Fact Sheet

FRAZIL ICE DETECTION AT WATER INTAKES

PROBLEM

Operating water intakes in lakes and rivers in northern regions is complicated by the presence of ice. One of the most difficult problems encountered is the accumulation of frazil ice (small ice particles formed in turbulent, supercooled water) on the intake trash rack, which can lead to complete blockage, and can rapidly and unexpectedly shut down the intake facility.

BACKGROUND

There currently is no widely available means of detecting frazil ice suspended in the water being drawn into an intake. Monitoring the head loss through an intake is not a reliable means of detecting frazil because a considerable amount of ice can accumulate before the head loss through a trash rack becomes significant. Early detection of frazil ice could be of significant benefit to intake operators. For example, possible strategies based on early detection include starting anti-icing procedures (if available), reducing intake flow rates, or initiating an orderly shutdown of the facility. Early detection would provide the operator with a clear indication of a possible problem in the operation of the intake, rather than requiring the operator to deduce the presence of frazil based on wet-well water levels, pump trip-outs, or sudden cessation of downstream processes.

SOLUTION

A new electromagnetic-based sensor system for remote monitoring and early warning of the presence of frazil ice at water intakes has been developed at CRREL. Positive preliminary laboratory experimental results have led to the filing of patent applications. Plans for developing turnkey, practical, field-ready instruments are currently underway. This technology provides a robust, relatively inexpensive, easy-to-install, and low-maintenance solution for detecting the presence of frazil ice in the water entering the intake. A frazil ice detection system can be tailored for site-specific application across a wide range of intake configurations. Alarm indication of frazil can be transmitted back to a control center.

This technology has the following advantages:

- Allows unattended automatic operation;
- Provides real-time data;
- Provides an alarm in advance of intake blockage.

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