Topography, Mining and Sustainability in Times of Pandemic

ANGÉLICA María LEÓN Pedraza, Colombia

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ABSTRACT

The new reality that we have been forced to face this year allowed us to develop skills that guarantee the sustainability of our work as surveyors, obtaining innovative results around the world. In this case study, it was a challenge for the mine topography area to guarantee the optimization of resources while carrying out the environmental recovery of the intervened areas during mineral extraction. This summary allows to demonstrate that it is possible to change the way of seeing things, it is possible to adapt to the changes and challenges that arise and the importance of planning, technification of the activities of the industry, teamwork and the vision of a sustainable future,
These achievements will be evidenced with the presentation of the mining development of the exploitations that are currently being developed in the department of Boyaca.

INTRODUCTION

The only certainty is change, and although it is likely to think that you are prepared to face almost any type of situation, life never ceases to surprise us.
The historical events that we have faced in the last year have allowed us to develop skills, creativity and innovation; It has been a challenge to keep the different organizations afloat due to the unexpected changes that this new reality has resuscitated for us.
The construction and mining industry, as well as different industrial activities, had to temporarily close, forcing us to bring out the best in people, to develop our intellect, seeking solutions to the new problems that have arisen.
The mining sector has shown an ability to cope with the crisis caused by the virus, moderating projections and adjusting plans according to the economic crisis.
The success of any type of Project is divided into two fundamental parts: Planning and execution, according to different authors; A project is the search for an intelligent solution to a problem to be solved, it is thus a sequence of unique, complex and related activities that must be completed within a specific time and within an established budget.

THEORETICAL FRAMEWORK

In the case of the Minera, planning is essential to make decisions, determine the sequencing of mineral extraction, establish production programs and generate the required supply. In Argos Long, medium and short Term Plans are generated that allow having a clear navigation chart, with this guideline the modeling and calculation of the quantities to be extracted is carried out; hand in hand with planning is the execution of the project by the Quarry Management, who follow the guidelines set in the field by the surveying commissions.
The constant monitoring of the topography and teamwork between those who plan and those who execute have made it possible to optimize resources and therefore generate savings; It is wrong to think that a long-term mining operation can be maintained without an established and approved planning.
Knowledge of the deposit to be exploited and the correct topographic description will allow us to economically evaluate the project and carry out a more objective planning, adapting the design to obtain the best possible geometry. The objective of strategic mining planning is to establish a geometry and an exploitation sequence that allows to extract the deposit in the best way, taking into account all the technical, economic, operational, economic, environmental, social guidelines and characteristics of the topography and the deposit. , in turn guaranteeing compliance with environmental regulations. This document will show the evolution of the extraction of the San Antonio Mine, Monjas Mine and Belencito Mine through the implementation of optimal Mining Planning and marking and monitoring on the ground with topography,
The year 2020 forced us to optimize the extraction sequences in order to ensure the profitability of the business, guarantee the production of cement and be sustainable over time.
Always thinking that "every crisis generates an opportunity", the pandemic evidenced the need to innovate, to change the way of producing and of thinking in general
The implementation of virtual technologies, remote work and control of operations through the use of new technologies broadened the panorama of the industry in general.
This summary will show the results obtained in 2020. the way in which the organization specifically in the Sogamoso plant, unifying forces between Mining planning and the execution in the field of activities related to topography and mining.

2.1.SPACE LOCATION OF THE PROJECT

The aforementioned operations represent a small percentage of those that belong to the organization, these mines are located in the Department of Boyacá in Colombia as shown in Image No. 1.

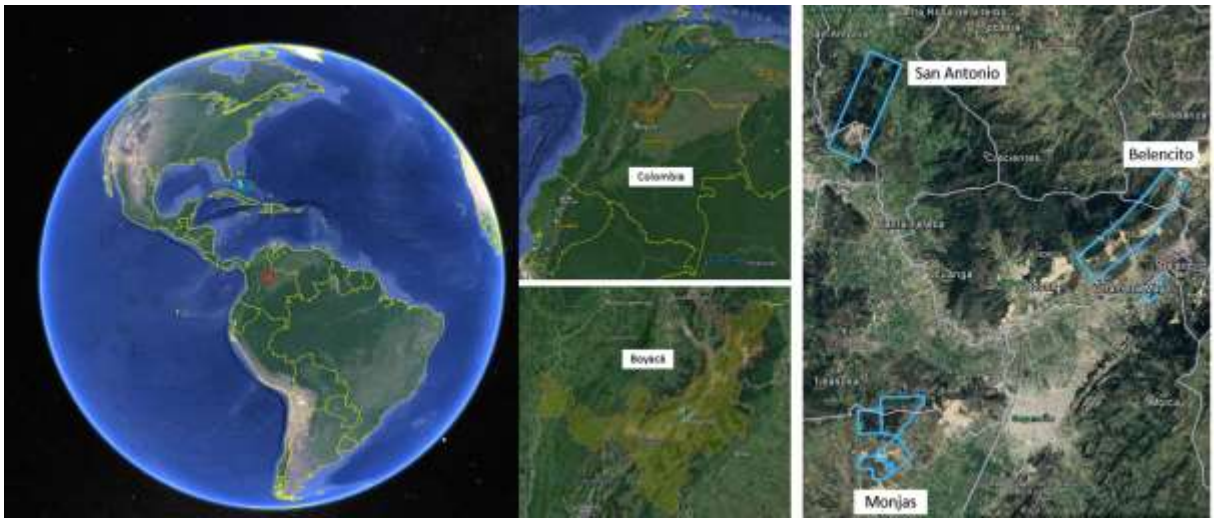

Image1: Location of the study quarries. Source: Google Earth itself.

2.2. MINING PLANNING PROCESS CONCEPTUAL MAP

Concept Map Source: Own Generation Argos guidelines

2.1 RESPONSIBLE PRODUCTION AND CONSUMPTION

On March 11, 2020, the WHO declared the covid-19 outbreak a pandemic, causing a long pause in the hectic day-to-day work, it was possible to show that the mining industry has the potential to redesign its technical process objectives, to readjust its cost structure in order to evolve and successfully face this crisis, the following measures were taken:

2.2 1. Guarantee the employment of collaborators

2.2.2. Objective prioritization

- In accordance with changes in the national economy and market changes, it became necessary to rethink and redesign what was established.

2.3 3. Resource Optimization

- Looking for cheaper commodities and optimizing own mineral resources.
- Project implementation postponement

2.3.4. Reorganization of activities

It was established as a priority to work in the waste disposal areas, taking advantage of the low demand for mineral, this allowed to reshape the areas and start the process of installation of organized, vegetal and native species layer.

2.4 GEOLOGY AND MINING

Using the geological models of the Plant Mines, an optimization of the resources was made by sectoring the mining titles in areas according to the cost per stripping ratio, in order to reorganize the sequence seeking to lower the price of the ton limestone, how was it made? Giving priority to the areas with the lowest stripping ratio for the first three years (2020-2022). In 2022 the mine will be sequenced again optimizing extraction.

2.5 TOPOGRAPHY

The personnel of the surveying commissions were kept since they are the ones who make the markings, monitoring and control in the field of the conformation of the waste, validating that the angles of the slopes, the height of the banks and the widths of the berms correspond with established geotechnical information.
The following shows the progress of sterile material shaping:


COTA 2630

2.6 LANDSCAPE RECOVERY

Taking advantage of the time during which no mineral extraction was carried out, the landscape recovery of the waste disposal areas was carried out. The technical closure of the Chámeza Mine was also carried out, an exploitation front that has already exhausted resources.
These activities are included in the Work and Works Plan, they made it possible to take care of the employees' employment and in turn carry out activities that were pending to be carried out.
The following images show the progress in the recovery of sterile disposal areas.
The purpose of this recovery is to leave the areas the same or better than before being operated on.

Photo No. 2 Landscape Restoration Chámeza Mine

Figure No. 3 Progress of the rehabilitation process Sterile disposal area San Antonio Mine

Figure No. 4 Progress of the rehabilitation process Sterile disposal area Belencito Mine

Figure No. 5 Total recovery Mina Monjas sterile disposal area

2.7 SUSTAINABLE DEVELOPMENT

The optimization of mineral extraction reduces CO2 emissions, reduces the environmental impact and in turn guarantees mining resources for a longer time. In the particular case of the Sogamoso Plant for at least 50 years.

The following shows the process of empradization and maintenance of the Areas:

Fauna recovery:

Camaleón Andino
Dactyloa heterodermus

Tirano Melancólico
Tyrannus melancholicus

Cucarachero
Troglodytes aedon

Ratón montañero
Thomasomys sp.

Zorro gatuno
Cerdocyon thous

Construction of water management works:

3 CONCLUSIONS

- Adapting to changes allows subsistence, that applies in all areas of the human being.
- We can always find a better way to do things.

REFERENCES

BIOGRAPHICAL NOTES

- **Cementos Argos Sogamoso Plant - Boyacá**

CONTACTS

Title Given name and family name: Engineer Angélica María León Pedraza
Organization Cementos Argos SA
Address Carrera 11 Number 6 - 70
City Nobsa - Boyacá
COUNTRY Colombia
Tel. +573116732289
Email: topoangy@gmail.com
Website: https://www.linkedin.com/in/angelica-maria-leon-pedraza