

### **"French Research Capabilities for Cold Regions Development"**

**G. Huard**

Vice-Président, Bouygues Offshore et  
Président de DIPOL

**Michel Huther**

Directeur Recherche et Développement, Bureau Veritas et  
Secrétaire de DIPOL

**Author:** G. Huard is Vice-President, Engineering and R&D of Bouygues Offshore, Paris and is Managing Director of B.G. Engineering. He worked with Safetec, Bureau Veritas, Alsthom-Chantiers de l'Atlantique prior to joining Bouygues Offshore in 1981. Mr. Guard is currently President of DIPOL and a member of the technical committee of Bureau Veritas.

**Author:** See earlier section for Michel Huther's resume.

**Abstract:** For many years, various French research laboratories and industrial companies have developed investigations on subjects dealing with cold regions problems and technologies. The creation of DIPOL, a French consortium for the development of industries in Polar regions, has aided in coordination of cold regions research with twelve collaborative projects currently underway. Both theoretical and experimental, these fall into one of five main categories: site analysis; ice-structure interaction; materials; ships; and structural concepts (onshore and offshore).

Site analysis research is described, including atmospheric conditions, iceberg occurrence distribution, iceberg behaviour during impact, soil modelling and soil migration, and the structure of an artificial breakwater. In the materials area, the correlation between external and internal temperatures of steels and composite materials is described, as are experiments related to the long-term behaviour of concrete and composite materials exposed to the harsh Antarctic environment. In the ship research area, investigations aimed at developing a new arctic steel and optimizing the structure and form of a large ice-breaker is described. Work in structural concepts is also reviewed; specifically, three projects, two related to gravity base concrete structures designed for use in frozen seas, and one related to a concrete floating production vessel for use in ice-infested waters.