

BMA - Daunia Mine

Flyrock Modelling

'Lightning Exclusion Zone Reduction'

ISEE Presentation,
Perth, November 2018.



BHP Billiton Mitsubishi Alliance

Flyrock – Lightning Exclusion Zones

During periods of electrical storms, blast charging processes are suspended, blast areas are evacuated and large exclusion zones are implemented around loaded shots where lightning is present. This project was aimed to determine the safe lightning exclusion distances for loaded shots in open cut operations at Daunia Mine.

Standard Industry practices include –

- Radius of 600 metres, and up to 1000 metres applied;
- The exclusion radius is maintained for 30 minutes after storm passes;
- ‘Limited’ or ‘No’ modelling validation conducted on actual in field loading conditions;
- Exclusion distances largely historical ‘Rule of Thumb’ off design assumption;
- Not based on Engineered or Scientific assessment of flyrock projection
- Risk assessed off design not as loaded conditions;
- Misfires have an exclusion zone which varies for sites and maybe inadequate to manage risk safely

Flyrock Exclusion Zones – Project Summary

The Journey for Change:

- Engage industry expert to support trials and independently Annalise data;
- Commenced trial of Flyrock modeling software (Paradigm);
- Field tests in various ground conditions in multiple pits and RL's;
- validated data captured for each blasthole via (Blastlogic);
- Integration of as loaded data required for modelling software (Blastlogic > Paradigm);
- Communication with Blast crews new data process requirements (Top of Product);

An overview of the Flyrock modelling work conducted..

Atlas Hole #1 (229 mm, 5 m aggregate
stemming, 134 kg ANFO @ 0.80 g/cc)

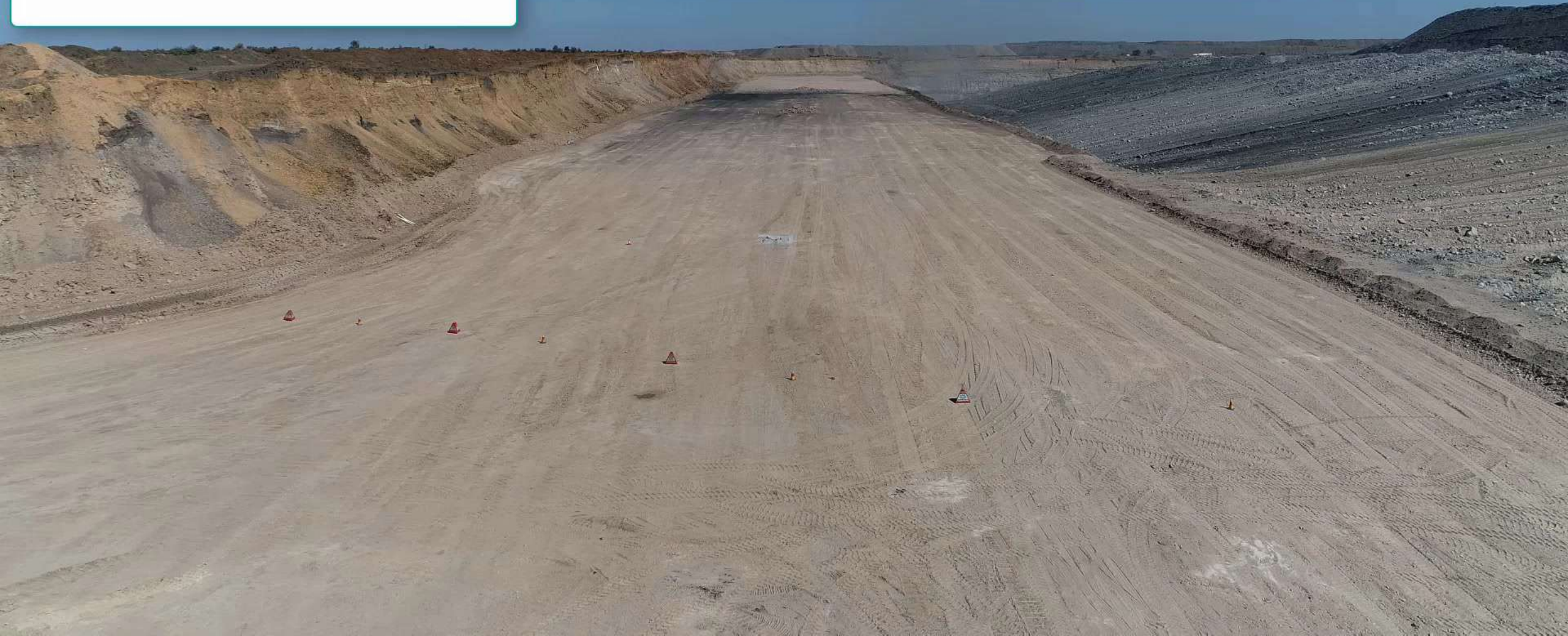
Charge length: 4.4 m

Effective hole dia: 220 mm

SDoB: 1.54 m/kg^{1/3}

Cratering: No

Max projection distance: 15 m



Atlas Hole #1 (229 mm, 5 m aggregate
stemming, 134 kg ANFO @ 0.80 g/cc)

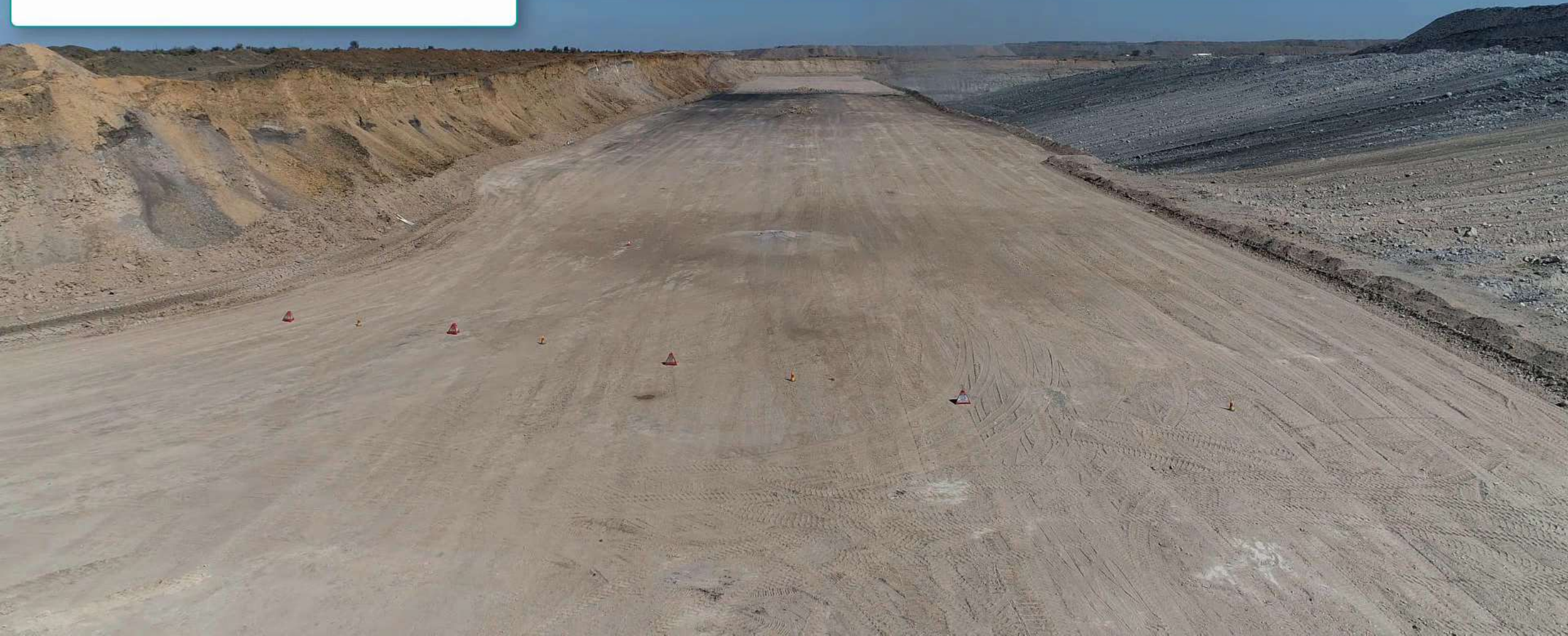
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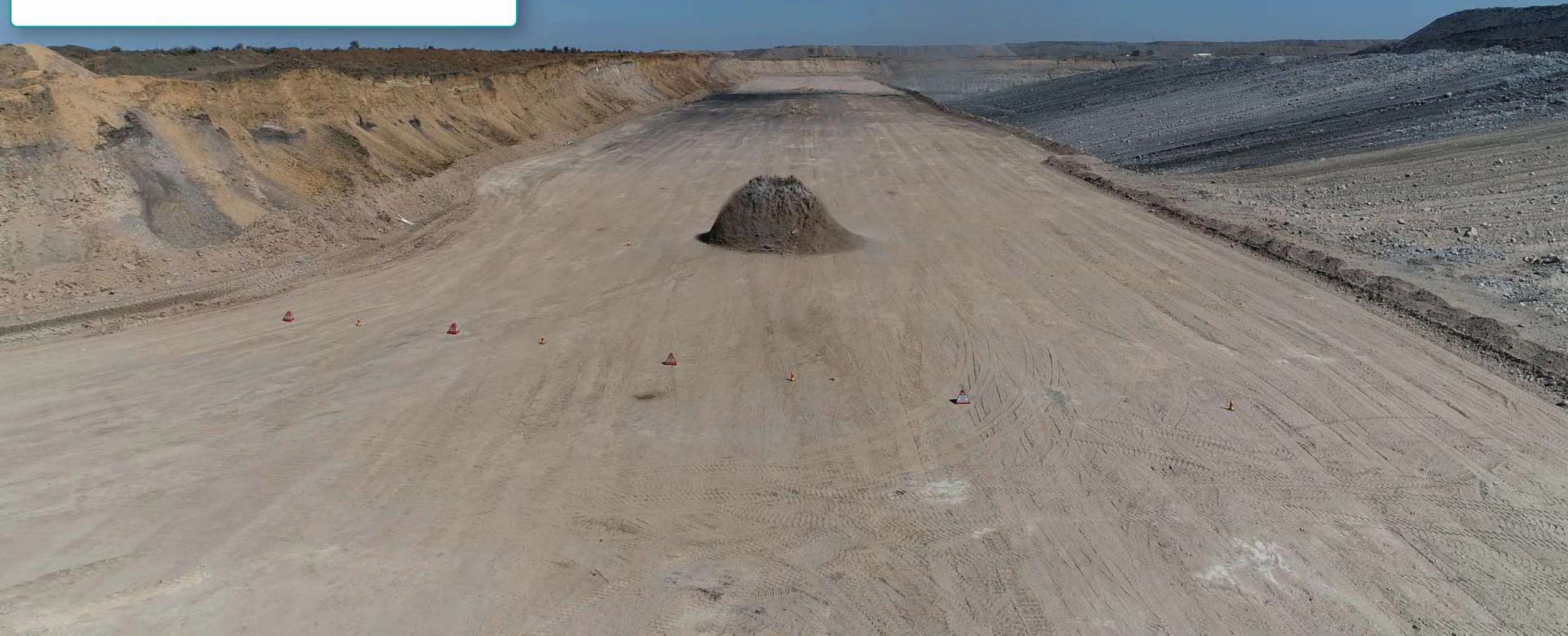
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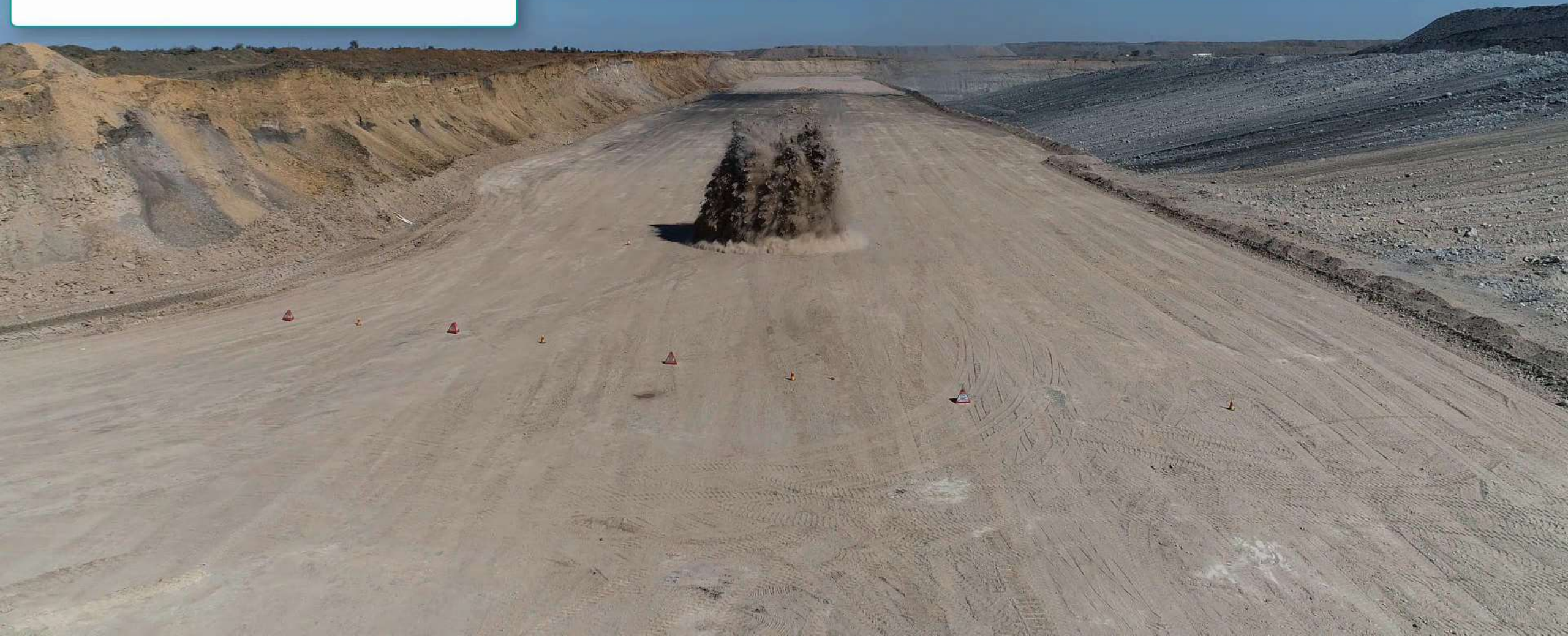
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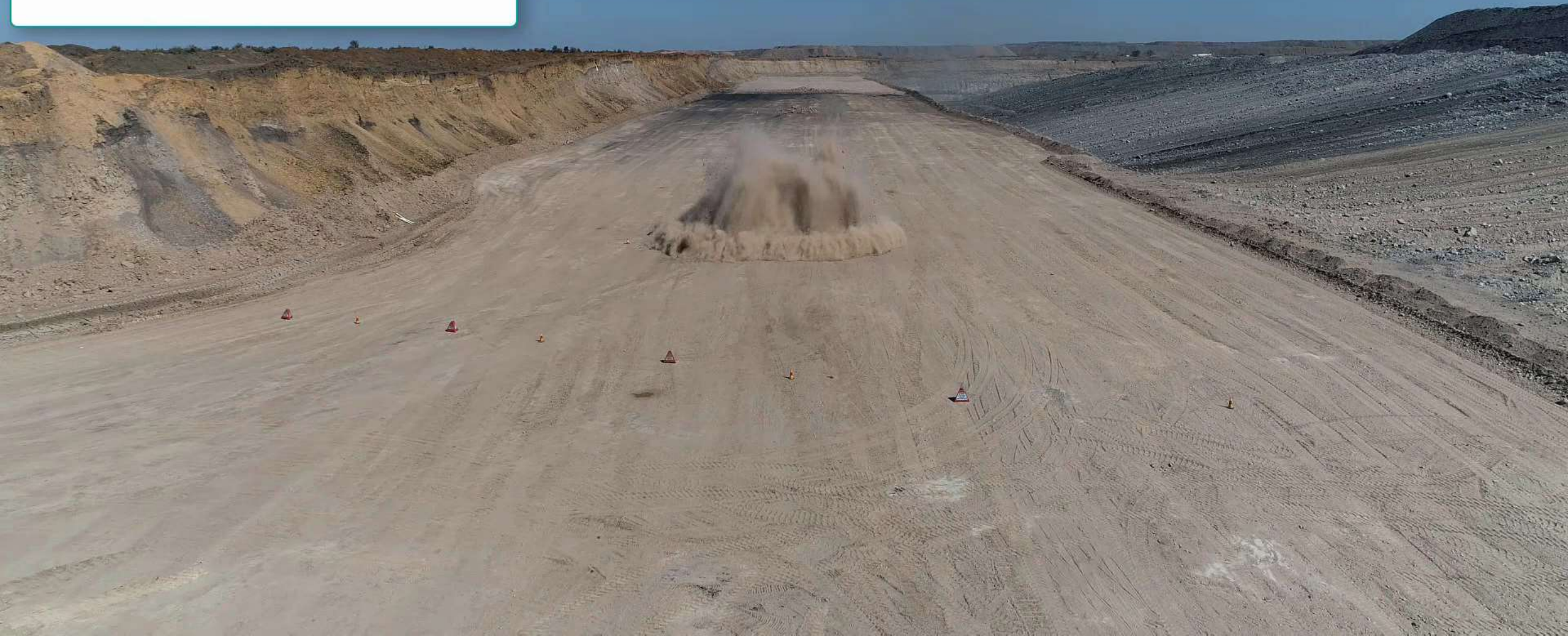
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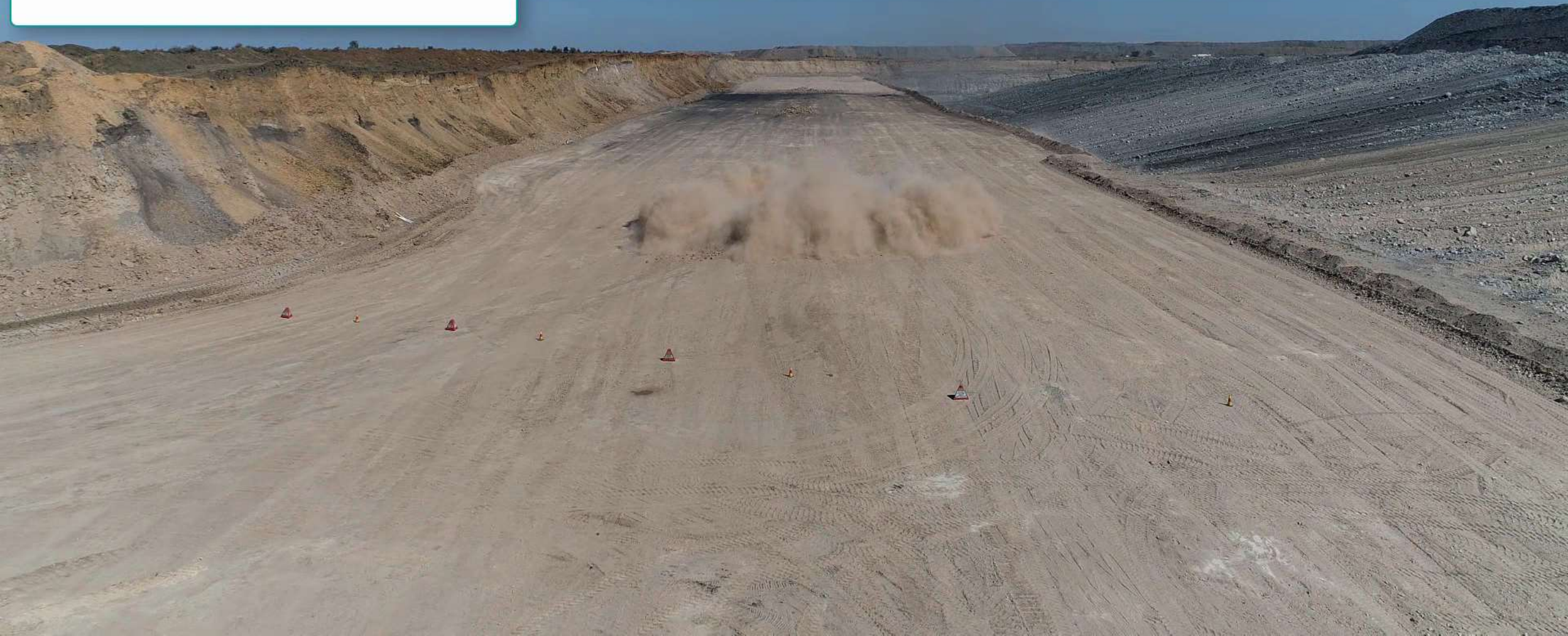
Charge length: 4.4 m

Effective hole dia: 220 mm

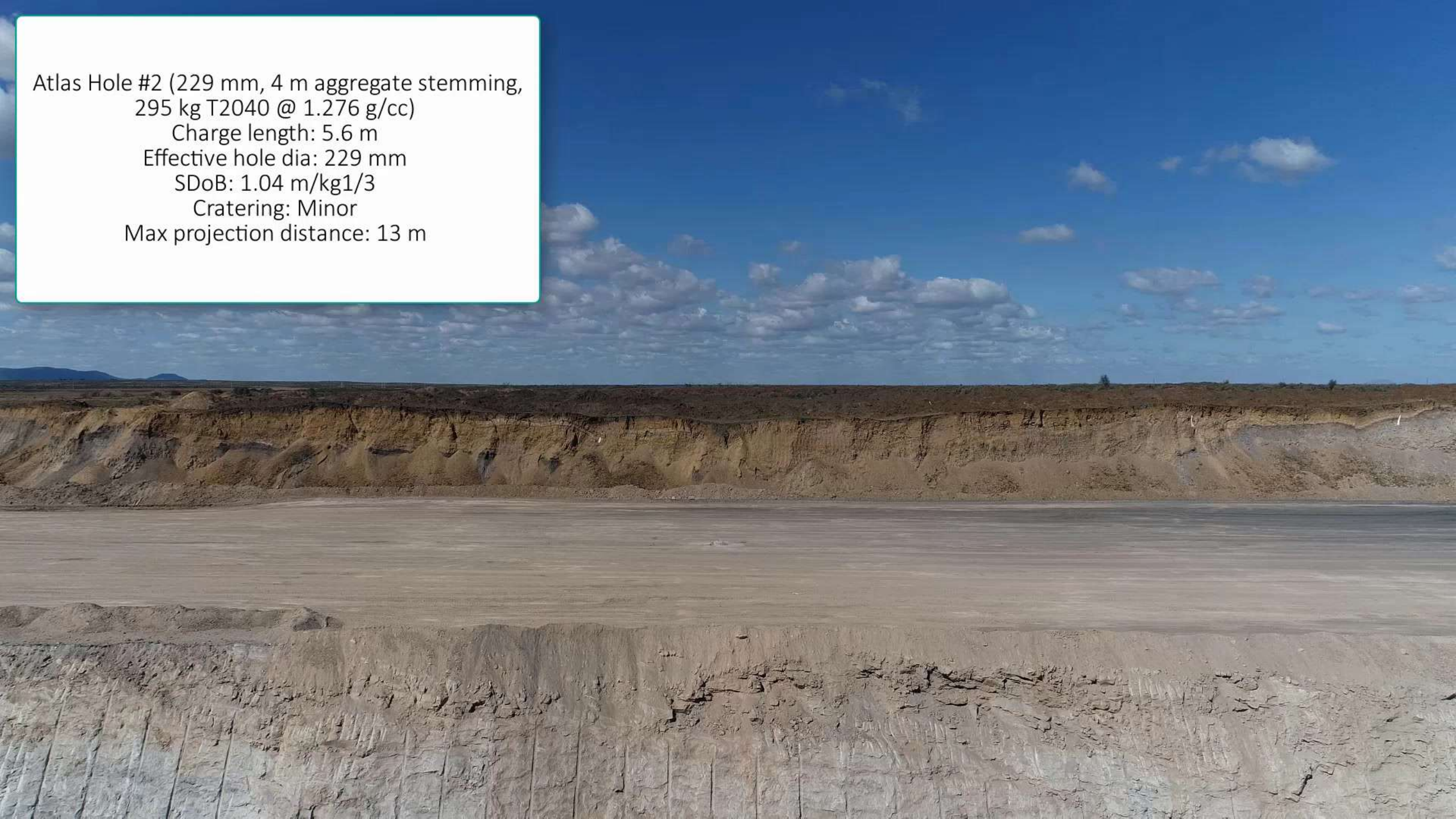
SDoB: 1.54 m/kg^{1/3}

Cratering: No

Max projection distance: 15 m



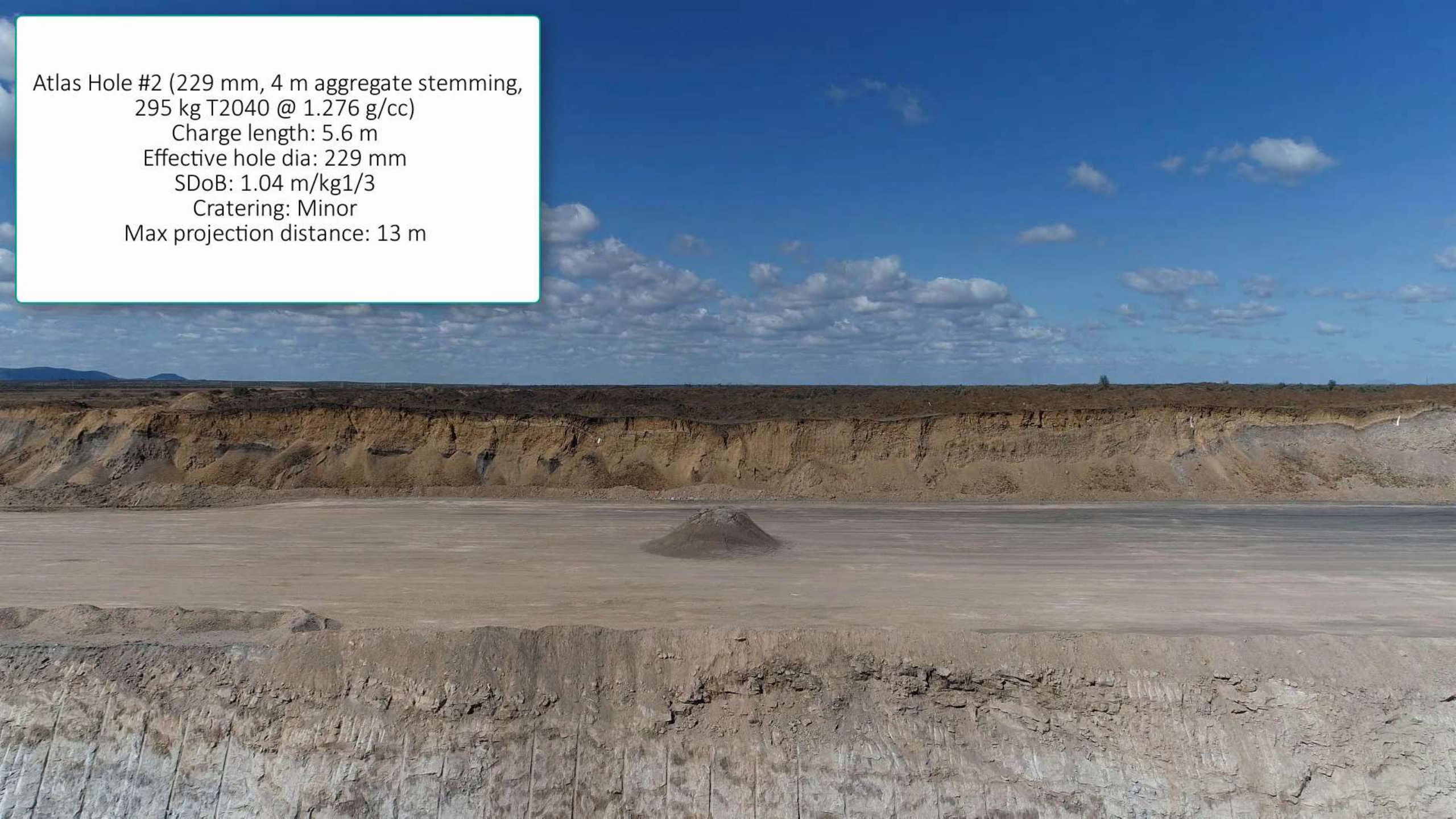
Atlas Hole #2 (229 mm, 4 m aggregate stemming,
295 kg T2040 @ 1.276 g/cc)
Charge length: 5.6 m
Effective hole dia: 229 mm
SDoB: 1.04 m/kg^{1/3}
Cratering: Minor
Max projection distance: 13 m



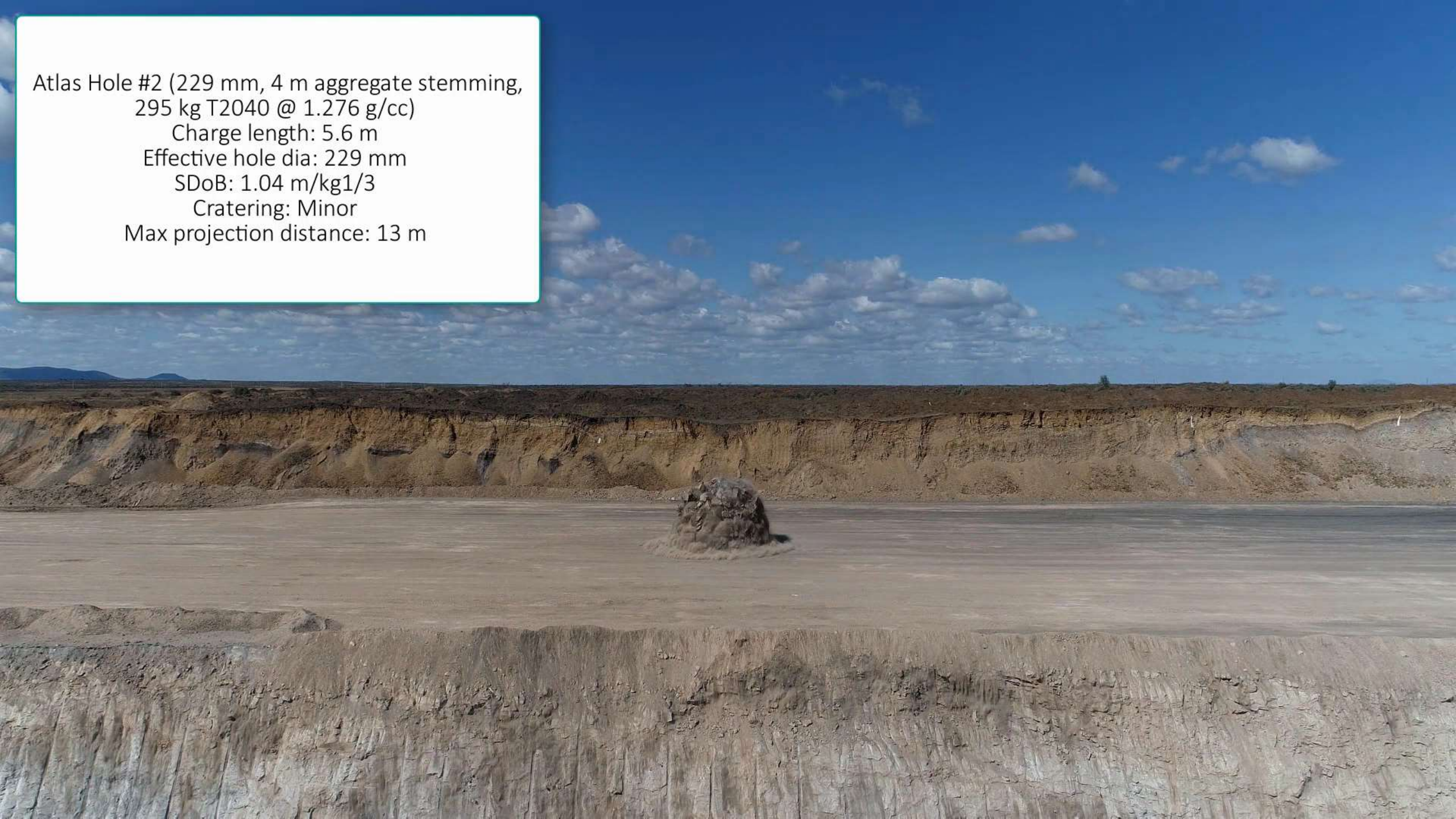
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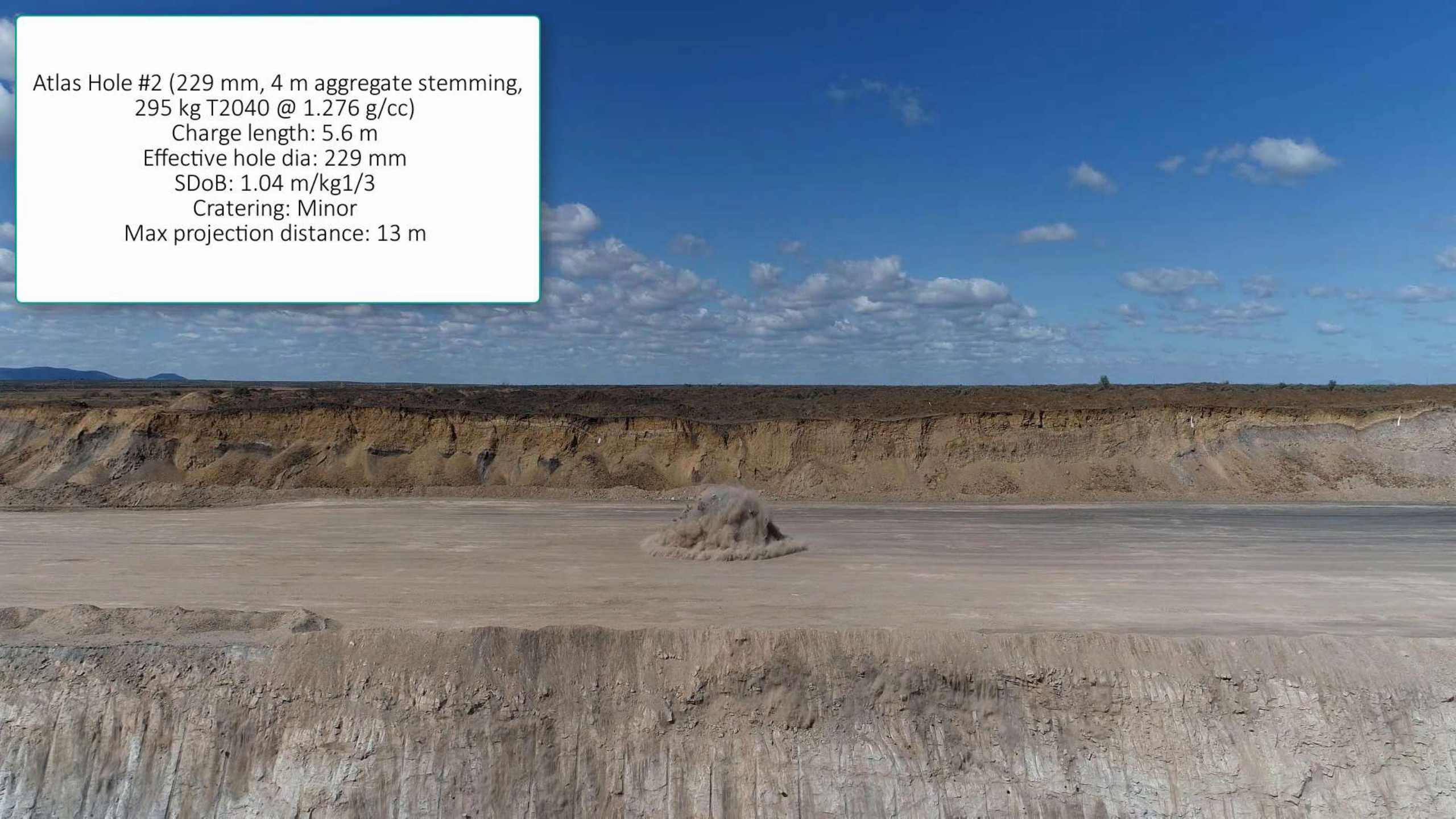
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SDoB: 1.04 m/kg^{1/3}
Cratering: Minor
Max projection distance: 13 m





Atlas Hole #3 (229 mm, 4.5 m aggregate stemming,
159 kg ANFO @ 0.8 g/cc)
Charge length: 5.1 m
Effective hole dia: 223 mm
SDoB: 1.39 m/kg^{1/3}
Cratering: No
Max projection distance: 12 m



Atlas Hole #3 (229 mm, 4.5 m aggregate stemming,
159 kg ANFO @ 0.8 g/cc)
Charge length: 5.1 m
Effective hole dia: 223 mm
SDoB: 1.39 m/kg^{1/3}
Cratering: No
Max projection distance: 12 m



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SDoB: 1.39 m/kg^{1/3}
Cratering: No
Max projection distance: 12 m





Atlas Hole #4 (229 mm, 4 m aggregate stemming,
188 kg ANFO @ 0.8 g/cc)
Charge length: 5.9 m
Effective hole dia: 225 mm
SDoB: $1.24 \text{ m/kg}^{1/3}$
Cratering: Partial
Max projection distance: 90 m



Atlas Hole #4 (229 mm, 4 m aggregate stemming,
188 kg ANFO @ 0.8 g/cc)
Charge length: 5.9 m
Effective hole dia: 225 mm
SDoB: 1.24 m/kg^{1/3}
Cratering: Partial
Max projection distance: 90 m



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Charge length: 5.9 m
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Effective hole dia: 225 mm
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Cratering: Partial
Max projection distance: 90 m



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Charge length: 5.9 m
Effective hole dia: 225 mm
SDoB: $1.24 \text{ m/kg}^{1/3}$
Cratering: Partial
Max projection distance: 90 m

Atlas Hole #5 (229 mm, 4.5 m aggregate stemming,
283 kg T2040 @ 1.276 g/cc)
Charge length: 5.1 m
Effective hole dia: 235 mm
SDoB: 1.10 m/kg^{1/3}
Cratering: Partial
Max projection distance: 43 m



Atlas Hole #5 (229 mm, 4.5 m aggregate stemming,
283 kg T2040 @ 1.276 g/cc)
Charge length: 5.1 m
Effective hole dia: 235 mm
SDoB: 1.10 m/kg^{1/3}
Cratering: Partial
Max projection distance: 43 m



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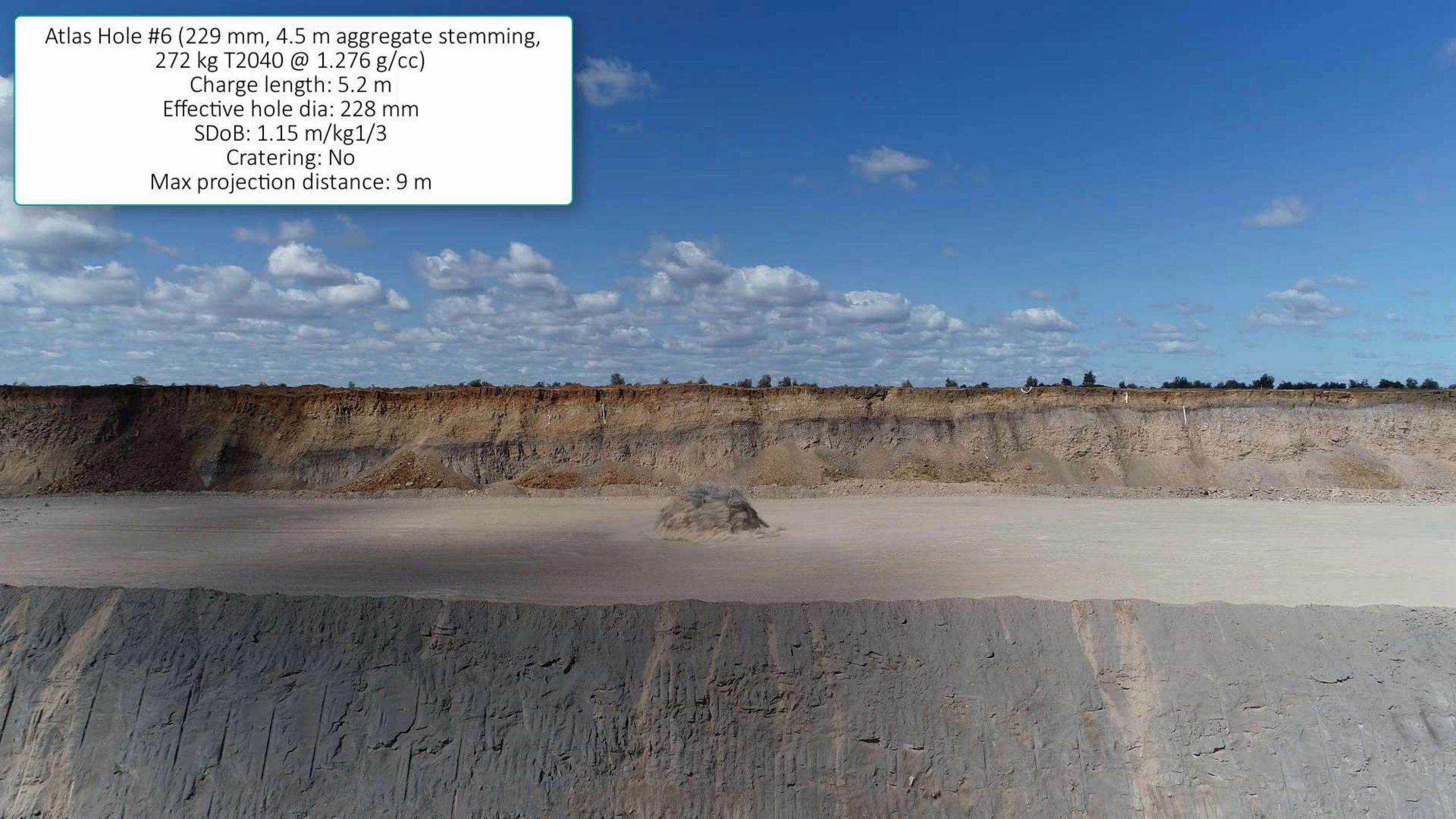
Atlas Hole #6 (229 mm, 4.5 m aggregate stemming,
272 kg T2040 @ 1.276 g/cc)
Charge length: 5.2 m
Effective hole dia: 228 mm
SDoB: 1.15 m/kg^{1/3}
Cratering: No
Max projection distance: 9 m



Atlas Hole #6 (229 mm, 4.5 m aggregate stemming,
272 kg T2040 @ 1.276 g/cc)
Charge length: 5.2 m
Effective hole dia: 228 mm
SDoB: 1.15 m/kg^{1/3}
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Effective hole dia: 228 mm
SDoB: 1.15 m/kg^{1/3}
Cratering: No
Max projection distance: 9 m



Atlas Hole #7 (229 mm, 5 m aggregate stemming,
234 kg T2040 @ 1.276 g/cc)
Charge length: 4.6 m
Effective hole dia: 229 mm
SDoB: 1.26 m/kg^{1/3}
Cratering: No
Max projection distance: 0 m



Atlas Hole #7 (229 mm, 5 m aggregate stemming,
234 kg T2040 @ 1.276 g/cc)
Charge length: 4.6 m
Effective hole dia: 229 mm
SDoB: 1.26 m/kg^{1/3}
Cratering: No
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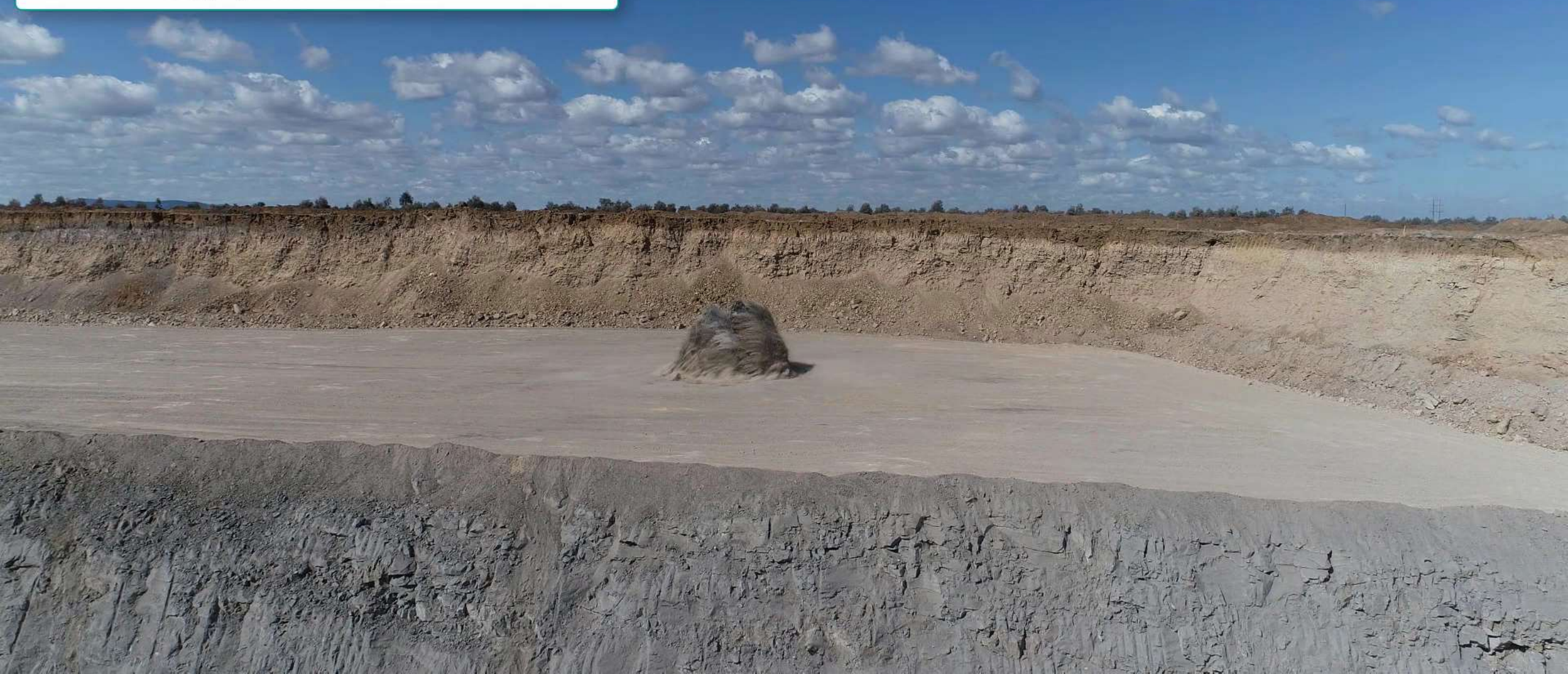
Atlas Hole #8 (229 mm, 4.3 m aggregate stemming,
273 kg T2040 @ 1.276 g/cc)
Charge length: 5.2 m
Effective hole dia: 229 mm
SDoB: 1.1 m/kg^{1/3}
Cratering: Minor
Max projection distance: 14 m



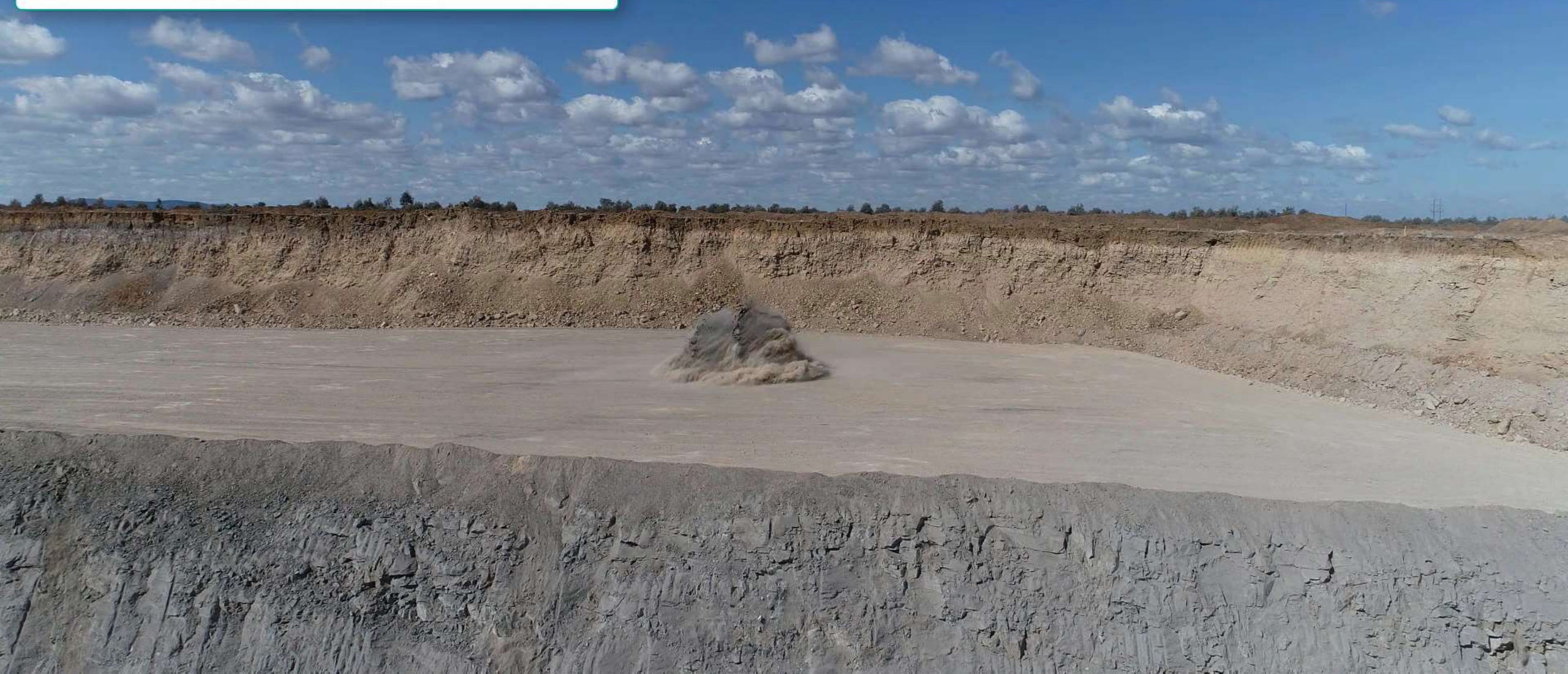
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Charge length: 5.2 m
Effective hole dia: 229 mm
SDoB: 1.1 m/kg^{1/3}
Cratering: Minor
Max projection distance: 14 m



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Cratering: Minor
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Cratering: Minor
Max projection distance: 14 m

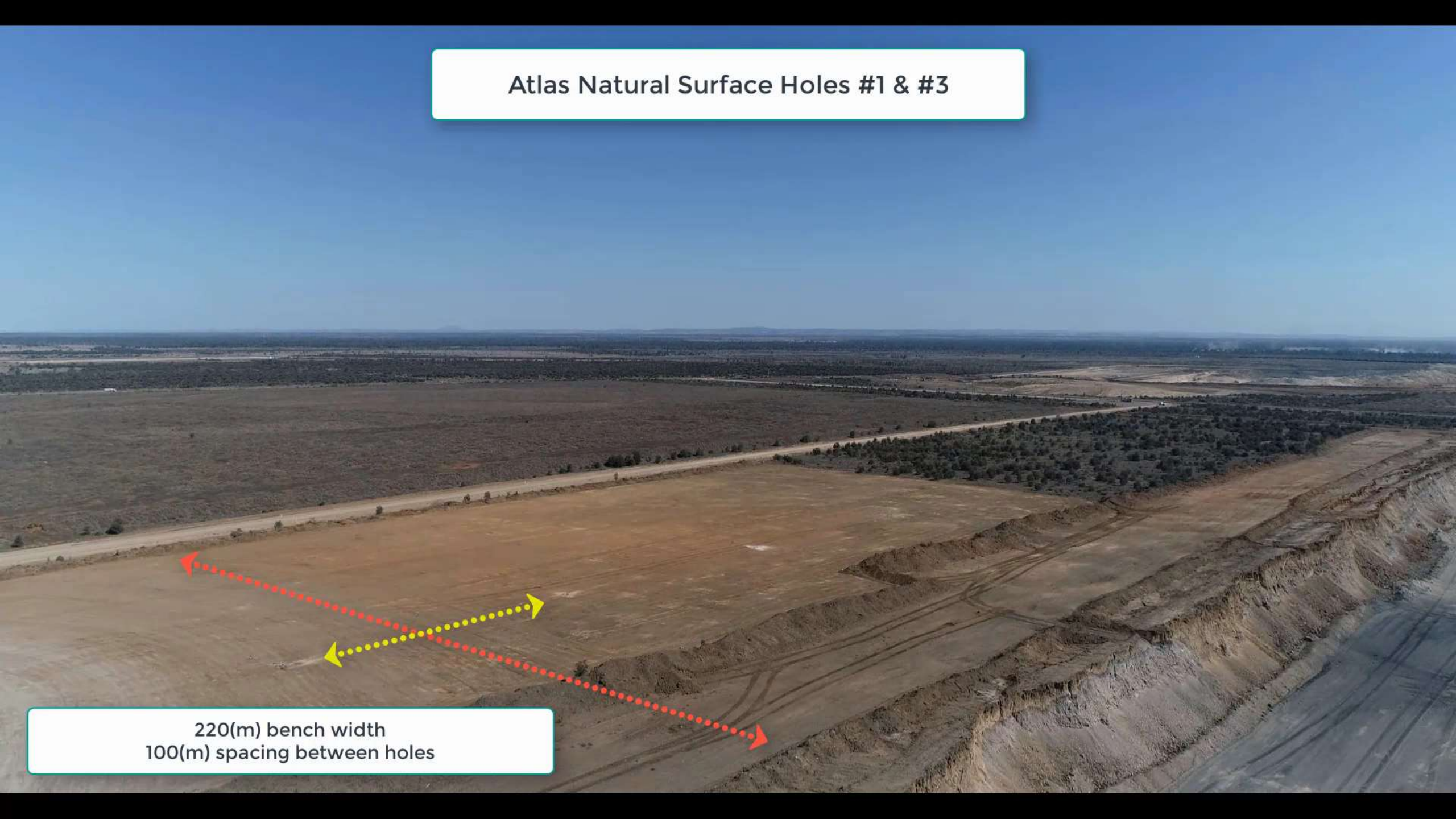


Natural Surface Test Holes

Tertiary material with high clay content.

Does this material behave differently?

Atlas Natural Surface Holes #1 & #3



220(m) bench width
100(m) spacing between holes



Hole #3
4m Stemming
983kg 2040

Hole #1
4m Stemming,
672kg Anfo



Hole #3
4m Stemming
983kg 2040

Hole #1
4m Stemming,
672kg Anfo



Atlas Natural Surface A#8



Atlas Natural Surface A#8



Atlas Natural Surface A#8





Difficult to model footprint due to clay material breaking up.
No rocks identified outside clearance area.
Partial cratering did occur from hole but flyrock reasonably well contained.



A8 was drilled in an old 'Fill point' dam through 2m fill to represent how fill material impacts containment of blasthole energy.

A1 Cratering





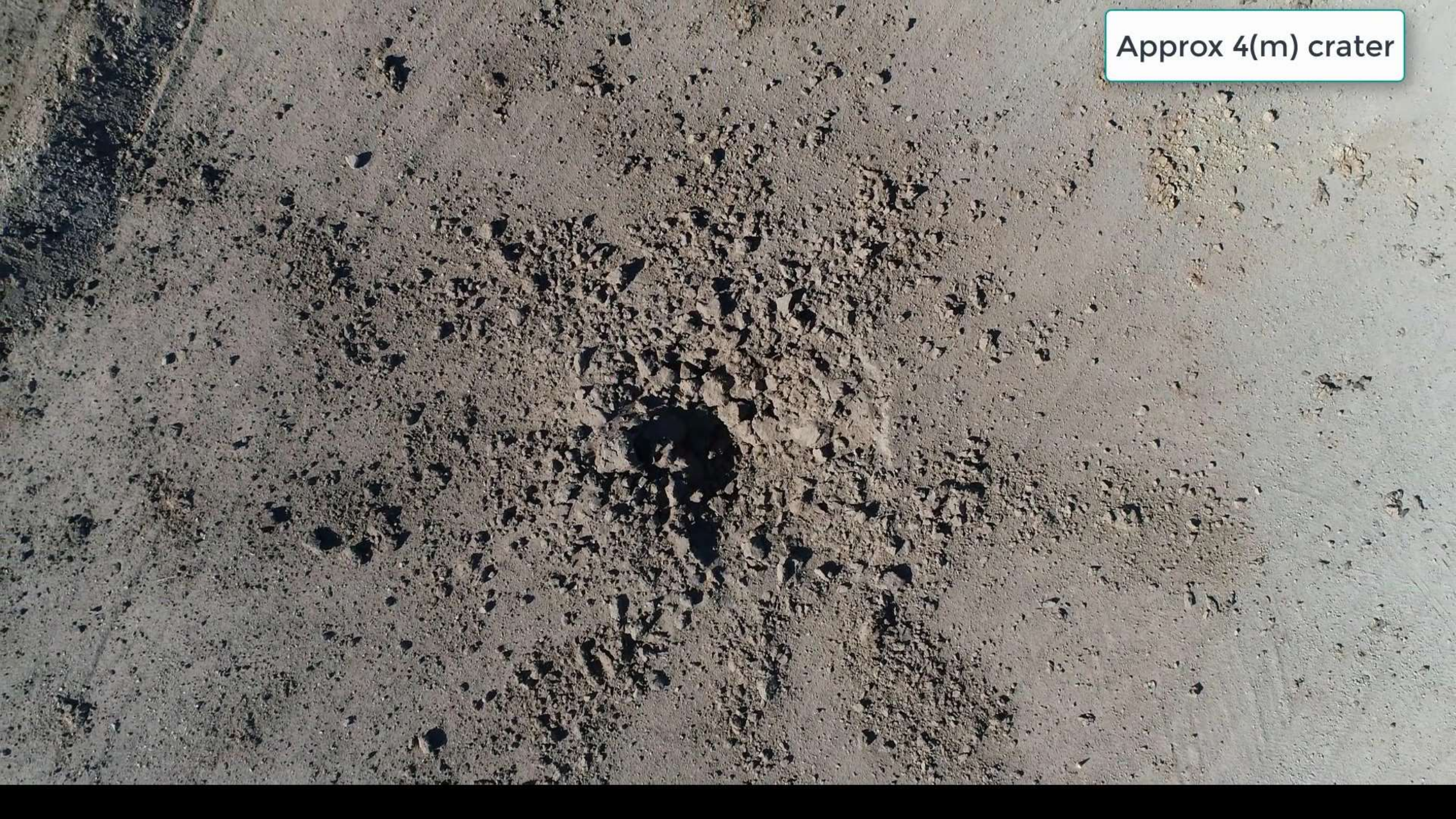
A3 Heave



A8 - 2m Fill



Approx 4(m) crater



Flyrock remains within
flyrock zone predicted



'Blast Hole Quality'

Checks were conducted to assess the in hole conditions and stem zone characteristics through fill material of A8.



20.6
cm

Hole A8 - Drilled through 2m of fill material.



Hole A8 - Drilled through 2m of fill material.







Fill material finished at this point -
2m from surface

Hole condition was poor between 6m - 10m. Large cavities appearing in what looks like an old creek bed.



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'Titan West Pit'

3 x Holes with reduced stemming fired to replicate overloaded holes.







Flyrock
identified at
270m



Flyrock
identified at
270m



Titan Holes #1, #2 and #3 (229 mm, T2040 and ANFO)
Stem Ht: #1 @ 3.4 m, #2 @ 3.5 m, #3 @ 3.5 m

SDoB: #1 @ 0.88 m/kg^{1/3} , #2 @ 1.05 m/kg^{1/3}, #3 @ 0.88 m/kg^{1/3}
Cratering: #1 Partial, #2 Partial, #3 Complete
Max projection distance: 270 m










Note - Angle of Trajectory of each hole. Hole #1&2 partially crater.
Hole #3 on right has complete cratering.





So...How does this risk
compare with other risks on a
Mine site ????



Flyrock Exclusion Zones - Statistics

Statistics - Lundborg 'v' Insurance Information Institute of USA (III) = 1:			
	Lundborg	(III)	Flyrock Model
Accidental fall	5,000	139,544	
Motor Vehicle	1,538	9,008	
Probability of flyrock strike if 1 million fragments projected			100,000
Accidental Drowning	25,000	454,860	
Probability of flyrock strike if 1 thousand fragments projected			100,000,000
Lightning	1,818,182	12,754,000	

Where does the risk of Unplanned Flyrock sit in comparison to other on site activities based on Statistical data?

Eg:

- LV / HV Interactions?
- Dumping over tip heads?
- Hot Works?
- Working Around Water?
- Working Near Crests and Slopes?

Flyrock Exclusion Zones - Probabilities

When considering an appropriate Factor of Safety(FOS) to be applied to extreme weather exclusion distances, the following probability factors must be considered pertinent for Risk Assessment purposes with respect to collar flyrock ejections:

- The **probability** of a lightning strike, sufficiently close to a loaded pattern as to initiate a column of explosive, is low;
- The **probability** that a nearby lightning strike will initiate either an AXXIS electronic detonator or a column of explosive is low;
- The **probability** that an unplanned detonation due to lightning will produce large flyrock projections is low;
- The **probability** of ejecting a rock fragment of optimum size to achieve maximum projection distance is low;
- The **probability** that a rock fragment will be ejected at the optimum angle to achieve maximum projection distance is low;
- The **probability** that a rock fragment will be projected in a particular direction where personnel are working is low;
- The **probability** that a rock fragment will strike a small footprint (e.g. vehicle) is very low.

The risk to nearby operators is the product of **all** of the above probabilities

Flyrock Exclusion Zones - Probabilities

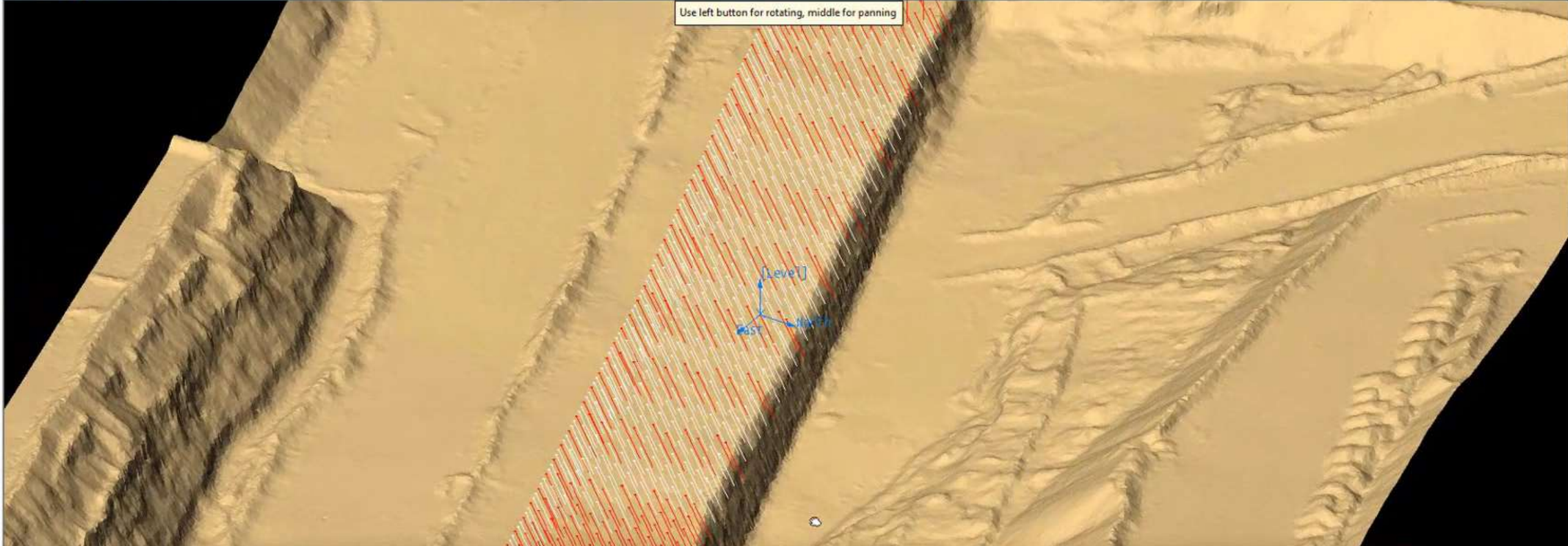
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Note - Paradigm calculates the maximum flyrock range a rock fragment could travel if "optimum size and angle" is achieved.

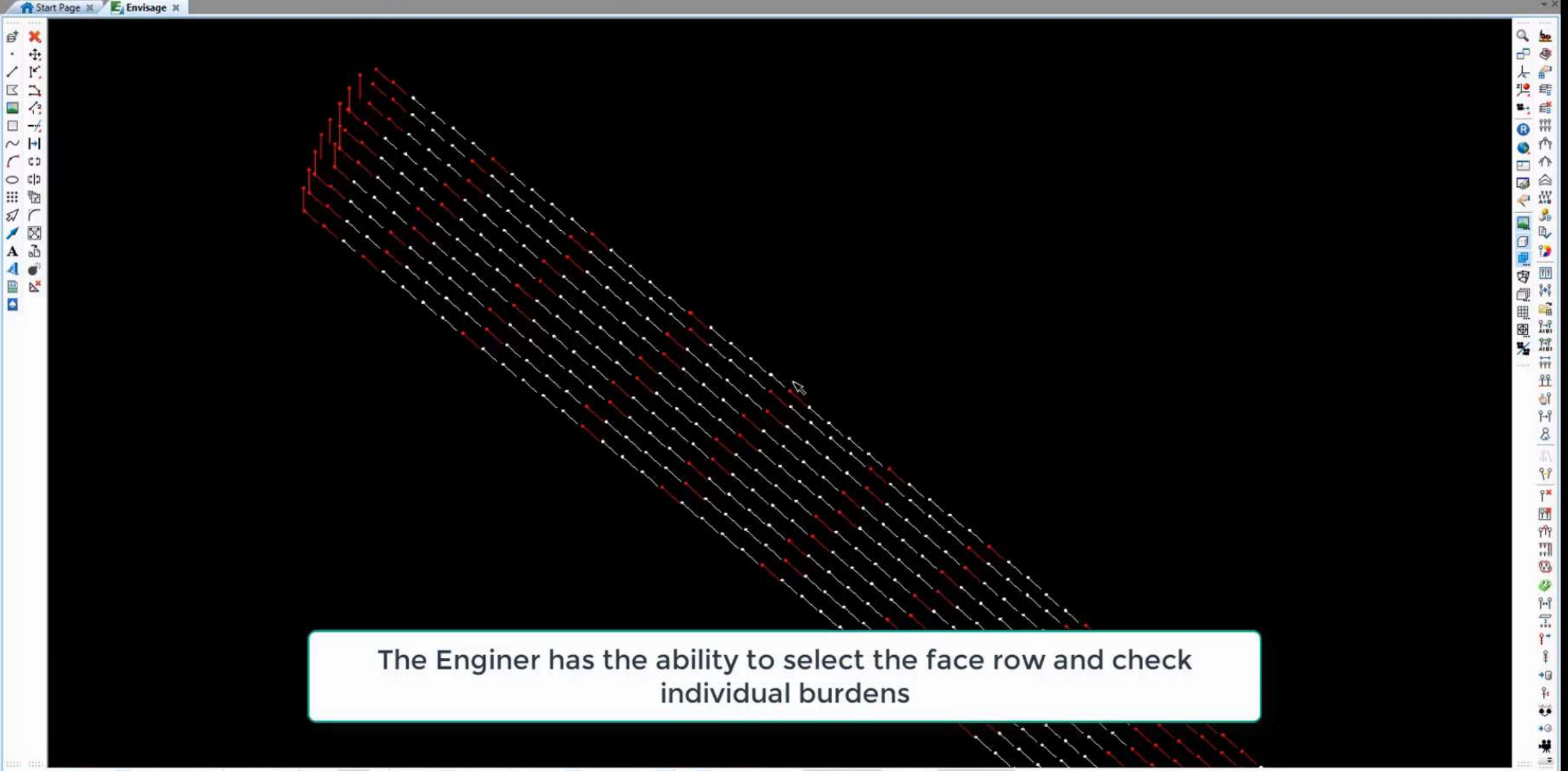
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ENGINEERING / DESIGN

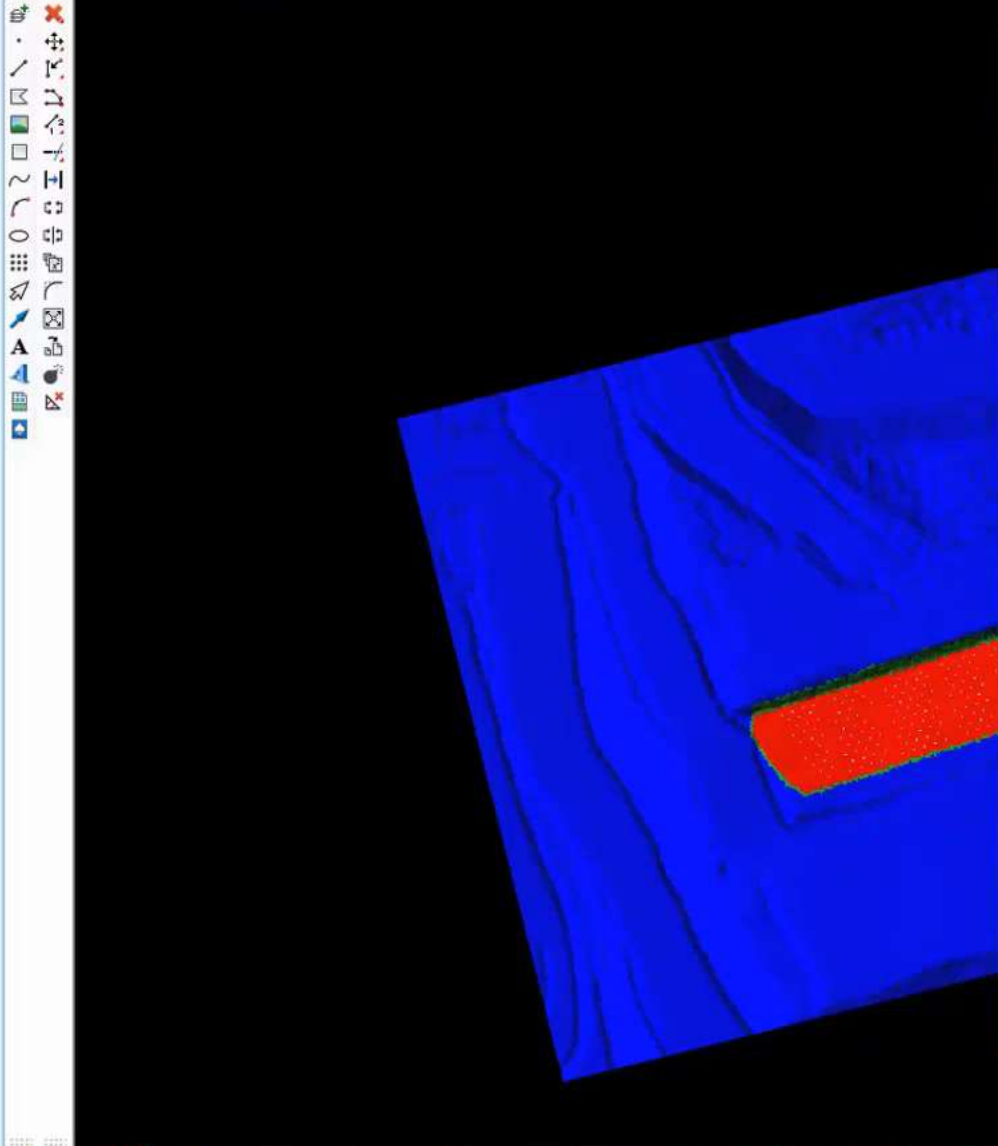


A robust process is required;

- Drill hole positioning on face row must have burdens checked;
- Must review the actual hole placement in field, not design (Driller accuracy)
- Auditing of this step by operations Supervisors must be conducted;
- 'Engineering' and 'Operations' must both ensure compliance is achieved.



The Engineer has the ability to select the face row and check individual burdens



Minimum Burden Adjustment

Current Hole: **Current Selected Hole - J48**

Current Hole: Minimum Burden Plot

Hole Selection: [Navigation Buttons]

Position of Hole: [Navigation Buttons] Step size: 0.200

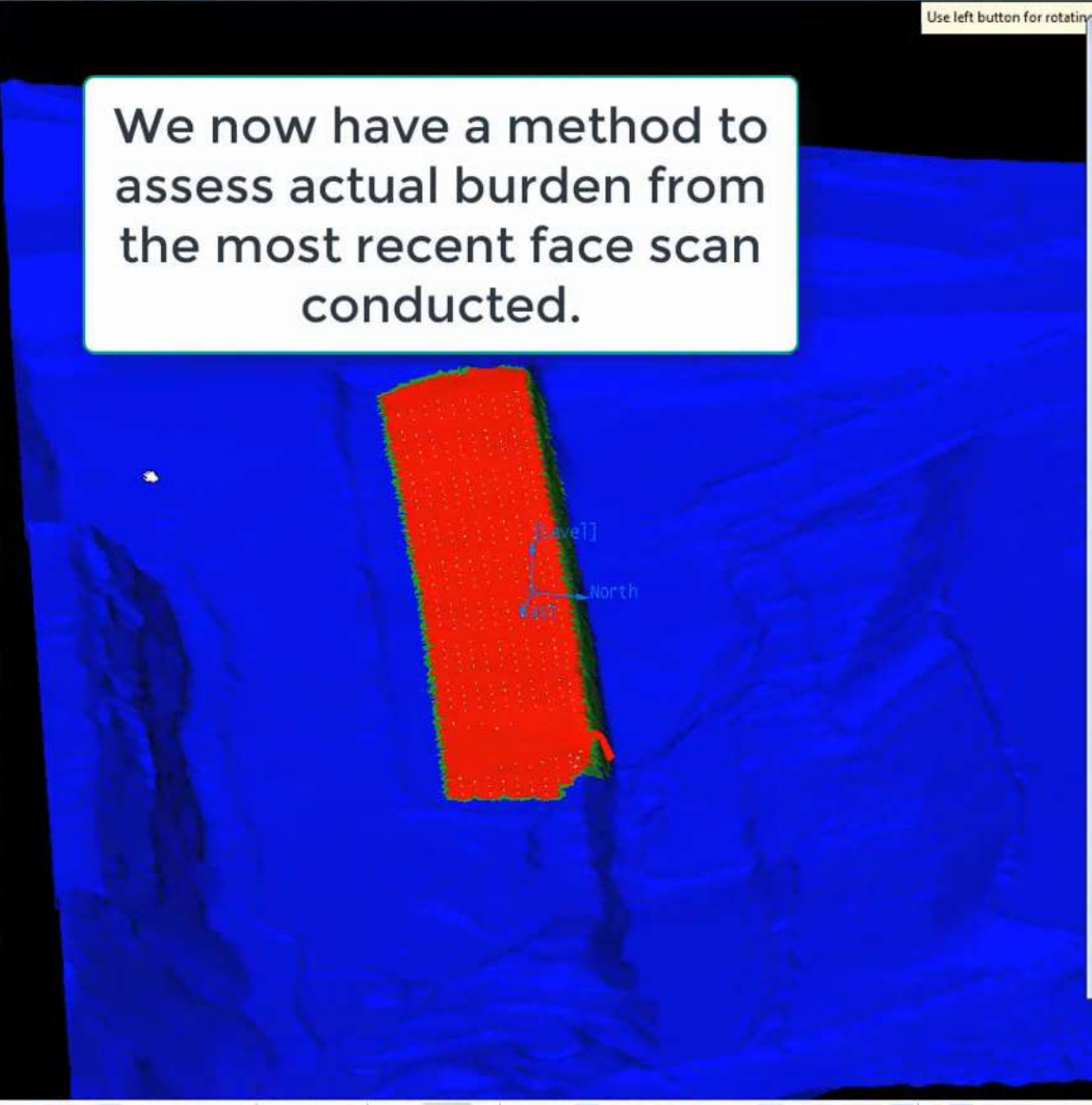
Direction of Hole: Bearing Step size: 10.0, Dip Step size: 5.0

Controls:

- Face Model Display Settings:
 - Translucent surface: Translucency: 49
 - Contour lines: Type: Standard, Interval: 5.00
 - Wireframe
 - Invisible
 - Burden colours: Translucency: 1
- Blast Row Surface:
 - Show blast row surfaces
 - Surface colour: [Color Picker]
 - Translucency: 20
- Minimum Burden Adjustment Settings: Settings

Row ID	Hole Name	Unique Name	Collar Type	Collar X	Collar Y	Collar Z	Dip	Bearing	Toe Type	Toe X	Toe Y
10	J37	J/37	Surface	632650.654	7559534.064	116.863	65.0	345.3	Surface	632649.258	7559539.387
10	J38	J/38	Surface	632657.827	7559536.189	116.387	65.0	345.3	Surface	632656.449	7559541.444
10	J39	J/39	Surface	632665.191	7559537.760	115.955	65.0	345.3	Surface	632663.823	7559542.978
10	J40	J/40	Surface	632672.418	7559539.740	115.585	65.0	345.3	Surface	632671.056	7559544.935
10	J41	J/41	Surface	632679.558	7559542.092	115.417	65.0	345.3	Surface	632677.969	7559548.153
10	J42	J/42	Surface	632686.805	7559544.051	115.357	65.0	345.3	Surface	632685.391	7559549.446
10	J43	J/43	Surface	632694.064	7559545.958	115.070	65.0	345.3	Surface	632692.640	7559551.390
10	J44	J/44	Surface	632701.209	7559548.251	114.549	65.0	345.3	Surface	632699.804	7559553.612
10	J45	J/45	Surface	632708.419	7559550.383	113.843	65.0	345.3	Surface	632707.053	7559555.593
10	J46	J/46	Surface	632715.618	7559552.435	113.310	65.0	345.3	Surface	632714.061	7559558.374
10	J47	J/47	Surface	632722.769	7559554.710	112.724	65.0	345.3	Surface	632721.241	7559560.539
10	J48	J/48	Surface	632729.871	7559557.208	112.246	65.0	345.3	Surface	632728.359	7559562.973
10	J49	J/49	Surface	632737.088	7559559.261	111.626	65.0	345.3	Surface	632735.609	7559564.903
10	J50	J/50	Surface	632744.374	7559561.098	111.315	65.0	345.3	Surface	632743.106	7559565.935
10	J51	J/51	Surface	632751.990	7559561.568	111.615	60.0	345.3	Surface	632750.326	7559567.917
10	J52	J/52	Surface	632759.509	7559562.419	111.403	60.0	345.3	Surface	632757.823	7559568.851

We now have a method to assess actual burden from the most recent face scan conducted.



Minimum Burden Adjustment

Current Hole: **Current Selected Hole - J48**

Minimum Burden Plot

1.28	
2.56	5.61
3.85	6.13
5.13	6.41
6.41	6.45
7.69	6.27
8.97	6.27
10.26	6.32
11.54	6.27
12.82	6.28
14.10	6.31

Hole Selection: [Navigation buttons]

Position of Hole: [Navigation buttons]

Direction of Hole: [Navigation buttons]

Bearing: [Navigation buttons] Step size: 10.0

Dip: [Navigation buttons] Step size: 5.0

Controls

Face Model Display Settings

- Translucent surface (Translucency: 49)
- Contour lines (Type: Standard, Interval: 5.00)
- Wireframe
- Invisible
- Burden colours (Translucency: 1)

Blast Row Surface

- Show blast row surfaces (Surface colour: [Hatched], Translucency: 20)

Minimum Burden Adjustment Settings

Settings: [Settings button]

Row ID	Hole Name	Unique Name	Collar Type	Collar X	Collar Y	Collar Z	Dip	Bearing	Toe Type	Toe X	Toe Y
10	J36	J/36	Surface	632643.470	7559531.912	117.351	65.0	345.3	Surface	632641.844	7559538.116
10	J37	J/37	Surface	632650.654	7559534.064	116.863	65.0	345.3	Surface	632649.258	7559539.387
10	J38	J/38	Surface	632657.827	7559536.189	116.387	65.0	345.3	Surface	632656.449	7559541.444
10	J39	J/39	Surface	632665.191	7559537.760	115.955	65.0	345.3	Surface	632663.823	7559542.978
10	J40	J/40	Surface	632672.418	7559539.740	115.585	65.0	345.3	Surface	632671.056	7559544.935
10	J41	J/41	Surface	632679.558	7559542.092	115.417	65.0	345.3	Surface	632677.969	7559548.153
10	J42	J/42	Surface	632686.805	7559544.051	115.357	65.0	345.3	Surface	632685.391	7559549.446
10	J43	J/43	Surface	632694.064	7559545.958	115.070	65.0	345.3	Surface	632692.640	7559551.390
10	J44	J/44	Surface	632701.209	7559548.251	114.549	65.0	345.3	Surface	632699.804	7559553.612
10	J45	J/45	Surface	632708.419	7559550.383	113.843	65.0	345.3	Surface	632707.053	7559555.593
10	J46	J/46	Surface	632715.618	7559552.435	113.310	65.0	345.3	Surface	632714.061	7559558.374
10	J47	J/47	Surface	632722.769	7559554.710	112.724	65.0	345.3	Surface	632721.241	7559560.539
10	J48	J/48	Surface	632729.871	7559557.208	112.246	65.0	345.3	Surface	632728.359	7559562.973
10	J49	J/49	Surface	632737.088	7559559.261	111.626	65.0	345.3	Surface	632735.609	7559564.903
10	J50	J/50	Surface	632744.374	7559561.098	111.315	65.0	345.3	Surface	632743.106	7559565.935
10	J51	J/51	Surface	632751.990	7559561.568	111.615	60.0	345.3	Surface	632750.326	7559567.917
10	J52	J/52	Surface	632759.509	7559562.419	111.403	60.0	345.3	Surface	632757.823	7559568.851

Any hole can be checked within a few minutes if Blast controller identifies change in field.
 eg: wedge failure, poor hole placement

Minimum Burden Adjustment

Current Hole: **Current Selected Hole - J45**

Minimum Burden Plot

Hole Selection: [Left Arrow] [Right Arrow]

Position of Hole: [Up Arrow] [Down Arrow] Step size: 0.200

Direction of Hole: [Left Arrow] [Right Arrow] Step size: 10.0

Bearing: [Up Arrow] [Down Arrow] Step size: 5.0

Dip: [Up Arrow] [Down Arrow]

Controls

Face Model Display Settings

- Translucent surface (Translucency: 49)
- Contour lines (Type: Standard, Interval: 5.00)
- Wireframe
- Invisible
- Burden colours (Translucency: 1)

Blast Row Surface

- Show blast row surfaces (Surface colour: [Hatched], Translucency: 20)

Minimum Burden Adjustment Settings

Settings [Settings]

Row ID	Hole Name	Unique Name	Collar Type	Collar X	Collar Y	Collar Z	Dip	Bearing	Toe Type	Toe X	Toe Y
10	J36	J/36	Surface	632643.470	7559531.912	117.351	65.0	345.3	Surface	632641.844	7559538.116
10	J37	J/37	Surface	632650.654	7559534.064	116.863	65.0	345.3	Surface	632649.258	7559539.387
10	J38	J/38	Surface	632657.827	7559536.189	116.387	65.0	345.3	Surface	632656.449	7559541.444
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10	J40	J/40	Surface	632672.418	7559539.740	115.585	65.0	345.3	Surface	632671.056	7559544.935
10	J41	J/41	Surface	632679.558	7559542.092	115.417	65.0	345.3	Surface	632677.969	7559548.153
10	J42	J/42	Surface	632686.805	7559544.051	115.357	65.0	345.3	Surface	632685.391	7559549.446
10	J43	J/43	Surface	632694.064	7559545.958	115.070	65.0	345.3	Surface	632692.640	7559551.390
10	J44	J/44	Surface	632701.209	7559548.251	114.549	65.0	345.3	Surface	632699.804	7559553.612
10	J45	J/45	Surface	632708.419	7559550.383	113.843	65.0	345.3	Surface	632707.053	7559555.593
10	J46	J/46	Surface	632715.618	7559552.435	113.310	65.0	345.3	Surface	632714.061	7559558.374
10	J47	J/47	Surface	632722.769	7559554.710	112.724	65.0	345.3	Surface	632721.241	7559560.539
10	J48	J/48	Surface	632729.671	7559557.208	112.266	65.0	345.3	Surface	632728.158	7559562.977
10	J49	J/49	Surface	632737.088	7559559.261	111.626	65.0	345.3	Surface	632735.609	7559564.903
10	J50	J/50	Surface	632744.374	7559561.098	111.315	65.0	345.3	Surface	632743.106	7559565.935
10	J51	J/51	Surface	632751.990	7559561.568	111.615	60.0	345.3	Surface	632750.326	7559567.917
10	J52	J/52	Surface	632759.509	7559562.419	111.403	60.0	345.3	Surface	632757.823	7559568.851

The burden assessment can be used to review risk of flyrock from face rows prior to firing.

Minimum Burden Adjustment

Current Hole: **Current Selected Hole - J43**

Minimum Burden Plot

Hole Selection: [Navigation buttons]

Position of Hole: [Navigation buttons]

Direction of Hole: [Navigation buttons]

Bearing: [Step size 10.0]

Dip: [Step size 5.0]

Controls

Face Model Display Settings

- Translucency surface: [Translucency 49]
- Contour lines: [Type Standard, Interval 5.00]
- Wireframe
- Invisible
- Burden colours: [Translucency 1]

Blast Row Surface

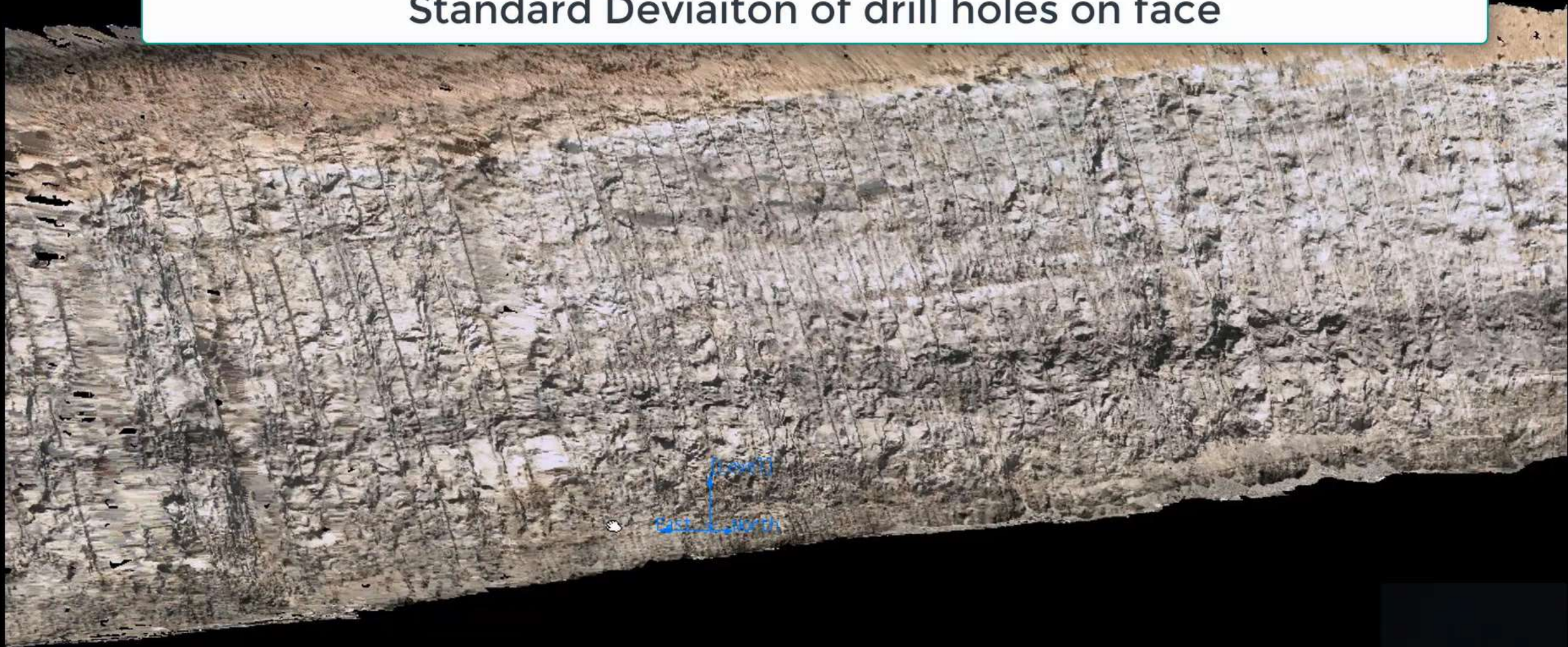
- Show blast row surfaces: [Surface colour, Translucency 20]

Minimum Burden Adjustment Settings

Settings [Settings]

Row ID	Hole Name	Unique Name	Collar Type	Collar X	Collar Y	Collar Z	Dip	Bearing	Toe Type	Toe X	Toe Y
10	J36	J/36	Surface	632643.470	7559531.912	117.351	65.0	345.3	Surface	632641.844	7559538.116
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10	J40	J/40	Surface	632672.418	7559539.740	115.585	65.0	345.3	Surface	632671.056	7559544.935
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10	J42	J/42	Surface	632686.805	7559544.051	115.357	65.0	345.3	Surface	632685.391	7559549.446
10	J43	J/43	Surface	632694.064	7559545.958	115.070	65.0	345.3	Surface	632692.640	7559551.390
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10	J47	J/47	Surface	632722.769	7559554.710	112.724	65.0	345.3	Surface	632721.241	7559560.539
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10	J49	J/49	Surface	632737.088	7559559.261	111.626	65.0	345.3	Surface	632735.609	7559564.903
10	J50	J/50	Surface	632744.374	7559561.098	111.315	65.0	345.3	Surface	632743.106	7559565.935
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10	J52	J/52	Surface	632759.509	7559562.419	111.403	60.0	345.3	Surface	632757.823	7559568.851

Highwall Scan 'v' Drill X,Y,Z
Standard Deviaton of drill holes on face



Scan accuracy (+-) 100mm

Triangulation
V:\DNM_Geotechnical\Geotech_Vulcan\
AES12_West_raster1.00t

Actual X,Y,Z from drill records

Section Type

- Create or replace the window's primary section
- Create a section through all objects
- Create a section through a single object

Primary Section Shadows

Draw shadows

Backwards width Forwards width
Backwards colour Forwards colour

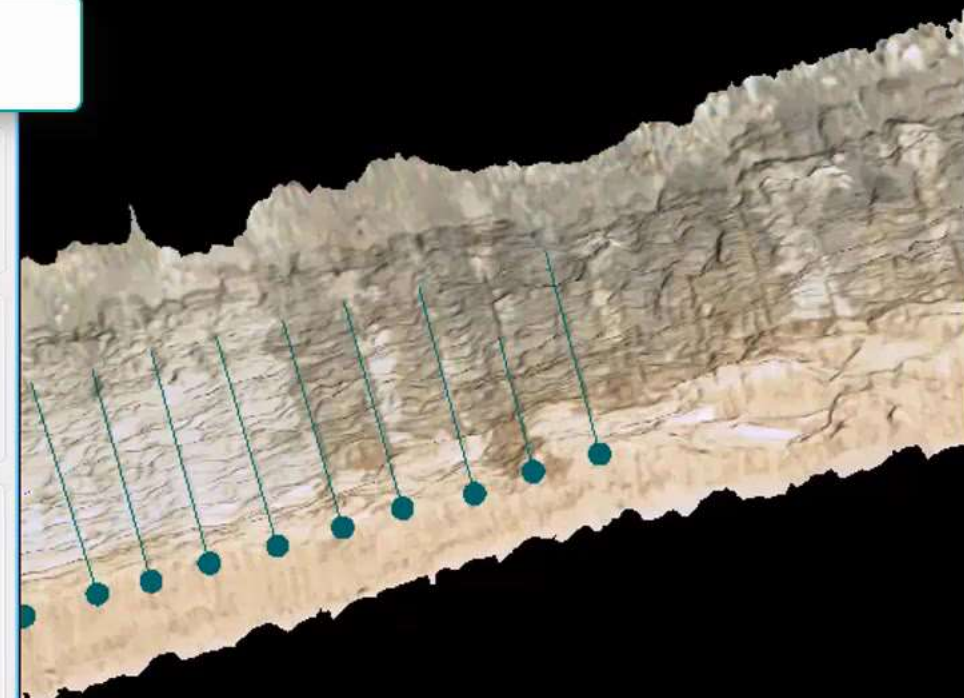
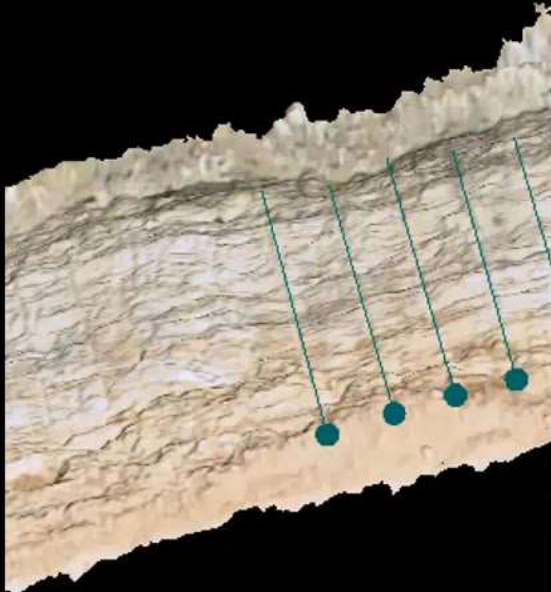
Clipping Planes

Clip
 Symmetrical clipping
Width either side
 Asymmetrical clipping
Backwards width
Forwards width
Step size
Display grid spacing
Display colour
 Annotate
Section name

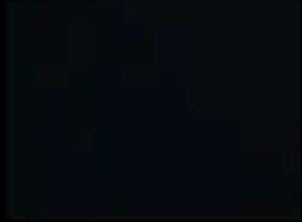
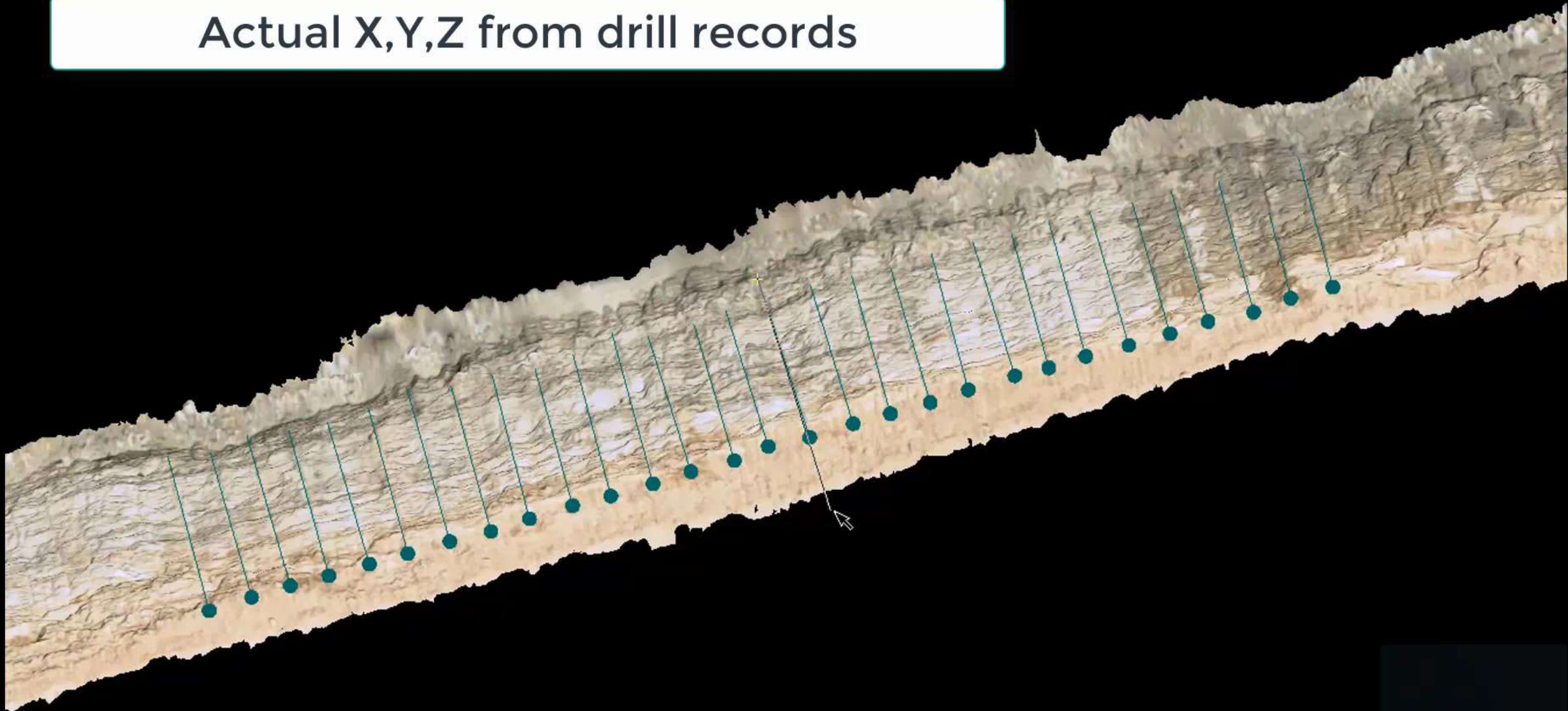
Select Plane By

Line segment 2 points
 3 points
 Guide centre line [section is normal to line]
 Easting
 Northing
 Level
Facing

Auto



Actual X,Y,Z from drill records

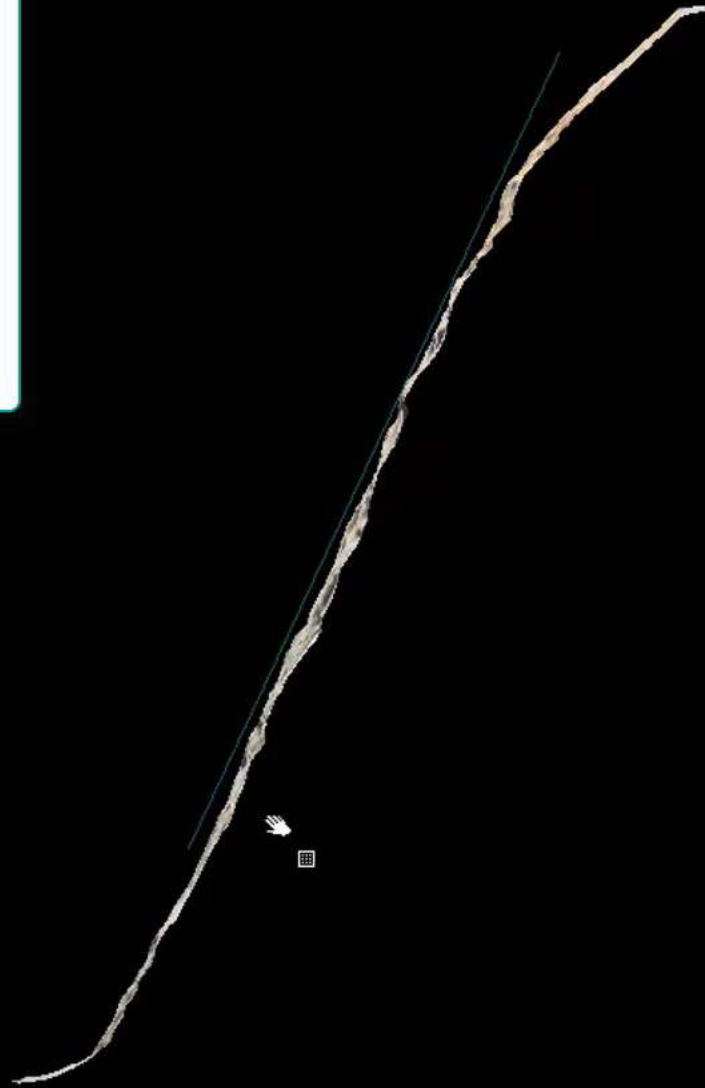


Mapping Scan against X,Y,Z from drill log.
Variances show for a 20(m) bench (-)500mm



Influencers can include:

- Geology
- Bit type
- Pull down force applied
- Rod deflection
- Depth of hole





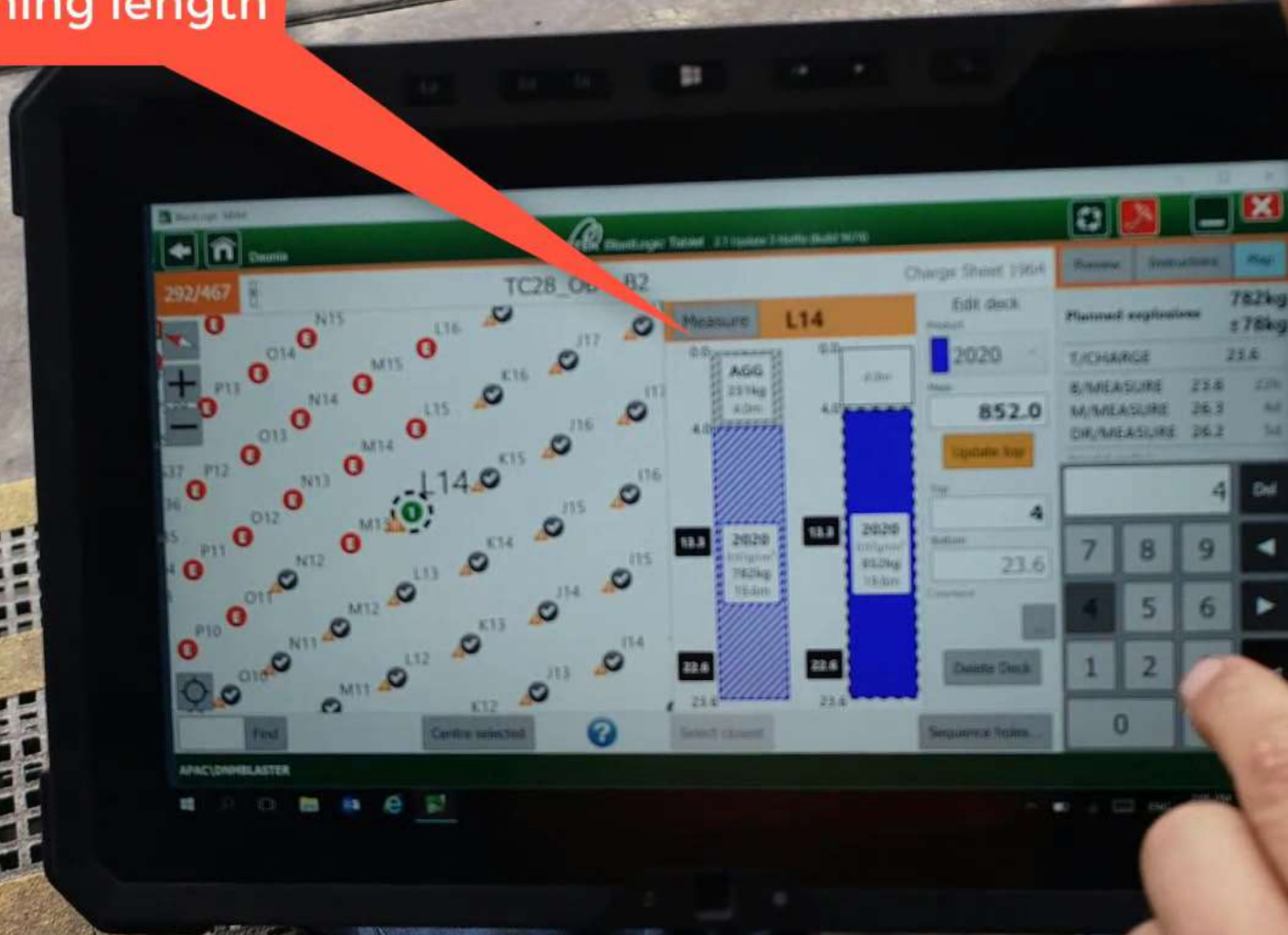
OPERATIONAL RESPONSIBILITIES

In Field;

- Robust quality control and records for Top of Product (ToP) information must be captured;
- High level of confidence in the blast crew to capture accurate data in Blastlogic;
- Requirement for MPU operators to record (ToP) before leaving blast hole to prevent fallback;
- Accurate (ToP) data for every hole to record actual explosives top.



Aggregate -
Actual
stemming length



COMPLIANCE CHECKS

Daunia Drill and Blast Survey Audit Dashboard

List of completed audits (since August 2018)

- Date and Time: 8/29/2018, 4:03 PM
Auditor: Travis Zealey
Blast ID: TW10-IB1-B6
- Date and Time: 8/30/2018, 12:18 PM
Auditor: Travis Zealey
Blast ID: TW10-IB1-B6
- Date and Time: 8/31/2018, 12:12 PM
Auditor: Travis Zealey
Blast ID: TW14-OB3-B4
- Date and Time: 9/1/2018, 2:07 PM
Auditor: Travis Zealey
Blast ID: TW10-OB3-B4
- Date and Time: 9/3/2018, 1:45 PM
Auditor: Travis Zealey
Blast ID: TE14-OB3-B4

A list of all users logged into the Daily Audit Survey123 App
Last update: a minute ago



List of completed audits (since August 2018)

- Date and Time: 8/1/2018, 8:25 AM
Auditor: Wayne Gordon
Blast ID: TW-S14-IB3-B2
- Date and Time: 8/15/2018, 2:30 PM
Auditor: Travis Zealey
Blast ID: TW14-OB3-B2
- Date and Time: 8/17/2018, 9:48 AM
Auditor: Travis Zealey
Blast ID: TW16-OB1-B4
- Date and Time: 8/18/2018, 1:27 PM
Auditor: Travis Zealey
Blast ID: TW14-OB3-B2
- Date and Time: 8/19/2018, 12:41 PM
Auditor: Travis Zealey
Blast ID: TW14/OB3-B2
- Date and Time: 8/20/2018, 10:48 AM
Auditor: Wayne Gordon
Blast ID: TW-S14-OB3-B2

A list of all users logged into the Daily Audit Survey123 App
Last update: 2 minutes ago



Percentage of surveys undertaken where no lightning was present



Percentage of drill holes surveyed that have been correctly stemmed



Percentage of drill holes surveyed that are face row compliant to design



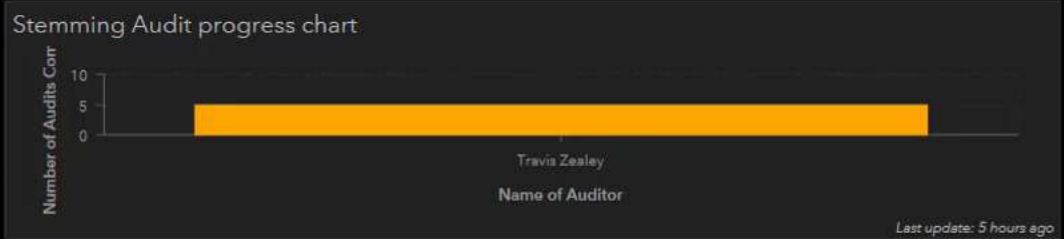
Legend

- ### Daunia Machine Locations
- Drills
 - Wheel Dozer
 - Dozers
 - Water Truck
 - Grader
 - Service Truck
 - Rear Dump
 - Truck
 - Excav

Completed Daily Audit Surveys (via Survey123)

- Daunia Lightning Zone and Flyrock Daily Audit Form v1

Completed Stemming Audit Surveys (via Survey 123)



'Survey123' is an App which can be uploaded by multiple users including Shotfirers, Supervisors, OCE's to conduct in field verification of blast crew loading practices.

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Total number of stemming surveys completed (since August 2018)

5

Last update: a minute ago

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Auditor: Wayne Gordon
Blast ID: TW-S14-OB3-B2

A list of all users logged into the Daily Audit Survey123 App
Last update: 2 minutes ago

Total number of daily surveys completed (since August 2018)

7

Last update: 5 hours ago

Percentage of surveys undertaken where no lightning was present



Last update: 5 hours ago

Percentage of drill holes surveyed that have been correctly stemmed



Last update: 5 hours ago

Percentage of drill holes surveyed that are face row compliant to design



Last update: 5 hours ago

Showing 1

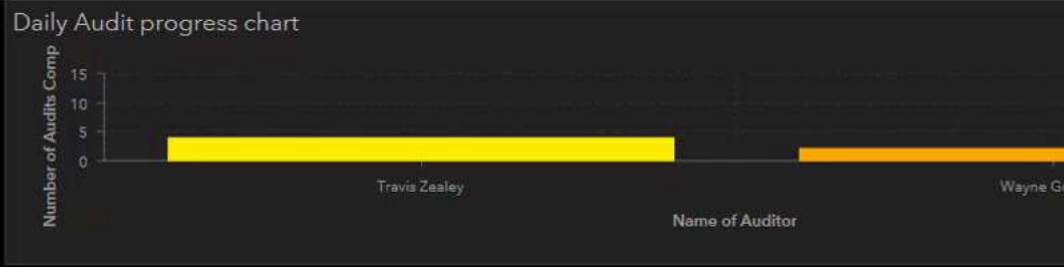
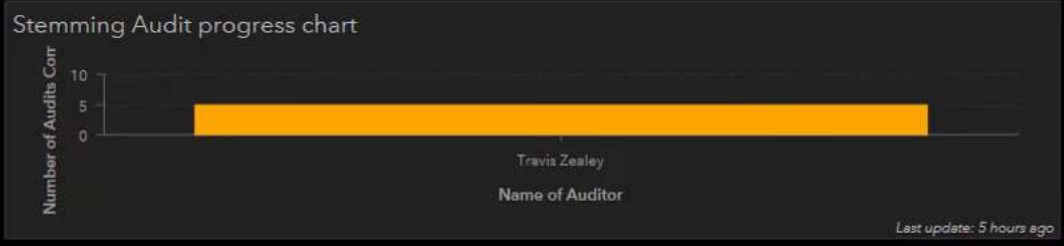
Stemming Audit Results

Name of Auditor: Travis Zealey

Enter Blast ID: TW14-OB3-B4

Date of Inspection: 8/31/2018, 12:12 PM

Was there lightning on shift or previous shift: No



Legend

- Daunia Machine Locations**
- Drills
 - Wheel Dozer
 - Dozers
 - Water Truck
 - Grader
 - Service Truck
 - Rear Dump
 - Truck
 - Excav
- Completed Daily Audit Surveys (via Survey123)**
- Daunia Lightning Zone and Flyrock Daily Audit Form v1
- Completed Stemming Audit Surveys (via Survey 123)**

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- Date and Time: 8/20/2018, 10:48 AM
Auditor: Wayne Gordon
Blast ID: TW-S14-OB3-B2

Percentage of surveys undertaken where no lightning was present



Last update: 5 hours ago

Percentage of drill holes surveyed that have been correctly stemmed



Last update: 5 hours ago

Percentage of drill holes surveyed that are face row compliant to design



Last update: 5 hours ago

Showing 1

bridging in stem zone?
What is being done to manage flyrock?
Overall
Comments:
Audit: 8/31/2018, 12:12 PM
Complete
Name: Travis Zealey

Legend

Daunia Machine Locations

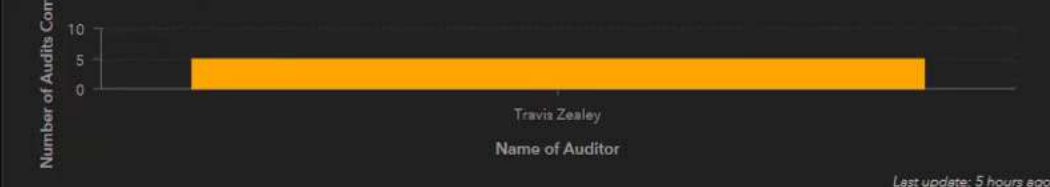
- Drills
- Wheel Dozer
- Dozers
- Water Truck
- Grader
- Service Truck
- Rear Dump
- Truck
- Excav

Completed Daily Audit Surveys (via Survey123)

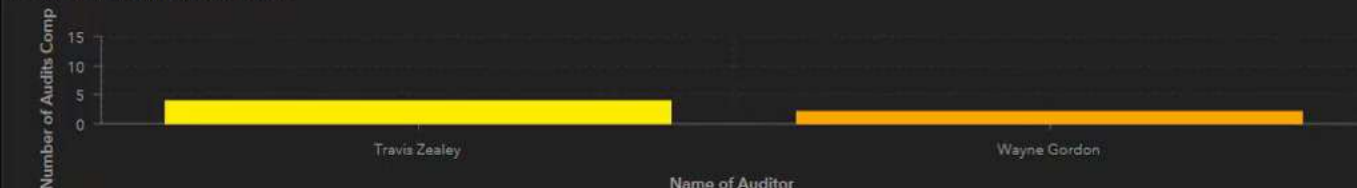
- Daunia Lightning Zone and Flyrock Daily Audit Form v1

Completed Stemming Audit Surveys (via Survey 123)

Stemming Audit progress chart



Daily Audit progress chart



A list of all users logged into the Daily Audit Survey123 App

A list of all users logged into the Daily Audit Survey123 App

Total number of stemming surveys completed (since August 2018)

5

Last update: a minute ago

Total number of daily surveys completed (since August 2018)

7

Last update: 5 hours ago

Each audit can be reviewed and includes pictures and signoff by the person conducting audit.

Daunia Drill and Blast Survey Audit Dashboard

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A list of all users logged into the Daily Audit Survey123 App
Last update: 2 minutes ago

Total number of daily surveys completed (since August 2018)

7

Last update: 5 hours ago

Percentage of surveys undertaken where no lightning was present



Last update: 5 hours ago

Percentage of drill holes surveyed that have been correctly stemmed

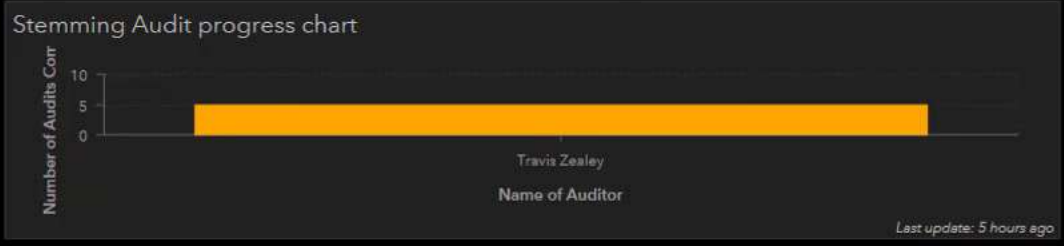
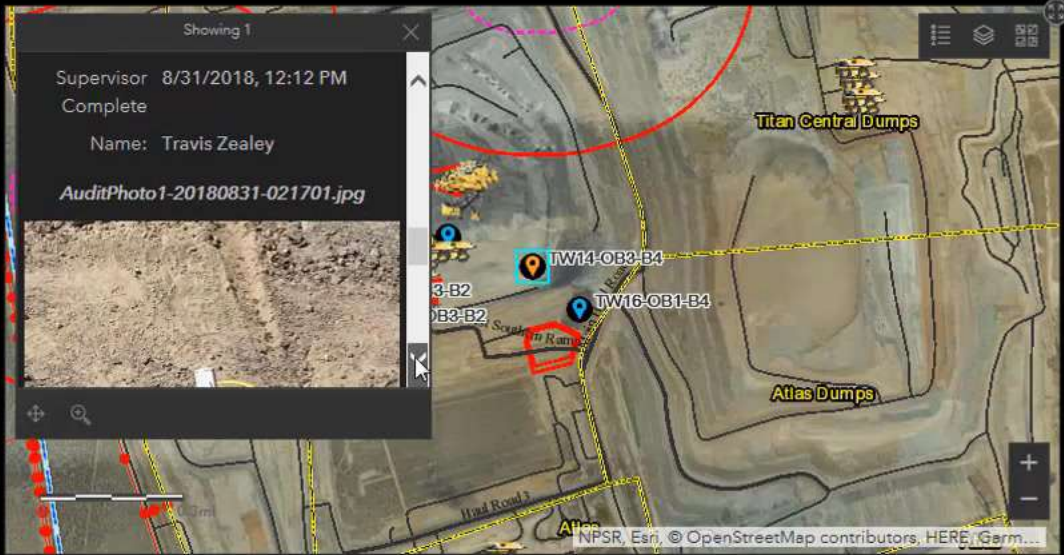


Last update: 5 hours ago

Percentage of drill holes surveyed that are face row compliant to design



Last update: 5 hours ago



Legend

- ### Daunia Machine Locations
- Drills
 - Wheel Dozer
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Completed Daily Audit Surveys (via Survey123)

- Daunia Lightning Zone and Flyrock Daily Audit Form v1

Completed Stemming Audit Surveys (via Survey 123)

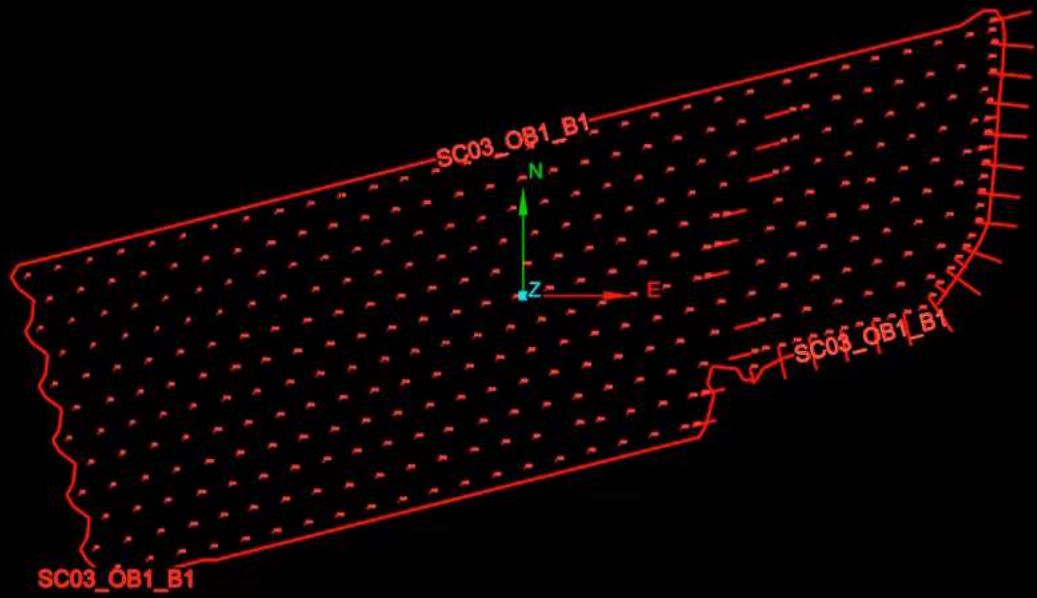
The dashboard will allow us to track who does the audits and give an overview of how many are conducted for each pattern.

'Blastlogic'

Blasting Database

- Point... Q+Click
- Distance... D+Click
- Hole tabular view... Ctrl+T
- Blast tabular view... Ctrl+Shift+T
- Spatial measurements...
- Properties Ctrl+I

- blasts
 - SC0
 - SC0
 - SC0
 - SC0
 - SC0
 - TC22_OB4_B3
 - TC23_IB1_B1
 - TC23_IB1_B2
 - TC23_IB1_B4
 - TC24_IB1_B1
 - TC26_OB4_B3
 - TC28_OB3_B1
 - TC28_OB3_B2
 - TC30_OB1_B1
 - TC30_OB1_B3
 - TN01_OB2_B1
 - TC28_OB4_B2
 - TW11_IB1_B1
 - TC28_OB4_B1
- charge rules
- site data
- cad
- search results
- Recycle bin





- Daunia
- blasts
 - SC02_OB1_B1
 - SC02_OB1_B2
 - SC02_OB1_B3
 - SC02_OB1_B4
 - SC03_OB1_B1
 - TC22_OB4_B3
 - TC23_IB1_B1
 - TC23_IB1_B2
 - TC23_IB1_B4
 - TC24_IB1_B1
 - TC26_OB4_B3
 - TC28_OB3_B1
 - TC28_OB3_B2
 - TC30_OB1_B1
 - TC30_OB1_B3
 - TN01_OB2_B1
 - TC28_OB4_B2
 - TW11_IB1_B1
 - TC28_OB4_B1
- charge rules
- site data
- cad
- search results
- Recycle bin

Hole tabular view

Presets: Custom Delete preset

Columns: Blast, Hole ID, Hole status, Last known depth, Design angle, Design diameter, Design drill depth, Design charge depth, Design charge standoff, Design charge standoff direction, Ta... 13 selected Save preset

Holes													
	Blast	Hole ID	Hole status	Last known Depth	Design Angle	Design Diameter	Design Drill depth	Design Charge depth	Design charge Standoff	Design charge Standoff direction	Target Drill depth	Target Charge depth	Drill Depth
1	SC03_OB1_B1	A8	Fired	13.9m	0°	0.229m	18.0m	14.0m	2.0m	Vertical	17.9m	13.9m	16.5m
2	SC03_OB1_B1	A9	Fired	14.6m	0°	0.229m	19.9m	14.7m	2.0m	Vertical	19.8m	14.6m	17.1m
3	SC03_OB1_B1	A10	Fired	15.7m	0°	0.229m	20.1m	15.9m	2.0m	Vertical	19.9m	15.7m	18.0m
4	SC03_OB1_B1	A11	Fired	16.8m	0°	0.229m	20.3m	17.0m	2.0m	Vertical	20.1m	16.8m	19.4m
5	SC03_OB1_B1	A12	Fired	17.9m	0°	0.229m	20.8m	18.1m	2.0m	Vertical	20.6m	17.9m	20.8m
6	SC03_OB1_B1	A13	Fired	18.5m	0°	0.229m	21.6m	18.7m	2.0m	Vertical	21.3m	18.5m	21.3m
7	SC03_OB1_B1	A14	Fired	20.0m	0°	0.229m	22.2m	20.1m	2.0m	Vertical	22.1m	20.0m	22.7m
8	SC03_OB1_B1	A15	Fired	21.3m	0°	0.229m	22.7m	21.2m	2.0m	Vertical	22.7m	21.3m	23.9m
9	SC03_OB1_B1	A16	Fired	22.6m	0°	0.229m	23.7m	22.6m	2.0m	Vertical	23.7m	22.6m	
10	SC03_OB1_B1	A17	Fired	22.5m	0°	0.229m	24.3m	24.7m	2.0m	Vertical	24.4m	24.8m	4.4m
11	SC03_OB1_B1	A18	Fired	26.7m	0°	0.229m	29.0m	27.2m	2.0m	Vertical	28.7m	26.9m	31.0m
12	SC03_OB1_B1	A19	Fired	20.5m	0°	0.229m	20.7m	20.7m	-2.0m	Vertical	20.7m	20.7m	22.3m
13	SC03_OB1_B1	A20	Fired	20.1m	0°	0.229m	20.5m	20.5m	-2.0m	Vertical	20.1m	20.1m	21.9m
14	SC03_OB1_B1	A21	Fired	20.1m	0°	0.229m	20.3m	20.3m	-2.0m	Vertical	20.1m	20.1m	21.8m
15	SC03_OB1_B1	A22	Fired	19.5m	0°	0.229m	20.1m	20.1m	-2.0m	Vertical	20.1m	20.1m	21.8m
16	SC03_OB1_B1	A23	Fired	19.0m	0°	0.229m	20.0m	20.0m	-2.0m	Vertical	20.3m	20.3m	21.8m
17	SC03_OB1_B1	A24	Fired	20.0m	0°	0.229m	19.9m	19.9m	-2.0m	Vertical	20.3m	20.3m	21.1m
18	SC03_OB1_B1	A25	Fired	20.0m	0°	0.229m	20.2m	20.2m	-2.0m	Vertical	20.3m	20.3m	21.1m
19	SC03_OB1_B1	A26	Fired	20.0m	0°	0.229m	20.4m	20.4m	-2.0m	Vertical	20.3m	20.3m	21.5m
20	SC03_OB1_B1	A27	Fired	21.5m	15°	0.229m	21.2m	21.2m	-2.0m	Vertical	21.5m	21.5m	22.1m
21	SC03_OB1_B1	B7	Fired	13.7m	0°	0.229m	17.1m	13.7m	2.0m	Vertical	17.1m	13.7m	16.7m
22	SC03_OB1_B1	B8	Fired	14.3m	0°	0.229m	18.0m	14.5m	2.0m	Vertical	17.9m	14.3m	16.6m
23	SC03_OB1_B1	B9	Fired	15.0m	0°	0.229m	18.0m	15.2m	2.0m	Vertical	17.8m	15.0m	24.2m
24	SC03_OB1_B1	B10	Fired	15.8m	0°	0.229m	20.3m	16.0m	2.0m	Vertical	20.1m	15.8m	18.6m
25	SC03_OB1_B1	B11	Fired	16.8m	0°	0.229m	20.6m	16.8m	2.0m	Vertical	20.6m	16.8m	0.0m
26	SC03_OB1_B1	B12	Fired	18.7m	0°	0.229m	21.2m	18.8m	2.0m	Vertical	21.1m	18.7m	20.9m
27	SC03_OB1_B1	B13	Fired	19.4m	0°	0.229m	21.9m	19.7m	2.0m	Vertical	21.8m	19.5m	21.9m
28	SC03_OB1_B1	B14	Fired	20.5m	0°	0.229m	22.3m	20.7m	2.0m	Vertical	22.2m	20.5m	24.1m
29	SC03_OB1_B1	B15	Fired	22.0m	0°	0.229m	22.9m	22.2m	2.0m	Vertical	22.7m	22.0m	24.5m
30	SC03_OB1_B1	B16	Fired	23.2m	0°	0.229m	23.6m	23.3m	2.0m	Vertical	23.4m	23.2m	0.0m
31	SC03_OB1_B1	B17	Fired	25.5m	0°	0.229m	28.3m	25.7m	2.0m	Vertical	28.1m	25.5m	36.9m
32	SC03_OB1_B1	R18	Fired	20.5m	0°	0.229m	20.8m	20.8m	-2.0m	Vertical	20.5m	20.5m	22.4m

Hole properties Refine selection Export to report Export to CSV



- Daunia
 - blasts
 - SC02_OB1_B1
 - SC02_OB1_B2
 - SC02_OB1_B3
 - SC02_OB1_B4
 - SC03_OB1_B1
 - TC22_OB4_B3
 - TC23_IB1_B1
 - TC23_IB1_B2
 - TC23_IB1_B4
 - TC24_IB1_B1
 - TC26_OB4_B3
 - TC28_OB3_B1
 - TC28_OB3_B2
 - TC30_OB1_B1
 - TC30_OB1_B3
 - TN01_OB2_B1
 - TC28_OB4_B2
 - TW11_IB1_B1
 - TC28_OB4_B1
 - charge rules
 - site data
 - cad
 - search results
 - Recycle bin

Hole tabular view

Presets: Custom [Delete preset] [Save preset]

Columns: All, Design, Current state, Drill, Dip, Backfill, Survey, Temperature, Charge, Charge placement, Charge rule parameters, Blast, Paradigm

ID	Code	Label	Status	Depth (m)	Dip (°)	Charge (m)	Charge (m)	Charge (m)	Charge (m)	Charge (m)	Charge (m)	Charge (m)
9	SC03_OB1_B1	A16	Fired	22.6m	0°	0.229m	23.7m	22.6m	2.0mVertical	23.7m	22.6m	
10	SC03_OB1_B1	A17	Fired	22.5m	0°	0.229m	24.3m	24.7m	2.0mVertical	24.4m	24.8m	4.4m
11	SC03_OB1_B1	A18	Fired	26.7m	0°	0.229m	29.0m	27.2m	2.0mVertical	28.7m	26.9m	31.0m
12	SC03_OB1_B1	A19	Fired	20.5m	0°	0.229m	20.7m	20.7m	-2.0mVertical	20.7m	20.7m	22.3m
13	SC03_OB1_B1	A20	Fired	20.1m	0°	0.229m	20.5m	20.5m	-2.0mVertical	20.1m	20.1m	21.9m
14	SC03_OB1_B1	A21	Fired	20.1m	0°	0.229m	20.3m	20.3m	-2.0mVertical	20.1m	20.1m	21.8m
15	SC03_OB1_B1	A22	Fired	19.5m	0°	0.229m	20.1m	20.1m	-2.0mVertical	20.1m	20.1m	21.8m
16	SC03_OB1_B1	A23	Fired	19.0m	0°	0.229m	20.0m	20.0m	-2.0mVertical	20.3m	20.3m	21.8m
17	SC03_OB1_B1	A24	Fired	20.0m	0°	0.229m	19.9m	19.9m	-2.0mVertical	20.3m	20.3m	21.1m
18	SC03_OB1_B1	A25	Fired	20.0m	0°	0.229m	20.2m	20.2m	-2.0mVertical	20.3m	20.3m	21.1m
19	SC03_OB1_B1	A26	Fired	20.0m	0°	0.229m	20.4m	20.4m	-2.0mVertical	20.3m	20.3m	21.5m
20	SC03_OB1_B1	A27	Fired	21.5m	15°	0.229m	21.2m	21.2m	-2.0mVertical	21.5m	21.5m	22.1m
21	SC03_OB1_B1	B7	Fired	13.7m	0°	0.229m	17.1m	13.7m	2.0mVertical	17.1m	13.7m	16.7m
22	SC03_OB1_B1	B8	Fired	14.3m	0°	0.229m	18.0m	14.5m	2.0mVertical	17.9m	14.3m	16.6m
23	SC03_OB1_B1	B9	Fired	15.0m	0°	0.229m	18.0m	15.2m	2.0mVertical	17.8m	15.0m	24.2m
24	SC03_OB1_B1	B10	Fired	15.8m	0°	0.229m	20.3m	16.0m	2.0mVertical	20.1m	15.8m	18.6m
25	SC03_OB1_B1	B11	Fired	16.8m	0°	0.229m	20.6m	16.8m	2.0mVertical	20.6m	16.8m	0.0m
26	SC03_OB1_B1	B12	Fired	18.7m	0°	0.229m	21.2m	18.8m	2.0mVertical	21.1m	18.7m	20.9m
27	SC03_OB1_B1	B13	Fired	19.4m	0°	0.229m	21.9m	19.7m	2.0mVertical	21.8m	19.5m	21.9m
28	SC03_OB1_B1	B14	Fired	20.5m	0°	0.229m	22.3m	20.7m	2.0mVertical	22.2m	20.5m	24.1m
29	SC03_OB1_B1	B15	Fired	22.0m	0°	0.229m	22.9m	22.2m	2.0mVertical	22.7m	22.0m	24.5m
30	SC03_OB1_B1	B16	Fired	23.2m	0°	0.229m	23.6m	23.3m	2.0mVertical	23.4m	23.2m	0.0m
31	SC03_OB1_B1	B17	Fired	25.5m	0°	0.229m	28.3m	25.7m	2.0mVertical	28.1m	25.5m	36.9m
32	SC03_OB1_B1	R18	Fired	20.5m	0°	0.229m	20.8m	20.8m	-2.0mVertical	20.5m	20.5m	22.4m

[Hole properties] [Refine selection] [Export to report] [Export to CSV]



- Daunia
- blasts
 - SC02_OB1_B1
 - SC02_OB1_B2
 - SC02_OB1_B3
 - SC02_OB1_B4
 - SC03_OB1_B1
 - TC22_OB4_B3
 - TC23_IB1_B1
 - TC23_IB1_B2
 - TC23_IB1_B4
 - TC24_IB1_B1
 - TC26_OB4_B3
 - TC28_OB3_B1
 - TC28_OB3_B2
 - TC30_OB1_B1
 - TC30_OB1_B3
 - TN01_OB2_B1
 - TC28_OB4_B2
 - TW11_IB1_B1
 - TC28_OB4_B1
- charge rules
- site data
- cad
- search results
- Recycle bin

Hole tabular view

Presets: Paradigm Delete preset

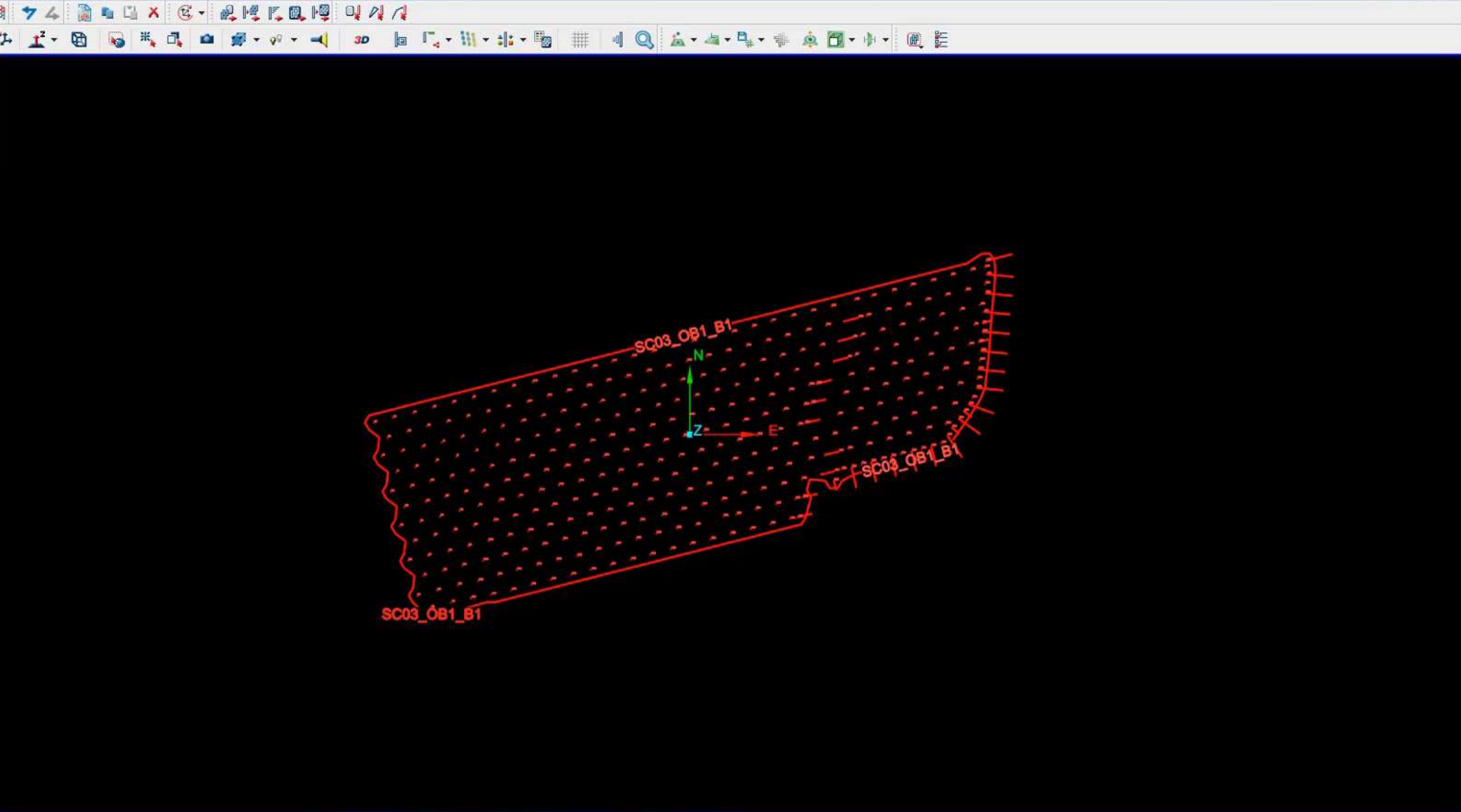
Columns: Blast, Hole ID, Actual collar X, Actual collar Y, Actual collar Z, Actual angle, Actual bearing, Actual diameter, Last known depth 9 selected Save preset

Holes									
	Blast	Hole ID	Actual Collar X	Actual Collar Y	Actual Collar Z	Actual Angle	Actual Bearing	Actual Diameter	Last known Depth
1	SC03_OB1_B1	A8	631,803.90m	7,559,840.50m	221.67m	0°	166°	0.229m	13.9m
2	SC03_OB1_B1	A9	631,811.42m	7,559,842.46m	221.97m	0°	161°	0.229m	14.6m
3	SC03_OB1_B1	A10	631,818.52m	7,559,844.00m	221.97m	0°	158°	0.229m	15.7m
4	SC03_OB1_B1	A11	631,826.09m	7,559,845.30m	222.06m	0°	113°	0.229m	16.8m
5	SC03_OB1_B1	A12	631,833.29m	7,559,846.98m	222.20m	0°	104°	0.229m	17.9m
6	SC03_OB1_B1	A13	631,840.51m	7,559,848.88m	222.18m	0°	87°	0.229m	18.5m
7	SC03_OB1_B1	A14	631,847.84m	7,559,850.75m	222.13m	0°	78°	0.229m	20.0m
8	SC03_OB1_B1	A15	631,855.10m	7,559,852.54m	222.23m	0°	76°	0.229m	21.3m
9	SC03_OB1_B1	A16	631,862.38m	7,559,854.39m	222.46m	0°	346°	0.229m	22.6m
10	SC03_OB1_B1	A17	631,869.65m	7,559,856.15m	222.44m	0°	74°	0.229m	22.5m
11	SC03_OB1_B1	A18	631,876.88m	7,559,858.06m	222.34m	0°	74°	0.229m	26.7m
12	SC03_OB1_B1	A19	631,884.04m	7,559,859.89m	222.67m	0°	106°	0.229m	20.5m
13	SC03_OB1_B1	A20	631,891.44m	7,559,861.85m	222.09m	0°	88°	0.229m	20.1m
14	SC03_OB1_B1	A21	631,898.70m	7,559,863.76m	222.09m	0°	85°	0.229m	20.1m
15	SC03_OB1_B1	A22	631,906.03m	7,559,865.51m	222.09m	0°	82°	0.229m	19.5m
16	SC03_OB1_B1	A23	631,913.33m	7,559,867.41m	222.35m	0°	76°	0.229m	19.0m
17	SC03_OB1_B1	A24	631,920.57m	7,559,869.25m	222.35m	0°	77°	0.229m	20.0m
18	SC03_OB1_B1	A25	631,927.80m	7,559,871.10m	222.35m	0°	74°	0.229m	20.0m
19	SC03_OB1_B1	A26	631,934.92m	7,559,872.86m	222.35m	0°	74°	0.229m	20.0m
20	SC03_OB1_B1	A27	631,937.66m	7,559,873.50m	222.72m	15°	76°	0.229m	21.5m
21	SC03_OB1_B1	B7	631,799.02m	7,559,844.91m	222.18m	0°	252°	0.229m	13.7m
22	SC03_OB1_B1	B8	631,806.34m	7,559,846.86m	222.15m	0°	254°	0.229m	14.3m
23	SC03_OB1_B1	B9	631,813.93m	7,559,848.79m	222.20m	0°	261°	0.229m	15.0m
24	SC03_OB1_B1	B10	631,821.31m	7,559,850.31m	222.25m	0°	258°	0.229m	15.8m
25	SC03_OB1_B1	B11	631,828.40m	7,559,852.48m	222.51m	0°	255°	0.229m	16.8m
26	SC03_OB1_B1	B12	631,835.27m	7,559,854.25m	222.49m	0°	259°	0.229m	18.7m
27	SC03_OB1_B1	B13	631,842.64m	7,559,856.13m	222.46m	0°	255°	0.229m	19.4m
28	SC03_OB1_B1	B14	631,849.87m	7,559,857.96m	222.24m	0°	259°	0.229m	20.5m
29	SC03_OB1_B1	B15	631,857.31m	7,559,859.31m	222.32m	0°	253°	0.229m	22.0m
30	SC03_OB1_B1	B16	631,864.38m	7,559,861.61m	222.35m	0°	77°	0.229m	23.2m
31	SC03_OB1_B1	B17	631,871.65m	7,559,863.62m	222.42m	0°	75°	0.229m	25.5m
32	SC03_OB1_B1	B18	631,878.91m	7,559,865.63m	222.54m	0°	73°	0.229m	20.5m

Hole properties Refine selection Export to report Export to CSV

- Import... F2
- Export... F3
- Export loaded decks...
- Load
- Attachment
- Setup
- Preferences...
- Quit Ctrl+Shift+Q

- TC23_IB1_B2
- TC23_IB1_B4
- TC24_IB1_B1
- TC26_OB4_B3
- TC28_OB3_B1
- TC28_OB3_B2
- TC30_OB1_B1
- TC30_OB1_B3
- TN01_OB2_B1
- TC28_OB4_B2
- TW11_IB1_B1
- TC28_OB4_B1
- charge rules
- site data
- cad
- search results
- Recycle bin



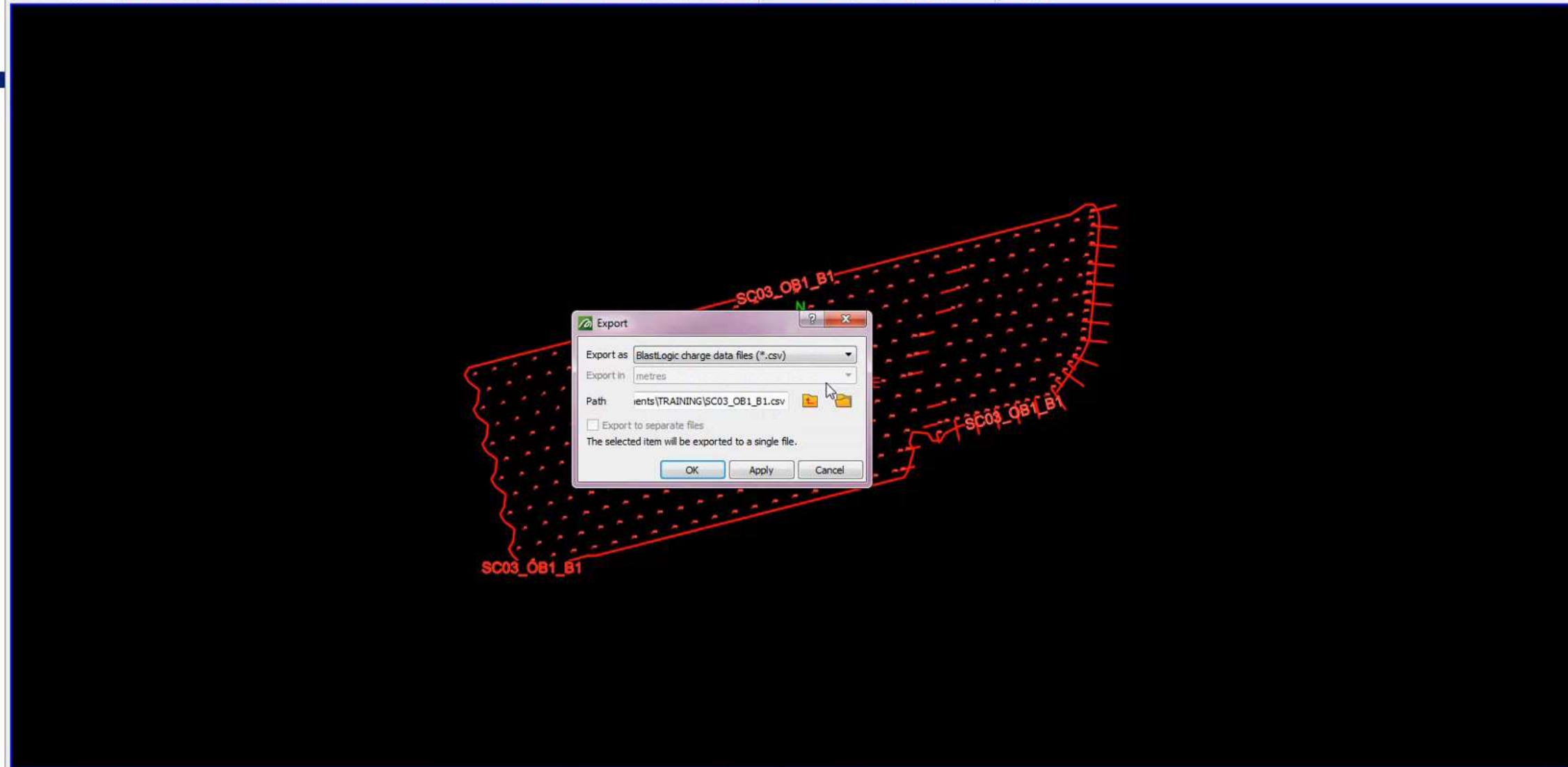
Export holes to CSV Exported 360 selected hole(s) to C:\Users\lohehc\Documents\TRAINING\blastlogic_export_2018-11-06.csv

Successfully exported charge data to C:\Users\lohehc\Documents\TRAINING\SC03_OB1_B1.csv.

Export holes to CSV Exported 360 selected hole(s) to C:\Users\lohehc\Documents\TRAINING\blastlogic_export_2018-11-06.csv



- Daunia
 - blasts
 - SC02_OB1_B1
 - SC02_OB1_B2
 - SC02_OB1_B3
 - SC02_OB1_B4
 - SC03_OB1_B1**
 - TC22_OB4_B3
 - TC23_IB1_B1
 - TC23_IB1_B2
 - TC23_IB1_B4
 - TC24_IB1_B1
 - TC26_OB4_B3
 - TC28_OB3_B1
 - TC28_OB3_B2
 - TC30_OB1_B1
 - TC30_OB1_B3
 - TN01_OB2_B1
 - TC28_OB4_B2
 - TW11_IB1_B1
 - TC28_OB4_B1
 - charge rules
 - site data
 - cad
 - search results
 - Recycle bin



Export

Export as: BlastLogic charge data files (*.csv)

Export in: metres

Path: ients\TRAINING\SC03_OB1_B1.csv

Export to separate files

The selected item will be exported to a single file.

OK Apply Cancel

- Export holes to CSV Exported 360 selected hole(s) to C:\Users\iohehc\Documents\TRAINING\blastlogic_export_2018-11-06.csv
- Successfully exported charge data to C:\Users\iohehc\Documents\TRAINING\SC03_OB1_B1.csv.
- Export holes to CSV Exported 360 selected hole(s) to C:\Users\iohehc\Documents\TRAINING\blastlogic_export_2018-11-06.csv

CAUsers\ohehc\Documents\TRAINING\blastlogic_export_2018-11-06.blst - Paradigm Advanced

Session Editing Timing Modelling

Blast Settings Statistics Hole Selection Tool Heat Map Node Library Pattern Designer Terrain X-Section View Text View Text

Charge Scenario 1 Charging Rules Manage Charge Scenario Pre-Split Designer <No Snapshot Active> Manage Snapshot Measure Distance Move Tool Group Un-Group Select Duplicates Create Hole Create Dummy Annotation Tool Add Notes Delete Print...

Selection

- Row Selection
- Ignore Ties
- Box Selection
- Polygon Selection
- Draw Selection
- Auto-Tie on Selection

Select All Holes

Clear Selection

Select With Current Delay

Select Entire Branch

Select Up

Node List

3D View Plan View

View Options Zoom Fit Selected Fit Holes Fit All Reset North

Set Location

Libraries Documents My Documents TRAINING

Organize New folder

Documents library

TRAINING

Name	Date modified	Type	Size
SC03_OB1_B1	6/11/2018 11:44 AM	Microsoft Excel C...	144 KB
blastlogic_export_2018-11-06	6/11/2018 11:44 AM	Microsoft Excel C...	44 KB

File name: blastlogic_export_2018-11-06

Blast Logic CSV Data File Files

Open Cancel

Attributes

Session Editing Timing Modelling

Geology Types Fragmentation Analysis Calibrate Geology Settings Enable Heatmaps Create Heatmap Node Bench Damage Graph Section View Settings Enable Flyrock Show Footprint for Selection Flyrock Calculator...

Overpressure Settings Overpressure At Location Show Overpressure Rings Enable Vibration Contours Footprint Settings Show Contributing Holes Receivers Sweetspot Foresight

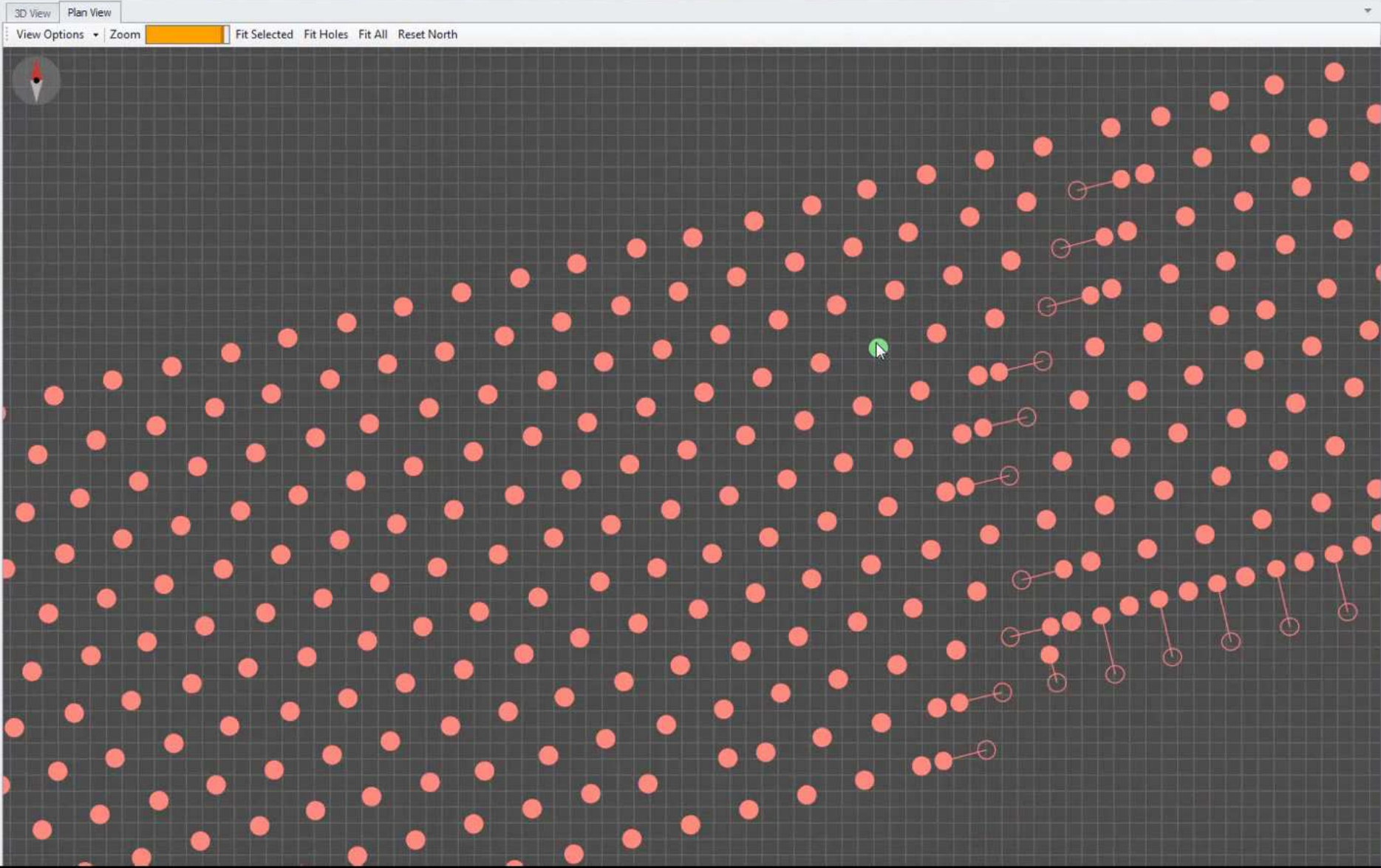
Fragmentation Damage/Energy Flyrock Overpressure Vibration Footprint Seedwave Modelling

Selection

Row Selection Ignore Ties Box Selection Polygon Selection Draw Selection Auto-Tie on Selection

Select All Holes
Clear Selection
Select With Current Delay
Select Entire Branch
Select Up

- Node List
- 123
 - 124
 - 125
 - 126
 - 127
 - 128
 - 129
 - 130
 - 131
 - 132
 - 133
 - 134
 - 13
 - 14
 - 15
 - 16
 - 17
 - 18
 - 19
 - 20
 - 21
 - 22
 - 23



Attributes

Name: 123
Visible:
Position: Bearing 631.9, Northing 7,559, Elevation 222.9 Metres
Diameter: 229 Millimetres
Length: 20.93 Metres
Sub Drill: 0 Metres
Bearing: -14 Degrees
Inclination: 90 Degrees
Colour: [Red]
Charging Rule: 123 Charge Rule
Geology: Geology 1
Explosive Weight: 538 Kilograms
Initiation Time: 0 ms
Powder Factor: 0.53 kg/m³
SDoB: 1.465
Burden Spacing: 7.44 6.54 Metres
Flyrock Range: 159 Metres

Deck Statistics

Deck 1 Actual Length: 20.93 Metres
Deck 1 Explosive Weight: 538 Kilograms

A blue lightning bolt strikes across the background of the text.

EXCLUSION ZONES

Session Editing Timing Modelling

Geology Types Fragmentation Analysis Calibrate Geology Settings Enable Heatmaps Create Heatmap Node Bench Damage Graph Section View Settings Enable Flyrock Show Footprint for Selection Flyrock Calculator... Overpressure Settings Overpressure At Location Show Overpressure Rings Enable Vibration Contours Footprint Settings Show Contributing Holes Receivers Sweetspot Foresight

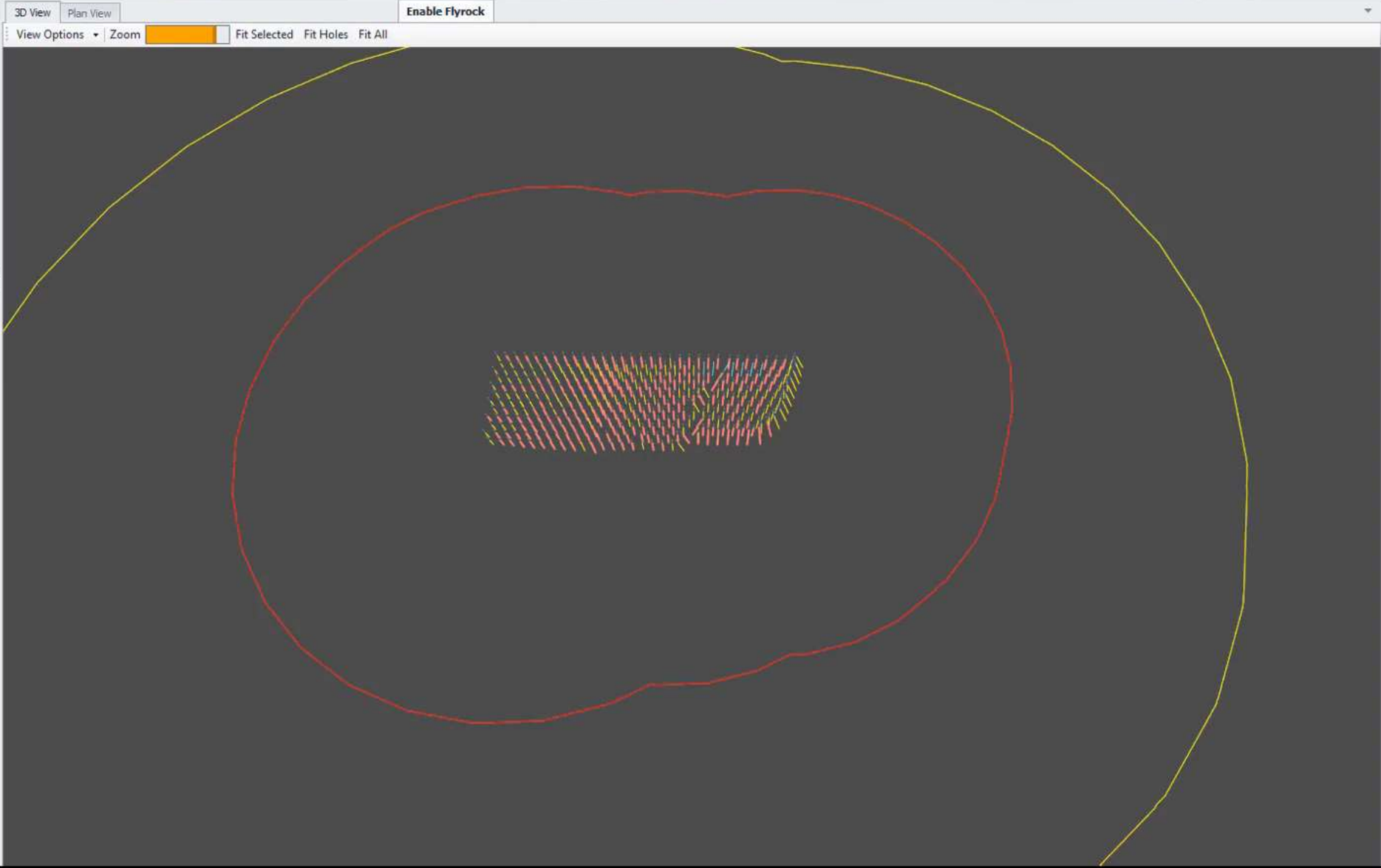
Fragmentation Damage/Energy Flyrock Overpressure Vibration Footprint Seedwave Modelling

Selection

- Row Selection
- Ignore Ties
- Box Selection
- Polygon Selection
- Draw Selection
- Auto-Tie on Selection

Select All Holes
Clear Selection
Select With Current Delay
Select Entire Branch
Select Up

- Node List
- 123
 - 124
 - 125
 - 126
 - 127
 - 128
 - 129
 - 130
 - 131
 - 132
 - 133
 - 134
 - 13
 - 14
 - 15
 - 16
 - 17
 - 18
 - 19
 - 20
 - 21
 - 22
 - 23



Attributes

Session Editing Timing Modelling

Geology Fragmentation Calibrate Geology Settings Enable Heatmaps Create Heatmap Node Bench Damage Graph Section View Settings Show Footprint for Selection Flyrock Calculator... Enable Flyrock

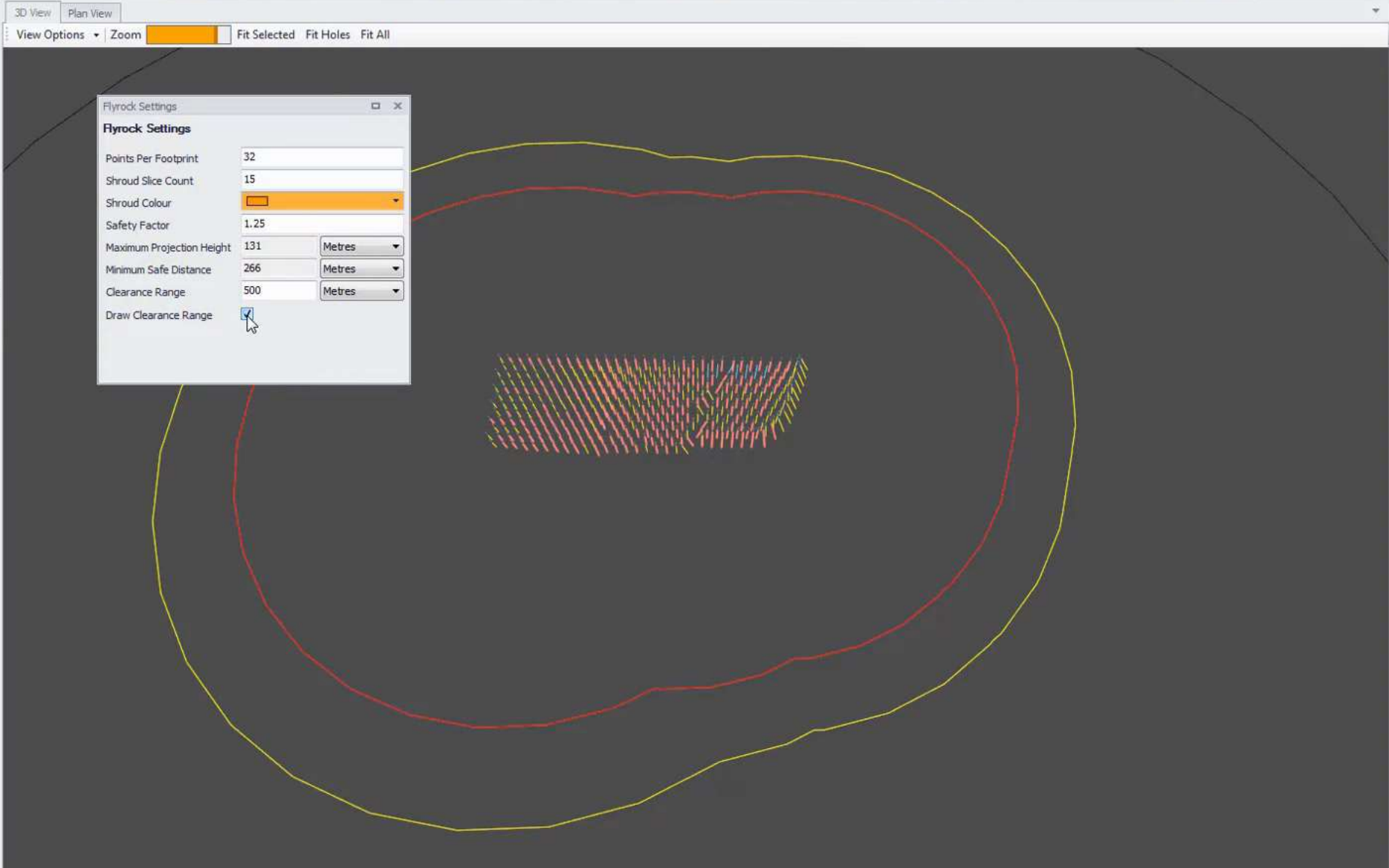
Fragmentation Damage/Energy Flyrock Overpressure Settings Overpressure At Location Show Overpressure Rings Enable Vibration Contours Footprint Settings Show Contributing Holes Receivers Sweetspot Foresight

Selection

- Row Selection
- Ignore Ties
- Box Selection
- Polygon Selection
- Draw Selection
- Auto-Tie on Selection

Select All Holes
Clear Selection
Select With Current Delay
Select Entire Branch
Select Up

- Node List
- 123
 - 124
 - 125
 - 126
 - 127
 - 128
 - 129
 - 130
 - 131
 - 132
 - 133
 - 134
 - 13
 - 14
 - 15
 - 16
 - 17
 - 18
 - 19
 - 20
 - 21
 - 22
 - 23



Flyrock Settings

Flyrock Settings

Points Per Footprint 32

Shroud Slice Count 15

Shroud Colour [Orange]

Safety Factor 1.25

Maximum Projection Height 131 Metres

Minimum Safe Distance 266 Metres

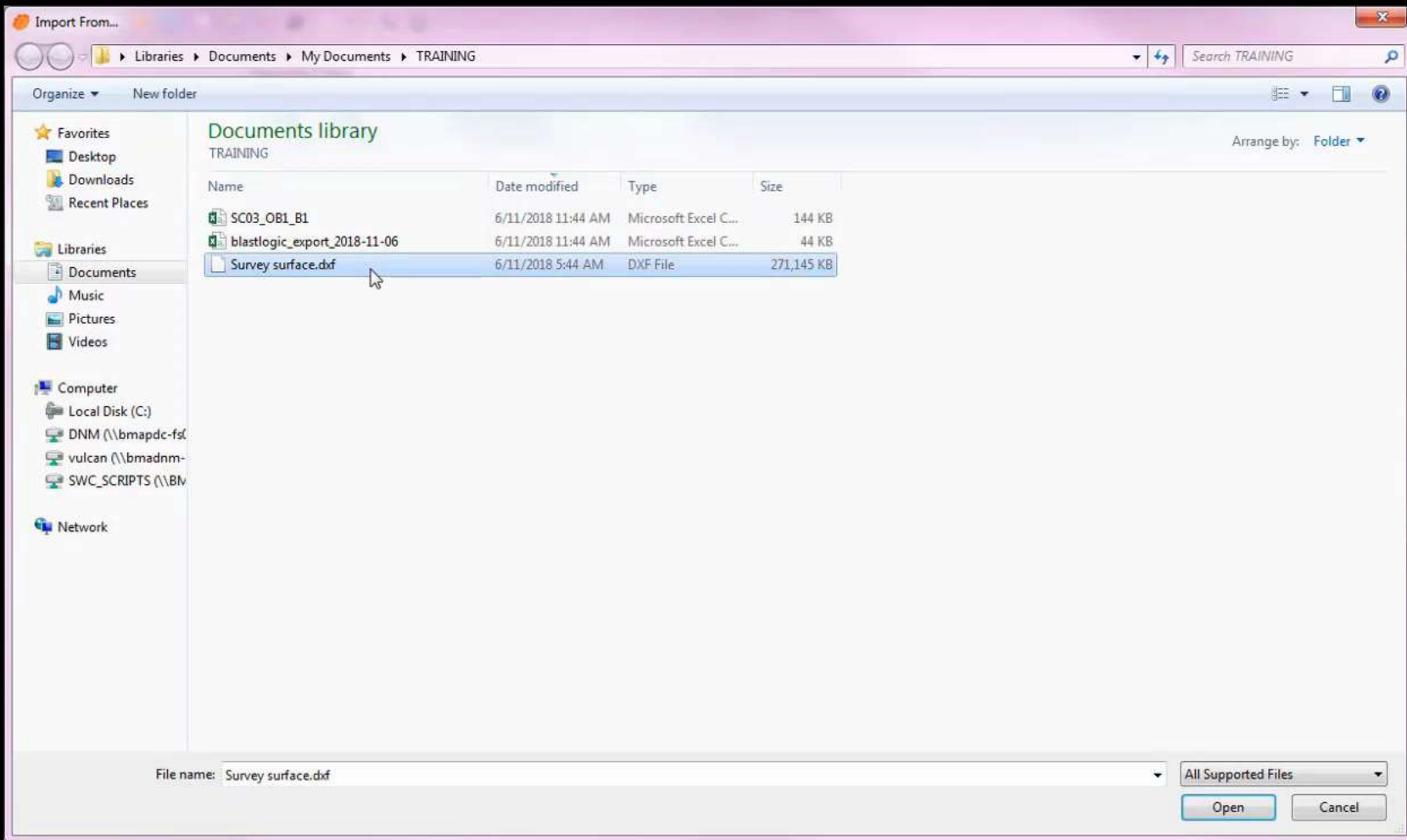
Clearance Range 500 Metres

Draw Clearance Range

Attributes

A blue lightning bolt strikes across a dark blue background, illuminating the scene. The lightning is bright white and yellow, with several smaller bolts branching out from the main one.

SURVEY DXF FILES



Build Information

Build Name: Paradigm Advanced
Build Version: 18.5.5250.0 x64
Build Date: 17/10/2018 5:11:20 PM
[release notes](#)

Licence Information

Session Editing Timing Modelling

Blast Settings Statistics Hole Selection Tool Heat Map Node Library Pattern Designer Terrain X-Section View Text View Text

Charge Scenario 1 Manage Charge Scenario Pre-Split Designer

<No Snapshot Active> Manage Snapshot

Measure Distance Move Tool Group Un-Group Select Duplicates

Create Hole Create Dummy Add Notes Annotation Tool Delete Print...

Selection

- Row Selection
- Ignore Ties
- Box Selection
- Polygon Selection
- Draw Selection
- Auto-Tie on Selection

Select All Holes

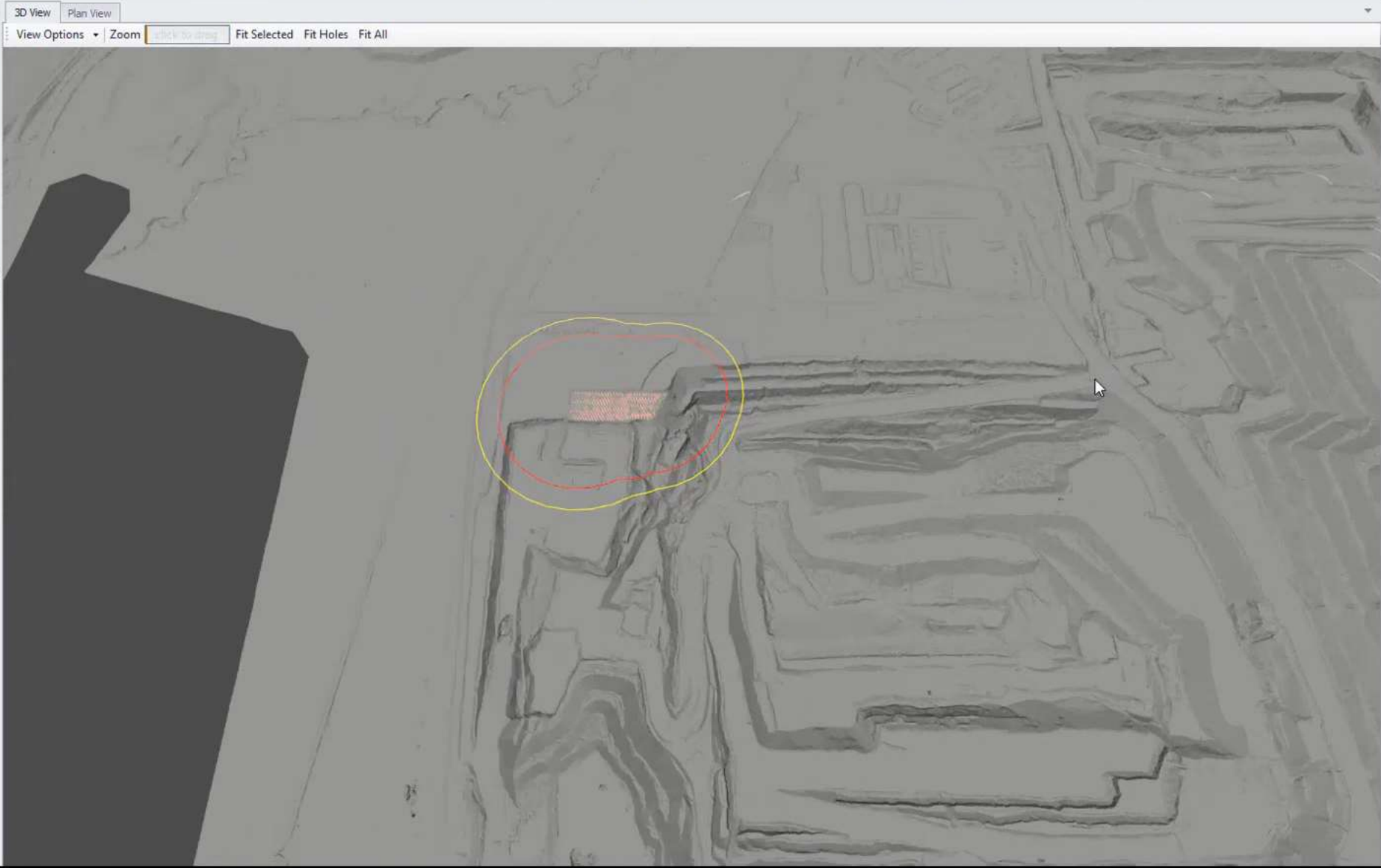
Clear Selection

Select With Current Delay

Select Entire Branch

Select Up

- Node List
- E10
 - E11
 - E12
 - E13
 - E14
 - E15
 - E16
 - E17
 - E18
 - E19
 - E20
 - E21
 - E22
 - E23
 - E24
 - E25
 - E26
 - E27
 - E28
 - E29
 - E30
 - E31
 - E32
 - E33
 - E34
 - E35
 - F5
 - F6
 - F7
 - F8
 - F9
 - F10
 - F11



Attributes

HEAT MAPS



Session Editing Timing Modelling

Blast Settings Statistics Hole Selection Tool Heat Map Terrain X-Section View Text View Text Charge Scenario 1 <No Snapshot Active> Measure Distance Move Tool Group Un-Group Select Duplicates Create Hole Create Dummy Add Notes Delete Print...

Selection

- Row Selection
- Ignore Ties
- Box Selection
- Polygon Selection
- Draw Selection

Auto-Tie on Selection

Select All Holes

Clear Selection

Select With Current Delay

Select Entire Branch

Select Up

Select Down

Select Initiation Path

- Node List
- SC03_0B1_B1
 - A8
 - A9
 - A10
 - A11
 - A12
 - A13
 - A14
 - A15
 - A16
 - A17
 - A18
 - A19
 - A20
 - A21
 - A22
 - A23
 - A24
 - A25
 - A26
 - A27
 - B7
 - B8
 - B9
 - B10
 - B11
 - B12
 - B13

Heat Map

Attribute to map

FlyrockRange (Length)

Units Metres

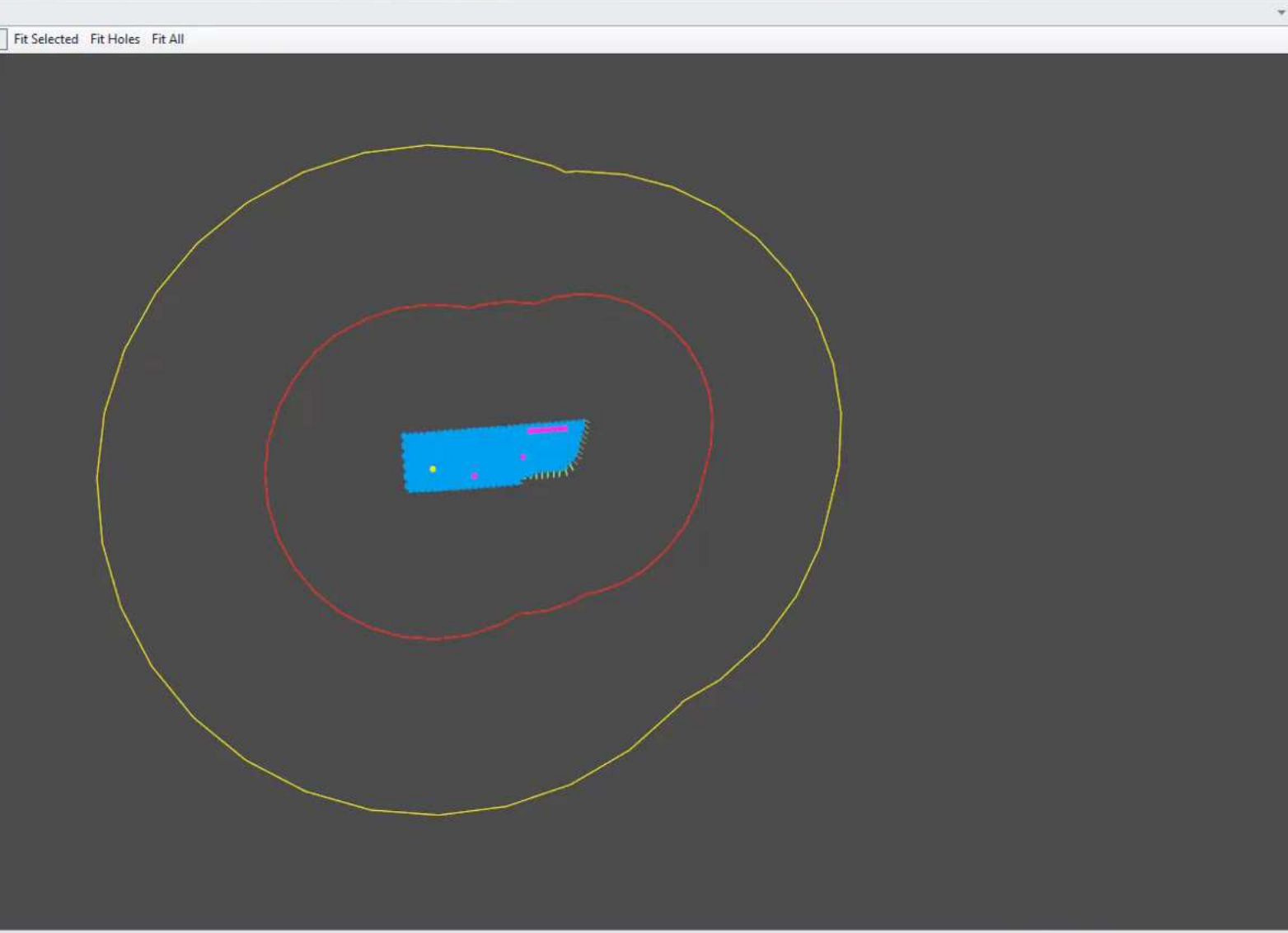
Gradient min/max values

- Auto Determine Min/Max

0

214.226

Interpolate Colours



Attributes

Name A8

Visible

Position Easting Northing Elevation Metres
631,8 7,559, 221.6

Diameter 229 Millimetres

Length 13.9 Metres

Sub Drill 0 Metres

Bearing 166 Degrees

Inclination 90 Degrees

Colour

Charging Rule A8 Charge Rule

Geology Geology 1

Explosive Weight 302 Kilograms

Initiation Time 0 ms

Powder Factor 0.58 kg/m³

SDoS 1.465

Burden Spacing 6.6 5.64 Metres

Flyrock Range 159 Metres

Deck Statistics

NOTE: Multiple holes are selected...

Deck 1 Actual Length 13.9 Metres

Deck 1 Explosive Weight 302 Kilograms

Session Editing Timing Modelling

Blast Settings Statistics Hole Selection Tool Heat Map Node Library Pattern Designer Terrain X-Section View Text View Text

Charge Scenario 1 Manage Charge Scenario Pre-Split Designer <No Snapshot Active> Manage Snapshot Measure Distance Move Tool Group Un-Group Select Duplicates Create Hole Create Dummy Annotation Tool Add Notes Delete Print...

General Charging Snapshots Tools

Selection

- Row Selection
 - Ignore Ties
 - Box Selection
 - Polygon Selection
 - Draw Selection
 - Auto-Tie on Selection
- Select All Holes
- Clear Selection
- Select With Current Delay
- Select Entire Branch
- Select Up
- Select Down
- Select Initiation Path

Node List

- E10
- E11
- E12
- E13
- E14
- E15
- E16
- E17
- E18
- E19
- E20
- E21
- E22
- E23
- E24
- E25
- E26
- E27
- E28
- E29
- E30
- E31
- E32
- E33
- E34
- E35
- F5
- F6

3D View Plan View

View Options Zoom Fit Selected Fit Holes Fit All

Heat Map

Attribute to map: FlyrockRange (Length)

Units: Metres

Gradient min/max values

- Auto Determine Min/Max
- 0
- 214.226
- Interpolate Colours

Attributes

Name: E10

Visible:

Position: Easting 631.8, Northing 7,559, Elevation 222.8

Diameter: 229 Millimetres

Length: 17.64 Metres

Sub Drill: 0 Metres

Bearing: -14 Degrees

Inclination: 90 Degrees

Colour: [Red]

Charging Rule: E10 Charge Rule

Geology: Geology 1

Explosive Weight: 419 Kilograms

Initiation Time: 0 ms

Powder Factor: 0.49 kg/m³

SDoB: 1.278

Burden Spacing: 7.36 6.65 Metres

Flyrock Range: 214 Metres

Deck Statistics

Deck 1 Actual Length: 17.64 Metres

Deck 1 Explosive Weight: 419 Kilograms

Getting it right...

0.5x

BMA DAUNIA MINE - Calypso Pit



0.5x



0.5x

WHAT GOOD LOOKS LIKE



0.5x



Minimal face burst through accurate placement of face row holes

0.5x

Minimal ejection through controlled stemming processes



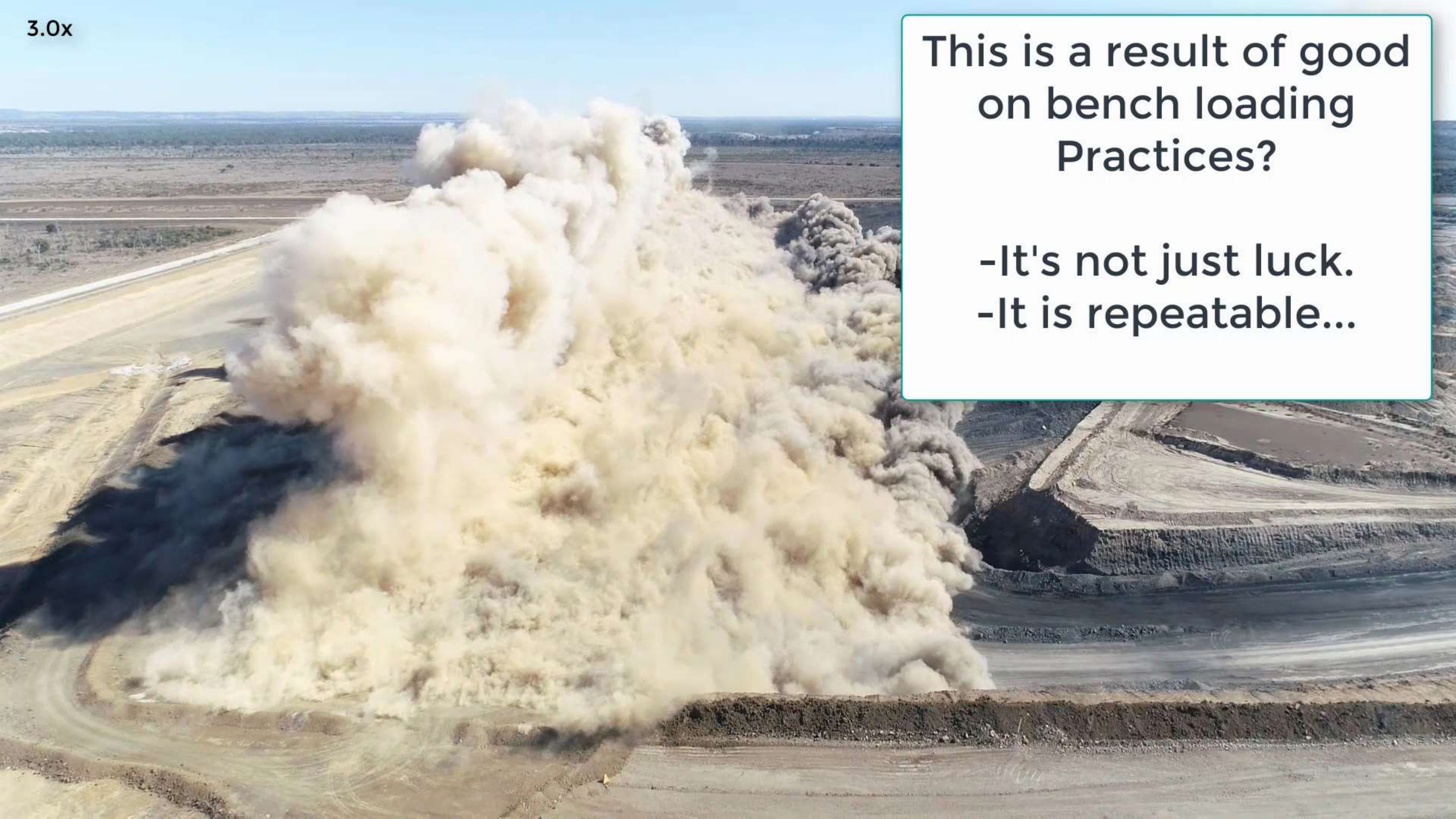
0.5x



Minimal Flyrock outside blast perimeter.



3.0x



**This is a result of good
on bench loading
Practices?**

- It's not just luck.**
- It is repeatable...**

- We have great technology available today,
- If we educate.....If we train our people.....,
- If we encourage and demand best practice from crews....,

We can provide a much safer outcome, by removing the emotional decision making process and use real time data and science to establish safe clearance zones.

BMA Daunia Mine

Flyrock Testing Results

Thank You for watching.