388 Elmfield Road
RR#2 Scotsburn
Nova Scotia, B0K 1R0
jillgrahamscanlan@gmail.com
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Environmental Assessment Branch
Nova Scotia Environment
P.O. Box 442
Halifax, Nova Scotia B3J 2P8
Fax: (902) 424-6925

Via e-mail at ea@novascotia.ca
and fax 1-902-424-6925

Dear Sir or Madam:

RE: Northern Pulp's Replacement Effluent Treatment Facility Project

I am writing to comment on Northern Pulp's proposed Replacement Effluent Treatment Facility Project.

I am a life long resident of Pictou County and have many ties to the Northumberland Strait. For over 40 years, my family has owned a cottage along the Northumberland Strait. I have spent each summer walking the beaches and swimming the waters. I have worked in Pictou as a lawyer for over 25 years and am a volunteer member of several boards and organizations in the area, including the Northumberland Fisheries Museum and Heritage Association, which is dedicated both to the preservation of fishing history and the celebration of the fishing culture. I am married to a commercial fisherman who fishes the waters of the strait, like many generations of his family who came before him. Involvement in the commercial fishery is a family commitment that is shared by our children and shapes our lives on a day to day basis. Like so many people in Pictou County and beyond, the Northumberland Strait is beloved by me and my family and is the cornerstone of our economic prosperity, social enjoyment and mental well being. The risk that Northern Pulp's proposed Effluent Treatment Facility Project poses to the Northumberland Strait and all who rely on it is simply too great for the Minister to grant approval.

Regulation 12 of the Nova Scotia *Environment Act* sets out the factors the Minister must consider when making her decision:

> 12 All of the following information shall be considered by the Minister in formulating a decision under subsection 34(1) of the Act:
>
> (a) the location of the proposed undertaking and the nature and sensitivity of the surrounding area;

(b) the size, scope and complexity of the proposed undertaking;

(c) concerns expressed by the public and aboriginal people about the adverse effects or the environmental effects of the proposed undertaking;

(d) steps taken by the proponent to address environmental concerns expressed by the public and aboriginal people;

(da) whether environmental baseline information submitted under subclause 9(1A)(b)(x) for the undertaking is sufficient for predicting adverse effects or environmental effects related to the undertaking;

(e) potential and known adverse effects or environmental effects of the proposed undertaking, including identifying any effects on species at risk, species of conservation concern and their habitats;

(f) project schedules where applicable;

(g) planned or existing land use in the area of the undertaking;

(h) other undertakings in the area;

(ha) whether compliance with licences, certificates, permits, approvals or other documents of authorization required by law will mitigate the environmental effects;

(i) such other information as the Minister may require.

Regulation 13(1)(e) made pursuant to the *Environment Act* states that one of the decisions of the Minister upon registration of a Class 1 undertaking may be as follows:

> "that a review of the information indicates that there is a likelihood that the undertaking will cause adverse effects or significant environmental effects which are unacceptable and the undertaking is rejected."

Section 34 (1) of the Nova Scotia *Environment Act* states that the Minister shall make one of six listed determinations upon the registration and review of an undertaking. I submit that, based on the factors listed in Regulation 12 set out above, it is appropriate that the Minister reject the undertaking as per section 34(1)(f) "because of the likelihood that it will cause adverse effects or environmental effects that cannot be mitigated."

ERRORS, MISREPRESENTATIONS, CONCERNS

In my review of Northern Pulp's proposed Replacement Effluent Treatment Facility (ETF) Project, I identified many errors, misrepresentations, and concerns. These are as follows:

1. Definitions: Commencing at Page xxiii, there are a number of words that are defined for the purposes of the proposal. Not all of the definitions used are the same as the definitions of the same terms used in relevant legislation, including the following definitions (emphasis are mine):

(a) **Contaminant** is defined in the *Environment Act* as: "contaminant" means, unless otherwise defined in the regulations, a substance that causes or <u>may cause an adverse effect</u>;

Contaminant is defined in the ETF proposal as: "A biological, chemical, physical or radiological substance <u>that becomes harmful</u> for humans or living organisms, when accidentally or deliberately introduced to air, water, soil or food."

(b) **Deleterious** substance is defined in the *Fisheries Act* as: deleterious substance means

> (a) any substance that, if added to any water, would degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water, or
> (b) any water that contains a substance in such quantity or concentration, or that has been so treated, processed or changed, by heat or other means, from a natural state that it would, if added to any other water, degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water,
> and without limiting the generality of the foregoing includes
> (c) any substance or class of substances prescribed pursuant to paragraph (2)(a),
> (d) any water that contains any substance or class of substances in a quantity or concentration that is equal to or in excess of a quantity or concentration prescribed in respect of that substance or class of substances pursuant to paragraph (2)(b), and
> (e) any water that has been subjected to a treatment, process or change prescribed pursuant to paragraph (2)(c); (substance nocive)"

Deleterious substance is defined in the ETF proposal as: "A substance that is dangerous and harmful."

(c) **Mitigate** is defined in the *Environment Act Regulations* as: "mitigate" means, with respect to an undertaking, to eliminate, reduce, or control the adverse effects <u>or the significant environmental effects of an undertaking</u>, and <u>may include</u> restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means;

Mitigation is defined in the ETF proposal as: "With respect to a project, refers to the elimination, reduction or control of the adverse environmental effects of the project <u>and includes</u> restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means."

(d) **Significant** is defined in the *Environment Act Regulations* as: "significant" means, with respect to an environmental effect, an adverse effect that occurs or could occur as a result of any of the following:
   (i) the magnitude of the effect,
   (ii) the geographic extent of the effect,
   (iii) the duration of the effect,
   (iv) the frequency of the effect,
   (v) the degree of reversibility of the effect,
   (vi) the possibility of occurrence of the effect;

   Significance is defined in the ETF proposal as: "A defined threshold of acceptability. The significance of adverse environmental effects is determined by a combination of scientific data, regulated thresholds, standards, social values and professional judgment. For example, the ecological context of a project may be determinant of whether likely adverse effects are significant."

It is noted that the term "**adverse effect**" is not defined in the ETF proposal. It is defined in the *Environment Act* as " an effect that impairs or damages the environment or changes the environment in a manner that negatively affects aspects of human health".

Also noteworthy is the definition of the term "**reach**" in the ETF proposal. It is defined as, "In the context of this project, a reach is a section of watercourse of defined length (usually 100 m) in which fish and fish habitat surveys are completed, and water quality measurements are taken." The term "reach" is not defined in the *Environment Act*, regulations or other applicable legislation.

Because the ETF proposal uses definitions which are different than those set out in the relevant legislation, when the proposal reaches a conclusion or makes a statement, the standards for that conclusion or statement may not be what is set out in the legislation. The conclusion or statement may satisfy the definition the ETF chooses to apply, but it may not satisfy the standard set out in the actual legislation.

Also of concern is the definition of "**change in water quality**" found on page 346 of the ETF proposal, which states, "For the purposes of this assessment, a change in water quality refers to any alteration to pH, dissolved oxygen (DO), temperature, total suspended solids (TSS) or contaminants in the water column." The definition does not include such things as AOX, BOD, COD or colour.

The definition of "**change in marine fish population**" set out in the proposal is also of concern. On page 384, a change in marine fish population is said to "include any physical injury or mortality on fish attributable to the project, and any destruction or alteration of habitat from disturbance of the marine environment." It is not clear whether this definition includes such things as bio-accumulation and any other effect or change to fish.

2. The ETF proposal states that the temperature of the treated effluent will reach ambient termperatures within 2 meters of the diffuser and therefore will comply with CCME Guidelines for temperature . This is a misrepresentation of the CCME Guidelines (Canadian Water Quality Guidelines for the Protection of Aquatic Life - see attached), which state, "Human activities should not cause changes in ambient temperature of marine and estuarine waters to exceed +/- 1degree Celsius at any time, location, or depth."

3. On page 123 of the proposal, it is stated that, "Dioxins and furans in NPNS's effluent have virtually been eliminated since the conversion to chlorine dioxide bleaching in 1998. NPNS has never exceeded the limits as per the Pulp and Page Mill Effluent Chlorinated Dioxins and Furans Regulations. In fact, dioxins and furans testing for the last 5 years has consistently shown that all of the compounds required to be tested under the regulations have not been detected in NPNS' effluent (non-dedect)." This statement runs contrary to the test results of samples taken June 11, 2014 from NPNS' effluent leak. The test results are published on NSE's website and attached hereto. The test results appear to reveal that there were exceedences of dioxins and furans beyond what is permitted under the Pulp and Paper Effluent Regulations.

4. On page 433 of the proposal, the physical land use in the vicinity of the land-based portion of the effluent pipeline route is set out. There are a number of land uses missing from this list, including single family homes and cottages in the area between the causeway and Division Road, and near the ferry wharf. Also in the vicinity of the ferry wharf and missing from the list are the Caribou fishing wharf, the fishing wharf at North Nova Seafoods, the North Nova Seafoods fish plant, and the Pictou Island ferry. At the fishing wharves, the uses extend beyond the tying up of fishing vessels. At the wharves is where fish buyers set up their buying stations for various fisheries and store bait and catches. It is where fishers work on their vessels and gear. Fishers use water from the Northumberland Strait to wash down their vessels and hydrate and store their catches. The wharves are used by recreational boaters, barges and tugs and those seeking shelter from storms or rough seas. The proposal puts all of these uses at risk.

The ferry service between Caribou, Nova Scotia, and Wood Islands, Prince Edward Island, is a vital link between the two provinces. Any infrastructure or impediment to the use or expansion of the ferry wharf at Caribou should not be permitted. The proposal does not set out details as to the specific location of the proposed effluent pipe. Insufficient details are provided to determine whether the proposed pipe will impact the ferry service now or in the future. The attached article from CBC dated May 5, 2017 confirms that changes to the ferry service are being contemplated.

5. The proposal claims that "operation of the outfall will not interact with use of community beaches in the surrounding area." (see page 440). This statement appears to contradict the results of the Stantec Final Caribou Discharge Receiving Water Study found in Appendix E1 which shows effluent concentrations washed ashore in various areas. For example, Figures 2.7 and 2.9 shows effluent on the beach at Munro's Island which is a popular provincial park. Figure 2.11 shows effluent on a beach at Caribou Island which is enjoyed by many locals, cottagers and tourists. I suggest that the presence of effluent in any form on any beach or shoreline will interact

with the use of community beaches.

6. On page 505 of the proposal, it is stated that "Stantec (2019) also reported that ambient air monitoring data for 2015, 2016 and 2017 showed no exceedances of the applicable Nova Scotia regulatory AQC for the air contaminants monitored under the NPNS approval to operate." This does not appear to be a true statement. Attached is Source Emission Test Results for Winter 2015 and Summer 2015. Both tests were conducted by Stantec and the results were found on NSE's website. The test results show exceedances for both the recovery boiler and the power boiler as outlined in the company's industrial approval.

7. The proposal claims that "the loss of vegetation and associated bird habitat within the pipeline footprint area along the road shoulder (if it occurs) will be consistent with existing road maintenance activities along Highway 106 and thus, will not result in any additional loss of bird habitat." (see page 561). This statement fails to consider the habitat of the double breasted and great cormorant which are located along the Harvey A. Veniot Causeway. Their habitat will be destroyed with the construction of the pipeline, and will not likely recover.

8. The proponent's public consultation was not adequate. I attended the open houses in New Glasgow and Pictou Landing which were both held prior to the new route of the pipe to Caribou Harbour being announced. The open houses were conducted on the basis of the pipe going into Pictou Harbour. No open houses were conducted following the announcement of the new route to Caribou, even though Dillon Consulting Limited promised me in two letters that they would hold additional open houses. Dillon also promised me in the same correspondence that they would release studies to the public as they became available. Very few studies were released to the public prior to the registration of the proposal. The correspondence from Dillon are included with Ecojustice's submission to the proposal on behalf of Friends of the Northumberland Strait.

The open houses were crowded, loud, and not conducive to conversation, asking questions or obtaining information. They did not allow for meaningful discussion and it was difficult to engage the proponents. They did not have any means of taking notes of my concerns for future reference, consideration or documenting purposes.

The information provided at the open houses, in a subsequent mail out and advertisements represented that the project would include an oxygen delignification system which would improve the quality of the effluent. This system does not appear to be included in the proposal. There was no consultation by the proponent with the public following the announcement of the new route or the elimination of the oxygen delignification system from the project.

9. I am concerned that the environmental assessment is proceeding on the basis of a Class 1 environmental assessment which limits the time the pubic has to respond to the proposal. The proposal is almost 1700 pages long and takes a lot of time to read, analyse and reply. Because of the short length of time provided, I submit that the pubic consultation is not meaningful or as fulsome as it could otherwise be. This raises significant public policy concerns which are exacerbated by the lack of input the public will have to the additional information and studies the proponent has stated it will file at a later date. Pubic review and input is vitally important to the EA process but the public is not being this opportunity.

Missing Information

Aside from the many studies yet to be completed, the proposal is missing several pieces of information, as follows:

(a) The proposal states that the proponent's "Toxicity Prevention and Remediation Plan" will be used. This plan was not included in the proposal, and as such, it is not possible to determine whether it is complete or effective. Any reference to this plan and its use to mitigate or address any issue should not be considered.

(b) Page 28 of the proposal refers to a brochure attached to Appendix D. No such brochure is attached.

(c) Page 349 and 351 makes reference to "occurring in a context of previous disturbance". There is no information provided as to what the previous disturbances refers to.

(d) Page 460 sets out 10 known ship wrecks in the vicinity of the marine PFA/LAA. Attached is a list of 17 ship wrecks which I found after searching the Marine Heritage Database if the Maritime Museum of the Atlantic which is the same database the proponent claimed to have used.

(e) There appears to be information missing from Table 11.1-1 (page 535) as not all VEC's set out in section 8 of the proposal are summarized.

(f) Appendix Q (Bird Data) sets out data collected for the month of December only. As such, any data from migratory birds who left the area by December is not captured.

(g) The proposal fails to disclose that the location of the new on-site ETF will be located adjacent to Canso Chemicals which is a former chemical plant that has known deposits of mercury on its property. The proposal does not address the potential interaction that the presence of mercury will have on the construction and operation of the ETF and the environment.

(h) Although the proponent appears to imply that the lack of cooperation from fishers is the reason for the deficiencies in the proposal's information relating to commercial fishery in the area, it must be noted that area fishery information is contained in the most recent Environmental Effects Monitoring Study (EEM), which is attached as Appendix J of the proposal. The Receiving Waters Study completed by Stantec (attached as Appendix E2 of the proposal) sets out less information on the area fishery than the EEM study which was prepared prior to the Receiving Water Study. Also, during the open houses I attended in both New Glasgow and Pictou Landing hosted by the proponent as part of this environmental assessment process, I personally witnessed fishers and others drawing on a map the location of the fishery and explaining in detail the location of the area fishery to the proponent. The proponent appears to have disregarded this information as it has not been included in the proposal.

(i) A provision in the sign off sheet contained in the Receiving Water Study found in Appendix E3 of the proposal limits the usefulness of the study. The provision states, "The material in it [the Receiving Water Study] reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client." Unless the contract between Stantec and KSH (the Client) is disclosed, it is not possible to understand the effect that the "scope, schedule and other limitations" imposed in the contract may have had on the results of the Receiving Water Study. As such, the Receiving Water Study ought not to be relied upon in the review of the proposal.

(j) On page 336 of the proposal, the marine local assessment area (LAA) is said to consist of a corridor approximately 300 m wide, including an area of 300 m encircling the outfall. There is no explanation as to how this area was determined or developed. It appears to be an arbitrary area with no basis for its existence.

CONCLUSION

This proposal was submitted prematurely without proper study or consideration for the environment and the adverse effects of the proposal on the Northumberland Strait. On page 12 of the proposal, the proponent admits that "due to EA Registration submission timing, the study period did not facilitate full biological field assessments for the current proposed transmission pipeline corridor", and "...it was not possible to conduct field work in the new pipeline corridor or marine environment in order to inform this EA Registration." The time constraints were created and were self imposed by the proponent. They could have chosen to complete the required studies and then file the proposal. Failure by the proponent to do so, and acceptance by the minister of this tactic if the proposal is approved, sets a very dangerous precedent for future EA registrations. It would convey the message that EA registrations do not need to be complete at the time of registration. Instead, a proponent can file an incomplete EA, receive approval, and then complete important studies. These studies would be filed without public review and input which would eliminate a vital component of an EA. This is not acceptable and is against public policy and violates procedural fairness.

I suggest that the proposal ought not to have been accepted for registration because it was not complete. Regulations 9(1A) made pursuant to the *Environment Act* states that the proponent must submit, "environmental baseline information". This was not included in the proposal.

To protect the integrity of the EA process in Nova Scotia, this proposal must be rejected. The proponent must start the process from the beginning once it has gathered the required environmental baseline information and all studies required to properly review it's proposal. The precautionary principle, set out in section 2(b)(ii) of the Environment Act, ought to be followed. It states,

> "(ii) the precautionary principle will be used in decision making so that where there are threats of serious or irreversible damage, the lack of full scientific certainty shall not be used as a reason for postponing measures to prevent environmental degradation."

The environmental effects which would occur as a result of the proposal cannot be mitigated.

The proposal suggests that fishers can be compensated and therefore mitigation will be served. Money cannot address the harm that this project will bring because there is more than monetary or commercial issues at play. Money cannot compensate for the loss of a beloved beach or shoreline. Money cannot compensate for the loss of peace and enjoyment of a day on the strait with family and friends. Money cannot compensate future generations of fishers who want to fish the pristine waters of the strait. Money cannot compensate a rural community who is dependent on the strait for its economic prosperity, social well being and mental health.

This project must be rejeted because of the likelihood that it will cause adverse effects or environmental effects that cannot be mitigated.

Yours truly,

Jill Graham-Scanlan

Canadian Water Quality Guidelines for the Protection of Aquatic Life

TEMPERATURE
(Marine)

Water temperature, along with salinity, is one of the most important physical factors affecting marine and estuarine organisms. Temperature affects almost every physical property of seawater. The ionization constant, surface tension, and latent heat of vaporization decrease in a near-linear fashion as temperature is raised. The compressibility, viscosity, and specific heat of water all decrease nonlinearly with increasing temperature. Vapour pressure and thermal conductivity, the speed of sound in seawater, its electrical conductivity, and osmotic pressure, however, increase in magnitude as temperature increases. The solubility of gases, such as nitrogen, hydrogen, carbon dioxide, and oxygen, in contrast, all decrease as water temperatures rise (Cox 1965; Houston 1982).

Temperatures in the Canadian Pacific and Atlantic coastal and estuarine waters vary considerably depending on location, depth, freshwater inputs, extent of ice formation, upwellings, and currents (Dera 1992). For both coasts there is a pronounced seasonal variability in nearshore surface temperatures. Temperature measurements along the Canadian Atlantic coast have shown that winter water temperatures often range between -2 and 6°C, while summer temperatures vary between 7 and 18°C (Petrie and Jordon 1993). In the Straits of Georgia and Juan de Fuca, along the Canadian Pacific coast, winter temperatures between 5 and 8°C have been measured, while summer temperatures have been between 12 and 15°C (Thomson 1981). These general water temperature ranges are often exceeded in localized areas, such as certain fjords in British Columbia (e.g., Pendrell or Hotham Sound), where summer stratification has caused surface temperatures to exceed 20°C (Valiela 1979; Thomson 1981). Temperatures in the Arctic Ocean also exhibit geographical, seasonal, and annual variations, but fluctuations are smaller than those experienced in the Pacific or Atlantic Canadian coastal waters. In areas with drifting ice, surface waters usually remain at about -1.8°C, year-round. In the summer, ice-free areas may reach temperatures that rise several degrees above 0°C (Heimdal 1989). In northern Baffin Bay, average monthly temperatures over a 2-year period changed only marginally from a low of -1.53°C to a high of 0.19°C (Ross 1991). Ice and water transport patterns, winter air temperatures, and freshwater inputs can contribute to considerable local variability in recorded Arctic marine water temperatures (Drinkwater 1986; Prinsenberg 1986; Hopky et al. 1990).

Most of the human activities that affect the temperatures of marine and estuarine waters in Canada are associated with the release of waste heat. The major sources of these inputs include the processes of the chemical, petrochemical, and pulp and paper industries; municipal sewage; and thermal generating stations (Swiss 1984). Thermal generating stations account for over 75% of the total heat discharged into the marine environment. For example, the six thermal stations in Nova Scotia have been observed to raise the temperature of their effluent between 6.1 and 14.4°C over natural levels (Swiss 1984).

Other disturbances of aquatic temperature regimes may be related to the physical alteration of a water body. For instance, such processes as river diversions, water withdrawals from coastal areas, retaining walls in estuaries, large jetties, breakwaters, and causeways in coastal areas may significantly alter water temperatures. The construction of a tidal barrage in the upper regions of the Bay of Fundy, for example, increased the local tidal range and resulted in an overall lowering of the area's surface sea temperatures (Greenberg 1984).

Biological Effects

Summary

Temperature affects many chemical and biological processes. Chemical equilibrium constants, solubilities, and the rates of chemical reactions are temperature-dependent (Whitehouse 1984). Most marine and estuarine organisms are poikilotherms (i.e., cannot regulate their internal temperatures). As a result, biological processes, such as photosynthetic and respiration rates, spawning, uptake of toxic substances, and behavioural patterns of organisms, are all responsive to changes in temperature (Strickland 1965; Houston 1982; Aiken and Waddy 1990).

Kinne (1963) conducted a comprehensive review of the effects of water temperature on marine and brackish water animals. The results of this review indicated that biological processes may be greatly affected by water temperature fluctuations, gradients, ranges, and averages, as well as by the frequency and intensity of changes, duration of patterns, and accumulated heat units. Most marine and estuarine species, or populations within species, have characteristic tolerable temperature ranges that include specific high and low lethal temperatures. Eurythermal species, i.e., species that can tolerate wide ranges of temperatures, are characteristic of aquatic environments with fluctuating temperatures. Stenothermal species, i.e., species that can only exist in a narrow range of temperatures, are characteristic of environments with near-constant temperatures. Gradual water temperature changes are usually better tolerated by all species than sudden changes (Kinne 1963).

Many marine and estuarine organisms can adjust to alterations in ambient water temperatures through an array of biological responses. This process, termed acclimation, can include behavioural, morphological, physiological, or biochemical responses. The length, frequency, and severity of exposure, as well as thermal history, are all-important determinants of an individual organism's response to temperature changes (Fry 1971; Hochachka and Somero 1971; Thompson and Newell 1985).

Potential effects of extremely low water temperatures on aquatic organisms include insufficient integration of nervous and metabolic processes, insufficient rates of energy liberation, changes in water and mineral balance, increase in osmoconcentration resulting from extracelluar freezing followed by the dehydration of cells, liquefaction of cortical protoplasm, and gelation of the cell interior (Kinne 1963). Many species of marine fish have body fluids with lower osmotic pressure than seawater, causing such species to freeze at temperatures above the freezing point of seawater. Most species of marine fish avoid freezing by either avoiding ice-laden seawater and/or by increasing the osmotic concentration of their blood (DeVries 1971).

The effects of extremely high temperatures include insufficient supply of oxygen, failures in process integration, desiccation (intertidal organisms), enzyme inactivation, change in lipid state, increase in protoplasmic viscosity, increase in cell membrane permeability, protein denaturation, and release of toxic substances from damaged cells. Death can result from exposure to either extremely high or extremely low water temperatures (Kinne 1963).

Water temperature changes that are not lethal can produce a wide variety of significant sublethal effects. For example, temperature changes can significantly affect photosynthesis; respiration; susceptibility to disease; osmoregulation; uptake of pollutants; susceptibility to the toxic effects of pollutants; various behavioural patterns, including physical activity, reproduction, feeding, growth, migration, distribution, intra- and inter-specific competition, predator–prey relationships, community composition, and parasite–host relationships; and many other biological processes (Kinne 1963). Selected examples of some water temperature effects in marine and estuarine ecosystems follow. Wherever possible, examples dealing with Canadian marine or estuarine systems were selected.

Specific Effects

Lüning and Freshwater (1988) studied the water temperature tolerance (-1.5–30°C) of marine algae (49 species) and seagrass (two species) near Vancouver Island. All species studied showed high levels of cold tolerance, with all surviving at 0°C and only six species dying at -1.5°C. Heat tolerance was much more variable; most subtidal species showed survival limits lower than 20°C; intertidal species survived at higher ranges of 20–28°C. Only one species, the seagrass *Zostera marina*, survived at 30°C. The authors characterized the northeast Pacific seaweeds as "cold-stenothermal", indicating a narrow range of temperature tolerance at the low end of the range of global marine temperatures.

Different organisms will exhibit different productivity levels at a given water temperature range. In Newfoundland coastal waters, Pomeroy and Deibel (1986) measured low levels of bacterial growth and respiration during the spring phytoplankton bloom, when surface temperatures were -1–2°C. It was suggested that in very cold environments, low bacterial activity (i.e., decomposition) during a period of high primary production could result in greater food availability for herbivores, thereby enhancing secondary production. Temperature-related control of bacterial activity may therefore be important in influencing production at higher trophic levels (Pomeroy and Deibel 1986; Pomeroy et al. 1991).

Water temperature plays a limiting role on the feeding and recruitment success of fish and crustacean larvae. The eggs of the walleye pollock *(Theragra chalcogramma)* in the Bering Sea generally hatch at temperatures ranging between 3 and 6°C, and the larvae feed on copepod nauplii. It was found that the larvae reared at 5.5°C were more successful at capturing copepod nauplii when the prey was at low concentrations, than the larval fish cohorts reared at 3°C. Conversely, larvae hatching at 5°C required 8% more calories than those hatching at 3°C (Paul 1983 and references therein). Paul and Nunes (1983) reported that northern pink shrimp larvae *(Pandalus borealis)* that hatched during a warm year (i.e., at 6°C) required 63% more calories to meet their metabolic requirements than larvae of the same weight that hatched in a cooler year (i.e., at 3°C). If this increased metabolic requirement were to exceed their ability to find and ingest food, the survival of that year's recruits could be compromised.

Increasing water temperature generally causes increases in the respiratory rates of aquatic animals and vascular and nonvascular plants (Kinne 1963; Dawson 1966). Beyond a given temperature, thermal stress is induced (Kinne 1963; Paul and Nunes 1983; Paul 1986; Paul et al. 1988). As respiratory rates increase, so do the organism's metabolic energy needs (feeding or photosynthesis). This relationship has important implications for the overall productivity and survival of marine and estuarine organisms that thrive in habitats with varying temperature regimes. Commercially important pacific fish species were investigated for their metabolic oxygen requirement. In the linear portion of the oxygen consumption-temperature relationship, the nonfeeding metabolic requirement increased by 11%, 7–12%, 9%, and 18% per °C for Pacific cod, Atlantic cod, saffron cod, and juvenile walleye pollock, respectively (Paul 1986; Paul et al. 1988, 1990, and references therein).

Water temperature may also affect the reproductive capacity of marine organisms. Tanasichuk and Ware (1987) found that for Pacific herring the mean sea temperature in overwintering habitats during the three months before spawning (December to March) best accounted for variations in size-specific fecundity. The range in mean monthly sea surface temperature during the three months before spawning for the five years studied was 5.6–8.1°C. This range is relatively narrow, considering that the data purposely included one year that was very strongly influenced by an El Niño episode, and that herring came from seven sites extending close to 700 km along a north–south axis (Tanasichuk and Ware 1987).

All the relationships previously described demonstrate that relatively small changes in the extent and timing of temperature phenomena in high-latitude coastal waters can significantly alter biological processes.

Temperature and Toxic Substances

In general, the sensitivity of aquatic organisms to toxic substances increases with increasing water temperature (Cairns et al. 1975). The interactions between temperature and toxicity, however, are very complex because temperature generally affects the chemistry and availability of toxic substances, the survival and function of organisms, and the responses of organisms to toxicants. In water, ammonia exists in two forms, a non-ionic species (NH_3) and an ionic species (NH_4^+). The toxicity of ammonia to aquatic organisms is largely determined by the concentration of the non-ionic species, which is partly temperature dependent. A decrease in temperature will lead to an increase in the proportion of NH_3 in water (Whitfield 1974; Miller et al. 1990).

Some criteria or guideline documents state different maximum or average toxicant concentrations allowed or recommended for different temperatures. The British Columbia ambient water quality criteria for ammonia for the protection of marine life (Nordin 1992, adopted from USEPA 1989) give maximum and average concentrations of total ammonia nitrogen that vary with water temperature.

According to Voyer and Modica (1990), insufficient data exist to permit the development of relationships between either water temperature or salinity and the toxicity of heavy metals in marine water. However, the authors also stated that evidence is available that indicates that survival, bioconcentration, and sublethal effects of pollutants on estuarine organisms are often related to ambient salinity and temperature conditions. Generally, as water temperature increases, the rate of metabolic processes increases, resulting in enhanced uptake and toxicity of metals to marine and estuarine organisms (Phillips 1976; Waldichuk 1985; McLusky et al. 1986; Voyer and Modica 1990).

Interim Guideline

Human activities should not cause changes in ambient temperature of marine and estuarine waters to exceed ±1°C at any time, location, or depth. The natural temperature cycle characteristic of the site should not be altered in amplitude or frequency by human activities. The maximum rate of any human-induced temperature change should not exceed 0.5°C per hour (CCME 1996).

Rationale

Many biological processes that occur in marine and estuarine waters are sensitive to temperature changes. The interim guideline of ±1°C for induced temperature change is recommended to ensure that adverse effects on these processes are minimized. The variability of coastal and estuarine waters is such that this temperature alteration is probably a minor proportion of the total variability to which organisms are exposed in these environments. Furthermore, the recommended rate of temperature change of 0.5°C per hour, which is adopted from the Alaskan guideline for temperature (BNA 1986; State of Alaska 1989), should reduce the impact of sudden induced temperature changes on the Canadian marine environment.

Site-specific diurnal, seasonal, and annual water temperature regimes are intended to be maintained through the recommendations of the interim temperature guideline. In recognition of this intention, a clause, adapted from the USEPA (1986) and Alaskan (BNA 1986; State of Alaska 1989) guidelines, which calls for the preservation of the amplitude and frequency of ambient temperature cycles, has been included as part of the Canadian interim temperature guideline.

It is recognized that, in implementing the recommended interim guideline for temperature, allowance may be made for the existence of mixing zones. Definitions of mixing zones are generally site-specific and consider the requirements of the jurisdiction or jurisdictions responsible for a particular activity.

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For further scientific information, contact:

Environment Canada
Guidelines and Standards Division
351 St. Joseph Blvd.
Hull, QC K1A 0H3
Phone: (819) 953-1550
Facsimile: (819) 953-0461
E-mail: ceqg-rcqe@ec.gc.ca
Internet: http://www.ec.gc.ca

For additional copies, contact:

CCME Documents
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200 Vaughan St.
Winnipeg, MB R3C 1T5
Phone: (204) 945-4664
Facsimile: (204) 945-7172
E-mail: spccme@chc.gov.mb.ca

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Northern Pulp Effluent Leak NSE test results - samples taken June 11, 2014

The following test data was taken on June 11, 2014, after an effluent leak at Northern Pulp. The wetlands were the most affected by the leak, and the evidence shows that materials likely did not reach Melmerby Beach and other points downstream from where the leak occurred **Definitions:** pg is picogram (one trillionth of a gram); ug is microgram (one millionth of a gram), and mg is milligram. ND = not detected. Dioxins and Furans (below the blue line) were compared to federal pulp and paper effluent regulations (PPER). Exceedances to the operating approval (blue) will be dealt with in accordance with the department's compliance model. It should be noted that despite BOD and TSS exceeding approval limits, results of toxicity testing determined the exceedances were non toxic. Dioxins and Furans were compared to PPER exceedences (red) and fall under the jurisdiction of Environment Canada.

Parameter	SW2 - Wetland at Indian Cross Point	SW3 - East River at point of release	SW1 - Melmerby Beach	Approval Requirement	SW2- Wetland at Indian Cross Point	SW3 - East River at point of release
Biochemical Oxygen Demand (BOD)	88 mg/L	3.1 mg/L	ND	3960 kg/day	[redacted]	279 kg/day*
Total Suspended Solids (TSS)	82 mg/L	65 mg/L	4.4 mg/L	4100 kg/day	[redacted]	[redacted]
pH	7	7.7	7.68	6 to 9		
Acute Toxicity	PASS	Lab error**	Lab error**	PASS		
Dioxins & Furans				PPER***		
2,3,7,8 - TCDD	ND	ND	ND			
1,2,3,7,8 - P_5CDD	ND	ND	ND			
1,2,3,4,7,8-H_6CDD	ND	ND	ND			
1,2,3,6,7,8-H_6CDD	ND	ND	ND			
1,2,3,7,8,9-H_6CDD	ND	ND	ND			
1,2,3,4,6,7,8-H_7CDD	**17.5 pg/L**	**1.69 pg/L**	ND			
OCDD	**304 pg/L**	**21.0 pg/L**	**3.93 pg/L**			
TCDD	ND	ND	ND			
P_5CDD	ND	ND	ND			
H_6CDD	**6.37 pg/L**	ND	ND			
H_7CDD	**43.8 pg/L**	**3.32 pg/L**	ND			

2,3,7,8-TCDF	ND	ND	ND			
Parameter	SW2 - Wetland at Indian Cross Point	SW3 - East River at point of release	SW1 - Melmerby Beach	Approval Requirement	SW2- Wetland at Indian Cross Point	SW3 - East River at point of release
Dioxins & Furans				PPER		
1,2,3,7,8-P_5CDF	ND	ND	ND			
1,2,3,4,7,8-H_6CDF	ND	ND	ND			
1,2,3,6,7,8-H_6CDF	ND	ND	ND			
2,3,4,6,7,8-H_6CDF	ND	ND	ND			
1,2,3,7,8,9-H_6CDF	ND	ND	ND			
1,2,3,4,6,7,8-H_7CDF	ND	ND	ND			
1,2,3,4,7,8,9-H_7CDF	ND	ND	ND			
TCDF	ND	ND	ND			
P_5CDF	ND	ND	ND			
H_6CDF	ND	ND	ND			
H_7CDF	**3.58 pg/L**	ND	ND			
*Calculated based on 90,000 cubic metres per day flow						
**Lab used fresh water rather than marine species for testing. Samples had passed the acceptable hold period by time the lab discovered the error, however based on the fact samples at SW2 have higher concentrations of effluent than those at SW1 or SW3, it can be concluded that the effluent would have a reduced impact once diluted.						

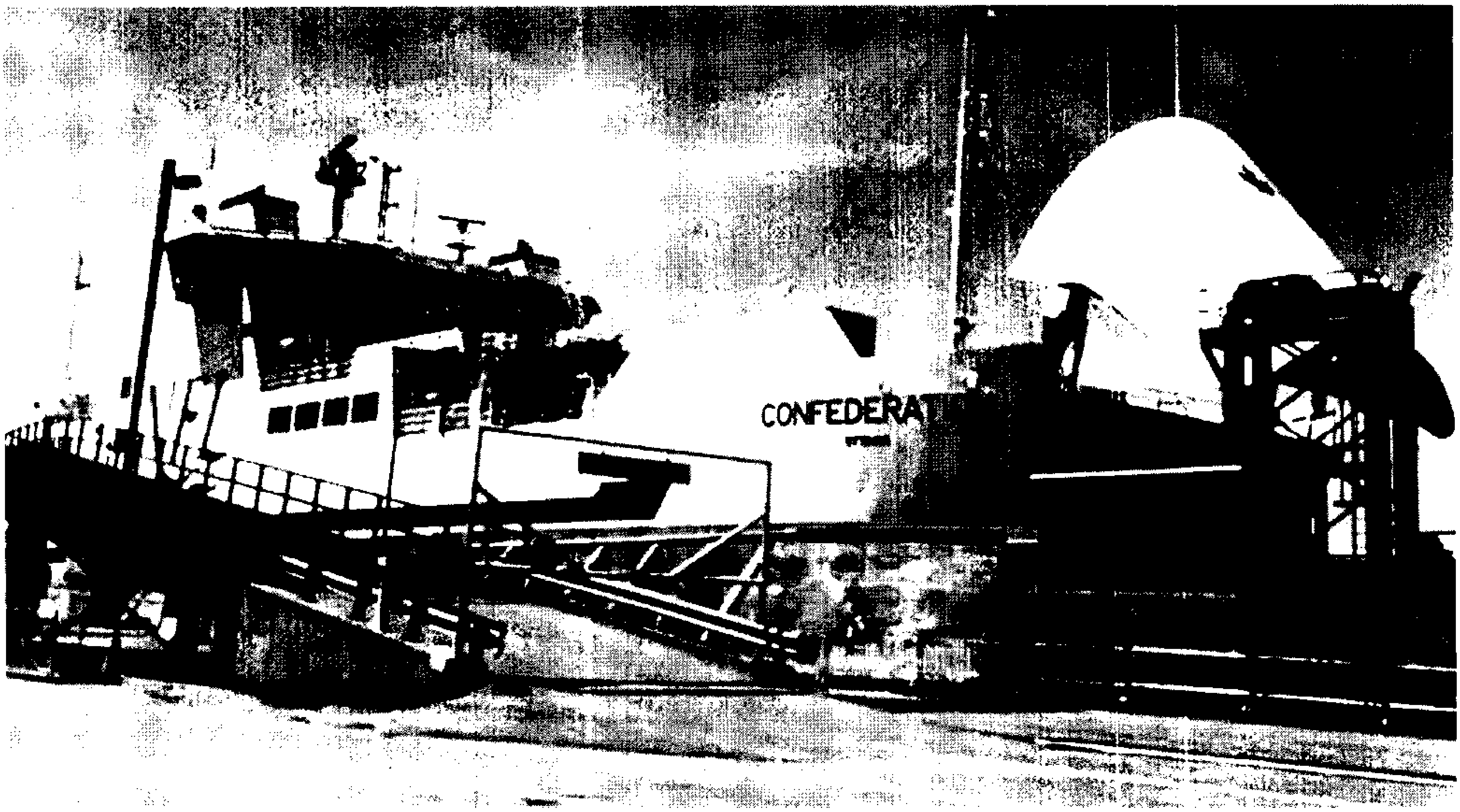
***PPER - Federal Pulp and Paper Effluent Regulations require dioxins and furans to be non-detectable. This is enforced by Environment Canada.

CBC

New ferries, new operators, part of proposed revamp of Maritime ferries

Proposal would see operator-owned ferries on the water

[illegible] · CBC News · Posted: May 05, 2017 7:[illegible] AM AT | Last Updated: May 5, 2017



The Confederation was left alone to serve the Northumberland Strait, offering limited sailings for most of last season. (Julia Cook/CBC)

A federal government proposal could see new operators for three ferry services in the Maritimes, new ferries, and big changes to the way the services operate.

The government made the announcement at the community centre in Belfast, in eastern P.E.I., Friday morning.

The affected services connect

- Wood Islands, P.E.I., and Caribou, N.S.
- Souris, P.E.I., and Îles de la Madeleine, Que.
- Digby, N.S., and Saint John, N.B.

"I am very pleased that the Government of Canada is seeking to move towards long-term contracts to provide stability and certainty in the communities of eastern Prince Edward Island, which in turn will stimulate our economy," said Cardigan MP Lawrence MacAulay in a news release.

MacAulay said the proposal opens up the contract process in a way it has never been before.

Northumberland Ferries, the current operators of the P.E.I. — Nova Scotia service, welcomed the announcement of a strong, long-term commitment in a news release sent out after the announcement.

"We are pleased, for our customers, our employees, and the communities we serve, that the Government of Canada is making a strong and long-term commitment to the Wood Islands/Caribou and Saint John/Digby ferry services," said Chairman and CEO Mark MacDonald in a statement.

New operating structure proposed

Before that announcement, in the early morning hours of Friday, the government posted a request for information from industry that outlined its plans.

Ottawa is looking to move away from the current model where it owns the ferries and leases them to the companies that operate the services. The proposal is for the operating companies to own the ferries and sign a long-term contract — perhaps as long as 20 years — to provide the service.

The proposal is currently at a request for information stage, with the government seeking feedback from companies.

As it stands, the government plan would see at least of three of the four ferries on the three routes replaced within the next three years. Ottawa is offering up the *MV Fundy Rose*, which service the Saint John – Digby route. Purchased in 2015 for $44.6 million, the *Fundy Rose* was built in 2000.

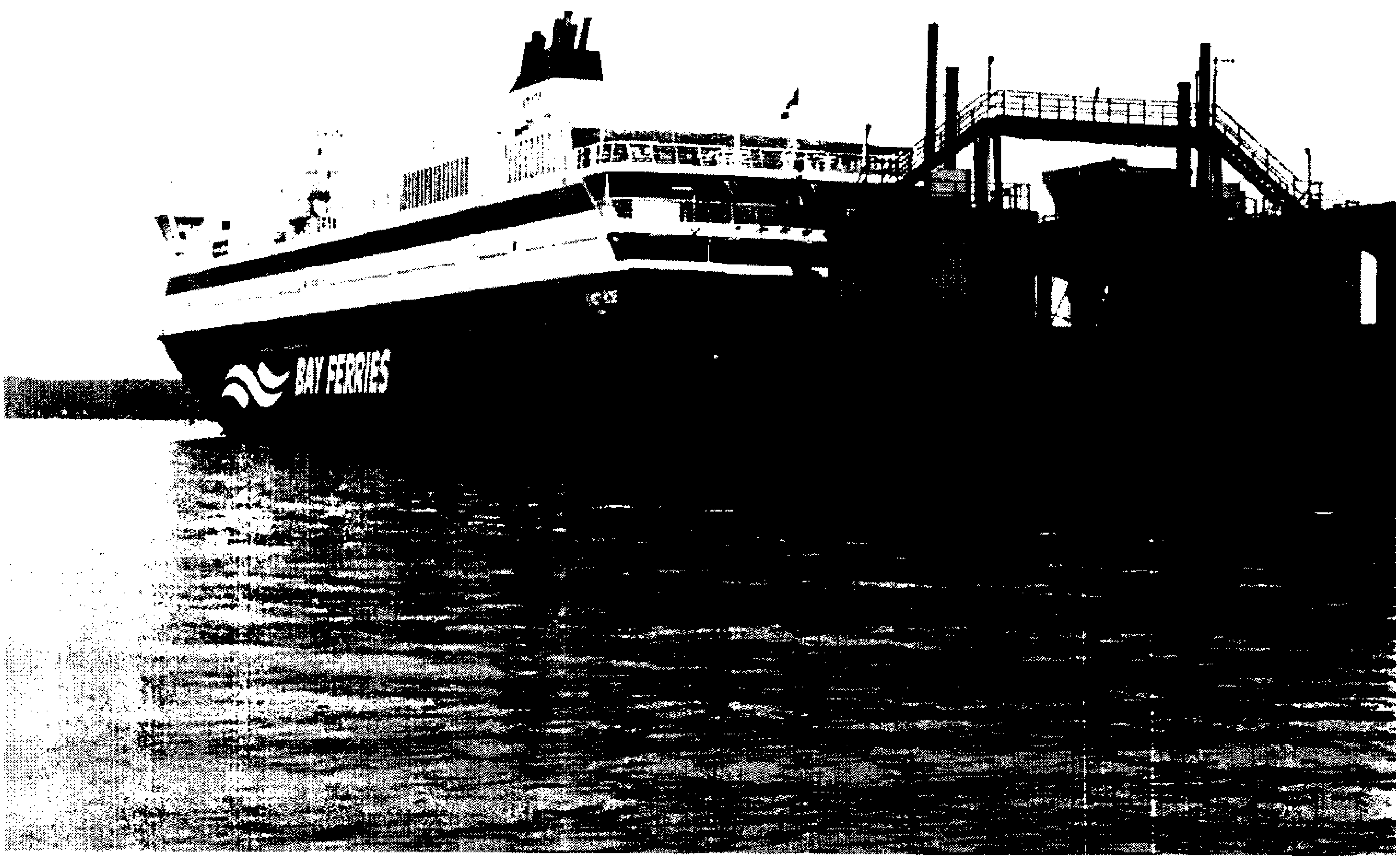
- **Fundy Rose ferry between Saint John and Digby unveiled**

The government says it is interested in leasing out the other ferries for a transition period of up to three years. Those ferries are:

- *MV Confederation*: Built in 1992, serving the P.E.I.- N.S. route.
- *MV Holiday Island*: Built in 1971, serving the P.E.I.- N.S. route.
- *MV Madeleine*: Built in 1981, serving the Souris Îles de la Madeleine route.

Vessels new to the routes would be no more than 10 years old.

The most recent federal budget included $278 million over five years for the service, about $18 million more than the previous funding agreement. In August Prime Minister Justin Trudeau said his government was committed to supplying the ferry service.



[illegible] up the MV Fundy Rose as an option for the Digby - Saint John route with the new contract. (Roger Cosman/CBC News

The government will hold an industry day for discussions on the proposals in Gatineau, Que., on June 2, and is scheduling one-on-one meetings with companies between July 10 and 21. It is accepting comments on the proposals until July 31.

Last summer the aging ferries connecting the Island and Nova Scotia struggled to stay on the water. The *Holiday Island* was in dry dock most of the season, leaving the *Confederation* alone to serve the route through the busy July-August season.

- **MORE P.E.I. NEWS | 'Our child shouldn't have laid there': Mother waits hours on roadside with dead son**
- **MORE P.E.I. NEWS | Online voting not ready for federal, provincial election: officials**

With files from Island Morning

Northern Pulp Nova Scotia mill, in Abercrombie, Pictou County
Source Emission Test Results for Winter 2015

The table below provides an overview of the results of the stack testing (source of the emissions) conducted on the Northern Pulp mill. The testing was conducted by Stantec Consulting Ltd., during the week of March 9, 2015.

Stack tests were taken at two locations: recovery boiler and power boiler

At the time of testing, stack emissions on the recovery boiler were 833 mg/Rm3, which is well above the stack emission limit of 375 mg/Rm3 as outlined in the company's industrial approval with the province. Emission levels for particulate on the power boiler were 155 mg/Rm3, which is above the approval limit of 150 mg/Rm3.

Legend:

does not meet limit
meets limit
unknown

	Stack Emission Limits		Source Emission Testing Results	
POINT SOURCE	**AIR CONTAMINANT**		**AIR CONTAMINANT**	
	PARTICULATE	**TOTAL REDUCED SULPHUR (TRS)**	**PARTICULATE**	**TOTAL REDUCED SULPHUR (TRS)**
Recovery Boiler	375 mg/Rm^3	15 ppm dv (any 4 hour rolling average)	833 mg/Rm^3	Not Tested (not required in Source Testing Section of the Approval)
Power Boiler	150 mg/Rm^3	n/a	155 mg/Rm3	Not Tested (not required in Source Testing Section of the Approval)
REFERENCE SAMPLING METHOD	Environment Canada's EPS 1/RM/8	US EPA Method 16/16A/16B	Environment Canada's EPS 1/RM/8	US EPA Method 16/16A/16B

mg -	milligrams
Rm^3 -	reference cubic meter (ie. The volume of gas at 25 degrees celsius (ºC) and 101.3 kilopascals (kpa) corrected to 11% Oxygen)
ppm dv -	parts per million dry volume
kg -	kilograms
adubmt -	reference production rate in air dried unbleached metric tonnes

Northern Pulp Nova Scotia mill, in Abercrombie, Pictou County
Source Emission Test Results for Summer 2015

The table below provides an overview of the results of the stack testing (source of the emissions) conducted on the Northern Pulp mill. The testing was conducted by Stantec Consulting Ltd., during the period of September 15-18, 2015.

Stack tests were taken at two locations: recovery boiler and the power boiler.

At the time of testing, emissions of particulate matter from the recovery boiler was 3.9 mg/Rm3, which is well below the stack emission limit of 77 mg/Rm3 as outlined in the company's 2015 industrial approval. Results for the power boiler were 190 mg/Rm3 which is above the emission limit of 150mg/Rm3.

Legend:
does not meet limit
meets limit
unknown

	Stack Emission Limits		**Source Emission Testing Results**	
POINT SOURCE	**AIR CONTAMINANT**		**AIR CONTAMINANT**	
	PARTICULATE	**TOTAL REDUCED SULPHUR (TRS)**	**PARTICULATE**	**TOTAL REDUCED SULPHUR (TRS)**
Recovery Boiler	77 mg/Rm^3	15 ppm dv (any 4 hour rolling average)	3.9 mg/Rm^3	
Lime Kiln	0.50 kg/adubmt	20 ppm dv (any 4 hour rolling average)	Not Tested (not required in this round of Source Testing under the Approval)	Not Tested (not required in this round of Source Testing under the Approval)

Smelt Dissolving Tank	0.50 kg/adubmt	n/a	Not Tested (not required in this round of Source Testing under the Approval)	Not Tested (not required in this round of Source Testing under the Approval)
Power Boiler	150 mg/Rm^3	n/a		
High Level Roof Vent	n/a	n/a		Not Tested (not required in this round of Source Testing under the Approval)
REFERENCE SAMPLING METHOD	Environment Canada's EPS 1/RM/8	US EPA Method 16/16A/16B	Environment Canada's EPS 1/RM/8	US EPA Method 16/16A/16B

mg -	milligrams
Rm^3 -	reference cubic meter (ie. The volume of gas at 25 degrees celsius (°C) and 101.3 kilopascals (kpa) corrected to 11% Oxygen)
ppm dv -	parts per million dry volume
kg -	kilograms
adubmt -	reference production rate in air dried unbleached metric tonnes

Marine Heritage Database

Results 1 to 18 of 18 from your search: carib

Vessel Name	Date of Wreck	Event	Location of Wreck
Belle - 1875	1875-07-01	Foundered	Pictou Island, between Caribou Island and
Bounty - 1887	1887-12-20	Stranded	Cariboo Island
Cape Breton - 1887	1887-11-07	Foundered	Caribou Island
Ellen - 1875	1875-11-20	Stranded	Caribou Harbour, entrance
Emelle - 1885	1885-04-11	Wrecked	Caribou Island
Emma - 1870	1870-06-09	Stranded	Cariboo Point
Harriet - 1868	1868-10-17	Stranded	Cariboo Island
Hilda - 1886	1886-05-09	Stranded	Little Caribou Entrance
Maggie - 1883	1883-11-17	Stranded	Caribou, off
Mary Hart - 1875	1875-10-24	Stranded	Caribou Island Shoal, Pictou Harbour
Ocean - 1875	1875-09-01	Stranded	Caribou Island
Nancy - 1879	1879-10-19	Stranded	Caribou Island
Nightengale - 1868	1868-11-21	Stranded	Cariboo Island
Shannon - 1868	1868-10-17	Stranded	Cariboo Island
Speed - 1878	1878-12-22	Stranded	Cariboo Cove, Gut of Canso
Trimmer - 1939	1939-05-24	Wrecked	Caribou River
Union - 1910	1910-07-20	Stranded	Caribou Head
Zaidee - ~~1896~~	~~1896-11-01~~	~~Stranded~~	~~Toney River, near Caribou~~

Page 1 of 1: **1**

enter a search

select a search field
Vessel Name ▼ Search