Fact Sheet

CONTROLLING ICE PROBLEMS AT WATER INTAKES

PROBLEM

Hydroelectric plants, fish hatcheries, ski areas, and many industrial and municipal water plants have water intakes located in rivers, lakes, or reservoirs that are subject to ice in the winter. A major problem faced by intake operators in winter is blockage of the intake trash rack by frazil ice, which can accumulate quickly on the trash rack and lead to complete and seemingly sudden blockage of the intake, often with disastrous consequences. Although there is a range of solutions available, it is often difficult to select the appropriate one. Mechanical removal of the frazil ice, when possible, is often labor-intensive and expensive. Removal of the ice-clogged trash racks allows water to enter the intake, but leaves downstream structures or equipment vulnerable to damage from debris. Heating the entire trash rack is usually energy-intensive and uneconomical.

SOLUTION

CRREL engineers have studied the process of trash rack blockage both in the laboratory and the field, and have examined the physics of frazil-ice growth and transport. They have developed an edge-heated trash rack design that has proven to be an economical and effective means of applying heat to a trash rack when no other solution is available. They have also developed and patented a device for detecting under-water frazil ice. While it is important to remember that there is no single solution effective for all intakes, CRREL engineers can help sort through the range of solutions available and select the most effective and economical solution for each intake site. For example, if warm water is generated as a by-product at the facility using the intake, it can be effective in preventing frazil blockage. Relocating the intake, re-designing the intake, increased monitoring of environmental variables, and changing the intake operation may also be viable options.

RESULTS

Improved wintertime operation of water intakes, with fewer and less severe occurrences of frazil ice blockage, achieved with cost-effective measures, are the expected results. In many cases complete elimination of frazil ice blockage may be possible. Often the remedial measures will pay for themselves in a short time, sometimes within one year.

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