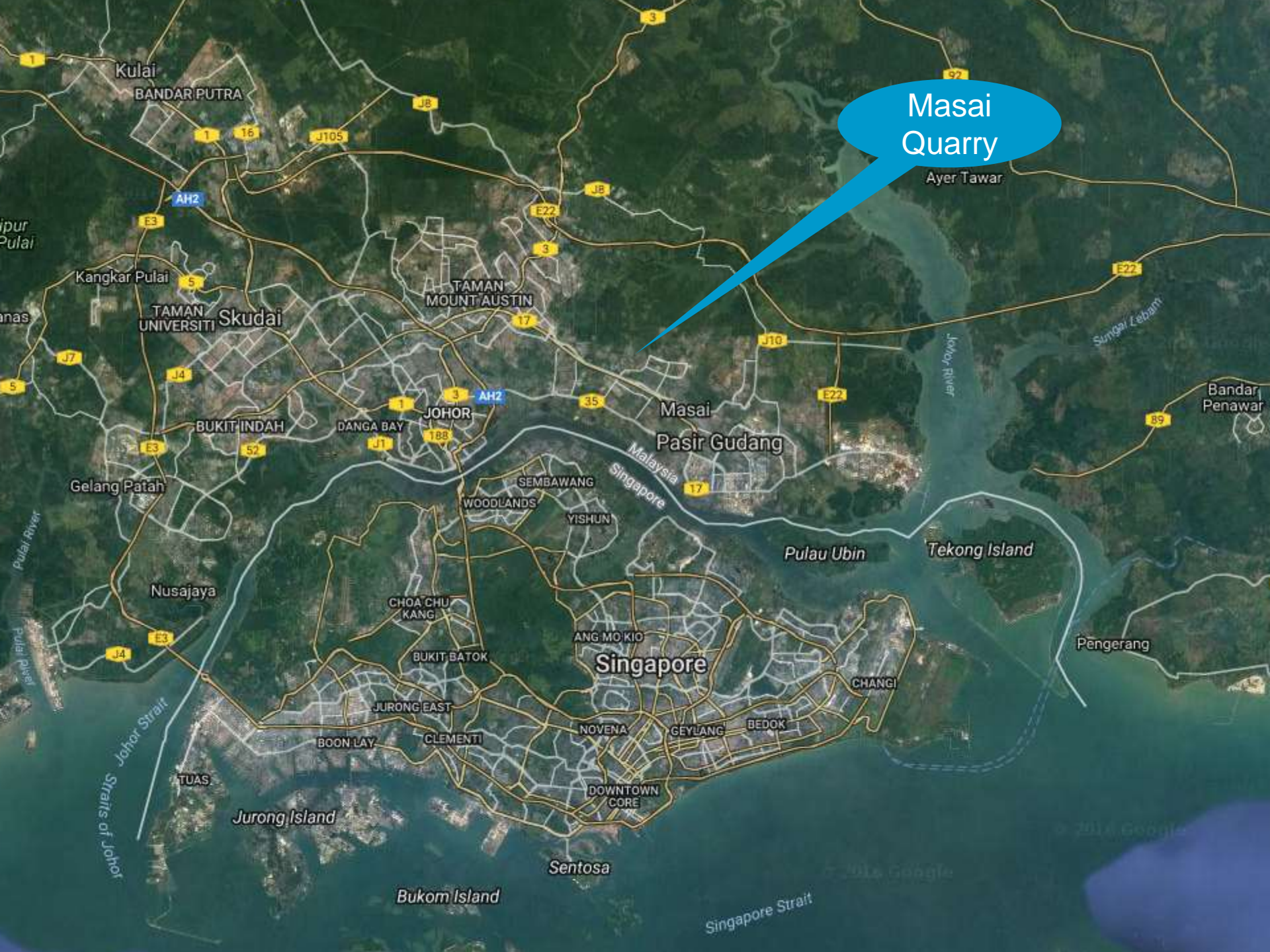




RISK MANAGEMENT AT MASAI QUARRY

November 2016

Martin Adam Manager Global Technical Excellence



Masai
Quarry

Ayer Tawar

Kulai
BANDAR PUTRA

Kangkar Pulai

TAMAN UNIVERSITI
Skudai

TAMAN MOUNT AUSTIN

BUKIT INDAH

DANGA BAY

JOHOR

Masai

Pasir Gudang

Gelang Patah

SEMBAWANG
WOODLANDS

YISHUN

Pulau Ubin

Tekong Island

Nusajaya

CHOA CHU KANG

ANG MO KIO

Singapore

BUKIT BATOK

CHANGI

JURONG EAST

BOON LAY

CLEMENTI

NOVENA

GEYLANG

BEDOK

TUAS

Jurong Island

DOWNTOWN CORE

Sentosa

Bukom Island

Singapore Strait

© 2016 Google

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PROXIMITY TO NEAREST NEIGHBOURS



19 JULY 2013

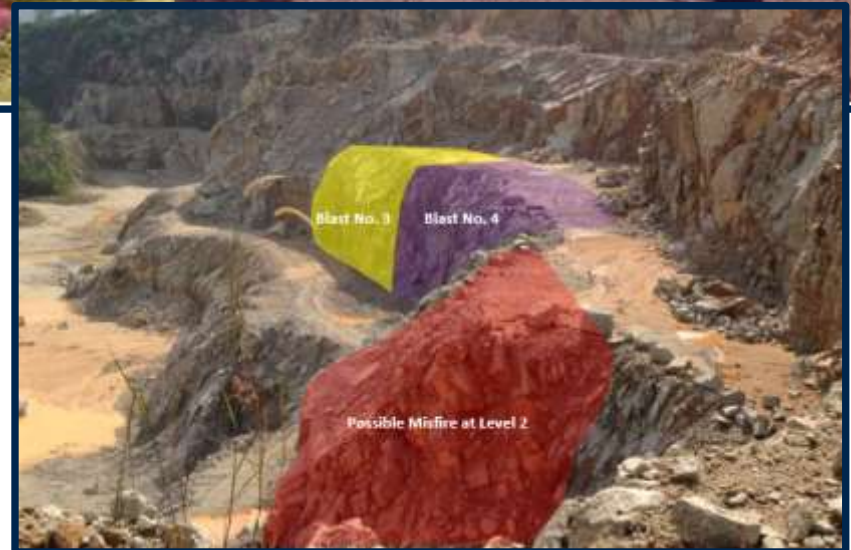


SwitchUp.tv

19 JULY 2013



PLANNING THE RESTART



TYPICAL MALAYSIAN GRANITE QUARRY



ADVERSE JOINTING



DEMONSTRATION BLAST OBJECTIVES


- Test powder factor and vibration assumptions
- Demonstrate Orica's ability to manage the whole process
- Test community response to the restart.



BLASTING RESTARTS NOV 2014

Komuniti Jalan Bukit Seri Alam
December 6, 2014 · 🌐

14th November 2014, 11.55am
The Seri Alam Quarry Blasting has started again.
It was only 150 meters away from us.
Our safety has been jeopardized.
Who is going to protect us?

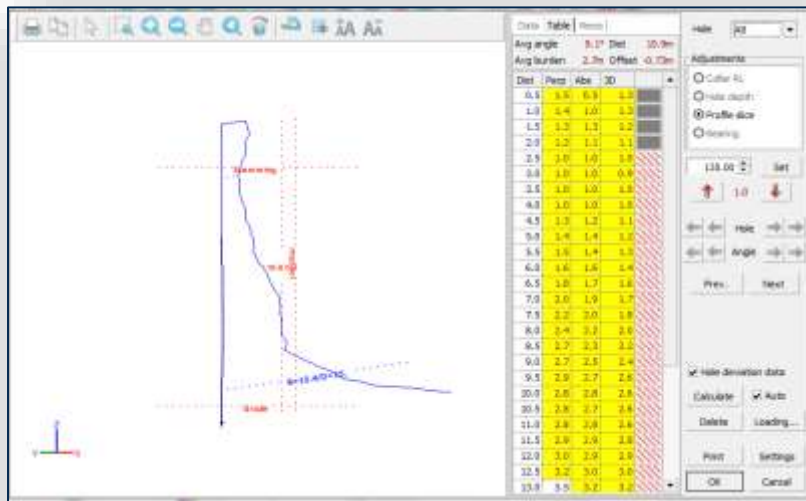


130 Views

👍 Like 💬 Comment ➦ Share

14th November 2014, 11.55am
The Seri Alam Quarry Blasting has started again.
It was only 150 meters away from us.
Our safety has been jeopardized.
Who is going to protect us?

BLASTING RESTARTS NOV 2014



COMPLIANCE MONITORING



BLAST IQ – BLAST DATABASE ONLINE

The screenshot displays the ORICA Blast IQ web application interface. At the top left is the ORICA logo and navigation links: Home, Site, My Account, and Sign-out. A search bar and a dropdown menu for 'Site' (set to 'Masai Quarry') are on the top right. Below the navigation is a menu with tabs: Overview, Site Map (active), Blasts, Performance, Documents, Images, Videos, and Vibration prediction. The main content area is titled 'Masai Quarry' with a 'Show full screen' link. A 'Blast Bounds Legend' shows 'Fired' in red and 'Preparing' in blue. The central part is a satellite map of the quarry area, overlaid with red and blue blast boundaries. On the left, there are 'Elevation Filter' (set to 97.0 m) and 'Date Filter' (set to 6/06/2016) controls. On the right, a 'Settings' panel includes 'Map Type' (Satellite Hybrid), 'Site map' options (Blast Master Text, Plan RL27.5), 'Points of interest' (Monitors), 'Blasts' options (Blast centre, Blast bounds), and a 'Filter' section for Blast Type, Geology, Holes Diameter, and Initiating System. The map shows various roads like 'Jalan Bukit 1' through 'Jalan Bukit 8' and nearby buildings such as 'Accobiotech Sdn. Bhd' and 'Tropical Network Sdn Bhd'. At the bottom, there are 'Google' and 'Map data' attributions, and a footer with 'Terms & Conditions | © Copyright 2015 Orica Limited. All rights reserved. | Build 1.22'.

MASAI COMPILATION



18 MONTHS ON...



FLYROCK RISK ASSESSMENT

BTQ Masai Blasting Risk Assessment (Flyrock)		Value	Weighting	Score
Blast Number				
Date of Assessment				
Conditions	Wet Holes (1) = Wet holes expected	1	8.0%	8%
	Geology (1) = Transitional Rock	0	8.0%	0%
	Damage (1) = Visible prior blast damage	0	8.0%	0%
Face	Free face (1) = no free face	0	8.0%	0%
	Face direction (1) = South or East, (0) = North or West	1	8.0%	8%
	Bench Ht (value in metres)	15	1.0%	15%
Trajectory	Bench Elevation (m)	20	0.2%	4%
	Distance from Grochem (m)	200	5.0%	25%
Risk Factor				60%

WHY IS VIBRATION A PROBLEM?

**Human Comfort
(Freedom from fear)**



**Property Damage
(or the perception of)**



CLAIMED EFFECTS

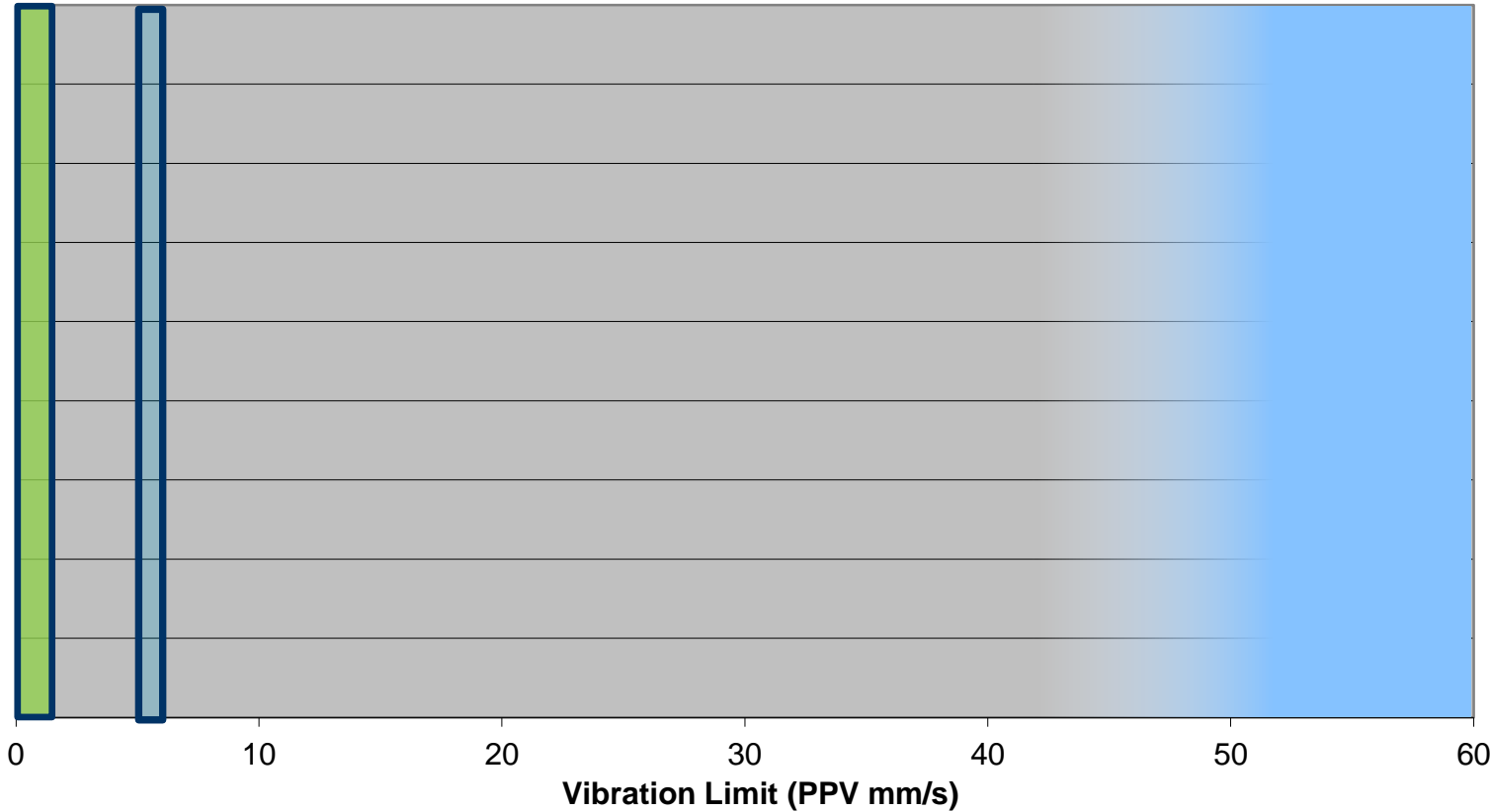


WHAT IS BEST TIME TO BLAST?

Not Business Hours!

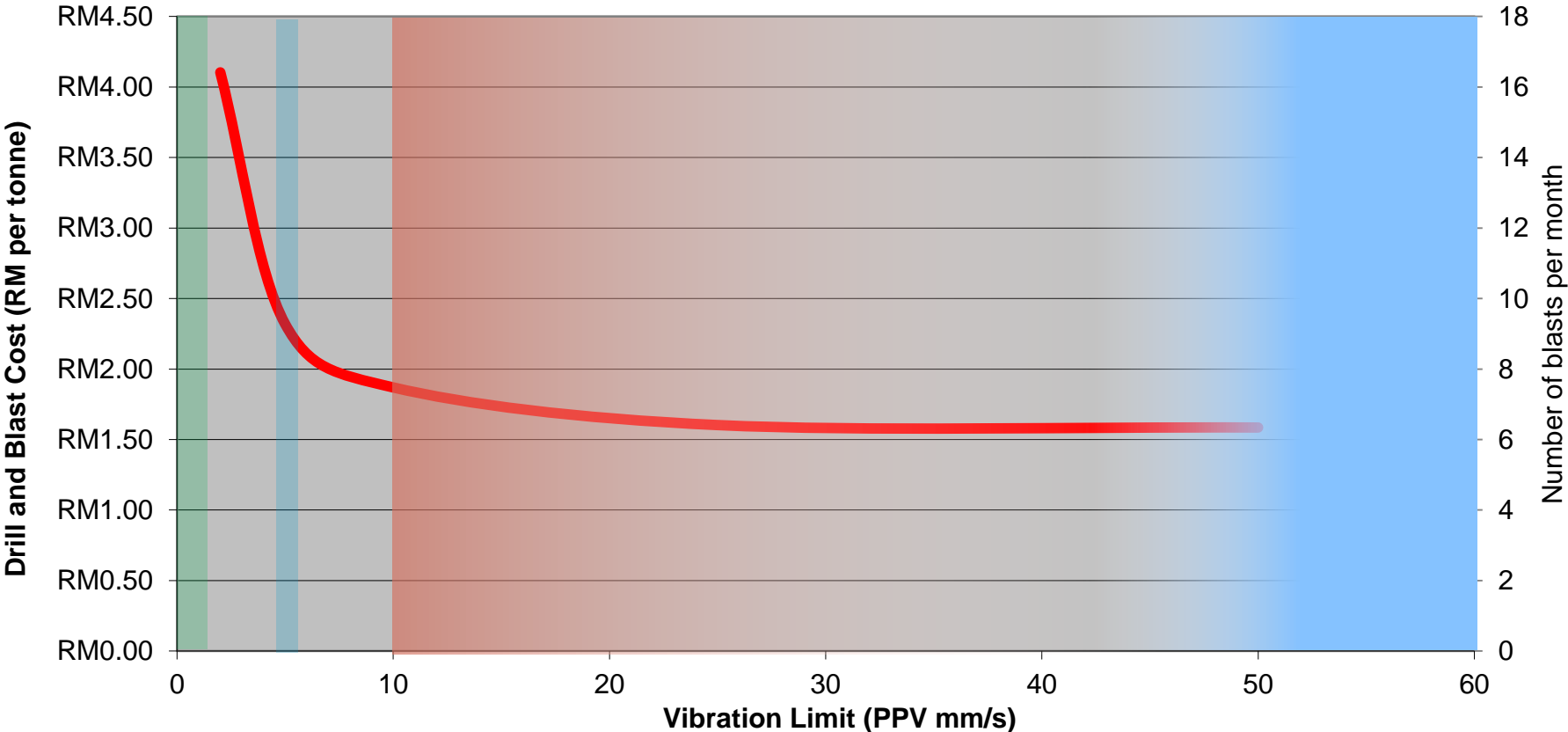


WHAT IS THE BEST VIBRATION LIMIT?



WHAT IS THE BEST VIBRATION LIMIT?

Range for “lowest net cost to community”



COMPLIANCE MONITORING

Only measures one value
at one point in time and space;

Velocity is not directly correlated with
damage;

No information on

- ENERGY RELEASE
- DURATION
- RESPONSE



HURRICANE VS SNEEZE

- Both peak velocity >200 km/h
- Which one causes more damage?



ENGINEERING BLAST MONITOR



NCVIB – VIBRATION RESULTS ONLINE

ORICA Report Filter Marty Adam

Project: Ma01 - BTQ Masai Quarry

Project Documents Measurements Blasts Events Map Instruments Administration

Active Project Title

Project:
Ma01 01
BTQ Masai Quarry
Saei Alam

Head Consultant:
Kin Herley
+61 425 840 232
kin.herley@orica.com

Consultants:
Kin Herley
Marty Adam
Mehd Shah Pooza Bin Muta
Neil Labouon

Customer:
YTL Cement
Wen Izzamudin

Users:
Wen Izzamudin

Third Parties:
No Third Parties are Available

API Users:
No API users on this project

Latest Notices

Search

No notices were found

Blast Summary

Blast Number	Contract Part	Section	Time
RL27.5-12.5 Pattern 25			09/10/2016 17:38
RL27.5-12.5 Pattern 22			25/09/2016 17:45
RL27.5-12.5 Pattern 18			20/09/2016 14:20
RL27.5-12.5 Patterns 17, 19B, 21, 24			14/09/2016 19:12
RL27.5-12.5 Pattern 16			07/09/2016 17:35

Active Measurement Points

Search

Measurement Point#	Placement	Date	Value
01 - V	Geocoin	09/10/2016 17:38	5.5 mm/s
01 - L	Geocoin	09/10/2016 17:38	1.00 mm/s
01 - T	Geocoin	09/10/2016 17:38	2.35 mm/s
02 - V	Geocoin	09/10/2016 17:38	2.40 mm/s
02 - L	Geocoin	09/10/2016 17:38	0.80 mm/s
02 - T	Geocoin	09/10/2016 17:38	0.95 mm/s
03 - Ext	Geocoin Extensometer		-

NCVIB - Continuous Wave Report - Linear Diagram - Internet Explorer

Orica - Australia Continuous

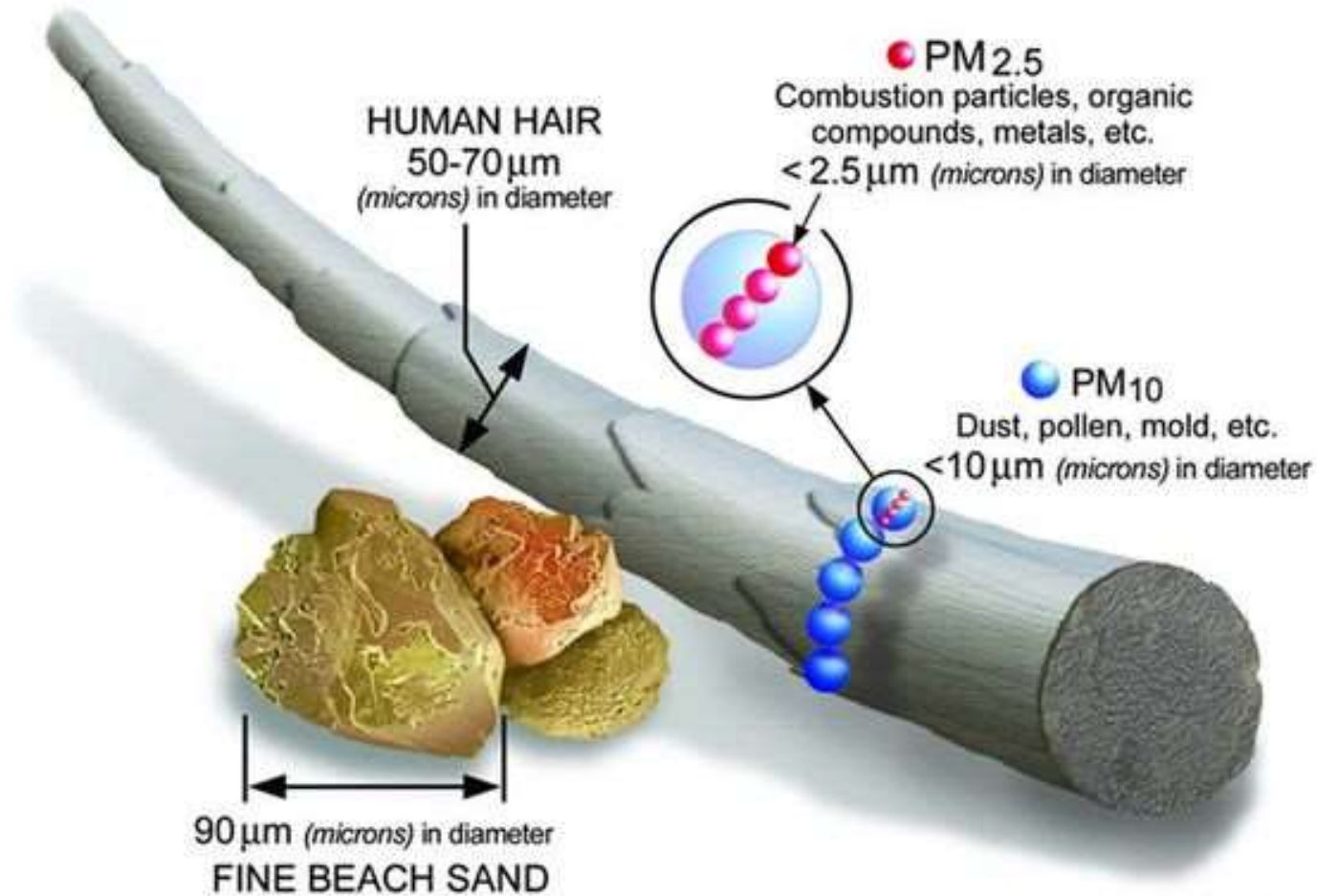
From 09/10/2016 00:00 To 09/10/2016 11:30

03 - Ext Geocoin Extensometer [ms] [Crack width]

3 Day

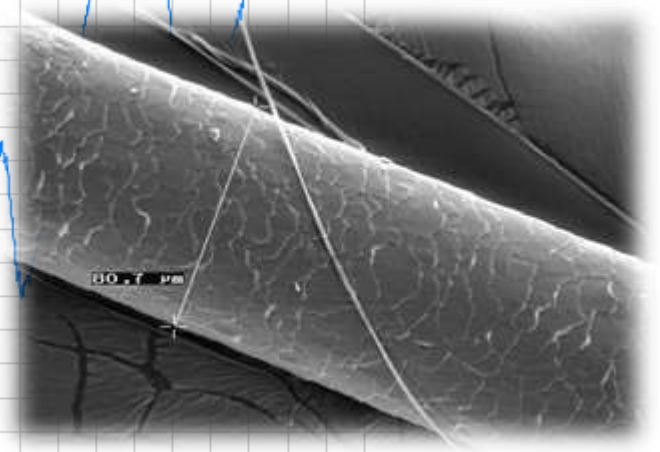
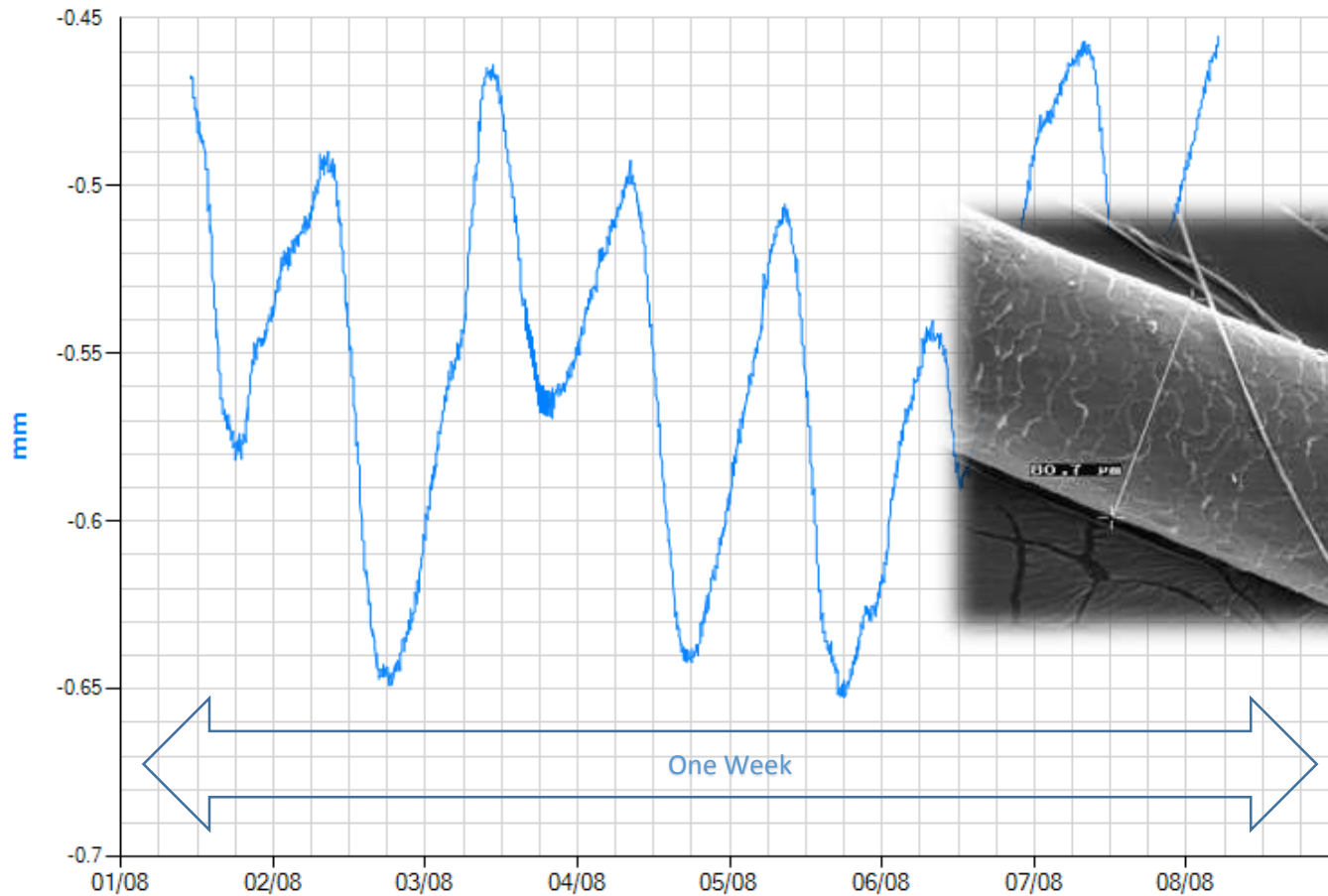
100%

LESS THAN A SMOKE PARTICLE

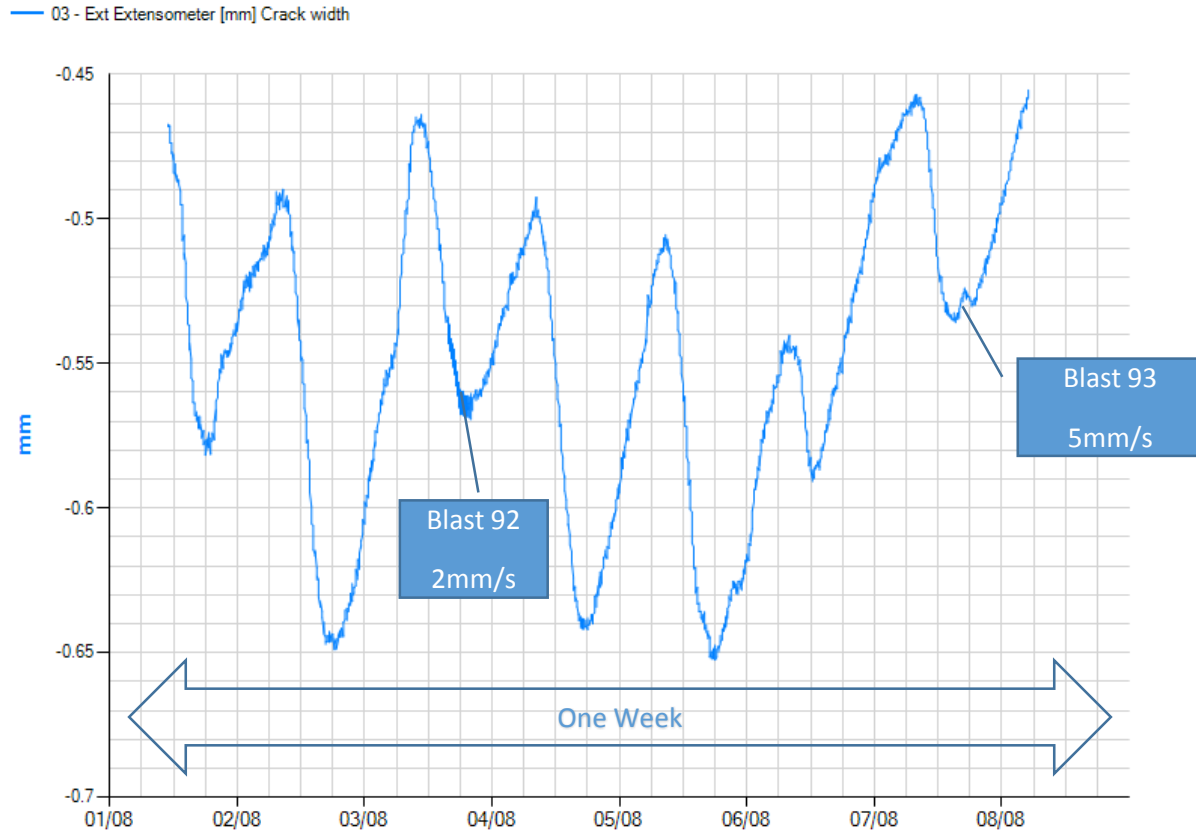


EXTENSOMETER RESULTS

— 03 - Ext Extensometer [mm] Crack width

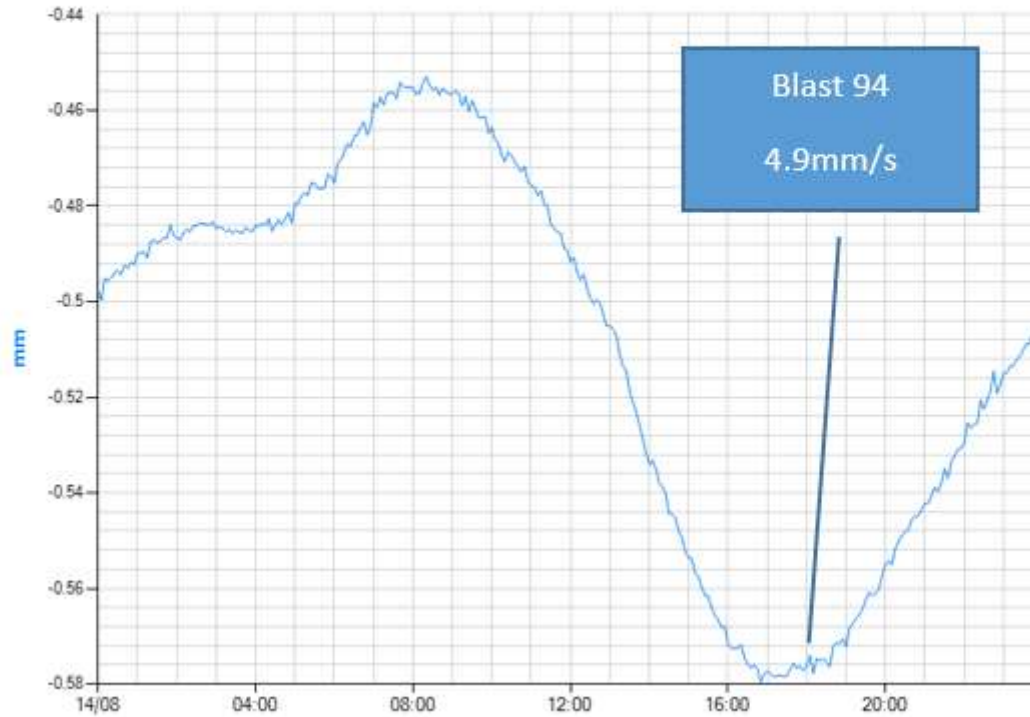


EXTENSOMETER RESULTS



From 14/08/2016 00:00 To: 14/08/2016 23:59

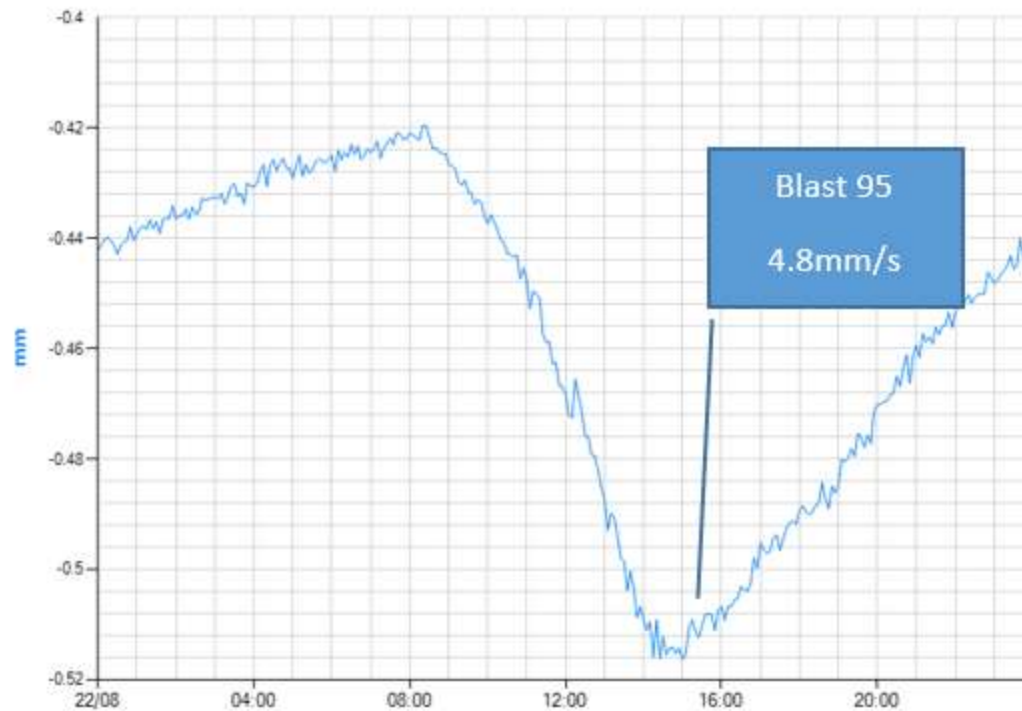
03 - Ext Extensometer [mm] Crack width



< 1 Day

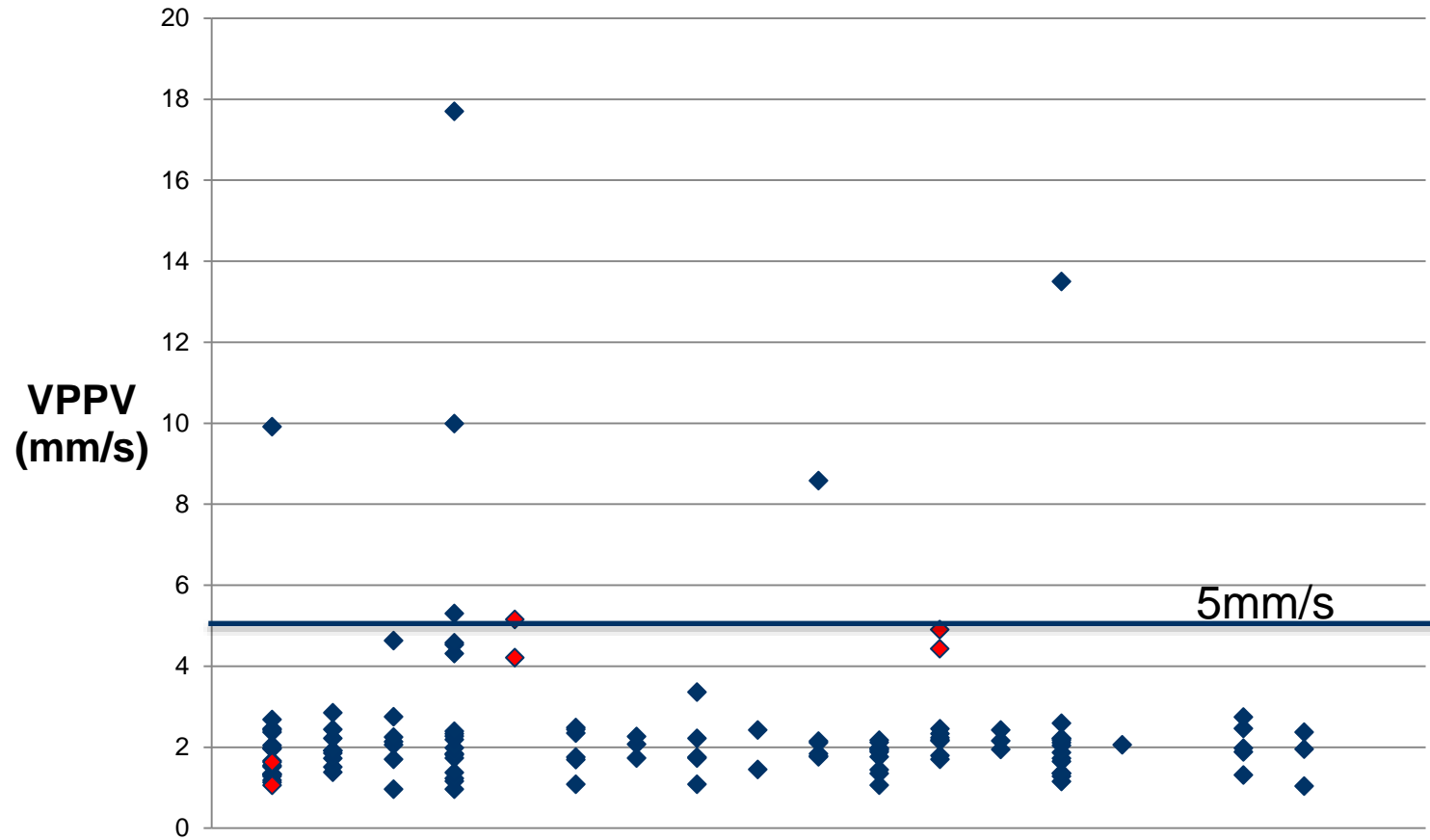
From 22/08/2016 00:00 To: 22/08/2016 23:59

03 - Ext Extensometer [mm] Crack width



EVENTS THAT WEREN'T BLASTS

All Triggers 3 August - 20 August



CONCLUSIONS

- “Least harm” strategies may contradict traditional ideas
- Blasting vibration management has two faces
- Blasts at 5mm/s produce tiny movement

Solution

- Adopt a “least harm” strategy
- Fire large blasts, less often = reduced frequency of blasting
- Engineering monitors can be used to prove this is safe to structures

