

## TOTAL INTERPRETATION - FURTHER COMMENTS

by

R.A. Facer\*

ABSTRACT

Basic agreement is reached with the thoughts expressed by Richards on total interpretation. In support of his discussion the importance of "geology" in exploration geophysics interpretation is emphasized. Assessment of data is often improved by total interpretation in both "pure" geophysics and mineral exploration. It is important that education in exploration geophysics interpretation is based on the concept presented by Richards.

It was reassuring to read the editorial of Richards (1972) on the concept of total interpretation, and not only because his discussion was based on sixteen years of "experience in oil exploration" (p.71). However, it is disturbing that he should find it necessary to express such thoughts. Total interpretation (of Richards (1972) and this discussion) is an important concept.

Definitions may be out of place here, but it is perhaps worth remembering that "geophysics" is the "physics of the earth" (Fowler and Fowler, 1964, p.512). Strictly speaking, "geophysics" is thus part of "geology" - "Science of the earth's crust, its strata, and their relations and changes" (Fowler and Fowler, 1964, p.511). Some geophysicists may not be happy with being thus grouped with other geologists, and although there are many physicists whose fields of interest include study of

the earth's physical properties, in the context of total interpretation geophysics should be vitally integrated with an understanding of the earth. This integration, or interdependence is important for both exploration geophysics and "solid earth" or "pure" geophysics.

The importance of geology (in, for example, the more restricted sense of petrography of rocks) in geophysical interpretation could be explained by using magnetic studies as an example. From the "pure" point of view, the potential influence of the opaque mineralogy and petrology on the magnetic properties of rocks is still a problem (e.g. Wilson, 1966 and Facer 1971b; cf. Larson and Strangway, 1966). Similarly, magnetic remanence may significantly influence field magnetic readings (Hays and Scharon,

\*Department of Geology,  
Wollongong University College,  
WOLLONGONG. N.S.W. 2500.

1963) - and although generally impractical, final interpretation could only be "total interpretation" if due allowance were made for magnetic properties of the rocks surveyed. Naturally this latter problem is unlikely to arise for many rocks, although a further complication could arise from the effect of lightning strokes (Facer, 1971a).

Laboratory experiments, both modelling and on actual samples, is important in interpretation, but as Newton *et al.* (1972) discussed, field results are not always as expected. The deep weathering profiles of much of Australia have provided many examples of the need for field geological data in interpretation.

Education of potential exploration geophysicists should include an appreciation of "geology" — the trespassing (Richards, 1972, p.71) into this preserve notwithstanding. Many exploration geophysicists could disagree, but for interpreters of geophysical data such a disagreement would probably be less easily sustained. At the Wollongong University College geophysics simply forms part of the senior undergraduate course in geology. At the University of Sydney, although it is possible to study "Geophysics III" without Geology III, geophysics is still integrated with geological information. At the risk of raising a storm of resentment, the discussion of Richards (1972) is extended to suggest that exploration geophysics interpretation can only be

taught (at least until experience is obtained) as geology and geophysics.

From the more practical point of view, companies engaged in exploration, especially for metalliferous minerals, could do well to take notice of the warning sounded by Richards (1972) in his last paragraph. For some companies, fortunately, this warning is not necessary. As an example, one of the smaller exploration companies has a base-metal prospect for which induced polarization data, petrography, "economic" mineralogy and geochemical information are being correlated. With modern computers such correlation is relatively simple, and could easily be extended to include other data. Results for this prospect may not prove helpful, but this approach to total interpretation should assist evaluation both of that prospect and elsewhere - which may not be possible using geological or geophysical data separately. It is not intended that these remarks are critical of maths- or physics-trained exploration (geo)physicists, but merely that final interpretation, to be total interpretation (after Richards, 1972), should be geo-physical.

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