preliminary Information of Geology and Mineral Occurrences of Areas

1.5.1 - Description of Outcrops

Mafic and ultramafic intrusive body: These are bodies of mafic and ultramafic rocks with irregular shapes, often very elongated, often intertwined. Rocks are composed mainly of gabbro-norite, also including peridotites (usually serpentinized) and pyroxenites, all structurally concordant with the host rocks, which are represented by sequences of supracrustal rocks metamorphosed in granulite facies and granitoid intrusive.

It is iron mineralization associated with mafic and ultramafic rocks (hornblendite, peridotite and pyroxenite) with supra-crustal (friable itabirite) associated. These rocks have to be rich in magnetite and are in the "trend" of the regional field of Mirabela.

As these areas recently requested the exploration works are in the initial phase, as well as all other blocks, but there are indications of potential mineralization associated with iron and other metals that could be confirmed with the development of the exploration.

Analysis done in the laboratories of SGS GEOSOL in fragments of rock surface, randomly taken in the locality, found concentrations greater than 5,000 ppm nickel, 3256 ppm vanadium, 15.7% aluminum, 3646 ppm of chromium, 3021 ppm copper, 29.5% titanium oxide, 53% Manganese, 11 ppb platinum, 42.3% iron and 77% Fe₂O₃.

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1.5.2 - Field Photo Memorial



Photo 1 - Extensive rock outcrops very magnetic



Photo 2 - Detail of ultrabasic rock very magnetic



Photo 3 - ultrabasic outcrop of rock magnetic

1.6 - The City of Iguai

1.6.1 - Characterization

Area: 833.333 Km²

Altitude: 352 m

1.6.2 - Population

Total: 29,449 (IBGE 2009 estimate)

1.6.3 - Transport

Highway

Approximate distances to major centers (Km):

Salvador: 447

Aracaju: 636

Vitória: 772

Belo Horizonte: 960

Rio de Janeiro: 1223

Limiting municipalities:

IBICUÍ

NOVA CANAÃ

POÇÕES

DÁRIO MEIRA

BOA NOVA



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1.7 - THE CITY OF IBICUÍ

1.7.1 - Characterization

Area: 1163.296 km²

Altitude: 365 m



1.7.2 - Population

Total: 16,464 (IBGE 2009 estimate)

1.7.3 - Transport

Highway

Approximate distances to major centers (Km):

Salvador: 459

Aracaju: 649

Vitória: 775

Belo Horizonte: 972

Brasília: 1148



Limiting municipalities:

FIRMINO ALVES

IGUAÍ

NOVA CANAÃ

ITORORÓ

ALMADINA

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DÁRIO MEIRA

FLORESTA AZUL

ITAGIBÁ

SANTA CRUZ DA VITÓRIA

COARACI

ITAPITANGA



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2 - LOGISTICS AND ACCESSIBILITY

2.1 - Access to the Area

Leaving Salvador, take the BR - 324, exit northeast of the city, meaning Feira de Santana. Follow approximately 90km and the city of Feira de Santana enter the left in BR - 101 southbound. Follow for another 200km to the city of Guandu. From there follow the highway for more than 100km BA-250, south to the junction with the highway BA-030. From there followed by another 4 km towards west, turn left There in the road and follow for more Iguai 43km to the urban area.

The project area is located southeast of Iguai and covers an extensive area of over 45,000 hectares covering the following counties: Iguai, Ibicui Firmino Alves, Santa Cruz da Vit6ria, Nova Canaan and Itoror6.

2.2 - Main Access Roads

The main access routes to the area of the process are the BR - 101, -116 BR, BR - 415 AB - 262 AB - 030 BA - 670, BA - BA 667 - 250, and back roads near the area process.

2.3 - Airports

The main airport near the area of the airport process is Pedro Otacílio Figueiredo in the city of Vitoria da Conquista, about 125km away from the area, which operates domestic flights to some major cities in Brazil.



Image 5 - Area of departure/arrival of Airport Pedro Otacílio Figueiredo.

Alternatively there is the International Airport Magalhães, located in Salvador, capital of Bahia state, about 450 km distant from the area.



Image 6 - Partial view of the International Airport Deputado Luís Eduardo Magalhães

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In Itapetinga, about 100 km, there is an airport with paved runway of about 1.3 km for medium-sized aircraft (jets, turbo-propellers and midsize business jets). However this airport does not operate commercial flights.



Image 7 - Landing strip of Itapetinga airport.

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2.4 - Pipeline

Due to the scale of production and based on the current infrastructure, the option of disposing of iron ore by pipeline to the ZPE - Ilhéus or directly to the port of Ilheus, presents itself as an interesting solution and certainly more economical in the medium term, the road to passage of up to 130km to Ilheus.

The estimate for the pipeline route is 94km to a construction cost of \$ 1,300,000.00 / km, a total of \$ 122,200,000.00.

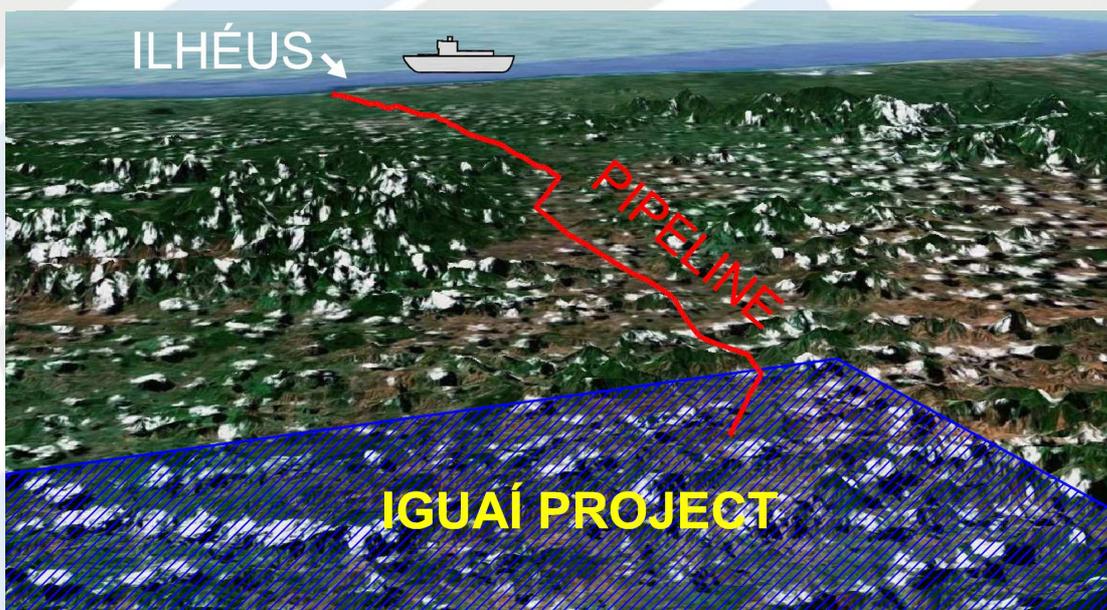


Image 8 - Preliminary design of the pipeline project Iguaí-Ilhéus.

The choice of the pipeline allows very low operating costs for transporting iron ore slurry with operational costs estimated at less than U\$0,50/ton of solids.

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Comparing to conservative with the costs associated with road transport (about \$ 13.18/tonelada), has a payback (based only on the economy generated) from 9 years to produce a relatively small (90,000 tons per month of concentrate) .

Considering a production of 250,000 tonnes per month (limit cut mines class G2-DNPM), the payback would be reduced to three years and if production is on the order of 1 million tonnes per month (equivalent to conservative estimates of expectation of production of Bahia Mineração Pedra de Ferro mine in Caetité-BA), the payback would be reduced to eight months.

Alternatively, you can take the road at an estimated cost of \$ 13.18/tonelada, which would allow the sale of ore at a cost of U.S. \$ FOB 31.84/tonelada Ilheus against U.S. \$ 18.66 FOB Ilheus adopting the pipeline.

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2.5 - Ports

2.5.1 - Port of Ilhéus - BA

With a volume of cargo movement by rotating around one million tonnes per year the Port of Ilheus, now a grain port drains, open to new challenges. The policy of modernization and expansion, adopted by CODEBA determines changes in infrastructure and in attracting business.

The idea is to anticipate the process of economic growth projected for the state, establishing the conditions necessary for the efficient flow of import and export of products and goods are generated in all regions of the state, especially the pulp in the south; grains , fruits and minerals in the north, west and southeast of the state.

The earliest efforts, already building a mooring dolphin at the north end of the pier. In the short term, expansion of backyard with over 100,000 square meters, stretches over 80m quay and increased depth of 10 to 12m. From the backyard of the new port will be leveraged to expand quay at over 600m, reaching 1200m, optimizing their potential for internal expansion, no need to go overboard.

Within these perspectives, ultimately, new investment community benefits signal port of Ilheus and bring more development conditions for the

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southern, southwestern and west of Bahia state, putting the port of Ilheus as a participant in economic growth and development of the State Bahia and Brazil.



Image 9 - Port of Ilheus

Link: http://www.codeba.com.br/porto_ilheus.php

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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 cannot 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.

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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 Propection

Intend to accomplished a geophysical propection in the area, conciliating two geophysical methods, as seismic and resistivity, aiming to detect possible anomalies that become into target for the investigation work in subsurface, posteriorly.

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 by the execution of the trenches (or "pipe") and galleries to 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 trenches will be directed perpendicularly to the layers' direction. The digging will be made with manual tools, as pickaxes and shovel. To the execution of the service will be contracted the local workforce.

The works will be following by the responsible technician.

3.1.6 - Boring

From the analysis of the obtained data in the geologic mapping, will be leased some orificies of borehole, comprehended in three stages. In the end of each boring stage, an evaluation will be made, aiming to the taking a decision as for the continuity of the exploration.

It is expected, in the three stages a boring with continuous coring. The works will be contracted with specialized companies.

The description of the testimony will include the petrographic aspects, stratigraphic and structural. The intervals will have maximum length of 1,5m, eventually extended to 2,0 m in the portions confessedly sterile.

3.1.7 - Chemical Analysis

The chemical analysis will be executed in a specialized laboratory and will include the grades of Fe, FeO, Mn, SiO₂, Al₂O₃, CaO, MgO, TiO₂, S, P and others elements traces.

3.1.8 - Technological Assays

It will be sending samples of ore for the execution of the technological assays in specialized laboratory that include granulometry analyses and the following tests:

- Tumbling Iso
- Crepitation Coismj
- RDI Coismj
- Reduction JIS M 8713
- Midrex Linder Test
- Sulphur Release

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These tests propitiated the verification of the material adequacy to the use in siderurgy, consisting of an evaluation for use in blast-furnace and for use in process of direct reduction.

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 considered in this study the reference exchange rate as U.S. \$ 1.00 = R \$ 1.85

For the implementation of the exploration program described above, it is estimated a total cost of **\$ 24,575,000.00**.

3.2 - Mining And Processing

The cost of mining iron ore for the monthly production estimated at 250,000 tons and its respective processing are presented below:

3.2.1 - Production Data (Monthly Estimates)

					Production	
					rate	
Mines' extraction	9	h/day	26	day/month	1068	t/hour
Processing	9	h/day	26	day/month	855	t/hour

Monthly Production of the Extracted Ore = 250.000 tons

Monthly Production of the Processed Ore = 200.000 tons

*P.S.: Considering a recovery of 80% in the process.

Considering the stripping ratio = 2/1

3.2.2 - Cost of the Mine work (Monthly Estimates)

Cut and ROM Load (R\$1,00/t) = R\$ 250.000,00

ROM Transport = R\$ 200.000,00

Drilling and Dismounting = R\$ 250.000,00

Road Maintenance = R\$ 100.000,00

Sterile Transport (R\$0,50/t) = R\$ 250.000,00

Cut and Load of Sterile (R\$0,50/t) = R\$ 250.000,00

General Expenses = R\$ 87.500,00

Unit Cost = R\$ 5,55 / ton (US\$ 3.00)

MONTHLY TOTAL (USD) = US\$ 750,000.00

3.2.3 - Cost of the Processing (Monthly Estimates)

Materials / Maintenance = R\$ 300,000.00

Crusher Feeding = R\$ 150,000.00

Mill Maintenance = R \$ 50,000.00

Flotation = R \$ 200,000.00

Electricity = R \$ 600,000.00

Overhead = R \$ 120,000.00

Quality Control = R \$ 60,000.00

Unit cost = R \$ 7.40 (U.S. \$ 4.00) / tonne of product

MONTHLY TOTAL (USD) = U.S. \$ 800,000.00

3.3 - Operation of the Pipeline

Operating costs of the pipeline are estimated at U.S. \$ 0.65 per tonne of ore transported to the pellet plant or port in Ilheus.

MONTHLY TOTAL (USD) = U.S. \$ 90,000.00

3.4 - Port

Port costs involved in storing and loading ships. The estimated average cost for ports in Bahia is R \$ 27.75 per tonne of ore, sinter feed.

Unit cost = R \$ 27.75 (U.S. \$ 15.00) per tonne

MONTHLY TOTAL (USD) = U.S. \$ 3,000,000.00

4 - ECONOMIC POTENTIAL OF ENTERPRISE

Verifying the exploration positive result according to the accomplished estimates, the venture will enable the marketing of the ore FOB (Ilheus) at a monthly cost of **US\$ 4,640,000.00** for 200 000 tonnes traded. Assuming an extra cost of \$ 10.00/ton for additional costs, cost FOB result is **US\$ 33.20/tonne**.

This represents a potential gross profit of **US\$ 51.80/tonne** sold, equivalent to **156% profit on the total cost** of the production chain.

Considerations: Currency: US\$ 1.00 = R\$ 1.85 and sales value of ore = US\$ 85.00)