



**Environmental
Hydraulics
Group**

**Coastal & River
- Power & Co-Generation**

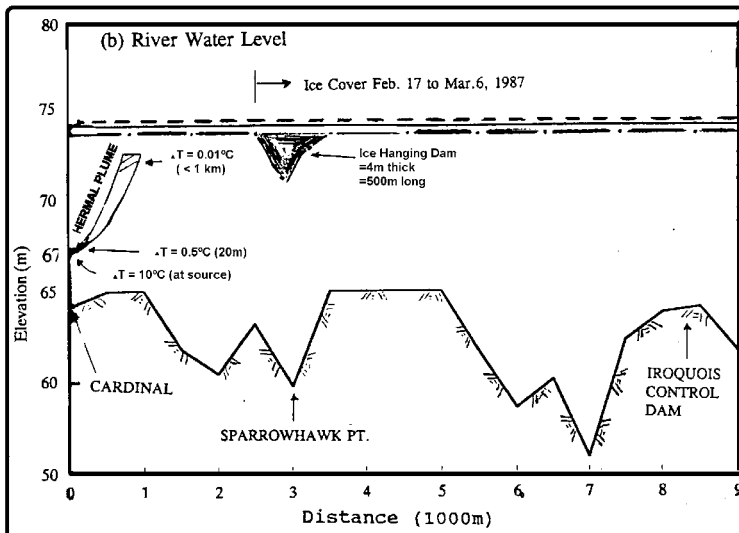
**Project: Impact of Thermal Discharge from
Cardinal Cogeneration Facility**

1992-451

Location: Cardinal, Ontario

Client: Cardinal Power of Canada

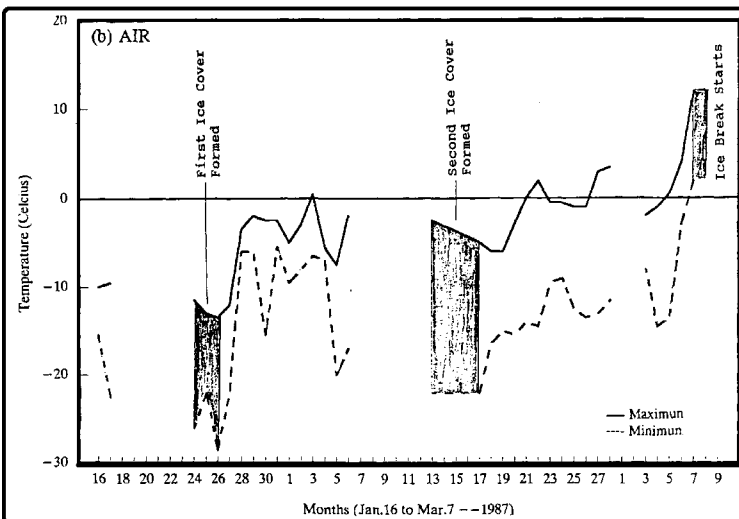
Completed: November 1992



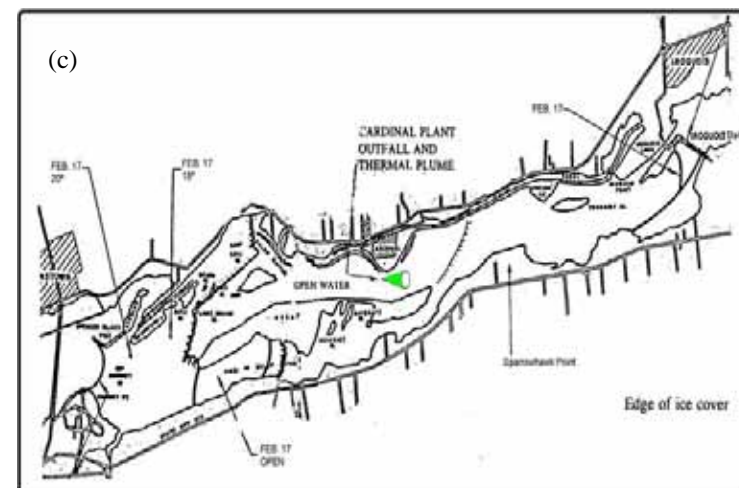
Description: A 150 MW cogeneration facility was proposed at the Village of Cardinal, Ontario on the St. Lawrence River. Ontario Hydro and subsequently the International Joint Commission, during their review of the project, raised concerns regarding the effects of the thermal discharge on the river ice during winter.

Any significant change in the ice conditions may have affected the flow capacity of the river system, and therefore the water levels in Lake Ontario and the economics of the hydro power generation.

The present study evaluated the potential impact of the proposed thermal discharge on ice formation during early winter as well as possible effects on the downstream ice cover during mid-winter.



Benefit to the Client: A thorough river mixing could be achieved because of the high flow rate and velocity near Cardinal. The submerged outfall would further improve dilution. At a dilution ration of 1000:1 (i.e. 0.01 degree Celsius above ambient), the thermal plume would extend over a length of less than 1 km and will disappear before reaching the water surface.



The normal generation of frazil ice in the river would not be affected since the thermal plume would not affect any surface area of open water. The ice cover would also not be affected as the normal ice cover started at a distance of 1 km or more from the edge of the thermal plume.

It was concluded that the proposed thermal discharge from the Cardinal cogeneration plant would have no impact on the natural ice conditions of the St. Lawrence River in winter.