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COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

Record No. 1969 / 3

Mount Ainslie Approach Road Blasting Vibration Test, Canberra 1968

by

G. Hart

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ILLUSTRATION

Plate 1. Locality map showing shooting and recording sites (I55/B5-57)

SUMMARY

A vibration test near some dwellings was carried out to determine the amplitude of ground vibrations following blasting by explosives in the construction of a road. The ground vibrations were of insufficient amplitude to register on the instrument used and were well within the safety limit.

1. INTRODUCTION

The Bureau of Mineral Resources, Geology and Geophysics was requested to measure ground vibrations resulting from blasting, and to determine whether they were of sufficient amplitude to cause damage to buildings about half a mile away.

The purpose of the blasting is to excavate hard rock in the construction of the Mount Ainslie Approach Road. The investigation was requested by the contractors for the construction of the road, Colless Bros. Holdings of the A.C.T.

The contractors had received several complaints concerning very minor damage to property, from residents about 1000 yards from the blast locations. In one case, a broken firebrick in a home pottery oven had been reported.

The test was carried out on the 27th August 1968 by G. Hart, geophysicist, from BMR.

2. METHOD AND EQUIPMENT

The instrument used to record the ground vibration was a Sprengnether Portable Blast and Vibration Seismograph, serial No. 1577, which records the three mutually orthogonal components of ground vibration on photographic paper. The battery-operated instrument has a magnification of approximately 50, a time scale on the record of 3 inches per second, and records continuously for up to 60 seconds without reloading the camera.

Only one shot was recorded. The shot consisted of about 200 lb of ammonium nitrate-dieselene composite, which was distributed in about 80 shallow drill holes, 3 to 7 ft deep and untamped, in an area about 10 yards square. Owing to lack of communication facilities between the shot-point and the recording site, recording had to be done by means of synchronism of watches with the shooter, who lit the fuse at a specificied time. According to the contractor, this shot was the largest to date.

The ground vibrations from the blast were recorded in the basement - garage of a dwelling at no. 22 Cobby Street, Campbell, A.C.T.

3. RESULTS

Plate 1 shows the locations of the shot-point and the recording station.

The seismogram of the blast does not show any measurable ground displacement. This indicates that any ground displacement caused by the blast was less than .00005 inch.

Following Duvall and Fogelson (1962) the peak ground velocity which may cause damage is taken as 2 inches per second. The velocity of the ground is equal to $2\pi fA$ where f is the frequency and A is the displacement of the vibrations. Assuming a maximum frequency of 100 Hz, the peak ground velocity (caused by the blast) must have been less than .03 inch per second, which is well within the safe limit for damage to dwellings.

4. CONCLUSION

The amplitudes of the ground vibrations recorded at 22 Cobby Street, Campbell, were found to be well below the value generally accepted as the minimum value that may cause damage to dwellings.

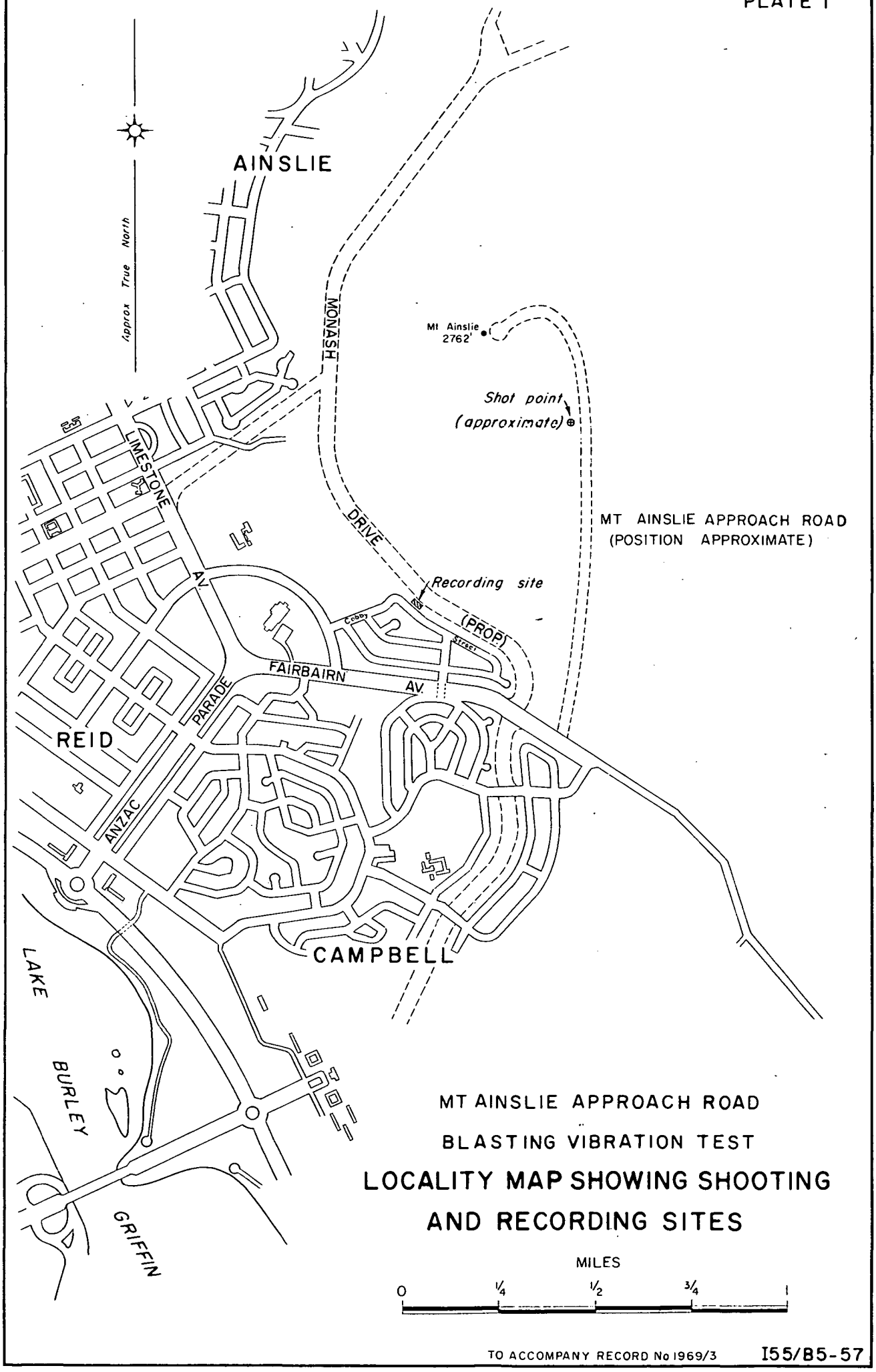
Measurements were made at only one site and from only one blast location and it is not possible to predict with certainty from these measurements the effects of the same blast at other sites, or the effects at the same site from blasts at other locations.

No measurements were made on the airwave from the explosion and if these are required, the Department of Works, Canberra, has the necessary instruments to carry out these measurements.

5. REFERENCE

DUVALL, W.I. and FOGELSON, D.E. 1962 Review of criteria for estimating damage to residences from blasting vibrations. U.S. Bureau of Mines Report of Investigations 5968.

PLATE I



MT AINSLIE APPROACH ROAD

BLASTING VIBRATION TEST

LOCALITY MAP SHOWING SHOOTING AND RECORDING SITES

TO ACCOMPANY RECORD No 1969/3

I55/B5-57