



GRANITE
CONSTRUCTION MATERIALS

WELCOMES YOU
TO A TOWN HALL MEETING



TOWN HALL MEETING

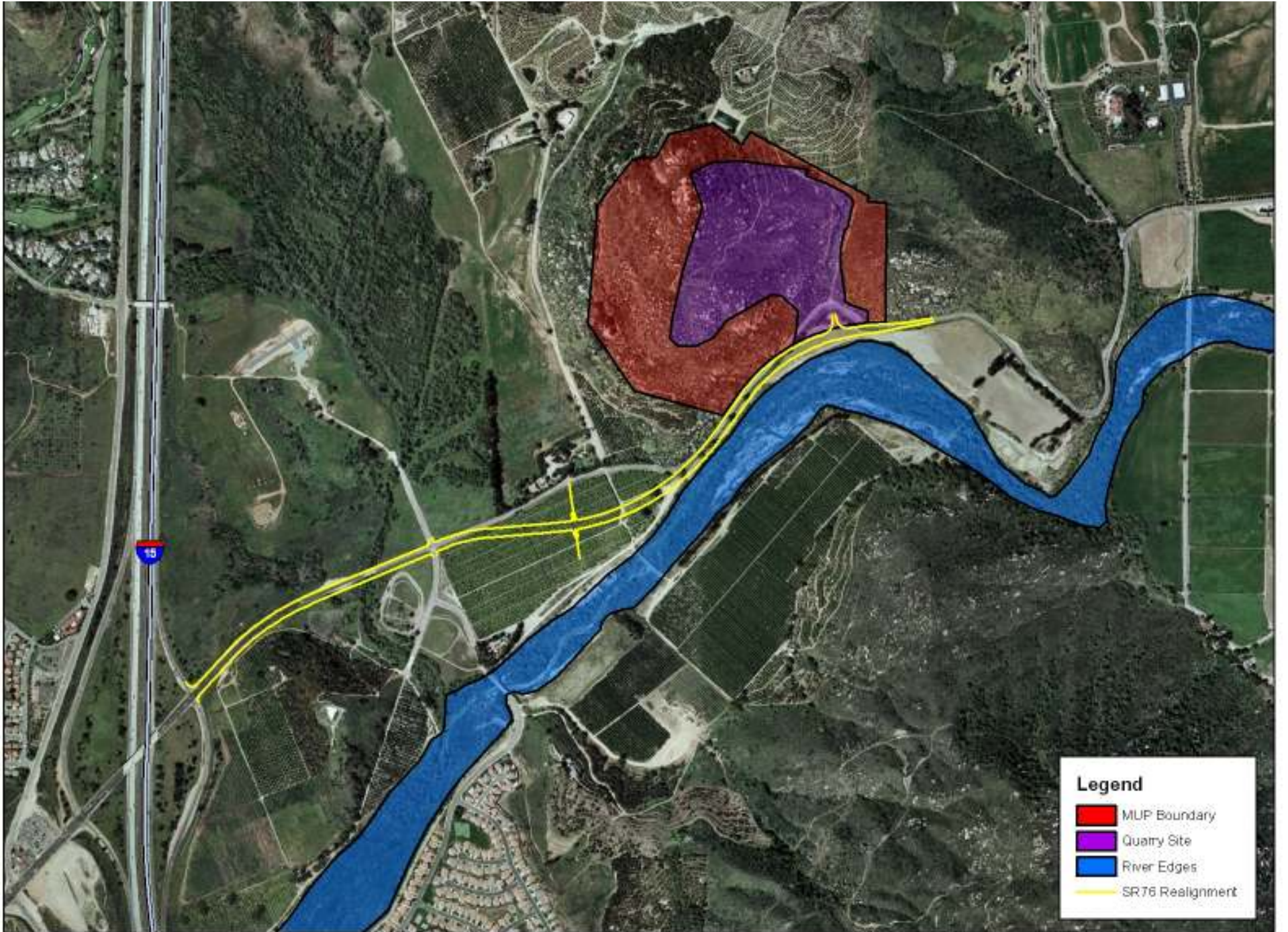
TONIGHT'S AGENDA

1. Blasting Fundamentals
2. Vibration
3. Seismic Monitoring
4. Drilling
5. Blast Video



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Blast Fundamentals





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Regulatory Agencies

USOSM – federal regulations for surface mining

MSHA – federal mining safety regulations

CalOSHA

ATF

DHS

San Diego County Sherriff's Department

San Diego County DLUP

San Diego County Air Pollution Control District



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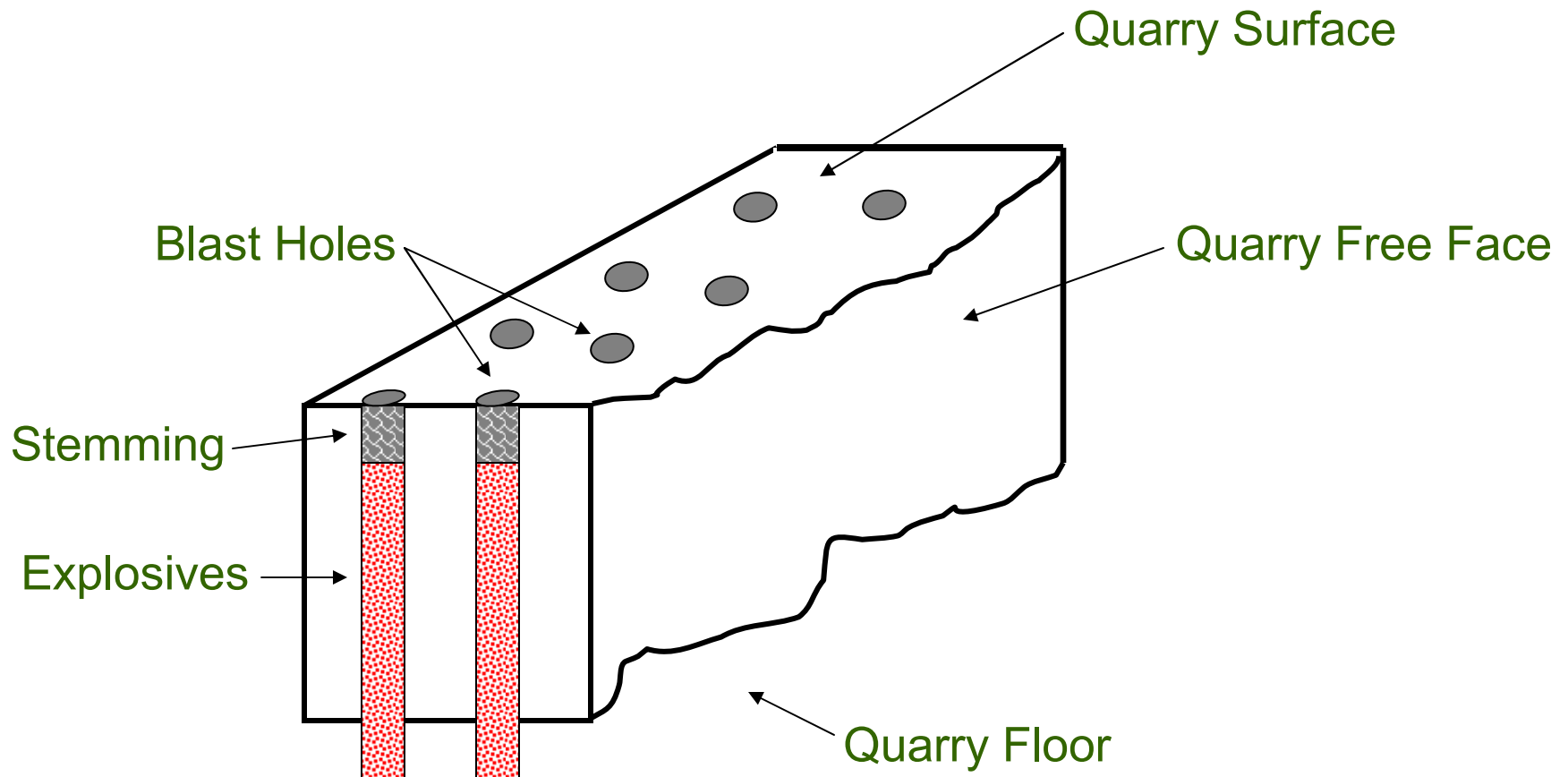
Blasting Operations

1. All blasting conducted by a licensed blaster under permit issued by the S.D. County Sherriff.
2. Blasting Hours – Monday thru Friday between 8:00 AM and 4:00 PM.
 - ✓ Maximum 1 blast per day.
 - ✓ 5 blasts per week during construction.
 - ✓ 3 blasts per week after plant development.
 - ✓ Most blasts will occur in the afternoon between 1:00 PM and 3:00 PM.
3. No explosives stored on-site.
4. No blasting when wind speed exceeds 15mph.



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Blast Diagram





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Blast Design Variables

- Blast hole diameter
- Number of blast holes
- Hole spacing
- Pattern delays
- Time of blast
- Type of explosive

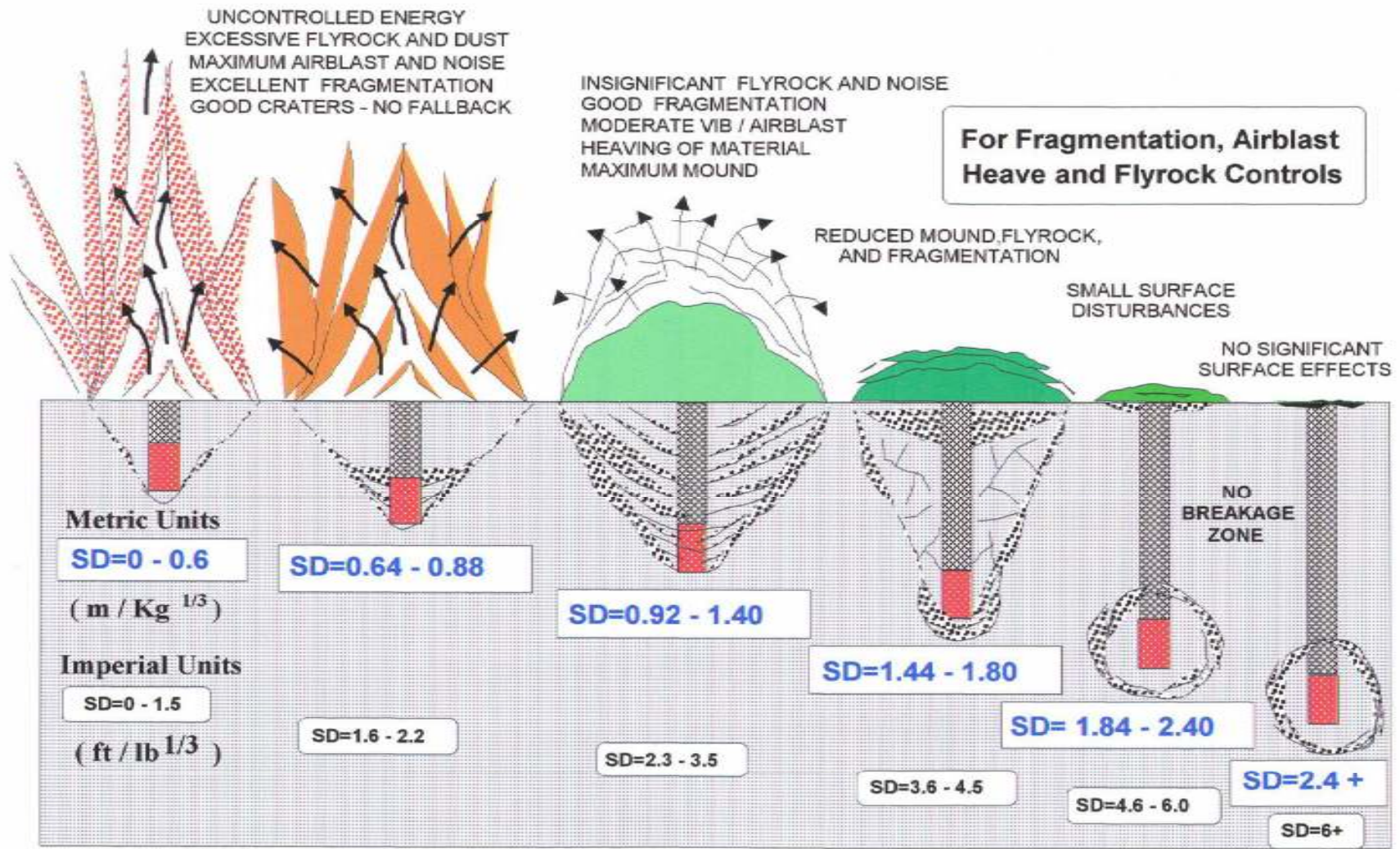


Figure A2 Significance of Scaled Depth of Burial (SD) - Metric & Imperial Units BAI98F16 CHQ04SD2





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Vibration



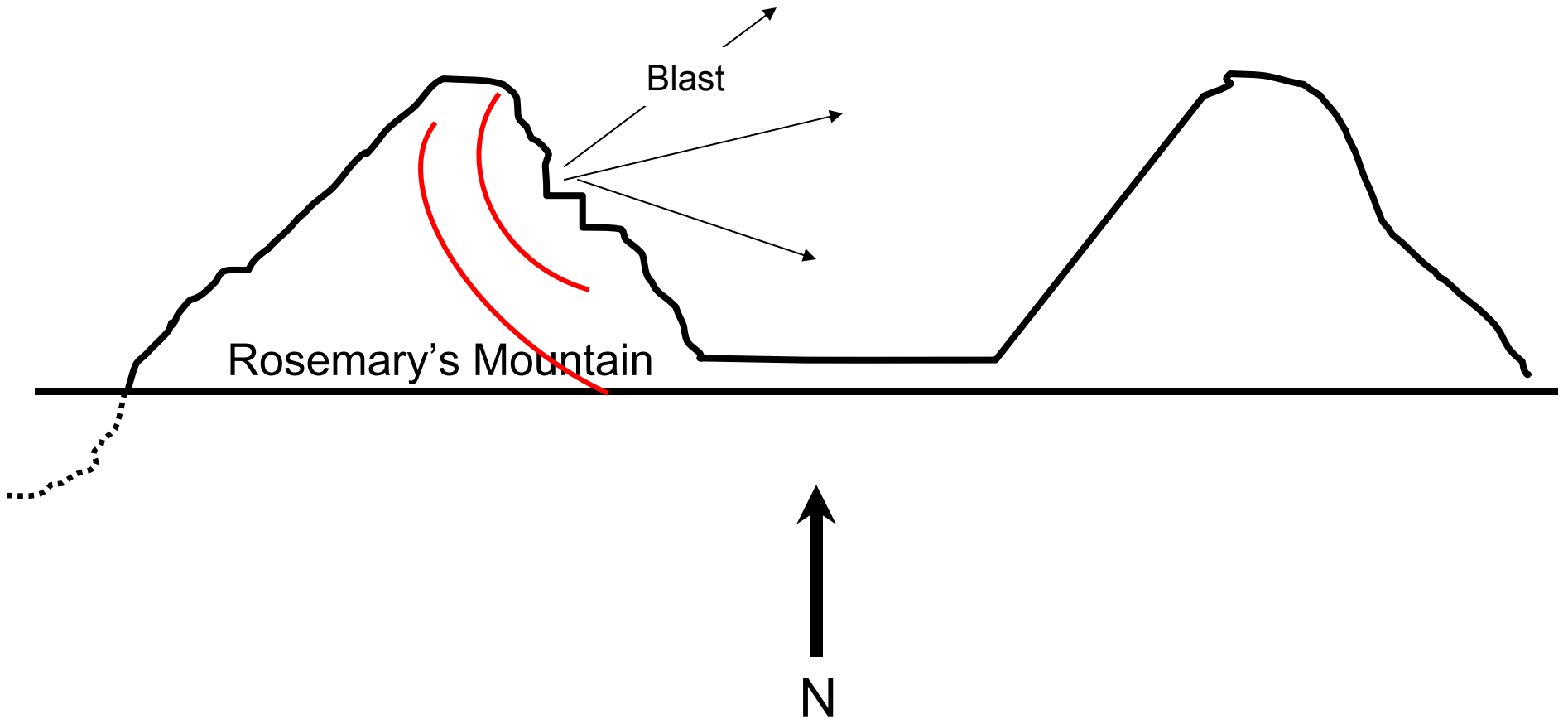
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Vibration Sources

- Ground Vibration
- Air Blast



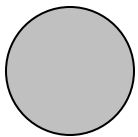
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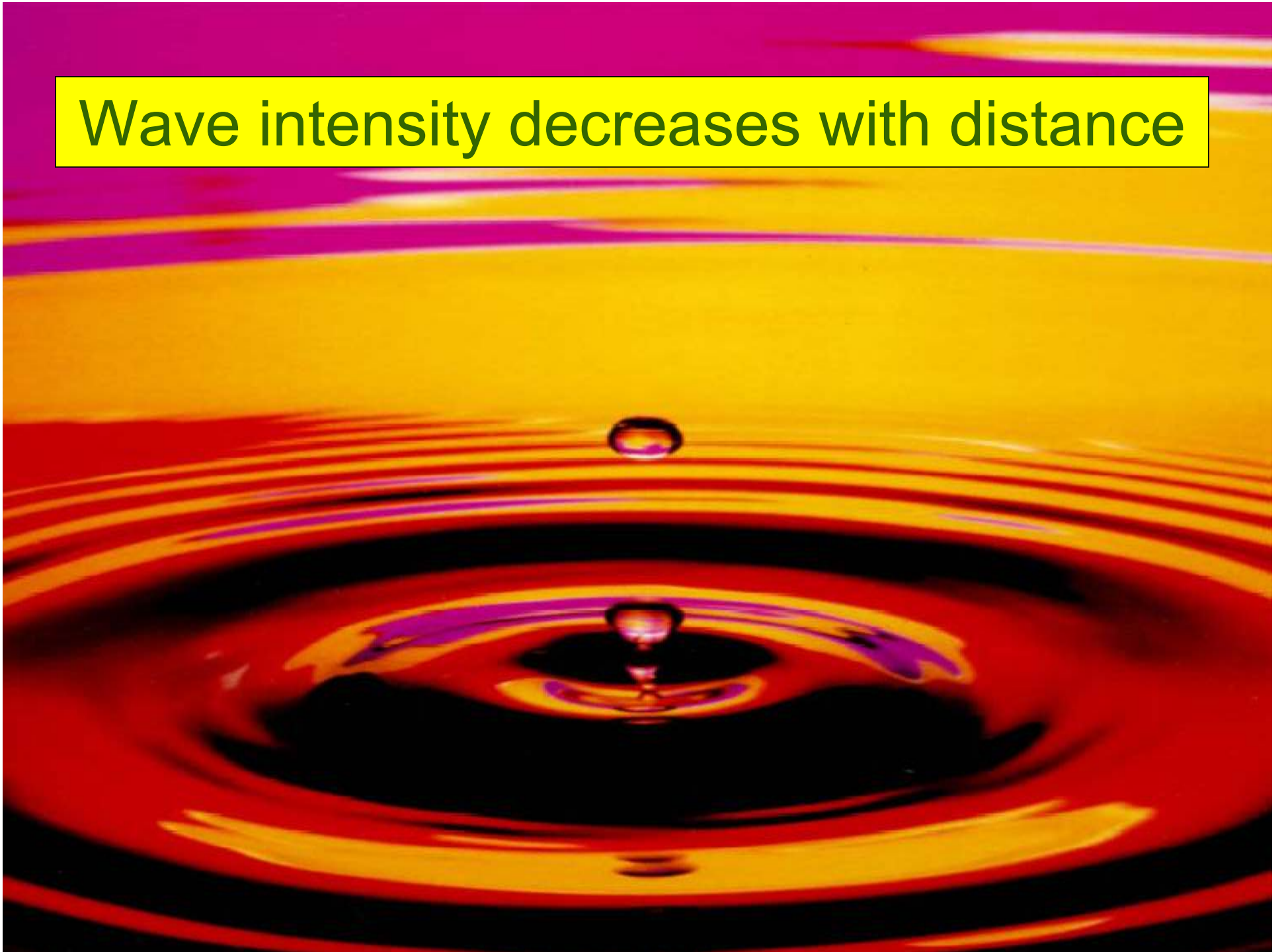


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Ground Vibration



Wave intensity decreases with distance





Destructive Interference



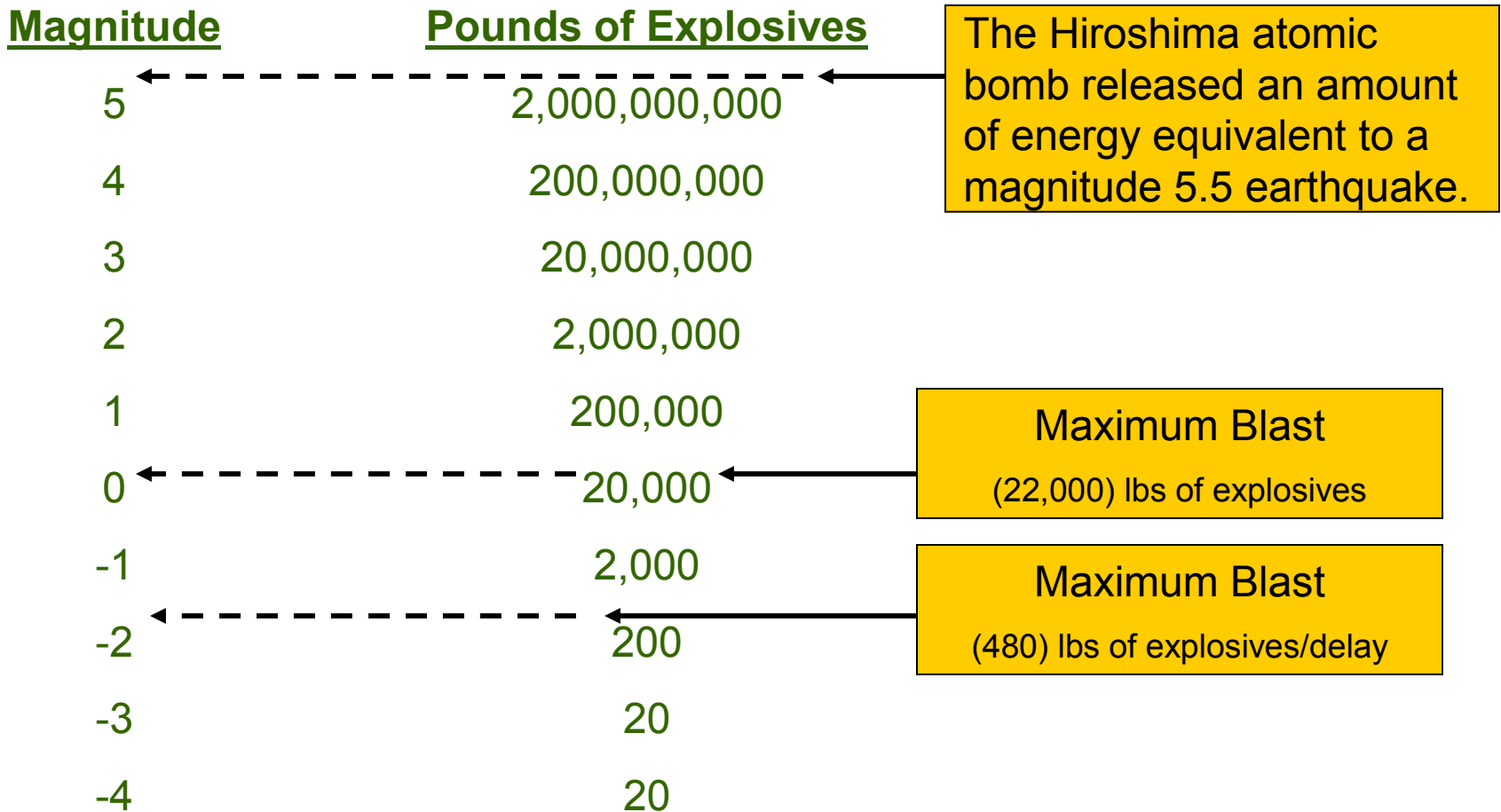
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Earthquakes vs. Blasting



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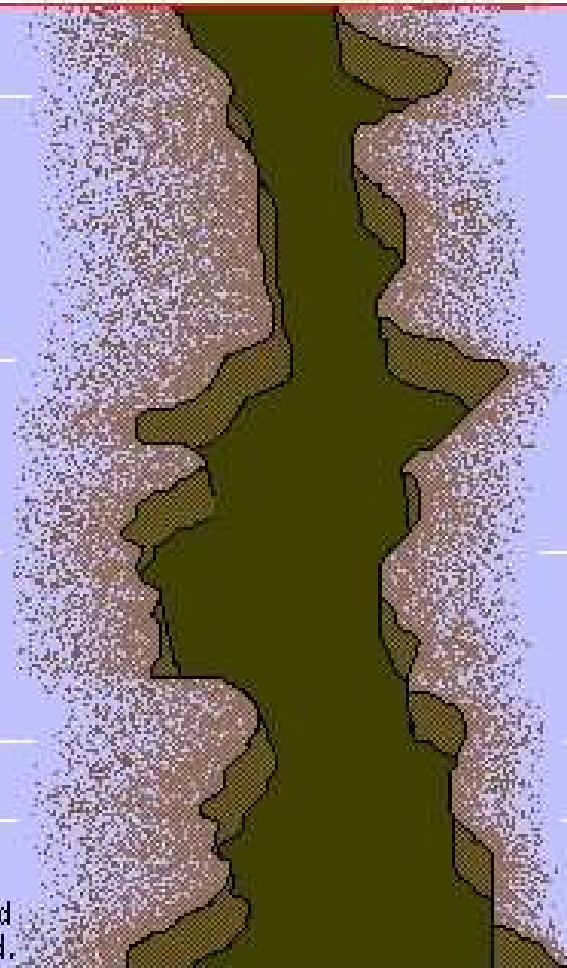
Richter Scale vs. PPV



Mercalli Scale

Richter Scale

- I.** Felt by almost no one.
 - II.** Felt by very few people.
 - III.** Tremor noticed by many, but they often do not realize it is an earthquake.
 - IV.** Felt indoors by many. Feels like a truck has struck the building.
 - V.** Felt by nearly everyone; many people awakened. Swaying trees and poles may be observed.
 - VI.** Felt by all; many people run outdoors. Furniture moved, slight damage occurs.
 - VII.** Everyone runs outdoors. Poorly built structures considerably damaged; slight damage elsewhere.
 - VIII.** Specially designed structures damaged slightly, others collapse.
 - IX.** All buildings considerably damaged, many shift off foundations. Noticeable cracks in ground.
 - X.** Many structures destroyed. Ground is badly cracked.
 - XI.** Almost all structures fall. Bridges wrecked. Very wide cracks in ground.
 - XII.** Total destruction. Waves seen on ground.
- Microsoft Illustration: Pots are tumbled and tossed.



- 2.5** Generally not felt, but recorded on seismometers.
- 3.5** Felt by many people.
- 4.5** Some local damage may occur.
- 6.0** A destructive earthquake.
- 7.0** A major earthquake.
- 8.0 and up** Great earthquakes.



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Important Concepts

Seismographs measure the intensity of the blast wave NOT the magnitude of the blast

Peak Particle Velocity (PPV)

- A measure of ground vibration as in/sec
 - Actual displacement of the earth's surface on the order of milli-inches (.001 in)

Frequency

- Number of cycles per second measured in hertz (Hz)
- Resonance



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Resonance





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USOSM Regulations

| <i>Ground Vibration Limits</i> | |
|--------------------------------|------------------------|
| Distance (ft) | Peak Particle Velocity |
| 0 to 300 | 1.25 in/sec |
| 301 to 5000 | 1.00 in/sec |
| Over 5000 | 0.75 in/sec |

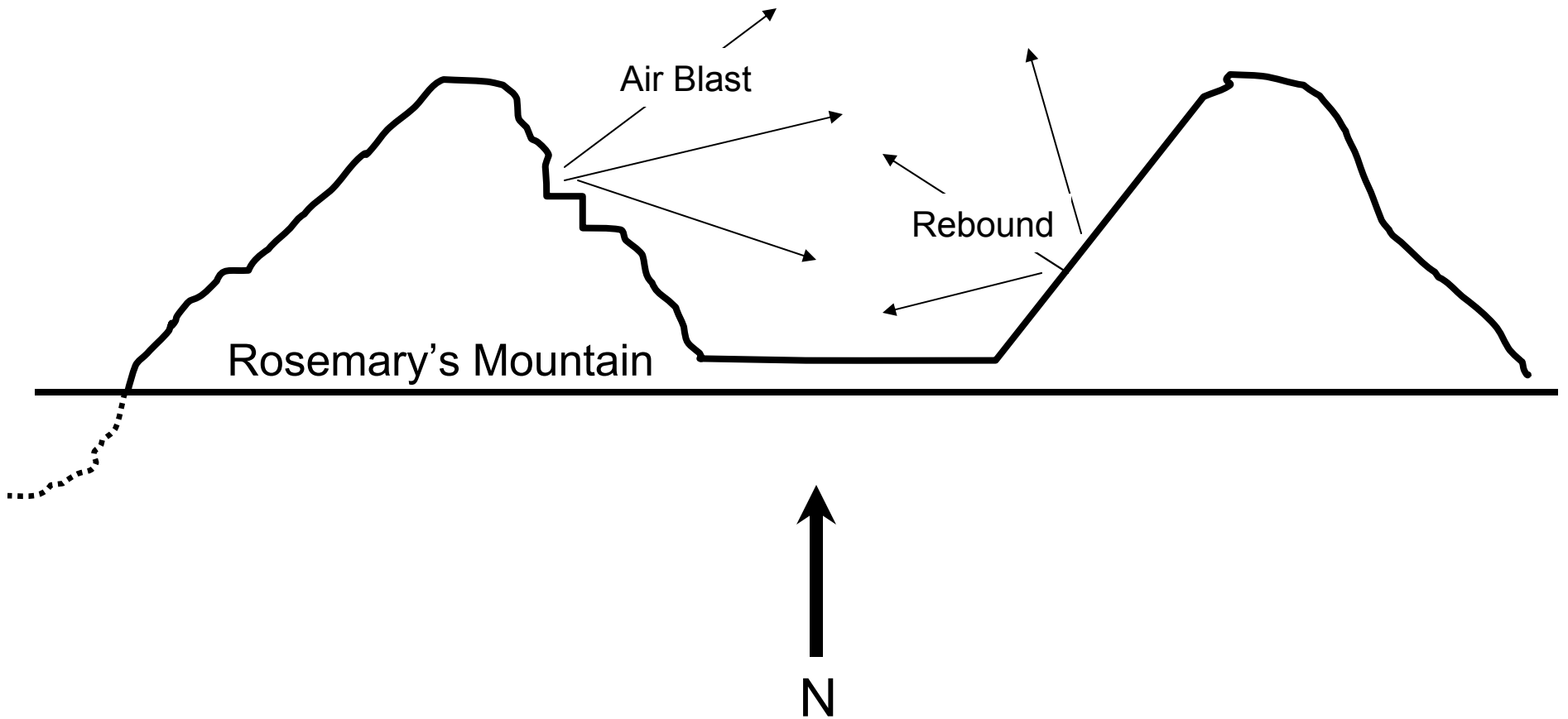


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Air Blast



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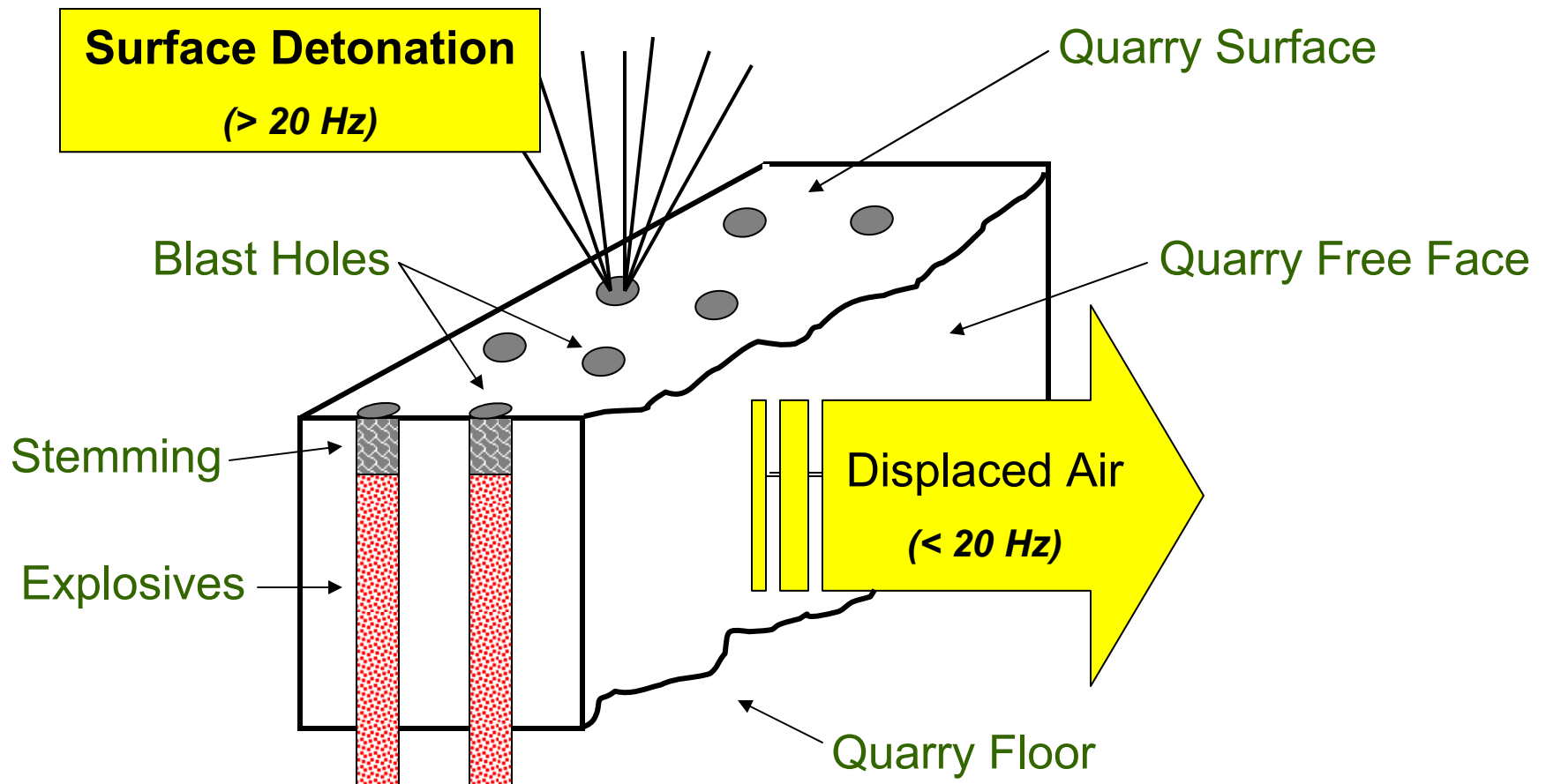
Variables Affecting Air Blast

1. Distance from blast site to receiver
2. Orientation of the face relative to structures
3. Topography
4. Delay interval of initiation
5. Amount of displaced rock
6. Wind direction
7. Atmospheric conditions



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Air Blast Sources





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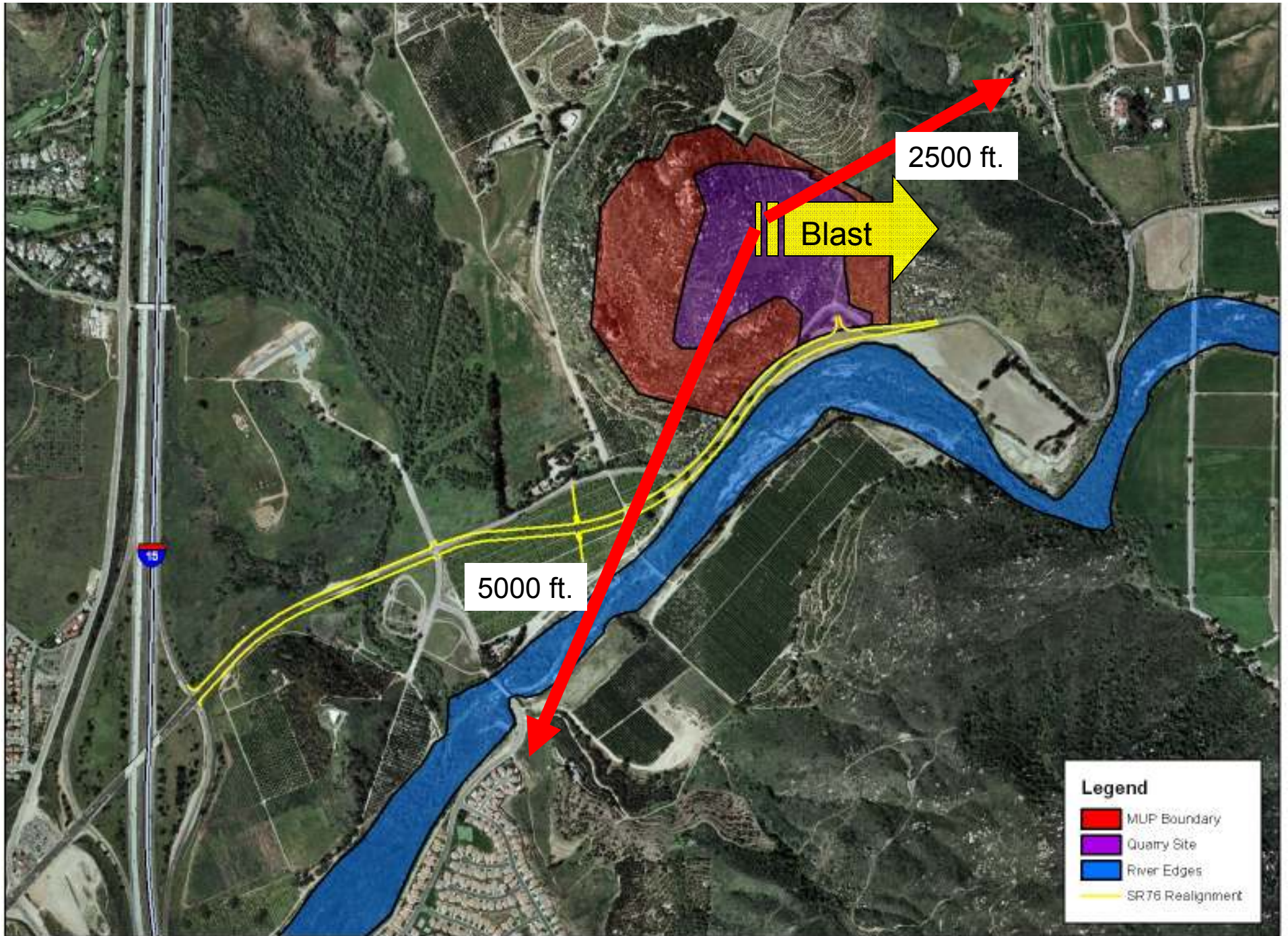
| Sounds | Noise Level dB(A) | Effects |
|--|-------------------------|--|
| Detonate 1 lb of TNT at 10 ft. | 180 | Structural damage |
| 100,000 watt stereo | 170 | Most windows break |
| 1600 watt music speaker | 150 | Some windows break |
| Jet takeoff (100 – 200 ft.) | 140 | Threshold of pain |
| Thunderclap | 120 | Threshold of discomfort |
| Power saw | 110 | Permanent hearing loss* |
| Motorcycle | 90 | Annoying |
| Average city traffic | 80 | Intrusive |
| <i><u>Production Blasting</u></i> | <i><u>75</u></i> | <i><u>Closing the trunk of your car</u></i> |
| Vacuum cleaner | 70 | Intrusive |
| Normal conversation | 60 | |
| Whisper | 30 | Very quiet |

* Permanent hearing loss with prolonged periods of exposure



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Seismic Monitoring





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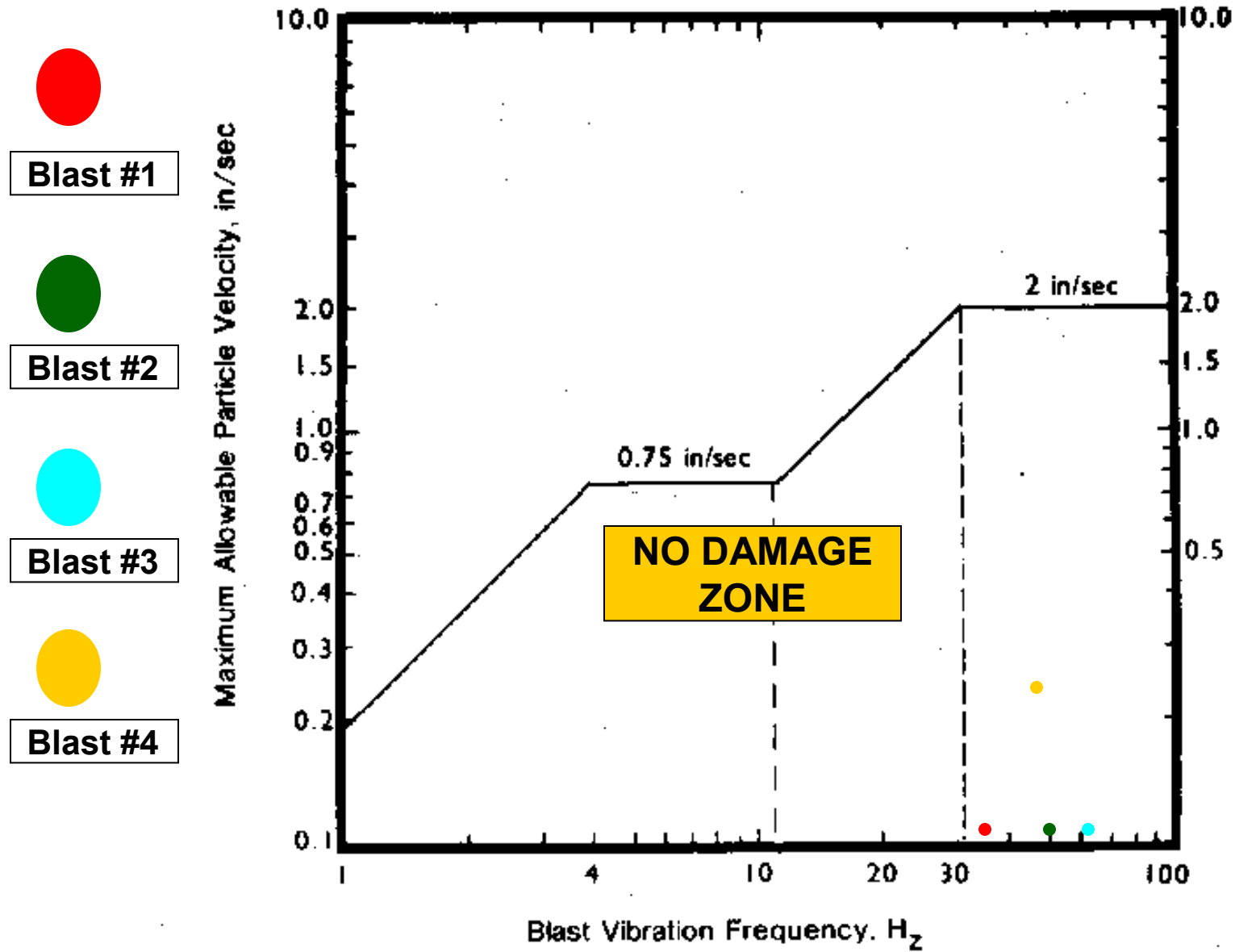


Figure 1. Alternative blasting level criteria.

(Source: Modified from figure B-1, Bureau of Mines RI 8507)



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| Blast # | Location | Distance (ft) | Actual PPV | OSM PPV | Freq Hz | Actual dB | OSM dB |
|----------------|-----------------|----------------------|-------------------|----------------|----------------|------------------|---------------|
| 1 | Pankey House | 1800 | .04 | 1.00 | 35.0 | 115 | 130 |
| 1 | Eastern Ridge | 879 | .06 | 1.00 | 50.4 | 121 | 130 |
| 1 | Front Entrance | 845 | .06 | 1.00 | 51.7 | 116 | 130 |
| 2 | Pankey House | 900 | .10 | 1.00 | 50.8 | 121 | 130 |
| 2 | Eastern Ridge | 1320 | <.05 | 1.00 | | | 130 |
| 2 | Front Entrance | 998 | .10 | 1.00 | 50.8 | 121 | 130 |
| 3 | Pankey House | 1088 | <.05 | 1.00 | | | 130 |
| 3 | Eastern Ridge | 1285 | <.05 | 1.00 | | | 130 |
| 3 | Front Entrance | 769 | .10 | 1.00 | 61.9 | 122 | 130 |
| 4 | Pankey House | 1536 | <.05 | 1.00 | | | 130 |
| 4 | Eastern Ridge | 1558 | <.05 | 1.00 | | | 130 |
| 4 | SR-76 | 924 | .26 | 1.00 | 48.7 | 126 | 130 |



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Drilling



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Blast Video





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24 Hour Hot Line

(760) 391-6340