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DEPARTMENT OF MINES.

SOUTH AUSTRALIA.

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QUARRY BLASTING - ADELAIDE METROPOLITAN AREA.

RESULTS OF INVESTIGATIONS.

by

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RESULTS OF INVESTIGATIONS.

Abstract.

It is clear that excessiveblasting charges can cause damage to buildings. Furthermore, the noise and air concussion, especially of unconfined shots under certain atmospheric conditions, can be a nuisance. However, the results of South Australian investigations, which are in accordance with those overseas, indicate the unlikelihood of damage to buildings here in Adelaide from normal quarry blasting. Tests also show that excessive noise can be reduced to a minimum.

Introduction.

The following information is largely taken from Departmental reports, Nos. 36 - 46, "Quarry Blasting"; No. MN/1/4, "Blasting in Metropolitan Quarries".

RESULTS.

Complaints.

(a) Complaints depend largely on the direction of the wind. For most Adelaide quarries an east wind, i.e., one which carries the sound towards the houses, is the important wind.

(b) In almost all cases it is the noise and air concussion produced by"blisters", "sand blasts" and other unconfined shots which cause complaints.

(c) The complainants are usually owners of new houses. This is to be expected since the residential areas are growing closer to the quarries.

(d) Although complaints from a particular firing are localized, not all people in the area complain of the noise or damage.

Noise.

It is very difficult to make people be definite about noise. The shots investigators heard were never as loud as the "one that went off last week". Nevertheless, "blisters" or unconfined shots make a sharp sound of sufficient loudness (accompanied by air consussion) to have a very real nuisance value. Both the noise and the air concussion have been greatly reduced in Adelaide by the use of efficient blasting technique.

Air Blast Pressure.

From the point of view of damage to property, the air blast pressures obtained from Departmental investigations were negligible. Just the same people are able to detect even a low air blast pressure even though they may exaggerate its possible effect. Air concussion can be reduced to a minimum with properly controlled blasting.

Ground Vibration.

During the investigations of 1954, ground vibration from test blasts was insufficient to have caused damage to buildings. Since then the Department has purchased a Cambridge vibrograph and officers of the Department use this instrument

continually in investigating complaints and helping quarry companies to improve firing technique. Ground vibration from blasting as recorded on the vibrograph has always been well below the damage level. It is evident, however, that excessive charges and bad firing technique could cause damage to houses built close to quarries.

Foundations and Structure of Houses.

In the examination of houses reported to have been damaged by quarry blasting, the Department was helped in its work by the Structural Engineer of the Architect-in-Chief's Department. There are three cases listed in the 1954 report. At least twelve others were examined in a previous survey in another district.

In no case did the engineer find evidence of damage caused by blasting. Inadequate foundations, poor bearing quality of soils, and bad workmanship accounted for all of the damage reported.

General.

Since the 1954 investigations were made, the Mines and Works Inspection Act has been amended to give Inspectors of Mines power to give directions to quarry owners where quarrying operations damage or are likely to cause damage to property, or where the operations cause or are likely to cause a nuisance. No quarry has been closed because of damage to property, though several have been closed because it was considered that there was a danger to persons living or working nearby through flying stones.

A new regulation under the Act limits the height of quarry faces to 65 feet. Higher faces may be worked in benches, the faces of which must not exceed 65 feet. Since this regulation has come into force, and millisecond

delay detonators have been introduced into quarry blasting, the situation is getting much easier. A further improvement has been effected by the Inspectors prohibiting "blisters" or unconfined blasts, unless permission is first obtained.

SUMMARY AND CONCLUSIONS.

1. Most complaints of quarry blasting, whether the complainants allege personal shock or property damage, arise out of noise and air concussion.

2. Departmental records show that noise and air concussion of normal quarry blasting is insufficient to cause damage to property.

3. Excessive explosive charges and bad firing technique could cause damage to property through ground vibration.

4. In Departmental investigations there was no proof of any damage to Adelaide buildings by ground vibration from quarry blasting.

5. The ground vibration from blasts in the local metropolitan quarries is well below that likely to cause damage to houses at present built, but the position needs constant watching.

6. The reduction in the height of quarry faces, the use of millisecond delay detonators, and the prohibition of "blisters" or unconfined shots has resulted in a great lessening of noise, air concussion, and ground vibration in Adelaide.

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