

Probable Effects of Blasting Air Over Pressures



Air Over Pressure		Probable Effects	Average Human Response
dBL	psi		
180	2.9	Structural damage	Possible ear drum rupture
150	0.092	Poorly mounted windows may break	~ 90 mph wind gust
140	0.029	~ 40 mph wind gust	Distinctly unpleasant
134	0.0145	USBM/OSMRE limit	
130	0.0092	~ 23 mph wind gust	
120	0.0029		Mildly unpleasant
110	0.00092	~ 7.2mph wind gust	
90	0.000092		Strongly perceptible
70	0.0000092		Distinctly perceptible
60	0.0000029		Barely perceptible

Source: Bender, 2006 & 2007

Why Are Some Residents Hearing or Feeling the Blasting?



- December 2012 Monitoring Results:
 - 50 blast events (88% were below detection, 6 recordable, 14 reported)
 - Of the 6 recordable; 2 on the 1200-level & 4 on the 1300-level
 - Of the 6 recordable
 - Average PPV was 0.013 in/sec in comparison to 0.20 in/sec allowable
 - Average AOP was 0.0058 psi (=18mph wind gust) c.f. 0.013 psi allowable
 - The largest recordable blast (0.0064 psi or 19 mph gust) not reported
 - Of the 6 recordable; 3 were reported and 3 were not
 - Of the 14 reported by residents; 21% were recordable & 79% were not
 - Of the 14 reported:
 - None were from the 900-level
 - 21% were from the 1100-level
 - 79% were from the 1200- and 1300-level; 29% and 50%, respectively

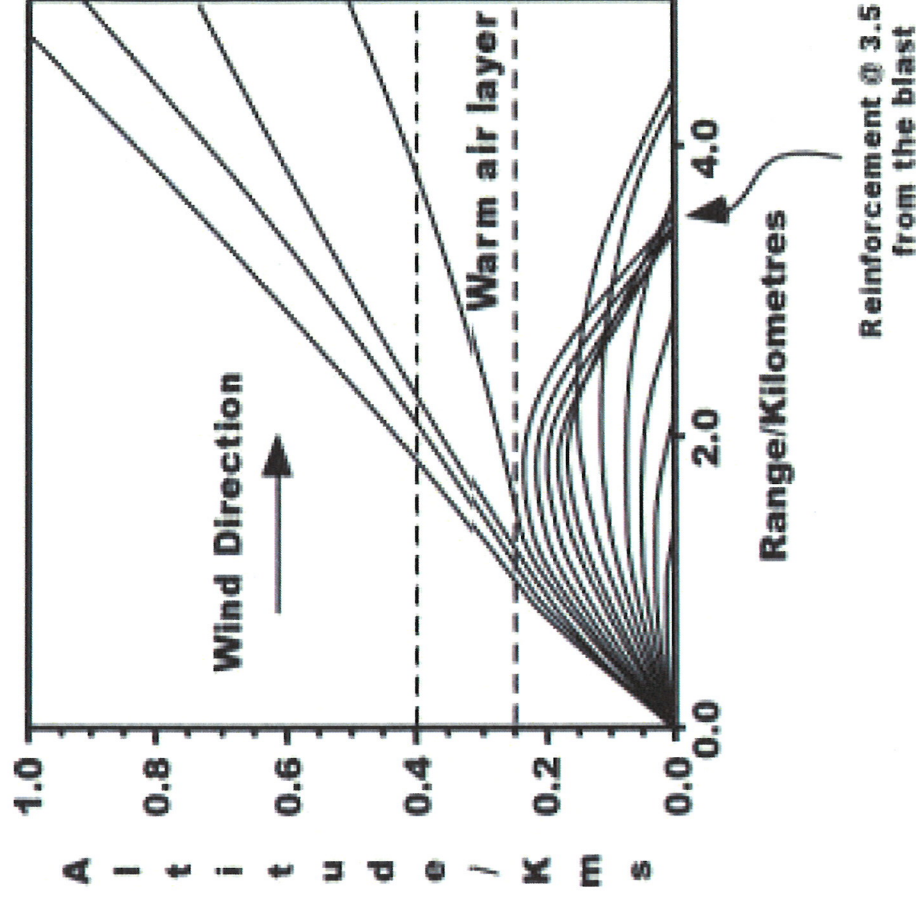
Meteorological Reinforcement: The Most Probable Explanation



A SEASONAL AND TRANSIENT PHENOMENON:

- ❑ Can influence the level of air over pressures in the area surrounding the blast, focusing and even increasing air over pressures at select locations approximately 1-3 miles from the blast site
- ❑ Conditions most likely in Winter months
- ❑ Can be enhanced by wind direction and velocity
- ❑ Can occur when temperature inversions and or wind shear conditions exist at levels <660' - 825' above the blast site
- ❑ Resulting elevated levels of air over pressures, at distance, are usually below regulatory limits owing to the distance (> 1 mile) from the blast site where they characteristically occur
- ❑ Basic emission levels are low following natural attenuation

Source : Terrock Pty. Ltd., 2007



Another Explanation: The Variable Human Response to Blasting Ground Vibrations & Air Overpressures



- Blast event duration (Sutter's are short, <1-2 seconds)
- Frequency of occurrence (Sutter's were 2-6 per day in Dec.)
- Startle factor
- Level of personal activity at time of blast event
- Health of the individual
- Time of day
- Orientation of the individual (standing up or lying down)
- The age, type and quality of the construction of the structure
- Political and economic perception of the blasting (mining) operation

Source: Caltrans, 2004

Summary & Conclusions:



- All 151 blast events in 2012 were below allowable limits at the project boundary which are less than the thresholds for damage to structures, including historic structures
- 85% of the events were less than the level of detection
- Ground vibrations were below the levels of perception at the nearest residences & therefore cannot be felt at distance
- The maximum level of air over pressures recorded at the nearest residences are equivalent to a 19 mph gust of wind
- Residents have reported feeling and or hearing less than 10% of the blast events; all reported events were in December
- There is no pattern to the reported events & the event characteristics other than the working level of the blast site

Summary & Conclusions:



- Reported events likely result from seasonal & transient meteorological effects focusing air over pressures @ distance
- 79% of the reported blasts were on the 1200- and 1300-levels which will soon be completed; so reports should decline
- Work is advancing to the southwest, away from Amador City, & deeper into the mine, reducing blast effects on the surface
- Sutter has engaged a noise consultant to conduct additional monitoring & evaluations not required by our permit
- The Company is installing a weather station that will help document meteorological conditions
- Historic structures survived the historic mining, the work in '89-91 and should not be affected by the new era of mining