QUANTIFYING DILUTION FOR OPEN PIT PROJECT

1. Summary

Mining dilution is one of the most important factors affecting the economy of mines. Mining dilution is defined as the ratio of waste mined and sent to processing with ore.

Dilution increases the operating costs in the mill by increasing the tonnage of material to be milled. It also reduces the efficiency of a mill by reducing its useful capacity and also reducing the feed grade. In most of the cases lower feed grade means weaker recoveries. Dilution also increases the cut-off grade that means less mineable resource (reserve) for a mine.

If not impossible it is extremely difficult and expensive to eliminate dilution in a mining operation. Although completely avoiding dilution may be impossible, we can measure and control it. By better understanding the root causes of the dilution and its impact on the economics of the project, dilution can be controlled.

While we do our best to identify and calculate all the other cost items of a project, no matter how small, it is common to make general assumptions about dilution instead of measuring it. It is paramount for mining projects to have a better understanding of dilution right from the beginning. In times like today where mining operations must operate at peak efficiency, it is even more crucial to be able to calculate and have a better grasp of all the parameters influencing the economics of a project including dilution. In order to produce better project evaluations, dilution studies should be an integral part of any project.

It is common to assume a general dilution such as 5% for massive deposits and 10% for tabular shape deposits. While these figures may be a good starting point in mining studies, it doesn’t take in to consideration the complexity of the matter. For example the amount of dilution in most of the cases is different in different parts of a mine. This is due to changes we usually see in grade distribution and the shape of the ore body.

The author presents in this paper a methodology to calculate dilution for mining projects. The proposed approach makes use of general mining software available in most of the mining companies. To explain the procedures, the paper includes a few case studies.

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