

Beyond Command and Control: Regulating in an Era of Uncertainty

Bradley D. Wylenko

In January, 1997 the manager of FMC Inc.'s hydrogen peroxide plant in Prince George, British Columbia, Canada, ordered the re-routing of a methanol transfer pipe. He had determined that large quantities of carbon dioxide were being emitted from burning the methanol in FMC's power boiler. Re-routing the pipe enabled the company to recycle the methanol rather than burn it. FMC eliminated a hazardous source of pollution and realized \$200,00 in annual savings.¹

A sound business decision? Yes. A good environmental decision? Absolutely. Required by regulation? Not at all. FMC's manager issued his order as a result of the company's participation in a new environmental management programme that combines legislative and voluntary initiatives, and brings companies, regulators and even environmental activists together to find a new way to protect our environment.

Environmental regulators and company managers face several new challenges at the end of the 20th century: the realization that science cannot provide the certainty that decision makers demand; the fact that the ecological consequences of human activity are global in nature; the reality of fiscal restraint; and the growing power of an informed citizenry. These issues weren't part of the equation when environmental management systems were established in the early seventies. Then it seemed reasonable to take a linear, reactive, end-of-pipe, "command and control" approach, emphasizing pollution control and adherence to legislated standards. This approach worked reasonably well for basic local pollution abatement: it provided soot free skies and phosphate free lakes. But it has not and probably cannot stop pesticides from reaching the poles, carbon dioxide from building up in the atmosphere, or hormonal imbalances from damaging fish. For these larger and more complex problems, at least, the system has proven to be rules bound and legalistically gagged.

A new regulatory strategy is required – one that provides an anticipatory, systems-based method to preventing environmental harm. Such a strategy would foster greater operational efficiency, and build company and community commitment to continuous environmental improvement. The strategy must ensure companies comply with legal requirements, and at the same time, encourage them to make environmental performance an integral part of their corporate agendas for innovation and global competitiveness. This chapter explores the foundation for such a strategy.

The Limitations of the Command and Control Approach

When post-war environmental problems first garnered a legislative response in the early 1970's, environmental managers characterized the problem as a matter of controlling the unwanted by-products of industrial processes.ⁱⁱ They addressed the issue in a linear fashion by identifying problem emissions, measuring their impact on the environment, determining a non-impact emission level (or assimilative capacity), assessing the technological capability of the day, and setting legally enforceable emissions targets. Their approach resulted in cleaner skies, water and land and it remains today the predominant response to the environmental harm posed by industrial pollution.ⁱⁱⁱ

Unfortunately, this "command and control" approach is showing signs of strain. Typically it requires government regulators and company managers to engage in lengthy and detailed negotiations to arrive at legally enforceable discharge specific standards. Once set, and enforced, the standards keep pollution and its effects within a specified range; but, the approach does nothing to encourage companies to go beyond compliance with the letter of the law.

Command and control regulations prescribing emission standards and detailing the technology required to meet them have worked relatively well in controlling readily apparent contaminants such as soot, phosphates and heavy metals. But current environmental concerns centre on difficult-to-detect and difficult to assess by-products such as dioxins and furans. Dioxins and furans have been studied since the mid-seventies, and yet debate still rages over acceptable levels of exposure, especially to the evidently most dangerous members of these chemical families. Initially, scientists thought that levels in the parts per billion were acceptable. It then became clear that parts per trillion were to be preferred. More recently, the International Agency for Research on Cancer has determined that 2,3,7,8-tetrachlorodibenzo-p-dioxin, the most dangerous form of dioxin, is a human carcinogen.^{iv} Command and control standard setting is ill-suited to responding to such rapid changes in scientific understanding.

Determining specific acceptable levels for each of the many different members of these chemical families is an enormous task. It is also never-ending, since the standards have to be adjusted frequently in light of new scientific findings. Industry finds the moving targets thwart long-term business planning. Governments find monitoring compliance to these changing numbers prohibitively expensive. And in all this effort to address specific contaminants and immediate exposures, more serious cumulative and long term environmental problems are neglected.

The command and control standard setting approach was designed to deal with specific pollution sources with local effects. But today the most worrisome environmental protection challenges are probably those at the regional or global level. And many large-scale contaminant problems – acidic precipitation, for example – are the cumulative products of discharges from many sources which are individually acceptable and in compliance with local standards.

The most-discussed recent concern is the prospect of highly disruptive global climate change resulting from rising atmospheric concentrations of greenhouse gases. In 1996 the Intergovernmental Panel on Climate Change announced broad scientific agreement that, in part due to human-induced changes in atmospheric chemistry, global temperatures would likely increase by 0.8°C to 4.5°C by the year 2100.^v Predicted effects include sea levels rising from 0.1 to 0.9 metres world-wide, increased frequency of floods

and droughts, and more extreme weather events. These effects respect no country's borders.

Traditional command and control regulations focusing on local pollution have paid little attention to carbon dioxide emissions. And although greenhouse gases are now recognized as a major problem, the complexities are great. The mechanisms of the problem are beyond confident understanding and the scope of necessary action is beyond any existing authority. No one really knows what standards should be set, and no single jurisdiction can implement them. This challenge led to the 1997 United Nations Conference on Global Climate Change in Kyoto, Japan.

After a week of hard bargaining, representatives at the conference managed to agree on global targets for greenhouse gas reductions. However, critics quickly claimed that meeting the Kyoto targets would have draconian economic effects. At the same time, environmentalists charged that the targets were too low to avert disaster.^{vi} Both may be right. The command and control approach taken by the conference requires a level of simplicity and certainty that global problems simply do not offer.

Government deficits provide another complicating factor. The command and control approach has given rise to a substantial bureaucracy in order to formulate standards and issue licences. Every government that took this route hired hundreds of staff to administer their programmes. These programmes are valuable and may still be necessary to provide a reasonable foundation of environmental protection. But in the flurry of recent deficit cutting measures, governments are eliminating large portions of their regulatory control capacity. From 1996 to 1998 Environment Canada cut its budget by 30 percent. Newfoundland, Quebec, Ontario and Alberta followed suit with cuts of 65 percent, 65 percent, 44 percent and 37 percent respectively. These cuts have resulted in staffing reductions and office closures. Ontario is currently preparing legal defences against the possibility of being sued for not enforcing its regulatory obligations.^{vii}

Command and control can not be maintained in this fiscal climate. At the same time, public expectations for a clean and healthy environment continue to rise, along with a legitimate desire to be involved in that protection. The Canadian public does not accept that there must be a trade off between jobs and the environment, or that contaminated groundwater and dirty air are the price of progress. At the same time, the level of public trust of government and corporations is at an all time low.^{viii} The typical command and control style of closed-door negotiation is no longer acceptable.

In sum, the linear command and control approach is proving to be inflexible and dangerously inefficient. It is simply not ambitious enough to deal with the new and emerging environmental problems of the late 20th century.

Principles for an Alternative Approach

An effective environmental management strategy must accommodate scientific uncertainty, along with the global nature of environmental problems, fiscal restraint, and the growing power of an informed citizenry. In order to meet these challenges, the strategy must be built upon a set of coherent and comprehensive principles.

1. Prevent Pollution

The key to a new strategy is a focusing on preventing pollution from occurring in the first place. Preventing pollution offers the only long-term response to scientific uncertainty and global effects. Only by preventing pollution, rather than trying to control it once created, can managers assure themselves that harm will be avoided. While the environment can assimilate a degree of contamination, human understanding of that assimilative capacity is quite limited and the notion is coming under increasing attack.^{ix}

Such attack has lead various authorities to re-examine their approach to pollution management. This re-examination was first expressed internationally in the *Ministerial Declaration of the Second International Conference on the North Sea* . It states,

[The Parties] [t]herefore agree to... accept the principle of safeguarding the marine ecosystem of the North Sea by reducing polluting emissions of substances that are persistent, toxic and liable to bioaccumulate at source by the use of the best available technology and other appropriate measures. This applies especially when there is reason to assume that certain damage or harmful effects on the living resources of the sea are likely to be caused by such substances, even where there is no scientific evidence to prove a causal link between emissions and effects (“the principle of precautionary action”).^x

The principle of precautionary action was picked up in the 1990 *Bergen Ministerial Declaration on Sustainable Development in the ECE Region*. It adopted the concept for application throughout Europe:

In order to achieve sustainable development, policies must be based on the precautionary principle. Environmental measures must anticipate, prevent, and attack the causes of environmental degradation. Where there are threats of serious or irreversible damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.^{xi}

The 1992 *Rio Declaration*, ratified at the United Nations Conference on Environment and Development, sought to apply the concept to the world :

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.^{xii}

More recently, the European Union has argued that the precautionary principle has become a rule of law.^{xiii}

The precautionary principle has various implications, but for government it chiefly entails action in the absence of full scientific certainty, including encouragement of abatement beyond the minimum standards derived from current knowledge. For

companies it means a shift from end-of-pipe compliance to overall emission minimization, with an emphasis on prevention rather than control.

But in order to prevent emissions, company managers and government regulators must become familiar with the operation of the regulated facility. They must understand its energy and material flows. They must move from focusing their attention on such activities as sewage treatment and air emission control, to understanding inputs, production processes and outputs. This requires new knowledge, new skills, and most importantly, a new relationship between the regulators and regulatees as government crosses the front gate and starts to ask operational questions never before posed.

This is an understandably uncomfortable prospect for many companies who prefer to keep government "out of the business." Traditionally, staff employed in the environmental side of the business had one focus: monitor the pollution control devices and ensure they work. Where a prevention focus is being introduced, environmental staff are being asked to understand and explain how the whole facility functions. They are unfamiliar with this role, and quite frankly unsure of just how much to reveal to government.

The necessary change in roles is also uncomfortable for government regulators. Where once they focused simply on monitoring the pollution control systems, regulators are now expected to work with the operational side of the business. This demands new skills of facilitation, communication and supervision. For people who have specialized in pollution control technology and operation, shifting focus to working knowledgeably and constructively with operational staff can be very difficult.

Pollution prevention requires new techniques and new skills. As with all planning exercises, it requires more time and effort up front, to lead to better environmental protection in the longer term. This may seem to companies like just another cost imposed because of environmental constraints, but unlike pollution control, pollution prevention typically leads to greater efficiencies. It can actually improve a company's bottom line.^{xiv}

Pollution prevention also affects governments' bottom line. While not profit oriented, governments still have to deal with a fiscal reality. Increased up-front planning and on-site involvement can cut the regulatory time and resources required for managing the site over the longer term. This is truly a case of an ounce of prevention winning a pound of cure; though planning may seem onerous at first, it is much less expensive than the time and cost of enforcement otherwise required. In addition, up-front planning involves the community in a positive anticipatory exercise, unlike the reactive, negative experience of a courtroom. This first principle is therefore somewhat paradoxical: in order to achieve financial savings in the longer term, government needs to spend more time, more resources and be more involved in a company's operations up front than it has ever been before.

One promising application of the preventative approach is British Columbia's Pollution Prevention Demonstration Project (see sidebar "Practicing Prevention"). The project, initiated in 1995, goes beyond the traditional focus on pollution control to find ways of avoiding, eliminating or reducing the quantity of polluting substances used or created. The results, including the pollution reduction and cost savings success at the FMC plant mentioned at the beginning, have been very encouraging.

2. Make the Polluter Pay

In 1975, the Council of Ministers of the European Economic Community recommended approval of the polluter pays principle.^{xv} The concept quickly gained world-wide acceptance. Canada's federal government endorsed the principle in 1991, with the province of British Columbia following suit in 1992.^{xvi} The polluter pay principle shifts the responsibility for waste management from society at large to those who profit from creating the waste.

This is a profound change in focus unrecognized in the traditional command and control approach. Typically, while a company expects to incur costs in controlling its production process emissions, little attention is paid to the environmental effect of the use and disposal of its products. With some exceptions, manufacturers have claimed no responsibility for their products once they leave the factory gate.

In an innovative move, the Province of British Columbia has institutionalized the polluter pays principle through its Household Product Stewardship Programme. The programme, the first of its kind in North America,^{xvii} deals with household paint, solvents, pesticides, fuel and pharmaceuticals. It has ensured that the producers and consumers of these hazardous products take responsibility for managing the left-overs. This results in both better environment management, and an incentive for the manufacturers (or "brand-owners") to reduce the hazardousness of the products.

The programme requires brand-owners to provide collection facilities within four kilometers of the point of sale. However, if a brand-owner wishes to, they can submit a plan to the government outlining a collection programme that is equally effective and convenient to the consumer. If accepted by government, the plan substitutes for the four kilometre requirement. The plans may be company specific, or drafted on behalf of the industry.^{xviii}

To date, 100 paint and nine solvent, pesticide and fuel collection facilities have been opened across the province. From September 1994 to January 1998, approximately 6 million litres of paint were collected. Once collected, the material is either recycled, neutralized, or used for its heat value.^{xix}

In shifting the traditional responsibility for managing household hazardous waste from taxpayers to the producer/consumer the product stewardship programme creates an incentive for brand-owners to re-examine their products. This leads to a reduction in both the amount left-over, for example by re-designing the packaging and delivery system, and more importantly, to a re-design of the product itself.

The goal of the product stewardship programme is the management of all household hazardous waste by brand-owners. Through this approach, changing environmental standards, due to uncertain science, become automatically incorporated into the design, delivery, use and disposal of a product.

3. Focus on Performance

In a 1995 article entitled, "Green and Competitive: Ending the Stalemate," Michael Porter and Claus van der Linde argue that a properly conceived environmental regulatory system not only fosters innovation, but can actually drive innovation by encouraging companies to outperform their competitors. The trick, they say, is to focus on performance rather than technique.^{xx}

Porter and Linde advocate a rejigging of the command and control approach, arguing that extending regulatory timeframes and concentrating on outcomes rather than

techniques can free up a company to respond to a regulator's demands as the company sees fit. As evidence for this they compare the relative successes of the Scandinavian and US governments in achieving emission reductions in the pulp and paper industry. According to Porter and Linde, the Scandinavian companies, "... developed innovative pulping and bleaching technologies that not only met emission requirements but also lowered operating costs."^{xxi} In contrast, the US companies failed to innovate, because the US regulations did not, "[let] ... industries discover how to solve their own problems."^{xxii}

In British Columbia, pulp and paper mill effluent discharge is regulated through the *Pulp Mill and Pulp and Paper Mill Liquid Effluent Regulation*,^{xxiii} This regulation sets a target of zero discharge of adsorbable organic halogens (AOX) by December 31st, 2002, but does not specify how that target is to be reached. To date, all pulp mills have met the interim target of 1.5 kilograms of AOX per air dried tonne of bleached pulp.

Such performance-based regulations, which set the goal posts and leave it up to industry to determine the means of achieving the goals, are a critical element of a new, more efficient strategy.

4. Encourage Continual Improvement

Continual improvement, borrowed from the total quality management realm, involves beginning with minimum legal standards and then constantly striving to do better. Through a consistent programme of continual improvement, companies may progressively reduce their emissions - typically while also improving their bottom line.

For example, in the Netherlands Dutch regulators have begun negotiating agreements, called covenants, with companies owning licenced facilities. Essentially contracts between the companies and the national government, covenants are voluntarily entered into, but once signed, are enforceable under civil law. They consist of a sectoral agreement to targets and goals backed up by company specific environmental business plans. To date, covenants have been negotiated with the packaging, metallurgic, chemical, and dairy sectors amongst others.^{xxiv} The business plans require a company to initially assess its ability to reduce emissions, and to continually strive to meet the goals and targets.

If a company fails to meet the conditions of the covenant, it faces a unilateral tightening of its pre-existing licence along with a civil enforcement action. In some respects, this new strategy is legally stronger than the traditional one since it relies on civil remedies, which with their lower standard of proof, are often easier to pursue than criminal prosecutions.^{xxv}

Covenants are a legal-voluntary hybrid. Powerful legal incentives for participation and compliance are retained. But the covenant negotiating process encourages a more constructive flow of information than the traditional licencing process, and companies are pushed to look for operational efficiencies as well as environmental gains. The Dutch covenant approach takes companies beyond minimum standards to continual improvement.

5. Treat Different Companies Differently

Dealing with the challenge of fiscal restraint is a critical element in any successful regulatory strategy. All of the programmes discussed above have addressed this to varying degrees, but one of the most interesting responses is found in the State of Victoria in Australia. While pollution prevention, product stewardship, performance based standards, and covenants all aim to reduce administrative costs, the State of Victoria's Accredited Licence system goes the furthest in this effort. It does this by treating different companies differently.^{xxvi}

In line with the command and control approach, the State of Victoria's 1970 *Environmental Protection Act* requires all facilities emitting pollution to hold a discharge licence. However, in 1993 the Act was amended to enable the government to grant performance-based "Accredited Licences" to individual companies. The Accredited Licence consists of whole-of-plant discharge limits (in contrast to outlet specific discharge limits), and requires submission of an annual performance report, reporting of incidents, and an up-to-date site plan. Because an Accredited Licence neither specifies the operating parameters of specific pollution control devices nor involves detailed monitoring, the government exercises far less control over the site than under a general licence. This results in cost savings to both government and the company.

However, not all companies are eligible for such a licence. To qualify as an "Accredited Licensee" a company must have in place an environmental management system, an environmental auditing programme, and an environmental improvement plan. A company may choose the environmental management system it prefers (e.g., British Standard 7750 or International Standards Organization 14001) so long as the system is approved by the government. The environmental auditing programme must include both system and compliance elements. An environmental improvement plan, written jointly with government and members of the public, must include the following elements:

- compliance with regulation,
- benchmarking against industry and government emission standards,
- monitoring,
- community participation,
- plans for up-grading,
- assessment of new technology, and
- emergency plans.

Seven companies have been granted Accredited Licences since the program began.^{xxvii}

Through this initiative, the State of Victoria Environment Protection Agency takes on the role of auditor rather than monitor. This frees up resources to deal with more problematic actors. Of course, if an Accredited Licensee is found to have abused this privilege, it is immediately dropped back into the general licencing scheme with its attendant costs and penalties. Companies with Accredited Licences save money through reduced licencing requirements and associated paperwork. The environment benefits through a greater focus on the problematic companies. Government gains greater efficiencies while maintaining environmental protection.

6. Involve the public

Involving the public in decisions affecting the environment has become a requirement in almost all jurisdictions. By involving the public up-front in the regulatory process, companies and government not only gain from the expertise that a community holds, but

also encourage a constructive atmosphere of problem-solving before problems arise. Thus a longer-term relationship can develop between a community and the company, and a degree of trust may develop between the community and the government.

The Dutch government recognized this challenge early on, since the Dutch public has for some time demanded access to the traditional licencing process. In many cases this access has been granted, but at a high administrative cost since the system was not designed to accommodate the public. The results have included delays and frustrations.

The covenant approach includes non-governmental community organizations in the negotiations leading to the covenants. In some cases, the covenants are worked out between companies and the non-governmental groups even before they reach the government. Once the covenants are in place, the non-governmental groups are involved in monitoring to ensure that companies live up to the agreements.

In a similar departure, the British Columbia Pollution Prevention Pilot Project has established public advisory committees for each of the pilot sites. These committees have the power to approve the terms of reference guiding the site's specific pollution prevention planning process. The public is therefore involved in the establishment of the planning process as well as in the negotiation of the site plan itself. In this way the Project aims to combine better environmental performance with better relations between the companies and the communities in which they operate.^{xxviii}

Experience with the Project so far suggests that public involvement in the traditionally closed process of government/industry licencing negotiations is an effective way of building stronger community ties, more credibility for government and industry efforts and, most importantly, a higher level of protection of the environment.

A New Regulatory Strategy

The preceding six principles provide the foundation for a new regulatory strategy – a strategy which leads to both environmental protection and industrial efficiency. The principles build on the command and control approach adding flexibility and responsiveness. This enables regulators, companies and the public to meet their particular goals within the overall objective of environmental protection.

The guiding principles may be summed up as follows:

- ? Preventing pollution rather than trying to control it after its creation;
- ? Ensuring the polluter pays for the benefits gained by creating that pollution;
- ? Focusing on performance in order to encourage innovation, which may lead to enhanced competitiveness;
- ? Encouraging continual improvement, leading to cost savings and new sources of revenue as well as environmental improvement;
- ? Treating different companies differently to reward good company efforts and focus government resources where they are needed most; and,
- ? Involving the public to ensure that community values are reflected in the environmental protection programme.

Individual regulatory programmes necessarily reflect the varying cultural contexts of their different jurisdictions. They may, as illustrated, take various forms. However, whatever the form, the underlying strategy must be based on a coherent and comprehensive set of principles that respond to the challenges of the late 20th century.

The preceding six principles offer a solid foundation for meeting that challenge, and set the stage for the regulatory strategy that will be needed in the 21st century.

This opinions and views expressed in this paper are solely those of the author and do not necessarily reflect the opinion or views of either the BC Ministry of Environment, Lands and Parks, or of the editors/publishers of this book.

i Discussions with the Manager of the FMC plant, Mr. Rob Service, March 9, 1998. FMC also switched from using diatomaous earth to polyester filters in recycling its work solution. This resulted in a cost savings of \$80,000 per year and a 50% reduction in solid waste generation.

ii See for example, the US Clean Water Act, Pub. L. No. 92-500, 86 Stat. 816 (1972).

iii See for example, British Columbia's Waste Management Act (RSBC 1996, c.482); and the Canadian Environmental Protection Act (RSC 1985, c. 16(4th Supp.)).

iv "International Panel Concludes Dioxin is Known Human Carcinogen", *Risk Policy Report* (Environmental Protection Agency: Washington, 1997) vol. 3, no. 2, p. 6. For a review of this debate, see, C. Van Strum & P. Merrell, *No Margin of Safety: A Preliminary Report on Dioxin Pollution and the Need for Emergency Action in the Pulp and Paper Industry* (Greenpeace: Washington, 1987). Note, in response to scientific uncertainty on this issue, in 1994 the US EPA released a draft report entitled, "Estimating Exposure to Dioxin-like Compounds", reviewing data on the topic. For a discussion of the scientific uncertainty of the role of dioxins and furans in pulp mill effluent, see also D. VanNijnatten & W. Leiss, "Environment's X-File: Pulp Mill Effluent Regulation in Canada", Working Paper Series 97-1 (Queen's University: Kingston, Sept. 1997) pp. 1-34.

v J. Houghton, I. Meira Filho, B. Callander, N. Harris, A. Kattenberg & K. Maskell, *Climate Change 1995, The Science of Climate Change*, "Contribution of Working Group 1 to the Second Assessment Report of the Intergovernmental Panel on Climate Change" (Cambridge University Press: Cambridge, 1995) pp. 40 & 41.

vi British Columbia Business Council, Press Release, "Business Council Critizes the Federal Government over Canada's Climate Change Commitment in Kyoto", December 12, 1997; A. McIlroy, "Canada to cut emissions by 6%", *The Globe & Mail*, December 11, 1997.

vii A. Mitchell & M. Winfield, "The Accord is a Tragedy for Canada's Environment", *The Globe & Mail*, February 2, 1998, p. A19.

viii See for example, data from *The Environmental Monitor* (Enviro-nics International: Toronto) January and July 1997.

ix For a review of the debate, see A. Stebbing, "Environmental Capacity and the Precautionary Principle", in *Marine Pollution Bulletin*, 1992, vol. 24, no. 6, pp. 287-295; and further, M. MacGarvin, "The Implications of the Precautionary

Principle for Biological Monitoring”, in Helgolander Meeresuntersuchungen, (1995), vol. 49, no. 1-4, pp. 647-662.

^x *Second International Conference on the Protection of the North Sea, Ministerial Declaration*, at 1 (London, Nov. 1987), as reported in, J. Cameron & J. Abouchar, “The Precautionary Principle: A Fundamental Principle of Law and Policy for the Protection of the Global Environment” (1991) 14:1 *Boston College International and Comparative Law Review*, pp. 2-25..

^{xi} Bergen Ministerial Declaration on Sustainable Development in the ECE Region, May 16, 1990 at 1, resulting from a conference entitled, “Action for a Common Future”, organised by the Government of Norway, May 8-15, 1990, in Bergen, Norway.

^{xii} The Rio Declaration on Environment and Development, UN Doc. A/CONF. 151/5/Rev. 1 (June 13, 1992). Also available on line at <http://sedac.ciesin.org/pidb>.

^{xiii} “EU Defends Precautionary Action Before WTO”, *Environment Watch: Western Europe*, vol. 6, no. 22, Nov. 21, 1997, p. 1. For an example of how the precautionary principle is being incorporated into license requirements, see the British Columbia Ministry of Environment, Lands and Parks, “Guidelines and Standards Policy”, 1997, available on-line at <http://elp.gov.bc.ca:80/epd/epdpa>.

^{xiv} For example, Dow Canada designed and built an \$800 million ethylene plant without an effluent discharge pipe. The design makes it 20% more efficient than other facilities producing the same product. Discussion with K. Tasng, Process Engineer, December 15, 1996.

^{xv} S. Johnson & G. Corcelle, *The Environmental Policy of the European Communities* (London: Graham & Trotman Publishers, 1989) pp. 265-266.

^{xvi} Government of Canada, *Canada's Green Plan for a Healthy Environment* (Ottawa: Ministry of Supply and Services, 1990) p. 16; Ministry of Environment, Lands and Parks, *New Approaches to Environmental Protection in British Columbia: A Legislative Discussion Paper* (Victoria: Province of British Columbia, 1992) p. 14.

^{xvii} The Program won the 1997 Leadership Award for Product Stewardship from the North American Hazardous Waste Management Association.

^{xviii} See, the Post-Consumer Paint Stewardship Program Regulation (BC Reg. 200/94); Post-Consumer Residual Stewardship Program Regulation (BC Reg. 333/97).

^{xix} Discussions with Jim Marr, Pollution Prevention Analyst, BC Ministry of Environment, Lands and Parks, February 23, 1998.

^{xx} Michael Porter & Class van der Linde, “Green and Competitive: Ending the Stalemate”, *Harvard Business Review*, Sept. - Oct., 1995, pp. 120-134.

^{xxi} Porter and Linde, p. 129.

^{xxii} Porter and Linde, p. 129.

^{xxiii} BC Reg. 470/90.

^{xxiv} “Voluntary Accords Seen as Way to Protect Environment While Remaining Competitive”, *International Environmental Reporter*, (1995: The Bureau of National Affairs: Washington), July 26, 1995, p. 586.

^{xxv} It should be noted that this is a hotly debated point. Since the standard of proof is lower, it may be easier to convince a court to find guilt, a very difficult exercise in environmental cases. However, since the action is a civil action, rather than a criminal action, the penalty can not include incarceration. Thus the company may be found guilty, but only face a fine (which is often tax deductible).

^{xxvi} State of Victoria Environmental Protection Agency, “Accredited Licence - Guidelines for Applicants”, *EPA Information Bulletin #424* (February 1996). See, J. Clements, “Environmental Management Systems and How they Fit into the Program of the EPA (Victoria: EPA) (unpublished). Available on-line at <http://www.epa.vic.gov.au>.

^{xxvii} Discussion with Scott Hamilton, Project Manager, Industry Service Branch, EPA, March 2, 1998.

^{xxviii} The province is committed to a process that, “... enables companies to incorporate pollution prevention within the context of their strategic business plans and develop stronger ties with their community.” *Introduction to Pollution Prevention Planning for Major Industrial Operations in BC*, (Victoria: British Columbia Ministry of Environment, Lands and Parks, 1996) doc. no. ENV 509 864.0396, also available on line at <http://elp.gov.bc.ca:80/epd/epdpa/pppm/pphome.html>.