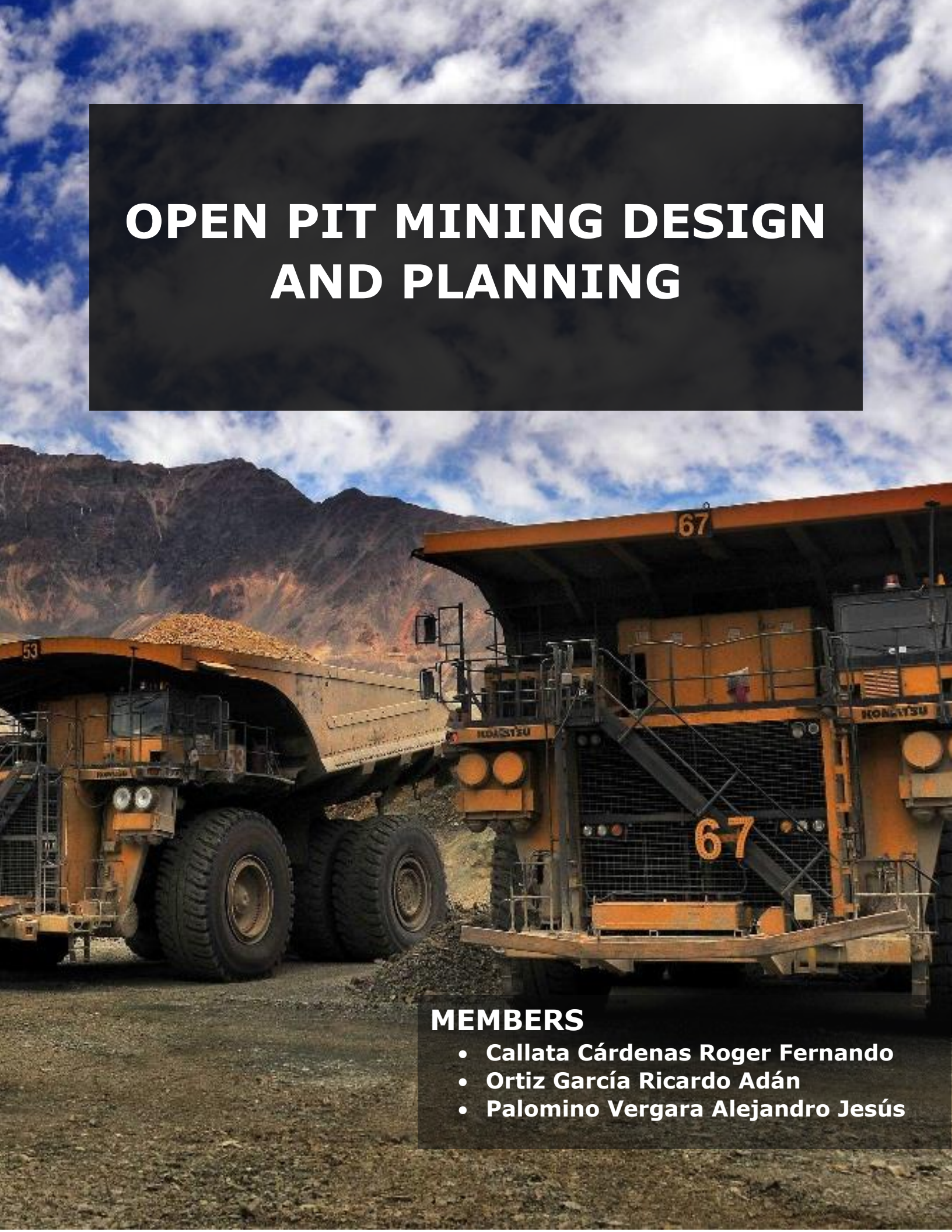
OPEN PIT MINING DESIGN AND PLANNING



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ABSTRACT

This research consists in the conceptual study of an open-pit mining project. From a database formed by the characteristics of a set of drillings made to the mining project's deposit, the grades and the lengths of the drillings were analyzed, and a composition of the drillings were elaborated. Then, we analyzed geostatistically the composition, and we estimated mineral resources and reserves, making a model for each one. From mineral reserves model and geographic relief of the zone, we had to start designing our project's layout, where we can define the location of the enough infrastructure to our project to have a good operating performance, considering economic, social, environmental and legal to make a suitable design. Within the necessary infrastructure are the access roads, the pit, the processing plant, dump, etc. Once the layout of the project is considered, we analyze the mine production plan, where we will detail the production of mine, plant, stock piles and the life of mine. Finally, the sizing of mining equipment, estimation of operating costs, estimation of capital costs and the economic analysis were carried out, realizing the cash flow where we would observe the profitability of the studied project.

CONCLUSIONS

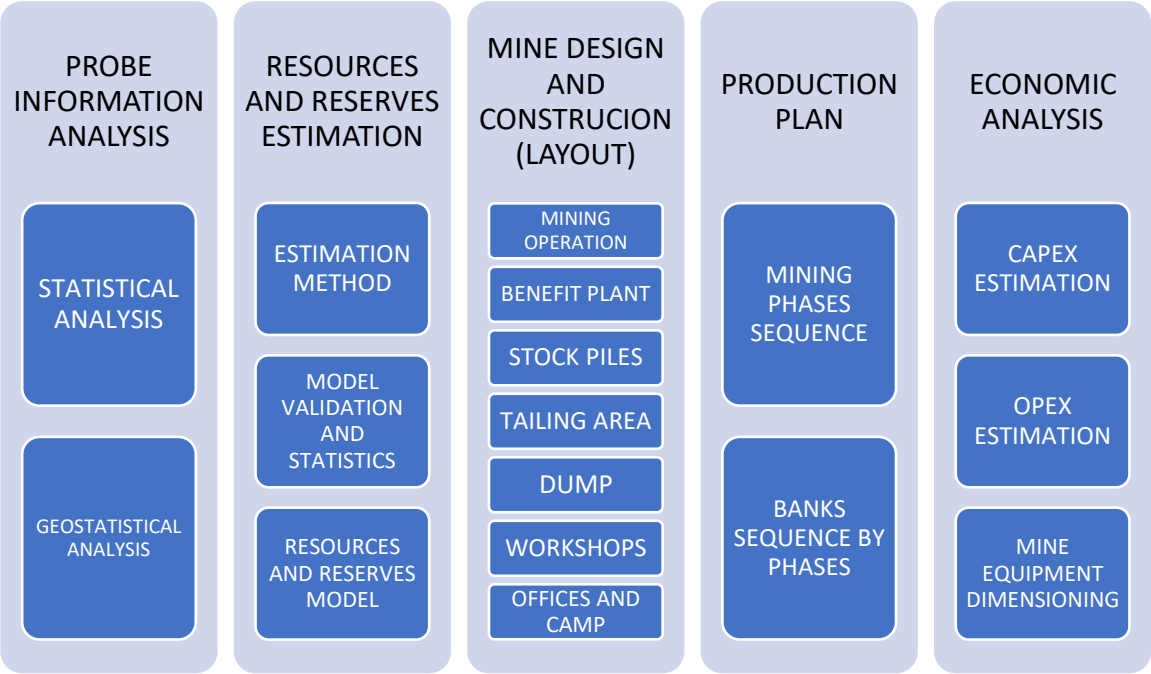
- The considerations taken in this conceptual study have a low level of certainty and detail because there are no complementary studies necessary for a complete analysis. However, it is an acceptable basis to present and describe a project in broad strokes.

- The Minesight / MSOpit program allows to obtain the economic envelopes of the model, in this case; the nested pits, from which the operating pit must be designed

- The data considered as input, to obtain the economic envelopes, has blocks of measured, indicated and all the inferred resources. This consideration is due to the small amount of Measured and Indicated Resources for this level of detail.

- The Economic Evaluation has been carried out to know if the project (mining plan) generates value for the company, for this, a Cash Flow Projection has been developed, in our case the free cash flow. Likewise, the Profit and Loss Statement have been projected and the profitability indicators have been calculated: Net Present Value (NPV), and Internal Rate of Return (IRR). Finally, we can conclude that the project is profitable since it has a positive NPV about US $ 1,078,199 (000) and an IRR of 50% which makes the project low risk considering a discount rate of 8%.

- The development of the Production Plan and the Economic Analysis are complementary in any mining project, for this we must follow the following Flow Diagram.



- For a result of the economic evaluation closer to reality, it is necessary to carry out a detailed analysis of the estimate of Capex, Opex and Equipment Dimensioning. Approximate values of Operating Cost and Investment according to the level of Production have been considered for this Project, so error bias is likely.