

1994 Louis S. St-Laurent Expedition to the North Pole
Sponsored by: Canadian Coast Guard, U.S. Coast Guard



In July 1994, the CCGS Louis S. St-Laurent and the USCGC Polar Sea began a scientific deployment to the Arctic Ocean from Victoria, BC boarding scientists in Nome, Alaska. The ships made a historic first crossing of the central Arctic basin from the Pacific to the Atlantic, attaining the geographic North Pole along the way on August 22. During the voyage, extensive measurements were made by a multi-discipline group of scientists to understand the Arctic Ocean and to look for evidence of change due to Global warming.

The objective of the ship technology program was:

- 1) To measure ice loads on three locations at the hull of the *Louis S. St-Laurent*. The analysis of this data will provide information on the peak pressures on the hull, total load on the hull, size and shape of the loaded area and a comparison of the frequency and magnitude of loading on the three areas of the hull. This data will be used by designers for future icebreaker designs and by the regulatory bodies for the formulation of regulations to provide safe shipping in the Arctic region.
- 2) To measure the torque, thrust, and RPM on the starboard and centerline propeller shafts of the *Louis S. St-Laurent*. The data collected on the shaftlines will be used to estimate loads on the propellers. Ultimately, information of this type, along with data collected on other ships and from model tests, will be used for the revision of regulations governing vessels in the Arctic.
- 3) To document and collect a comprehensive set of navigation parameters such as ice concentration, ice thickness, ice properties, and atmospheric conditions along the route. This data will provide a comprehensive set of data on the conditions a vessel is expected to encounter on a trip of this type. This data will also be used in the analysis of the hull and propeller shaft data.

The two ships operated in a variety of summer ice conditions including first, second, and multi-year ice. More than 4000 ice impact events were recorded using the three instrumented hull panels and 855 ice-propeller interactions were measured.