

An aerial photograph of a mining site. In the foreground, two workers wearing white hard hats and orange safety vests are walking along a dirt path. The ground is uneven, with numerous small mounds of earth and dark patches, likely from blasting. The background shows a vast, open area with more mounds and tracks, extending towards the horizon.

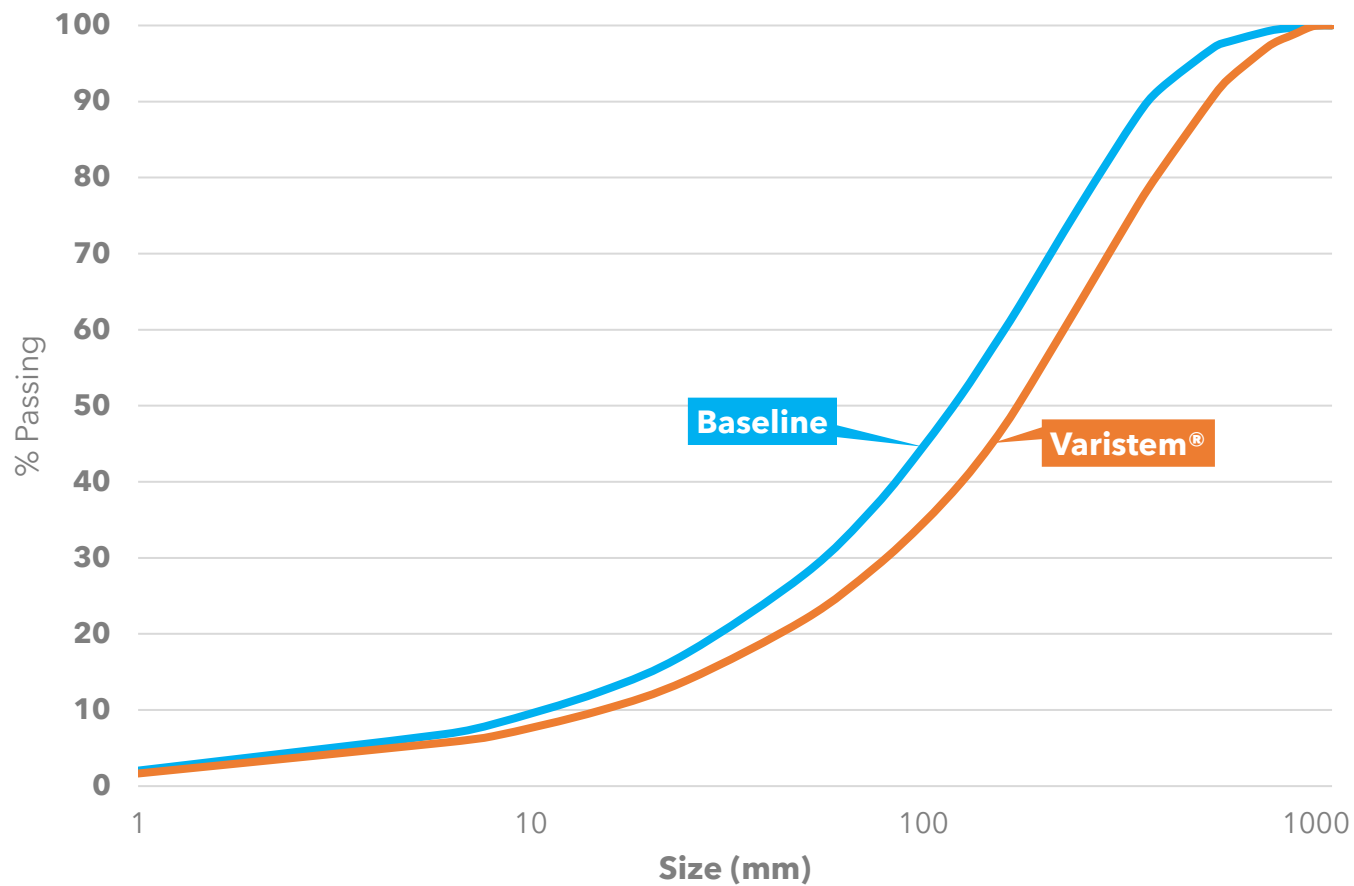
**HOW A MINOR CHANGE TO  
BLAST DESIGN RESULTED IN  
AN ADDITIONAL  
+\$10 MILLION PER YEAR IN  
VALUE**

**A CASE STUDY FROM A SOUTH AFRICAN  
MANGANESE MINE**



**BLASTING IS THE FIRST STEP IN THE  
MINING VALUE CHAIN. ANY POSITIVE  
IMPACTS MADE DURING BLASTING  
RESULTS IN EXPONENTIAL DOWNSTREAM  
GAINS**





**IN THE CASE OF MANGANESE MINING, THE  
DOWNSTREAM GAINS CAN BE  
ASTRONOMICAL IF YOU ARE ABLE TO  
REDUCE THE AMOUNT OF FINES PRODUCED  
DURING BLASTING**



**THE TYPICAL  
MANGANESE  
MINE SELLS  
TWO  
CATEGORIES OF  
PRODUCTS,  
ALBEIT AT  
DIFFERENT  
GRADES: LUMPY  
AND FINES**





**ON AVERAGE, FINES ARE PRICED AT A DISCOUNT OF AROUND 30% TO LUMPY**



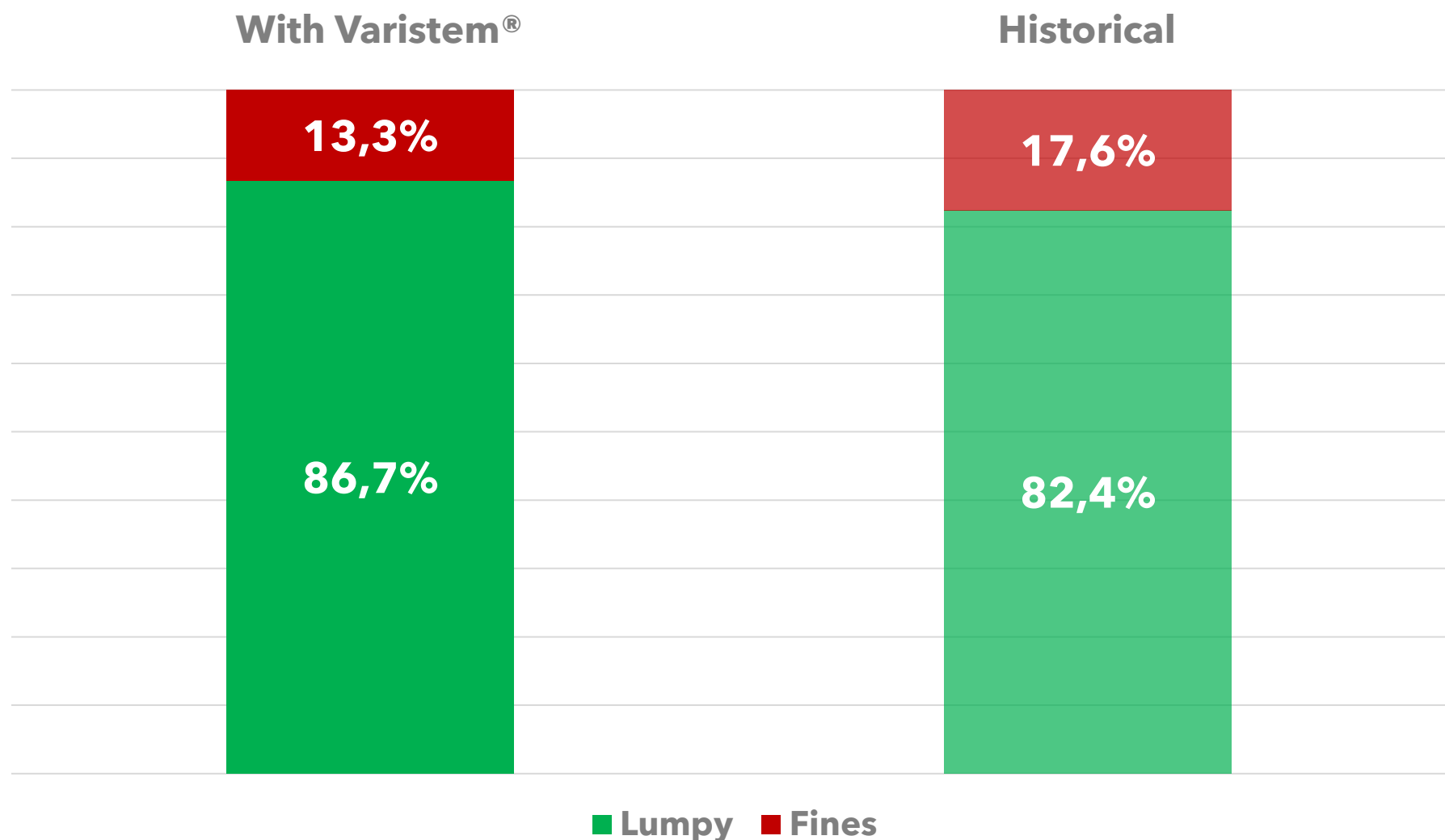


**SO, IF YOU ARE  
ABLE TO REDUCE  
FINES THROUGH  
BLASTING, YOU  
ARE LEFT WITH  
MORE LUMPY TO  
SELL AT A HIGHER  
PRICE**





# AND THIS IS EXACTLY WHAT WE WERE ABLE TO ACHIEVE AT MANGANESE MINE X IN SOUTH AFRICA. REDUCING FINES AND INCREASING LUMPY





**WE DID THIS BY FOCUSING ON IMPROVED  
ENERGY RETENTION AND DISTRIBUTION  
DURING BLASTING, USING VARISTEM<sup>®</sup>  
STEMMING PLUGS AS THE KEY TOOL TO  
EFFECT THIS CHANGE**



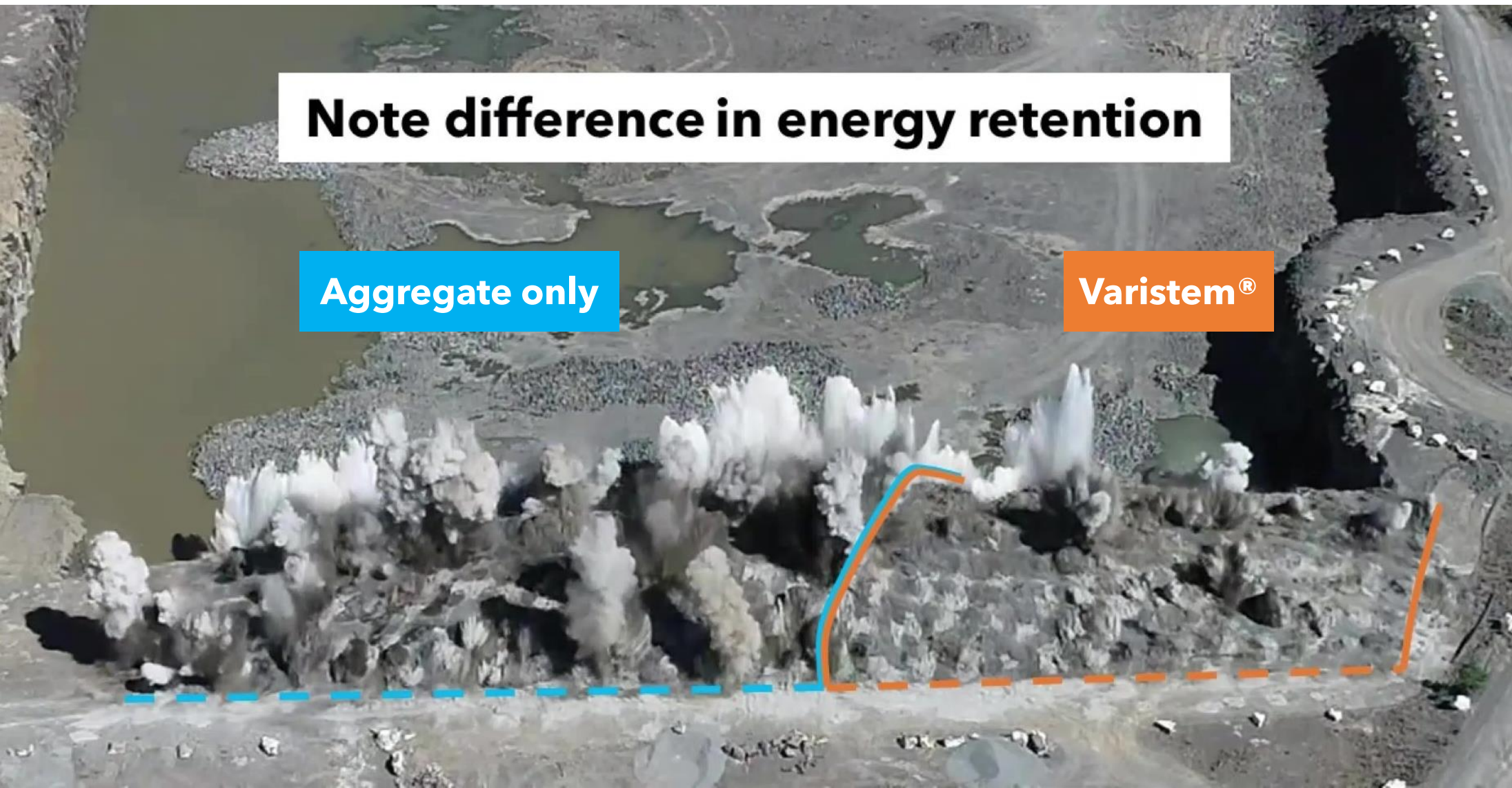
# MANGANESE MINE X BLASTS

## APPROXIMATELY 6.9 MILLION TONS OF MANGANESE PER YEAR, AT DIFFERENT GRADES AND CORRESPONDING PRICES

Note difference in energy retention

Aggregate only

Varistem®





**CONSIDERING THE REDUCTION IN FINES  
AND CORRESPONDING INCREASE IN  
LUMPY, THE NET FINANCIAL GAIN PER  
YEAR ON HIGH GRADE MANGANESE IS  
+\$6.7 MILLION, AND ON LOW GRADE  
MANGANESE +\$3.3 MILLION FOR  
MANGANESE MINE X**





**RELATING THIS BACK TO TONNAGES: FOR HIGH  
GRADE MANGANESE THE EFFECTIVE INCREASE  
IN VALUE PER IN-SITU TON IS **+\$1.6/TON** &  
FOR LOW GRADE, THE INCREASE IS  
**+\$1.25/TON****



**AND THAT IS HOW, WITH A SIMPLE  
CHANGE IN BLASTING DESIGN AND THE  
USE OF VARISTEM<sup>®</sup> STEMMING PLUGS,  
LESS FINES ARE PRODUCED, RESULTING IN  
SOME INCREDIBLE NET FINANCIAL GAINS**

