

**FRASER RIVER
ACTION PLAN**



**Enforcement vs.
Voluntary
Compliance:
An Examination of
the Strategic
Enforcement
Initiatives
Implemented by
Pacific and Yukon
Regional Office of
Environment Canada**

1983 to 1998

DOE FRAP 1998-3



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by

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Executive Summary

Environment Canada's Pacific and Yukon regional office has implemented a compliance and enforcement program which has developed over the last 15 years into four primary stages: Problem definition and Scientific assessment: Compliance Promotion and Inspection: Strategic Enforcement Initiatives and Prosecution: Compliance Maintenance. These can be divided into 8 distinct phases. The compliance process takes place over a 5 to 7 year period depending on the industry and has resulted in dramatic reductions in the discharges of harmful substances and increases in compliance with the **Federal Fisheries Act** and the **Canadian Environmental Protection Act**. Three case studies of the Antisapstain Industry, Pulp and Paper Industry, and Heavy Duty Wood Preservation Industry which included 154 of the largest industrial facilities in British Columbia demonstrate that compliance promotion combined with progressive use of stronger enforcement tools leads to compliance with federal environmental legislation.

The design of this process results in less than 0.5% to 1.5% of the facilities in any of the industry groups being subjected to prosecution and maximizes the use of other enforcement tools such as inspections, warning letters and direction letters. The sole reliance on voluntary compliance was demonstrated to be ineffective for these sectors in achieving even a marginally acceptable level of compliance or benefit to the environment. These findings mirror the independent results reported in the 1996 KPMG Environmental Risk Management Survey of 1,547 of the largest Canadian companies, hospitals, universities and school boards. This survey found that the prime motivating factors for implementing environmental improvements were, compliance with regulations >90%, Board of Director liability >70%, employees >60%. The least influential factors were: voluntary programs 15% to 20%, interest groups 10% to 12%, and trade considerations <10%.

Properly designed and applied compliance and enforcement programs resulted in a significant expenditure/cost ratio. Expenditures by industry to comply with the regulatory initiatives were demonstrated to exceed the federal government costs for the program by ratios that were greater than 70:1. In one case study the heavy duty wood preservation expended over \$39,000,000 to comply with environmental requirements as a result of a \$600,000 expenditure on a strategic enforcement program under the Fraser River Action Plan.

The role of analysts is key in three of the phases of the compliance and enforcement program:

- analytical methods development for new chemicals,
- analysis of routine samples collected by inspectors to verify compliance
- analysis of legal samples for the purposes of prosecution and testifying as expert witnesses in court proceedings

A review of 19 different regulatory groups found that those industrial sectors which relied solely on self monitoring or voluntary compliance had a compliance rating of 60% vs. the 94% average compliance rating for those industries which were subject to federal regulations combined with a consistent inspection program. Voluntary compliance programs and peer inspection programs could not achieve satisfactory levels of compliance.

Future compliance and enforcement programs will likely require an increased demand on enforcement resources as regulatory initiatives proliferate. When large point sources of pollution such as pulp and paper mills, mines and lumber treatment facilities are brought into compliance the enforcement programs will shift towards the more diffuse sectors such as agriculture/ranching, urban development, municipal effluent, transportation and specific chemicals such as Ozone depleating substances and dry cleaning solvents. The large number of sites in these sectors will require an increased effort towards education and compliance promotion during the initial phases of the enforcement programs which will place greater demands on limited enforcement resources.

In the last 10 years, the number of sites to which federal regulatory initiatives apply has risen from 5,600 to over 17,000. In British Columbia there are 7 full time inspectors and 3 investigators and 5 emergency response officers in the federal department of environment. These 15 people are frequently called upon to assist or co-operate with provincial staff in enforcement initiatives which provide the minimal deterrent necessary to achieve an acceptable level of environmental protection. The common inference that there is overlap and duplication of effort between federal and provincial enforcement agencies is not supported by the available data.

Even with combined resources of other federal and provincial agencies, Environment Canada must still be selective in which situations will eventually be inspected and/or investigated. Every effort is made to apply at least one of the available enforcement tools to motivate a change in behavior that leads to compliance with Canada's environmental legislation.

Sommaire

Le Bureau régional du Pacifique et du Yukon d'Environnement Canada a exécuté un programme d'observation et d'application des règlements qui s'est développé au cours des 15 dernières années en quatre stades primaires : Définition des problèmes et évaluation scientifique; Promotion de l'observation des règlements et inspection; Initiatives stratégiques de mise en application; et Poursuites judiciaires et maintien de la conformité aux règlements. Ces stades peuvent être divisés en 8 phases distinctes. Le processus entier se déroule au cours d'une période qui varie entre 5 et 7 ans selon l'industrie; il a abouti à une réduction importante des déversements de substances nocives et à une augmentation de l'observation de la Loi sur les pêcheries et de la Loi canadienne sur la protection de l'environnement. Les trois études de cas sur l'Industrie anti-tache de sève, l'Industrie des pâtes et papiers et l'Industrie de la préservation industrielle du bois, qui ont pour objet 154 des plus grandes installations industrielles de la Colombie britannique, montrent que la promotion de l'observation des règlements, combinée avec l'emploi progressif d'outils de mise en application plus puissants, entraîne la conformité avec la législation environnementale fédérale.

Ce processus est conçu de manière à ce que moins de 0,5 p.c. à 1,5 p.c. des installations d'un secteur industriel donné fassent l'objet de poursuites judiciaires, en maximisant l'emploi d'autres outils de mise en application tels que les inspections, les lettres d'avertissement et les lettres de directives. Dans ces secteurs, s'appuyer exclusivement sur l'observation volontaire des règlements s'est avéré inefficace à atteindre un niveau d'observation ou de bénéfice pour l'environnement qui soit même à peine acceptable. Ces conclusions sont identiques aux résultats indépendants de la KPMG Environmental Risk Management Survey (Enquête sur la gestion des risques pour l'environnement) de 1996 qui a examiné 1 547 des plus grands hôpitaux, entreprises, universités et commissions scolaires du Canada. D'après cette enquête, les facteurs principaux qui poussent de tels organismes à réaliser des améliorations environnementales étaient : observation d'un règlement >90 p.c., responsabilité légale du conseil d'administration >70 p.c., employés >60 p.c. Les facteurs les moins déterminants étaient : programmes volontaires 15 p.c. à 20 p.c., groupements d'intérêt 10 p.c. à 12 p.c., considérations commerciales <10 p.c.

Les programmes d'observation et de mise en application bien conçus et bien exécutés ont entraîné une proportion favorable de dépenses contre coûts. On a démontré que les dépenses faites par les industries pour se conformer aux règlements ont dépassé le coût des programmes pour le Gouvernement fédéral dans des proportions de plus de 70 contre 1. Selon l'une des études de cas, l'industrie de la préservation industrielle du bois a dépensé plus de 39 000 000\$ pour se conformer aux exigences environnementales suite à une dépense de 600 000\$ pour un programme d'application stratégique sous le Plan d'action pour le fleuve Fraser.

Le rôle des analystes est primordial dans trois des phases du programme d'observation et de mise en application :

- la mise au point de méthodes analytiques pour les nouveaux produits chimiques
- l'analyse d'échantillons prélevés habituellement par les inspecteurs pour vérifier la conformité aux règlements
- l'analyse d'échantillons légaux à l'usage des témoins experts dans les poursuites judiciaires

Un rapport sur 19 groupes réglementés a conclu que les secteurs industriels qui dépendaient uniquement de l'autosurveillance ou de l'observation volontaire avaient un taux d'observation de 60 p.c., par opposition au taux d'observation moyen de 94 p.c. pour les industries qui étaient soumises à un règlement fédéral combiné avec un programme d'inspection systématique. Les programmes d'observation volontaire et d'inspection par les pairs se sont avérés incapables d'atteindre des niveaux d'observation satisfaisants.

Les futurs programmes d'observation et de mise en application exigeront probablement de plus en plus des ressources attribuées à l'application, à mesure que les projets de réglementation proliféreront. Lorsqu'on aura mis en conformité les grandes sources ponctuelles de pollution telles que les fabriques de pâtes et papiers, les mines et les installations de traitement du bois, les programmes d'application cibleront les secteurs plus diffus tels que l'agriculture / l'élevage en ranch, l'aménagement urbain, les effluents municipaux, le transport et certains produits chimiques tels que les substances appauvrissant la couche d'ozone et les solvants utilisés dans le nettoyage à sec. En raison du grand nombre de sites concernés, durant les phases initiales des programmes d'application, Environnement Canada sera obligé d'augmenter ses efforts en matière d'éducation et de promotion de l'observation des règlements. Ces efforts entameront encore plus les ressources limitées.

Au cours des 10 dernières années, le nombre de sites soumis aux règlements fédéraux a augmenté de 5 600 à plus de 17 000. La Colombie-Britannique compte 7 inspecteurs à plein temps, 3 enquêteurs et 5 agents d'intervention d'urgence. On demande souvent à ces 15 personnes d'aider ou de coopérer avec le personnel provincial chargé de l'inspection et de l'application, dans des initiatives d'application qui prévoient les moyens de dissuasion minimaux nécessaires pour atteindre un niveau de protection environnementale acceptable. Les données disponibles infirment la notion répandue selon laquelle les travaux des services d'application fédéraux et provinciaux se chevauchent et font double emploi.

Même avec les ressources combinées d'autres services fédéraux et provinciaux, Environnement Canada est toujours obligé de choisir avec soin les situations qui feront l'objet d'inspections et/ou d'enquêtes. On s'évertue à employer au moins un des outils d'application disponibles pour motiver un changement de comportement qui mène à l'observation de la législation environnementale canadienne.

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1. Phases of an Environmental Law Compliance and Enforcement Program

Environment Canada is responsible for the enforcement of several Statutes which protect the environment including those listed in Appendix I. In 1992, the Pacific and Yukon Region initiated the Fraser River Action Plan (FRAP) which provided additional resources with three main objectives: to work with partners and stakeholders to manage the Fraser Basin in a sustainable manner; to improve fish and wildlife productivity in the Fraser Basin; and to reduce pollution. FRAP resources were used monitor the impact of environmental law enforcement strategies on various industrial sectors and to review historical data related to these sectors.

The examination of 19 industrial sectors indicated that there are distinct phases in an enforcement cycle that will last from 5 to 10 years depending on the intensity of the program. This paper examines these phases using the Antisapstain wood preservation, pulp and paper (dioxin and furan discharges) and heavy duty treated wood industries as examples of this case study. The studies parallel the findings in the KPMG report (12) with respect to primary driving factors which influence corporations to take action on environmental issues. Future trends related to enforcement programs moving from large point source discharges to diffuse discharges are briefly examined.

1.1 Phase 1: Problem Definition and Scientific Assessment.

The technical/operational procedures in an industry are examined to identify the sources and effects of pollution from selected operations. This may include scientific studies, sampling and testing of new production or pollution control technology. Inspections are conducted at a few selected sites. A high priority is placed on analytical method development by Environment Canada's laboratories. (e.g. Antisapstain and Dioxin and Furan analytical methods research and development)

1.2 Phase 2: Development of Best Management Practices.

Technical experts and industry operators and interested government stakeholders meet to examine causes and solutions to the identified problems. Usually a "Code of Operating Practice" is developed. In some cases, regulations may be developed. Expertise in pollution abatement and emerging technology is critical in this phase.

1.3 Phase 3: Development of Formal Inspection Techniques and Compliance Promotion

Environment Canada typically develops inspection techniques including the use of checklists which reflect the requirements of the relevant Code of Practice or regulation. Inspections may be done jointly with provincial Ministry of Environment Lands and Parks (BCMELP) Inspectors to co-ordinate procedures. The number of sites inspected increases, usually to test out the checklists and gain input from the industry group. Inspections at this stage may result in some form of enforcement action depending on the seriousness of the situation at the site being inspected. Co-operation between Compliance and Enforcement Sections with Pollution Abatement and Analytical Laboratory divisions is high.

At the end of this phase training seminars for the government inspectors will occur, focusing on environmental issues, control technology and regulatory enforcement. Information seminars for the industry may occur as a part of the compliance promotion program. The most progressive members in the target industry group exhibit a high degree of co-operation and 10% to 15% of the facilities will normally be found to be in a reasonable status of compliance during this phase.

1.4 Phase 4: Expanded Inspections.

In this phase, the inspection protocol has been tested and more facilities are inspected. Joint inspections with BCMELP Inspectors may occur. Usually, Environment Canada and BCMELP will divide responsibilities to increase the number of sites that can be inspected. Depending on what is found the following enforcement actions may occur if an Environment Canada Inspector inspects a site:

- 1) Industry operator receives a copy of the inspection report
- 2) When minor deficiencies are found an Inspector may set a date to re-inspect.
- 3) If moderate deficiencies are found an Inspector may issue a **Warning Letter** which clearly identifies the deficiencies and legal violations, specifies that a re-inspection will occur and if the situation is not corrected, further enforcement actions may be taken.
- 4) Where significant deficiencies are found which require immediate attention, the Inspector will issue a "**Direction**" which specifies the expected results of corrective actions and advises that further enforcement action may be taken if these results are not achieved. The dates within which re-inspections will occur to verify complete compliance may be specified.

Verbal “Warnings” and “Directions” are usually followed by written versions and clearly outline the infractions, applicable legislation and penalties associated with continuance of the infraction. These letters are directed to the presidents, board of directors, chief operating officers, facility managers and perhaps the individual operator responsible for the infraction and form part of the compliance history of the individuals and the companies. Due to the significant liability placed on corporate directors these letters often result in significant downward administrative pressure within a company to resolve the issue. 80% to 90% of the facilities normally reach a high level of compliance in this phase.

The role of the analytical laboratories in this phase is to analyze samples which are collected by Inspectors to verify compliance with limits set under permits, regulations or the general provisions of S. 36.(3) of the **Fisheries Act**.

1.5 Phase 5: Strategic Enforcement Initiatives.

Clear and significant violations may be referred immediately to the Investigations Section of Environment Canada and may result in an investigation/prosecution. Facilities which have a significant impact on the environment, which have not made improvements, or which have not made a reasonable effort to move to compliance will be targeted for investigation. Search Warrants are usually executed and evidence is collected to determine if prosecution is warranted. During this period, some facilities make the necessary improvements and it may be possible to avoid prosecution although avoidance is rare. One half percent to 5% of the facilities in any industry group normally fall within this group.

In certain industrial groups, the avoidance of implementing sound environmental practices resulted in strategic enforcement initiatives targeted at the most delinquent facilities. Two examples are provided later in the text.

The role of the analytical laboratories is critical in this phase. Samples collected under legal protocol must have the continuity of evidence maintained through strict security procedures in the laboratory. The analysts must be certified under the legislation as designated analysts. If necessary the analysts will be called to testify as expert witnesses which requires similar training as inspectors and investigators with respect to presentation of evidence in court.

1.6 Phase 6: Prosecution

If a facility is investigated, all the evidence concerning the violation(s) is summarized into a report called a “Prosecution Brief”. This brief is submitted to the Federal Department of Justice for a decision as to whether to prosecute. If the Dept. of Justice approves the prosecution, the investigator lays a charge and the manager (and possibly the corporate directors) of the facility will receive a summons to appear in court. One half percent to 2% of the facilities in any industry group will normally fall within this group.

1.7 Phase 7: Conviction, Fines, Penalties and Court Orders.

If the facility /operator/company is found guilty a penalty will be assessed. This is normally in the form of fines and court orders. The convicted person or company may be required to pay a fine to the government, pay money to an environmental group to improve fish habitat and correct all the deficiencies which caused the offense. Environment Canada Inspectors conduct inspections under the authority of the **Canadian Environmental Protection Act** (18), pollution prevention provisions of the **Fisheries Act** (19) and the **Migratory Birds Convention Act** (20) which have penalties that range up to:

- maximum fine \$300,000 and /or imprisonment for 1 year on summary conviction
- maximum fine \$1,000,000 and/or imprisonment for 3 years on indictment.

A court order may:

- prohibit a person from doing an activity
- direct a person to pay for the improvement of fish or fish habitat (no limit as to cost)
- direct a person to publish the facts of their conviction in the newspaper at their cost.
- pay compensation to the government
- perform community service
- post a bond

One half percent to 1% of the facilities in any industry group will normally be included within this phase.

1.8 Phase 8: Compliance Maintenance Inspections.

Re-inspection will occur to verify compliance with Warnings, Directions and Court Orders. A certain percentage of all the facilities within an industry group will be re-inspected in following years on a rotational basis to ensure that the standards are being maintained. The facilities are chosen based on compliance history and some random selection.

2. Case study #1: The Antisapstain Wood Preservation Industry Compliance Promotion and Enforcement Program.

British Columbia supplies an estimated 39% of the world's soft wood lumber supply and annual sales often exceeded CDN\$4,000,000,000 providing major employment and tax revenues. Prior to 1983, water borne solutions of pentachlorophenol (PCP) and tetrachlorophenol (TTCP) were the primary chemicals used to protect freshly cut lumber from moulds and fungi which attacked the spruce, pine and fir (SPF) species. There were no regulations or codes of practice which defined how the chemicals were to be applied and how the treated lumber was to be stored.

Prior to 1986, approximately 108 mills in B.C. used to treat wood in this manner. The basic process involved dipping or spraying water borne solutions of up to 1% PCP/TTCP onto green, rough cut lumber. The treated lumber was then moved to exterior storage yards with gravel or paved surfaces which may be up to 80 acres in size. British Columbia coastal rainfall can exceed 1.9 meters annually and it was estimated that over 250 million cubic meters of acutely lethal effluent discharged annually from these facilities into fresh water and marine environments that supported valuable salmon and other fish/shellfish stocks.

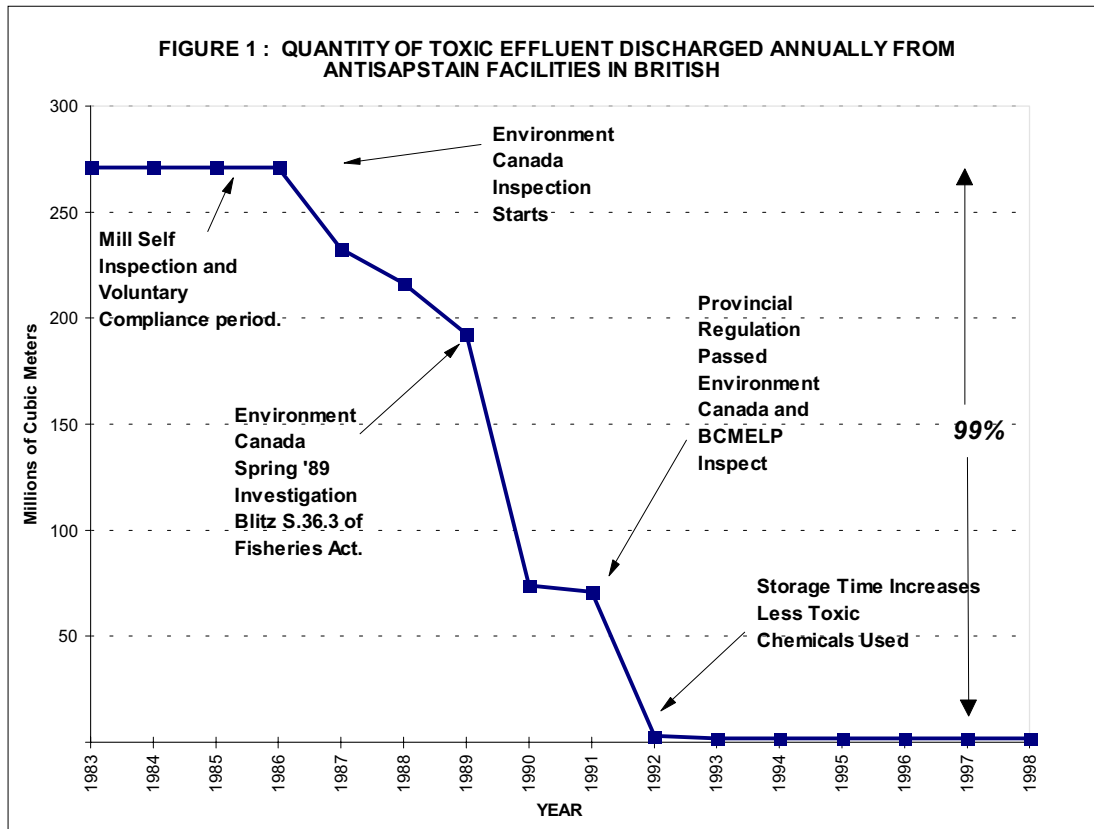


Photo #1: Leaching of Chlorophenates from Freshly Treated Lumber Prior to Implementation of Regulations. (3)



Photo #2: Contaminated Storm water Runoff Discharging into the Fraser River with Fluorescence Dye used to Highlight the zone of Impact.

The Fraser River has a flow rate which ranges from 3,340 to 3,360 cubic meters per second (m³/s). During the winter rainy season, pentachlorophenol could be detected in water samples throughout the lower Fraser River estuary downstream of the Port Mann Bridge Crossing. A scientific assessment confirmed that this was due to a very large discharge of chlorophenols from the Antisapstain Wood Preservation Industry.



From 1983 to 1986, voluntary implementation of code of practice recommendations was the only tool used and mills were permitted to self inspect. During this period there was negligible improvement in operations which reduced toxic discharges. (3,4,5)

From 1986 to 1989, Environment Canada formalized the inspection protocol using specific checklists and onsite visits from inspectors combined with compliance promotion seminars. Training courses were provided to BCMELP Inspectors and the mills were divided into primarily provincial responsibility and federal responsibility for inspection purposes. The progressive mills implemented proper chemical handling and treatment procedures or constructed facilities necessary to control or prevent releases, however, a significant proportion of the mills did not implement corrective measures. Legal charges were not laid for improper practices during this period.

In the spring of 1989, Environment Canada's enforcement staff embarked on a strategic enforcement initiative and targeted five of the worst known mills for investigation and ultimate prosecution. A significant number of mills improved their operating procedures but there were specific issues which were argued to be too costly. (See Section 7 Costs)

In 1991, Environment Canada, the BCMELP and the Department of Fisheries and Oceans co-operated to draft a regulation which was enacted by the provincial government to make certain operating practices mandatory. This was followed by a comprehensive inspection and sampling program by Federal and Provincial Inspectors which resulted in the rapid development and use of new antisapstain chemicals which were significantly lower in toxicity. The mills constructed improved lumber treatment facilities including increased covered storage which prevented wash off of chemicals immediately after treatment. The number of mills using these chemicals decreased from 108 to 51. This was achieved by using alternate methods to protect the wood and develop new markets which did not require preservation. By 1993 it was estimated that a 99% reduction in the discharge of acutely toxic effluent was achieved.

This industry group is now undergoing a re-evaluation to determine if the practices and preservatives currently in use may be causing significant sub-lethal effects in the receiving environment. If this were determined to occur then a new baseline would be established and regulatory and compliance enforcement initiatives would have to be developed and a new phase 1 program implemented.

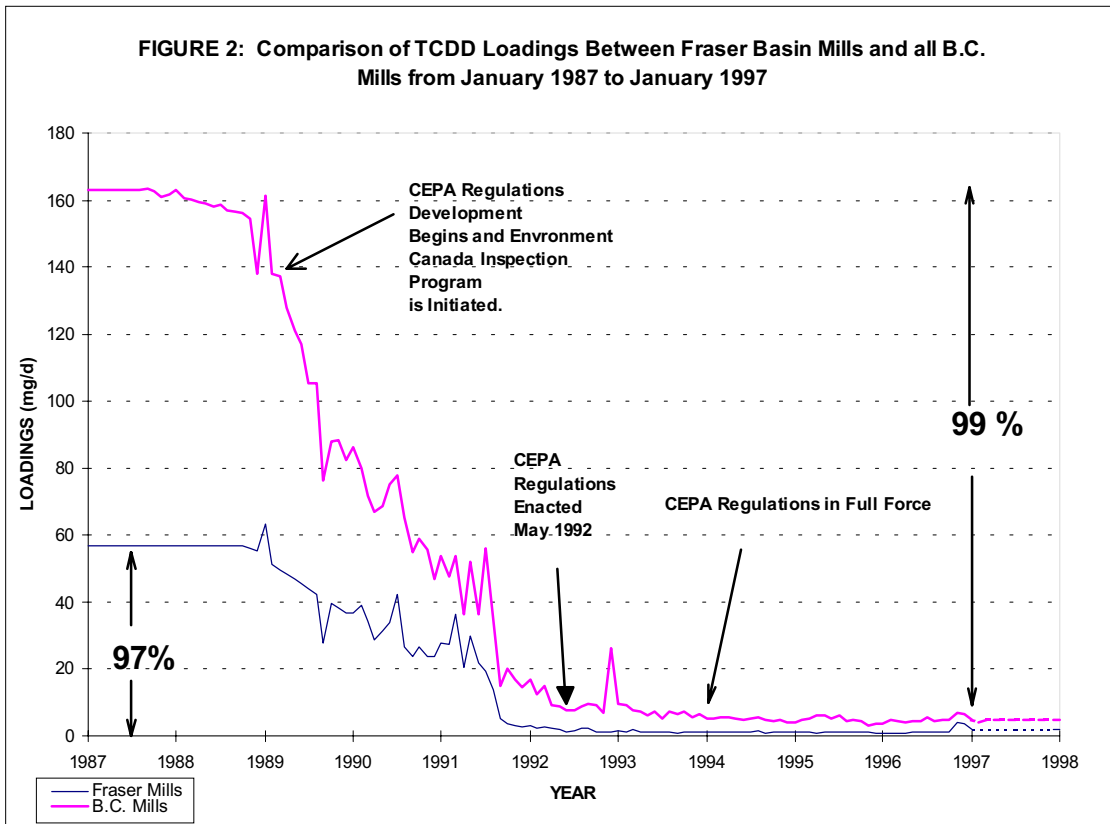
3. Case Study #2: The British Columbia Pulp and Paper Mills, CEPA: Dioxin and Furan Regulations, Compliance Promotion and Enforcement Program.

In 1998/99 there was significant international pressure to eliminate the use of chlorophenols as an anti-sapstain chemical especially by non governmental environmental organizations such as Green Peace. In British Columbia there were several protests at suppliers and sawmills and wood preservation companies which used these products. Chlorophenols and their associated dioxin and furan contaminants were entering the pulp and paper products as a result of shipment of chlorophenate treated wood shavings and mill ends which were chipped and sent from sawmills to pulp mills as supplemental feed stock.

Pulp mills also formed chlorinated dioxins and furans from petroleum based defoamer products which combined with chlorine added during the pulp bleaching process. As soon as the chlorophenols were on the verge of elimination from the sawmill industry, Green Peace representatives collected samples of sediment and crab from the receiving waters near the Harmac Pulp mill on Vancouver Island which were found to contain chlorinated dioxins and furans. Environment Canada and the Department of Fisheries and Oceans collected numerous samples in areas near sawmills and pulp mills which confirmed the presence of the same chemicals. The contamination resulted in the closure of 1,200 square km of crab and shellfish harvesting areas. (3,14)

The development of the Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans Regulations (15) and the Pulp and Paper Mill Defoamer and Wood Chip Regulations (16) under the Canadian Environmental Protection Act (18) began in 1989 in consultation with stake holders and the pulp and paper industry. In this case there was no industrial code of practice development phase as the issue was deemed a significant national priority that required direct regulatory action. An inspection program was developed immediately.

Draft regulations were developed which required an immediate ban on the purchase and use of wood products contaminated with chlorophenols and defoamers contaminated with dioxin and furan precursors. The mills implemented these bans in anticipation of the regulations resulting in an immediate decline in the discharges of the two regulated chemicals, 2,3,7,8-tetrachloro-dibenzo-para-dioxin (2,3,7,8-TCDD) and 2,3,7,8-tetrachlorodibenzofuran (2,3,7,8-TCDF). Figure #2.



Any mill which was constructed before June 1, 1990 was permitted to apply for an extension to comply with the regulations by January 1, 1994. All B.C. mills were constructed prior to this date and applied for the extension. Figure #2 shows that all mills were essentially in compliance by the January 1994 deadline. Several excursions over the regulated limits occurred due to technical factors such as re-suspension of previously contaminated sludges in treatment lagoons and hog fuel (tree bark fed to power boilers) which was contaminated by saltwater during transport to mills via log booms.

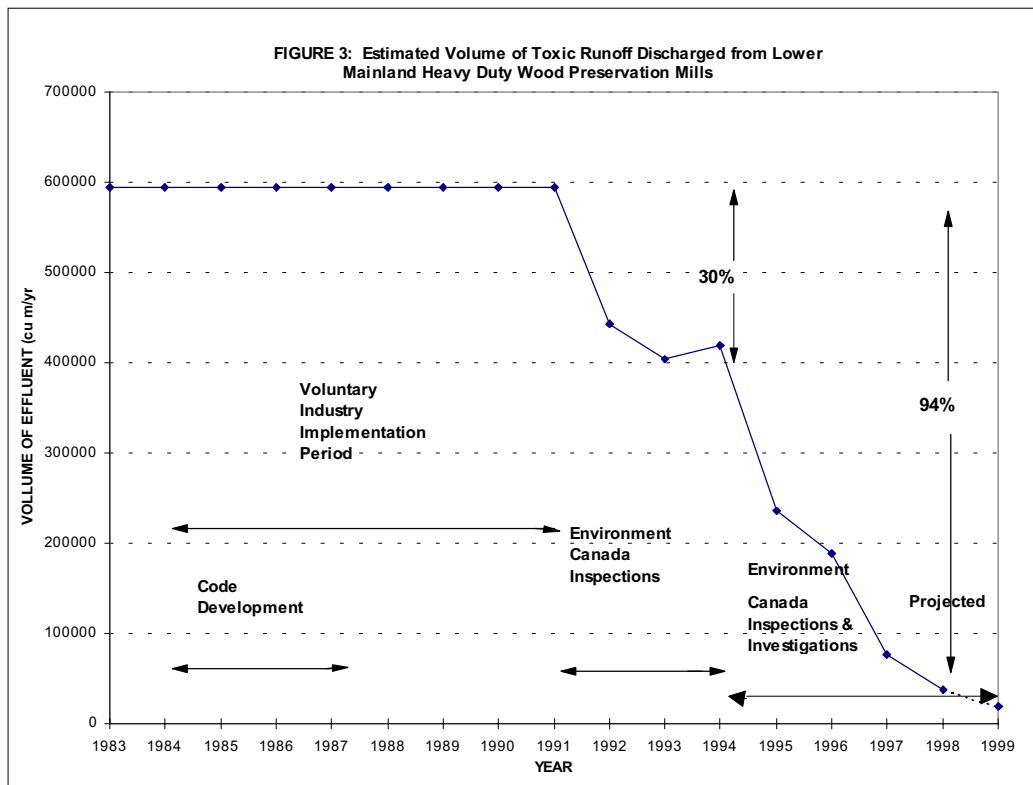
The frequency of federal inspections during the pre and post regulation phase averaged a minimum of twice per year or more for mills which were considered high risk. The federal inspection program required a significant diversion of resources away from the antisapstain industry to concentrate on the new pulp and paper program. The inspections were sometimes co-ordinated with provincial inspectors or conducted as random, unannounced inspections.

These inspections included sampling and testing for biochemical oxygen demand, total suspended solids and acute toxicity which were required under the Fisheries Act, Pulp and Paper Effluent Regulations (18,19). The same pattern of decline was observed in these three parameters but are not depicted in Figure 2.(3)

4. Case Study #3: Discharges of Acutely Lethal Effluent from Heavy Duty Wood Preservation Mills in British Columbia.

In 1983, the production of pressure or thermal treated lumber and poles resulted in similar contamination of storm water runoff as was observed in the anti-sapstain industry. There were an average of 19 to 21 operating mills in British Columbia compared to the 108 in the antisapstain group which used preservatives such as oil borne pentachlorophenol, creosote and water based mixtures of copper, chromium, arsenic and ammonia.

In co-operation with stakeholders and industry associations, Environment Canada developed 5 codes of practice which were not legally binding on the industry. (6,7,8,9,10) In 1987, Environment Canada informed the industry of the results of studies concerning contamination of soils and in particular, storm water runoff. The volume of acutely toxic storm water effluent discharged from six facilities in the Greater Vancouver Area was calculated to exceed 600,000 cubic meters per year. (3) (Figure 3)



From 1983 to 1991 the industry operated under a voluntary program to implement code of practice recommendations as the enforcement resources of Environment Canada were primarily directed towards the anti-sapstain and subsequently the pulp and paper industry. As these two industries moved towards compliance Environment Canada diverted inspection resources from them and implemented an inspection protocol which resulted in some improvement during the 1991 through 1993 period. In 1991 Environment Canada conducted further scientific research which confirmed that these mills were still discharging significant quantities of acutely toxic effluent and informed each mill by providing copies of the report which identified each facility. (11) Significant operational changes did not occur after the release of this information to the mills.

Under the federal Fraser River Action Plan (FRAP) Environment Canada's Inspection and Investigation divisions initiated an intensive inspection and investigation program which targeted all six Greater Vancouver mills. The program was initiated in February 1994 and continued into 1998. In Figure #3, the points on the curve indicate the reduction in the discharge of acutely lethal effluent which resulted as successive mills implemented physical and operational changes to reach near zero effluent discharges.

The enforcement program was conducted in co-operation with the BCMELP where Environment Canada conducted all the essential sampling and physical plant inspections. Four of the six mills were issued provincial pollution abatement orders under provincial legislation based on the data collected by Environment Canada. One mill (which was located on land under sole federal jurisdiction) was investigated however the mill managers initiated structural changes and soil cleanup programs in such a rapid manner that charges were not laid.

The surface assets of the sixth mill were sold to an operating company while the original owner retained the contaminated land. Operational practices conducted before and after the sale resulted in charges under the federal **Fisheries Act** being laid against both companies at the same site. At this site the **Fisheries Act** is the primary legislative enforcement tool for contaminated surface runoff and contaminated groundwater which may discharge into surface waters. The provincial legislation is used as the primary enforcement tool to control the movement of liquid contaminants and contaminated groundwater across property boundaries and cleanup of surface soils.

A 34% to 85% reduction in the quantities of environmentally harmful substances in Fraser River sediments adjacent to the five mills where investigations were initiated has recently been verified by follow up inspections.

5. Evaluation of the Three Case Studies.

The data from Figures 1, 2 and 3 were normalized by calculating the ratio of the quantity of pollutant discharged at any time divided by the quantity prior to the enforcement initiatives and converting to a percentage value. The three curves were then re-plotted in figure #4.

Figure 4: Normalized Graphs of Three British Columbia Forest Sector Industries Response to Environmental Law Enforcement Programs.

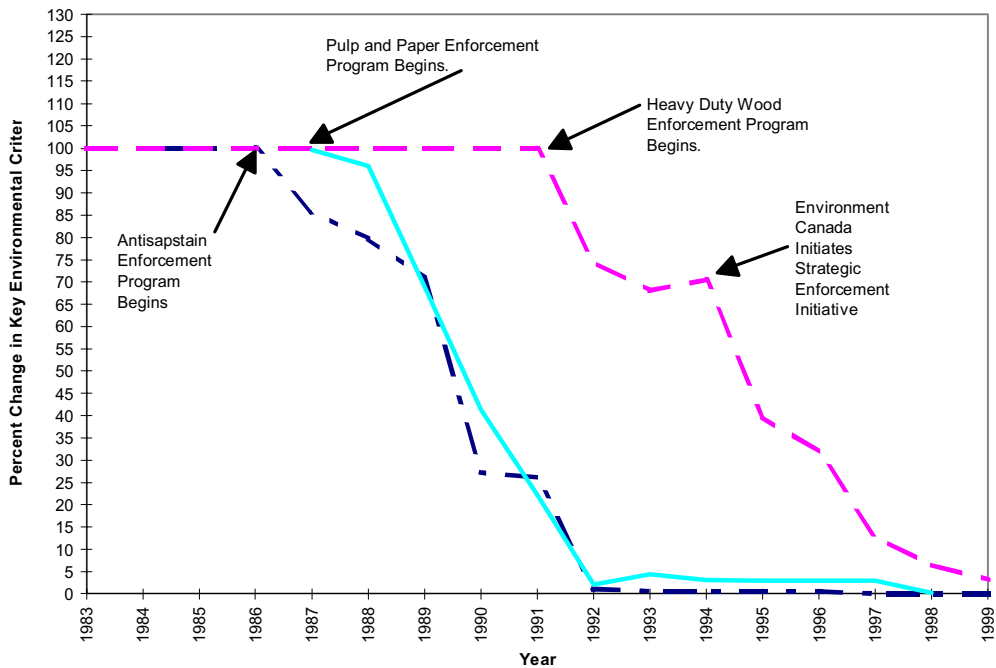


Figure #4 shows that the period of voluntary compliance resulted in negligible or unsatisfactory changes in the quantity of pollutants discharged in the Antisapstain Industry until the stronger inspection and investigation initiatives were implemented. This is followed by the decline in discharges from the pulp and paper industry as enforcement resources were diverted to deal with the dioxin, furan, BOD, TSS and toxicity issues.

As long as stronger enforcement resources were diverted to the anti-sapstain and pulp and paper industries the voluntary compliance and limited inspection activity in the Heavy Duty Wood Preservation industry resulted in negligible changes in the discharge of acutely toxic effluent. In 1991 inspection resources were diverted to the Heavy Duty Wood Preservation sector and minor improvements were observed but reached a plateau in 1992. In 1994, as soon as the strategic enforcement initiative was implemented and the mills were served with federal charges or provincial pollution abatement orders the discharge of pollutants declined dramatically.

These observations support the data reported in the 1996 Canadian Environmental Management Survey conducted independently by the KPMG Environmental Risk Management Practice. (12) (A division of KPMG Chartered Accountants) The KPMG study surveyed 1000 of the largest companies in Canada as ranked by the Financial Post, and 400 companies from the Canadian Corporate Disclosure data base (sales under \$28,000,000), as well as hospitals, municipalities, universities and school boards across Canada.

The 27% response rate was tabulated and determined that the overall ranking of top factors influencing organizations to take action on environmental issues remained unchanged in 1995.

The most influential factors were:

Compliance with regulations	>90%
Board of Director Liability	>70%
Employees	>60%

The least influential factors were:

Voluntary programs	15% to 20%
Interest groups	10% to 12%
Trade considerations	<10%

This explains the rapid change in the B.C. industries performance when corporate directors were faced with warning letters, pollution abatement orders and federal prosecutions.

6. Time Periods to achieve compliance

The time periods required to achieve the desired level of compliance varied depending on the duration of the voluntary program and the intensity with which the strategic enforcement initiatives were implemented. The Antisapstain industry required 7 years to reach what was considered an acceptable level which was the period from 1996 to 1992.

The pulp and paper industry required 5 years to implement the structural changes which covered the period from 1989 to 1994. The heavy duty wood industry required 7 years of which the first three consisted of a limited inspection program. From 1994 through 1997 the 19 facilities in B.C. were subjected to an unprecedented 85 inspections with the greater Vancouver mills subjected to 6 investigations and two prosecutions which accounted for the significant rate of decline in toxic discharges during the last three years of the program.

In the spring of 1997 Environment Canada and the B.C. Ministry of Environment met with the national associations of the heavy duty wood preservation industry to discuss the implementation of a national inspection program. The program would use the revised codes of practice (13) as the template to generate inspection questionnaires and would be applied similar to the program in British Columbia. The national association representatives concluded that the program would not be successful on a solely voluntary implementation basis and inquired if there was a legislative process which would ensure compliance by all mills in Canada. The national association was concerned with two issues: that the non-compliant mills in the other regions would have an economic advantage over the mills which had come into compliance and: that the environmental problems created by the non-compliant mills would reflect poorly on the public perception of the entire industry and negatively impact sales of their product in regional and world markets.

7. Economic Impact of Compliance and Enforcement Programs.

The cost of compliance and enforcement must be compared to the expenditures experienced by industry. With respect to the Antisapstain Wood Preservation program the industry conducted a study in 1988 and reported:

“The report prepared for COFI on the mitigative options for anti-sapstain contamination of storm water runoff, focused on five general approaches: covered storage, wrapping of treated lumber, physical and chemical treatment of runoff, kiln drying, and new alternative chemicals and technologies. The result of this investigation which was not reviewed by the government agency members is that the lowest cost option, which uses pre-engineered steel covered storage, would cost the industry over \$360 million. The annual costs for all options ranges from \$28 million to \$335 million. The report concludes the current export market advantage B.C. enjoys would be seriously eroded should these costs have to be incurred.” (1)

The initial cost estimates of \$10,000,000 per mill in 1988 were revised to \$5,300,000 in the industry generated report. (1) The actual costs experienced by 1996 ranged from \$1,000,000 to \$1,500,000 per mill (2)

Compliance and enforcement programs play a significant role in creating a level economic playing field, in a region or a country. For example, the typical pulp and paper mill in B.C. incurs costs of \$30.00 per tonne of pulp to comply with environmental standards. The average mill produces nearly 1,000 tonnes per day with a daily cost of \$30,000 or an annual cost of nearly \$9,000,000. If a mill of similar size in another region does not comply to the same standards it will gain an economic advantage of \$9,000,000 or more depending upon interest rates and capital cost factors. The \$9,000,000 costs may be considered an economic penalty by the compliant mill. This cost for complying with the law far exceeds the highest fines ever issued against any industrial facility in Canada for violation of the Fisheries Act or CEPA.

Operational costs of the Heavy Duty Wood Preservation enforcement program were monitored as part of the Fraser River Action Plan initiative which totaled approximately \$600,000 by Dec. 31, 1997. The industry costs to comply with the federal and provincial requirements will total \$39,000,000 by September 1998 as five of the six facilities come into compliance with federal and provincial requirements. This is nearly a 70:1 ratio of industry expenditure in response to federal government expenditure. The sixth company is still before the courts and costs to comply have not been fully assessed but may double this ratio.

These are first order costs and do not consider the multiplier effect through the economy where wages and expenditures by suppliers of technology, expertise and services result in additional economic benefits.

These economic issues extend beyond national borders where pulp and paper suppliers in competing countries may not be subject to the same environmental criteria as Canadian companies. Environment Canada has been active in supporting the development of regulations and enforcement programs in developing countries which will aid in protecting the global environment and help prevent the creation of "pollution havens". Programs specific to enforcement techniques have been conducted by the Pacific Regional Office in Mexico in 1993 and Thailand in 1997 and government inspectors from Indonesia and China have received training in North Vancouver in 1995 and 1997 respectively.

8. Enforcement Premium

The compliance rates of 19 industrial sectors were examined as part of the FRAP review which compared industrial groups which were subject to voluntary programs vs. those which had undergone voluntary plus strategic enforcement initiatives. Appendix II shows that those industries which relied on self monitoring or voluntary compliance programs average a 60% implementation of best management practices. Significant discharges of harmful substances or destruction of fish habitat continued. (3)

Those industries which must comply with a regulation and which were subjected to federal or combined federal/provincial inspections and/or 4 to 5 years of sustained enforcement initiatives averaged 94% compliance rates. The discharges of harmful substances frequently decreased by over 90% from the pre-enforcement period. (3) The premium for a comprehensive compliance promotion and enforcement program is therefore approximately 30% improvement in best management practices or regulatory compliance with reductions in harmful substance discharges (or habitat degradation) of over 90%.

9. Future Compliance and Enforcement Strategies

The primary focus of compliance and enforcement programs by the Federal Department of Environment has been on large point sources such as pulp and paper mills, mines, sawmills and heavy duty wood treatment facilities. These were sources of large volume discharges of environmentally harmful substances which frequently caused acutely lethal effects in organisms such as fish living in the receiving environment. As these large point sources are brought under control there are two emerging issues which will challenge how compliance and enforcement resources are deployed.

The first relates to current research which indicates that discharges from industrial facilities and pesticides may still release significant quantities of natural or artificial chemicals such as “endocrine disruptors” which can cause sublethal damage to organisms in the receiving environment. If these “newly identified” chemicals are confirmed to be priorities they will establish a new baseline in terms of quantities discharged and compliance with a best management practice or regulation. In effect the lines in figure 4 will move back up to the 100% discharge level for these new chemicals. The extent to which compliance and enforcement resources are diverted to these new issues will have to be balanced against the second issue.

The second is with respect to research conducted under the Fraser River Action Plan. Smaller, diffuse, non-point sources such as farms, ranches, households with septic systems, new residential subdivisions, commercial areas, transportation routes and municipal sewage discharges have significant impacts on water quality and fish and wildlife habitat. These smaller sources are more numerous and distributed over a much larger area than the large point sources such as pulp and paper mills, mines and wood preservation facilities. The large number of private individuals who are owners and managers creates communication challenges concerning the technical requirements of the regulations and logistical problems to inspect all the facilities with limited personnel resources.

The pollution abatement, compliance and enforcement divisions will have to determine which priority represents the greatest return on the available compliance and enforcement resources. The impact of agriculture and ranching on stream side riparian zones and water quality has resulted in hundreds if not thousands of kilometers of deteriorated stream beds which significantly impair or prevent spawning and rearing of fish. This is not a criticism on these particular industries which have initiated peer programs and are in the development of stream stewardship programs.

It is presented in terms of the type of choice which must be made. This industry is currently at its original baseline stage which is comparable to the situation that the anti-sapstain, pulp and paper and heavy duty wood industries were operating in the early 1980's. If there are no new resources or a reduction in terms of personnel and operating funds then a clear choice will have to be made as to whether or not compliance and enforcement resources are directed towards these issues.

As the number of inspectable targets increases, the demand on enforcement resources increases and the strategies deal with these issues are likely to result in earlier participation in compliance promotion programs. In the three case studies, "hard enforcement" in the form of prosecutions for incidences of noncompliance related to best management or regulatory requirements were very limited. In the antisapstain industry, 2 mills out of 108 were prosecuted for non-compliance with best management practices. The prosecution ratio was zero for 17 mills subject to the dioxin and furan regulations for pulp and paper mills and 2 out of 19 in the heavy duty wood industry. Prosecution is likely to be used on average in 0.5% to 1% of the facilities in any industry group. The primary mechanisms which achieve compliance are repeated inspections, issuing of federal warning letters and direction letters. (Ticketing provisions have not yet been added to the list of tools which can be utilized by federal pollution inspectors.)

In the case of agriculture and ranching in British Columbia with at least 10,000 inspectable sites this ratio would result in a minimum of 50 to 100 prosecutions which would likely exceed the capacity of the investigation resources available for all federal (and most likely provincial) pollution prosecutions in B.C. Other tools such as federal ticketing powers may be required to achieve a reasonable level of compliance .

10. **Overlap and Duplication of Effort**

In British Columbia there are currently 7 inspectors 5 emergency response personnel and 3 investigators employed on a full time basis in the Environmental Protection Branch. During strategic enforcement initiatives, experienced managers may be required to participate directly to supplement personnel requirements. In 1998/99 the Pacific Regional Inspections Section will plan inspection programs for 56 regulatory initiatives under **CEPA** and the **Fisheries Act**, (and provide limited support to the federal Wild Life Section under the **Migratory Birds Act (MBA)**, **Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act (WAPRITA)** and **Convention on International Trade in Endangered Species (CITES)**. The number of facilities subject to federal legislation is now over 17,200 facilities. The three case studies have illustrated that the combined efforts of federal and provincial compliance and enforcement resources are required to effectively implement improvements in the environmental compliance and reduce discharges of harmful substances. Even with existing resources the departments had to be selective in order to achieve acceptable goals while leaving other polluting industries relatively untouched. The impression that there is large scale duplication of effort and the implication that there are large cost savings and improved environmental performance which can be achieved by removing overlap and duplication is largely a myth unsupported by any data.

The role that the federal government played in the example of the pulp and paper industry was to set a broad based national standard which the provincial governments could adopt or set more stringent standards. Equitable enforcement of the standards would reduce or eliminate the financial benefits of non-compliance and inhibit the establishment of so called "pollution havens". In British Columbia, in 1997, the federal inspection, investigation and pollution abatement divisions played a significant role in supporting 5 investigations with the B. C. Ministry of Environment by providing field and technical expertise, preparation of court briefs and testimony in prosecutions of pulp and paper mills for violations of federal and provincial standards.

In the case of the antisapstain and heavy duty wood preservation industries (which when combined, are the single largest economic sector in British Columbia that had sales in excess of \$4,000,000,000 annually), the federal government demonstrated that there was a strategic importance in having an independent enforcement division which could target a non-compliant industrial group. The result was a strong federal enforcement presence which supported the objectives of the British Columbia Ministry of Environment Lands and Parks and eventually achieved an acceptable environmental standard at a significantly lower cost than was predicted by the industry.

Many compliance negotiations involve representatives from the federal Department of Environment, Department of Fisheries and Oceans and B.C. Ministry of Environment. There are numerous examples where federal legislation is better suited to deal with the specifics of the case than provincial legislation (and vice versa) In certain instances both will apply and frequently the combined resources of all three agencies are required to achieve compliance. Even with combined resources the Department of Environment must still be selective in which situations will eventually be prosecuted. Every effort is made to apply at least one of the available enforcement tools to motivate a change in behavior that leads to compliance with Canada's environmental legislation.

Appendix I

Table of Federal Regulatory Initiatives and Estimated Size of Regulated Communities

Act	Reg. #	Regulation	Estimated Size of Regulated Community
CEPA	A.1	Asbestos Mines and Mills Release Reg.	0
	A.2	Chlor-Alkali Mercury Release Regs.	0
	A.3	Chlorobiphenyls Regs.	645
	A.4	Chloroflourocarbon Regs	0
	A.5	Benzene in Gasoline Regulations	50
	A.6	Contaminated Fuel Regulations	20
	A.7	Diesel Fuel Regulations	1600
	A.8	Export and Import of Hazardous Waste Regs	50
	A.9	Federal Mobile PCB Treatment and Destruction	1
	A.10	Fuels Information Reg.. No. 1	20
	A.11	Gasoline Regulations	5
	A.12	New Substances Notifications Regulations	8
	A.13	Ocean Dumping Regulations	108
	A.14	Ozone-Depleting Substances Regs	57
	A.15	Ozone-Depleting Products Regs	15
	A.16	Phosphorus Concentration Regs	45
	A.17	PCB Waste Export Regs, 1996	0
	A.18	Prohibition of Certain Toxic Substances Regs.	5
	A.19	Pulp and Paper Mill Defoamer and Wood Chip	18
	A.20	Pulp and Paper Mill Chlorinated Dioxin/Furan	18
	A.21	Registration of Storage Tank System (petrol)	250
	A.22	Secondary Smelter Release Regulations	1

A.23	Storage of PCB Materials Regs.	490
A.24	Toxic Substances Export Notification Regs	1
A.25	Vinyl Chloride Release Regs. 1992	0
A.26	Perchloroethylene (Dry Cleaners) Draft reg.	Unknown ?
A.27	Halocarbon Regulations	Unknown ?

CEPA
Notices.

B.1	Notice re: Nat. Pollutant Release Inventory.	120
C.1	Glycol Guidelines	10
CEPA TOTAL		3537.00

MFAA

D.1	Manganese-based Fuel Additives Act.	1600
MFAA total		1600

Fisheries Act

E.1	Chlor-Alkali Mercury Liquid Effluent Regs	0
E.2	Meat and Poultry Products Plant Liq. Eff. Regs	5
E.3	Metal Mining Liquid Eff. Regulations	20
E.4	Petroleum Refinery Liquid Effluent Regs.	2
E.5	Potato Processing Plant Liquid Eff. Regs	5
E.6	Pulp and Paper Effluent Regulations	27
E.7	Shellfish Regulations	10

F. A.36.(3)

F.1	Agriculture Dry Agriculture Wet	10000
F.2	Antisapstain Dry Antisapstain Wet	51
F.3	Auto Recyclers	
F.4	Bulk Loading Dry Bulk Loading Wet	17
F.5	Dairy Processing Facilities	20
F.6	Fish Processing	30

F.7	Industrial Storm Dry	300
	Industrial Storm Wet	
F.8	Municipal STP	12
F.9	Pesticide Dry	1000
	Pesticide Wet	
	Pesticide Overflights	
F.10	Readymix Concrete Dry	100
	Readymix Concrete Wet	
F.11	Ship Repair Dry	310
	Ship Repair Wet	
F.12	Wood Preservation Dry	19
	Wood Preservation Wet	
F.13	Non MMLER Mines	??
F.14	Contaminated Sites	100

	FA Total	12028
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Migratory Birds Act

G.1	Aviculture Inspections	15
G.2	Taxidermy Inspections	8
G.3	Wildlife Rehabilitation	3

	MBA total	26
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WAPRITA

H.1	Customs Inspections	10
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	WAPRITA total	10
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CITES

I.1	Customs inspections	10
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	CITES total	10
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	Grand Total	17211.00
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Appendix II

Comparison of 1996 Compliance or Best Management Practice Implementation Rates for Federally Regulated and Non-Regulated Sectors in British Columbia (3)

Regulation or Industrial Group	% Compliance under Mandatory Federal Regulations (1996 Data)	% Implementation of Best Management Practices under Voluntary Programs (1996 Data)
Pulp and Paper Dioxin and Furan	99	
Export and Import of Hazardous Wastes	100	
Ocean Dumping	91	
Ozone Depleting Substances (Bulk)	73	
Ozone Depleting Substances (Products)	94	
PCB In Service Equipment	100	
PCB Waste Storage	94	
Pulp and Paper Wood chip and defoamer	100	
Agriculture		30
Antisapstain Wood Preservation		87
		*7 year Federal Program + Provincial Regulation
Dry Bulk Loading		61
Fish Processing		41

Heavy Duty Wood Preservation	89	* 4 year Federal enforcemen t program under the Fraser River Action Plan
Metal Mining	90	
Municipal Sewage Treatment Plants	45	
Pesticide Use	100	
Pulp & Paper Effluent, Fisheries Act. Toxicity BOD TSS	98	
Ready Mix Concrete	70	
Ship Building & Repair	57	

Average Values	94%	60%
	Federally regulated and enforced.	Voluntary programs includes two federal enforcement initiatives otherwise average would be lower.

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