

TECHNIFICATION OF OPEN PIT EXPLOTATION THROUGH TOPOGRAPHY AND IMPLEMENTATION OF MINING PLANS IN MINAS BELENCITO - MONJAS - SAN ANTONIO



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Key words: Plan implementation, Geology and Mining, Photogrammetry, Women in mining topography (Gender diversity)





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HOW DO YOU GET TO THIS RESULT?













SPACE LOCATION OF THE PROJECT



The mining exploitation under study is located in the Republic of Colombia; Boyacá department. There are three mining titles:

- San Antonio Title 14665 Mine with an area of 659 Hectares
- Belencito Title 11387 Mine with an area of 692 Hectares
- Monjas Title 911-15 Mine with an area of 117 Hectares









MINING PLANNING PROCESS

Input	Activity	Product
-Geological model (Litolog. Structure, Geometry, Profiles) -Block Model -Updated topography with location infrastructure and drains, populations -Ambi Restrictions: Withdrawats, Reserve Zones and Protection -License limit, own property -Geotechnical studies: Height, wide banks, FS -Minimum area of work fronts	1. Mine Design	Delimitation final area of exploitation Geometry work benches and end slopes Main Roads
		-Quantity and quality of bookings -Location of booking blocks
Block model Cutting tenor (% Composition)	2. Booking calculation and RD	-Convertible ratio
Cost Movement Raw material and sterile Annual raw material requirements, increases Required Quality (Modules) Type and capacity equipment available	3. Mining Planning	Areas or sectors to be exploited Extraction sequence: MP and sterile volume to be extracted annually in each sector, quality (Tables-Maps) Back-filling sequence Equipment requirements
Topography Natural drains Volume of sterile to be removed Character. Material (FE, FC, Ang. Rest, density)	4. Dump design	-Dump sites -Boot geometry -Capacity and life dumps -Filling sequence
Topography Mining design (Pit, dumps) nfrastructure Requirements: Restricted Areas	5. Infrastructure Location	-Infrastructure location plan: Workshops, fuels crushers, couplings, powder
opography /lining design (Pit, dumps) Final Location Infrastructure: Location Natural Drains Restricted areas	5. Design Auxiliary Works	-Geometry tracks -Design drains, pit channels and dumps -Location lagoons -Pumping system
Mine and dump sequences Final mining design (Pit, dumps) Final location infrastructure Natural drains	6. Closure and recovery plan	-Plant layer storage -Recovery sequence exploited areas and dump





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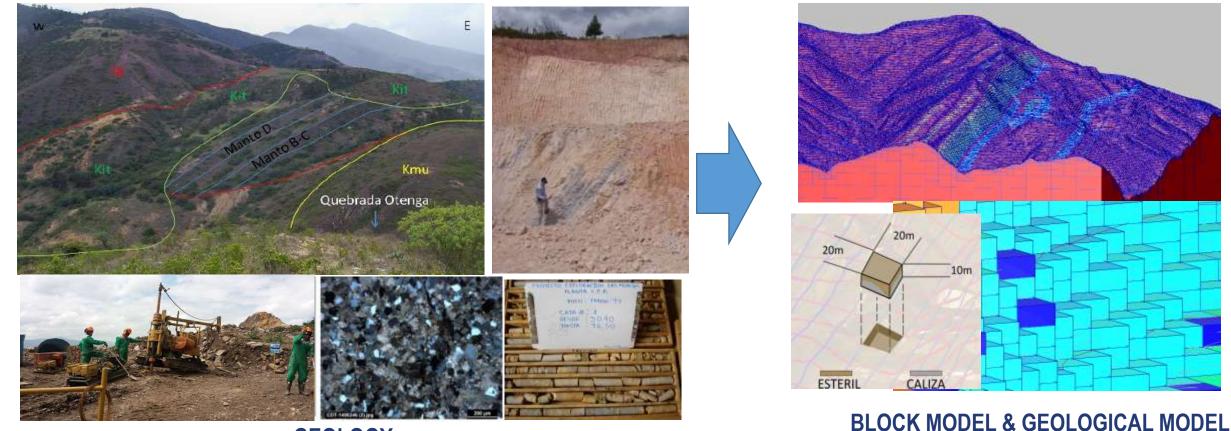






INPUT INFORMATION

OUTPUT INFORMATION



GEOLOGY









INPUT INFORMATION

OUTPUT INFORMATION

3DM **TOPOGRAPHY**





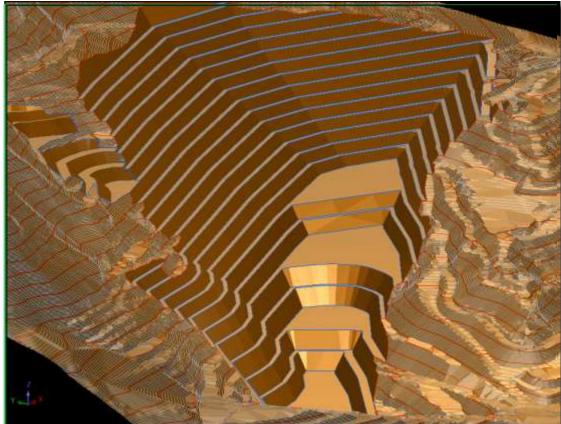




MINING DESIGN













TOPOGRAPHICAL REPLANTING IN THE FIELD











BEFORE AND AFTER





Geometric cut terraces, slopes with design angles and bench heights according to geotechnics.









BEFORE AND AFTER



Geometric conformation of sterile disposal area and subsequent geomorphological restoration.









BEFORE AND AFTER



Geometric conformation of area of disposition of steriles preserving heights and angles established in the design.









BEFORE AND AFTER





Geometric cut with heights and widths of berms established in the design.









BEFORE AND AFTER



Slopes with stable angles, floors on one level. Slope heights according to design.









BEFORE AND AFTER



Implementation of access and ramp designs with widths and slopes according to the standard.









BEFORE AND AFTER



Design of terraces of constant height and berms in a single nibe



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CONCLUSIONS

- It is possible to demonstrate the technology in a mine through topographic control, well-defined berms and slopes and developed ore cloaks.
- Topography has become a very dynamic profession, it must incorporate more knowledge into daily applications in addition to the essence of the surveyor is required to have a broader field of action.
- The technology of mining operations is necessary to be able to guarantee the extraction of minerals, it must be at the forefront of technology.
- Between different Teamworks with people with different capacities allows to achieve success in any project, this with a clear guideline established in a previous planning.
- Topography is an indispensable tool in the implementation of a mining planning, since it allows to make precise cuts and fills, rethink established alignments and comply with the monitoring and production indicators.
- > An unsentweight mine cannot guarantee its long- or medium-term existence.
- Untracked topographical mining becomes a mine with unsafe operations.
- A No Topography mine will generate arbitrary geometries, even though a Mining planning has been established, it will not be able to reach the objectives set with the design data.





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