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GUEST EDITORIAL

GEOPHYSICAL TECHNIQUES IN URBAN AND INDUSTRIAL ENVIRONMENTS

This volume is based on the seminar organised by the Earth Resources Foundation, the University of Sydney, and the NSW Branch of the Australian Society of Exploration Geophysicists. It was held on 15 November, 1991. The papers presented herein provide a representative sample of the work covered, as well as a worthwhile and permanent record of the proceedings.

The seminar was designed for both geotechnical professionals and the general public. It focussed on current and future environmental concerns, and discussed geophysical techniques applicable to studies in built up areas. As such, it was one of the first to deal with the specific problems associated with the identification of subtle target anomalies often masked by a confusion of unwanted signals.

In this context, unwanted signals are often termed cultural noise, and can be generally broken down into two components, namely 'repeatable' and 'randomly varying' signals. For example, service reticulation systems, such as buried water pipes, have repeatable signatures as detected by ground penetrating radar. Traffic noise, on the other hand can be much harder to deal with during a seismic survey, because of its time varying nature.

Geotechnical work in urban and industrial areas demands higher resolution. It requires more intimate knowledge of responses generated by man-made structures. Most importantly, it requires detailed knowledge of the applications and limitations of geophysical techniques and equipment.

The detection of subtle anomalies requires a better understanding of the theory behind the methods. This is essential for the development and use of data processing software. One of the problems with commercially available data processing packages is that the exact mathematical bases are not generally documented in a usable form.

Routine procedures involving inversion of geophysical data still rely on using non-dipping, layered, isotropic and homogeneous models. Pollution plumes, for example, are irregular, anisotropic and inhomogeneous targets. Most geophysical methods used to detect and delineate such anomalies rely on the assumption that the target is much larger than the size of the array. It is timely, therefore, that the development of the routine use of 3-D modelling be included in data analysis as an essential step in the interpretation of complex geophysical responses.

It is the role of the exploration industry generally, and the ASEG members specifically, to highlight both successes and shortcomings in theory, results, procedures and equipment. Thus, areas requiring development can be communicated to workers in relevant fields. Conversely, it is an important duty of the teaching profession as a whole, and universities in particular, to include environmental topics in their technical courses, and encourage good students to concentrate their efforts on solving specific problems for the industry.

No one person can have a detailed grasp of environmental matters, and needless to say. I have had to lean heavily on the work and opinions of colleagues from many institutions. I would like to take this opportunity to thank them all here, and encourage them to continue the quest for answers to the many remaining questions which their research has prompted.

Joe Odins
Associate Editor