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FACTORS INFLUENCING KRAFT PULP MILLS WHEN REDUCING IMPACTS OF EFFLUENT DISCHARGE

SFMN FINAL PROJECT REPORT

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FACTORS INFLUENCING KRAFT PULP MILLS WHEN REDUCING IMPACTS OF EFFLUENT DISCHARGE – SFMN PROJECT

Executive Summary

The project, was originally designed to investigate factors influencing the development of effluent standards for the kraft pulp industry and suggest new institutional arrangements that may be more effective in addressing new impacts. The three-year project was started April 2000 and completed in April 2003. The majority of the original project tasks were completed on schedule with the submissions of the SFMN working paper and successful publishing of two additional papers. The design of a new model for setting kraft pulp mill standards was not completed, since it was determined that the best solution would be predominately from the political science field. While technology is critical, it is resource management governance mechanisms that ultimately set industrial pollution control standards. Training technically strong managers in policy development and governance is crucial to ensure sustainable development in the future.

Introduction

The purpose of this report is to present a brief description of the original SFMN project, entitled Factors Influencing Kraft Pulp Mills When Reducing Impacts of Effluent Discharge, and progress made in achieving the objectives. The SFMN project was originally approved for three funding years in April 2000. Research began at that time and run continuously until the end of the funding period April 2003. While many of the objectives were achieved, further research is required to complete the project and will be done outside of the SFMN funding opportunities.

Original Project Proposal Description

The original goal of this project was to suggest a new mechanism for proactively and cost effectively improving pulp mill effluent quality. This three-year project was to examine factors influencing the development of effluent standards for the kraft pulp industry and suggest new institutional arrangements that may be more effective in addressing new impacts.

- The first phase of the two phase project was to investigate the historical evolution of AOX standards and potential links to endocrine disrupters. This phase was to be based on the literature reviews and interviews with representatives of regulatory agencies, pulp industry, non-governmental organizations, and others. This information was set up to assist in defining the effects and interactions of various factors that influence the decision process when reducing effluent discharges with technology improvements.
- The second project phase was to investigate a wide variety of institutional arrangements that are currently involved in identifying new science and developing standards. Some of these were to include commissions, private/public research institutes, government agencies, industry technology centre, and resource boards. Each institutional arrangement was to be evaluated and ranked for effectiveness and appropriateness to the forest industry. The final phase of the project would incorporate information generated in the first phase and recommend several new alternative institutional arrangements that will effectively incorporate new science, and proactively develop standards to minimize environmental impacts from the forest industry.

Final Project Results

Progress towards original objectives

Table 1 presents a detailed summary of activities achieved and dates completed. This schedule formed the basis of the original project proposal and was used to track progress made over the three years of research.

TABLE 1: RESEARCH ACTIVITY SCHEDULE

Milestone	Description	Planned Starting Date	Planned Completion Date	Date Completed
Set Up & Research	Produce detailed work plan & review with project manager	April 2000	May 2000	May 2000
	Research and document history/elements of AOX	May 2000	Jun 2001	June 2001
	Evaluate how scientific knowledge is synthesized and made available to regulators, industry, and public by researching critical factors through literature review, attending industry conferences and interviews	May 2000	Dec 2000	Dec 2000
	Establish pulp mill inventory data base and establish contact with mills and Alberta Environment	May 2000	Dec 2000	Oct 2000
	Research and document history/elements of risk assessment	Jan 2001	Apr 2001	Apr 2001
	Design model for setting kraft pulp mill standards from case studies and stratify pulp mill data base.	January 2001	Jan 2001	ongoing
	Prepare interim working paper and presentations	March 2001	July 2002	Jan 2002
Working Paper	Submit working paper and deliver paper at related conferences; continue to validate critical factors	July 2002	July 2003	ongoing
	Survey to test model on industry, government, NGOs and other stake holders	April 2002	July 2003	ongoing
	Evaluate how factors interact and summarize results	January 2002	Dec 2002	ongoing
	Develop better institutional arrangements	January 2002	Dec 2002	ongoing
Final Report	Produce and deliver final report as well as executive summary	January 2003	April 2003	October 2003

Key findings

Phase 1

The majority of the Phase 1 tasks, as described in Table 1, were completed on schedule with the submissions of the AOX working paper in 2002. This SFMN working paper, entitled Concern About AOX, was completed and posted on the website for distribution. It was based on a literature review of the evolution of pulp mill effluent parameters (mercury and AOX), ecological risk assessment, EEM program, data from Alberta water quality monitoring, and

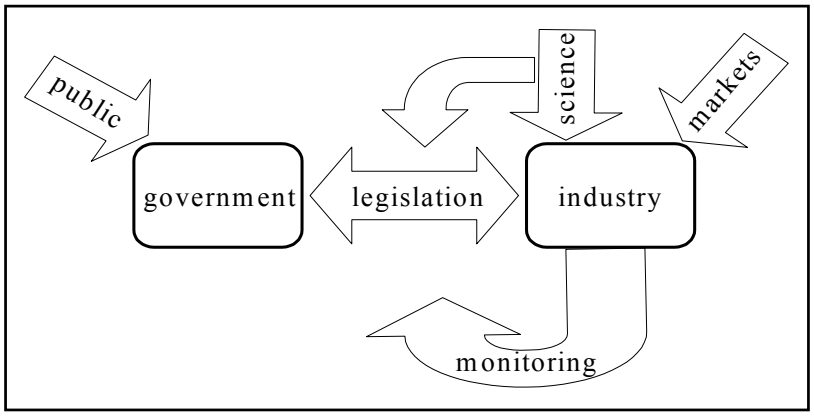
legislative models using risk assessment approach to set parameters levels. The key findings involved a number of critical areas, namely:

- How did science lead to effluent quality improvements? The AOX case study revealed how and when information about AOX was first identified as a potential impact to government, industry, and universities. It reviewed the role played by extension models, policy analysis mechanisms, market condition influences, as well as links between various research groups, conference disseminations and general media contributions. The project investigated how science facilitated new technology to mitigate the impacts, once the hazard of AOX was identified.
- How did legislation and other government actions improved effluent quality? The evolution of AOX legislation indicated industry and government inefficiencies and the link to scientific information. The project investigated how government decided to implement best-available technology policy and establish effluent standards.
- How did non-governmental organizations contribute to the increasing awareness about AOX? The project investigated how links to potential public health indicators increased political pressure at the local, regional, and global levels.
- How did markets influence industries ability to respond? European markets favoured elemental chlorine free pulp and some new mills, providing state-of-the-art technology with a market advantage. The project investigated pulp market conditions during the AOX controversy and the ability of industry to invest in improved pulping and effluent systems.

Phase 2

One key element that was not completed, as indicated in Table 1, was the design of a new model for setting kraft pulp mill standards from case studies, an important component of the project's second phase. The key challenge facing the project was the development of a model that would better incorporate science into environmental impact decision making. After considerable research, it was determined that the solution, as presented in Figure 1, while multi-disciplined, would come from political science.

Figure 1: Factors Influencing Kraft Pulp Mills when Reducing Impacts of Effluent Discharge



To remedy this challenge, the project adapted an different approach. Instead of developing one model, several published papers would be prepared to address different facets of the problem. In this way, the publish papers would make a contribution to the topic, demonstrate original

thinking, and provide continuity to the original objectives. Two of the proposed five papers have been published, as indicated below. The remaining three papers will focus on different ways to incorporate science into government decision making.

Technology Transfer

Another related objective of this project was to train highly qualified personnel. This project enabled one PhD student the opportunity to conduct graduate research and publish results. This student pursued a cross discipline program linking the Environmental Engineering and Science with Rural Economy Department and Environmental Health programs. The student examined environmental contaminants, their reduction, and social-economic impacts on the industry. This training enabled the individual to secure a senior managers position at Alberta Sustainable Resources, where acquired skills are currently being applied to include science in resource decision making.

This project also provided funding for this PhD student to attend a number of key conferences related to the project. Some include:

- SFMN Conference Edmonton November 2002
- Sustainable Futures August 2002 Banff
- Alberta Land Use Conference Jan 2002 Edmonton
- Canadian Environmental Round Table Conference Nov 2001 Winnipeg
- Canadian Pulp Mill Environmental Effects Monitoring Conference Sept 2001 Winnipeg
- Ecological Monitoring and Assessment Network Conference May 2001 Calgary
- Cumulative Environmental Effects Management, Calgary November 2000
- Environmental Studies Association of Canada, Edmonton May 2000
- TAPPI Environmental Conference, Denver May 2000
- Role of Boreal Forests and Forestry in the Global Carbon Budget Conference, Edmonton May 2000

This project generated several working papers for distribution. Two related peer review articles have been published as part of the support offered from the project.

- Lindsay, K.M. and Smith, D.W. 2001. Evaluation of British Columbia Ministry of Forests Aboriginal Rights and Title-Consultation Guidelines-The Ditidaht Case Study. *Environmental Engineering and Policy*, *2*, 191-201.
- Lindsay, K.M., Svrcek, C.P. and Smith, D.W. 2002. Evaluation of Cumulative Effects Assessment in "Friends of the West Country Association v. Canada" and Land Use Planning Alternatives. *Journal of Environmental Assessment Policy and Management*, *4*, 2, 151-169.

Management Policy Implications

Setting standards by which to minimize pulp mill effluent impacts is highly complex and not necessarily just based on science. An important contribution made from this SFMN research project was to identify the significant role that political science plays in setting technical standards. The structure of environmental institutional arrangements, designed to develop policy to control impacts, must on the one hand manage technical information while on the other hand recognize social and political pressures that drive decision makers. While technology is critical, it is resource management governance mechanisms that ultimately set industrial standards that

control pollution. Training managers with strong technical background in policy development and governance is crucial to ensure sustainable development in the future.

Future related research

Research on this project will be ongoing in the future. This inter-discipline approach will continue to investigate knowledge about pulp mill effluent treatment processes and technical/socio/economic model/approaches that will clarify how to best incorporate science into decision-making. The purpose will be to find or develop alternatives to effectively develop standards to minimize environmental impact of pulp mill discharges and to proactively monitor new science as it unfolds. The project research will describe how standards, technology development, environmental and human health impacts, and economics, influence industry in Canada to adopt new technology and reduce impacts of effluent discharges. The resulting new institutional arrangement will contribute to sustainable forest management by framing a methodology for more effectively minimizing impacts.