COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORDS 1960 NO. 95

GARBUTT AERODROME MAGNETIC TESTS QUEENSLAND 1960

by

J.R. Pollard

1960/95B

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1. INTRODUCTION

The survey was requested by the Department of Air to enable a site to be selected for a building in which M.A.D. (Magnetic Airborne Detector) equipment would be serviced. The main requirement was that magnetic "noise" at the site selected should be less than 0.3 gammas in the frequency range 0 to 2 c/s. The survey took place from 24th to 26th May 1960.

2. EQUIPMENT

A fluxgate magnetometer, normally used for recording daily variations in total magnetic field at a base station during airborne magnetic surveys, was modified for use on this survey. The time constant of the amplifier was decreased to enable fluctuations at 10 c/s to be observed and a recorder was used which responded to frequencies up to 30 c/s. Full-scale deflection of the instrument was 30 gammas and the chart speed was 15 cm/minute.

3. PROCEDURE AND RESULTS

In addition to the magnetic requirements stated above, the Department of Air thought it desirable that the selected site should be close to existing water and power supplies. Before starting the survey, therefore, a plan of the base was studied and preliminary areas were selected. Some of these preliminary areas were later rejected when they were actually examined, owing to :-

(a) proximity of munitions storage huts

(b) volume of traffic passing close by

(c) great distance from headquarters

Of the remaining sites which fulfilled the requirements three were finally selected for the survey, and the magnetometer was set up to obtain recordings of variations in the total magnetic field at these points. Their positions are shown as Site 1, Site 2, and Site 3 on the accompanying map of the base (Drawing No.G97-14). The records were taken at times when electrical equipment which is normally running at the aerodrome was switched on.

The peak noise levels at the selected sites were :-

Site 1	4 gammas
Site 2	4.5 gammas
Site 3	6 gammas

As these noise levels range from 12 to 20 times greater than the maximum desired level, it will be necessary for the Department of Air to employ some form of magnetic shielding around the detector heads of the M.A.D. equipment they service there.

The system of three annealed permalloy (or mu-metal) shields recommended as part of the serviceing kit by the AN/ASQ-8 Handbook (Australian Air Publication, 756.11, table 2-1) will reduce the levels of magnetic disturbance by a factor of between 20 and 100, provided the detector elements is fixed in a position at right angles to, rather than along, the axis of the shield. A factor of 20 can be obtained without annealing the shields. By hydrogen annealing this factor can be improved by an amount which depends on the care with which the shields are handled afterwards.

Use of these permalloy shields permits only the detector channel to be tested. A much larger volume would have to be shielded from external magnetic disturbance if the complete system of detector-plus-orienter-channels were to be tested together. However, attempts by various authorities to shield or compensate large volumes have usually been very expensive and often not very satisfactory. The best solution is always to find an area free of disturbance.

4. CONCLUSIONS

The results show that Sites 1 and 2 are better than Site 3. Site 3 is also much closer to buildings where electrical equipment of various kinds is operated. The peak noise levels at Sites 1 and 2 are closely similar, Site 1 being slightly better than Site 2. Site 1 is also to be preferred to Site 2 because it is farther from the roadway leading to a nearby hangar, and therefore less likely to be disturbed by passing vehicles.

5. ACKNOWLEDGEMENTS

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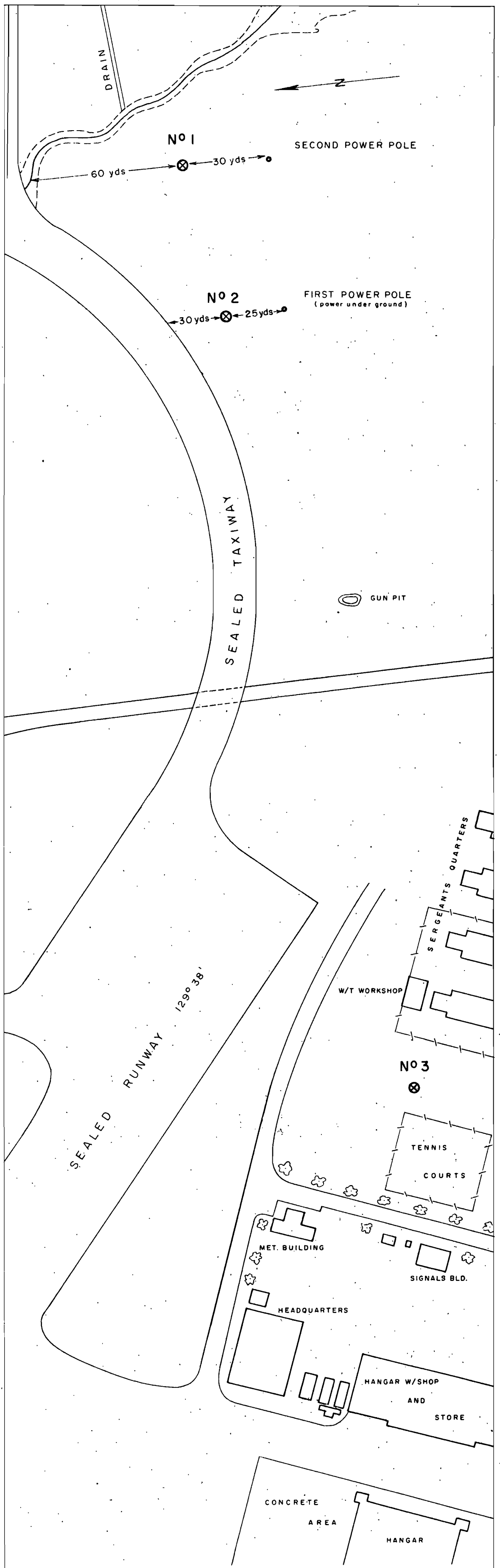

TOWNSVILLE, QUEENSLAND

GARBUTT AERODROME MAGNETIC TESTS

TEST SITES

(AFTER DRAWING No. 53.54.239)

SCALE IN FEET

100 50 0 100 200

G 97-14

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics

TO ACCOMPANY RECORDS 1960, No 95