

A wide-angle photograph of a large-scale quarrying operation. In the foreground, a massive, billowing plume of brown dust and debris rises from a recent explosion, partially obscuring the sky. To the left, a deep, terraced quarry pit is visible, with a small stream of water flowing at the bottom. The background shows more of the quarry's terraced walls under a clear blue sky with a few wispy clouds. The overall scene conveys the power and scale of industrial blasting.

BLASTING IS ART

HOW CAN WE CONSISTENTLY PRODUCE MASTERPIECES?

WHAT IS THIS PRESENTATION ABOUT?

Blasting is art - so how can we consistently produce masterpieces?

Looking at drill and blast through a non-conventional lens



EPIISODE 1: AN ARCHITECT IS NOT ENOUGH



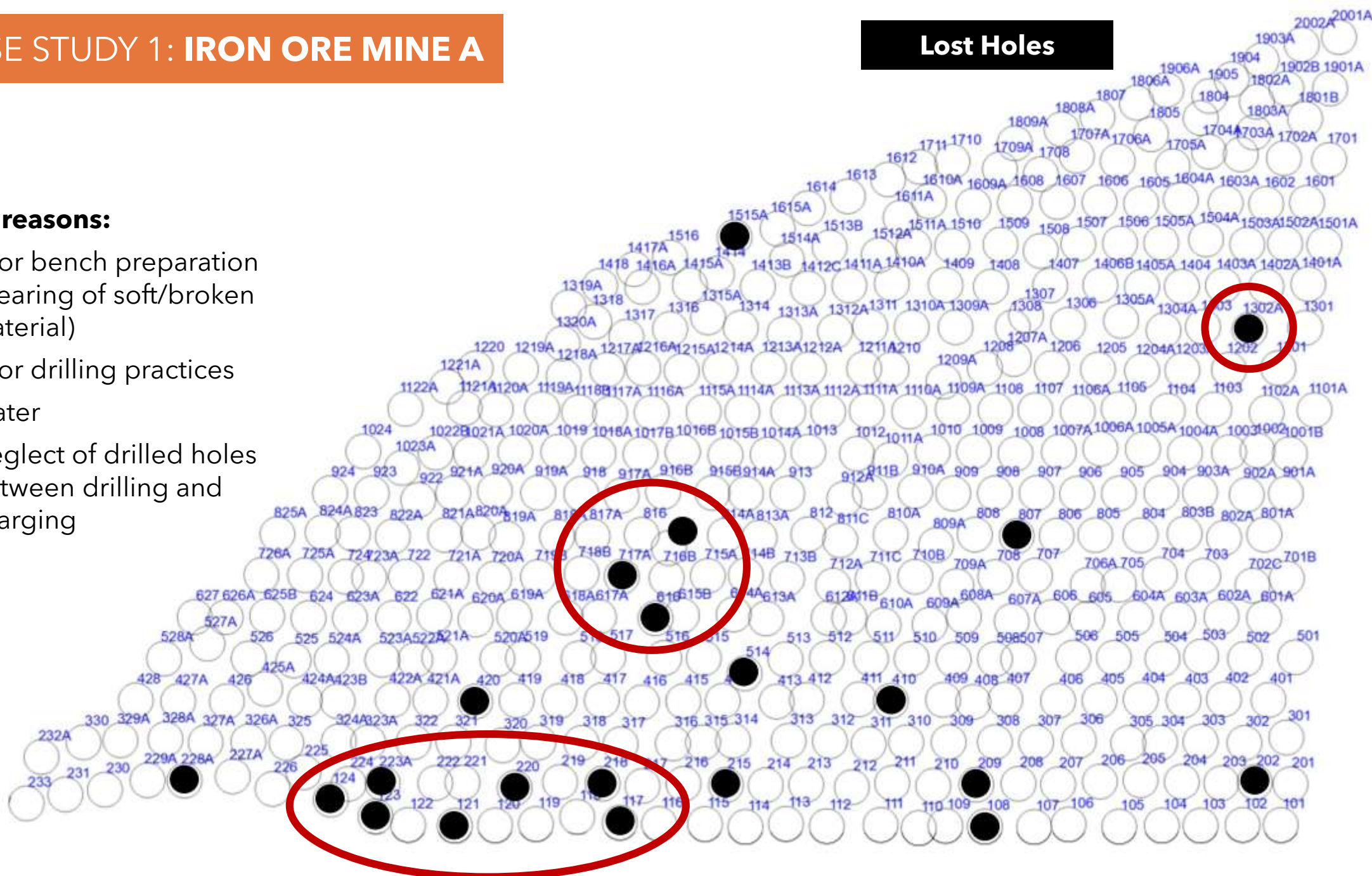
CASE STUDY 1: IRON ORE MINE A



Lost Holes

Main reasons:

- Poor bench preparation (clearing of soft/broken material)
- Poor drilling practices
- Water
- Neglect of drilled holes between drilling and charging



CASE STUDY 1: IRON ORE MINE A

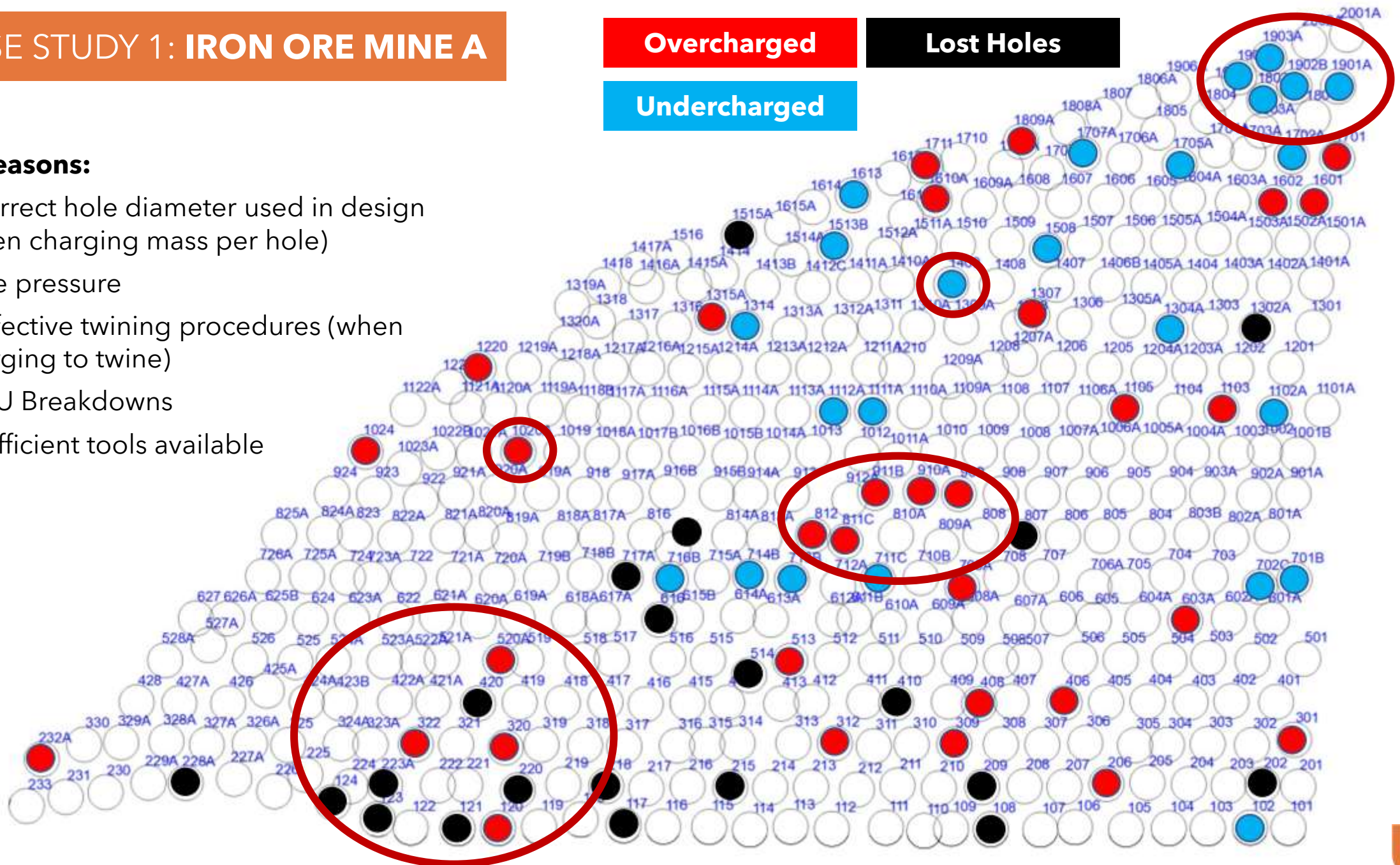
Overcharged

Lost Holes

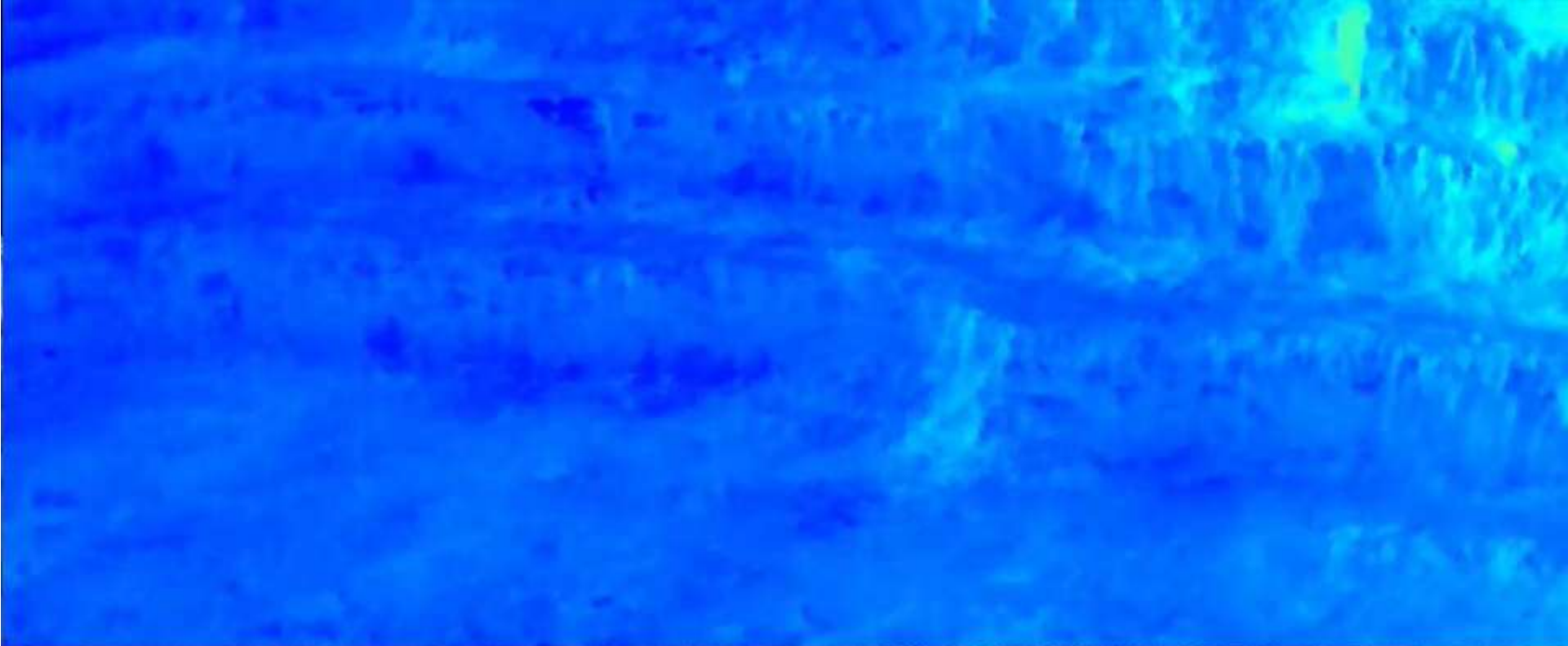
Undercharged

Main reasons:

- Incorrect hole diameter used in design (when charging mass per hole)
- Time pressure
- Ineffective twining procedures (when charging to twine)
- MMU Breakdowns
- Insufficient tools available





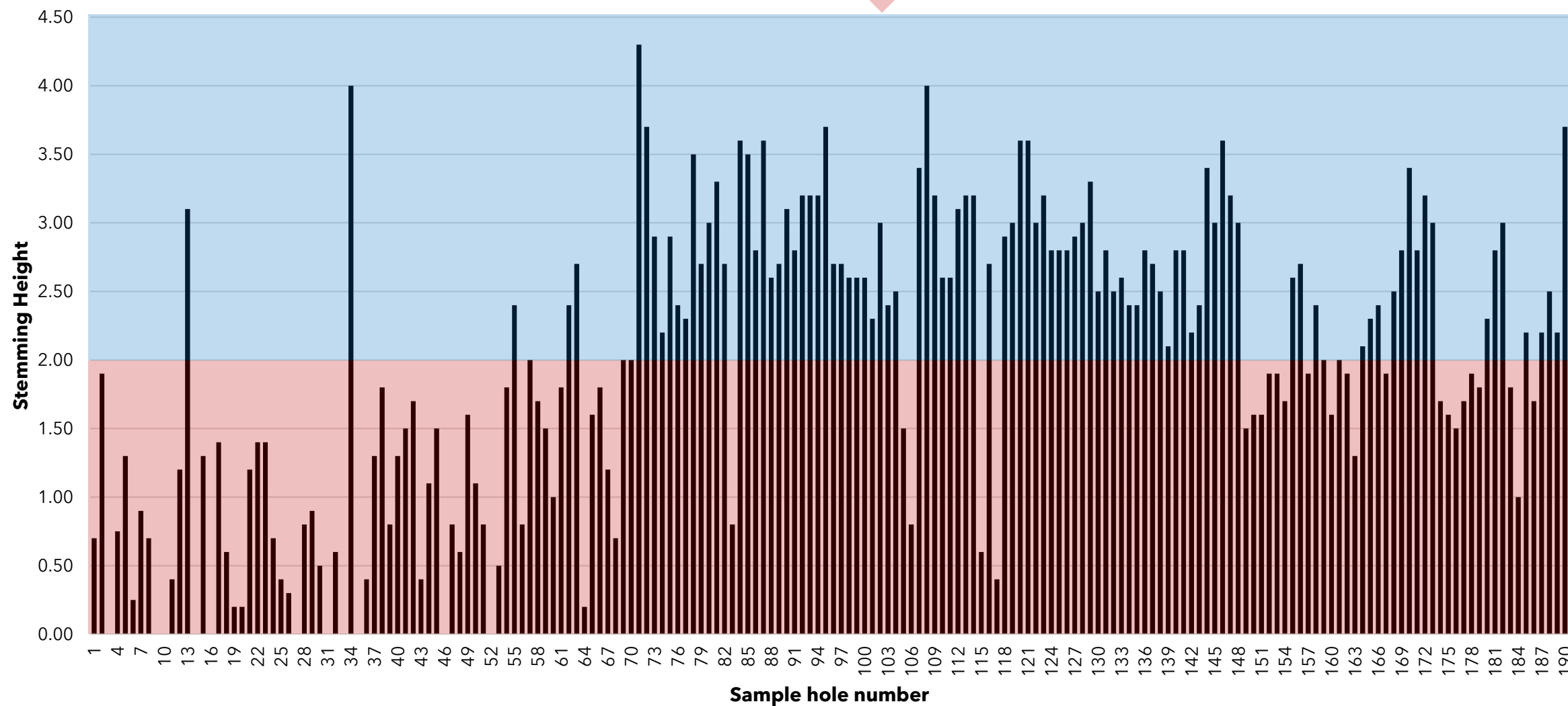


CASE STUDY 3: CHROME MINE A

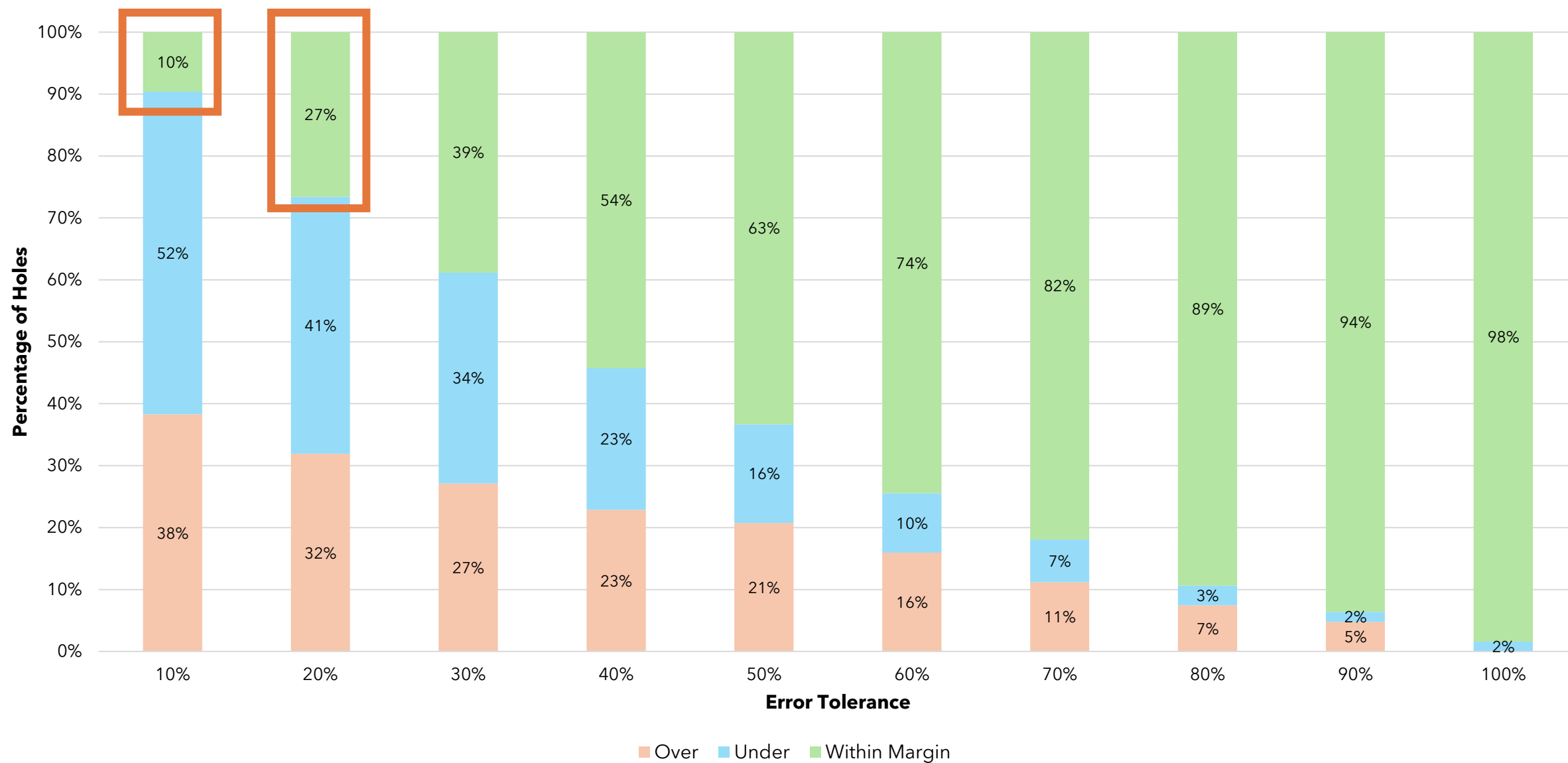
Undercharged

Overcharged

Hole Diameter	140mm
No. of Holes in QAQC Dataset	188
Design Stemming Height	2m
Max Stemming Height	4.30m
Min Stemming Height	0.00m

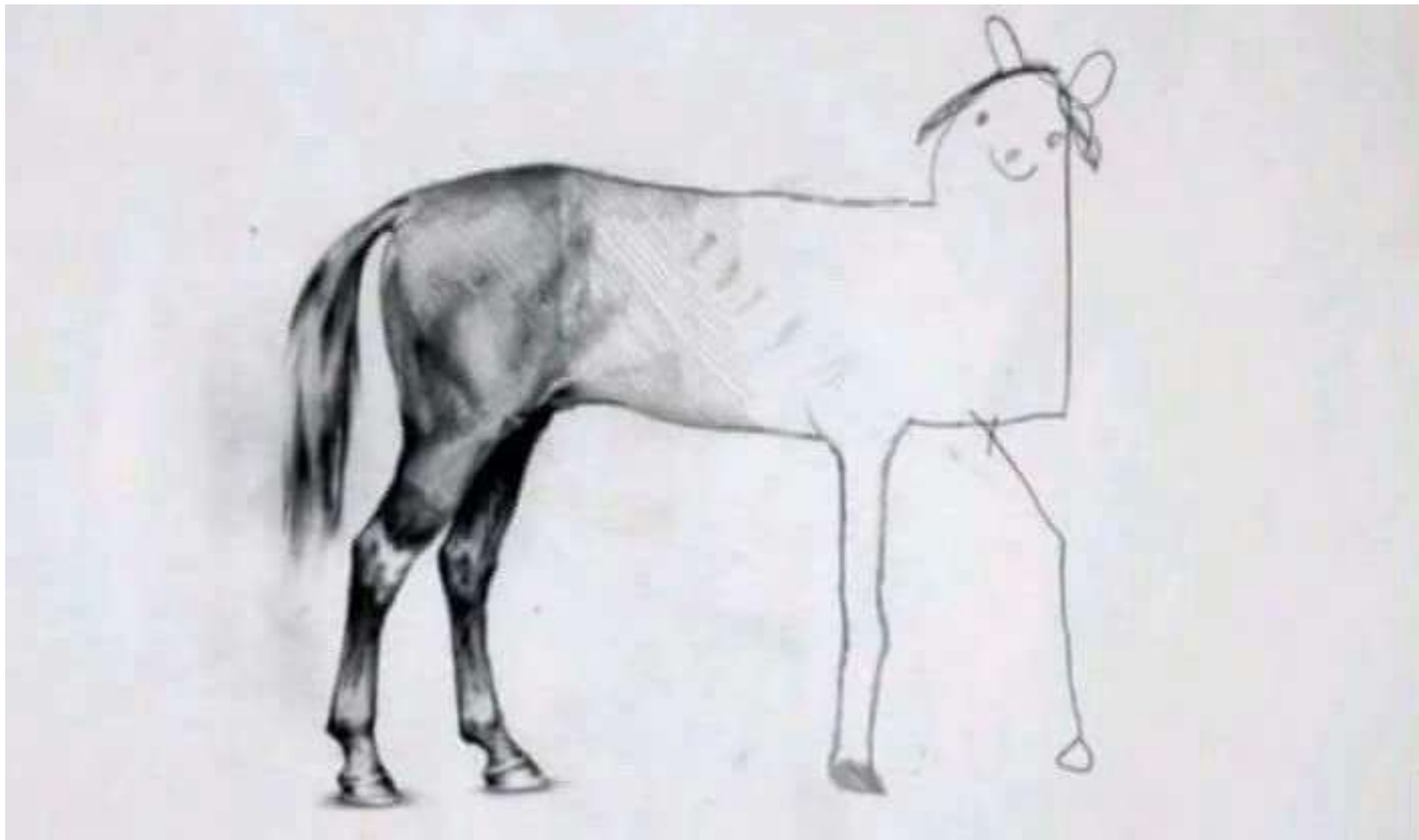


CASE STUDY 3: CHROME MINE A

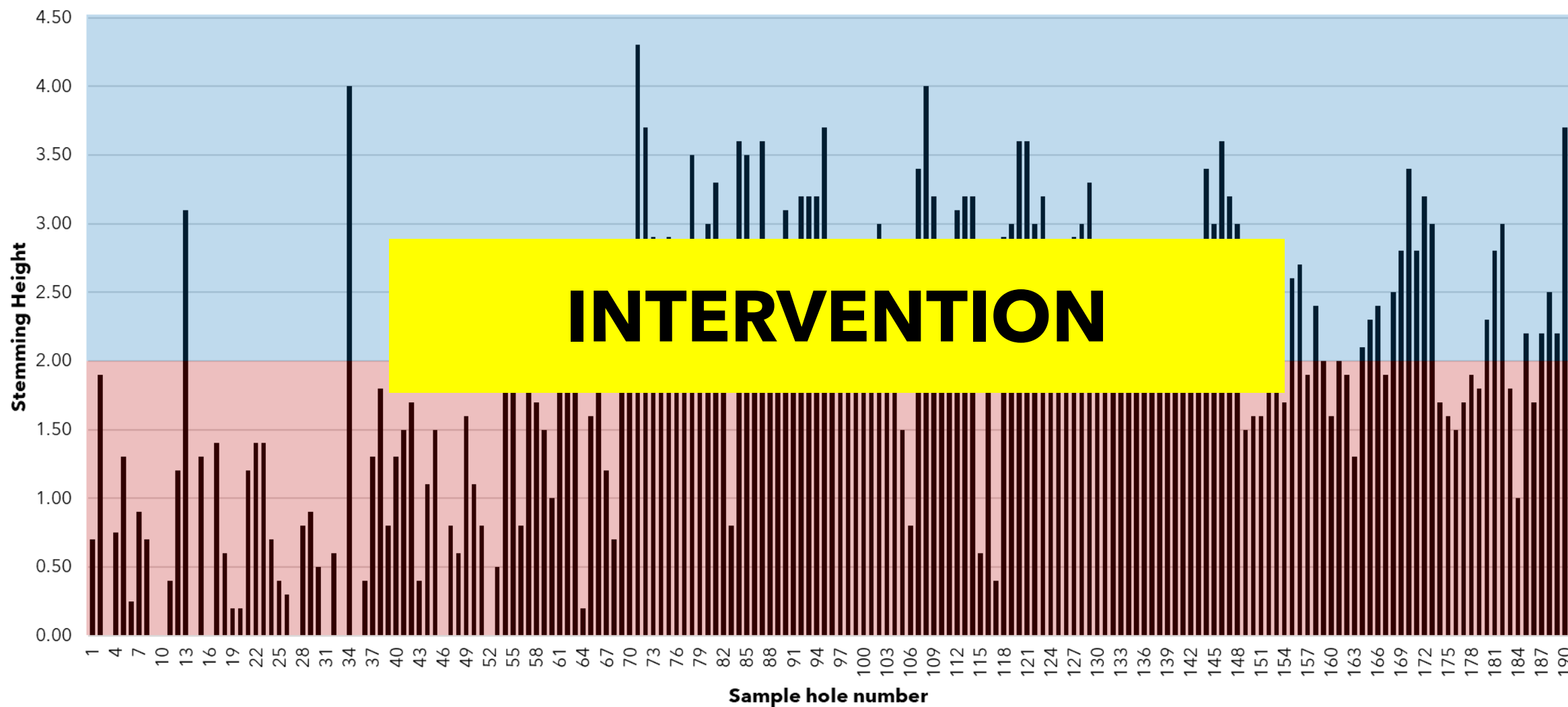




EPISODE 2: CAN'T RUSH A GOOD THING



CASE STUDY 3: CHROME MINE A



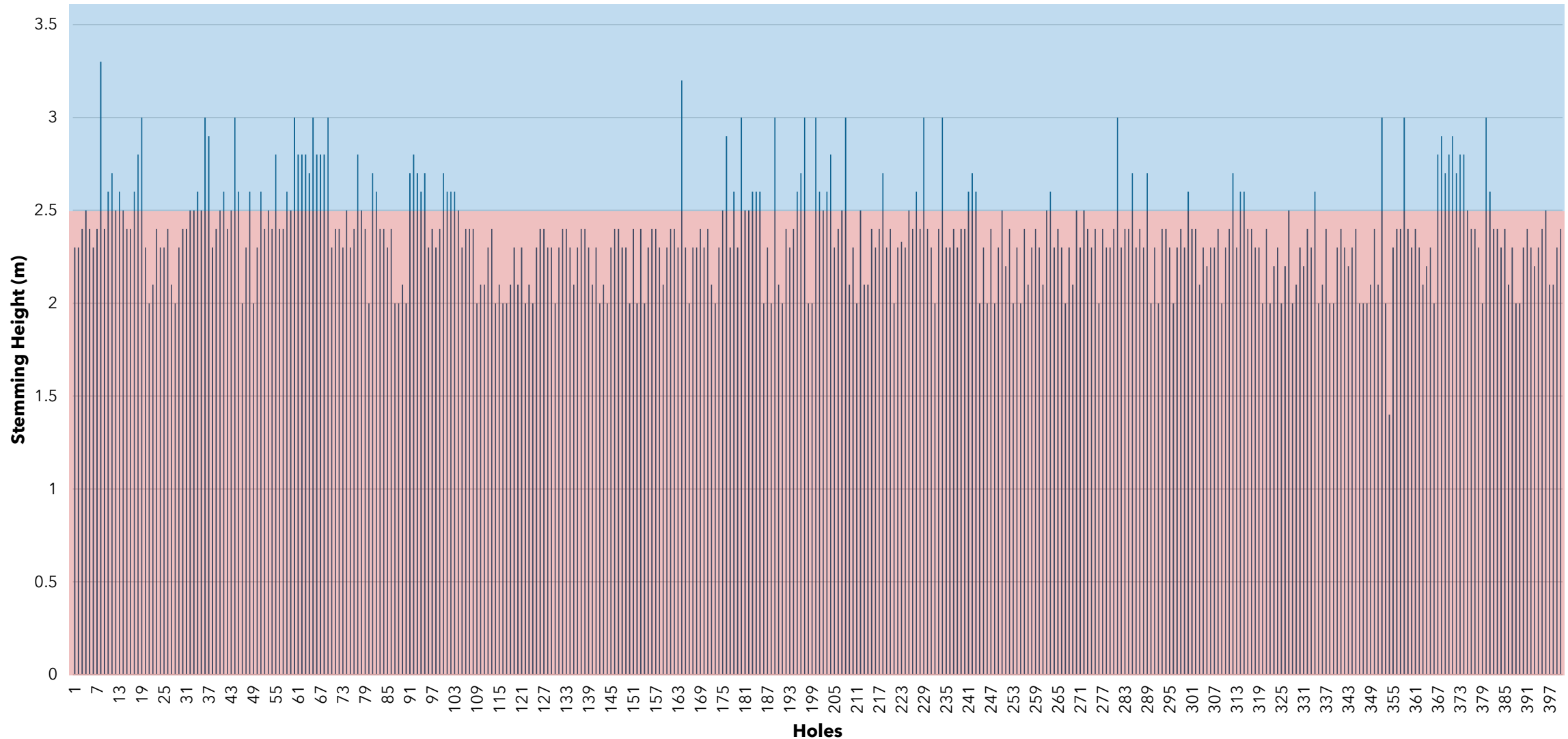
CASE STUDY 3: CHROME MINE A

FIRST BLAST **AFTER** INTERVENTION

Undercharged

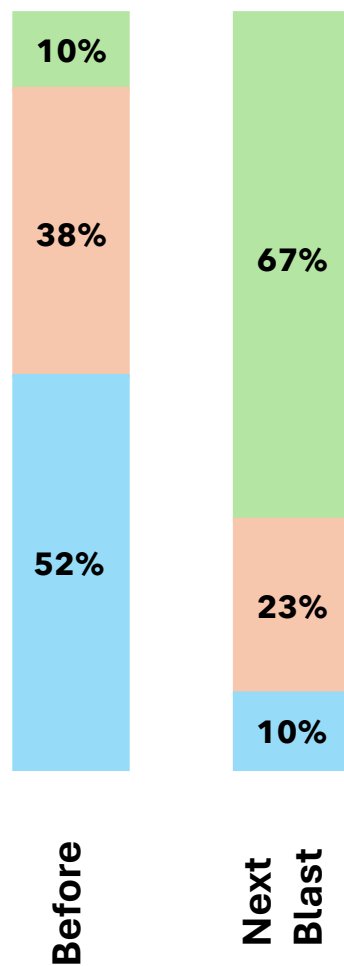
Overcharged

Hole Diameter	140mm
No. of Holes Measured	407
Collapsed Holes	7
No. of Holes in QAQC Dataset	400
No. of Remedied Holes	78
Design Stemming Height	2.5m

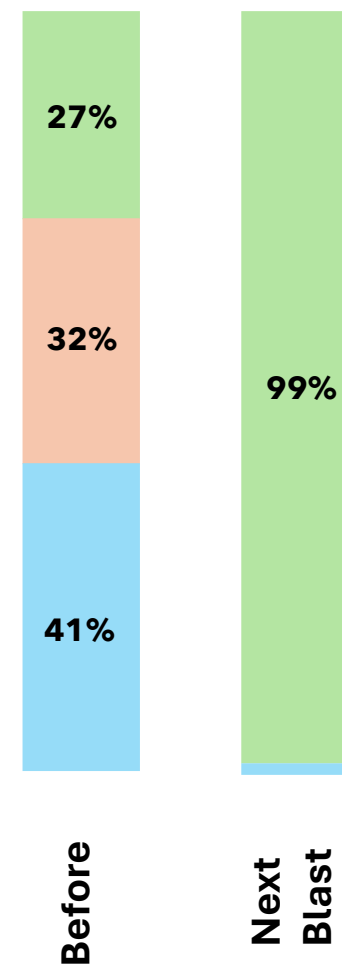


CASE STUDY 3: CHROME MINE A

2.25m - 2.75m
Error Tolerance 10%



2.00m - 3.00m
Error Tolerance 20%



A large, dark rock is shown falling from a steep, rocky cliff. A massive, billowing cloud of dust and debris is being kicked up by the impact, partially obscuring the cliff face. The scene is captured in a dynamic, slightly blurred manner, emphasizing the power of the fall.

EPISODE 3: WOW, THAT'S A BAD BLAST

CASE STUDY 4: **COAL MINE A**



CASE STUDY 4: **COAL MINE A**



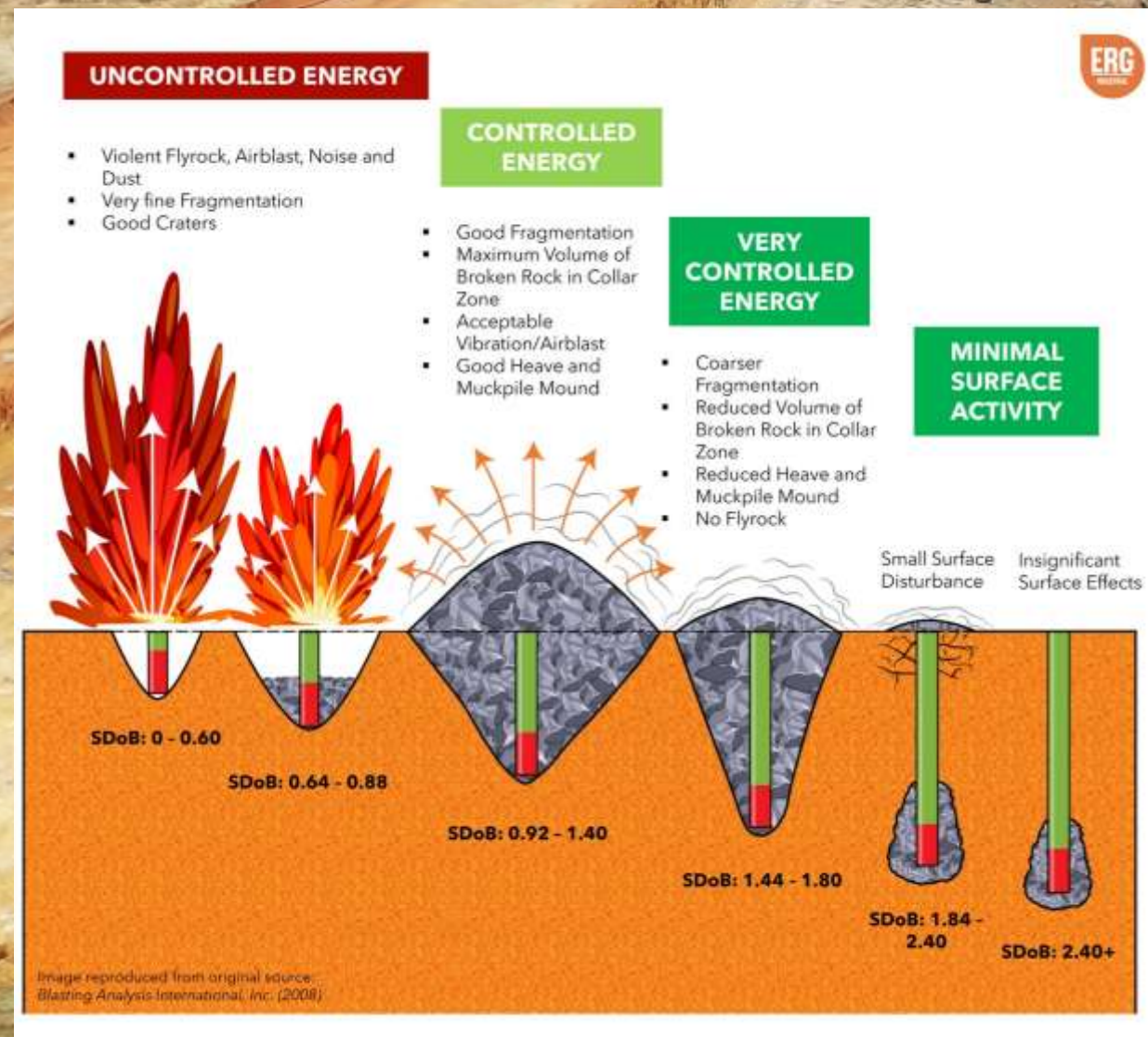
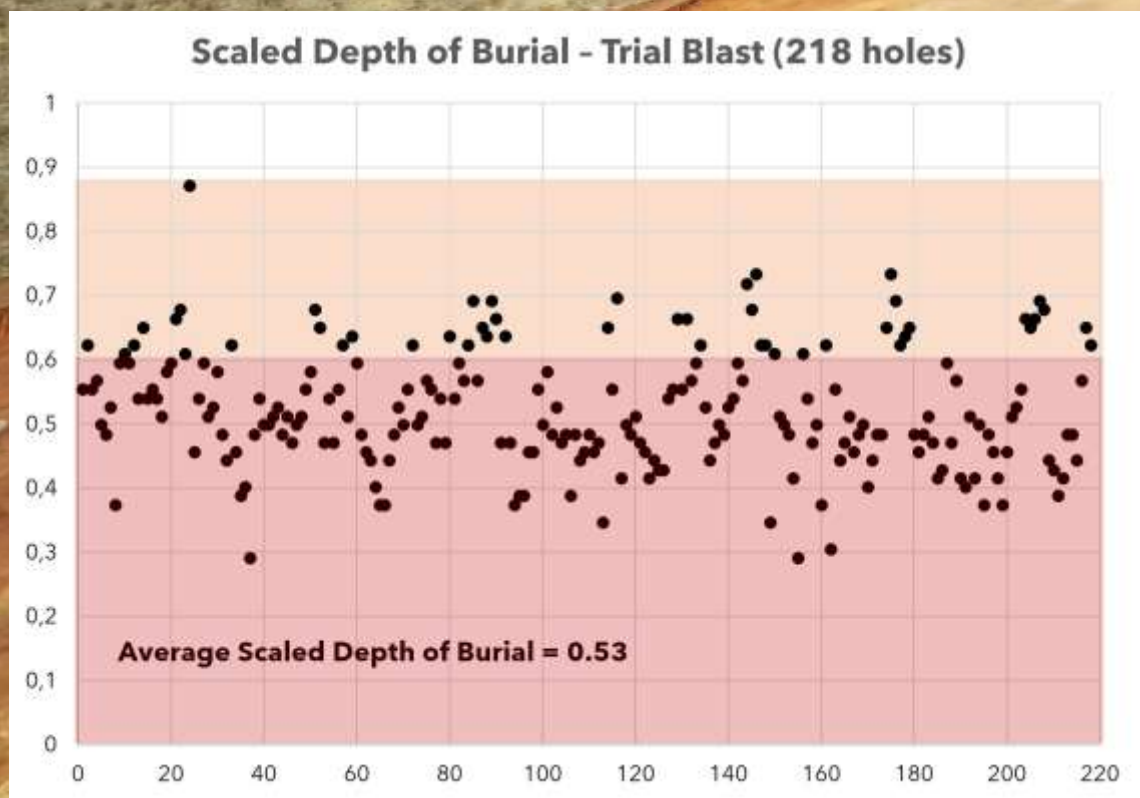
CASE STUDY 4: COAL MINE A

Number of holes:	218
Average drill depth:	2.08m [shortest hole 0.4m]
Average stemming height:	1.04m
Hole Diameter:	



CASE STUDY 4: COAL MINE A

Number of holes: 218
 Average drill depth: **2.08m** [shortest hole 0.4m]
 Average stemming height: 1.04m
 Hole Diameter: **171mm**



CASE STUDY 4: **COAL MINE A**



Blast progression to
this point

CASE STUDY 4: **COAL MINE A**



Blast progression to
this point

CASE STUDY 4: **COAL MINE A**



CASE STUDY 4: COAL MINE A

Hole D51

Scaled Depth of Burial = **0.47**
Violent flyrock expected

Hole C51

Scaled Depth of Burial = **0.48**
Violent flyrock expected

Hole B51

Scaled Depth of Burial = **0.48**
Violent flyrock expected

Hole A51

Scaled Depth of Burial = **0.55**
Violent flyrock expected

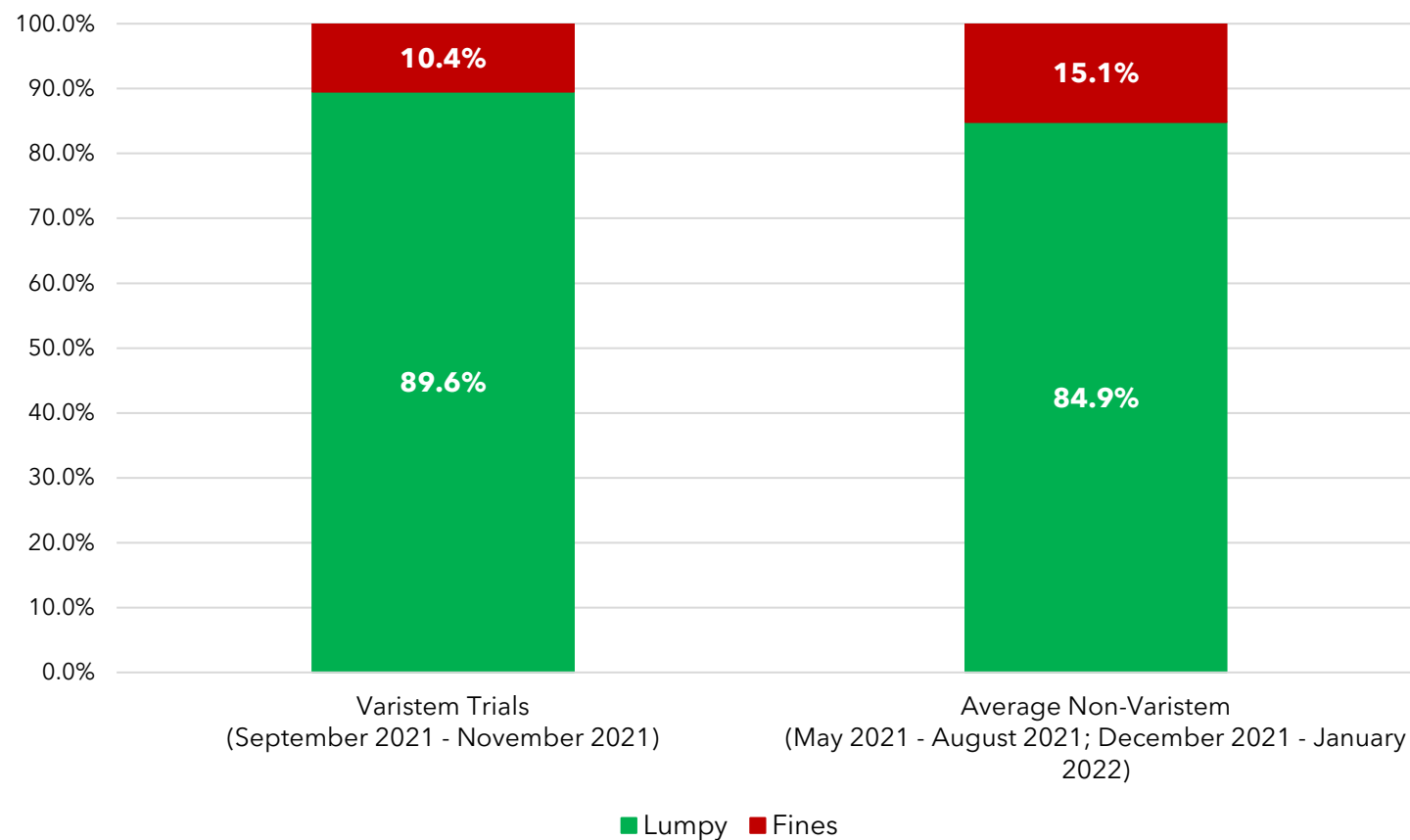


EPISODE 4: YOUR BLAST OBJECTIVES AREN'T MINE

CASE STUDY 5: **MANGANESE MINE A**



CASE STUDY 5: MANGANESE MINE A



CASE STUDY 6: DOLOMITE QUARRY A

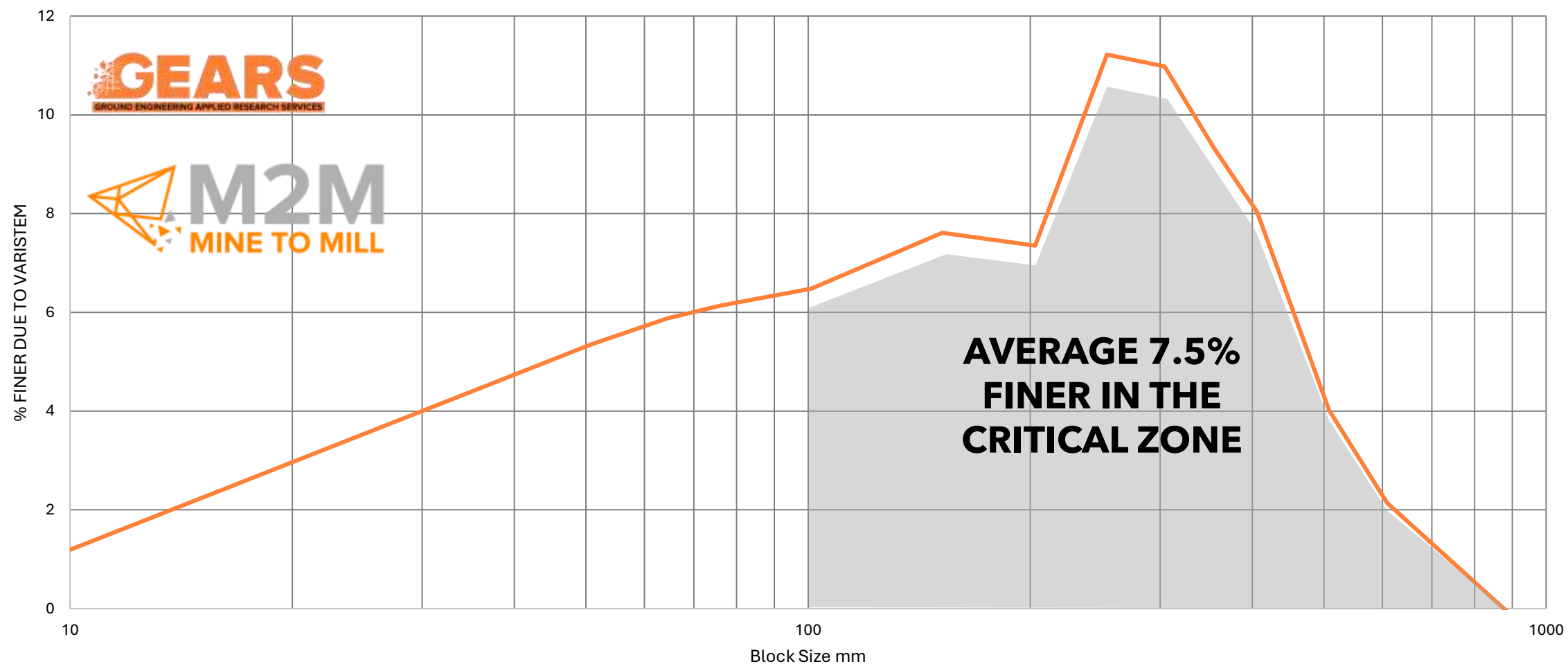


CASE STUDY 6: DOLOMITE QUARRY A

WHITWELL QUARRY VARISTEM TRIAL 06/07/23

NORMAL STEMMING SIDE

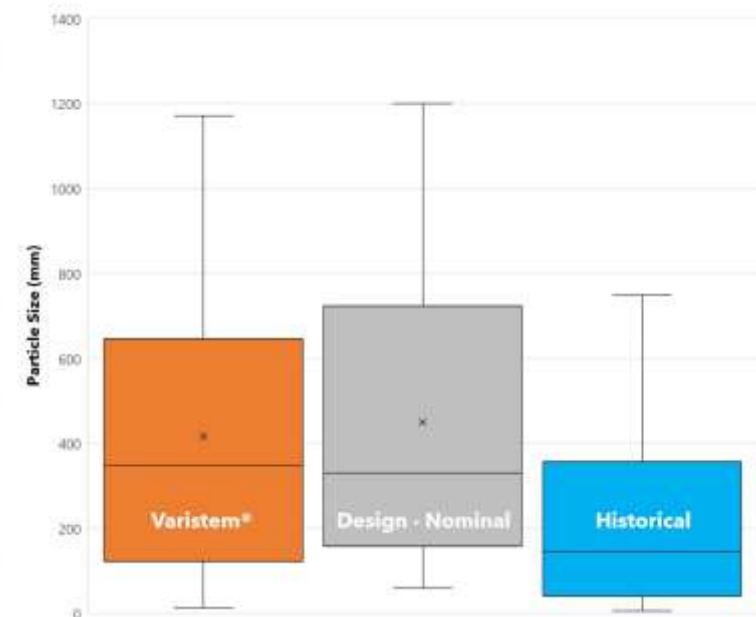
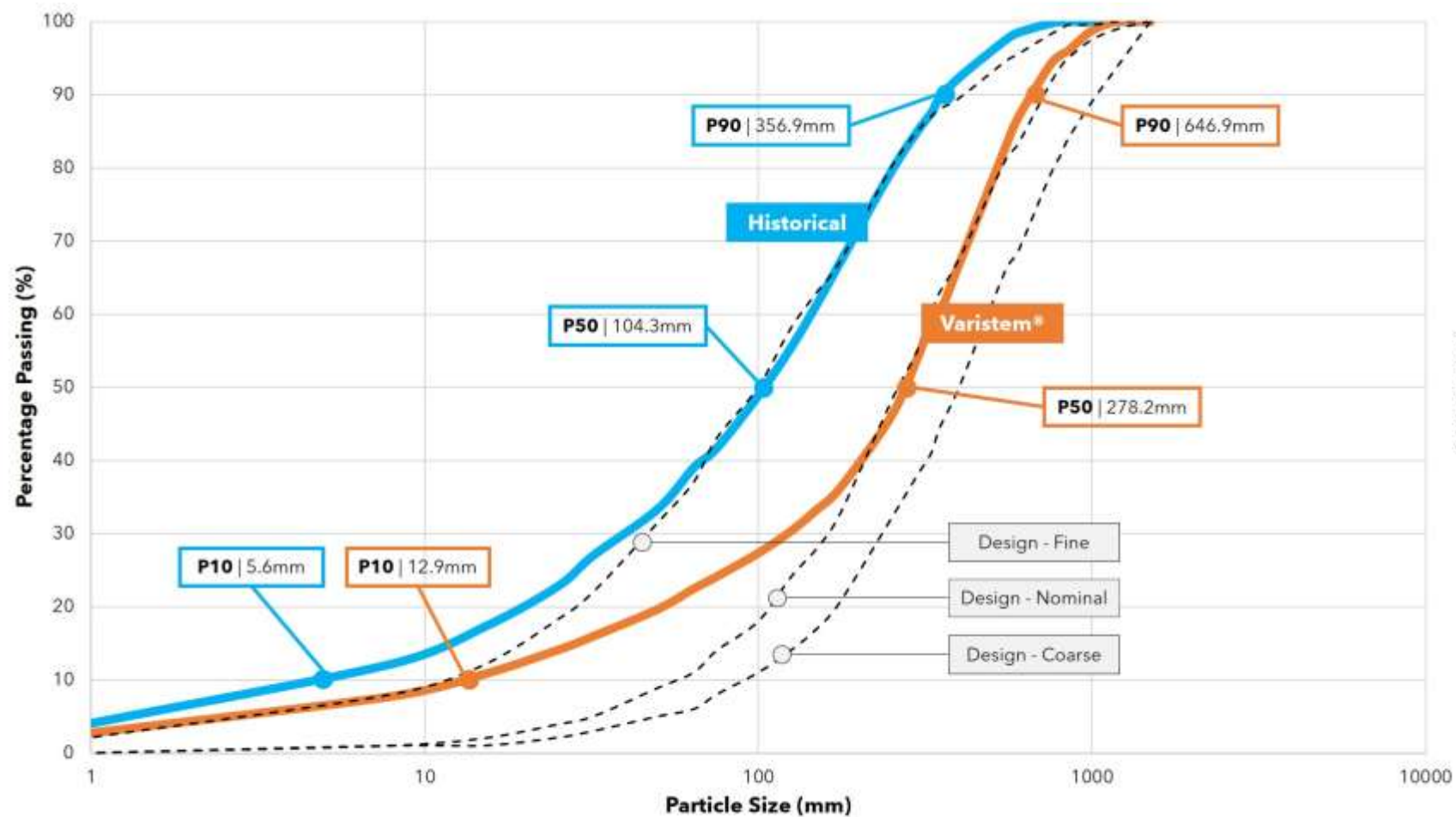
CASE STUDY 6: DOLOMITE QUARRY A



CASE STUDY 7: IRON ORE MINE B



CASE STUDY 7: IRON ORE MINE B



CASE STUDY 8: **COAL MINE B**



CASE STUDY 8: COAL MINE B

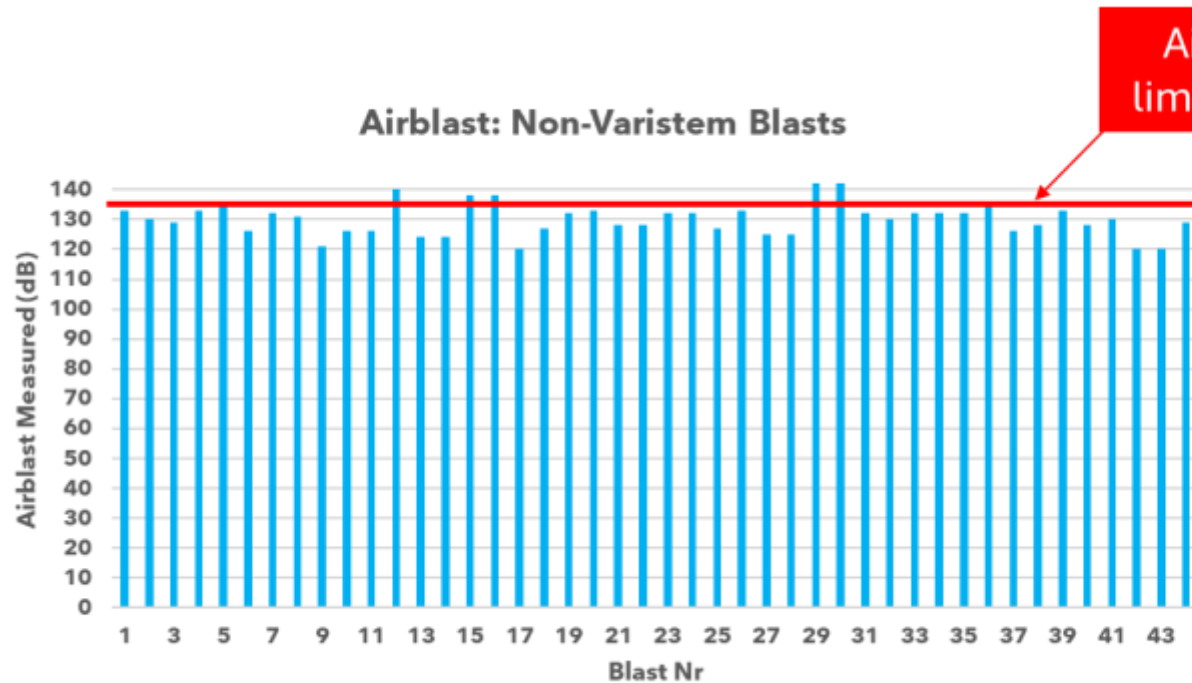


Figure 1: Airblast measured over 44 blasts (Without Varistem ®)

Air blast
limit 134dB

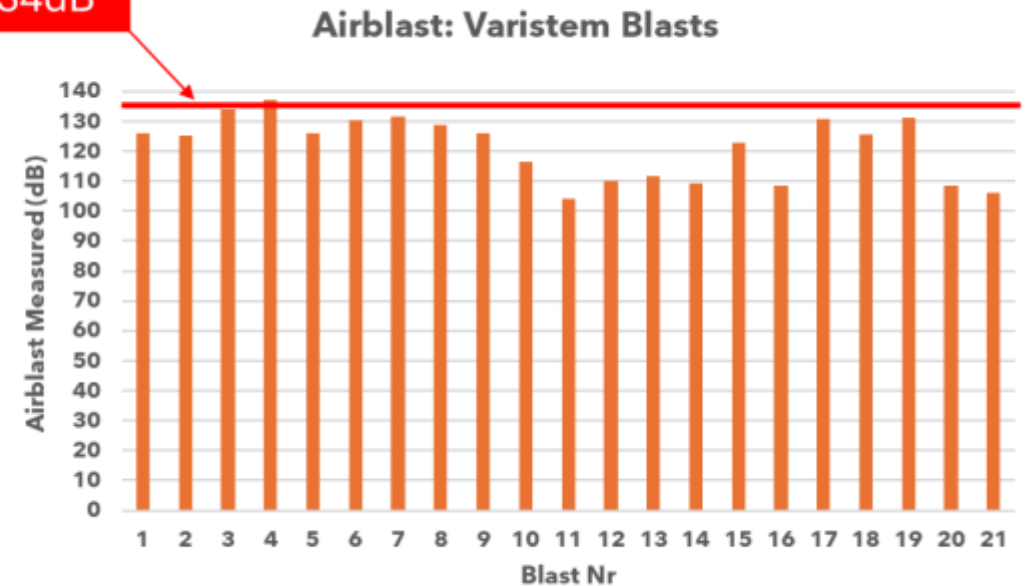


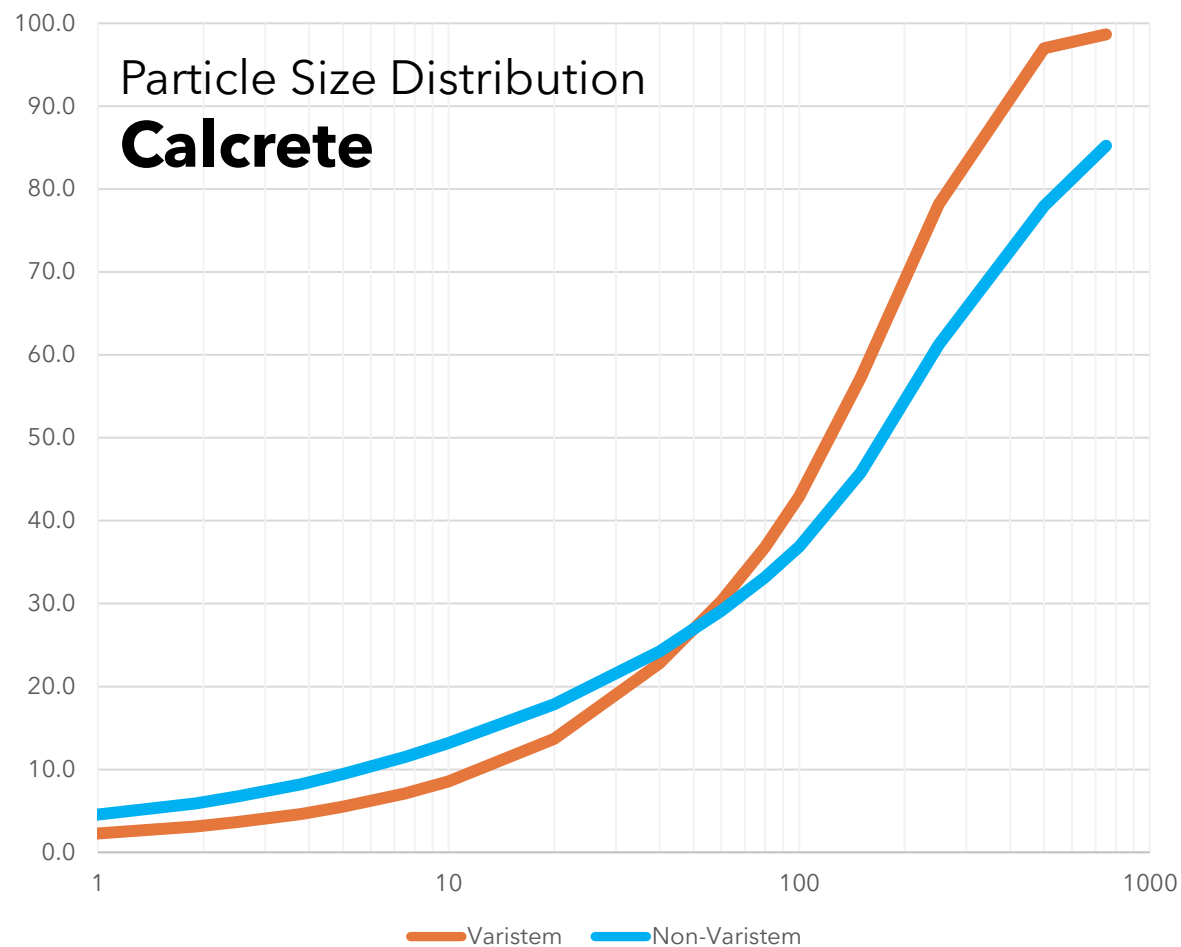
Figure 2: Airblast measured over 21 blasts (With Varistem ®)



EPISODE 5: STEMMING IS AN AFTERTHOUGHT

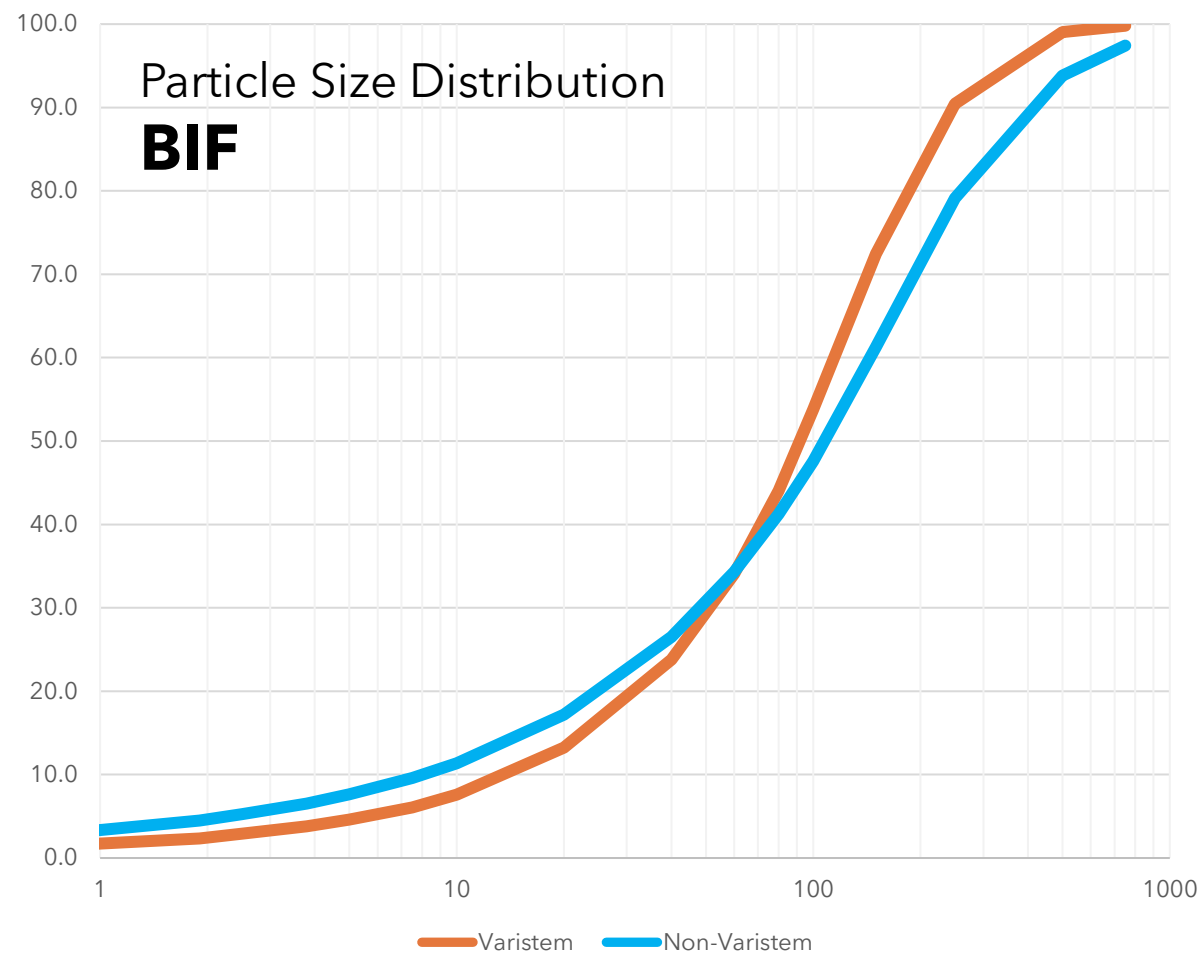


CASE STUDY 9: MANGANESE MINE C



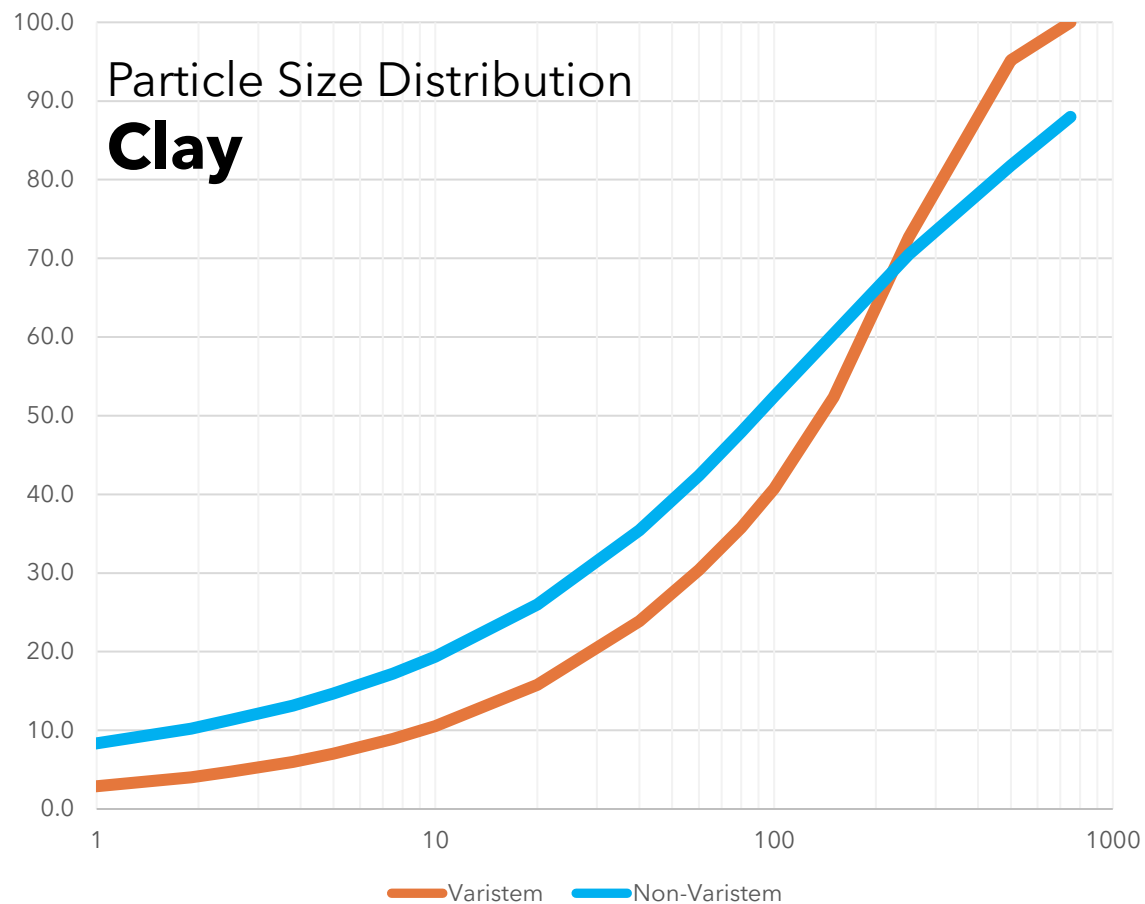
	Varistem (mm)	Non-Varistem (mm)	Reduction (%)
Topsize	622	1548	60%
F90	359	1001	64%
F80	259	748	65%
F70	203	529	62%
F60	162	342	53%
F50	130	210	38%
F40	101	129	22%
F30	74	74	0%
F20	50	39	-28%
F10	27	16	-70%

CASE STUDY 9: MANGANESE MINE C



	Varistem (mm)	Non-Varistem (mm)	Reduction (%)
Topsize	446	756	41%
F90	247	426	42%
F80	189	283	33%
F70	152	213	29%
F60	122	162	25%
F50	97	122	21%
F40	74	88	16%
F30	53	59	10%
F20	33	34	2%
F10	16	14	-17%

CASE STUDY 9: MANGANESE MINE C



	Varistem (mm)	Non-Varistem (mm)	Reduction (%)
Topsize	714	1526	53%
F90	390	797	51%
F80	296	488	39%
F70	235	308	24%
F60	185	177	-5%
F50	140	109	-29%
F40	97	59	-64%
F30	59	29	-104%
F20	30	11	-163%
F10	9	3	-245%

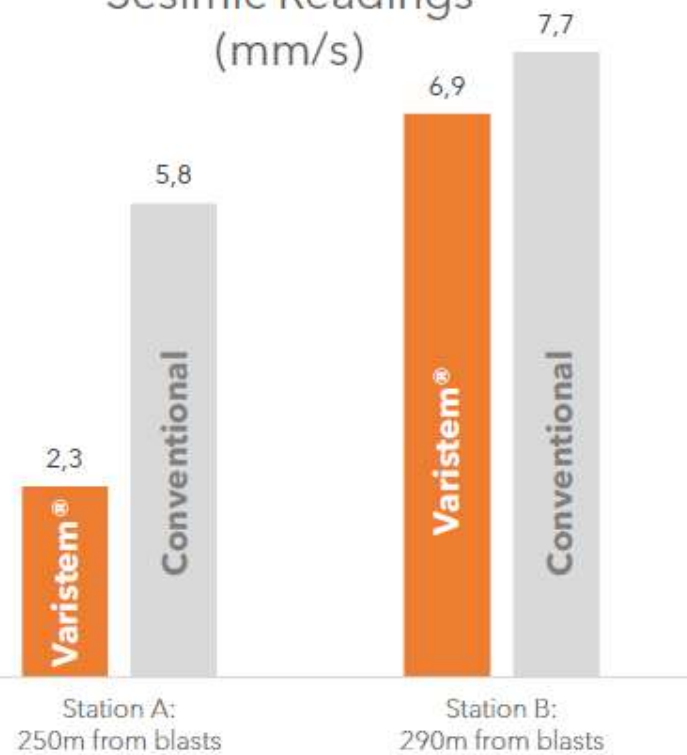
CASE STUDY 10: **QUARRY C**



CASE STUDY 10: QUARRY C

60% reduction 10% reduction

Sesimic Readings
(mm/s)



CASE STUDY 10: QUARRY C

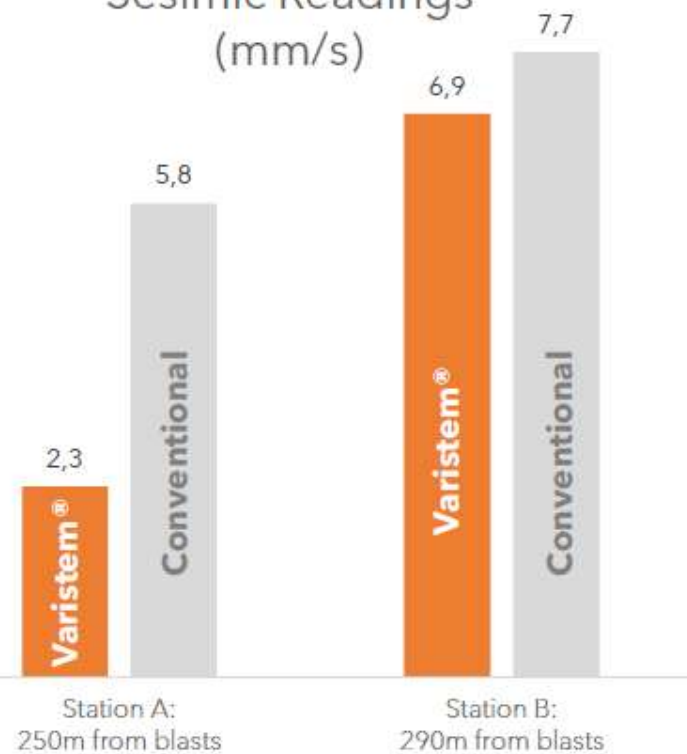
60% reduction

10% reduction

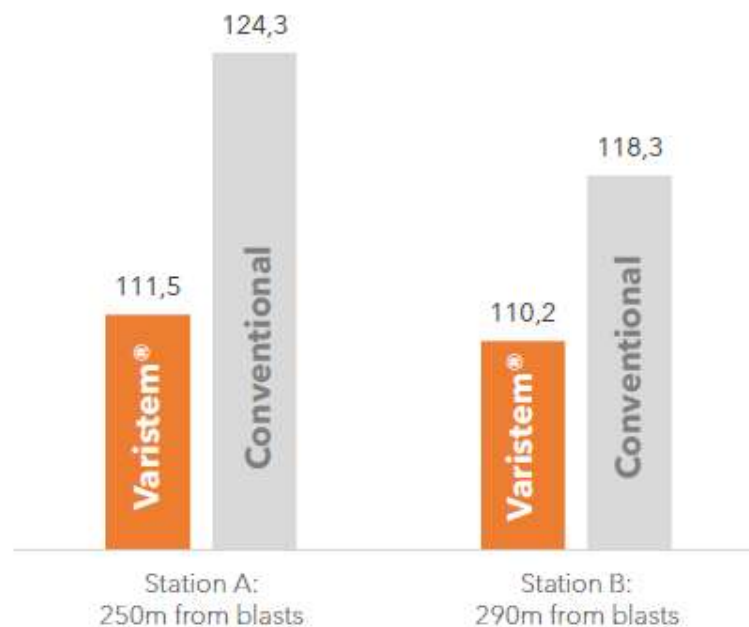
10% reduction

7% reduction

Sesimic Readings
(mm/s)



Noise Readings
(dBL)



CASE STUDY 10: QUARRY C

60% reduction

10% reduction

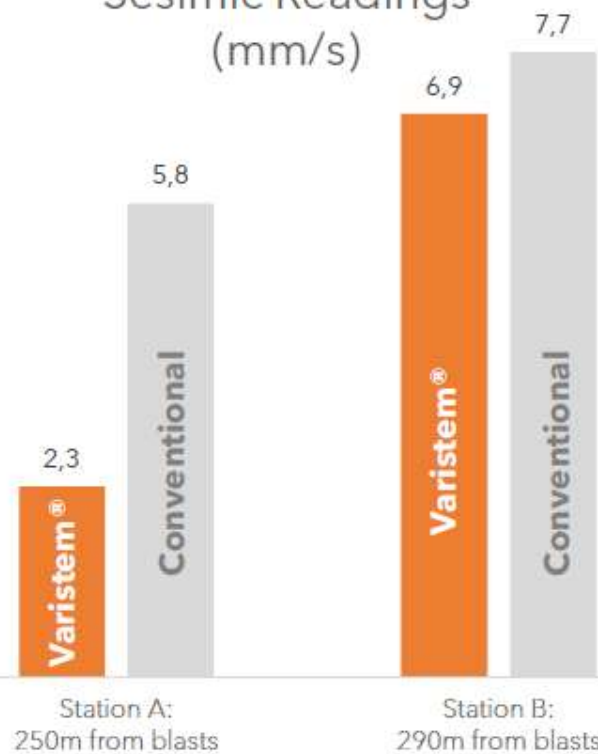
10% reduction

7% reduction

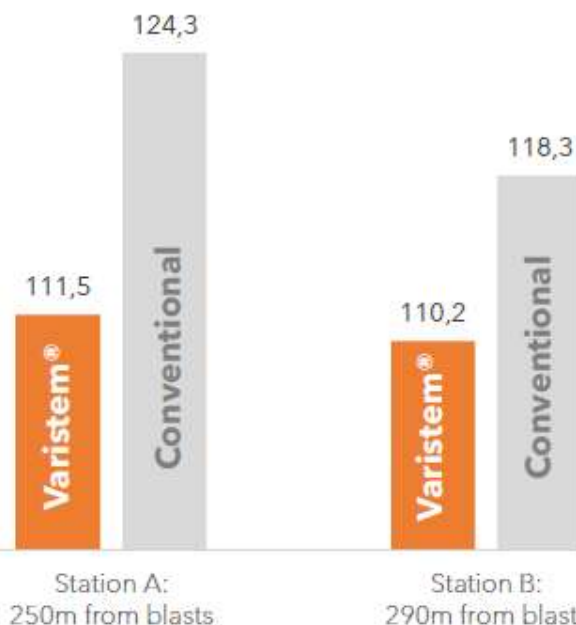
77% reduction

61% reduction

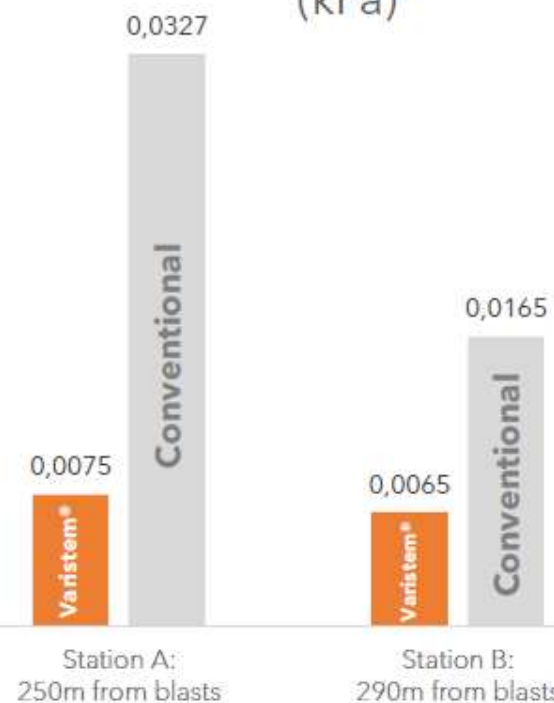
Sesimic Readings
(mm/s)



Noise Readings
(dBL)



Air Blast Pressure
(kPa)





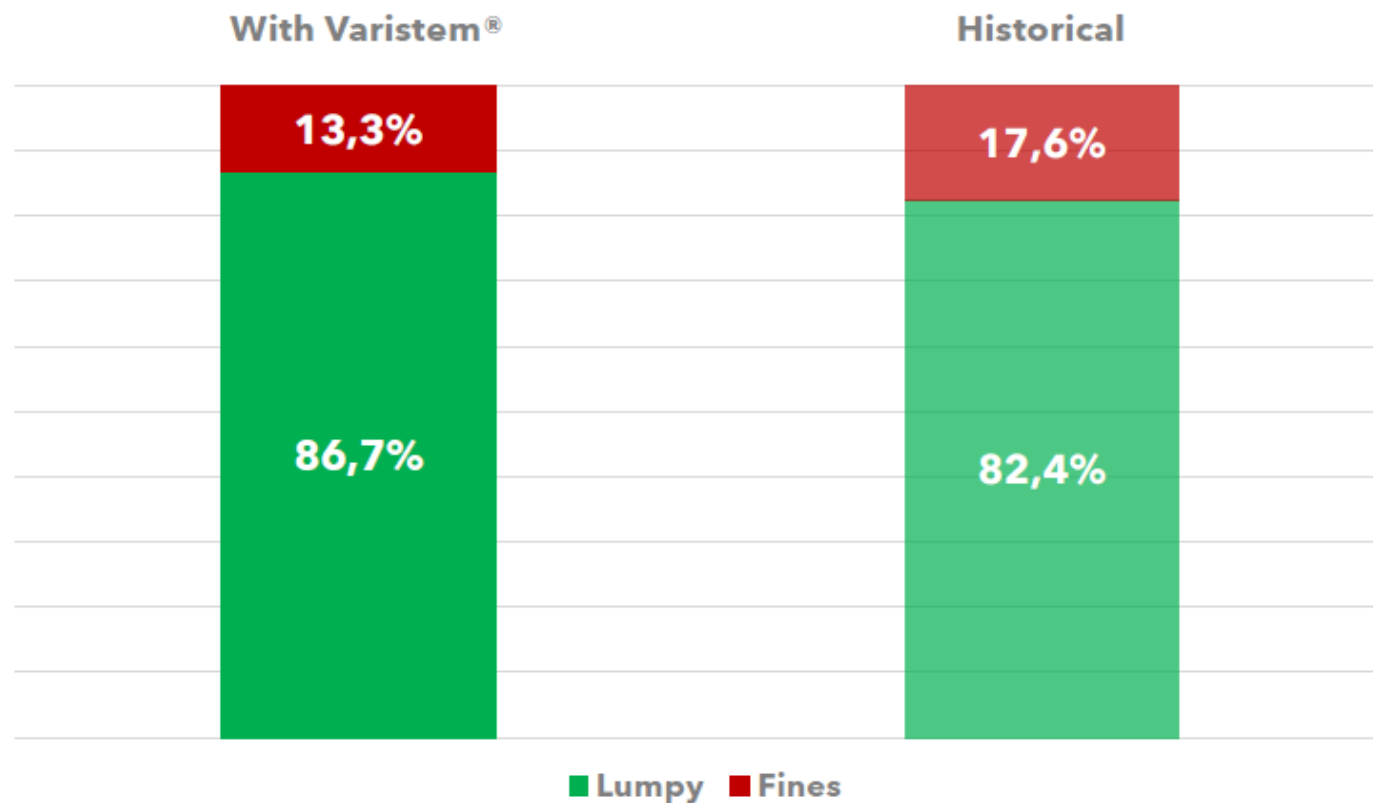
EPISODE 6: IT'S ALL ABOUT MONEY IN THE END



CASE STUDY 11: **MANGANESE MINE B**



CASE STUDY 11: MANGANESE MINE B



+ \$9.9M
PER ANNUM PROFIT

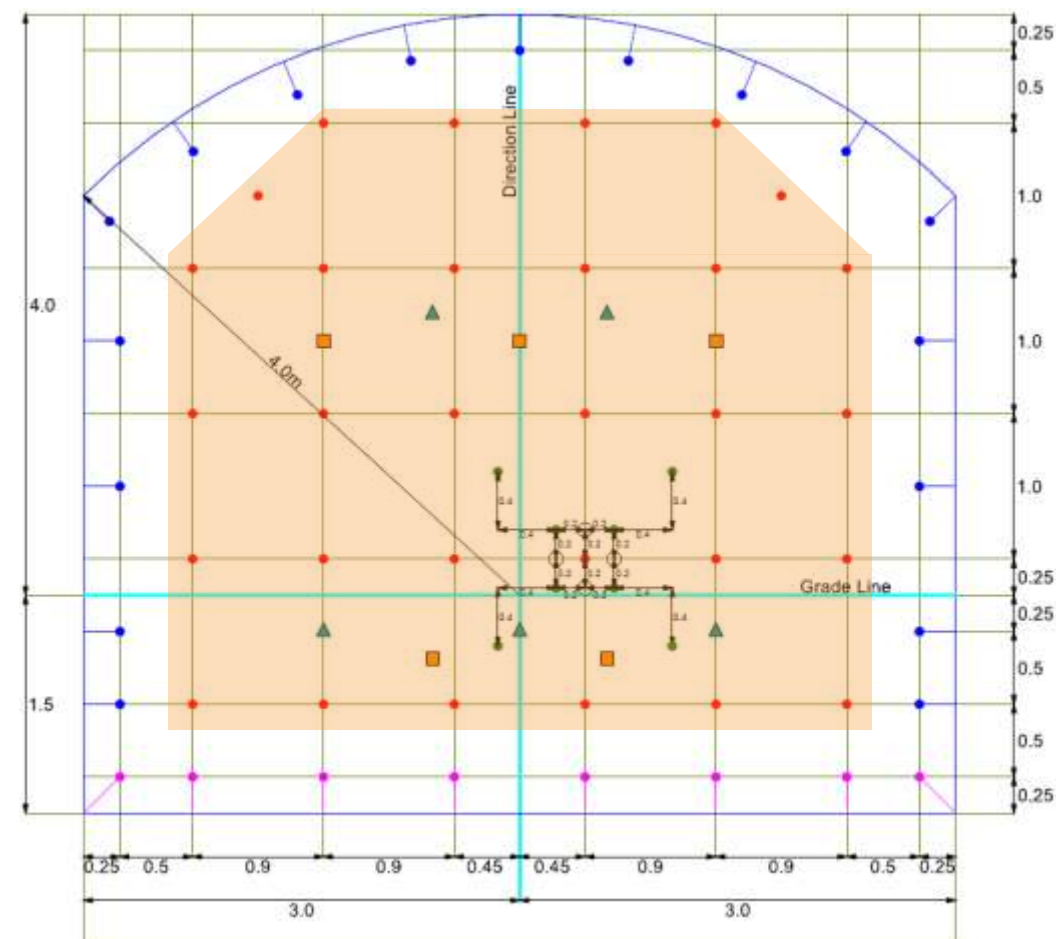
CASE STUDY 12: UG PLATINUM MINE A



CASE STUDY 12: UG PLATINUM MINE A



Example UG Drill Plan



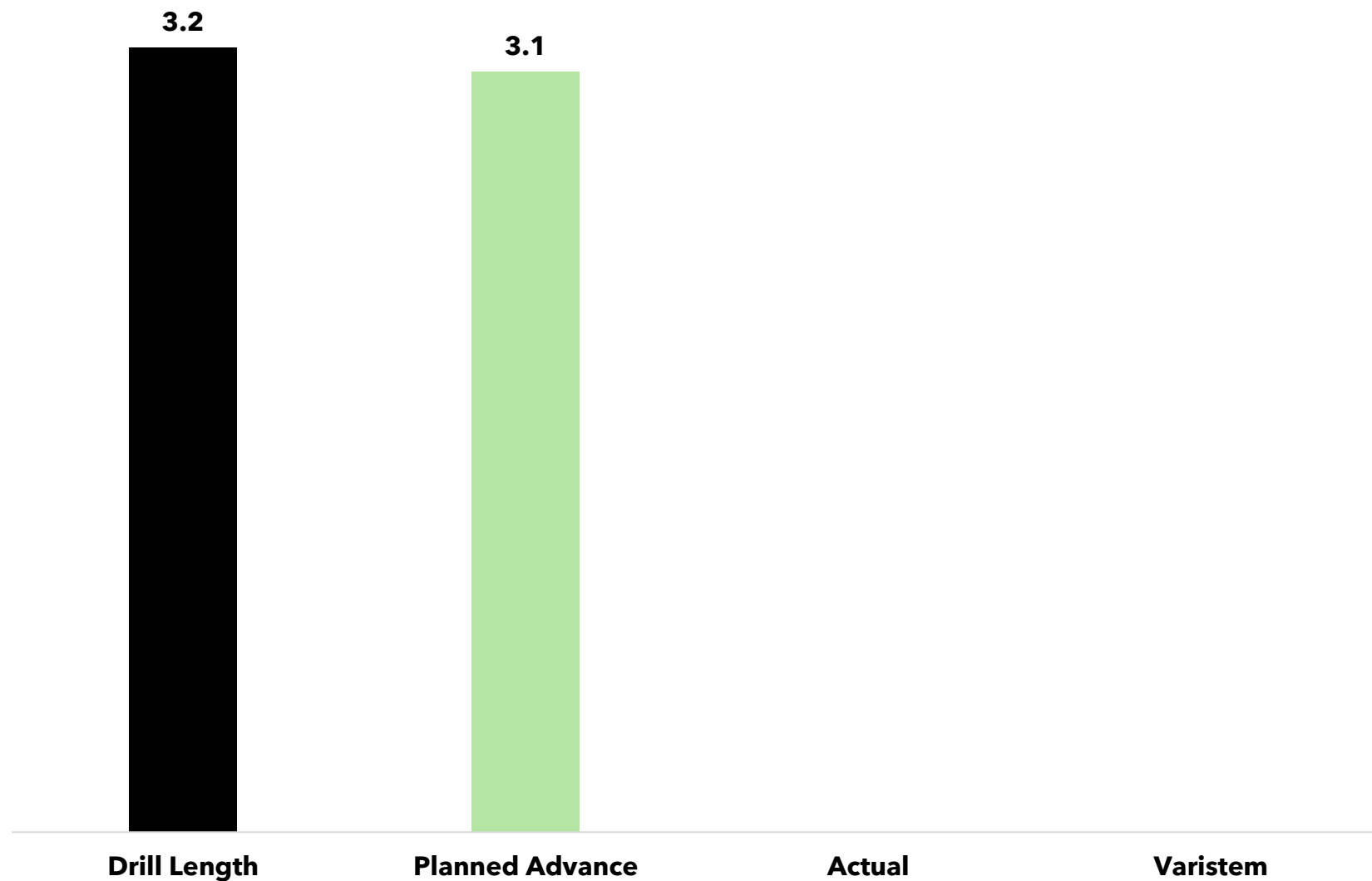
Legend:

- Perimeter Holes
- Grid Holes
- Lifter Holes
- ▲ Cut Holes
- Preconditioning Holes
- Open Cut Holes

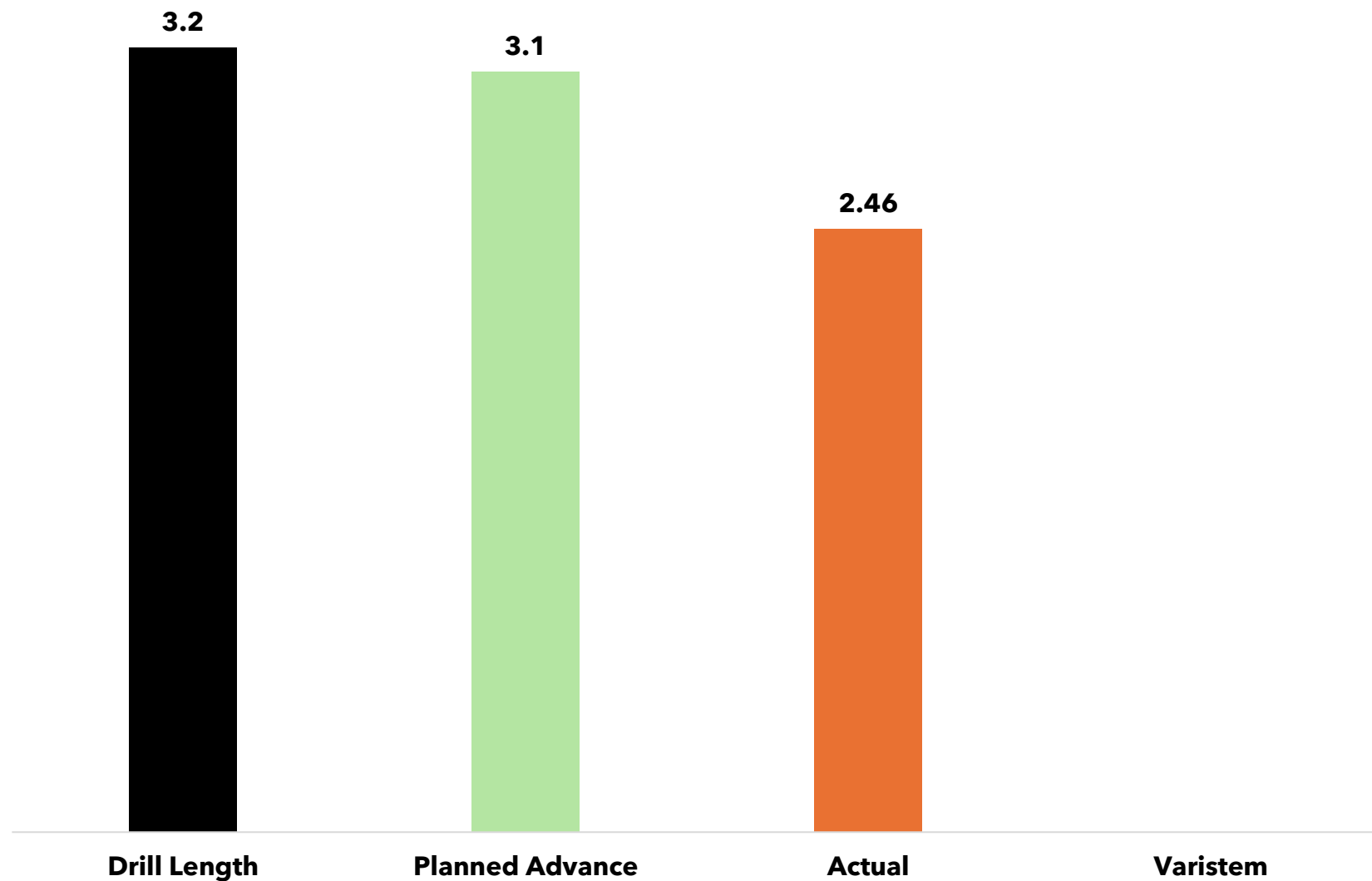
CASE STUDY 12: **UG PLATINUM MINE A**



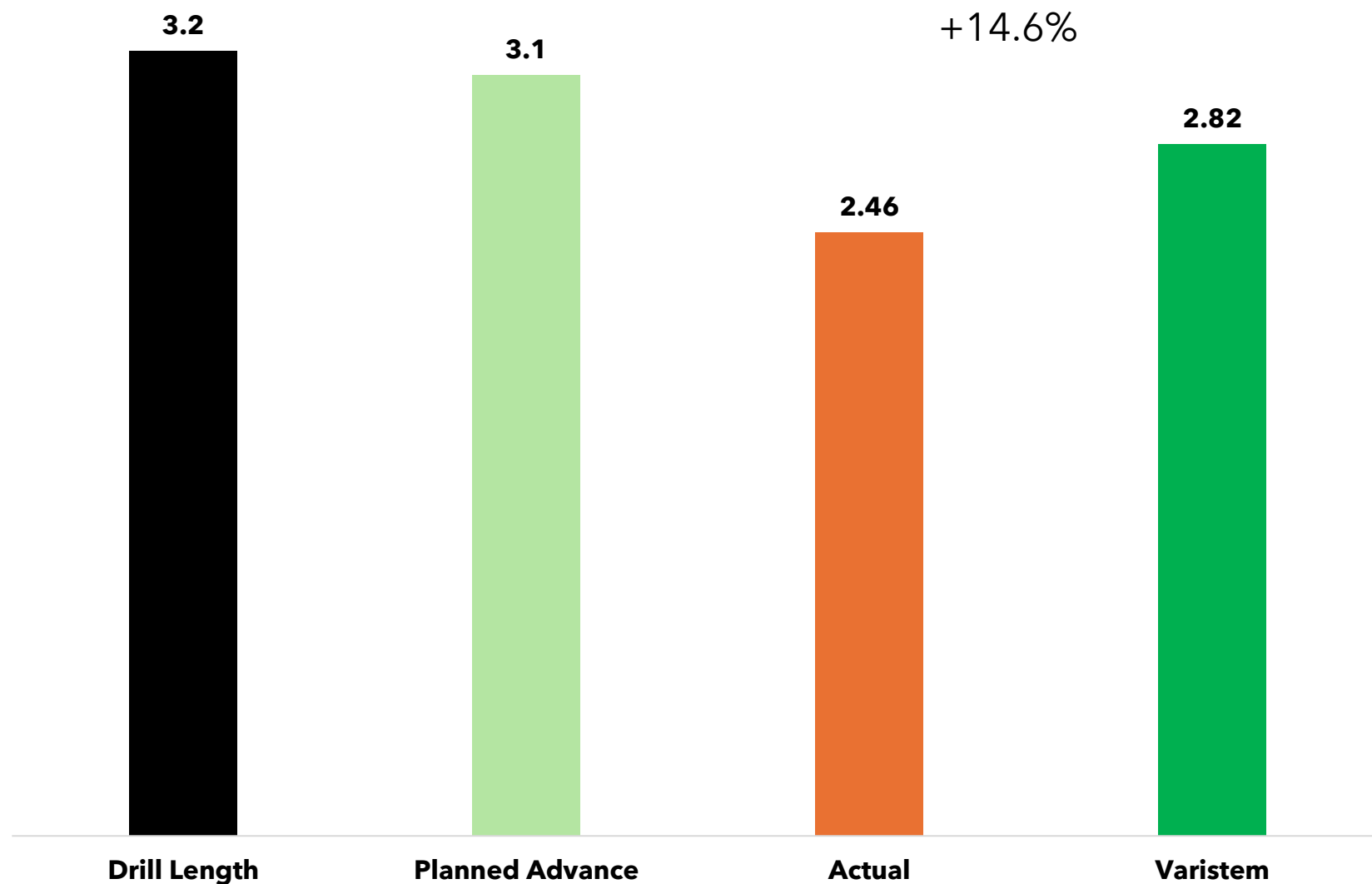
CASE STUDY 12: UG PLATINUM MINE A



CASE STUDY 12: UG PLATINUM MINE A



CASE STUDY 12: UG PLATINUM MINE A



+R 1.19Bn p/a

+\$ 69M p/a

In closing...

Blasting is art - so how can we consistently produce masterpieces?

Episode 1: An architect is not enough

Episode 2: Can't rush a good thing

Episode 3: Wow. That's a bad blast

Episode 4: Your blast objectives aren't mine

Episode 5: Stemming is an afterthought

Episode 6: It's all about money in the end

THANK YOU

