The Effects Monitor

Environmental Effects Monitoring Newsletter for the Atlantic Region

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EEM Studies at Atlantic Region Pulp Mills

The first cycle of the environmental effects monitoring program for the pulp and paper industry is in full swing. Under the Pulp and Paper Effluent Regulations, all pulp mills in Canada must submit their EEM report on or before April 1, 1996. With only one year left, the mills and their consultants are working diligently to prepare their proposals and to get ready for the upcoming sampling season; their last opportunity to collect the required environmental information before the deadline. In the first three months of 1995, Environment Canada has received pre-design reports and EEM study proposals from the following mills:

- Avenor Maritimes Inc., Dalhousie, N.B.
- Irving Pulp and Paper Ltd. and Irving Tissue Company, Saint John, N.B. for a joint study
- Irving Paper Incorporated., Saint John, N.B.
- ABTCO, Canexel Hardboard Division, East River, N.S.
- Stora Forest Industries Ltd., Port Hawkesbury, N.S.

These reports have been distributed to the respective provincial Technical Advisory Panels and are in various stages of review. Since these mills may want to begin field work by early summer, the approval process has been accelerated to accommodate their needs. The three mills in Newfoundland have yet to file their EEM study plans with Environment Canada. These reports are expected to be received in early April.

A report titled - ***Marine Sentinel Fish Species for the Atlantic Region*** was recently published by the Environmental Protection Branch. This guide is designed to assist pulp mills which discharge their waste waters to the marine environment with the selection of appropriate fish species to use for the ***adult fish survey*** component of the EEM study.

On the national level, guidance documents for the analyses and interpretation of the adult fish survey results and the invertebrate community survey results have been completed, translated to French and are at the printers. These documents will be distributed to all regional pulp and paper mills and their consultants to assist them with the preparation of their final EEM report. A third draft of a guidance document for the analyses and interpretation of the sub-lethal toxicity tests is in preparation. This document is expected to be completed in the fall of 1995.

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Environmental Effects Monitoring and the Fixed Link

The "Fixed Link" is a 13 kilometre three-lane bridge spanning the Northumberland Strait between Cape Jourimain, N.B. and Borden, P.E.I. It has been under construction by Strait Crossing Inc. for over one year and is scheduled for completion by October, 1997.

Throughout the planning stage for this project and the associated environmental assessment, complex environmental and socio-economic issues were addressed. More than ninety individual studies were carried out on behalf of the proponent to determine both the effect of the proposed bridge on the environment and the potential impact of the environ-

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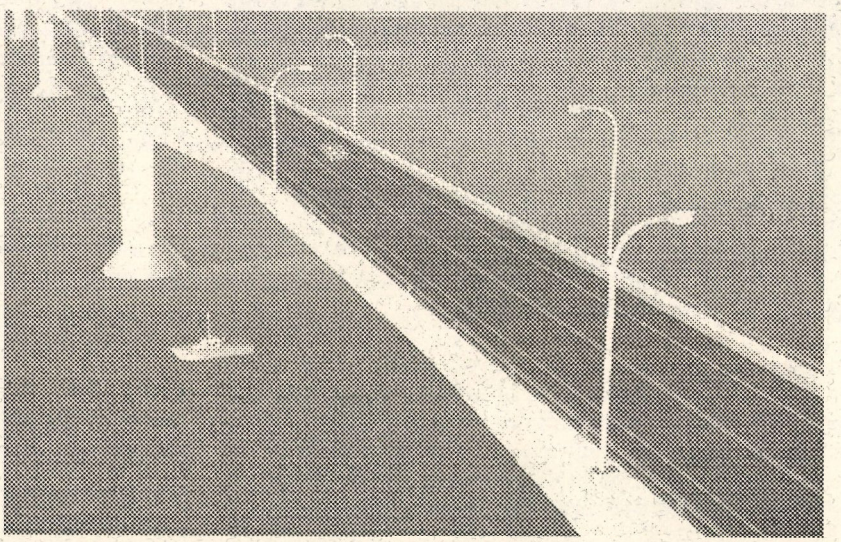
ment on the bridge. One of the conditions of approval for this project was that there would be a comprehensive environmental management plan in place throughout the construction and initial operating phases of the project.

Another condition of approval was that, prior to commencement of construction, environmental effects monitoring programs would have to be in place for the land and marine environments which could be impacted by the project. An important feature of the environmental management plan was the creation of independent scientific advisory committees to ensure that studies carried out to assess potential environmental impacts did so in a credible manner.

Following the completion of the formal environmental impact assessment in April, 1993, the Environmental Management Plan became the primary management tool to ensure that construction and operation of the bridge occurred with a minimum of environmental and social disruption. On-site environmental monitoring is conducted by the developers using their own environmental advisors and staff. An on-site environmental coordinator works with these staff to ensure compliance with the Environmental Management Plan in terms of environmental and compliance monitoring, environmental protection and emergency preparedness. They are also responsible to ensure that all necessary permits are obtained from regulatory agencies and that training in acceptable environmental practices is given to all on-site operators. More than 110 permits have been obtained from government authorities for the completion of various project activities to date.



Of particular interest to Environment Canada has been the issuance of an Ocean Dumping Permit under part VI of the Canadian Environmental Protection Act for the marine disposal of material dredged from the seafloor during site preparation for the bridge support piers and shoreline facilities. A detailed sediment monitoring program and a schedule for operations to avoid conflict with fishing and other marine activities were prepared and are being effectively managed. The ocean disposal program is in its second year of operation and no notable problems have arisen.

The Company has instituted some creative mitigation programs. For example, a number of artificial nesting platforms for ospreys were constructed in the Cape Jourimain National Wildlife Area and several were occupied in 1994. Under the direction of the Canadian Wildlife Service, Ducks Unlimited and the province of Prince Edward Island, Strait Crossing Inc. constructed a waterfowl wetland at the P.E.I. end of the crossing to compensate for some wetland that would be disrupted by construction of the proposed toll booth. Native trees have been planted between the P.E.I. staging area and adjacent Amherst Cove to create a buffer zone.

A third level of environmental monitoring and oversight of the project is provided by Public Works and Government Services Canada (PW&GSC), the initiating federal department for the environmental assessment. An Environmental Committee was formed and has been in operation for the past five years. The committee is chaired by PW&GSC and is made up of representatives from several other federal government departments and the environmental departments of the provinces of New Brunswick and Prince Edward Island. Each phase of the project is reviewed by this committee. The company's Environmental Manager submits regular compliance reports and weekly environmental summaries of monitoring, spills and other environmental incidents as well as reports on environmental training and orientation which have been provided to contractors and other on-site staff and operators.

As a result of the environmental assessment, the continued monitoring and the educational activities by the proponent, their consultants, government and academia, a considerable amount of data has been acquired with respect to the bio-physical environment of the Northumberland Strait and adjacent land in the vicinity of the bridge. Much of this data is in digital, geographical referenced format and provides a comprehensive environmental database for the area. As a result, private compa-

nies, governments and universities are given an opportunity to work together to maximize the usefulness of this information. For this reason, interest has been shown by a number of companies and government departments in using the Northumberland Strait area as a test area for a suite of coastal and marine environment technology and data management system applications.

In conclusion, the Northumberland Strait Crossing Project is a world class engineering project that has required and received state-of-the-art environmental management and protection. There is in place a management protocol which not only enables the environmental impact of this development to be monitored, measured and assessed, but also provides a means of implementing timely and effective mitigation while the project is still under way. Thus, potential detrimental effects of this development are minimized.

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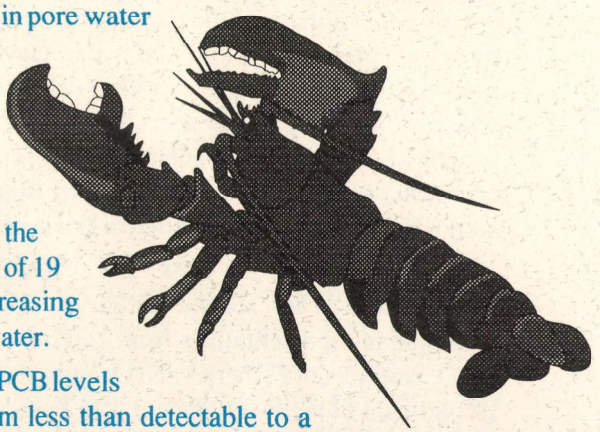
Environmental Assessment of a Dredged Material Disposal Site

A three year environmental assessment of sediments at the dredged material dump site outside of Saint John Harbour, New Brunswick was conducted from 1992 to 1994. The toxicity of the dump site sediments was evaluated using a battery of four bioassay tests: the luminescence of marine bacteria (Microtox™) on both the pore water and solid-phase; indigenous bacteria exoenzyme activity; survival of two species of marine amphipod; and sea urchin fertilization success. In addition, sediment samples were analyzed for metals, polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), organic carbon, sulphide and grain size. Ammonia was measured in pore water samples. The uptake of sediment contaminants was assessed by chemical analyses performed on the digestive glands and muscular tissues of lobster collected from the dump site. The results of the study were used to evaluate the selected bioassays for assessing the potential for long-term biological effects from the disposal of dredged materials at ocean dump sites.



Two bacterial tests, Microtox™ solid-phase and exoenzyme test, were the most sensitive to the dump site sediments with toxic effects observed in 14 of 19 samples and 18 of 19 samples respectively. The other assays in order of decreasing sensitivity were sea urchin fertilization, amphipod and Microtox™ pore water.

Heavy metal concentrations were low in all dump site sediment samples. PCB levels were generally below detectable levels. PAH concentrations ranged from less than detectable to a maximum of 13.85 mg/kg. No significant correlation was found between concentrations of PAH or PCB and the measured endpoints of the three most sensitive bioassays. However, significant correlations were detected between those same endpoints and concentrations of ammonia in sediment pore water and sediment sulphides.

PAH concentrations in the digestive gland and muscular tissue samples of lobster collected from the disposal site were low in comparison to tissue concentrations from lobster taken from other harbours in industrialized areas of Atlantic Canada.

Based on the toxicity tests and the bioaccumulation survey, it was concluded that the toxicity of the dump site sediment was most likely due to the presence of ammonia and/or sulphides in the sediment samples. The concentrations of PAH in some of the dump site sediments were higher than the ocean disposal regulated limit of 2.5 mg/kg; however, no significant correlations were observed between the sediment PAH and the toxicity endpoints. Further, no significant uptake of PAH was observed in the digestive glands and muscular tissue samples of the lobsters caught at the disposal site.

The sensitivities of the bioassay tests and their environmental relevance are a critical considerations in regulatory decision-making relating to the ocean disposal of dredged materials. Based on the data from this and other studies, the following criteria are recommended in for use in the interpretation of sediment toxicity test results. **Microtox™ solid-phase assay:** sediments producing a 5 minute IC_{50} of less than 1000 ppm are considered toxic. **Amphipod test:** sediments are rated as toxic if mortality is at least 20 percent higher than and statistically different from reference sample mortality. **Sea urchin fertilization:** sediments are rated as toxic if fertilization is at least 25 percent lower than and statistically

different from control sample fertilization. **Indigenous bacteria exoenzyme test:** sediments are toxic if control site activity is reduced by 20 per cent or more of the normalized dilution value at a test sediment concentration of 25 per cent. Further investigation is recommended for the selection of a more sensitive endpoint for the Microtox™ pore water assay.

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East Tusket River Monitoring Committee

In 1985, Rio Algom Ltd. developed an open-pit tin mine at East Kemptville in Yarmouth County, N.S. Local concerns about possible negative impacts of the tin mine on the water quality of the East Tusket River led to two initiatives.

First, site specific water quality objectives were established for the East Tusket River. These objectives covered 15 chemical parameters that were identified or suspected of being constituents of the tin mine effluent. The objectives were based on background water quality in the East Tusket River and the concentrations of those chemicals which would not have adverse effects on fish and other aquatic life in the river. Regular sampling for the specified chemical parameters was conducted by the mining company and the results were reported to Environment Canada.

The formation of the East Tusket River Monitoring Committee was the second initiative. The committee consisted of representatives from Environment Canada, the Department of Fisheries and Oceans, the Nova Scotia Department of the Environment, the Tusket River Environmental Protection Association and Rio Algom Ltd. The committee normally meets twice annually to review the water quality monitoring data and to determine if the water quality objectives are being met. In addition, the committee makes recommendations about changes to the monitoring program, changes to the water quality objectives and the quality assurance/quality control aspects of the monitoring program. The committee submits an annual report to the Regional Director of Environmental Protection Branch of Environment Canada outlining the results of the monitoring program.

Having the water quality objectives and the stakeholder monitoring committee in place has proven to be an effective mechanism to ensure the protection of the water quality of the East Tusket River. It has ensured that reliable water quality data has been collected and that the water quality has not deteriorated to unacceptable levels as a result of the activities at the tin mine. The tin mine ceased operation in 1992 and reclamation activities at the site will continue for several years to come. The monitoring committee will remain in place throughout this period to ensure that the restoration measures undertaken at the abandoned mine site will result in satisfactory water quality in the East Tusket River.

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The Effects Monitor will be published quarterly by Environment Canada, Atlantic Region. Anyone interested in receiving a copy of the newsletter, submitting an article for the newsletter or making any comments or suggestions, should contact:

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