

The El Palmar Bauxite Deposit in Venezuela

Noel Mariño

Mining Consultant

Bolívar State, Venezuela

Corresponding author: nmarinop@gmail.com

Abstract

DOWNLOAD
FULL PAPER



Near El Palmar, eastern Bolívar state, a bauxite deposit was located by CVG-Tecmin in the mid-1980s. The El Palmar Bauxite Deposit was identified by the plateau's geomorphological pattern being similar to that of the well-known Los Pijiguaos Deposit. Chemical analyses allow its classification as a siliceous and/or low grade bauxite, similar that of Los Pijiguaos but of a different quality. The profile is divided into three zones: the upper 2 to 3 metres is 39 % average total alumina and 32 % average silica. The middle zone, 4 to 5 metres thick, is a pisolithic bauxite with 34 % total alumina and high silica around 44 % average. The lower zone down to bedrock has clays with high silica content (> 48 %). Inferred resources are estimated at 475 million tons for an assumed depth of 4 metres, or 270 million tons for an assumed depth of 2 metres. The El Palmar Bauxite Deposit has a favorable geographical location due to its proximity to the CVG-Bauxilum Alumina Refinery in Ciudad Guayana, 90 km to the northwest. However, legal and environmental constraints, as well as bauxite quality, limit the development of the project in the short term.

Keywords: Venezuelan bauxite, geomorphological patterns, average chemical results, inferred resources, bauxite project limitations.

1. Introduction

Following indications reported in unpublished reports from the Ministry of Mines and Hydrocarbons, starting in 1987, CVG-Tecmin (a geological – mining research and development company) began work on the recognition and verification of the existence of granitic rocks with the possible development of laterization profiles containing bauxite, which might be economically exploitable. This exploration took place in the mountain range of Paisapa, about 20 km northeast of El Palmar and about 90 km southeast of Ciudad Guayana, between the municipalities Padre Chien of Bolívar state and Antonio Díaz of Delta Amacuro state, both southeastern Venezuela.

Through aerial reconnaissance missions and field verification work, CVG-Tecmin detected a potentially exploitable reservoir in the El Palmar region (Figure 1). Pereira [1] reported it consisting of a:

“Lateritic siliceous bauxite from the decomposition and alteration of the rocks of the [...] Imataca Complex.”

Imataca Complex rocks are felsic and mafic gneiss, granulites, ferruginous quartzites and granitic rocks, with common amphibolite dikes and sills, and local minor occurrences of calcareous rocks (dolomites) [2].

This deposit exhibits analogies with the bauxite deposit of Los Pijiguaos, such as flat top or plateau relief, a height of between 600 and 700 metres above sea level, high monsoon type rainfall and deep laterization of the bedrock.

2. Field Work

As the first exploratory activity, in 1988, CVG-Tecmin [3] made three trial pits (see Table 1) excavated in the centers of the lobes of better development and drilled 89 boreholes. A 250 x 250 metres grid was used through the symmetry axis of the selected bauxite bodies. Metre by metre samples were taken according to the CVG-Bauxiven standard. These were then sent to the laboratory of the Los Pijiguaos Mine, where there was sufficient expertise in the relevant analytical procedures, a properly calibrated X-ray fluorescence (XRF) instrument for bauxite, and because CVG-Bauxiven had financed the exploration project. CVG-Bauxiven was created in 1979 to manage the operations of the bauxite mine of Los Pijiguaos.

As a result, mineral resources were initially estimated at around 150 million tons, as reported by Mibam [4].

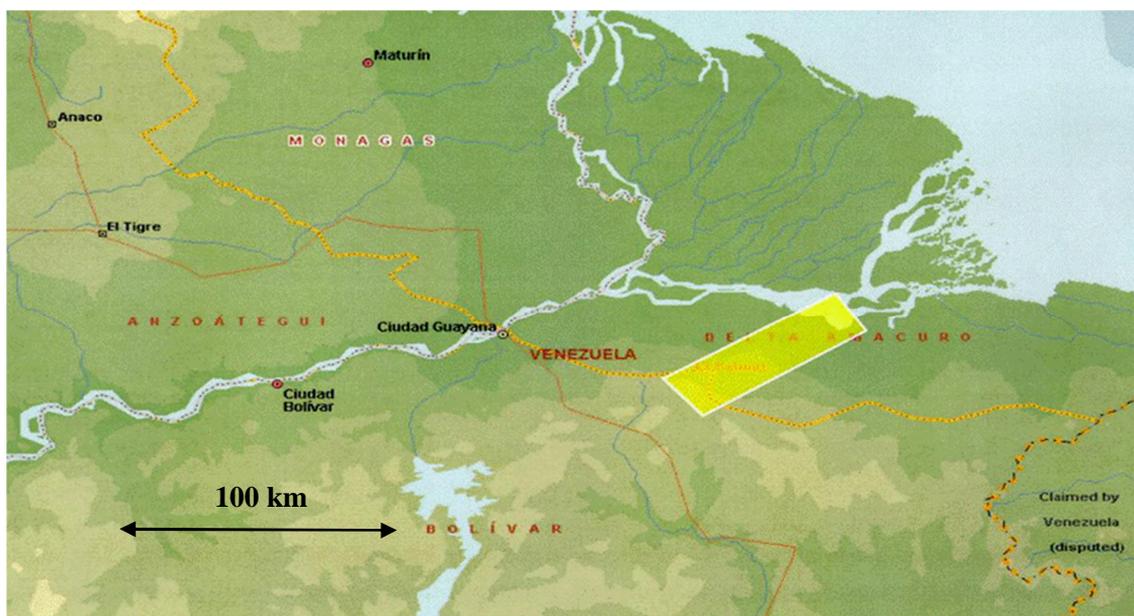


Figure 1. Relative location (yellow box) of the El Palmar Bauxite Deposit [4].

Table 1. Average chemical results of the samples taken at the three trial pits [4].

Trial Pits	Depth (m)	SiO ₂ (%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ (%)	TiO ₂ (%)	PPR
1	8	23.6	34.77	14.48	1.35	17.45
2	8	17.4	49.90	7.2	1.14	24.83
3	7.5	35.27	36.84	6.58	1.04	19.60

In May 1988, the author carried out a field inspection at the site, to take some samples of bauxite for analysis and comparison. From the results of these analyses and the CVG-Tecmin reports [5], it was possible to make a first description of the lateritic profile from top to bottom:

- A lateritic cover of 2 to 3 metres thick, with 39 % average total alumina and 32 % average silica was observed.
- The middle zone 4 to 5 metres thick is a pisolitic bauxite with interlayers of hard thin layers. This zone has 34 % total alumina and 44 % average silica.
- The lower zone down to bedrock has clays with high silica content (> 48 %).

- In a vertical profile three well defined zones of mineralization were observed. The middle zone could be considered as ore, although with average values of total alumina and high silica.
- The spectral response of the vegetation, geomorphological domains, texture features and tonality, was evaluated to estimate inferred bauxite resources.
- For ore quantification, two assumed deposit depths were chosen: the first, very conservative, 2 metres and another, more realistic of 4 metres.
- Inferred resources are 475 million tons to a depth of 4 metres and 270 million tons for 2 metres.
- For both depths, resources are higher than the report of Mibam [4], where inferred resources were established at 150 million tons.
- The El Palmar Bauxite Deposit has a favorable geographical location due to its proximity to CVG-Bauxilum Alumina Refinery in Matanzas, Ciudad Guayana, 90 km to the northwest. However, legal and environmental constraints, as well as bauxite quality, limit the development of the project in the short term. CVG-Bauxilum was the merger between CVG Bauxiven and CVG Interálumina in 1994.
- It is imperative to carry out the further geological prospection to help reach the best investment decision in this area, which has been included in the recently declared “Zone of National Strategic Mining Development” or also known as Orinoco Mining Arc.

5. Acknowledgements

Thanks to Professors Franco Urbani and Sebastian Grande (Universidad Central de Venezuela) and my colleague José A. Rodríguez (FUNVISIS) for their critical suggestions. Special thanks to Steve Healy for his assistance with English editing.

6. References

1. Manuel Pereira, Evaluación de las áreas potenciales en reservas de bauxita en la concesión Río Grande I en El Palmar, municipio Padre Chien, estado Bolívar, Venezuela. Núcleo Bolívar, Universidad de Oriente - UDO 2009. Unpublished thesis. Industrial tutors: Luis Guzmán and Noel Mariño.
2. Juan Ríos, Geología de la región Upata-El Palmar-Villa Lola. *IX Conf. Geol. Interguayanas*, (Ciudad Guayana, 1972), *Bol. Geol., Publicación Esp.* 6: 354 - 371.
3. CVG-Tecmin, Informe preliminar sobre la evaluación del depósito de bauxita de El Palmar. Internal report prepared for CVG-Bauxiven, 1988. Unpublished internal report.
4. Mibam, Plan Minero Nacional 2010 – 2013. Lineamientos Estratégicos. Ministerio del Poder Popular para las Industrias Básicas y Minería, 2010. Unpublished internal report.
5. CVG-Tecmin, Estudios sobre bauxitas en Venezuela (Guayana, Edo. Bolívar). Cartografía y evaluación preliminar de depósitos de bauxita en la región de El Palmar, 1992. Unpublished internal report.
6. Harvey Beltrán, Billiton y CVG negocian JV por bauxita de El Palmar. Equipo de Prensa Business News Americas. Publish: Wednesday 25/09/2002 (GMT-0400). Link: http://www.bnamericas.com/es/news/metales/Billiton_y_CVG_negocian_JV_por_bauxita_de_El_Palmar
7. Noel Mariño, Yacimiento de bauxita de El Palmar. *Commodities Venezolanas*, 20th edition, year 6, June 2017: 50 – 53.
8. Antonio Brojanigo, Guías de prospección regional para bauxita. Contexto geológico yacimiento Los Pijiguaos, Venezuela. CVG-Tecmin, 1989. Unpublished internal report.