CONE

MINE EXPLORATION

Nonato Project

Iron and Manganese

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SUMMARY

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1. Introduction

This document shows the geological and technological studies made for iron and manganese reserves of the Nonato Project. The project area is located near the city of São Raimudo Nonato, state of Piauí, northeastern Brazil. Between the presented data highlights the detailed description of these reserves, illustrated with geological mapping, descriptions of the pit, results of chemical analyses, beneficiation tests, ore quality and demonstrations of the technical-economic practicability of the explotation works.

The area has exploration permission with DNPM and all documents are up to date.

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2. Location, Access and Regional logistics

The Nonato Project's area is located near the city of São Raimudo Nonato, state of Piauí, northeastern Brazil. The city São Raimundo Nonato is located 576 km of Teresina, capital of Piauí, have a population of 31,744 habitants, 2606.8 km², and it is considered the main city of the micro-region. The Hydroelectric of Sobradinho is approximately 270 km of the city, and have a installed power of 1.050.300 kW (6 UGs).

Image 1: Map showing the location of São Raimundo Nonato

The area can be accessed by federal road using the BR-343 and BR-020, or state road using PI-144 or PI-140. Distance using paved roads from the cities:

- Eliseu Martins: 199 km
- Canto do Buriti: 112 km
- Petrolina: 303 km
- Teresina: 588 km
- Campo Alegre de Lourdes: 97 km
- São João do Piauí: 98 km
- Floriano: 275 km
- Picos: 306 km

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There is an airport being constructed in the city of São Raimundo Nonato scheduled for completion of the works in July/2013 with a 1.650m x 45m airstrip. Currently the access can be done using one of the state airports and continuing by roads after:

- Airport of Bom Jesus: 204 km
- Airport of Corrente: 432 km
- Airport of Floriano: 275 km
- Airport of Gilbués: 357 km
- Airport of Guadalupe: 342 km
- Airport of Oeiras: 270 km
- International Airport Prefeito Dr. João Silva Filho – Parnaíba: 836 km
- Airport of Picos: 306 km
- Airport Senador Petrônio Portella – Teresina: 588 km

*Distances above are via paved roads.

Nowadays there is a railroad called Nova Transnordestina being made in northeastern Brazil connecting the state of Piauí to Pecém Port (Ceará) and Suape Port (Pernambuco). The main objective of this project to is increase the market competition for agriculture and mining companies of the region. The railroad has a total of 1,728 km of rails and has Ribeira do Piauí (171 km by roads from Nonato Project area) as intermediate city and Eliseu Martins (199 km by roads from Nonato Project area) as reference city. The works are scheduled to finish in the end of 2014.

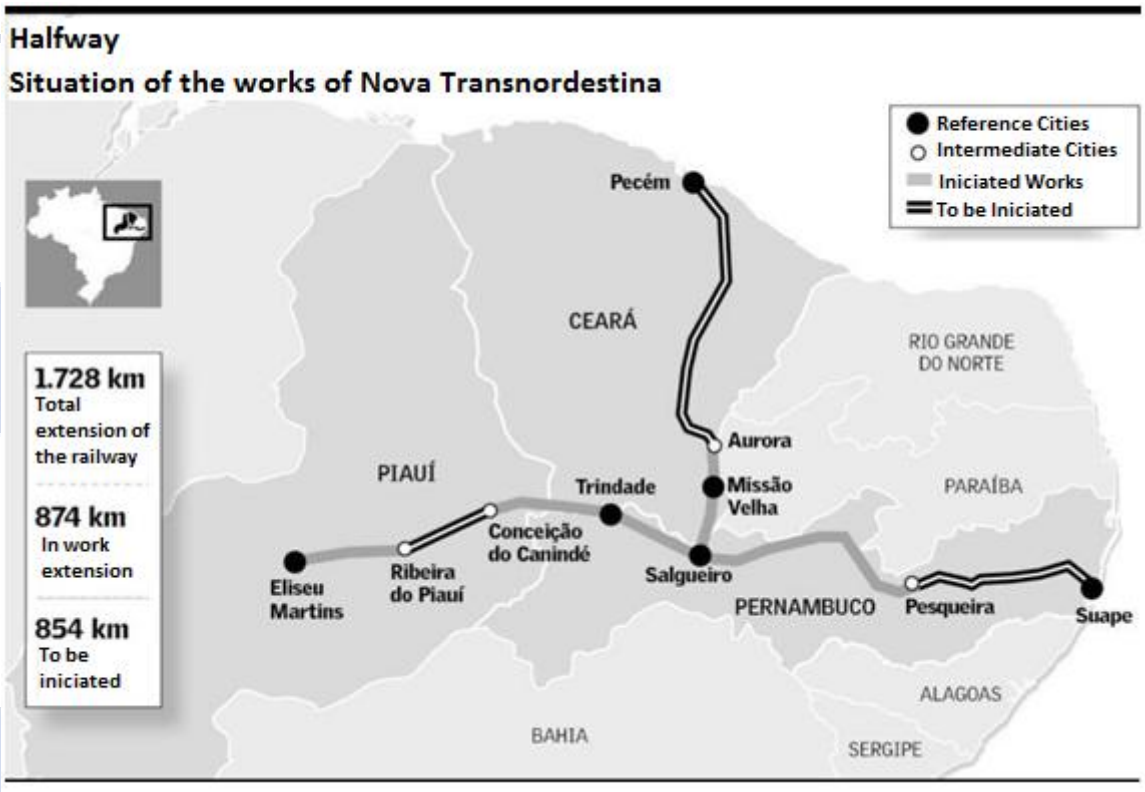

Image 2: Situation of the works of Nova Transnordestina Railroad

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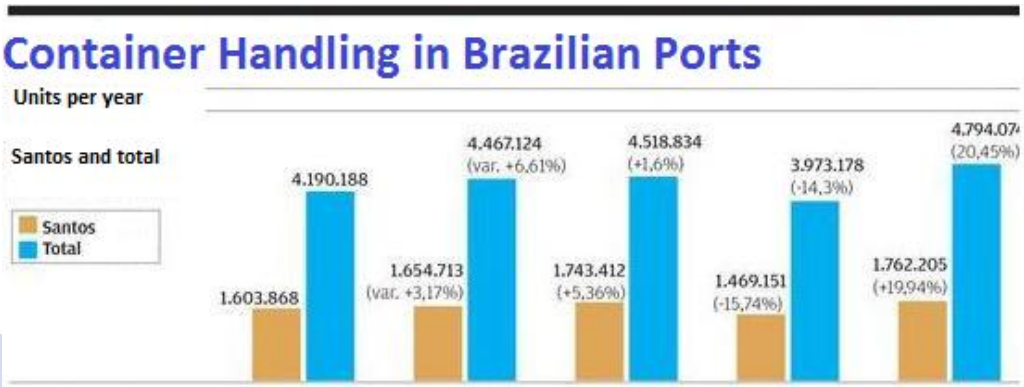
Approximate distance between the reference city Eliseu Martins to ports by railroad:

- Suape Port: 1100 km
- Pecém Port: 1100 km

The Suape Port is situated between the cities of Ipojuca and Cabo de Santo Agostinho, in the state of Pernambuco Northern Brazil. It has an area of 140 square kilometers and 13.5 thousand hectares in extension divided into Port, Industrial, Administrative, Ecological Preservation and Cultural Preservation zones. Its conception as an industrial port offers exceptional conditions for the installation of enterprises of the most varied segments which will use the port infra-structure, roadways and railways with direct access to the cargo terminals and the tank storage area. The full data about Suape Port can be seen in their site: http://www.suape.pe.gov.br/home/index-en.php

The Pecém Port is located in northeastern Brazil, in the Metropolitan Region of Fortaleza, in the city of São Gonçalo do Amarante, state of Ceará. Due to its privileged location, the Pecém Port is the brazilian international port with shorter transit time to United States and Europe. The Pecém Port Terminal consists of two sea Piers, one for supplies, steel products and other general cargo, and other for liquid bulk, especially crude oil and petroleum products.



Other Ports	2006	2007	2008	2009	2010
Itajaí *	472.417	390.394	396.287	346.479	565.017
Rio Grande	369.362	388.320	372.811	394.005	408.835
Paranaguá	296.919	348.000	356.577	367.798	399.590
Rio de Janeiro	260.232	290.575	289.059	244.536	299.623
Itaguaí	194.867	174.865	213.272	154.289	196.267
Vitória	197.903	207.234	197.773	156.420	184.737
São Francisco do Sul	128.772	201.500	175.288	152.478	118.802
Salvador	163.834	165.715	150.497	144.263	168.283
Manaus	143.093	174.570	189.330	190.000	238.646
Suape	128.237	163.500	201.562	167.870	226.538
Pecém	70.627	77.689	60.575	88.301	111.334
Fortaleza	44.408	80.689	41.201	33.000	46.855
Belém	32.463	43.465	27.479	18.363	22.377
Vila do Conde	19.363	17.690	14.498	17.605	21.527
Outros	63.823	88.205	89.213	28.620	23.438

Source: Brazilian Association of Container Terminals for Public Use (ABRATEC)

Image 3: Container Handling in Brazilian Ports 2006-2010

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3. Geological Characterization of the Areas

The studied areas are inside three distinct lithologic domains: Crystalline Basement, Sedimentary Basin of Parnaíba and Recent Capping. The Crystalline Basement, Pre-Cambrian age, is represented by two different units: Gneiss-Migmatitic Complex and Volcano-Sedimentary Sequence São Raimundo Nonato. The reserves of iron and manganese of the Nonato Project are located inside the last one. The Sedimentary Basin of Parnaíba is represented by Serra Grande Formation, occupying the basement position, consist of sandstones and siltstones. The deposits classified as Recent Capping have Pleistocene-Holocene age and discordantly cover the formations Serra Grande and Pimenteira, comprehending deposits of sand, clay, gravel and laterite.

Geology of the Volcano-Sedimentary Sequence Raimundo Nonato

The occurrences of mineral deposits of iron ore and manganese are associated with the Volcano-Sedimentary Sequence Raimundo Nonato. Morphologically consists of a narrow, elongated ridge located at the foot of a branch of Serra Nova. It has about five miles long. In its south ending it divides into two branches, in the form of a large inverted Y. The main branch has its south termination together with the curve of the highway, extending thence north with north-northwest direction. In its northern third is broken by a temporary stream, unnamed, and about 1.5 km later inflects in a pronounced arc to the east, near the escarpment Devonian, sustained by Phanerozoic sediments of the Sedimentary Basin Parnaíba. Included within the Gneissic-Migmatitic complex attend the preserved remains of an ancient metamorphosed volcano-sedimentary sequence, located in a ridge subdivided into four continuous hills (Mel, Furna, Tromba, eCafé), in the form of a narrow and elongated body, occupying an area of approximately 3.9 km². The body is directed to north-northwest consisting of layers of itabirites, ferruginous quartzites and calco-silicated rocks. This lithological set associated with itabirite, occurs the secondary manganese ore amid colluviums-alluvial materials. The iron ore can be found along the central portion of the volcano-sedimentary sequence, following the crest of the mountains, in banded ferruginous quartzite rocks. In the portion of the body facing west, have proven secondary manganese reserves, deposits in colluviums-alluvial (Morros da Furna and Tromba), associated with supergene enrichment in ferruginous quartzites Morro do Café (northwest).

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Image 4: Quikbird satellite image, showing the volcano-sedimentary sequence Raimundo Nonato – PI

The geology of the sequence has the following lithologies from bottom to top: Quartzite and quartz-mica-schist; Itabirito and / or ferruginous quartzite; association of Iron and Manganese. These lithologies are embedded in granite-gneiss basement with a complex structuring. The volcano-sedimentary sequence is disposed in an antiform fail, drawn on a reverse side of an older folding. Structurally is represented by an antiform fail, parallel to the axis, with trims 20 ° to 60 ° west. The axis of the folded structure is directed toward the north-northeast, with low trim to the north. The dip of the layers of the volcano-sedimentary sequence, observed in outcrops were determined to range between 40 ° and 90 ° northwest, west flank of the structure, and from 5 ° to 45 ° east to the eastern flank. The bodies contact, as well as the failure, is masked by soil covering and rock fragments.

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a) Quartzites and quartz-schists - The quartzite occupies the top position of the set of rocks identified on surface at the Volcano-Sedimentary Sequence Raimundo Nonato, and occurs in the triangular area between the two branches of the structure and the road under construction in the southern areas, west and east. It is greenish in color and presents interbedded quartz-mica schist, very weathered, attitude of the west flank of the ridge of 340 ° / 80 ° SW;

b) Itabirite and / or ferruginous quartzite – Imposed under the earlier lithology, there is a itabirite layer, with variations for ferruginous quartzite, with about 50 meters thickness and 5 miles long. Extends along the volcano-sedimentary sequence Raimundo Nonato and, due to its high resistance to weathering processes, is a continuous and elongated ridge, interrupted only by an intermittent stream without specific designation in its middle portion. Petrographic Studies made rank him as itabirite and / or ferruginous quartzite depending on the structure, and represents a banded iron formation (BIF), gray to dark brown, characterized by alternating of bands rich in quartz and bands rich in opaque minerals. The bands rich in quartz present granoblastic texture, inequigranular, wherein the quartz grains, fine to medium granulometry, strong wavy extinction, appear stretched and oriented, defining a foliation parallel to the banding. The bands rich in opaque, are fine-grained and poorly oriented parallel to the banding. The opaque minerals, in view of the chemical analysis, are represented by magnetite and goethite, occupying 40-45% of the sample, while quartz occupies 55-60% of sample.

The superficial change produces a sandy-clay soil, light brownish to reddish, when it is more ferruginous. The ferruginous quartzites and / or itabirites make up the measured reserves of iron ore in the areas of study.

The sampling data of outcrops, trenches, boreholes and geological mapping shows that the slope of northwest of Morros do Mel-Furna- Tromba-Café consists of a sequence of meta-sedimentary rocks with basically chemistry origin, sometimes detritic. The thicker identified package refers to a set of meta-sediments of about 180 meters thickness, a layer of itabirite on the top, followed by a ticker layer of carbonates, largely replaced by silica. It was unable to better characterize this layer in view of its high degree of dissolution and consequent low recovery rate in SR-1, SR-2 and SR-3. Beneath this layer appears a layer of itabirites / quartzite, more and less enriched with iron. Positioned at the contact between the layer of carbonates / silexites and the itabirite / quartzite, attends a relatively thin layer of amphibolite, with about 3-4 meters thick, which shows volcanic activity during deposition of this group of rocks. About the package of rocks described above appears a layer of carrier manganese, possibly a layer of manganese carbonate and manganese marl.

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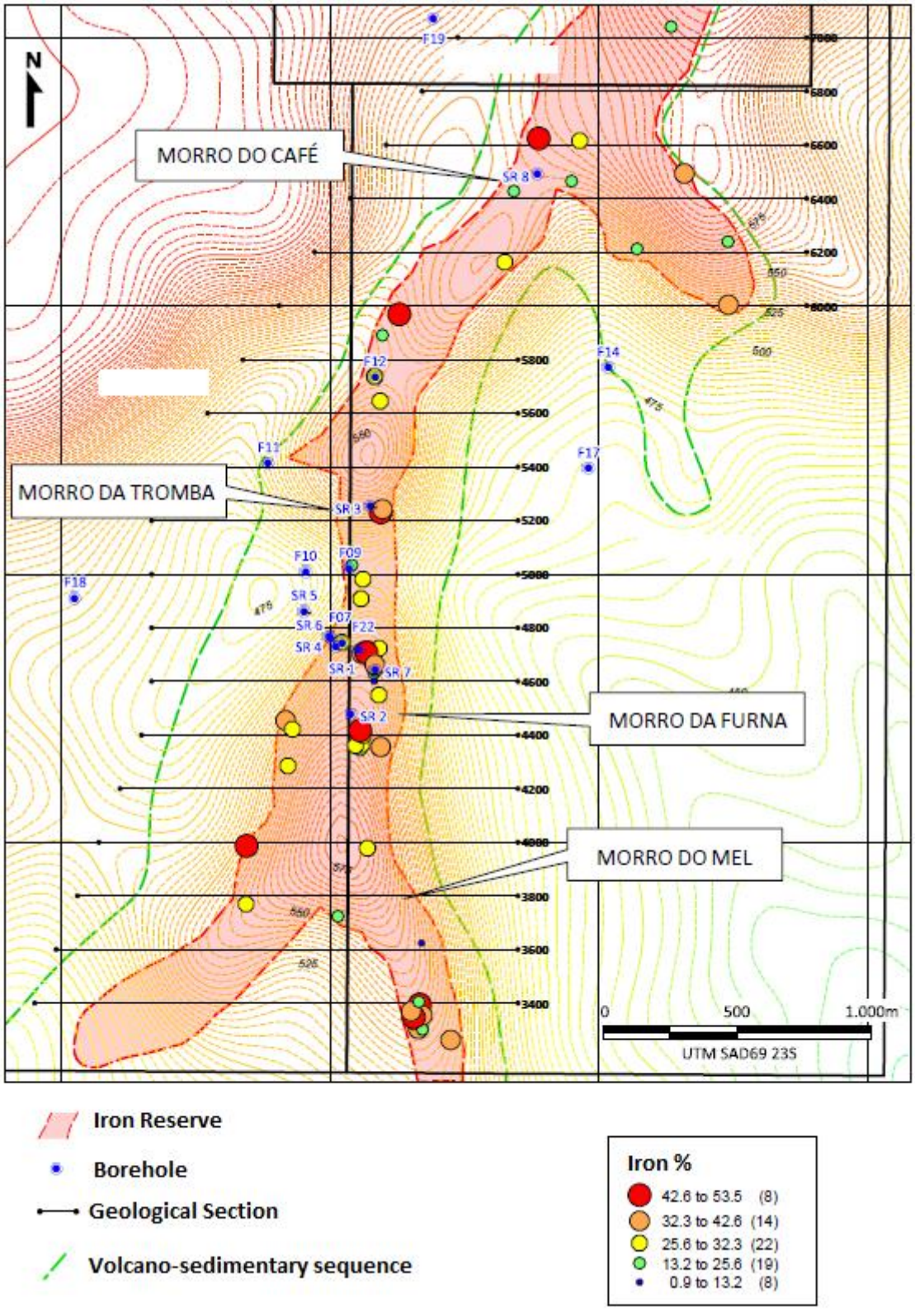

Image 5: occurrence map of ferruginous quartzites (iron ore)

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4. Exploration Works

Stage for Recognition

In 1st. stage the company VPC was contracted to the geological reconnaissance of the occurrences of iron and manganese ores in the geologic unit Volcano-Sedimentary Raimundo Nonato Sequence, of the Morro do Mandacaru (or Mel), where 14 samples were collected (VPC-1 to 14) of rocks "in natura", in outcrops, for laboratory analysis. With 5 of these samples were performed petrographic analyzes. The remaining samples were sent for semi-quantitative rock chemical analysis. It indicated mineralization of iron and manganese with economic potential.

Later the company Runge also conducted a geological reconnaissance of occurrences of ferruginous quartzites, defining target areas (Morro Mel, Morro da Furna, Morro Morro da Tromba and Café) mineralized with iron and manganese. Another 10 samples (AM-01 to AM-10) were collected from outcrops and submitted to quantitative analysis by fluorescence Rx 10 of the main oxides, to the laboratory of SGS-Geosol of Belo Horizonte-MG. Results showed a potent sequence of ferruginous quartzite with average content of 29% Fe (average of 10 samples), underlying a sequence composed by quartz-mica schist, both part of the Volcano-sedimentary sequence of São Raimundo Nonato.

Semi Detailed Step

For consolidation of the information obtained in the 1st. step, we performed a systematic sampling of the sequence of ferruginous quartzites, with openings lines east-west (3400, 3800, 4200, 4600, 5000, 5400, 5800, 6200, 6600, 7000), spaced by 400 m (from south to north – Morros de Mel-Furna-Tromba-Café respectively). The company Runge collected 31 samples (5501-5505, 5507-5532) in outcrops and trenches opened earlier to define the areas of occurrence of manganese and iron ores. These samples were analyzed quantitatively by SGS-Geosol.

Besides the trenches, principle oriented for knowledge of the occurrences of manganese, during the period August to December 2007 was performed a drilling campaign of 21 boreholes with an average depth of 50 meters, toward to do the final report of exploration for DNPM. Due to capacity problems of the drilling equipment, the holes should be done by rotary drilling, but they were drilled with rote-percussion, destroying much of the material drilled. Only were tapped a portion of the samples from holes F07, F09, F10, F11, F12, F14, F17, F18, F19, F22.

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Detailed Step for Mineralized Areas with Fe – Mg

Given the need for more precise information about the occurrences of iron and manganese ores, such as their space distribution, thickness, genesis, contact relations, stratigraphic position, changes in levels in depth, number of mineralized layers, among other important issues, was hired to CAGEO Company - Consulting and Geology Field LTDA, for implementation of the drilling campaign, with a total of 400m, distributed in 8 boreholes, on the western slope of the Morros da Furna, Tromba and Café. Because of the low recovery (36%) of testimonies, no samples were submitted for chemical analysis, these being used only for control of the stratigraphic sequence of ferruginous quartzite.

Table1: recuperation of the boreholes

Borehole	Depth (m)	Recuperation (m)	Recuperation (%)
SR-1	53	9,13	17,23
SR-2	35,5	3,71	10,45
SR-3	49,9	11,71	23,47
SR-4	51	26,75	52,45
SR-5	54,5	42,44	77,87
SR-6	59	28,84	48,88
SR-7	49	12,55	25,61
SR-8	55	11,44	20,8
Total	**406,9**	**146,57**	**36,02**

The boreholes were located based on the evidence of manganese ore on the surface, open trenches, previously geological studies made in the 1st step by VPC / Brazil (2006) and 2nd step by Runge (2008), and according to the Quickbird image of the area, treated in GIS environment. Each site was inspected in detail before chosing the location and orientation of each borehole. The holes SR1, SR2, SR4, SR6, SR7 and SR8, were vertical (inclination of 90 °), while the holes SR3 and SR5 were conducted at 110 ° / 60 °.

In this step were also performed 16 excavations type pipe / trench (T1 to T16) in the Morro do Mel and Morro and Furna, aiming sampling and cubage the reserve for iron ore. The samples were sent to the laboratory of UFPR, Lamir, for quantitative chemical analysis.

To define the area of occurrence and cubage of the secondary manganese ore reserves, in eluvial-colluvial materials, was made a survey of detail on the western flank of the Morro da Furna and Tromba, opening 14 lines crossing the occurrences of Mn, with approximately 50m spacing between lines. A ground geophysics using electro-resistivity method was performed on opened lines, with readings every 20m, aiming the mapping of the structures (fractures) and resistivity anomalies associated with the colluvium-eluvial manganese material. In this detail procedure, the trenches previously opened were re-sampled and analyzed for manganese ore.

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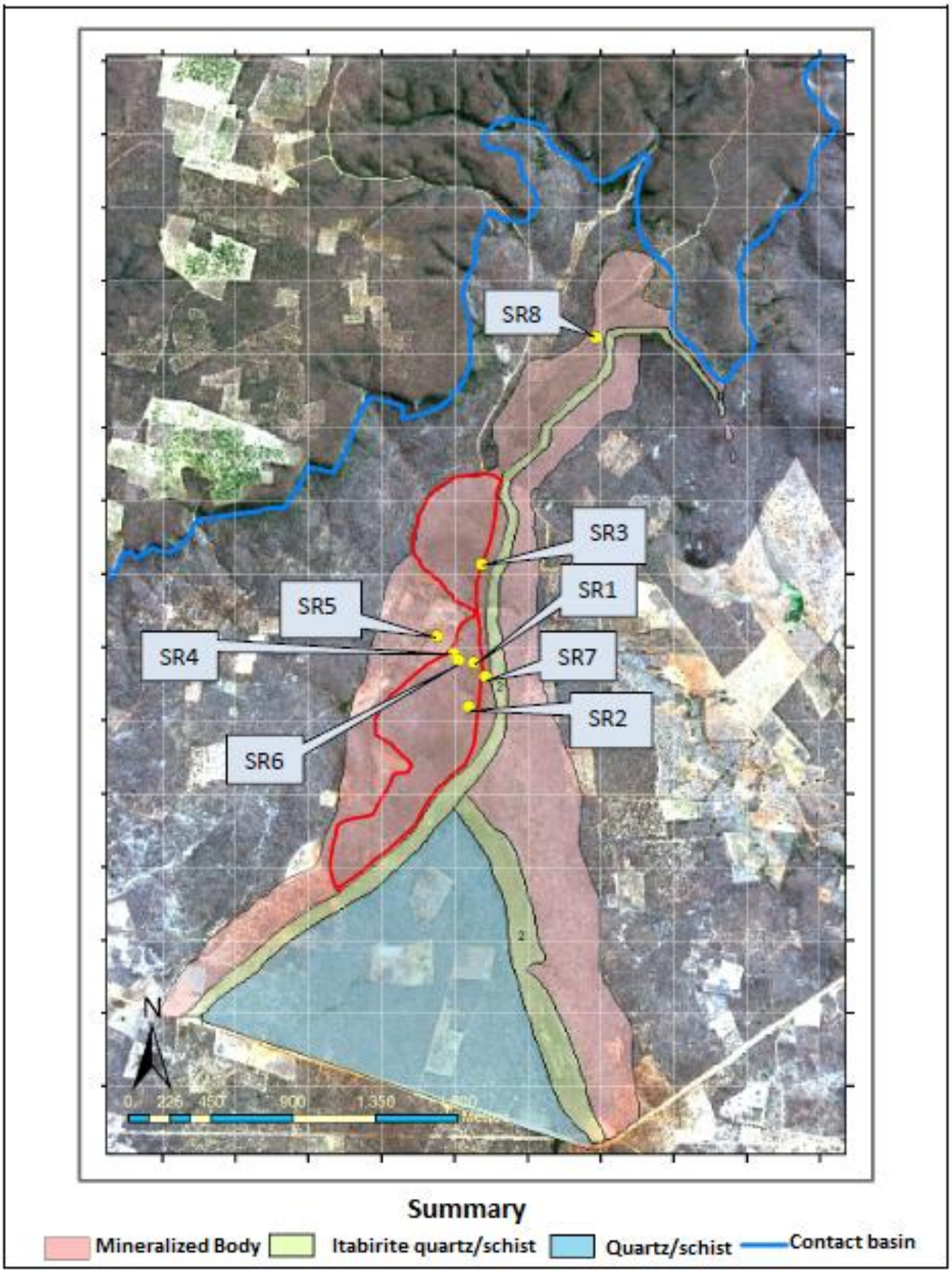

Image 6: geological mapping of the volcano-sedimentary sequence São Raimundo Nonato - PI

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5. Iron Ore Deposit

For the cubage of the iron ore reserves, it was considered the information and data obtained during the 03 stages of the research (Recognition, Semi- Details and Detailing of Targets of Morros do Mel (South, western and eastern), Furna, Tromba and Café (North, to west and to east). For this purpose, 19 geological cubing sections were made, directin west to east, crossing the iron ore body (ferruginous quartzite), with 200m between them, from south to north:

- Morro do Mel: Sections 3400, 3600, 3800, 4000 and 4200;
- Morro da Furna: Sections 4400, 4600, 4800 and 5000;
- Morro da Tromba: Sections 5200, 5400, 5600 and 5800;
- Morro do Café: Sections 6000, 6200, 6400, 6600, 6800 and 7000.

Measured Reserve

It was considered as a substitute measure the information of the systematic geological mapping of the unit mainly composed of banded ferruginous quartzite layers (BIF), individualized in Volcano-Sedimentary Sequence of São Raimundo Nonato, using information of: geological contact, folds, faults and / or fractures, layering, banding and / or schistosity), thicknesses of the layers, results of chemical analysis for quantitative determination of Fe % contained in at least 06 representative samples from outcrops, pipe / trenches and boreholes, in the area of influence between geologic sections of cubing. The descriptions of drill holes in depth only served to prove the occurrence of stratigraphic layers off ferruginous quartzites when this occurs. The borehole samples were not analyzed due to low recovery.

Indicated Reserves

It was considered the average percentage of Fe content contained in the quantitative chemical analyzes of the samples 02-05 representative of outcrops, trenches, boreholes in ferruginous quartzites in the area of influence between the geological sections of cubing, by extrapolation to a depth of 50 meters below the surface based on geological evidence.

Inferred Reserve

An estimate value based on knowledge of geological characters of the ferruginous quartzites occurrence at depths up to 100m from surface, with 01 or none representative sample of outcrops, trenches and boreholes in the area of influence between the geological sections of cubing.

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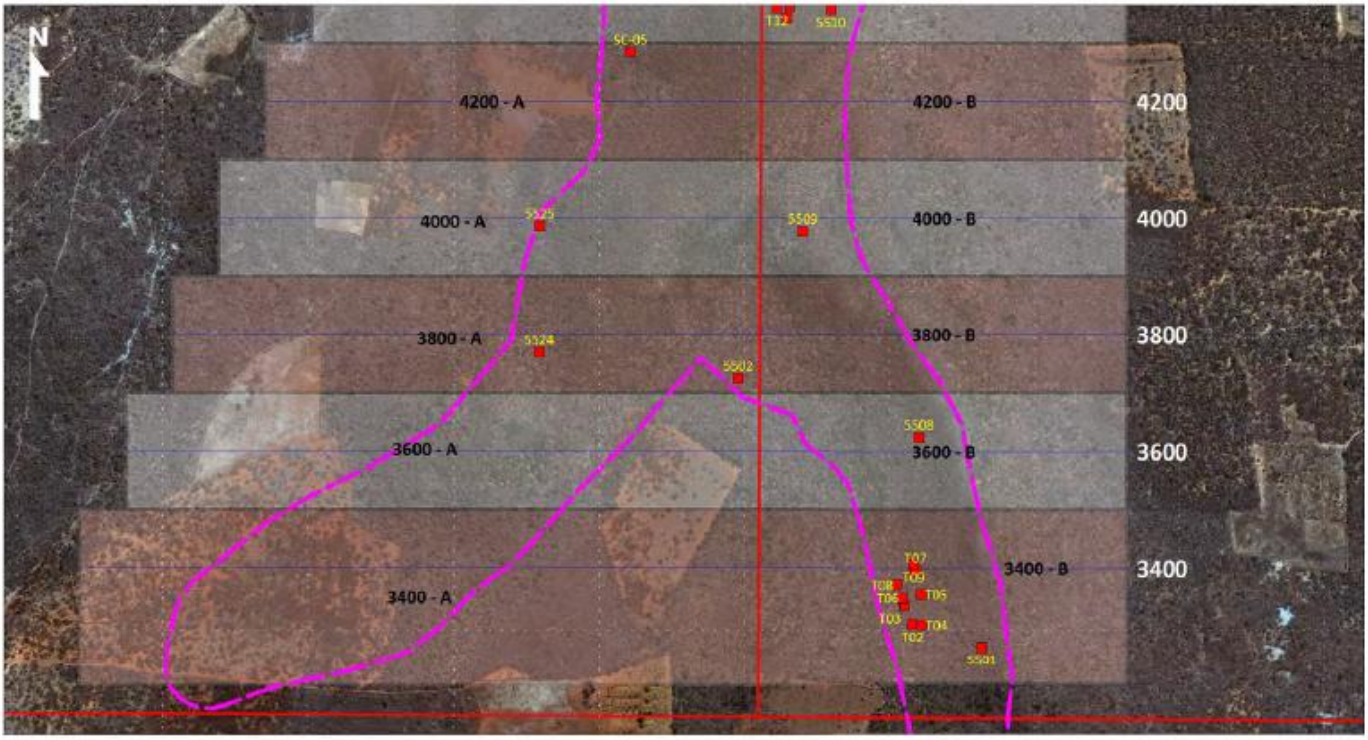
All reserve calculation bellow used MapInfo 10.1 and Excel to reach the results.



Iron Reserve - Target Morro do Mel

0 250 500m

UTM SAD69 23S

Area of influence of the section
Section
DNPM
Ferruginous Quartzite
Sample

Block	Influence	Measured Reserve	Indicated Reserve	Infered Reserve	Total
4200 - A	200	0.00	0.00	6592969.162	6,592,969.16
4200 - B	200	0.00	0.00	3268438.146	3,268,438.15
4000 - A	200	0.00	0.00	10581883.46	10,581,883.46
4000 - B	200	0.00	0.00	4402806.554	4,402,806.55
3800 - A	200	0.00	0.00	8303877.419	8,303,877.42
3800 - B	200	0.00	0.00	4898452.638	4,898,452.64
3600 - A	200	0.00	0.00	6352265.073	6,352,265.07
3600 - B	200	0.00	0.00	5788299.537	5,788,299.54
3200 - A	300	0.00	0.00	18661271.12	18,661,271.12
3200 - B	300	1839443.936	3620045.615	7707150.551	13,166,640.10
		1,839,443.94	3,620,045.61	76,557,413.65	82,016,903.20

Image 7: Iron Reserve – target Morro do Mel

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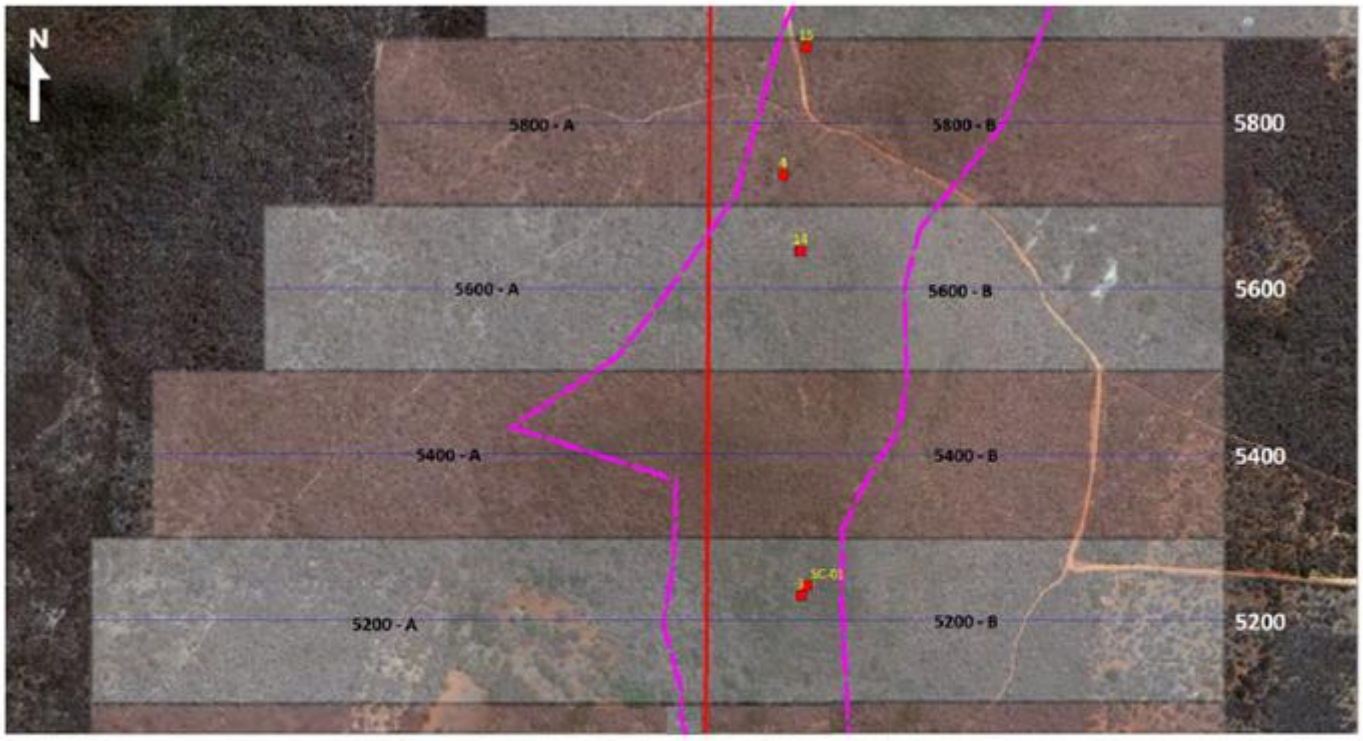

Iron Reserve - Target Morro da Tromba

0 125 250m
UTM SAD69 23S

Area of influence of the section
Section
DNPM
Ferruginous Quartzite
Sample

Block	Influence	Measured Reserve	Indicated Reserve	Infered Reserve	Total
5800 - A	200	0.00	0.00	14,342.78	14,342.78
5800 - B	200	2,999,863.79	1,607,987.93	1,665,226.73	6,273,078.44
5600 - A	200	0.00	0.00	1,887,632.07	1,887,632.07
5600 - B	200	0.00	0.00	5,136,075.89	5,136,075.89
5400 -A	200	0.00	0.00	2,181,164.69	2,181,164.69
5400 - B	200	0.00	0.00	3,602,851.26	3,602,851.26
5200 - A	200	0.00	432,266.27	2,259,293.28	2,691,559.54
5200 - B	200	0.00	1,087,341.10	2,899,107.29	3,986,448.38
		2,999,863.79	3,127,595.29	19,645,693.98	25,773,153.06

Image 8: Iron Reserve – target Morro da Tromba

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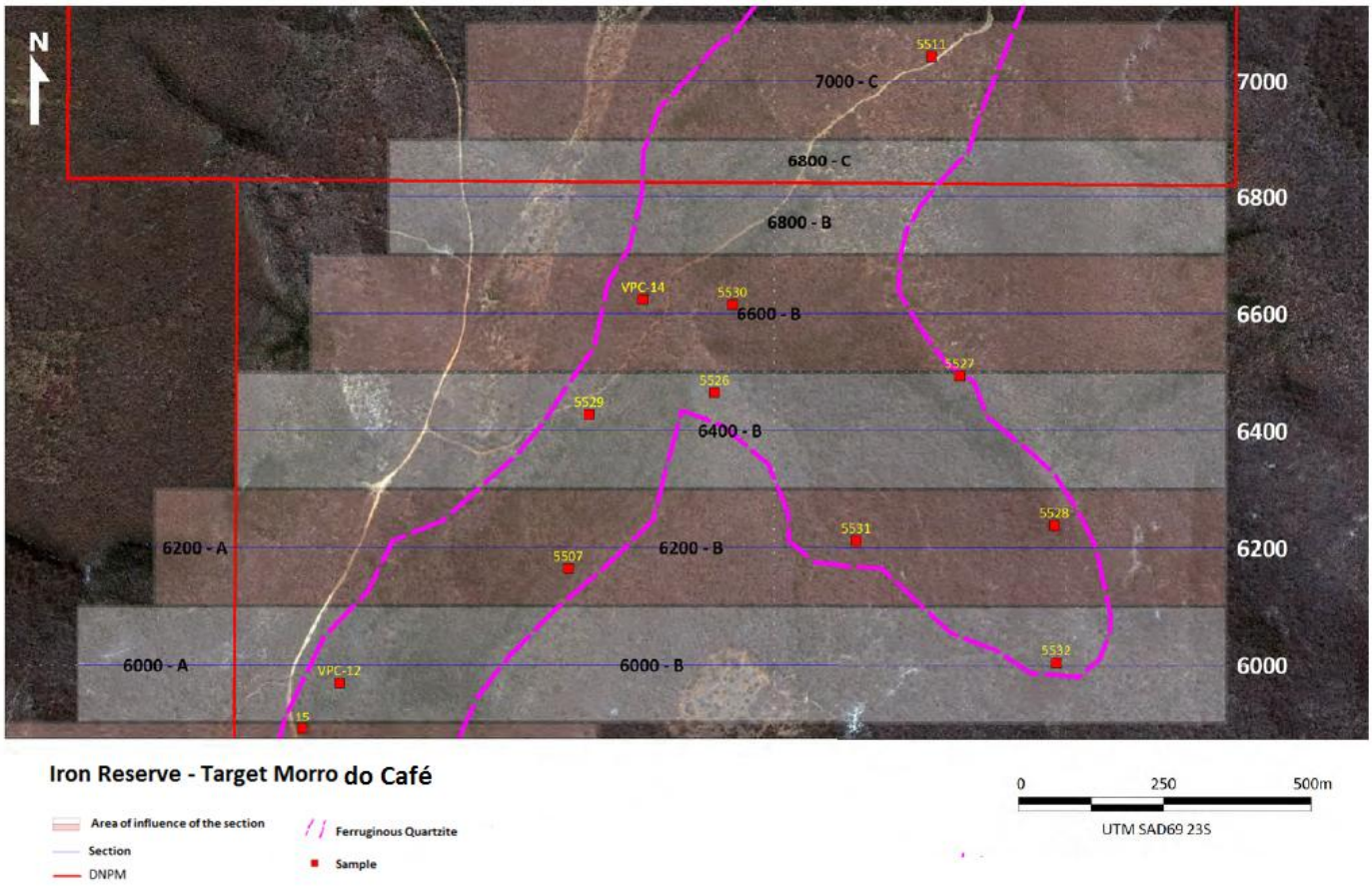

Block	Influence	Measured Reserve	Indicated Reserve	Infered Reserve	Total
7000 - C	200.00	0.00	0.00	6,886,553.70	6,886,553.70
6800 - C	120.00	0.00	0.00	5,274,216.43	5,274,216.43
6800 - B	80.00	0.00	0.00	3,516,144.29	3,516,144.29
6600 - B	200.00	0.00	0.00	11,585,436.62	11,585,436.62
6400 - B	200.00	0.00	1,486,037.65	14,471,747.88	15,957,785.53
6200 - A	200.00	0.00	0.00	0.00	0.00
6200 - B	200.00	0.00	3,541,791.49	11,984,034.48	15,525,825.97
6000 - A	200.00	0.00	0.00	0.00	0.00
6000 - B	200.00	0.00	0.00	11,527,447.58	11,527,447.58
		0.00	5,027,829.14	65,245,580.97	70,273,410.12

Image 9: Iron Reserve – target Morro do Café

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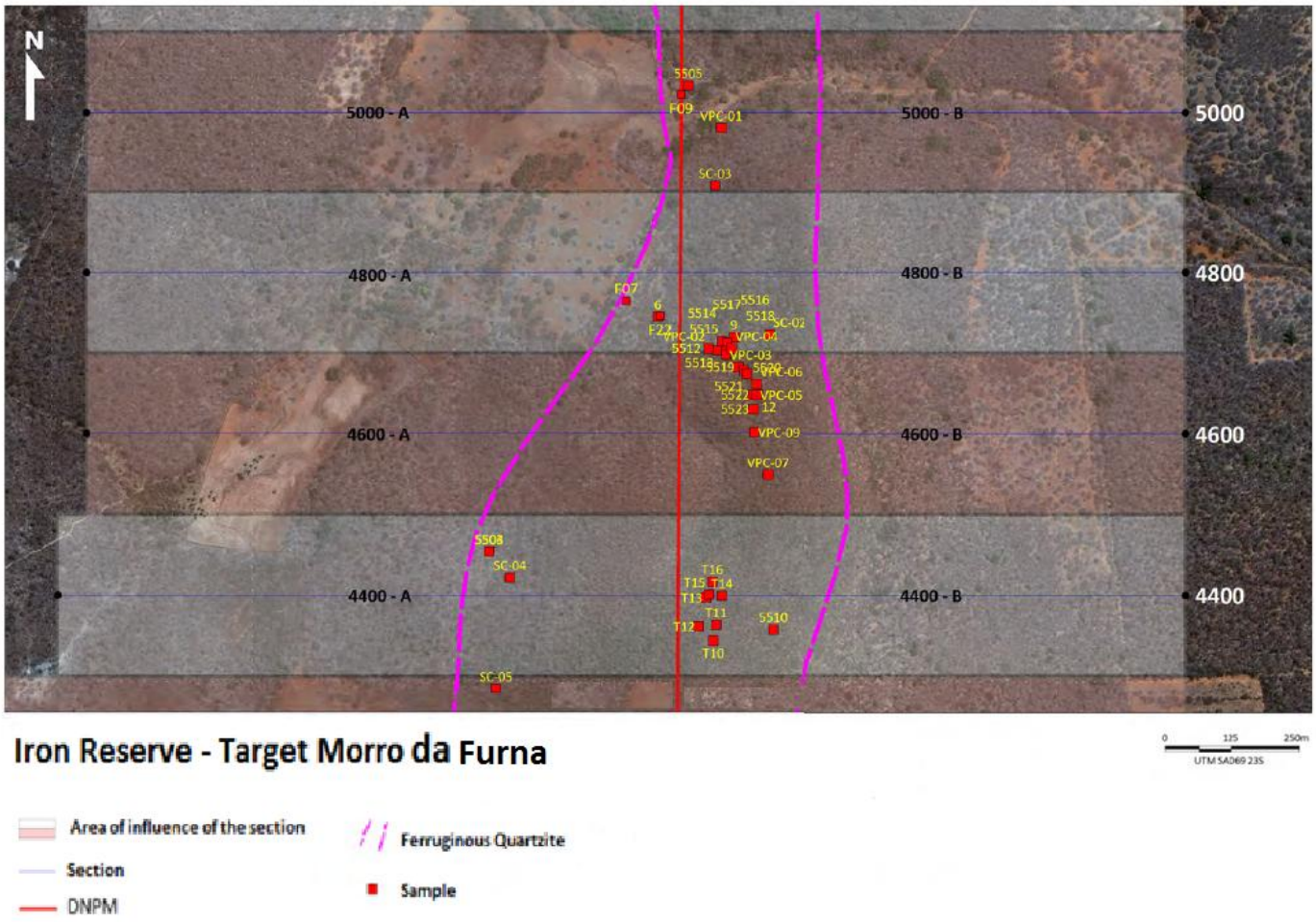

Image 10: Iron Reserve – target Morro do Furna

The Calculation of the reserves from Morro da Furna discovered reached:

- Measured Reserve: 9,977,838.8 t
- Indicated Reserve: 7,250,558.7 t
- Inferred Reserve: 7,738,144.8 t

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Total Iron Reserves

Table 2: Calculation of the reserves from Morro do Mel

Type	Volume (m³)	Grade (%Fe)	Density (t/m³)	Reserve (t)
Measured	1,569,063.0	34.48	3,4	**1,839,443.9**
Indicated	3,087,933.0	34.48	3,4	**3,620,045.6**
Inferred	76,101,164.0	29.59	3,4	**76,557,413.7**
Total	80,758,160.0	28.87	3,4	**82,016,903.2**

Table 3: Calculation of the reserves from Morro da Furna

Type	Volume (m³)	Grade (%Fe)	Density (t/m³)	Reserve (t)
Measured	12,556,620.8	23.37	3,4	**9,977,838.8**
Indicated	9,311,178.0	23.90	3,4	**7,250,558.7**
Inferred	9,945,390.9	28.88	3,4	**7,738,144.8**
Total	31,813,188.8	27.08	3,4	**24,966,542.3**

Table 4: Calculation of the reserves from Morro da Tromba

Type	Volume (m³)	Grade (%Fe)	Density (t/m³)	Reserve (t)
Measured	4,111,430.0	21.46	3,4	**2,999,863.8**
Indicated	3,333,596.0	27.59	3,4	**3,127,595.3**
Inferred	18,792,849.3	30.75	3,4	**19,645,694.0**
Total	26,237,875.3	28.89	3,4	**25,773,153.1**

Table 5: Calculation of the reserves from Morro do Café

Type	Volume (m³)	Grade (%Fe)	Density (t/m³)	Reserve (t)
Measured	18,237,113.8	23.90	3,4	**0**
Indicated	23,363,333.0	23.95	3,4	**5,027,829.1**
Inferred	177,825,072.9	28.00	3,4	**69,373,882.0**
Total	219,425,519.7	27.23	3,4	**70,401,771.1**

Table 6: Calculation of total reserves

Type	Volume (m³)	Grade (%Fe)	Density (t/m³)	Reserve (t)
Measured	18,237,113.8	23.90	3,4	**14,817,146.5**
Indicated	23,363,333.0	23.95	3,4	**19,026,028.7**
Inferred	177,825,072.9	28.00	3,4	**169,315,134.4**
Total	219,425,519.7	27.23	3,4	**203,158,309.6**

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6. Feasibility of the Iron Deposit

It is intended to start a production with 96 000 t / m of iron ore, through an open pit with an iron concentration plant indicated in beneficiation tests conducted by UFMG-Demin (Cristiano Otoni Foundation). It is expected, safely, an initial sale of 100% of the iron ore, which currently presents a significant deficit. After perfecting the process productive and better quality control, we intend to expand sales in the external market.

Current Price of the Iron

The current price for iron ore pellet with>64% Fe, according to Reuters is U.S. $ 120.00/t FOB, as the ore being produced in the area will be almost entirely of the type sinter feed, whose price is about 25% lower, was adopted here the price of $ 90.00/t FOB, corresponding to R$ 158.4/t FOB . In the present study we adopted the price FOM (in the mine) of R$ 69.36/T Mn, taking into view that the road freight from São Raimundo Nonato to the port (Aratu/BA or SUAPE/PE) is approximately R$ 89/T.

Annual Operating Revenue

Table 7: annual operation revenue

Production (t)		Unitary Price (t)		Monthly Revenue	Annual Revenue
Monthly	Annual	R$/t	US$/t	R$/t	R$/t
96,000	1,152,000	69.36	39.4	6,658,560.00	79,902,720.00

Investment Cost

a. Investment Planning and Engineering

These investments take into account the technical projects needed for implementation of the enterprise, both with DNPM and environment agencies.

• Plan for Economic Exploitation	R$ 52,000.00
• Environmental Impact Study/RIMA	R$ 85,000.00
• Cost Analysis of EIA/RIMA	R$ 33,000.00
• Costs of Environmental Licensing	R$ 66,000.00
• Environmental Control Plan - PCA	R$ 44,000. 00

TOTAL	R$ 280,000.00

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b. Investments in Early Development of the Mine

Some investments are the necessary for roads to access the mine and to transport the products. It is anticipated for this investment, based on other similar ventures, a value of R$ 210,000.00.

c. Investments in Mining and Processing Equipment

Investment directed to operation of the mine and beneficiation the ore. The definition of the investment in equipment was based on similar developments in the region.

These investments will be in the order of R $ 11,700,000.00.

d. Total Investments

The total investment (a + b + c) will be in the order of R$12,190,000.00.

Operating Costs

The costs here determined were in based specialist publications, such as Informer of Construction, Production Manuals, as well the data obtained in direct consultation with suppliers. These costs were also compared with the real total cost of a similar mine located in the state of Minas Gerais, which has a similar production capacity, uses the same equipment required for extraction and processing in question.

a. Financial and Operating Costs

The acquisition, ownership costs and operating costs were all calculated and determined the costs of productive hours and not productive hours.

From these we calculated the annual operating costs of the Mine, totaling R$ 15,000,000.00.

b. Labor Cost

The labor cost is about R$ 3,000,000.00.

c. Unforeseen

How unexpected events may occur, a percentage was stipulated to cover the costs of these events. It was considered as 5% of the total cost.

Unforeseen costs = 0.05 x R$ 21,583,918.08 = R$ 1,079,195.90

d. Total Operating Cost (a + b + c)

The total operating cost is the sum of all costs related above.

So be equal to R$ 19,079,195.90/year.

Taxes

a. Royalties

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The payment for the owner of the land will be made monthly. The value was considered 1% of revenues.

So the value is U.S. $ 799,027.20.

b. ICMS

The amount of ICMS is 17% of annual gross revenue.

Therefore the value will be R$ 13,583,462.40.

c. PIS / COFINS

The value of PIS / COFINS corresponds to 3.65% of annual gross revenue. This percentage is an average value obtained with accountants who work in the area, which takes into consideration the credits acquired in the purchase of equipment and supplies and are slaughtered with the payment of these taxes. The annual value calculated for this tax is R$ 2,916,449.28.

d. Social Contribution on net Income (CSSL)

The value of social contribution corresponds to 9.0% of income.

Therefore the value will be R $ 5,474,117.17.

e. Financial Compensation for Mineral Resources Exploration (CFEM)

The value of CFEM corresponds to 2% of net revenues, discounted taxes, insurance and expenses with transportation of the ore.

So the value will be R$ 1,216,470.48.

f. Income Tax

The income tax was calculated by the method of determination of taxable income. it is set at 25% of taxable income.

It was calculated as R$9,208,499.39.

g. Total spending with Taxes: R$ 33,198,025.92.

Viability Analysis

Operating Revenue	R$ 79,902,720.00
Operating Cost	(-) R$ 19,079,195.90
Operating Profit	R$ 60,823,524.10
Taxes	(-) R$ 33,198,025.92
Annual Net Income	R$ 27,625,498.17

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Profitability

$$R(\%) = \frac{\text{Net income}}{\text{Inverted Capital}} \times 100 = \frac{27{,}625{,}498.92}{12{,}190{,}000.00} = 226\%$$

Capacity Payment

$$CP = \frac{\text{Inverted Capital}}{\text{Net income}} = \frac{12{,}190{,}000.00}{27{,}625{,}498.17} = 0.44$$

Note: The return on invested capital will occur within approximately 6 months.

Average Life of the Deposit

Considering only the recovery of 90% of the measured reserve ore iron (14.817.146t x 90%), and without considering the indicated and inferred reserves, we have a measured of recoverable reserve of 13,335,431 tonnes of Fe. With an annual production of 1,152,000t, the life time of the mine is approximately 11.5 years.

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7. Manganese Ore Deposit

Types of Ores

Manganese ore occurs inside the areas of exploration as surface concentrations, which has its origin related to supergene action of the weathering agents, together with the effect of topography. The ore occurs in two basic ways: as shallow colluvial-eluvial deposit, represented by pisolites, magnesite canga and magnesite fragments, which are distributed generally over the bodies of ferruginous quartzite and deposits "in situ", where the manganese oxide can be found filling fractures in shear areas and plans of schistosity of ferruginous manganese quartzite (proto-mineral).

In the explored area the profile of colluvial ore has a very uniform pattern, being represented by basically three horizons with well-defined characteristics.

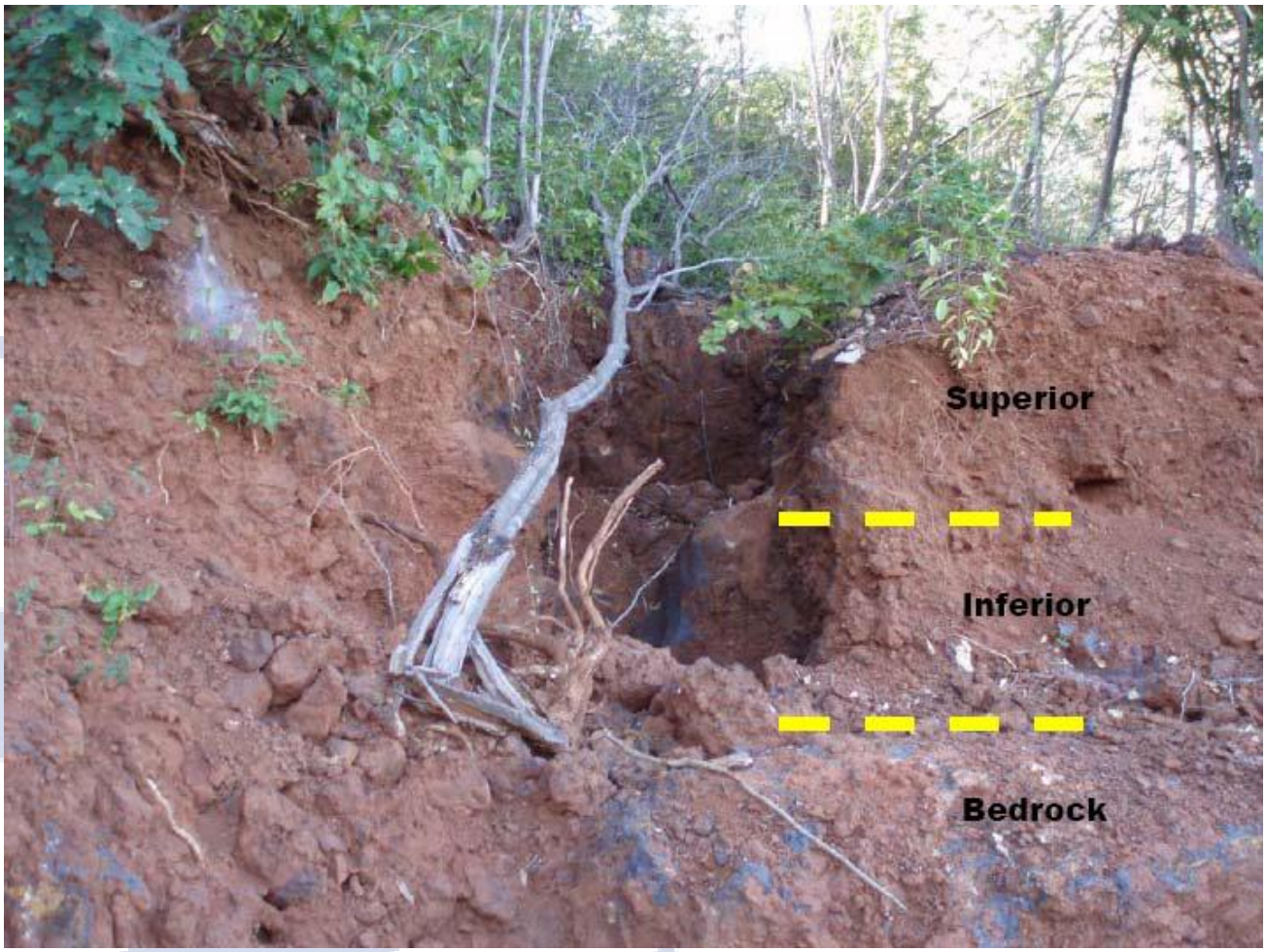

Image 11: Profile with three well defined horizons

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Superior - Composed by blocks with varying size (up to 20cm diameter) in a sand-clay matrix with granules rich in manganese. This horizon is the richest in Mn, with many blocks and pyrolusite psilomelano.

Bottom - Comprised primarily of boulders with dimensions of up to 0.5m in diameter, locally covered with a film of oxide of Mn, containing in the matrix small blocks and small granules of Mn. This matrix is rich in Mn and constitutes a recoverable ore.

Base (bedrock) - This is the bedrock, located immediately below the boulders, where occur sparse mineralizations of MnO filling fractures and cavities in schistosity plans.

Colluvial-eluvial - This type of ore occupies the eastern slope of the Morro da Tomba and Morro da Furna, where form a superficial layer that extends from the top almost to the base of the hills. It characterizes by the presence of irregular fragments consisting essentially of cryptomelane and pyrolusite, high-density, dark gray color, metallic gloss and thickness varying from few centimeters to 40cm. these fragments have high manganese content and often have cavities resulting from solubilization.

Besides many piselites, occur manganese blocks, with their rounded shapes characteristic with few millimeters to centimeters in diameter. Exhibit a core dark, consisting mainly cryptomelane, surrounded by a lateritic cover, brownish or reddish. Represent mineralization formed through manganese solutions upward, above the water table. Chemical analyzes performed on the samples of these fragments, it was verified that are cryptomelane consisting essentially of (K20.15MnO2MnO.nH2O) and pyrolusite (nMnO.MnO2.nH2O), with concentrations ranging between 29.68 to 56.71% Mn, characterized as excellent quality.

Image 12: Superior Horizon

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Image 13: Superior horizon, smaller blocks

Image 14: Inferior horizon

Image 15: Inferior horizon with bigger blocks

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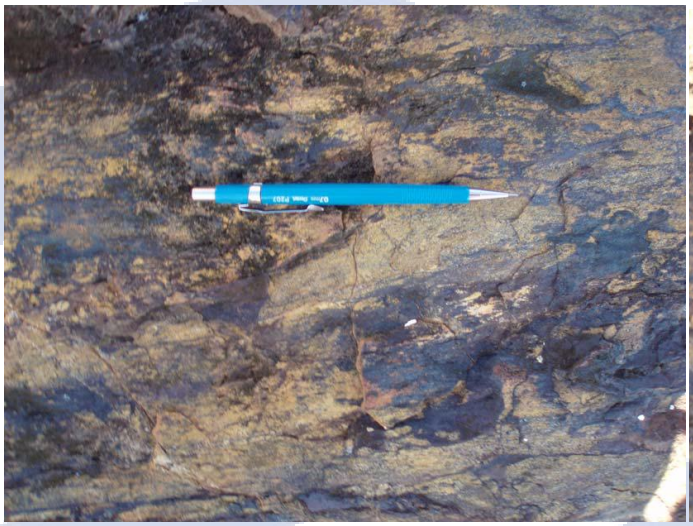
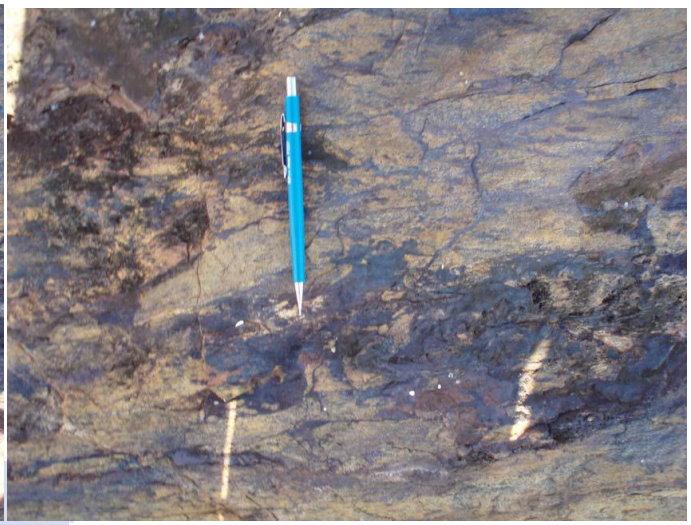
Ore "in situ" - In the superficial zone, where the manganese ferruginous quartzite is weathered, concentrations of manganese oxide are frequent, filling fractures in shear zones of the ferruginous quartzite and housing also in cavities that are parallel to schistosity. These cavities are the result of the process of dissolution and solubility, leaving clear the process of manganese ore enrichment, by action of weathering processes.

At the base of the colluvial-eluvial deposits from Morro da Furna and Morro da Tromba occur mineralizations of manganese filling dissolution cavities inside ferruginous quartzites.

Another pattern of this type of mineralization occurs at the top of Morro do Café, an intensely sheared zone, with fractures filled with oxide of manganese, forming a significant mineralized track with 180m wide and 850m long.


Images 15 and 16: Pit showing the manganese ore filling the cave

Images 17 and 18: Outcroppingof Morro do Café – manganese filling shears of the ferruginous quartz

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Sampling Methodology

Through systematic channel sampling in existing excavations the thicknesses of the different soil horizons were recorded and representative samples were made for analysis.

The trench samples were prepared in the field, taking into consideration the common procedure for processing this ore type: was initially made manual picking of the mineral blocks pure in manganese (> 5 cm diameter) generating the sub-sample "A"; The remaining material was sieved at mesh ¼ inch, and the fraction retained generated the sub-sample "B"; The material passing generated the sub-sample "C".

Adopted system:

- Sampling of the soil profile and weighing;
- Manual preparation of blocks of pure Mn ore and weighing;
- Sieving at mesh 1/4 inch and weighing the fractions > 1/4 "and < 1/4".

11 trenches were sampled in the two areas with the highest concentration of mineralizations, being 6 trenches in Morro da Furna and 5 in Morro da Tromba. All subsamples of the eleven (11) trenches were sent to the laboratory NOMUS ANALYSES MINERALS LTD. for mineralogical characterization and determination of the Mn.

- Sub-sample A (ore blocks of pure Mn);
- Sub-sample B (fraction> ¼ inch);
- Sub-sample C (fraction <¼ inch).

Images 19 and 20: Channel sampling and weighing

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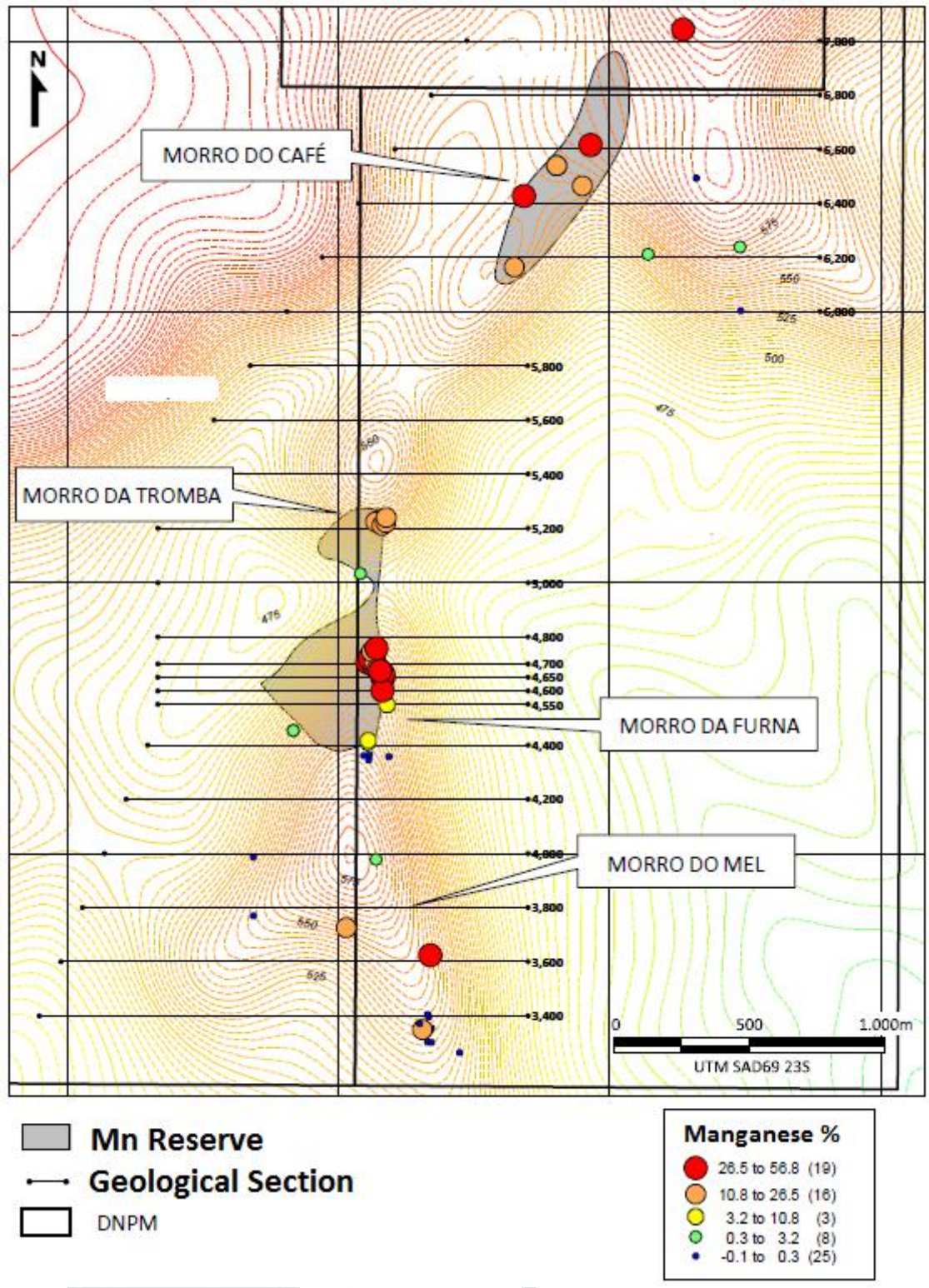

Image 21: Map of the Mn ore sampling

The colluvial-eluvial ore laterally presents significant variation in the concentration of Mn. In the Morro da Furna (South) the level varies from 37.88% to 14.47% and in the Morro da Tromba (North) 31.79% to 11, 99%.

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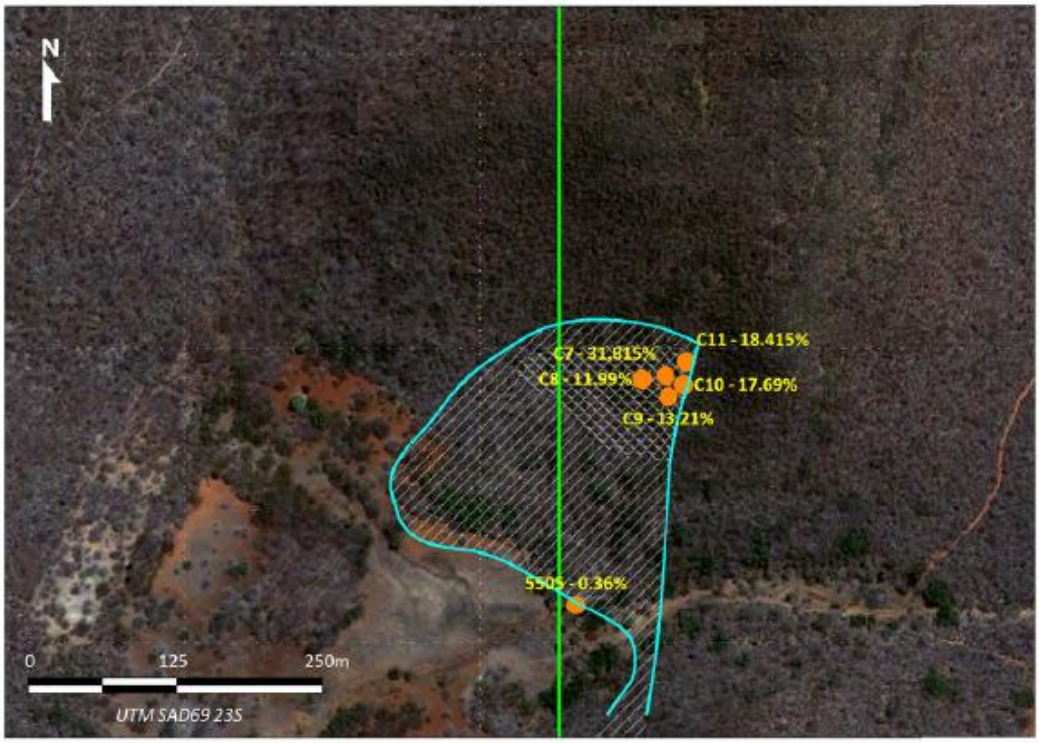
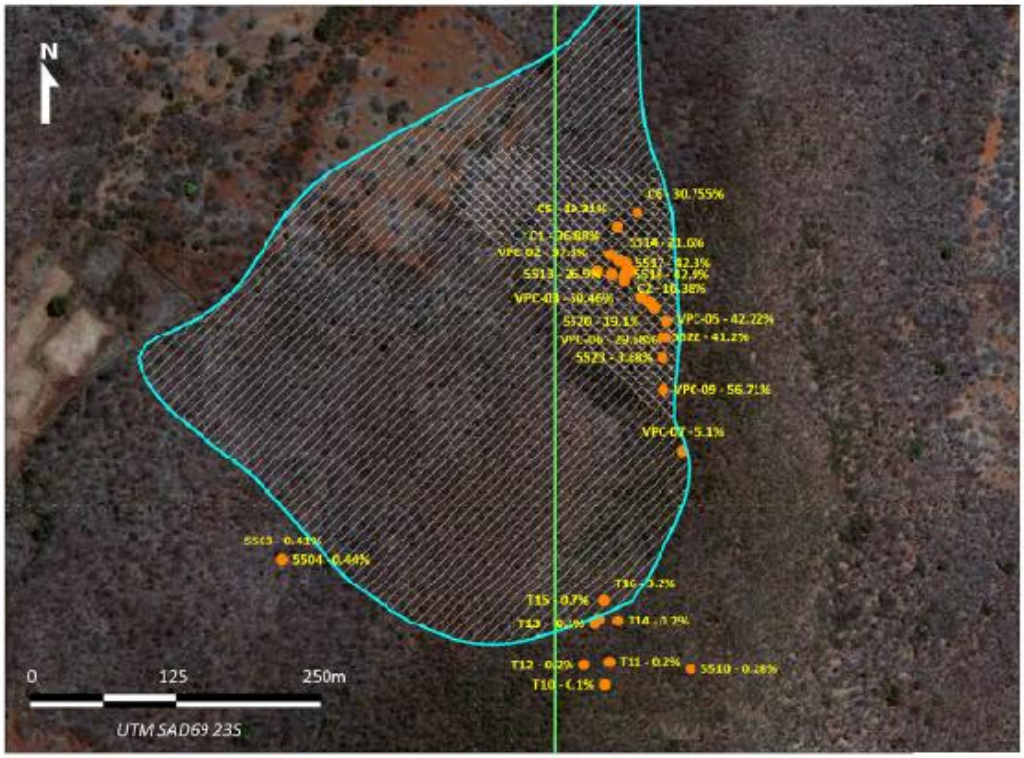
Nonato Project

Target Morro da Tromba



Target Morro da Furna



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Images 22, 23 and 24: Sampling targets

Calculation of the Reserves

The calculation of the reserves were made using the average measured Mn grade and density (3,9) of the collected samples of each target.

Table 8: Calculation of the manganese reserves

Type	M. Furna Contained Mn (T)	M. Tromba Contained Mn (T)	M. Café Contained Mn (T)	Total Contained Mn (T)
Measured	53,258	19,318	0.00	**72,596**
Indicated	276,490	69,207	0.00	**345,772**
Inferred	164,810	34,048	291,925	**490,783**
Total	494,558	122,573	291,925	**909,057**

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8. Feasibility of the Manganese Deposit

It is intended to start a production of 3000 t/month through an open pit. It is expected with certainty an initial sale of 100% of concentrated manganese in intern market, which currently has a significant deficit. After perfecting the production process and better quality control, we intend to expand sales in foreign market for nobler segments of manganese uses.

Current Price for Manganese Ore

The references available official price of manganese ore (site www.aliceweb.mdic.gov.br) refer to listing practiced in 2008, which corresponded U.S.$ 300/T FOB. However, considering the current deficit of the international market and prices currently practiced for ore with content above 35% Mn [granulometry 10-180mm (90%) - 0.28% Max P] price today is around $ 350 / t Mn.

In the present study we adopted the price FOM (the mine) of R$ 540.00/T Mn, taking into view that road freight from São Raimundo Nonato to the port (Aratu/BA or SUAPE/PE) is approximately R$ 60.00/T.

Annual Operation Income

Based on the production of 20T / h of ore Mn, corresponding to 3000 T/month and the sales price at the mine of R $ 540.00 /T, the expected annual revenue is as follows:

Table 9: Operation income

Production (T)		Unitary Price (T)	Revenue	
Month	Year	R$/T	Month (R$)	Year (R$)
3,000	36,000	540.00	1,620,000	19,440,000

Expected Annual Expenses

The annual costs were predicted based on the experiences of technicians and engineers of the company and the total actual costs of a mine situated in similar State of Rondônia, which has similar capacity and uses the same equipment for the mining and beneficiation in question.

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Table 10: Mine (ROM) – Cost of explotation and transport

	Ore ROM (T)	R$/T	Cost (R$)
Month	11,700	25.00	292,500.00
Year	140,400	25.00	3,510,000.00

Table 11: Cost of the beneficiation plant

	Month (R$)	Year (R$)
Labor	35,800.00	429,600.00
Social Bonds	44,034.00	528,408.00
Consumables	30,000.00	360,000.00
Maintenance	10,000.00	120,000.00
Electricity	15,000.00	180,000.00
Equipment Depreciation	72,816.67	873,800.00
Property Depreciation	4,960.00	59,520.00
Administrative Expenses	10,000.00	120,000.00
Taxes	64,800.00	777,600.00
Possible Expenditure	23,221.07	278,652.80
TOTAL	**310,631.74**	**3,727,580.80**

Total cost/year: Mine + Beneficiation Plant = **R$ 7,312,644.00**
Average price to produce one ton of Mn ore = **R$ 203.13**

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Necessary Investments

Table 12: Project cost

	R$
Topography	15,000.00
Earthwork (weir, etc.)	150,000.00
Drawings, flowcharts	6,000.00
Basic Engineering	60,000.00
Detailed Engineering	45,000.00
Environmental Licenses	50,000.00
TOTAL	**326,000.00**

Table 13: Acquisition of the area

	R$
Acquisition of the area	500,000.00

Table 14: Infrastructure

	Cost (R$/Km)	*Total Cost (R$)*
Electricity lines	10,800.00	86,000.00
Reform of the roads	7,200.00	136,800.00
TOTAL	18,000.00	223,200.00

Table 15: Mobile equipments (outsourced service)

Two wheel loaders
Three tipper
One compressor
Outsourced service

Table 16: Stationary equipments

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	Quantity	*Unit (R$)*	*TOTAL (R$)*
Silo of 50 m³	*2*	*30,000*	*60,000*
Disaggregating	*2*	*12,000*	*24,000*
Bar mill	*2*	*450,000*	*900,000*
Flotation cell	*24*	*10,000*	*240,000*
Vibrating screen	*5*	*25,000*	*125,000*
Spiral	*3*	*15,000*	*45,000*
Centrifuge	*2*	*10,000*	*20,000*
Water pump	*3*	*5,000*	*15,000*
Slurry pump	*4*	*7,000*	*28,000*
Dryer	*2*	*1,200,000*	*2,400,000*
Belt conveyor	*6*	*20,000*	*120,000*
Structures	*12*	*6,000*	*72,000*
Laboratory Equipment			*50,000*
TOTAL			***4,099,000***

Table 17: Buildings

	R$
Silo for ROM ore	50,000.00
Dewatering boxes	32,000.00
Foundations for equipments	60,000.00
Office, warehouse, toilets, etc	80,000.00
Sheds	150,000.00
TOTAL	**372,000.00**

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Table 16: Total

	R$
Acquisition of the area	500,000.00
Project	326,000.00
Infrastructure	223,200.00
Stationary equipments	4,066,000.00
Buildings	372,000.00
Electrical material	80,000.00
Hydraulic material	50,000.00
Mounting	140,000.00
Extras (5%)	289,510.00
TOTAL	**6,079,710.00**

Feasibility

Operating Revenue R $ 19,440,000.00

Operating Cost (-) R $ 7,312,644.00

_____

Operating Profit R $ 12,127,356.00

Income Tax (-) R $ 3,031,839.00

_____

Annual Net Income R $ 9,095,517.00

Profitability

$$R\,(\%) = x\,100 = \frac{\text{Net Income}}{\text{Inverted Capital}} = \frac{9{,}095{,}517.00}{6{,}079{,}710.00} = 149.6\%$$

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Payment Capacity

$$CP = \frac{\text{Inverted Capital}}{\text{Net Income}} = \frac{6{,}079{,}710.00}{9{,}095{,}517.00} = 0.67$$

Note: The return of invested capital will occur within approximately 8 months. 1.8 years.

Lifetime of the Mine

Considering a recovery of 95% the measured reserve of manganese, (72.575tx 95%), and without considering the inferred reserve and indicated reserve, have a reserve of 68,947 tons of Mn. With a production level of 36,000 tonnes per year, which entire meets the current deficit of demand, estimated as 12,000 t / year, the mine life will be approximately two (2) years.

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9. Conclusion

The Nonato Project has measured quite significant reserves of iron ore and manganese ore. Considering indicated and inferred reserves, which still need to be confirmed, the project turns into a great investment. The logistics of the region will become ideal with the end of Railroad Nova Transnordestina, highly improving the feasibility of the project.

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