

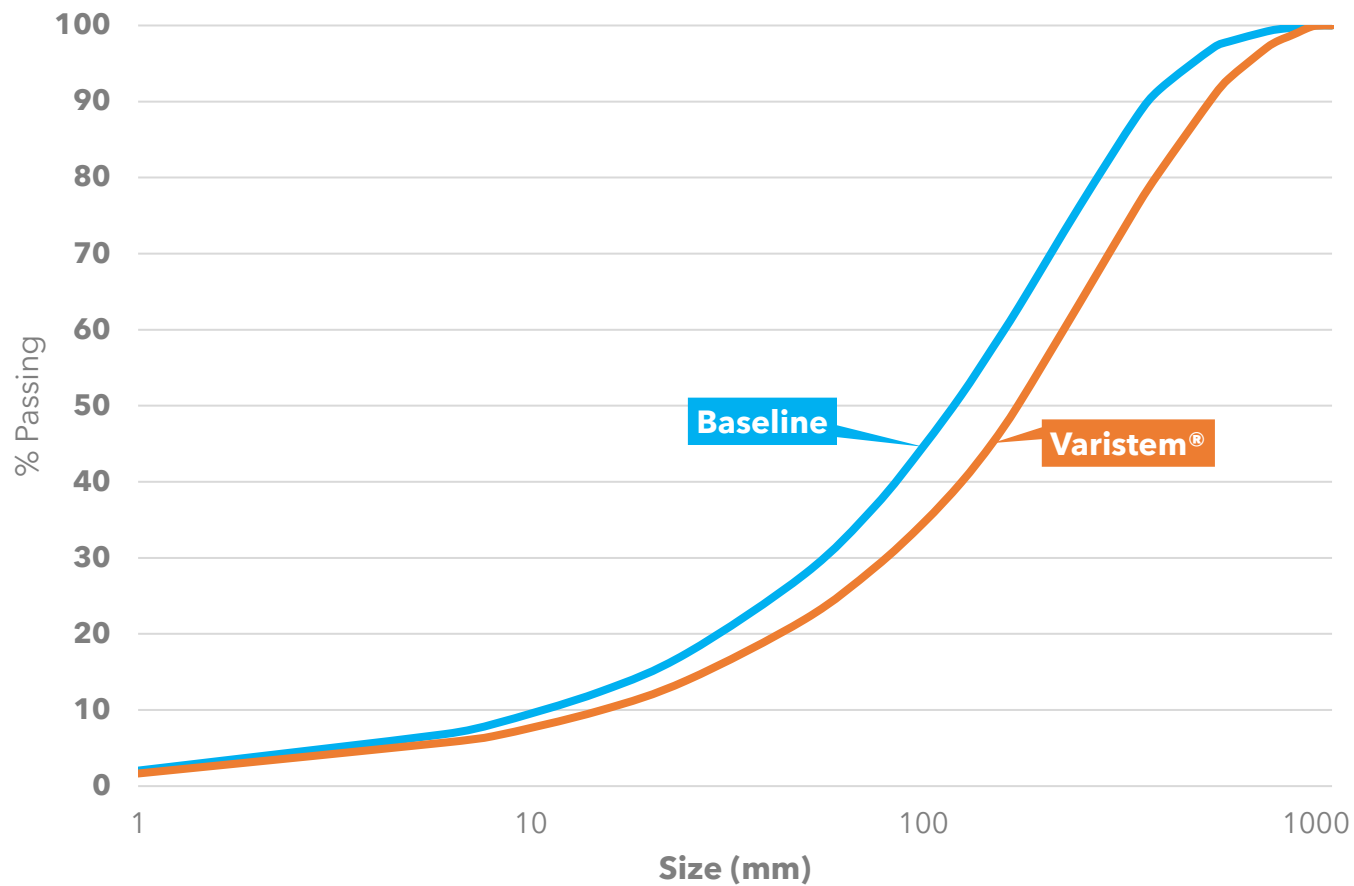
An aerial photograph of a mining site. In the foreground, two workers wearing white hard hats and orange safety vests are walking along a dirt path. The ground is uneven and shows signs of excavation, with several small white markers placed at intervals. The background shows a large, open area of earth with more markers and some dark patches, possibly indicating blast sites or material piles. The overall scene is a busy, active mining operation.

**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**



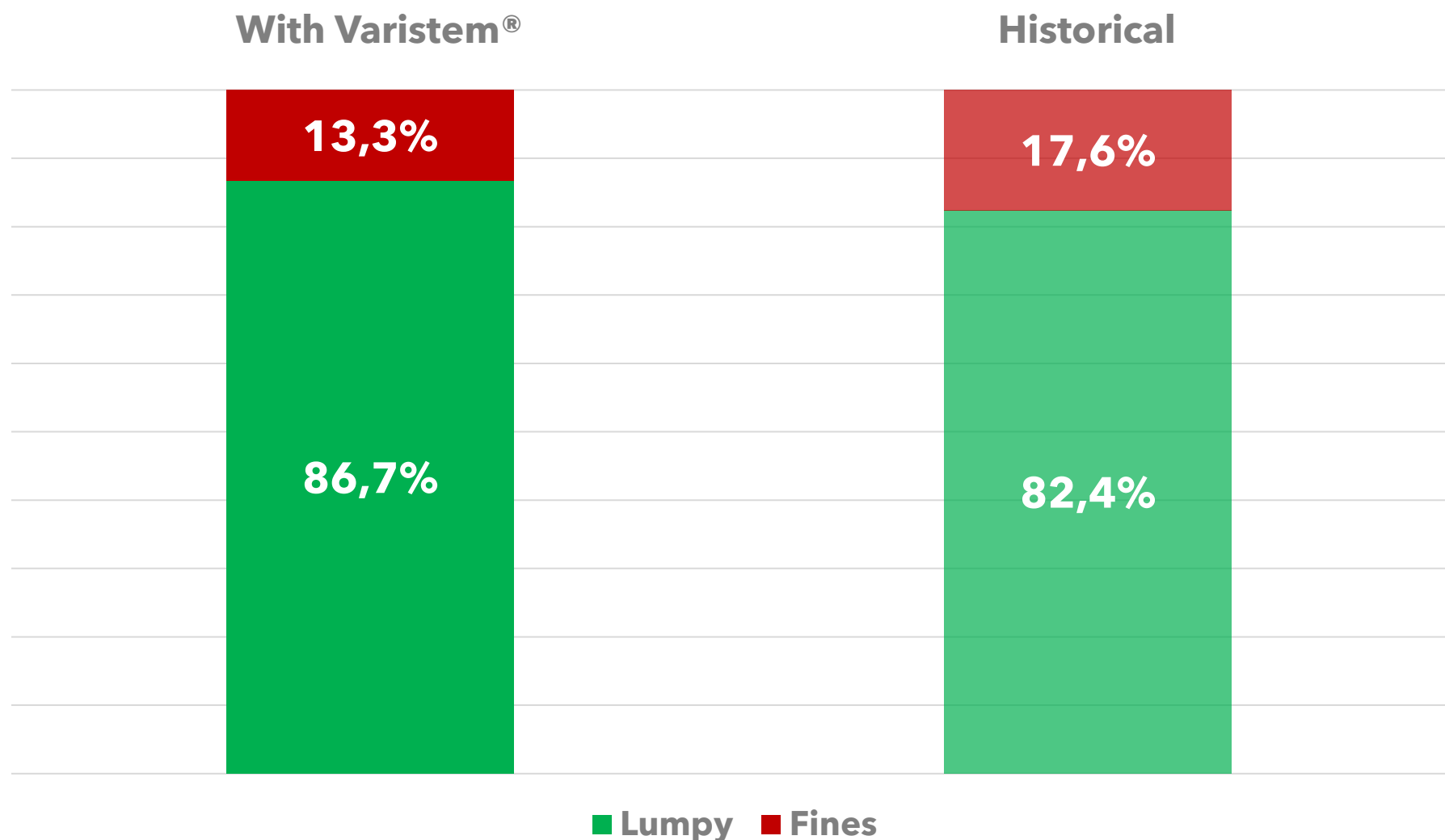
ON AVERAGE, FINES ARE PRICED AT A DISCOUNT OF AROUND 30% TO LUMPY



**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®
STEMMING PLUGS AS THE KEY TOOL TO
EFFECT THIS CHANGE**

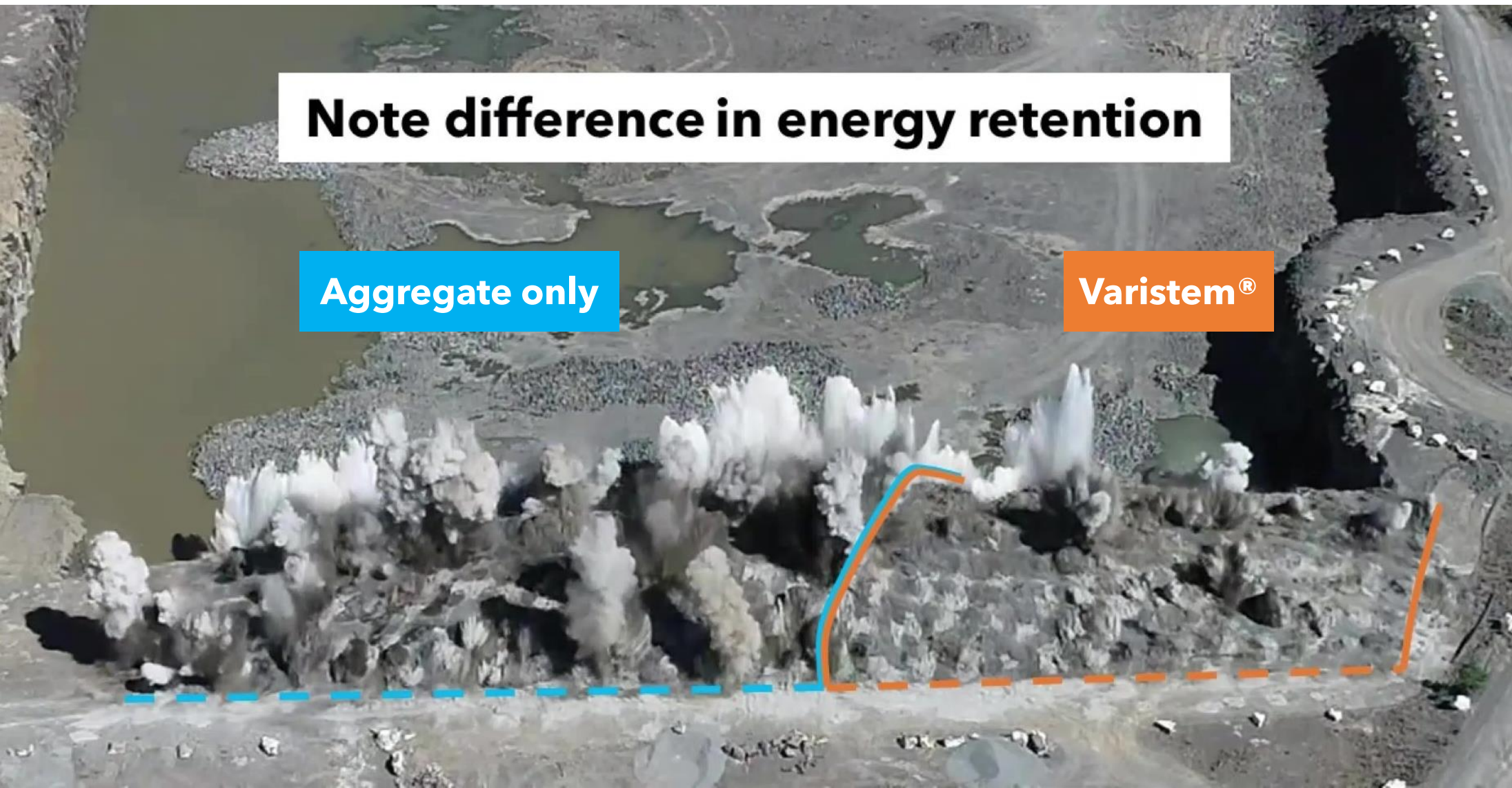
MANGANESE MINE X BLASTS

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[®] STEMMING PLUGS,
LESS FINES ARE PRODUCED, RESULTING IN
SOME INCREDIBLE NET FINANCIAL GAINS**

