

An integrated approach to resolving shallow marine structures and seabed sediments

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Geophysical techniques have been routinely used as reconnaissance tools in the site investigations for marine engineering construction and pre-drilling hazards site surveys. In all these surveys, it is crucial to predict shallow gas hazards from less significant biogenic accumulations or peat occurrences, soft organic or peaty substratum from hard sub cropping formations, stiff/hard over consolidated clays from the very soft to soft recent clay deposition or palaeochannels from circular slip faults. In the modern, large scale construction processes, the survey findings on the critical site conditions are often relayed to the design and planning centres for the route designs, planning and costing, prefabrications of parts and materials, structures, pipeline coating or cable armouring even as the survey progresses. Hence it becomes increasingly important to process and interpret the geophysical data reliably onboard the survey vessels as costly decisions are made on the basis of these pre-engineering surveys. Potential problems or hazards identified or taken into consideration can save millions of dollars in construction costs while unidentified problems actually manifest into costly delays during the construction stage. While many of the site surveys had been largely successful in routine charting and mapping work, there had been notable failures and several undocumented mis-interpretations when more geologically complex situations warranted the need for more specialised investigative skills. The weak link in almost all of these mishaps can be traced to the quality of interpretation or reporting of the survey.

A company can spend hundreds of thousands of ringgit for an advanced seismic system and yet the quality of the survey is only as good as the final interpretation of the seismic data. While the survey techniques and instruments have improved significantly over the years, the same cannot be said for the interpretation processes and techniques. Despite the advances in computer technology, we have yet to see any interpretation techniques that truly harness the power of computer-aided interpretation. Computerised-aided drafting and word processing programmes only add cosmetic not fundamental changes to final presentation of the results. Even though the seismic data are now recorded or backed up on tapes and disks, the major part of the interpretation is still carried out using the hard paper printouts. Although the interpretation is the most critical part of the survey, it is also the most neglected component part of the chain. Why? Because the worth of the survey is based on the number of acquisition data channels, equipment sophistication, speed and everything else except the quality of the interpretation work.

Until we make a paradigm shift, the quality of interpretation will continue to lack behind; unable to take advantage of the technological advances of the 21st century. This paper discusses an integrated approach which had been quite useful in resolving some of the more difficult problems encountered in the pre-construction engineering surveys. The technical points are highlighted here for academic purposes only. No malicious intended. Specific details have been left out intentionally to avoid any legal complications.