# Summaries

## Pitfalls Revisited* (Keynote Address)

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It has been over a decade since *'Pitfalls in Seismic Interpretation'* (November 1971) was first presented by Paul Tucker and Howard Yorston (1973). Since then direct contact with over 3000 explorationists, through the school 'Seismic Interpretation for Geologists', has been made. They have represented the full spectrum of companies, large and small.

These contacts have shown that the new generation of seismic interpreters (geophysicists and geologists) is unaware of the pitfalls in their data. These pitfalls include both the original list, and new ones that are a spin-off from our newer technology.

Of equal concern is that now there is an added group of nontechnical pitfalls. These may perhaps be called 'mental pitfalls': those which are within the minds of individuals, effectively blocking out the proper use and emphasis of the seismograph in our exploration effort.

'Pitfalls Revisited' should logically have followed the very successful format of the original publication, with a seismic example for each pitfall. Unfortunately, for many reasons this was impossible. The original was unique and is not reproducible today. But perhaps the cartoon examples of this presentation will serve the same purpose, being a gentle reminder of what to avoid. The original categories of 'Velocity', 'Geometry' and 'Recording and Processing' are followed, to which are added 'Stratigraphic Mapping' and 'General'.

### Reference

Tucker, P. M. & Yorston, H. J. (1973), *'Pitfalls in Seismic Interpretation'*, Soc. Explor. Geophys. Mono. Ser. No. 2.

*'Pitfalls Revisited', by P. M. Tucker, is available as a booklet from the Society of Exploration Geophysicists, PO Box 3098, Tulsa, Oklahoma 74101, USA.

## Horizontal resolution — the key to petroleum (Keynote Address)

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The traditional picture of the earth used for developing seismic reflection theory is one-dimensional, 'layer-cake' geology, where the physical properties of the earth vary only with depth, and the horizontal direction exists only for the purpose of considering an offset between source and receiver.

Unfortunately, layer-cake geology holds no oil or gas. It is only where it is interrupted by a dip reversal, a fault, a pinchout or a facies change that there is a potential trap. So it is in exactly our areas of interest that the theory (on which we base data acquisition and processing) breaks down.

The seismic reflection method was first applied successfully in areas where simple anticlines or domes often held oil or gas, and where the lateral dimensions of fields were large. In such cases, where dips are small and geology is simple, the theory used in reflection seismology is close to reality. But in most parts of the world, all such structures have been investigated. The remaining prospects are ones in which the resolution of lateral changes in the geology is important, and as the size of an economic prospect decreases, the limits to this resolution become critical.

What limits the lateral resolution? There are three basic limitations: (a) temporal frequency content of the recorded data; (b) spatial frequency content of the recorded data; (c) processing approximations and inaccuracies which cause loss of resolution.

The temporal (time) frequency content of the recorded data is limited by seven factors:
(1) frequency content of the source wave;
(2) losses in the Low Velocity Layer (LVL) (downgoing);
(3) transmission losses in the earth;
(4) losses in the LVL (upcoming);
(5) losses in the geophone array;
(6) frequency response of the recording system;
(7) dynamic resolution of the recording system.

The spatial frequency content is limited by:
(8) geophone and source array response;
(9) spatial sampling.