



Winter Navigation and the Frazil Problematic

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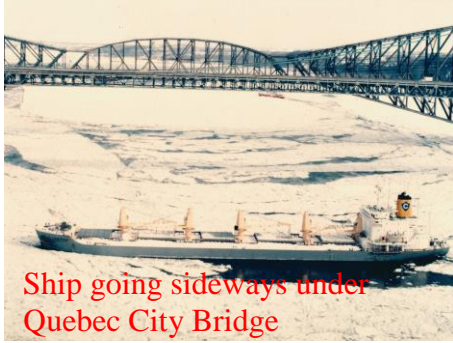
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CONTEXT OF WINTER NAVIGATION ON THE ST. LAWRENCE RIVER

Commercial ships navigating on the St. Lawrence River during the winter months are prone to the clogging or the choking of their sea water cooling suction strainers by frazil ice. Frazil ice is the collection of loose, randomly oriented ice particles in water. Frazil ice resembles slush and sporadically forms in open, turbulent, supercooled water.

Frazil ice clogging the seawater intakes is an event that constitutes a very significant danger to the vessel itself, to the waterway and to the environment. This problem can occur if ships are not properly equipped and/or if crews are not properly trained. The clogged seawater intakes can cause a loss of propulsion and these vessels, losing their navigability, drift with the current and can run aground and/or damage surrounding infrastructure.





These events can create a major incident. The grounding of a vessel can cause the interruption of marine traffic or damaged infrastructure (bridges, docks, etc.). This leads to an economic impact with the supply chain being cut-off or delayed. There is also the concern that these grounding events could result in serious environmental impacts through potential oil spills.

The problematic of frazil ice is not fully understood. Events that trigger frazil ice are not completely known nor are the concentration and geographical distribution of frazil ice on the St. Lawrence River. Currently, there are no means available for the stakeholders when and where these events may occur.

ROLES OF TRANSPORT CANADA MARINE SAFETY & SECURITY

Transport Canada Marine Safety & Security's (TCMSS) roles are to protect life, health, property and the marine environment in the context of an efficient and sustainable marine transportation system. During winter, all ships bound west of Les Escoumins pilot station must be adequately equipped to prevent clogging of their sea water cooling suction strainers. TCMSS's Quebec City district office screens ships to ensure that each one meets the requirements. Targeting is done well before ships are entering Canadian waters. Education and information is provided to ship crews, ship owners, and all other stakeholders on a daily basis to ensure ships conform and crews are well prepared to face winter navigation on the River. Ships not properly equipped to protect against clogging of seawater intakes are prohibited from sailing west of Les Escoumins.

JOINT RESEARCH PROJECT BETWEEN TRANSPORT CANADA MARINE SAFETY & SECURITY AND UNIVERSITÉ LAVAL

Knowing more about the characteristics of frazil ice, would help TCMSS to be more effective in its response to the vessels which may be affected by clogging of sea water strainers. TCMSS Quebec City District office together with Université Laval (Département de génie civil et de génie des eaux) have been awarded a research project from Transport Canada Transportation Innovation and Applied Research Centre. The objectives of the project are:

- To determine the periods and weather conditions when frazil ice could clog the sea water strainers of vessels transiting in the St. Lawrence River during the winter season.
- To quantify the heat required (volume flow of the ship's warm sea water returning to the suction) in order to ensure no frazil blockage.
- To help TCMSS to communicate best means, methods and practices regarding frazil ice blockage prevention and to inform stakeholders about periods of severe frazil conditions that could lead to frazil ice blockage occurrence in the St. Lawrence River as well as other areas where frazil can also affect the safety of navigation (i.e. Chaleur Bay, the Gulf of Saint Lawrence and the Atlantic).