

SHALDRIL Phase I Report: Executive Summary (Holloway, Nov 1997)

The SHALDRIL Committee requested a review of available geotechnical/mining/drilling contractors who might offer equipment suitable for a shallow water (< 1000 m) coring program in and around Antarctica. The SHALDRIL committee also requested a review of two ice class vessels that might be used as platforms to perform the operations. The two vessels are the *Laurence M. Gould* and the *Nathaniel B. Palmer*.

Eight contractors were approached with a Request For Proposal (RFP) and given the choice of either or both vessels from which to work. Six of the eight contractors responded with written proposals. Of those six, only one company (Seacore Limited) had equipment that is already designed, manufactured, and tested. Of the remaining five, two companies (Williamson & Associates and Geo Drilling) were in the process of developing drilling equipment that could be used for the SHALDRIL program. The remaining companies only offered some general guidelines as to what type of equipment or techniques might best be employed.

Three types of equipment were proposed by the contractors. These included: 1) A heavy duty portable or fixed derrick drilling rig, 2) a small mining type coring rig utilizing a riser, and 3) a sea floor coring device. Each type of equipment presents its own set of advantages and disadvantages. These are discussed in detail within the body of the report.

Of the six contractors responding, only two indicated that their equipment was suitable for work off either vessel. These contractors were the Norwegian company Geo Drilling proposing a mining-type coring rig with a riser and the United States/Australian/ Japanese consortium called Benthic Geo Tech proposing the sea floor coring device (PROD). Both of these systems are still in the design/manufacturing stage and have not been field tested. Field testing is expected to be complete within 6-9 months.

Geo Drilling has the most experience with the environmental conditions dictated in this study and offers a concept designed around the harsh environment. Geo Drilling's approach offers a less expensive option on the proposed vessels while providing proven diamond-coring and piston-sampling options.

The sea floor coring device (PROD) is versatile and can be deployed on either vessel in question. This proposal was submitted by the United States partner of Benthic Geo Tech, Williamson & Associates. Because of its small and compact size, it could be used in conjunction with other work during the same expedition. This most likely would not be the case with the drilling rig option where the amount of equipment necessary to support such an operation may consume most of the available deck space of either proposed vessel. The sea floor corer is not a proven device and offers many unknowns at this time. However, sea trials should be completed within six months that will assess whether the hardware and software is ready for a commercial venture or if additional development and research will still be required.

The United Kingdom contractor, Seacore, proposed a portable heavy-duty drilling rig and is ranked higher than either of the above two contractors. Seacore offers a more versatile and robust approach to both coring and sampling. The heavy-duty drilling rig scenarios offer more sampling

and coring options, in situ testing, larger sample size, better hole characteristics, the use of drilling fluids to stabilize and clean the bore hole, and the ability to penetrate deeper than the sea-floor coring device. Deck-mounted drilling rig and support equipment is more easily accessible and repaired than the remote and highly complex sea-floor coring device. Seacore already has developed this equipment and has operated it in over 600 site investigations in the past 15 years. The primary drawback to Seacore is that their equipment requires a vessel with a larger and more centrally located center well than either of the vessels proposed.

Costs for a typical 45 day drilling leg range from \$666,000 to \$1,395,000. These estimates include mobilization/demobilization and field costs. They do not include vessel day rate, vessel modifications (e.g., DP, moon pool installation) or logging operations.

Both vessels will require a Dynamic Positioning (DP) system to be installed if operations are to be conducted in open seas with deck-mounted drilling equipment. Cost for converting either vessel is approximately \$200,000. Depending upon the type of beacons selected another \$35,000 to \$70,000 will be required in addition to the upgrade costs.

The report provides the reader with background information about conventional geotechnical practices besides describing each contractors proposal pertaining to methodology and cost comparisons to the other types of equipment. Time projections for the three types of equipment proposed are included, as well as conclusions drawn from this study and recommendations for meeting the goals of the SHALDRILL Committee.