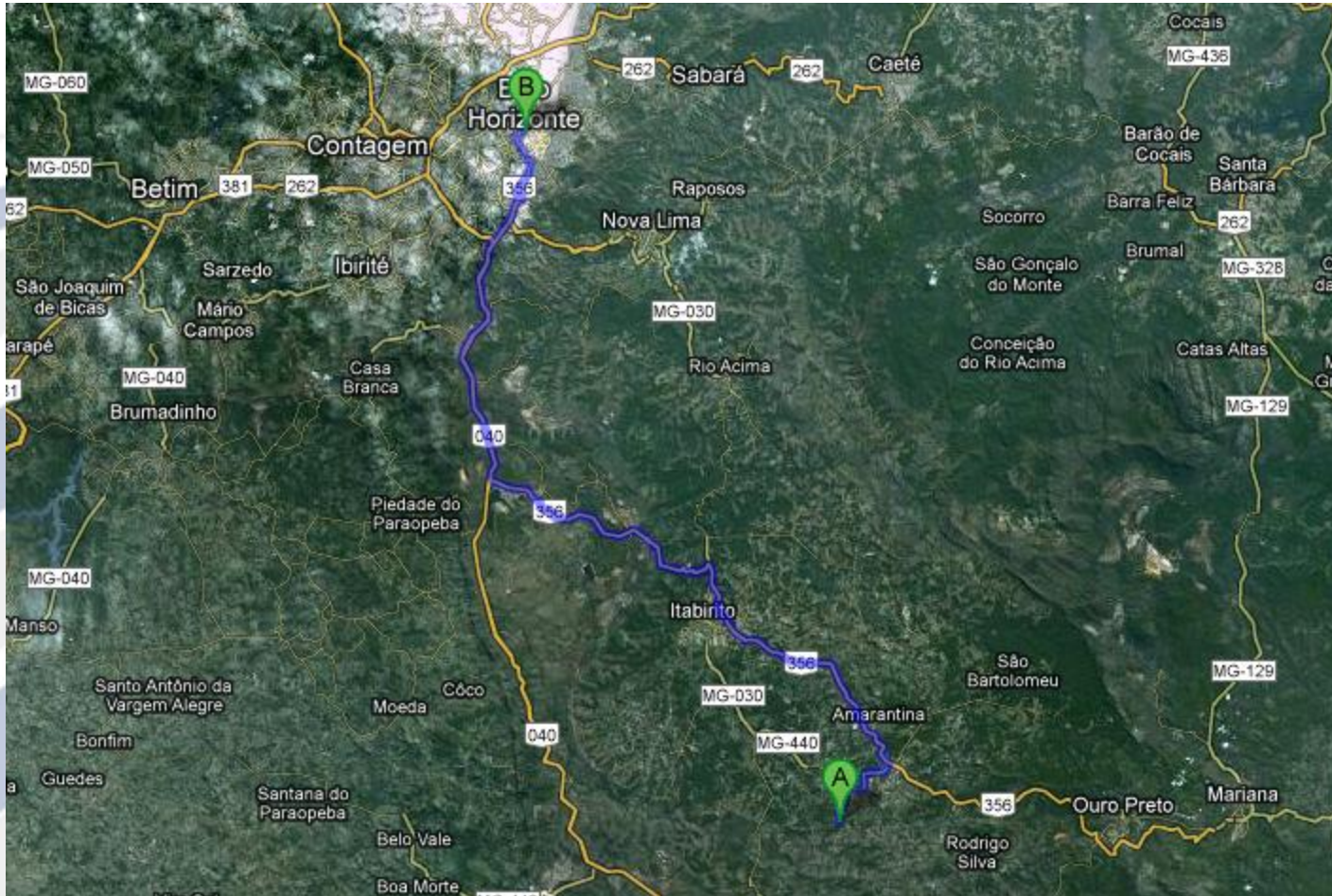# *Cruzeiro Project*

Location and Access

The area is located at Morro do Cruzeiro, in Ouro Preto, Minas Gerais, about 100 km away from Belo Horizonte, the capital of the state. The access is done, starting from the capital, by BR-040 road, heading to Rio de Janeiro, after traveling 40 km, the BR-356 road ("Rodovia dos Inconfidentes") is taken towards Ouro Preto, until the district of Cochoeira do Campo (75 km). During a course of approximately 15 km, through unpaved road, the south-central portion of the project is reached. The total area of the Project is about 390 HA.

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Cruzeiro Project

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Location and Access

Location and Access

Cruzeiro Project

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Regional Geology

The regional geology consists of na embasement of granitic and tonalitic rocks (Metamorphic Complex of Bação), involved in metasediments from the Supergroup Rio das Velhas, consisted of metavolcano-sedimentary rocks of the greenstone belt type.

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Regional Geology

The upper unit consists of plataformal metasediments (quartzites, phyllits, schists and dolomitic itabirite), named Supergroup Minas, composed of groups Caraça, Itabira, Piracicaba and Sabará. Superimposing the Supergroup Minas is the Group Itacolomi (quartzites, quartzose phyllites and conglomerates with itabirite pebbles).

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After the topographic and geologic mapping of the region, surveys were conducted totaling 343,35 m of rotating testimonials, four in total and aproximately 85 m each. Furthermore, for a better evaluation of the behavior of the ore body, it was done more two complementary boreholes, totaling 163,15 m of testimonials.

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After the drilling capaign, the testimonials were sampled, with sample intervals varying from 3 to 9 meters at most from each other. The sampling was done in friable itabirite.

Tests of technological characteristics of the sampled material were done, in order to determine their physical properties, such as particles size and distribution and chemical composition of the material.

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Calculation of Reserves

Only the Itabirite located northwest of the model used was considered as a continuous layer, the others were interpreted as lenses within the Group Piracicaba. The quota base of friable Itabirite was considered as 1171 meters, setting the contact with the compact Itabirite.

From the interpreted sections, it was constructed both solids of mineralized and sterile lithologies. Intersections between ore/sterile or ore/ore were removed from the solid model.
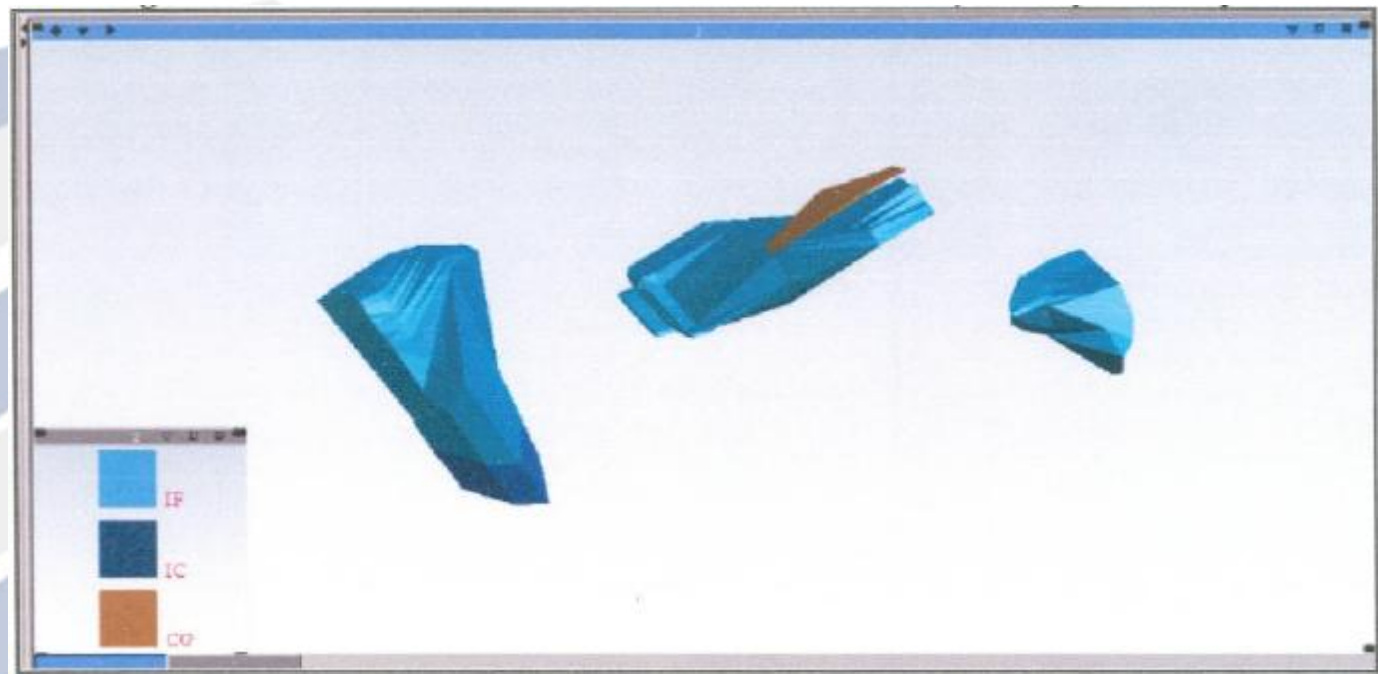
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The following picture shows an overview of the friable Itabirite solids modeling. The lateral limits of the model are the limits of the geologic section of 1145 meters elevation as the lower limit.

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The cubage was done considering the solid volume, from the geologic sections. The density is equal to 2,4 t/m³, and the following table shows the values of the volume and tonnage calculated for the solid; being the average iron oxide percentage is 40%.

Material	Density (t/m³)	Volume (m³)	Measured Reserve (t)
Colluvium	2,4	315.736	757.766
"Canga"*	2,4	10.934	26.242
Friable Itabirite	2,4	3.400.246	8.160.590
Compact Itabirite	2,4	608.282	1.459.877
Total	**2,4**	**4.335.198**	**10.404.475**

* Lateritic product of itabirite

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Research Works

In Target I, it was also calculated the inferred reserve value, according to some assumptions. First, it was defined the size of the area, which is equal to 46,96 ha. To calculate the volume, it was considered an 100 m height solid of irregular basis, then, the mass was found using the density of 2,4 t/m³ and subtracted the mass of the measured reserve.

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The following table presents the parameters used in these calculations and the value obtained.

Target I Area (m²)	Depth (m)	Volume (m³)	Mass (t)	Inferred Reserve (t)
46.960.000	100	15.653.333	37.568.000	27.163.525

Research Works

In the Target II area, it was found a ferruginous quartzite. In comparison with Target I, the material used in the analysis was low, however, it was still possible, due to the geological context, determine it as low power mineral resource. It was calculated an inferred reserve, using the same methodology used to infer the Target I reserve, with the exception of the withdrawal of the measured reserve.

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The following table presents the parameters used and the value obtained. The average percentage of FeO in this quartzite is equal to 18%.

Target II Area (m²)	Depth (m)	Volume (m³)	Inferred Reserve (t)
3.090	35	360.500	865.200

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Thus, we can summarize the reserves present in the area of Cruzeiro Project as it is followed:

Iron Ore Reserves - Target I	
Measured Reserve (t)	**Inferred Reserve (t)**
10.404.475	27.163.525

Ferruginous Quartzite Reserve - Target II	
Measured Reserve (t)	**Inferred Reserve (t)**
-----	865.200

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Cruzeiro Project

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Mining Servitude

The area is well mineralized, however, for continuity and planning of future works, spaces beyond the potential targets will be needed, thus justifying the maintenance of the entire area concession for the research.

The ore will feed the domestic market, being used as feedstock for the production of steel in steel industry.

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Mining Servitude

The reserves have the following estimated values: measured reserve of 10.404.475 tons, and inferred researve of 28.028.725 tons. Based in an annual average production of 200.000 t/year of ROM, it is expected that the development will have a lifespan of 52 years, considering only the measured reserve.

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