

5. Observations relating to the operations of Hobart Quarries' Giblin Street quarry.

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The following notes describe observations and conclusions resulting from many visits to the Lenah Valley area as part of the impact study investigation. Some information has been drawn from comments included in replies to the Mount Stuart Progress Association with confirmation of intent by interviews with complainants. Several problems and sources of complaint can now be resolved.

GROUND VIBRATION

Investigations were undertaken in cooperation with Mr R. Thomas and Mr W.R. Tindal, Inspectors of Mines.

Tests in Weerona Avenue, Mount Stuart Road, Dale Crescent, Giblin Street and Doyle Avenue, have revealed no significant ground movements. In most tests there has been no movement that could be attributed to the blasting and certainly none that might result in structural damage to houses in the area. It is established that *current* firing and loading practices recommended by the Department of Mines are very satisfactory although there may well have been problems in previous years before such advice was utilised. Most residents agree that there have been significant improvements in the last 6-12 months although there remain occasional days when disturbances are noted.

A question arises as to whether such practices are adhered to or whether some rock paths are more susceptible to energy transfer with the firing delays used.

Clearly perceptible motions can be felt at particle velocity levels of about one quarter of the most stringent damage standard (10 mm/s-DIN 4150) or about one twentieth of the normally accepted safe limit.

It has been concluded that the primary blasting using recommended techniques does not propagate any significant vibration into built-up areas. No damage could be ascribed to any vibration received. The secondary blasting which consists of small surface charges does not induce ground motions of any note whatever.

The above discussion refers to the principal operating faces of the quarry. However large firings have been made in the smaller quarry in the southern portion of the lease area. These firings have not always been at noon and thus complaints of irregular blast times are valid. These random blasts may be the source for the observations by residents that vibration is worse on certain days. Even where delay firing is used, resonance effects may be serious outside the dolerite area being quarried as the frequencies induced by the delays (30-40 Hz) are not dissimilar to natural frequencies of weathered sandstone, soil or clay, materials which occur in many parts of Lenah Valley and Mount Stuart. It is therefore concluded that residents up to 600 m from the quarry might have noticed ground motions although it is unlikely that damage would be caused. A full evaluation of the 'occasional' blasts is necessary before any firm conclusions may be drawn.

There is no evidence to suggest that susceptible rock paths exist. Perhaps more important is the observation that fault contacts, with a NNW-SSE trend, cut off Lenah Valley and Mount Stuart from the quarried dolerite mass. All houses east of it would record a much lesser vibration than if it

were not present since the transferred energy is halved by the fault zone. Those houses on the fault zone might be more sensitive to resonance effects however.

#### AIR VIBRATION

Many complaints relate to the shaking of objects, especially glassware or windows. Such observations relate to air pressure changes accompanying noise arrival. Examination of residents, progress association depositions and personal observations reveals that there is a band in which the refracted or reflected air wave is most pronounced. The effect, especially some noise, is noticeable for at least 3 km north of the quarry. The apparently critical band is about 250 m wide and is 300-550 m from the quarry in Mount Stuart and 400-650 m from the quarry in Lenah Valley. The lower limit may reflect lack of observers. There is some evidence to suggest that an ellipse of effect is more appropriate than a band. The extension toward Lenah Valley reflects topographic changes. The actual range or concentration of effect depends on:

- (1) The scale of the secondary blast: the amount of explosive used, the degree of tamping and hence the overall efficiency.
- (2) The position of the secondary blast within the quarry and any topographic relationships such that sound is concentrated near the Giblin Street outlet.
- (3) The presence of atmospheric inversions which may reflect or concentrate sound.
- (4) The direction of wind, if any.

Little control may be exercised over the efficiency of secondary blasting and much energy is released as sound. Examination of potential sound paths, assuming minimal diffraction shows that firings at or below level 3 (approx. 230 m) and on the western side of the quarry may cause most trouble as a result of topographic reflections. Firings on the eastern side are to be preferred providing the level is higher. Low level firings result in a large number of reflections and channelling of the sound directly into Giblin Street. If the firings are in the northern portion of the quarry, on the western side and below 245 m then much sound energy is transmitted toward Mount Stuart rather than Lenah Valley. These comments must not be regarded as absolute since local reflectors can be important and the shape of the quarry undergoes continual change. A southerly wind exacerbates the noise problem for Lenah Valley residents.

The pressure changes related to a particular sound can be estimated. A sound pressure level of 70 dB linear is equivalent to a pressure change of 0.06 Pa and 100 dB linear to 2 Pa (100 dB linear is equivalent to about 85 dB as heard by the human ear; the linear measurement being as buildings would 'feel' the sound). Since sound levels up to 85 dB can be attributed to the secondary blast, depending on distance, pressure changes of 0.5-1 Pa are probably not unusual. A pressure of one Pascal is able to move a mass of one kilogram with an area of one square metre at an acceleration of one metre/second. It is thus apparent that doors, loose windows and similar objects are easily affected. Thus while air vibration is not structurally damaging it has a nuisance value and, depending on house construction or design, may induce some resonance effects.

Air vibration is noted as the real source of vibration complaints. It is wholly related to secondary blasting and could only be prevented by crushing rather than blasting the larger rock pieces.

## FLY ROCK

The Mount Stuart Progress Association has drawn attention to the possibility of fly rock in the reserve. Fly rock is certainly present but its age is difficult to establish. However, several blasts were observed from the reserve and it can only be concluded that fly rock from the secondary blasting is not uncommon. Fly rock also implies wasteful use of explosives or incorrect charging of holes.

## FENCING AND SIGNS

The double fence of multistrand barbed wire described by Mr Kennedy is very obvious and one has to be purposeful and agile to climb it or crawl through it. It surrounds the entire high face. Warnings signs are present but are few and are now largely the target of vandals.

## DUST

With moderate wind velocities ( $\sim 10$  knots) definite dust suspensions can be observed to persist for at least 300 m. Dust is rapidly dissipated at higher wind velocities due to turbulence and is not carried at lower velocities. Dust sources include the primary blast, vehicles in the quarry, the secondary blasting, the crushing plant and the limestone crushing operation. The sources are listed in increasing order of offence and indeed the limestone plant may be the source of most complaints.

[18 June 1974]

(1) Consider the future of the quarry.

(2) Consider the principle of compensation if the quarry was required to close.

(3) Consider other lines for future developments so as to avoid similar conflict.

To enable the study group representative of Hobart Quarry and the Mount Stuart Progress Association to present a report to the local residents for or against the quarry operation.

## SUMMARY OF OBJECTIONS

The Mount Stuart Progress Association admitted their objections to the quarry with the results of a questionnaire which was circulated to the local residents. The objections to the quarry operation are summarized as follows:

- (1) The Hobart City Council was not entitled to trade in the quarry.
- (2) There is no period of time for the quarry to operate.
- (3) The Hobart Quarry has not held mining leases for the entire working area.
- (4) Fencing of the quarry is inadequate and incomplete.
- (5) Blasting is causing excessive noise and vibration.
- (6) Blasts are not spaced at regular intervals.
- (7) Fly-rock is falling on to the road.
- (8) Dustfall on to the road is excessive.
- (9) Noise levels, especially from the quarry, are excessive.
- (10) Road signs are inadequate in quantity and quality.
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