Cutting-edge Technology Supporting Hydro Paragominas Transmission Line Management System

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Abstract

Hydro Paragominas bauxite mine is a Norsk Hydro enterprise with a fully integrated system for the production of processed bauxite, which includes mining activities and ore processing on the Miltônia Plateau 3 in Paragominas, as well as a pipeline pumping system to transport the bauxite from Hydro Paragominas to Hydro Alunorte. Electricity is supplied through a 230 kV Transmission Line (TL) made up of 560 transmission towers and 236 km long, and there is no redundancy in the energy supply to the plant In this way, guaranteeing the reliability of this transmission line is extremely important for the business continuity. In this way several monitoring strategies were adopted to strengthen the reliability of the Transmission Line and to increase the safety for employees, the environment and the population around the LT right-of-way. Among these strategies can be mentioned the annual aerial inspection with laser mapping, continuous imaging and thermography; pilot project for online monitoring of the towers; wheather monitoring, among others. The aim of this work is present these strategies and how they helped Hydro Paragominas to guarantee the continuity of the business, avoiding transmission line incidents and shutdowns.

Keywords: Operational management, Transmission line, Reliability, Operational guarantee, Energy supply.

1. Introduction

Hydro Paragominas bauxite mine (MPSA) is a Norsk Hydro enterprise and contemplates the implementation of an integrated system for the production of processed bauxite, which includes mining activities and ore processing at Plateau Miltônia 3, in Paragominas-Pará (PA).

The electricity supply for the enterprise is made through a Transmission Line (TL) of 230 kV composed of 560 transmission towers and 236 km long, starting at the substation of Vila do Conde in Barcarena-PA, to the substation in the MPSA in Paragominas-PA, crossing seven municipalities: Barcarena, Abaetetuba, Mojú, Acará, Tomé-Açú, Ipixuna do Pará and Paragominas, as shown in Figures 1 and 2. The Pump Station 2 (PS 2) pump station is located in the municipality of Tomé- açu and is also served by the said Transmission Line, through a bypass existing at km 120.

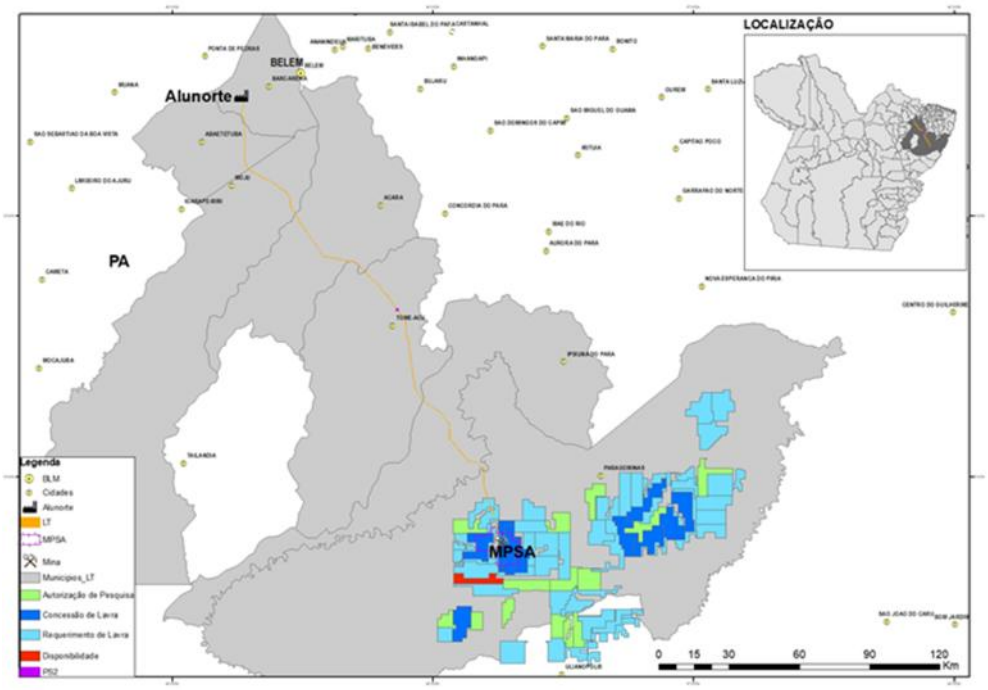

Figure 1. Vila do Conde - Miltônia 3 transmission line [1].

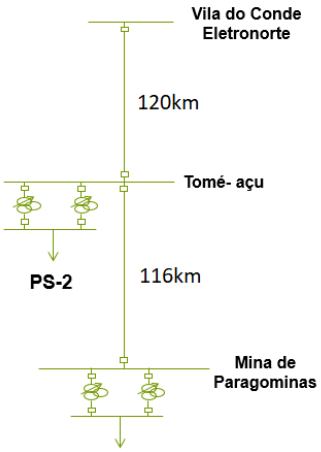

Figure 2. Vila do Conde - Miltônia 3 transmission line and pump station 2.

The transmission towers are divided by municipality according to Table 1.

Table 1. Towers by municipality.

City	Towers	Quantity of towers
Barcarena	1 to 29	29
Abaetetuba	30 to 78	49
Moju	79 to 140	62
Acará	141 to 228	88
Tomé-Açu	229 to 406	178
Ipixuna do Pará	407 to 489	83
Paragominas	490 to 560	71

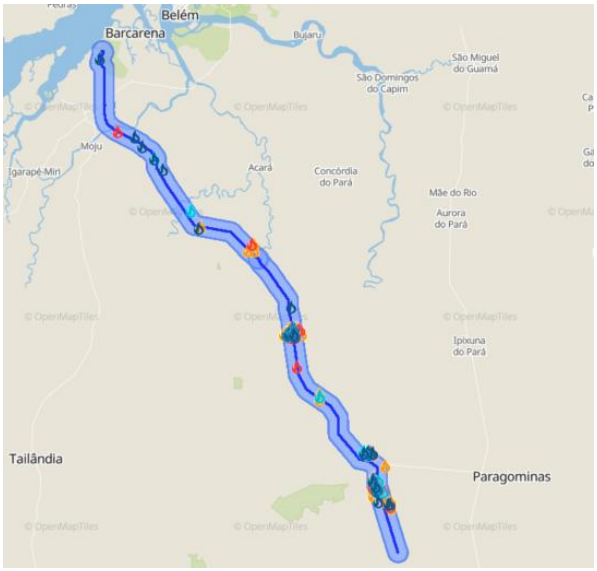

Figure 13. Burnings [4].

5.3.3 Hourly weather forecast

Over a period of 72 hours, it is possible to monitor, with hour-by-hour resolution, the forecast of temperature, relative humidity, atmospheric pressure, direction and average wind speed, precipitation and sunshine. To highlight the most relevant information, it is possible to define in the system itself which threshold values should be considered as a risk for the operation.

Within a 15-day scenario, it is possible to monitor daily forecast variations in meteorological parameters such as probability of occurrence and total volume of rain, maximum temperature, minimum temperature, wind, air humidity, visibility, pressure. The information is available in the form of a table, graph and map. It is also possible to define risk thresholds directly in the system to be highlighted in forecasts.

6 Conclusion

The Vila do Conde – Miltônia 3 Transmission Line is an extremely important asset for Hydro Paragominas bauxite mine as it guarantees the energy supply for the entire enterprise (bauxite extraction, production and pumping).

In this way, guaranteeing the reliability of this asset allows not only the operational guarantee of the Hydro Paragominas Bauxite Mine but also the safety for employees, the environment and the population around the TL right-of-way, which is the heart of Hydro's operations.

Among the monitoring adopted can be mentioned the annual aerial inspection with laser mapping, continuous imaging and thermography; pilot project for online monitoring of the towers and weather monitoring. In this work we present these strategies and how they helped us to guarantee the continuity of the business avoiding transmission line incidents and shutdowns.

7 References

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