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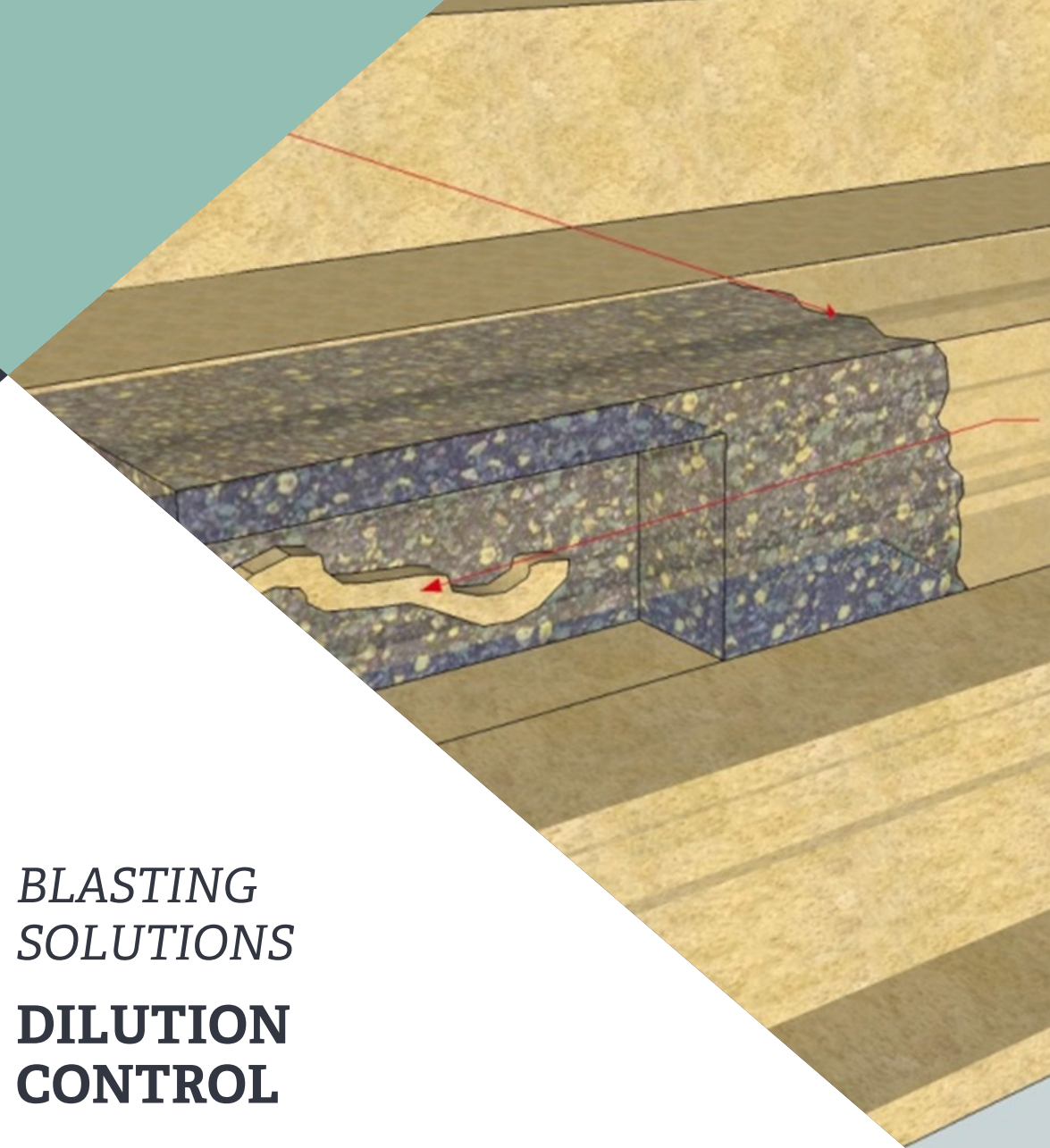
# *BLASTING SOLUTIONS*

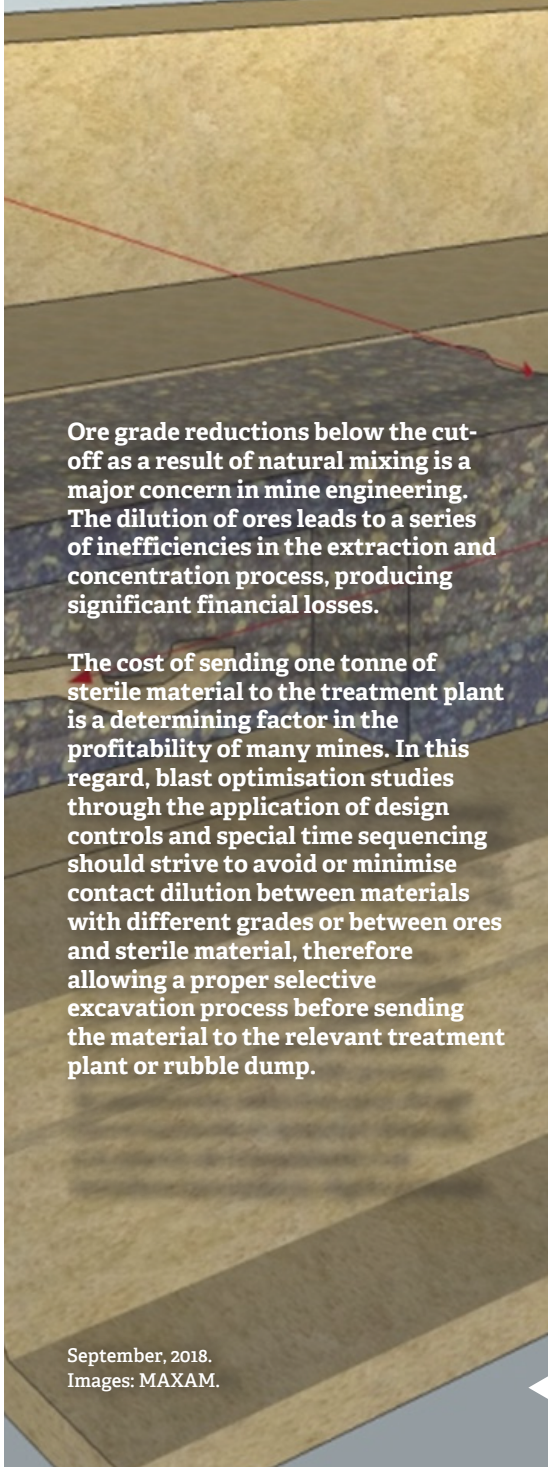
## **DILUTION CONTROL**

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Ore grade reductions below the cut-off as a result of natural mixing is a major concern in mine engineering. The dilution of ores leads to a series of inefficiencies in the extraction and concentration process, producing significant financial losses.

The cost of sending one tonne of sterile material to the treatment plant is a determining factor in the profitability of many mines. In this regard, blast optimisation studies through the application of design controls and special time sequencing should strive to avoid or minimise contact dilution between materials with different grades or between ores and sterile material, therefore allowing a proper selective excavation process before sending the material to the relevant treatment plant or rubble dump.

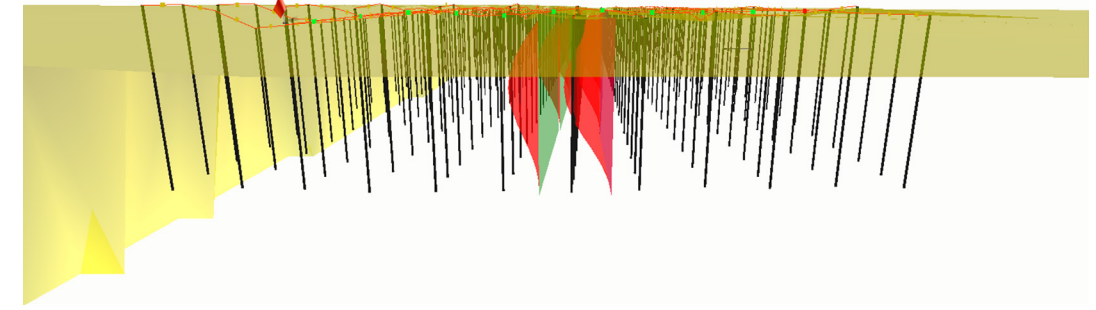
## DILUTION CONTROL

### WHAT IS DILUTION?

Ore deposits are often very heterogeneous. A cut-off grade (minimum grade required for an extracted ore to be economically viable) is established in accordance with the concentration and financial value of the ore in question. Any material above this grade is classified as an ore, and any that is below is classified as sterile or waste.

These ores are usually extracted by drilling and blasting techniques. Bench blasting is a method which is used extensively in open pit mines, allowing the rock obtained to be transported and processed. All blast designs involve an ad hoc spatial distribution (such as the type of stone, distance, diameter and length of blast holes) in order to apply the energy necessary to ensure suitable fragmentation.

Ore may be lost when moving material after the blast (when it is mixed with sterile material and mistakenly classified as such), or it may become diluted (when sterile material is mixed with ore, being erroneously classified as ore). Dilution can be classified as internal when a quantity of sterile material is introduced in the rock mass, and external (or contact dilution) when it is the result of contact and movements between the two types of material.



Simulation of the dilution with RIOBLAST.

### DILUTION CONTROL IN BLASTS

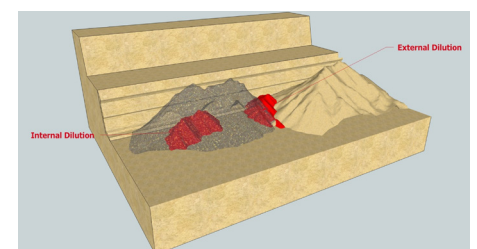
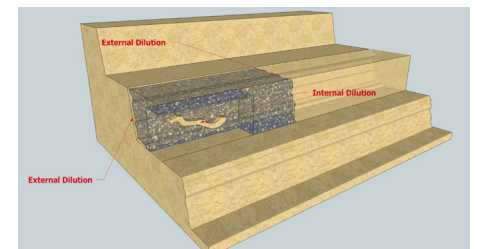
Dilution or loss of ore in blasting is associated with the following factors:

1. Blast location and geology (existence of contact between different materials).
2. Blast design (blast hole position, charge distribution, tamping, etc.).
3. Blast sequence and movement.

Blasting plays a fundamental role in controlling dilution. It must be designed with absolute precision to ensure the rock is fragmented but hardly moves, while also separating the sterile materials from those which contain ores. Carrying out dilution studies is important in order to quantify and model material movement, making it possible to envisage possible alternatives in terms of energy, times and initiation sequence; any possible mixing between ore and sterile material is therefore minimised or eliminated, always keeping the environmental effects which may occur during blasting under control.

It is therefore necessary to have blasting models which are capable of predicting, at the design stage, the potential impact of ore dilution and loss after detonation. These can be used to help optimise the selective excavation processes and boost the concentration and recovery of ores in the processing plants.

Be sure to contact MAXAM if you would like to add value to your mining project by applying dilution control services.



Types of dilution in bank blasting