the ice platform. Researchers at the Division could draw on their expertise in dealing with bearing capacity problems and on research on the strength and mechanical properties of floating ice pursued over the past 20 years. Relying on existing knowledge of ice properties and theoretical calculations, they recommended a program of observation of the properties of the ice platform to ensure its safety. This included measurement of the vertical and horizontal deflection of the platform as well as the ice salinity, strength and temperature. Those properties were monitored continuously during the platform construction and during drilling operations.

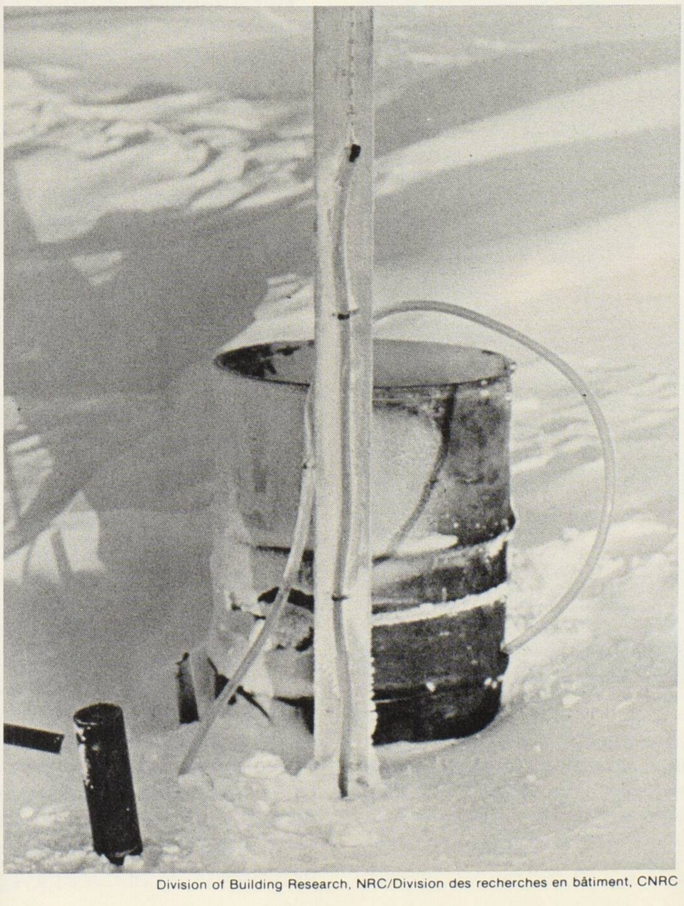
FENCO started building the platform in November 1973 on approximately five feet (1.5 m) of low-salinity multi-year sea ice. A light snow cover was cleared using a bulldozer and the ice cover was progressively strengthened by thicknening it through flooding and freezing in thin layers. The platform was completed on February 9, 1974. It then had a maximum thickness of 17.5 feet (5.2 m) at the center, gradually tapering to 5 feet (1.5 m) over a 215-foot (64.5 m) radius. The required platform dimensions were determined with the use of elastic stress and deflection formulae to ensure that both short- and long-term stresses and deflections would stay within safe limits. At that time, a 200- (60 m) by 6,000-foot (1 800 m) landing strip was built on the natural sea ice, one mile from the drilling site, to accommodate the Hercules aircraft which moved the drilling rig to the location. An eight-mile (12.8 km) road was also built on sea ice to link the drilling site with the mainland supply depot, using various kinds of vehicles, including ordinary pick-up trucks and large multi-wheel trucks.

Drilling proceeded smoothly for 42 days in March and April 1974, to the desired depth of 3,080 feet (924 m). With the help of a hydraulic tensioning platform between the drilling rig and the marine riser pipe, the tides in the area, (less than three feet [.9 m]) had no effect on operations. The performance of the platform was completely satisfactory and confirmed the feasibility of drilling offshore wells in suitable areas of the Arctic from floating ice platforms, using a standard drilling rig.

According to Dr. Bob Frederking, of the Geotechnical Section of the Division of Building Research: "Although ice platform techniques are maturing rapidly, it is still necessary to monitor the performance of these ice platforms to add to our knowledge of their behavior. The characteristics of each offshore site obviously have to be considered carefully; for the ice platform technique to be suitable, it is desirable to have a location with thick multi-year sea ice, with little or no horizontal movement during the two- or three-month drilling season. However, this is the normal situation for most of the sites of interest in the Arctic islands and it is now possible to build large ice platforms of considerable thickness quickly and economically in many offshore areas of the Arctic. Indeed, during the past two years, several more offshore ice drilling platforms have been built by Panarctic as part of the drilling programs aimed at delineating gas fields off Melville Island and Effel Ringness Island."

The Hecla Bay floating ice drilling platform project has been a good example of close and productive cooperation between private enterprise and various government agencies. The pioneer work of Panarctic Oils Limited and the Foundation of Canada Engineering Corporation has led to a remarkable breakthrough in petroleum exploration technology in the high Arctic. This important contribution to Canadian technology should help Canada move closer towards the objective of energy self-sufficiency. ☐

Michel Brochu



Division of Building Research, NRC/Division des recherches en bâtiment, CNRC

This platform tiltmeter consists of a U-shaped piece of plastic tubing filled with diesel fuel. Its ends were raised and fitted with calibrated glass tubing. The difference between fuel level readings taken at both ends indicates platform tilting behavior.

Cet inclinomètre consiste en un tube de plastique en forme de U, rempli de mazout, et dont les deux extrémités, relevées au dessus de la plate-forme, sont munies de cylindres de verre gradués. Il suffit de lire le niveau de liquide aux deux extrémités du tube pour mesurer l'inclinaison de la plate-forme.