Fact Sheet

ICE ENGINEERING RESEARCH DIVISION
CIVIL WORKS ACCOMPLISHMENTS

COST, BENEFITS, AND RETURNS ON INVESTMENT

- Delays to navigation, public and private property damage, and operational costs to the Corps because of ice problems and ice jams average between $100 and $200 million each year, and run to several hundred million dollars in difficult years.

- Under the current five-year, $4.5M River Ice Confluence Program, the potential benefits have been estimated at $21M per year. Assuming a twenty-five year amortization of program costs and a modest range of implementation costs, the benefit–cost ratio has been estimated to be between 6:1 and 9:1.

- The $12M River Ice Management Program, conducted during the 1980s, addressed problems that represented annual costs estimated at $205M, and produced potential cost savings of 25%. This would justify at least $815M in first-cost improvements, assuming 6% interest and 50-year project life.

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CONTROLLING ICE JAMS AND WINTER FLOODS

- Solved perennial ice jam flooding problems at Oil City, Pennsylvania (Pittsburgh District).
- Modeled and perfected an ice control dam for Cazenovia Creek, New York (Buffalo District).
- Designed and perfected a navigable ice boom on the St. Marys River, Michigan (Detroit District).
- Field-tested and optimized the Salmon River, Idaho, ice boom (Walla Walla District).
- Designed a high-stage bypass channel to relieve winter flooding on the Delaware River at Port Jervis, New York (Philadelphia District).
- Developed a warm-water syphon to deliver water from a power plant cooling pond to the ice-jam-prone Kankakee River, Illinois (Chicago District).
- Devised and perfected ice motion detectors and alarm systems to provide early warnings of river ice breakup.
- Developed an ice-watch program and deployed an ice alarm system for the city of Montpelier, Vermont (New York District).
- Analyzed major ice jams on the St. John River, Maine, and the Salmon River, Connecticut (New England Division).
- Developed an innovative, seasonally placed tension weir to provide low-cost ice-jam control on small streams.
- Developed an innovative method of using slope-face blocks as ice barriers while allowing flow to pass in small streams, and thus provide low-cost ice-jam control.
- Conducted a recent review of the performance of permanent ice-control structures worldwide.
- Developing the Ice Jam Database, in which is being collected all the pertinent information on specific instances of ice jamming, ice-jam flooding, and emergency response measures throughout the Nation.
- Optimized techniques for “dusting” river ice covers to accelerate ice weakening and breakup, and developed and tested the mechanical weakening techniques.
- Produced an ice-jam brochure providing a guide to the causes and control of ice jam flooding, for use by Corps Emergency Management personnel.
- Conducting workshops hosted by district Emergency Management offices to train personnel in dealing with threatened or actual ice jams (St. Paul District, New York District, Omaha District, Pittsburgh District, Kansas City District, and Huntington District).

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IMPROVING WINTER OPERATIONS AT NAVIGATION PROJECTS

- Developed and optimized modern high-flow air systems (bubblers) for ice control at locks and dams (Rock Island District, Pittsburgh District).
- Created electrically heated wall panels for use on critical surfaces such as lock walls and lock gate faces, and devised specialized electric heaters for placement on complex structural elements of lock and dam components (Rock Island District, St. Paul District).
- Establishing a practical river ice forecasting methodology that can be installed at Corps Water Control Centers to provide water managers and project operators with forecasts of ice development, location, thickness, areal extent, and disappearance.
- Formulated procedures for obtaining aerial video coverage of river ice conditions in near-real time (Pittsburgh District, Huntington District, Rock Island District, and Chicago District).

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MANAGING ICE EFFECTS AND ICE FORCES

- Conducting laboratory and field studies of ice action on riprap, for which design criteria are inadequate.
- Researching the effects of ice on bed and bank erosion.
- Developed a comprehensive methodology for routing of low winter river flows subject to multiple small ice jams (Missouri River Division).
- Developed effective and economical techniques for heating trash racks subject to abrupt blockage by frazil ice formation.
- Conducted observations of the environmental effects of winter ship passage in the Great Lakes connecting channels (Detroit District).
- Under support from several agencies (e.g., U.S. Navy, Federal Highway Administration), measuring the physical parameters of ice impacts and ice forces on movable and fixed structures, leading to the development of new design criteria.

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