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[Home](#) > [Pollution and Waste](#) > [Managing Pollution](#) > [Environmental Effects Monitoring](#) > [Pulp and Paper](#)
> [Publications](#) > [Smart Regulation](#) > Response

Smart Regulation Initiative for Environmental Effects Monitoring

Environment Canada Response to Working Group's Report

- [Introduction](#)
- [Achieving Tangible Improvements to the Regulation](#)
- [Working Group's Recommendations and Environment Canada Response](#)

Introduction

In December 2005, a group of policy experts from government, industry, non-government organizations and First Nations completed a report entitled *Improving the Effectiveness and Efficiency of Pulp and Paper Environmental Effects Monitoring*. The report includes eight recommendations to Environment Canada (EC) and the pulp and paper industry on how to improve the effectiveness and efficiency of the pulp and paper environmental effects monitoring (EEM) program.

This position paper outlines an EC response to each recommendation made by the above-mentioned working group. It has been developed by EEM practitioners in the department, including the National EEM team and EEM Science Committee. The National EEM team consists of about 40 members from the five regions and National Capital Region (NCR) who are responsible for the delivery of the National EEM program. The EEM Science Committee is a diverse group of about 20 scientists (e.g., toxicologists, and invertebrate and fish experts) who helped design the EEM program and provide continuous advice on new scientific issues.

Background Information about Environmental Effects Monitoring

Canada is a pioneer in the area of environmental effects monitoring and unique in requiring pulp and paper mills to conduct an EEM program under the 1992 *Pulp and Paper Effluent Regulations (PPER)*. The EEM program helps to assess the adequacy of the PPER in protecting fish, fish habitat, and the use of fisheries resources by measuring the potential effects of effluent on fish populations, benthic invertebrate communities, and fish tissue, respectively. EEM was built directly into the PPER to provide a science-based feedback loop to help assess whether national discharge limits are protective of the health of aquatic ecosystems receiving effluent from pulp and paper mills.

The EEM program is carried out in three-year cycles and consists of a biological monitoring study and sublethal toxicity testing (SLT) of effluent and supporting environmental measurements. Mills are required to conduct SLT on their effluent twice per year. The SLT evaluates the early life stage development of fish, invertebrate reproduction, and algal growth inhibition and reproduction. The biological monitoring study may consist of a fish survey, benthic invertebrate community survey, and a fish tissue survey that measures concentrations of dioxins and furans.

Data from EEM studies showed that most mills reported statistically significant effects in at least one of the core indicators for benthic invertebrate and fish population studies. Since it was recognized that statistically significant differences are not necessarily considered to be ecologically significant, a concept of Critical Effect Sizes (CES) was developed. Therefore, EC has adopted CES to identify differences that could be important and to ensure that more extensive monitoring efforts are undertaken at the mills with the largest effects. CES in fish population studies are expressed as a percentage (%) of the reference mean (gonad and liver are ?25% and condition factor is ?10%). CES for benthic invertebrate community endpoints are based on

whether the change in the endpoints falls out of the natural range of variability using a statistical basis of two standard deviations (?2 SD).

There were a number of key findings of the EEM program on a national basis in Cycles 2 and 3:

- On a national basis the responses measured for fish in both Cycles 2 and 3 in mills demonstrating effects were suggestive of nutrient enrichment and metabolic disruption: fish living in aquatic environments influenced by pulp and paper effluent are generally older, fatter, and have smaller gonad sizes;
- The response for benthic invertebrate communities in both Cycles 2 and 3 was generally indicative of eutrophication that ranged from mild to pronounced;
- Sublethal toxicity testing conducted under EEM showed clear improvements in effluent quality from Cycle 1 to Cycle 2, with, for the most part, no further changes in effluent quality in Cycle 3, which still indicate that effluent from some mills has the potential to elicit toxic responses (effects on water flea *Ceriodaphnia dubia* and alga *Selenastrum capricornutum*).

[Top of page](#)

Achieving Tangible Improvements to the Regulation

In 2004, EC recognized that the EEM program would be an excellent candidate for a project aimed at improving the effectiveness and efficiency of the EEM program and focussing monitoring efforts and resources where they are needed most. This opportunity was also recognized by the stakeholders and articulated using such fora as:

- fall information sessions across Canada to explain the amendments to the PPER and the EEM program;
- Forest Products Association of Canada (FPAC), which proposed the EEM program as a candidate for a second regulation renewal project (the first project explored innovative ways to manage air emissions from pulp and paper mills);
- External Advisory Committee on Smart Regulation, which made a strong recommendation to the federal government for a new regulatory strategy for Canada.

From the beginning of the EEM program, EC committed to reviewing the EEM program following each cycle to ensure that the program continues to provide valuable information. The most extensive review occurred in 1996–97 following Cycle 1, after which regulatory changes introduced decision trees and design changes to strengthen the program. Another recent change was to introduce tiered monitoring into the regulation, which reduces the frequency of biological testing from every three to every six years when mills show no effects in two consecutive EEM studies. After two complete cycles of high-quality data and the external recommendations to initiate a review project, the department felt this to be an appropriate time to review the program and identify opportunities for further improvement.

This project was launched in early 2005 with the goal to evaluate the effectiveness and efficiency of the requirements of the pulp and paper EEM Program, and to make recommendations for improvement. A Working Group consisting of stakeholders from industry, the Aboriginal and environmental communities and the federal government (Environment Canada, Department of Fisheries and Oceans, and the Privy Council Office) was created. This group of experts was asked to analyse common concerns and suggest innovative solutions to improve the effectiveness and efficiency of pulp and paper EEM with a goal of focussing monitoring efforts and resources where they are needed most. A report including the group's recommendations was published in December of 2005.

[Top of page](#)

Working Group's Recommendations and Environment Canada Response

Recommendation #1

Environment Canada should establish a collaborative, open, and transparent mechanism whereby industry, federal and provincial governments, and non-governmental stakeholders work together to achieve continuous improvement of water

quality where it is affected by pulp and paper mill activities. One task for this new mechanism will be to track implementation of the recommendations in this report.

EC response: The federal government has recently established Sector Sustainability Tables for a number of major industrial sectors which bring together representatives from federal and provincial governments, industry, environmental and NGOs, labour, academia, and the Aboriginal community to work collaboratively to improve long term environmental performance in the context of sustainability and competitiveness. The federal government will propose to the Forest Sector Sustainability Table (FSST) co-chairs that a Water Working Group (WWG) be established as a mechanism to address water quality and use issues in the forest sector. Tracking the implementation of the recommendations in the Smart Regulation Opportunity report would be one of WWG's tasks. The government will also recommend that the WWG includes stakeholders other than FSST members and that all interested provinces and stakeholders be invited into this group.

Recommendation #2

Addressing the effects will require the development of new technology and approaches that do not currently exist. Environment Canada should show leadership in bringing together industry, academia, and other research interests to develop these technologies and approaches.

EC response: EC is committed to playing a supporting and facilitating role with respect to technologies and approaches related to water quality issues and pulp and paper mills, including environmental effects monitoring, understanding the cause of effects and finding solutions to these effects. An example is EC's work with Paprican and university researchers to isolate the cause of small gonad effects in fish (see Recommendation #5). Once the cause of the effect is known, EC will help facilitate the development of approaches addressing the effect.

Recommendation #3

Environment Canada should take appropriate steps to enable maximum flexibility with respect to the design of investigation of cause (IOC) studies and encourage cooperation across mills to generate the critical mass necessary for more effective studies and to reduce duplication of effort. Where regulatory changes are necessary to affect this, these should be completed by 2007 in advance of the Cycle 5 EEM studies.

EC response: Considerable flexibility already exists with respect to investigation of cause (IOC) studies and an amendment to the regulations will not be required to address this recommendation. A good example of the existing flexibility is how a number of mills are meeting their cycle 4 requirements by supporting the collaborative efforts of EC, industry and university research scientists to identify the cause of the mills' observed effects: small gonads in fish. The current regulation allows mills that have the same effect to pool resources and conduct joint studies that will help to identify the cause of effects identified by EEM studies. EC will communicate with stakeholders to clarify the extent of flexibility related to IOC studies and will update the section on IOC in the EEM guidance document to further describe the existing flexibility, in particular to clarify that an IOC study will be geared towards finding the cause of the effect at mills where an effect has been detected. As mills identify new types of collaborative IOC opportunities, EC will continue to examine existing flexibility and provide on-going advice to the industry.

Recommendation #4

Environment Canada should modify the EEM program to incorporate a new component, investigation of solutions (IOS), to enable mills that understand the cause of their effects to formally accelerate actions towards solutions. This should be completed by 2007 in advance of the Cycle 5 EEM studies.

EC response: As a part of the department's commitment to move to solutions where effects have been identified, EC supports incorporating IOS into the EEM program, as a step following IOC. By moving towards identifying solutions, industry will be taking the next logical step towards eliminating the cause of their effect(s) and protecting the receiving environment. The

decision on follow-up action when solutions have been identified would then be based on a review of ecological, social, economic, and technical considerations. The department will investigate how to best achieve this goal. It is anticipated that this component will be implemented through an amendment to the regulation and/or development of additional technical guidance.

[Top of page](#)

Recommendation #5

Government and industry should work collaboratively and transparently to identify the cause of effluent effects on fish gonads and to find and implement solutions to address the cause:

- Government and industry should submit a public report in 2007 describing actions taken and money spent to identify the cause of decreased gonad size and explore solutions and to identify milestones for transparent tracking of this research.
- Industry should submit implementation schedules to address gonad effects by 2012.

EC response: Experts from industry, academia, and EC are working collaboratively to investigate the cause of smaller gonads in fish and potential solutions to reduce this impact. A research plan has been developed and the first round of field work supporting this initiative is expected to take place in the summer of 2006.

EC will collaborate with key partners in two phases. The first phase will focus on isolation of the cause of gonad effects in fish. The second will involve technical and economic analysis on mitigation options.

Phase 1: 2006-2010

Investigation of cause: EC has launched a collaborative initiative in 2006 with Paprican and other pulp and paper mills, and leading academic researchers to isolate the cause of small gonads in fish. A progress report and a workshop to communicate research results and next steps are planned for 2007.

Phase 2: 2010-2012

Investigation of solutions: while there is industrial and technical expertise on pulp and paper effluent management within the department, EC is looking for strong industry leadership and is committed to play a supportive and facilitative role.

Recommendation #6

Mills showing pronounced eutrophication (where the cause is already understood) must adopt best management practices as soon as possible -- by 2010 at the latest. Industry should develop a "best practices" guide, track effectiveness in reducing eutrophication, and report on progress in 2007 and 2010. Environment Canada should recommend criteria and guidance for identifying areas of pronounced eutrophication.

EC response: EC strongly supports the industry's commitment to address the problem of pronounced eutrophication. To help industry implement actions recommended to them, EC will develop criteria and guidance for identifying areas of pronounced eutrophication by 2007. This will be accomplished using existing benthic invertebrate and fish endpoints used in the EEM-based field monitoring studies.

[Top of page](#)

Recommendation #7

Environment Canada should initiate a regulatory amendment process to amend the EEM program in advance of Cycle 5 EEM (2007) studies to address the following issues:

- 7.1 decouple the benthic and fish surveys;**
- 7.2 remove the sublethal toxicity testing;**

**7.3 ensure that closed mills are not required to undertake continued monitoring;
7.4 include provisions for a QA/QC mechanism on field monitoring studies to ensure that data are adequate to assess the CES.**

Recommendation #7.1 Decouple the benthic and fish surveys.

EC response: The adult fish and the benthic surveys are complementary and both are essential to assess the effects of effluent on fish and fish habitat. Currently, mills must show no effects in both the benthic and the fish survey (and fish tissue, where applicable) for two consecutive cycles in order to reduce monitoring frequency. However, to ensure that monitoring resources are targeted most efficiently, EC agrees that program should allow mills that have no effects in one biological monitoring component (i.e. benthic invertebrate or fish surveys), but one or more effects (statistical differences) in the other, to reduce monitoring frequency in the component where they show no effects. For fish tissue, it would mean to discontinue monitoring unless triggered.

EC will amend the regulation to allow mills that have no effects in two consecutive surveys of one biological component (fish or benthic invertebrate surveys) to monitor that component every six years. Mills would continue to monitor the biological component showing effects every three years.

Recommendation #7.2 Remove the Sublethal Toxicity Testing.

EC response: EC believes it is premature to remove the Sublethal Toxicity Testing (SLT) component of the EEM program. SLT plays a role as a biological tool used for measuring more subtle changes in effluent quality. EC recognizes that the current test requirements can be modified to ensure they provide cost-effective, value added benefit to the EEM program.

EC will amend the regulation to streamline the sublethal toxicity testing requirements. This will mean removing tests that are no longer effective. Currently, mills are required to conduct three sublethal tests (on fish, invertebrates and algae) twice per year, for a total of 18 tests during a three year cycle. EC proposes that only two sublethal tests (on invertebrates and algae) be completed twice per year, for a total of 12 test results per cycle. Fish sublethal testing will be discontinued due to the lack of responsive test endpoints.

Furthermore, as per the response to Recommendation 8 below, EC is committed to develop a set of "robust triggers" which could be used to return mills which have ceased field monitoring, back into the field monitoring program. As part of this effort, EC will work to develop new tests that may be used as a possible trigger.

Recommendation #7.3 Ensure that closed mills are not required to undertake continued monitoring.

EC response: EC recognizes that there is a need to address closed mills more practically and that closed mills should not be required to undertake continued monitoring. EC will amend the regulation to indicate that closed mills are not required to undertake continued EEM monitoring, but EEM monitoring would resume within a specified time period after a mill reopens.

Recommendation #7.4 Include provisions for a QA/QC mechanism on field monitoring studies to ensure that data are adequate to assess the CES.

EC response: EC does recognise the need to establish better QA/QC data guidance for mills that have effects that are near or may exceed the CES. This guidance needs to be developed in conjunction with the review of CES.

EC reviews of individual EEM studies ensure a high level of QA/QC on field monitoring studies. EC is confident that mills are not able to move to minimal monitoring based on the results of poorly conducted studies. Therefore, an amendment to the regulations is not required to address this recommendation. Better QA/QC provisions for mills that have effects near the critical effects sizes will be developed as part of the review of critical effect sizes (recommendation 8.1).

[Top of page](#)**Recommendation #8**

Environment Canada should initiate discussions now to explore more complex issues that could lead to regulatory amendments in advance of the Cycle 6 EEM studies. These include:

R# 8.1 Strengthening the role of Critical Effect Size (CES) in focusing and accelerating action towards identification of cause and solutions and in improving efficient targeting of resources by identifying mills that could reduce monitoring frequency. This would include the following specific actions:

R# 8.1a Review and update currently recommended CES to ensure adequacy in identifying effects/mills of most importance by 2006.

R# 8.1b Develop provisions to allow mills to assess performance against updated CES and, in particular, to allow mills showing no effects or effects less than the updated CES to withdraw from field monitoring, conditional upon incorporation of "triggers" by 2007.

R# 8.2 Developing a robust set of "triggers" by 2007 to incorporate into the EEM program to return mills to field monitoring.

Recommendation# 8.1 a and b: Strengthening the role of CES: review and update CES.

EC response (R. 8.1a and b): EC agrees that the CES, as they are defined and applied currently, are not adequately identifying mills that need to do more to address effects and mills that are showing minimal or no effects. Over the next two years, EC will revise the CES or modify how they are applied to better define such mills.

Recommendation #8.2 Developing a robust set of "triggers" by 2007 to incorporate into the EEM program to return mills to field monitoring.

EC response: EC believes that to allow mills to withdraw from monitoring, the "robust set of triggers" would need to be predictive of field effects. At this time, no such monitoring methods exist. A research project investigating the cause of effects on fish gonads is expected to result in a test that will be predictive of gonad effects, but will need further development to ensure predictive abilities for other EEM endpoints.

EC will bring together a multi-stakeholder group of experts by the fall of 2006 to develop a set of robust triggers. This group should consider various types of triggers including production changes, effluent tests, etc. EC will also continue to track development of other monitoring techniques that may be used as triggers. However, it has to be recognized that development of robust triggers is complex and will take time. While EC is committed to this work, it is unlikely that these triggers would be developed by 2007.

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