

1968/40

COMMONWEALTH OF AUSTRALIA

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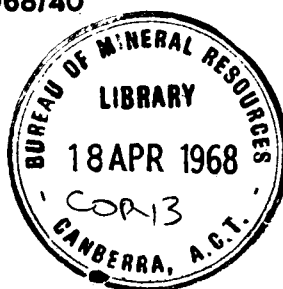
DEPARTMENT OF NATIONAL DEVELOPMENT  
BUREAU OF MINERAL RESOURCES  
GEOLOGY AND GEOPHYSICS

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RECORDS:

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RECORD NO. 1968/40



Magnetic search for a rifle  
in a river bed

*by*

**G. HART**

The information contained in this report has been obtained by the Department of National Development, as part of the policy of the Commonwealth Government, to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus without the permission in writing of the Director, Bureau of Mineral Resources, Geology and Geophysics.

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### GENERAL

Between the 8th and 12th February 1968 at the request of the New South Wales Police Department, the Bureau of Mineral Resources carried out a search of a river bed at Sydney. The search was made by G. Hart, party leader and geophysicist, with the assistance of five members of New South Wales Police Department. The purpose of the search was to locate a rifle by using a proton magnetometer.

Calculations had shown that, at a distance of 5 feet, an anomaly of about 40 gammas could be expected. Experiments with a 0.22 rifle in Canberra showed, at the same distance, a maximum anomaly of about 20 gammas, the value depending strongly on the orientation of the rifle in the Earth's field. The anomaly is greatest when the barrel is parallel to, and negligible when it is perpendicular to, the local field.

### SURVEY AREA

The area surveyed was in the George's River near Milperra, New South Wales, and was about one third mile long and about 15 yards wide.

### EQUIPMENT

The equipment used on the survey consisted of an Elsec Proton Magnetometer, a digital-to-analogue converter type 618, and a submersible towfish manufactured by the Littlemore Scientific Engineering Company. The magnetic field was displayed on a Bradley electronic multimeter. Eventually the Bradley was disused and the magnetometer dials were read directly. Two 12-volt batteries were supplied by the New South Wales Police Department.

### METHOD

The method finally adopted for locating and retrieving steel objects lying on the river bottom or buried in the mud, was as follows:

- (a) The instruments were housed in a 14-foot aluminium launch normally used for flood rescue work.
- (b) Using about 40 feet of cable, the towfish containing the detector heads was towed along the river bottom in the mud.
- (c) Towing speed was kept very low (e.g. about 1 knot) because the maximum useable cycling rate of the magnetometer of about 1 cycle per sec made it difficult to detect small anomalies at higher speeds. Another reason for a low towing speed was the possibility for the towfish to snag on old tree trunks and other objects on the river bed.

- (d) When an anomaly was detected, the towing cable was immediately slackened and the launch stopped. Police skindivers descended the towfish cable and search the bottom for a depth of up to about 3 ft and for a radius of about 6 ft around the towfish.

### RESULTS

Normal work with the magnetometer makes use of a change in signal frequency only. On this type of survey, the sudden drop in peak signal amplitude, when within about 3 ft of a steel object, was also diagnostic. This decrease in signal level, and in the extreme case cessation of operation of the instrument when very close to a magnetic object, may be caused by inhomogeneity in the field at the detector head, detuning of the circuit, or a combination of these factors.

The locality is close to a main road and is used by tourists. With the instrument, a great number of tin cans, oil drums, steel bars, pieces of drainpipe, old wire mattresses, and even a 0.38 calibre pistol were found. With experience, it became possible to distinguish between single tin cans and larger steel objects by the amplitude and duration (e.g. width) of the anomaly. Numerous clusters of tin cans continued to give trouble.

Eventually the survey party and equipment returned to Canberra, because it was decided that a simple search by skindivers would probably be more efficient.