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by

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PESTICIDES:

AN EXAMINATION OF

CANADIAN LAW AND POLICY+

by

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*To Follow.

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I. INTRODUCTION

Pesticides[1] are used extensively in agriculture, forestry and the home in both Canada[2] and other nations[3] to control insects, weeds and other pests. Accepted as essential beneficial ingredients particularly in global,[4] as well as Canadian,[5] agricultural food production programs, pesticides also pose serious environmental and human health threats domestically[6] and internationally.[7] In Canada, the contradiction between agricultural and other benefits on the one hand, and environmental health damage on the other, has increasingly drawn federal, provincial, municipal governments and the public to seek both preventive and remedial solutions to the problem.[8]

This paper will focus initially on the environmental and human health problems presented by pesticides. A discussion of the adequacy of, and difficulties in, applying common law remedies to pesticide - related damage follows. Constitutional underpinnings of federal and provincial legislative authority in this area are briefly noted. The paper then analyzes the origins and adequacy of current legislation and policy, with emphasis on the federal level, with respect to both the front and back-end of pesticide regulation. Front-end or preventive techniques, such as pesticide registration, tolerance setting for residues on food and permitted usages are examined in conjunction with back-end or remedial-enforcement approaches of an administrative, criminal and quasi-criminal nature such as re-evaluation, re-classification, suspension, cancellation, administrative orders and prosecutions. Non-regulatory mechanisms and their relationship to existing law are also examined where they may suggest areas of future regulatory control or alternatives that would reduce dependence on pesticide use and

resulting enforcement needs. International efforts, such as natural resource protection in the Great Lakes and attempts to achieve harmony in national pesticide registration requirements, are reviewed because of the impact they may have on Canada's pesticide regulatory program. The paper concludes with a number of law reform recommendations and a brief final assessment of current and future prospects for preventive and remedial strategies in the control of pesticides in Canada.

II. THE NATURE AND MAGNITUDE OF THE ENVIRONMENTAL AND HUMAN HEALTH PROBLEMS POSED BY PESTICIDES IN CANADA

The use of pesticides involves the deliberate application to land or water of chemicals which are intended to be poisonous to selected organisms.[9] Since the 1940's, when synthetic organic pesticides became commercially available, there has been a substantial, if not dramatic, increase in pesticide sales and use in Canada[10] and worldwide.[11] Between 1970 and 1975 there was a six-fold increase in the annual sale of agricultural herbicides in Canada, from $21 million to approximately $130 million.[12] At least 10 million acres in 1975 were treated with herbicides on the Canadian Prairies, where the greatest increase in herbicide use has been experienced.[13] By 1978, this had increased to at least 15.5 million acres.[14] In both 1976 and 1977 an average of 9.6 million pounds of phenoxy herbicides[15] alone, were sold each year by the Canadian agricultural chemical industry.[16] And between 1975 and 1979 expenditures on pesticides[17] by Canadian farmers increased from $163 million a year to more than $350 million, an increase of over 100 per cent.[18] According to the federal government this indicated "a substantial rise in the use of pesticides, principally herbicides".[19] Whether these figures represent the total picture regarding pesticide use in Canada is unclear because, according to the federal government, expenditures by all levels of government for control of forest insects and weeds along rights-of-way, "are not readily available."[20] Moreover, despite recent attempts by some provinces to determine exactly which pesticides are used, by whom, how frequently, at what application rates, on how much acreage, where and in what quantities, information of this type does not appear to be systematically available nationally.[21]

While the application of pesticides has been viewed as providing benefits to society in the form of increased agricultural yields and the control of diseases,[22] two main categories of undesirable effects resulting from pesticide use have been identified. These are (1) the development of resistance in pest species[23] and; (2) the impact on non-target species and ecosystems.[24] With regard to the latter concern, the United Nations Environment Programme has noted that:

> "When carelessly applied, chemical pesticides can result in acute and long-term side effects including sickness and death of people, useful animals, fish and birds, and destruction of crops. Even when properly used, chemical pesticides have a number of unavoidable side-effects. Their persistence and ubiquitous nature, coupled with a tendency for some compounds to concentrate in organisms as they move up the food chain, may increase their toxicity to fish, birds and other forms of life, including man, and cause other harmful effects on man's health and well-being."[25]

Recent examples across Canada demonstrate that the human health and environmental problems posed by pesticides are national in scope and the sources or pathways of possible contamination numerous, including air, water, land, food and drinking water. The following examples also show problems arising at all stages of pesticide regulation, including registration, use and disposal:

- Fish and Wildlife Kills. In New Brunswick during 1975, at least 3 million birds were killed from aerial spraying of approximately 7 million acres of forest to combat the spruce budworm. The insecticides phosphamidon and to a lesser extent fenitrothion were primarily responsible for the kills. Although the rates of application of individual insecticide compounds used are registered for forest protection, the practice of multiple application of insecticides is not covered by the registration process. As well, the overlapping of aerial sprays resulted in increased dosages of insecticides and consequently greater mortality rates.[26]

Carbofuran, a highly toxic carbamate insecticide, caused mortality in wild ducks in the Fraser River delta in British Columbia between 1973 and 1975. During autumn migration, ducks feeding in fields were killed by ingestion of the insecticide granules in three separate incidents during this period. Following the third duck kill, the manufacturer voluntarily withdrew the product from B.C. markets. Lack of proper field testing of the product in the area of proposed use prior to registration, has been argued to be a reason for the kills.[27]

Millions of honey bees were killed by insecticides throughout southern Quebec in 1980, following regular farmer aerial spraying of corn crops for caterpillar control. Fifty per cent of the province's honey producers were affected, with financial losses estimated to be at least $5 million.[28]

In 1979, in Ontario, following the roadside spraying of the herbicides 2,4-D and 2,4-DP along a ditch to control brush and weeds, 70,000 trout were killed when the chemicals reached a nearby body of water. The fish kill involved at least 20 percent of a trout farmer's stocks and resulted from the unsupervised spraying of the road right-of-way by an unlicensed 20-year old sprayer.[29]

- Farm worker poisonings and other effects from pesticide exposure. In 1983, a coroner's inquest into the death of a 20-year old British Columbia farm worker ended in a jury finding that his pesticide poisoning was the result of a preventable homicide. Testimony at the inquest indicated that the farmer was poisoned by the chemical Monitor at a farm where pesticides were sprayed

while workers harvested nearby, pesticide containers were disposed of haphazardly, little protective clothing or washing facilities were provided to workers, and where they were transported in vans that carried pesticides.[30]

A 1982 federally-sponsored study investigating the effects of pesticides on farm workers in British Columbia generally, found that 55 per cent of workers surveyed had been directly sprayed; 79.5 per cent had to work in fields which had just been sprayed; more than 25 per cent had their living quarters sprayed; and that while 7 out of 10 became physically ill after a direct spraying, less than 4 per cent of growers obtained medical help for their workers. Over 50 percent of workers exposed to pesticides reported that they suffered headaches; 44 per cent suffered from skin rashes; 35 per cent had experienced dizziness; and 36 per cent suffered from burning eyes. Almost 70 per cent of the workers had no proper wash-up facilities and over 80 percent had no choice but to eat lunch in sprayed field areas.[31] The study concluded that current agricultural practices in B.C. ensure that farm workers face widespread low-level exposure to dozens of extremely toxic pesticides.[32]

- Human health concerns in the general population. In the 1970s a series of research projects at Dalhousie University were prompted by the observation that children living near forest spraying operations in New Brunswick were suffering from a higher incidence of Reye's syndrome than children living in Nova Scotia, where no chemical insecticide spraying was conducted. By 1979, cases monitored by a Halifax hospital indicated that of the 21 confirmed cases seen from all of the Maritimes, 17 were from New Brunswick. Thus, while New Brunswick has only 40 per cent of the population at risk

(that is, children from birth to 18 years of age) it had 80 per cent of the Reye's syndrome cases. In 1980 and 1981, at least two more cases per year occurred in New Brunswick, an incidence rate nearly double the American rate of 1 per 200,000 population at risk. Statistics Canada figures on the incidence of new cases of cancer in New Brunswick and Nova Scotia indicate that New Brunswick's rate is much higher than Nova Scotia's although the two provinces have similar climate, industry and socio-economic conditions. The key difference is that New Brunswick has a massive aerial pesticide spray program.[33]

Toronto drinking water from Lake Ontario contains several pesticides which may be carcinogenic including lindane, heptachlor epoxide, dieldrin, ~~a~~-BHC and B-BHC. Moreover, existing water treatment plants fail to eliminate most of these pesticides in the water supply. A comparison of organic contaminants before and after treatment at a Toronto water treatment plant showed that 100 per cent of all of the above pesticides except dieldrin pass through the treatment process undiminished.[34]

• Environmental contamination. DDT was one of the first synthetic organo-chemical insecticides to be used in the 1940s, and it is still used on a large scale in many parts of the world.[35] In Canada, the use of DDT reached 1,250 tons in 1966, but has been restricted to small quantities since 1970. DDT seriously affected the reproduction of carnivorous birds, such as the peregrin falcon, which by 1972 had fewer than ten pairs remaining in Canada between the Rockies and the Atlantic.[36] Even though DDT was severely restricted in Ontario over a decade ago, its extremely persistent breakdown product PP DDE is still detected in Lake Ontario and

passes through Toronto's water treatment process undiminished.[37] Despite the early 1970's bans or restrictions of DDT in both Canada and the United States, by 1978 the average concentration of DDT in Lake Superior fish had not declined from levels reported from previous years.[38]

Federal environmental researchers in 1981 discovered that agricultural and industrial chemicals used in the Prairies are causing significant numbers of mutations in some animal life in a major Saskatchewan lake. The high incidence of mutations in one species of insect in the lake indicates that the impact of chemical contaminants on the lake's ecosystem is substantial and suggests possible future environmental problems in the Prairies.[39]

Endrin, a chlorinated insecticide used primarily on potatoes and grains in the Maritimes, has been found in concentrations in Prince Edward Island estuary sediments very similar in magnitude to endrin residue concentrations in southern latitudes where the chemical has been used extensively. However, the quantity of endrin used in the Atlantic provinces is unknown. Fish kills in P.E.I. from endrin have resulted from improper agricultural handling of the pesticide.[40] Endrin is extremely persistent, bio-accumulates and can affect the liver and central nervous system.[41]

A 1979 clean-up program conducted in southern Alberta by the provincial government, recovered nearly one thousand pesticide containers from eighteen landfills or dumps south of Lethbridge, Alberta. Six of the sites were classified as "having a high risk of pesticide residue getting into a waterbody or system", and an additional four sites were classified as being "environmental hazards".[42] In Saskatchewan, where almost one million

herbicide and pesticide containers are used a year, a growing problem also exists of empty cans accumulating at town dumps and posing a pollution hazard. In 1982, one town alone had 150 such containers at its local dump with other cans littering riverbanks in the area.[43]

Studies in 1980 indicated that fenitrothion, an organophosphate insecticide used for the control of forest pests, particularly the spruce budworm, has the potential to contaminate at trace levels, shellfish, including clams, mussels and oysters, over a widespread area of the Maritimes. Shellfish in areas as far as 50 kilometers from sprayed areas were found to be contaminated. Significantly high, if transitory, contamination levels were evident the closer shellfish were found to sprayed areas.[44]

• Scientifically invalid pesticide safety testing. The United States Food and Drug Administration (US FDA) and the United States Environmental Protection Agency (US EPA), as a result of a series of audits beginning in 1976 regarding chemical safety testing practices at U.S. laboratories, reported finding "serious deficiencies" in tests conducted by Industrial Bio-Test Laboratories, Inc. (IBT), an Illinois-based commercial testing lab. These deficiencies were found in tests IBT conducted for manufacturers to support the registration and marketing of numerous pesticides, chemicals and drugs in both the United States and Canada.[45] When problems in IBT's data were discovered, the two federal governments in 1977, began joint investigations to re-examine the studies on all pesticides whose registration was supported in whole or in part by IBT data.[46] Of the original 1205 IBT studies respecting 212 pesticides identified by US EPA, 801 studies on 140 pesticides

are considered significant to regulatory decisions respecting induction of tumors, birth defects, genetic mutations, neurotoxicity and other chronic reproductive effects.[47] Among the 801 health studies reviewed, 74 per cent of these studies have been found to be invalid by US EPA and the Health Protection Branch, Health and Welfare Canada as of July 1983. Eighty-six per cent of the tests IBT performed to determine if the pesticides cause birth defects are invalid; 83 per cent of the tests for cancer are invalid; 79 per cent of the tests for mutations are invalid; and 71 per cent of the tests for reproductive problems are invalid.[48] In Canada 113 pesticides were originally dependent in whole or in part on IBT data.[49] While replacement studies have been completed or are underway in many instances,[50] as of June 1983 the safety of over 40 of the pesticides tested by IBT and in use in Canada was still in question.[51] In 1981, four former IBT executives were indicted by a federal grand jury in Chicago.[52] The indictment alleges that the defendants entered into a scheme to defraud the sponsors of the studies, US EPA and US FDA by producing reports which contained false study descriptions, fabricated data, and fraudulent conclusions.[53]

The above examples indicate that pesticide damage is occurring across Canada through multiple environmental pathways and at every stage in the regulatory process. As well, the increasing total quantities of pesticides used in Canada include a large number of new and existing active pesticide ingredients[54] and formulated control products,[55] which now number approximately 600 and 5000 respectively.[56] Given the widespread use of pesticides, many segments of society, including farmers, industry, the medical and public health community, governments and environmental groups, have an interest in the purposes and

and effectiveness of the regulatory and enforcement process for pesticides in Canada. Before proceeding to a discussion of the institutional framework that has evolved for control of pesticides, a brief examination is undertaken of the role the common law has played in compensating or enjoining pesticide-related injury.

III. THE ROLE OF THE COURTS IN CONTROL OF PESTICIDES DAMAGE: AN EVALUATION OF THE EFFECTIVENESS OF THE COMMON LAW

The increased use of chemical pesticides since the end of World War II as well as greater public awareness of adverse human and environmental impacts associated with exposure to these chemicals, have led many to seek redress in the courts for damage to health and property. There are a number of traditional common law causes of action available to those seeking compensation (damages) or an injunction for pesticide damage.

These include the torts of nuisance (both private and public), strict liability, trespass, negligence, assault and battery.[57] There may also be actions for breach of contract or warranty regarding the fitness for intended purpose of certain pesticides. The scope and restrictions on these causes of action are discussed below. An analysis of the cases shows that while the common law may provide adequate redress for short term health impacts and damage to property, there are considerable obstacles to obtaining compensation for long term health effects from pesticide exposure.

There have been a significant number of decided cases in Canada involving short-term pesticide-related damage. One explanation for this may be the fact that pesticides are, by design, meant to be toxic to certain organisms and as such are deliberately applied to the environment.[58]

A. Private Nuisance

Private nuisance is defined as an unreasonable interference with the owner

or occupier's use and enjoyment of land.[59] This is the cause of action most often used in cases involving pesticide drift, where damages have occurred to health or property. The elements to be proved in a private nuisance action depend on what sort of damage has occurred; i.e. whether there has been material damage to property (for example, loss of crops) or health[60] or personal inconvenience or annoyance. If the activity results in actual damage to property or health, it will be found to be a nuisance even if the defendant's use of his land was reasonable and valuable to the community.[61] If it results in only personal inconvenience and annoyance, the interference must be substantial, i.e. more than the ordinary person ought to bear in the circumstances. The "circumstances" involve consideration of the character of the neighbourhood (e.g. rural or industrial);[62] the severity and frequency of the annoyance; and whether the plaintiff reacts as an ordinary person would.[63] While this distinction between physical harm to land and inconvenience is not always an easy one to make,[64] it appears that material damage to crops and health from pesticide exposure would fall into the former category.

In all cases, actual damage is an essential element to be proved. However, the courts have held that the burden of proving damages is a relatively easy one and that even where there is only interference with comfort and convenience caused by pesticide drift; no permanent loss or injury to health needs to be proved.[65]

While a nuisance is usually created by acts done on land in occupation of the defendant adjoining or in the neighbourhood of the plaintiff's land, that is not invariably the case. A nuisance may be created elsewhere "e.g. on a highway adjoining the plaintiff's land, or in a navigable river, or in some place of public resort".[66] Stevenson, J. in Bridges Brothers Ltd. v. Forest

Protection Ltd.[67] extended that proposition to the aerial spraying of fenitrothion for spruce budworm in New Brunswick, by the defendants on forest lands adjacent to the plaintiff's property, where ownership of these lands was not established. In that case, the plaintiff suffered property damage when the insecticide reduced the number of pollinating bees, adversely affecting the pollination of blueberry flowers.

The Court also adopted the reasoning in Newman v. Conair Aviation Ltd.,[68] another case involving pesticide drift of an insecticide dimethalate (Cygon 4E). The Court in that case found that it was no defence to an action for nuisance to show that the defendant's operation of his farm is a useful one necessary to the public interest,[69] or that it is carried on with all care and skill and every effort is made to prevent it from being a nuisance.[70] The Court indicated that negligence does not have to be shown in a claim for nuisance.[71]

Further, while a nuisance commonly arises from a continuing state of affairs, isolated or temporary events have been held to be nuisances. Salmond states that "The truth is that all wrongful escapes of deleterious things, whether continuous, intermittent, or isolated, are equally capable of being classed as nuisances." Salmond was cited with approval in the Bridges Bros. Ltd. case,[72] and it is clear that a single spray event can be held to be a nuisance.

The main defences to a nuisance action include (a) statutory authority (b) prescription[73] or (c) acquiesence.[74] The principle defence raised in regard to damages caused by pesticide use is statutory authority. This defence applies where a defendant can show that he was permitted by statute to act in

a way which resulted in the nuisance. This defence only applies when the nuisance is the inevitable result of the authorization, not when it can be avoided.[75] Further, the onus of proving inevitability lies with the defendant, who may satisfy it by showing that all reasonable care was exercised according to the state of scientific knowledge at the time and practical feasibility.[76] The statute, or permit, is usually construed very strictly.

In the Bridges Bros. case, the defendant claimed that its activity was justified by the statutory authority provided by s.3 of the Forest Service Act[77] which provided that the Lieutenant-Governor-in-Council was to maintain a forest service to protect the forest from insects. Section 3(2) provided that "subject to the approval of the Lieutenant-Governor-in-Council, the Ministry may enter into agreements...with any person to undertake to carry out operations for protecting the forests from fire, insects and disease". While the shareholders in the defendant company, Forest Protection Ltd. (FPL) included the Province of New Brunswick and eight companies engaged in the pulp and paper industry, the Court found that (a) there was no evidence that FPL was considered as constituting part of the forest service maintained by the Lieutenant-Governor-in-Council and (b) there was no evidence of either written agreements or more importantly, any Order-In-Council as required by section 3(2).[78] Therefore,FPL could not avail itself of the defence of statutory authority.

In Friesen et al. v. Forest Protection Ltd.,[79] another case involving damages caused by the spraying of fenitrothion, the defendant company again claimed that its spraying activity was justified by the statutory authority of s.3 of the Forest Service Act. This time there was an Order-in-Council and a written agreement between the Minister of Natural Resources and FPL to undertake the

aerial spraying of approximately 9.6 million acres of the forests in New Brunswick in 1976, which the defendant relied upon.[80] Notwithstanding these clauses, the Court held that the defendant could not avail itself of the defence of statutory authority as there was no express authority to place spray, at least without consent, on private lands to the detriment of private rights of the owner.[81]

Interestingly, in response to the Court's findings of liability in these cases, the New Brunswick legislature in 1978 amended the Forest Service Act to specifically allow aerial spraying of pesticides on private land.[82] In addition, the Act was amended to limit citizens' rights to sue in nuisance and trespass. Specifically, an action will lie only where the nuisance or trespass results in actual injury to persons or actual damage to property.[83]

The final element to be discussed in establishing a private nuisance is causation. Causation refers to the requirement that the plaintiff show on the balance of probabilities that there is a connection or link between the wrongful act and the damage.[84] The usual test is that the plaintiff must prove that without the act of the defendant he would have no damage.[85]

It is here that the tort system begins to break down for cases involving pesticide injury. While most of the decided cases deal with the immediate effects of pesticides; i.e. damage to crops and short term health impacts, (e.g. nausea, headaches) it is the long term health implications of pesticide exposure that are difficult to prove.[86]

This is especially the case when one is trying to prove future harm and predict that specific pesticides will have adverse effects on human health or the environment, and that for this reason the application of the pesticide should be halted or should not occur.[87] For example, in the Supreme Court of Nova Scotia in September 1983, 15 Cape Breton landowners, in a representative action, were unsuccessful in obtaining a permanent injunction based on private nuisance and related causes of action[88] to prevent Nova Scotia Forest Industries from spraying certain forest areas in Nova Scotia with the herbicides 2,4-D and 2,4,5,-T.[89]

In August 1982, the plaintiffs had been successful in obtaining both an interim and an interlocutory injunction preventing the spraying of these pesticides.[90] Highly technical evidence was presented in Court relating to the effects of these herbicides on human health. The bulk of the evidence focused on the contaminant 2,3,7,8 TCDD (dioxin) found in the herbicide 2,4,5,-T, which is thought to be the most potent carcinogenic and teratogenic chemical known to man.[91] The defendant company argued that relief should not be given to the plaintiffs as they had not presented evidence of impending harm and had only indicated a remote and problematic possibility of harm.[92]

Burchell, J. in granting the interlocutory injunction, discussed the hurdles set out in American Cyanamid[93] and other cases[94] that were necessary for the plaintiffs to overcome in order to obtain the injunction. The tests were that (1) the claim was not frivolous or vexatious (2) that there was a real question to be tried and (3) that the applicant has some "real prospect

of succeeding".[95] The Court held that having regard for the subject material and the serious nature of the harm anticipated, the claim could not be characterized as frivolous. Again, because of the public concern and scientific controversy out of which the case arose, there was clearly a serious question to be tried.[96]

Where the Court had difficulty was with the question of whether the plaintiffs had a real prospect of succeeding. The Court stated that the weakness of the plaintiffs' case was that it stood upon a possibility (rather than a certainty) of harm extrapolated from laboratory experiments and uncertain epidemiological data.[97] However, the Court held that unless it could be shown that the spraying activity could be conducted without hazards, the plaintiff should be able to refuse the kind of risk that was to be imposed upon them.[98] Burchell, J. went on to find that there were special considerations in this case that called for a relaxation of any strict rule as to "*prima facie*" or threshold levels of proof. Finally, if the interlocutory injunction were not granted, the spraying would occur and it would be pointless to proceed to trial.[99] In granting this injunction, the Court required the usual undertakings by the plaintiffs to guarantee that they will be responsible for all costs and damages claimed by the defendant company, should the decision go against them.[100]

The trial commenced on May 5, 1983 in the Nova Scotia Supreme Court before Mr. Justice Nunn and concluded at the beginning of June. As anticipated,

a key issue at trial was whether a causal link between the application of the two herbicides and adverse health effects could be established by the plaintiffs.[101] The difficulty is that these health implications may not manifest themselves for many decades after the initial exposure to the pesticide.[101a] As noted by the Judge over 40,000 articles have been written about dioxin and its effects, many of which were submitted to the court.[102] The court had to grapple with the conflicting scientific opinions that were presented by over 30 expert witnesses.

The plaintiffs based their case on evidence that even a small amount of dioxin can cause cancer and other adverse health effects. Witnesses for the plaintiffs testified that even "at the molecular level," phenoxy herbicides can cause reproductive changes.[103] It was also argued that 2,4,5-T has been banned in the United States for forestry and most other uses and is severely restricted or banned in three Canadian provinces.[104]

The defense witnesses testified that the amount of dioxin proposed for use in the Cape Breton forests was too small to have any impact on human health.[105] The defendant's lawyer argued that the law does not exist to protect plaintiffs from unfounded fear.[106]

The issue of where the onus of proof should lie in cases involving toxic chemicals was argued at trial. The plaintiff's position was that where toxic chemicals are involved, the onus should be on the party intending to use the chemical substance to show that it was not harmful. Further, any doubt or

uncertainty about the effect of potentially hazardous chemicals must be resolved in favour of safety.[107]

However, Mr. Justice Nunn held that this was not the rule, and that the burden of proof rested on the plaintiffs to prove on the balance of probabilities all issues asserted by them.[107a] The Court stated that "the plaintiffs must demonstrate "a strong case of probability", that a serious risk to health would exist."[107b] Mr. Justice Nunn found that the plaintiffs did not meet the burden of proof and that the totality of evidence did "not even come close to establishing any probability, let alone a strong probability, of risk to health to warrant the granting of quia timet injunctive relief."[107c] In dismissing the plaintiffs' action, the Judge took the further step of awarding costs and allowing the defendant to prove its damages, if any, at a later hearing.[107d]

This case clearly demonstrates the inadequacies of the common law in dealing with cases involving long term health impacts from past or future exposure to toxic chemicals where there is a long latency period from the time of release, subsequent exposure and the onset of damages to health. The traditional burden of proof, as stated above, has been on the plaintiff to prove on the balance of probabilities that the defendant's activities caused or will cause the resultant injury. Commentators have argued that in toxic chemical cases, after the plaintiff establishes a *prima facie* case, the burden of proof ought to shift to the defendant to show that the harm did not or will not result from his activities.[108]

B. Public Nuisance

Public nuisance is an interference with the right, convenience or welfare of the community at large.[109] One key difference between a private and a public nuisance is that a public nuisance has no obvious connection with interference with interests in land, but instead involves actual or potential interference with public convenience generally.[110]

If it is determined that the nuisance is "public" the common law precludes any person from suing unless the injury or damage he has suffered is much different or greater than that of any other member of the public.[111] Only the Attorney-General may commence an action for public nuisance, or authorize a relator to do so. However, if an individual has suffered special damage, it is possible for that person to bring a civil action for a public nuisance.[112] Some nuisances can cause damage that can have both public and private aspects. Despite the 'public' aspect, individuals can sue for damage to property, or interference with the enjoyment of it, even if this is not substantially different from the damage done to other people's property. The suit would be in private nuisance. On the other hand, if the claimant does not have a property interest, he cannot sue for relief from a nuisance which effects the community unless he can prove damage special to him.[113] His suit would lie in public nuisance.

While there do not appear to be any cases in public nuisance regarding pesticide use, it is clear that fact situations could arise where the public as a whole

would be effected. For example, in August 1983, in the course of a Manitoba government's spray operation for mosquitoe control, spray drifted onto a race track in Winnipeg where over 4,000 people were gathered.[114] Arguably, unless someone suffered "special damage" over and above the general inconvenience to the public, only the Attorney-General could sue in this situation. The barrier to standing in public nuisance suits has long been recognized as a problem requiring law reform.[115]

C. Strict Liability

There have been a number of cases in Canada in which damages for pesticide spray drift have been awarded on the basis of strict liability, i.e. the rule in Rylands v. Fletcher.[116] This cause of action is valuable because it is available in cases of personal injury alone - not necessarily covered by the laws of nuisance.[117] This theory of liability arises from the act of a person bringing onto his land something which is "not naturally" there, and which is likely to cause harm if it escapes. If it does escape, the person may be required to compensate another for injury or damages even though the loss was neither intentionally or negligently inflicted.[118] The two key elements which traditionally must be shown are (a) a non-natural use of land, and (b) an escape.[119]

The first case where the rule in Rylands v. Fletcher was considered in regard to pesticide drift was Mihalchuk v. Ratke; Kwasnuik, v. Ratke.[120] In that case, the plaintiffs claimed damage for injury to their rape crops caused by the drifting of 2,4-D onto their land. The Court held that 2,4-D was a substance that could readily do mischief or cause damage if it is not handled with care; that it was brought on or to their land by the defendants and that some of it escaped onto

the lands of the plaintiffs.[121] Even though there were no eyewitnesses to the drift, because of the evidence of herbicide damage to the rape, the defendants were found liable. The Court also dealt with the issue of whether the aerial spraying was a "natural" or "non-natural" use of the defendant's land.[122] The defence had argued that its spray activity was to kill weeds and that that was a valid agricultural purpose and that therefore it was a natural use. The Court rejected this arguement, stating that it was the method, not the purpose that was key and that aerial spraying was an unusual operation.[123] Therefore, the rule in Rylands v. Fletcher applied.[124]

In Cruise v. Niessen et al.,[125] the plaintiff farmers sued the adjoining farmers and the spray company on the basis of Rylands v. Fletcher for damages caused by the spray drift of a herbicide, MPCA. The Manitoba Queen's Bench found both defendants jointly liable. Here, the defendants argued that in the 10 years since the Mihalchuk decision, aerial spraying of herbicides was now accepted as a standard procedure and that it could no longer be considered a non-natural use. While the Court agreed that aerial spraying could no longer be regarded as an unusual operation, it held that it still did not relieve the person spraying from the responsibility for damages to his neighbours crops if the herbicide is permitted to escape. The Court went further and stated that it did not matter whether the herbicide was applied by ground or by aerial spraying, and that it was the action of allowing the herbicide, a dangerous substance, to escape beyond the boundaries of his own property that made the user liable.[126] As a result of this case, it seems clear that spray drift will be actionable in most circumstances under the rule in Rylands v. Fletcher, and that the often tortured definitions of the term "non-natural use" will not provide a defence.

Again in Bartel v. Ector,[127] plaintiff farmers brough an action for damages to trees caused by the spraying by adjoining landowners of 2,4-D, and the resultant drift. The Court adopted the reasoning of the trial judge in the Cruise case and found the defendants liable. In Schunicht v. Tiede,[128] a 1979 case, again involving spray drift and resulting damage, the Court found that the rule in Rylands v. Fletcher applied to the aerial spraying of the herbicide and that it was not a natural use of land.

One case in which the rule in Rylands v. Fletcher was found not to apply was the Bridges Bros. case discussed above.[129] In that case, there was no evidence as to the ownership of the lands adjoining the plaintiffs, where the defendant company was carrying out its spraying operations. The Court in Bridges Bros. found that while Rylands had been held to apply to persons who have no tenancy or independant occupation of the land, but use it only by permission, there is no authority for applying the rule where there was no evidence that the defendant had any right to be on or fly over the land being sprayed. The Court commented on the difference between nuisance and the rule in Rylands v. Fletcher noting that the former is a wrong to occupation, whereas the latter is a wrong arising from occupation of lands. However, the Court found that the plaintiff could be successful on the grounds of nuisance but not Rylands v. Fletcher.

Defences to strict liability include (a) consent,[130] (b) default of the plaintiff,[131] (c) Act of God,[132] (d) deliberate act of a third person,[133] and (e) statutory authority. The defence of statutory authority is often invoked and is the same defence used in relation to nuisance actions.[134]

There has been an emerging alternative theory of strict liability, based not on the historic requirements of non-natural use and escape, but on the basis of liability for ultra-hazardous activities.[135] This theory postulates that there are a limited number of activities so fraught with abnormal risk that the negligence standard is felt to provide insufficient protection. These 'ultra-hazardous' activities should be governed by a stricter form of liability that grants compensation for all losses generated, even when the activity is conducted with reasonable care.[136] While Canadian courts, on the whole keep to the traditional tests of non-natural use and escape, there is some movement in the other direction.[137] The use of toxic chemicals, including pesticides, may prove to be a testing ground for these theories in the future.

D. Riparian Rights

Riparian rights refers to rights to the use and enjoyment of water in a stream, river or lake arising from possession of land bordering on the water.[138] An interest in the land gives a person the right to the continued flow of the water in its natural quantity and quality - undiminished and unpolluted. Actual damage does not need to be shown; just a deterioration in the quality of water flowing past the riparian's land.[139] While there are no reported decisions in regard to pesticide use on the basis of riparian rights, the remedy may be available where, for example, pesticide run-off has effected the quality of the water of a riparian. The defense of statutory authority also arises in the riparian context.

E. Trespass

Every direct unauthorized invasion of private property, no matter how minor, is a trespass. Liability does not depend on actual damage being shown.[140]

In the Bridges Bros. case discussed above, trespass was alleged along with negligence, nuisance and the rule in Rylands v. Fletcher.[141] The Court held that while it was a trespass to cause a noxious substance to cross the boundary of the plaintiff's land, the injury must be direct rather than consequential and as the injury was the effect on pollination of the bees, it was consequential and therefore the plaintiff's claim in trespass failed.[142]

However, trespass was pleaded successfully in the Friesen case. There, the plaintiffs were sprayed either directly by the defendant's plane flying overhead or by way of spray drift from the spraying of the adjoining forest. The Court held that

> "to throw a foreign substance on the property of another, and particularly in so doing to disturb his enjoyment of his property, is an unlawful act. The spray deposited here must be considered such a foreign substance, and its deposit unquestionably amounted to a disturbance, however slight it may have been, of the owner's enjoyment of this property."[143]

The deposit of the spray was therefore found to be a trespass. It was unnecessary to decide if the deposit of spray on the adult plaintiffs and the probable exposure of the infant plaintiff to drifted spray amounted also to a trespass to their persons.[144]

It is interesting that the Bridges Bros. case was not discussed in Friesen, though the fact situations are very similar. However, the Bridges Court in making the distinction between direct and consequential injury appears to be talking about the specific type of damages that arose, not the spraying event itself. The Bridges approach appears to be inconsistent with the line of trespass cases which focus on whether the invasion was direct or consequential, and not on the type of damage that may result.[144a]

It would therefore seem that pesticide drift can amount to a trespass and that damages are recoverable for this invasion of property.

F. Assault and Battery

While assault and/or battery have been alleged in pesticide spraying cases,[145] there do not appear to have been any cases where findings have been made by courts as to their applicability to pesticide use situations.

A person who intentionally causes a harmful or offensive contact with another person is liable for battery.[146] This tort protects an interest in bodily security from deliberate interference by others. Both direct and indirect invasions of bodily security give rise to liability.[147]

Assault is the intentional creation of the apprehension of imminent harmful or offensive contact. The interest protected is that of mental security. Usually assault and battery are committed in rapid succession.[147a] It is arguable that while a pesticide applicator would not actually desire a

plaintiff to be sprayed, the consequences of the spraying activity (e.g. drift) and the closeness of the plaintiff to the sprayed area are known to be substantially certain to follow.

G. Negligence

In general terms, negligence is a breach of a standard of care owed to a person who is harmed by that breach. The elements to be proved by the plaintiff are that the defendant owed him a duty of care, that the defendant's conduct fell below the standard required of a reasonable person engaged in the particular activity and that damage resulted from the breach of duty. To be liable in negligence, the defendant must also prove a causal link between the breach and the harm and show that the harm was forseeable.[148]

Negligence is more difficult to prove than nuisance, strict liability or the intentional torts, but is often claimed in connection with these other causes of action.

In Fingas v. Sommerfeld Colony of Hutterian Brethren et al.,[149] the defendant was found liable in negligence for spraying the herbicide MCPA 80 amine in circumstances that caused damage to an adjoining landowner's sunflower crop. The defendant had not taken any precautions against spray damage and sprayed in windy conditions conducive to drift. The defendant appealed unsuccessfully on the basis that there was no causual connection between the damage to the neighbour's crop and the defendant's spraying.[150]

In Schunicht v. Tiede,[151] the defendant, an experienced applicator, was held liable for the spray drift of a phenoxy herbicide onto the plaintiff's land and resultant damage to his alfalfa crop. The Court found that even if the rule in Rylands v. Fletcher was not applicable, the defendant was negligent in that he was an experienced aerial operator who flew close to the plaintiff's land and knew that there would be herbicide drift.[152]

In Her Majesty the Queen v. Forest Protection Ltd.[153] the Crown was successful in recovering damages from the defendant for negligently spraying the Miramichi hatchery with DDT which resulted in the poisoning of a number of small trout and salmon. The defences of consent and estoppel were not accepted.[154] The Court found that it was negligent to carry out heavy or concentrated spraying on a stream near such a vulnerable object as a hatchery. Because the fish that were lost had no commercial value, only nominal damages were given.[155]

In the Bridges Bros. case, a number of allegations as to negligence were made. One issue raised was whether the defendant failed to use reasonable care in the selection and use of fenitrothion. The court found that the defendant's choice of that particular insecticide was based on the best scientific information available to it. However, it was known that fenitrothion was highly toxic to honey bees and therefore the defendant was found liable in negligence in flying over and close to the plaintiff's fields and failing to use reasonable care in preventing the pesticide from drifting on to the fields.[156]

Obstacles to recovery in a negligence suit include proving causation and establishing foreseeability of the type of damage sustained.[157] Again, the link between the alleged negligent pesticide use and the resulting damage may be difficult to prove. As noted above, in the nuisance section, this would be particularly the case in situations involving long term health impacts.

H. Products Liability

1. Tort Theory

Since the 1920's, Canadian courts have allowed injured consumers to sue the manufacturers of defective goods without the necessity of establishing the existence of a contract.[158] Negligence principles are applied in these cases to determine liability. Thus, the plaintiff must prove on the balance on probabilities that the defendant manufacturer was negligent and that the negligence caused the harm complained of.[159] Again, the damages caused must meet the test of foreseeability.

The Courts have extended the duty owed by the manufacturers in cases involving products dangerous in themselves, i.e. chemicals, including pesticides. In these cases, even though the product may not be defective, the manufacturer has a duty to warn the consumer of dangers likely to be encountered in the ordinary use of the product.[160] The required explicitness of the warning will vary depending on the dangers likely to be encountered.[161]

There have been a number of cases in which manufacturers of pesticides have been found liable in negligence for not providing warnings of dangers associated with the use of their pesticide products.

In Fillmore's Valley Nurseries Ltd. v. North American Cyanamid Ltd.[162] the plaintiff nursery, in 1956, obtained a supply of amino triazole, a weed killer, on the advice of the defendant's senior agriculturalist and relied on his representations regarding the time within which harmful residues were to disappear. Residues still present when the plaintiff's plants were put in resulted in the destruction of 175,000 pansy plants. The plaintiff recovered damages for the negligence of the defendant company. While the agriculturalist's representations in themselves were not taken to constitute a warranty, coupled with the act of supplying a dangerous substance and the failure to warn of the danger that a harmful residue might be left under certain conditions, made out a case of actionable negligence.[163] Significantly, Chief Justice Ilsey did not distinguish between dangers which stem from the nature of the product itself and those that are attendant upon intended use of the product.

This case was approved of in Ruegger v. Shell Oil Company of Canada Ltd. and Farrow.[164] There, the defendant company was also found liable in negligence for failure to give adequate warning of the fact that its pesticide product, 2,4-D could produce an invisible drift that could damage sensitive vegetables. The plaintiff's tomato crop was damaged when

his adjoining corn crops were sprayed. It was held that Shell Oil Company could not escape liability by pleading ignorance of the specific characteristics of the particular 2,4-D formulation. The Court stated that the manufacturer must be treated as an expert in the field and that it ought to have known of the invisible spray drift against which an adequate warning should have been given.[165]

More recently, in Labreque v. Saskatchewan Wheat Pool et al.,[166] the manufacturer, Eli Lilly and Company (Canada) Limited, was found liable for failure to specifically warn that its herbicide "Treflan" can only be used safely if the seeds are sown at a very shallow depth. The plaintiff suffered damage to his flax crop from the use of this herbicide. While successful at trial, the Court on appeal found that the plaintiff, an experienced farmer, ought to have known the dangers of deep planting and was therefore contributorily negligent.[167]

Harris v. Daco Laboratories Ltd. and Blonde,[168] one case in which the plaintiff did not recover damages, involved an insecticide which the plaintiff alleged caused his sows to abort after treatment with the product. There was conflicting evidence by two veterinarians regarding the cause of the abortions. The Court held that the causal connection between the insecticide and the abortions had not been established by the plaintiff, who had the onus to establish on the balance of probabilities that this was the case.[169] This finding again demonstrates the difficulties

for plaintiffs who first must prove that a substance is dangerous rather than the burden of proof being on the manufacturer to prove that it is safe.

One interesting case in Prince Edward Island, involved a lawsuit against the manufacturer, Diamond Shamrock and the seller of a herbicide, Dacthal W-75, for damages to the plaintiff's turnip crop. In Willis v. FMC Machinery and Chemicals Ltd., et al.,[170] the Court examined the procedure for registration and approval of pesticides in Canada. Dachtal W-75, was registered in 1965 for use on a wide variety of crops, but did not include turnips. In 1968-69, a "temporary registration" label was granted. Temporary registration means that the product is accepted on an experimental usage basis and allows the federal authorities and the manufacturer to gather information with a view to obtaining full registration.[171] An application for field use (i.e. full registration) was granted for Dachtal's use on turnips in May, 1970. The herbicide was then used by the plaintiff in conjunction with an insecticide and led to the damage to the plaintiff's crops. It was common knowledge that Dachtal would be used with insecticides, such as the one the plaintiff used.

The Court found Diamond Shamrock liable because of its negligence in introducing the product into the market without first taking all reasonable and possible care to ensure that the product was safe and reasonably fit for the purposes of controlling weeds in growing turnips. Perhaps even more significant was the finding that notwithstanding the product's registration, the manufacturer could still be found liable in negligence.[172]

Furthermore, the Court in an *obiter* statement, noted that the federal authority may also have been negligent in granting registration before sufficient trial experiments had been conducted.[173] It is therefore arguable that federal registration is neither a sufficient defence for a manufacturer to avoid liability or indeed a defence for the federal government which issued the approval.

Where a pesticide turns out to be unsafe and causes damage, an issue arises as to whether the federal government should be held liable for licensing it for public use on the basis that it did not verify the data submitted by the manufacturer.[174] Commentators have noted that while the general rule is that it is not unreasonable for the government to rely on the scientific data given to it by the manufacturer, there are circumstances where the government may be held liable for not requiring tests which would have revealed the dangerous nature of the product.[175] It has been suggested that the federal government could be held liable if improperly tested pesticides remained on the market (e.g. IBT tested products) and damages resulted to persons exposed to these chemicals while their safety was still in doubt.[176]

Perhaps the largest products liability action involving pesticides, is the litigation currently underway by thousands of U.S. Vietnam veterans and their families against a number of chemical companies which produced Agent Orange (a mixture of two herbicides, 2,4-D and 2,4,5-T), widely used as a defoliant in Vietnam.[177] The veterans are suing for a number

of ailments they claim to be caused by exposure to dioxin, an unavoidable contaminant found in 2,4,5-T. Thousands of these cases have been consolidated into one action before Judge George Pratt Jr. in Uniondale, New York.[178] The approximately 20,000 plaintiffs have asked that the manufacturers of Agent Orange be required to set up an adequate trust fund to pay damages, including those arising to future generations.

A number of complex legal issues have been before the court since 1979, when the first complaint was filed.[180] Recently, the Court ruled that the suit should go to trial, as there was enough evidence to show that the five chemical companies[180a] might have withheld crucial information from the government on the dangers of Agent Orange.[180b] The judge stated that in order for the veterans to establish a legitimate claim, they had to demonstrate that the chemical companies knew more about the dangers of Agent Orange than the federal government knew. The companies argued that the government was aware of the dangers of the herbicide for at least 20 years and that they were simply manufacturing the product to government specifications. However, the judge said that the companies might have withheld information, making it impossible to draw up reasonable safety specifications.

The Jury trial is not expected to commence until 1984. Victor Yannacone, Jr. lead counsel[181] in the case has proposed that the litigation be tried in 3 parts or "serials". The first segment would determine whether the defendants were "at fault", the second would determine whether Agent

Orange caused the various symptoms alleged by the veterans; the third phase would return the trial to the individual plaintiff's home district to determine the plaintiff's veteran status and the amount of damages.[182]

It is the second phase, i.e.the proving of causation that may prove to be the biggest hurdle in the suit. Many of the reported symptoms did not appear until years after the exposure to Agent Orange. As well, other toxic chemicals were used in Vietnam including chlordane and arsenic. The additive or synergistic effects of all the chemicals encountered in Vietnam are at best unpredictable.[183] The manufacturers will be attempting to creat doubt that Agent Orange was responsible for the veteran's illnesses.[184]

The Nova Scotia injunction case, though arguably even more difficult to prove because it was a case for anticipatory relief, where damages have not occurred and where dioxin levels are much lower, was being followed with great interest in the United States.[185]

Finally, the law of products liability has taken a different course in the United States than in Canada. The U.S. consumer need no longer prove negligence; all he has to show is that the product is defective. This move to "no fault" liability has been justified on a number of grounds.[186] The main rationale for having the manufacturers bear the costs of injury to consumers is that the manufacturers create the risk, are better able to spread the costs and derive the benefits of the activity.

In Canada, despite the similarity in products and the frequency of American ownership of manufacturing plants, the general rule is still that the plaintiff must meet the onerous burden of proving fault.[187] This may cause an anomalous result in the pesticides field, where the same pesticides may cause the same damage in both Canada and the U.S., but the legal results may be different as far as recovery of damages. Commentators have argued for many years for reform of Canada products liability law through either the courts or legislation.[188]

2. Contract Theory

There have been a number of cases involving pesticides where defendant companies have been found liable for breach of warranty for selling defective goods. Plaintiffs generally have brought suits for both negligence and breach of warranty together and have been successful on both grounds. For example in Fillmore's Nurseries, discussed above, the court found that the fact situation came under s.16 of the Sale of Goods Act,[189] which provides for an implied warranty of reasonable fitness where the buyer relies on the seller's skill of judgement with respect to goods ordered for a particular purpose and which it is in the latter's course of business to supply.[190] In that case printed disclaimers were held not to be sufficient and the plaintiff was successful in both tort and contract claims. The plaintiff recovered damages on the the tort scale, as they were higher.[191]

Again in Willis v. FMC Machinery & Chemicals Ltd., the seller was found liable for breach of the condition of reasonable fitness under s.16(1) of the PEI Sale of Goods Act,[192] even though the herbicide was fit for controlling weed in infestation on the growing of turnips, the Court found that because the herbicide was unsafe for use with certain insecticides and carried no warning to that effect, there was a breach of the condition of fitness as set out in s.16(1).[193]

It seems clear that sellers can be successfully sued for breach of warranty when damages occur from the use of pesticides. It appears that in these cases, the manufacturer is usually joined as a defendant and may also be found liable in tort. Commentators have noted that protection to consumers for breach of warranty is limited, especially by disclaimer clauses and the requirement that privity of contract be shown.[194]

I. Breach of Contract

Custom sprayers, and applicators have sometimes been held liable in contract for damages caused by pesticide use. For example, On Reugger v. Shell Oil Company Ltd. and Farrow,[195] the Court held the custom sprayer liable for damages to the plaintiff's fields, even though the contractor did not know 2,4-D should not be used within a quarter mile of a susceptible crop. The Court found that the contractor had held himself out as a person skilled and qualified to do the job for which he was hired without causing damage. Further, the plaintiff had relied on him to procure the right compound and apply it

properly.[196] This ignorance of the invisible spray drift did not help the defendant escape liability. Other cases have found applicators, under contract to be liable for damage caused in the course of their activities.[197]

J. Statute of Limitations

One barrier to the recovery of damages in tort cases is the limitation period within which an action may be brought. For example, in Ontario and most other provinces, negligence and other tort actions must be commenced within 6 years after the cause of action arose.[198] The case law indicates that a cause of action in tort arises at the time the damage occurs, not when the plaintiff realizes he's suffered damage.[199] This is the case even though the plaintiff could not have reasonably been expected to be aware that he had suffered damage. Again it is the plaintiff suffering damage many years after exposure to the pesticide that may be shut out of the courts because of limitation periods.

K. Summary

The review of cases involving pesticide-related injury shows that the common law as evolving can provide a remedy in cases involving short-term damage. Causation, the limitations of a public nuisance action, defences such as statutory authority and the difficulty of obtaining compensation for certain economic and psychic losses are all barriers which must be overcome. It is, however, in the cases where damage has not manifested

itself for many years after exposure to pesticides, or in cases where remedies are sought before the pesticides are used that the common law shows itself to be most inadequate.

Various reforms have been proposed over the years to deal with these obstacles. Amendments to statute of limitations either lengthening the time period for bringing actions in tort, or redefining the period when the cause of action arose (i.e. when one becomes aware of damage, rather than when it occurred) have been suggested.[200]

Reverse onus clauses, relaxation of causation requirements, as well as the abolition of certain defences and plaintiff court cost burdens, have been proposed in a number of private member bills across the country.[201]

Further law reform measures are discussed below.[202]

IV THE EXISTING PESTICIDE REGULATORY CONTROL REGIME AND ITS ADEQUACY

Given the inherent toxicity and deliberately poisonous nature of pesticides, the need for a more systematically preventive regime for their control than the principally reactive common law system provides, made it inevitable that governments would intervene statutorily to control such products. The need to prevent fraud as to the efficacy of such products was also a factor in the development of regulatory controls. The administrative mechanisms that have evolved both federally and provincially, particularly

since the advent of the synthetic organic pesticides in the 1940's, thus reflect attempts to regulate the availability, use and ultimate disposition of pesticides in the home, agriculture, forestry and related areas. Notwithstanding that the regulation of pesticides consitutes one of this country's earliest attempts at intervention in the market place to control a particular class of toxic substances, key problems exist in this control system even today, which will be outlined below. A brief examination of the constitutional basis for federal and provincial legislation in this area is first undertaken.

A. Constitutional Basis for Regulation of Pesticides

Though not explicitly addressing pesticides per se, the Constitution Act, 1867, distributes the basis for legislative control over the availability, use and disposal of pesticides between the federal and provincial levels of government. The Constitution provides for concurrent federal and provincial jurisdiction to legislate in relation to agriculture, though federal legislation prevails in the event of conflict.[203] Additional powers assigned to Parliament that may have application to control of pesticides include the criminal law power,[204] the power "to make laws for the peace, order and good government of Canada",[205] and the power to regulate trade and commerce.[206] Other federal heads of power provide a more limited basis for federal control of pesticides.[207]

The constitutional basis for provincial jurisdiction over pesticides includes the concurrent agricultural jurisdiction noted above,[208] the

authority to legislate with respect to the management of the public lands belonging to the province,[209] property and civil rights in the province,[210] matters of a merely local or private nature in the province,[211] local works and undertakings other than the classes of works and undertakings assigned to the federal government,[212] municipal institutions in the province,[213] and the imposition of punishment by fine, penalty or imprisonment for enforcing any provincial law.[214]

In general, it may be said the the jurisdiction over pesticides divides between federal registration, classification and labelling of such products (that is, their availability for certain uses)[215] and provincial control over their actual use through licences, permits and related regulatory techniques.[216]

Judicial decisions regarding the constitutionality of pesticides legislation have been rare. One of the few reported cases where the constitutionality of the federal Pest Control Products Act[217] was even raised, was Re Forest Protection Limited and Guerin.[218] There the applicant FPL was seeking to overturn charges laid under the federal statute.[219] However, counsel for the applicant eventually conceded that the Act was intra vires the Parliament of Canada, without the court having to rule on the matter.[220]

The "high degree of uncertainty" that has frequently been observed to accompany any discussion of the constitutional authority for government intervention with respect to environmental matters in Canada,[221] is not

generally the case when the subject matter is control of pesticides. The constitutional complexities that have plagued possible legislative interventions, particularly by the federal government, for such matters as control of the disposal of toxic chemicals or hazardous wastes,[222] apply to a lesser extent here. This appears to be the case because while disposal of pesticide wastes, cans, containers and related materials such as banned or seized pesticides is a problem,[223] it is not the principal means by which pesticides reach the environment. Pesticides are meant to be directly and deliberately applied to the environment. As such, the problem of pesticide disposal, while not unimportant, assumes a comparatively lesser degree of concern. Pesticide availability and use thus become the key issues of concern and they more easily resolve themselves into federal and provincial jurisdictional responsibilities.

B. The Role of the Federal Government

The federal role in control of pesticides is both substantial as well as complex. Key federal legislation such as the Pest Control Products Act,[224] the Food and Drugs Act,[225] and to a lesser degree the Environmental Contaminants Act[226] and the Fisheries Act[227] all have application to pesticides and are administered by four different federal departments.[228] This diversity, if not fragmentation of authority, may have both positive and negative aspects with respect to pesticide control strategies such as registration, re-evaluation, tolerance setting, monitoring and enforcement. The advisory role of several federal departments, particularly in the

pesticide registration and re-evaluation processes, for example, is an area that has raised the question of the strengths and weaknesses of the current divided scheme of authority within the federal government. Review of federal law will commence where the process itself begins for any company seeking pesticide registration in Canada; that is the process under the Pest Control Products Act. A brief overview of the origins of such legislation is first undertaken.

1. Origins of Modern Federal Pesticide Legislation

Federal intervention in the marketplace to control pesticides dates from the 1920's and 1930's when the principal public concern centred on appropriate labelling requirements under which pesticides could be imported, manufactured or sold.[229] The purpose of such legislation was to ensure product efficacy and to avoid fraud in product representation.[230] It was not until several decades after the advent of synthetic organic chemicals in the 1940's, that the Pest Control Products Act, 1939[231] was viewed by federal officials as needing amendment to substantially increase government authority over pesticides beyond the originally limited purposes of controlling product efficacy and misrepresentation.[232]

Amendments to the Pest Control Products Act, proposed in 1969 by the federal government, sought to expand legislative authority to control handling and use of such products,[233] inert ingredients,[234] as well as strengthen federal authority to protect the public from deception in pesticide merchandizing.[235]

The amendments were predicated in part on the "dual personality of pesticides." [236] The Hon. H. A. Olson, federal agriculture minister, noted during Parliamentary debate on the Bill that:

> "[pesticides] bring us untold benefits, but they can also get us into trouble if they are not handled properly. Careless use of pesticides can lead to food contamination, damage to crops; as well as human and animal injury...Government control of the manufacture and use of these potentially dangerous substances is necessary if we are to protect people from the misuse of pesticides....The increased use of pesticides and associated products, and a greater concern over their potential for harm as well as good necessitate a broader authority for regulation than in the past."[237]

Other comments during House of Commons debate suggest that Members of Parliament were well aware of the problems that pesticides were capable of posing to farmer health and safety,[238] the environment,[239] and general public health.[240] In addition, strong support was shown for adequate pre-registration testing of such products before their availability for use,[241] as well as for research into non-chemical alternatives to the use of pesticides.[242]

At Agriculture Standing Committee consideration of the Bill, chemical industry representations were made respecting the lack of a right of appeal under the Act should a pesticide registration be refused by the Agriculture Department.[243] These concerns eventually resulted in amendments to the Act allowing the Government to establish the procedures for appeals on registration refusals, suspensions or cancellations.[244]

Senate consideration of the Bill reiterated many of the above matters. Concerns were also raised that some pesticides, such as DDT, were impossible to use safely;[245] a theme which had not be sounded in the House, where misuse was viewed as the principal area where problems could arise.[246]

The Bill was passed in 1969, after other relatively minor amendments were made.[247] It eventually came into force in 1972 when regulations under the Act were promulgated.[248]

2. The Pest Control Products Act

The principal statute controlling pesticides in Canada is the Pest Control Products Act,[249] which is binding on both the federal and provincial crown,[250] and is administered by Agriculture Canada. The act prohibits any person from manufacturing, storing, displaying, distributing or using a control product "under unsafe conditions".[251] The prohibitions extend to importing or selling such products in Canada unless they have been registered, packaged and labelled according to prescribed conditions.[252]

Several important regulatory requirements supplement the Act's basic prohibitions. First, the Minister has broad authority to require registration of all control products imported or sold in Canada and can specify the scientific information to be submitted in support of a registration application.[253] Second, in conjunction with labelling requirements, the Minister can prohibit the use of pesticides in a manner

inconsistent with such labelling.[254] Third, the Minister can authorize record-keeping,[255] inspections[256] and can undertake a variety of enforcement actions, both administrative[257] and quasi-criminal,[258] under the Act. Key provisions are examined below.

a. The Registration Process: Testing Requirements and the Basis for Decision-Making on New Pesticides

Pesticides, with some exceptions,[259] must be registered before being sold in Canada.[260] Those pesticides not covered by an exemption, may only be registered if the Agriculture Minister is of the opinion that the control product has merit or value for the purposes claimed when used in accordance with label directions.[261] In addition, the pesticide's use must not lead to an "unacceptable risk of harm" to (1) things on or in relation to which the control product is intended to be used, or (2) public health, plants, animals or the environment.[262] A registration application must provide sufficient information to allow the Minister to determine "the safety, merit and value of the control product."[263] For these purposes the applicant for a control product registration must provide the Minister with scientific test studies and results regarding control product effectiveness; occupational safety and exposure; effects on host plant, animal, article or non-target organisms; control product and residue persistence, retention and movement; analysis methods for detecting the control product and its residues in food, feed and the environment; detoxification or neutralization methods with respect to the control product in soil, water, air or articles; disposal methods for the control product and its empty packages; and

information respecting the storage, display, stability and compatibility of the control product with other products.[264] Where the control product is intended for human consumption the applicant must also provide test results respecting the effects of the control product or its residues on test animals in order to assess human or animal risks associated with the product and related concerns.[265]

Under the Act, the suitability of new pest control products is the responsibility of Agriculture Canada.[266] Product acceptability is determined from data submitted to the Department by the particular company seeking the registration.[267] To help applicants meet the requirements of the Act and regulations, Department guidelines[268] and trade memoranda[269] provide guidance for organizing the technical data to be submitted in support of registration applications under the Act. For the registration of a control product containing a new active ingredient the type of data the Department requires includes draft label,[270] product chemistry,[271] toxicology,[272] metabolism studies,[273] food, feed and tobacco residue studies,[274] and information on environmental chemistry,[275] environmental toxicology[276] and efficacy.[277]

Due to various factors, including industry pressure,[278] in 1980 Agriculture Canada began to shift to registration procedures that are more product specific, than generic in nature. This program, known as product specific registration (PSR), focuses more directly on the active ingredient as well as on the final formulated control product.[279] According to Agriculture Canada officials:

> "PSR ties each individual registered product to a specific basic producer of the active ingredient and to a data package that relates specifically to the pesticide to be registered... PSR allows [Agriculture Canada] to 'track' individual products back to a basic supplier's technical or active ingredient and manufacturing process and to the...data package that related directly to it."[280]

Agriculture Canada's concern in developing PSR, in part, is that before the program's inception a generic approach was used which assumed all sources of a chemical were equivalent regardless of who manufactured it. However, it became increasingly apparent that different manufacturing processes can result in different product quality, including the presence of micro-contaminants, such as dioxins. As a result, Agriculture Canada has now moved in certain instances to register individual active ingredients as produced by certain manufacturers using a specific process at a designated plant.[281]

The value to industry in the PSR program arises from the fact that in Canada, exclusive property rights to registration data is not provided by the Pest Control Products Act or the Food and Drugs Act.[282] Under the generic system, according to federal officials, individual chemical manufacturers were reluctant to spend money on developing further safety studies because this was in effect research on a general product. Under such a system competing firms could obtain registration for similar products based on research data produced by other companies; that is, "me-too" registration.[283] Now, federal officials argue, companies have more incentive to supply safety studies on their products because such data are relevant to

their particular product and the data is for their exclusive use, as competitors will not be able to register similar products without doing the research.[284]

However, the PSR policy is not without its problems. First, the policy has clear implications for proprietary data ownership and protection which are not addressed by the Act or by the policy itself. As a result, current "deficiencies" in this policy with regard to this matter are now being evaluated.[285] A second and related concern is that to the extent that PSR duplicates work already done on a chemical it is an exercise that wastes both industry and government evaluators' time. A compensation approach to the use of similar data might be both a more effective and equitable device for addressing the problem.[286] However, this approach is not under active consideration by Agriculture Canada.[287]

Finally, Agriculture Canada may be moving to register active ingredients in their technical state. Currently, pesticides are regulated as formulated or "finished" products. This limits the ability of the Department to deal directly with primary producers of the active chemical who hold key information essential to assessment of safety, such as the presence of contaminants or impurities (e.g. dioxins) in the technical material.[288] In future, therefore, registration of active ingredients in their technical state (i.e. before formulation) could occur at the time they are imported into Canada.[289] Because there are very few pesticide manufacturers in Canada,[290] obtaining chemical specifications on imported technical products is considered important in strengthening direct regulatory control of the registration process.[291]

In the registration process itself, other government departments receive copies of the supporting scientific data submitted by the applicant and are requested by Agriculture Canada to review and comment on the material.[292] These departments include Health and Welfare Canada,[293] Environment Canada[294] and Fisheries and Oceans Canada.[295] While these departments provide advice on matters of expertise not otherwise possessed by Agriculture Canada, the final decision on whether to register a product rests with the Minister of Agriculture.[296]

The relationship between Agriculture Canada and Health and Welfare Canada respecting pesticide review under the Act has been formalized by an inter-departmental memoranda of understanding,[297] though not by formal recognition under the Act itself.[298] Other proposed interdepartmental memoranda of understanding may soon also acknowledge the role and responsibilities of the other federal agencies in the process, but are unlikely to change the statutory authority for final decision-making under the Act.[299] Indeed, federal and provincial agencies have recently adopted the position that the registration process should remain with Agriculture Canada but that the role of the other federal departments in the process be increased.[300] This position statement comes at a time when Agriculture Canada has been faced with calls for the removal of the Act from its sole authority by a coroner's jury,[301] federal advisory consultants,[302] public health[303] and environmental groups[304] as a result of the Department's perceived conflict of interest as both a promoter of food production and protector of the public from unsafe pesticides and practices. The situation parallels the experience in the United States in the late 1960's when federal pesticides

law was still administered by the United States Department of Agriculture.[305] Interestingly, Canada's federal environment minister, Charles Caccia, recently called for the establishment of a National Pesticides Review Board, a "superagency", to regulate all pesticides used in agriculture and forestry.[306]

Apart from this concern, a number of other issues arise with respect to the registration process including the adequacy of testing requirements; the meaning of the regulatory standard of "unacceptable risk"; temporary and research registration exemptions; and the role of the public in the process.

(i) Adequacy of Testing Requirements and Practices

Two areas of pesticide testing required by the federal government under the Act and regulations deserve special consideration: (1) human and (2) environmental toxicological testing.

With respect to animal toxicological testing, the federal government requires extensive data in order to evaluate a new pesticide proposed for registration under the Act.[307] Animal tests used to determine human health and safety of a pesticide include studies on acute toxicity,[308] short-term,[309] long-term[310] and special effects.[311] Both the active ingredient and the formulated control product are tested in order to determine whether the inert ingredients have an effect on the toxicity of the active ingredient.[312] The position of Health and Welfare Canada is that the onus is on the applicant to prove the safety of any pesticide proposed for use or sale in Canada.[313]

Indeed, much of this safety data is generated either by pesticide manufacturers or private laboratories in other countries.[314] However, the reliability of such safety testing data was questioned by provincial advisory bodies in the late 1970's. The Saskatchewan Environmental Advisory Council stated in 1978 that there are "major deficiencies in the present research and regulatory process" regarding pesticides. The Council found that:

> "At the federal level, the main regulatory bodies (Agriculture and Health) do not conduct sufficient independent research. Both Departments are forced to rely in part on laboratory tests by chemical manufacturers. It is not competence, but rather objectivity and credibility which are absent in this arrangement."[315]

Moreover, as noted above, in 1976-77 a large number of toxicological tests performed under contract from the pesticide industry by Industrial Bio-Test Laboratories in the United States were determined to be invalid.[316] Many of these invalid tests were originally used to support in whole or in part the registration of pesticides in Canada, the United States and other countries.[317] From this experience it has been argued that the U.S. did not have effective control or monitoring capacity over IBT, a large contract testing firm.[318] It is also clear, however, that Canada lacked a system of independent testing checks, since well over 100 pesticides tested by IBT were able to gain registration in this country. Industry has been required to spend millions of dollars in additional funds to re-validate such tests.[319]

The experience has served to underscore the need for ensuring good laboratory practices in firms doing testing for pesticide industry registrants. In 1979, Health and Welfare Canada entered into an inter-agency agreement with the U.S. FDA regarding good laboratory practices, the need to establish

standards or guidelines for non-clinical laboratories and the need to develop inspection programs for such facilities.[320] Health and Welfare Canada now has its own guidelines on the subject.[321] However, these are without legal effect and indeed no federal legislation or regulations exist which could effectively regulate such laboratories, especially if they are outside Canada. Federal legislation, though, is now under consideration.[322]

With regard to environmental toxicology testing, it has been suggested that estimates of exposure to non-target organisms and the toxic responses of biota are not easy to make and are hampered because of a lack of test protocols to estimate such exposure levels.[323] The scarcity of standard test protocols for both laboratory and field studies has been regarded as a serious impediment to the evaluation of the environmental hazards of new pesticides.[324] Federal advisory consultants argue that (1) Environment Canada has an inadequate pesticide monitoring system and (2) is not privy to all information in Agriculture Canada files.[325]

Indeed Environment Canada notes with respect to the latter concern that:

> "Chemical companies do environmental research in order to satisfy the information requirements of Agriculture Canada for new product registration or re-registration. Much of the information supplied to Agriculture Canada is privileged and is, therefore, not generally available to research and regulatory personnel of [Environment Canada]."[326]

With respect to the former concern Environment Canada notes that it:

> "...frequently directs resources to the evaluation of the fate, persistence and environmental effects of pesticides

> registered by Agriculture Canada to try to more thoroughly evaluate the environmental acceptability of certain pesticides where registration information has been judged by [Environment Canada] advisors to be insufficient, or when it is judged appropriate to independently verify data provided in support of the registration of a pesticide. But [Environment Canada] research resources must frequently be allocated and expended in reaction to the registration of pesticides by Agriculture Canada rather than in an integrated and planned fashion during registration review and prior to registration approval."[327]

In contrast, the pesticide industry argues that in fact field testing under rigidly controlled conditions is undertaken in Canada and the data produced in the tests are integrated with those developed in other tests and submitted as part of the registration application.[328] However, past damage to the Canadian environment has been documented and attributed to the lack of proper field testing under Canadian conditions prior to full registration.[329] Moreover, CCREM recently urged governments to provide appropriate support for the testing of pesticides under Canadian conditions and more environmental input to the registration process, including more data for Canadian conditions.[330]

Overall, both human and environmental toxicological testing for purposes of registration have been shown to contain gaps. The IBT affair underscores the unreliabiltiy of many human safety tests and of Canadian regulatory testing checks in the past. Whether good laboratory practice legislation, now under consideration, will fill the gaps remains to be seen. A combination of independent Canadian toxicology centres, government testing capability and reciprocal international testing protocols may also be necessary. Environmental toxicology testing controls appear to contain gaps as well, with environmental agencies arguing that insufficient consideration has been

given to certain ecologic parameters in the registration process, at least in some instances.[331] Resolution of these concerns may only be met if guidelines are replaced with protocols or regulations.

(ii) Unacceptable Risk of Harm

The key criterion under which the Minister of Agriculture may refuse to register a pest control product is where he is of the "opinion" that the use of the pesticide would lead to an "unacceptable risk of harm to ... public health, plants, animals or the environment".[332] It is submitted that the burden of proof arising from this section is on the applicant; he must prove the safety of any pesticide proposed for use or sale in Canada. Health and Welfare Canada, for example, takes this position with respect to who has responsibility for proving pesticide safety.[333] However, given the great scientific uncertainty that frequently accompanies determinations regarding the environmental health effects of chemicals,[334] absolute safety is not what must be or indeed is being shown by applicants. Because the statutory test is so vague (the Minister must be of the "opinion") it is arguable that there is considerable latitude for Ministerial descretion in any particular case as to how "unacceptable risk" will be viewed. Agriculture Canada officials, for example, state that the Department's evaluation process is partly founded on the risk-benefit principle "in its broadest sense".[335]

The standard of "unacceptable risk of harm" is not defined in the Act or regulations. Indeed, this standard only appears in the regulations.[336] As a result, there is no record of Standing Committee discussion of the possible meaning of this standard and how it is to be applied, as Parliament never had an opportunity to consider such a standard during 1969 deliberations concerning the Pest Control Products Bill.

In contrast, under the Federal Insecticide, Fungicide and Rodenticide Act in the United States,[337] the threshold finding that the United States Environmental Protection Agency must make prior to exercising its regulatory authority to register a pesticide, is whether the pesticide causes "unreasonable adverse effects on the environment".[338] This is further defined by the statute to mean that USEPA may not refuse to register a pesticide for a given use unless the risks of that use outweigh it benefits.[339] Thus, while it is clear that FIFRA requires the weighing of risk-benefit or cost-benefit considerations[340] as to whether a particular pesticide should be registered, the PCPA is silent on such matters. Indeed, if one compares the PCPA standard with the one contained in the Environmental Contaminants Act[341] where the Ministers of Health and Welfare and the Environment must be "satisfied" that a substance "does or will consitute a significant danger ... to human health or the environment "before they may recommend regulation of the substance,[342] it is clear that, unlike FIFRA, neither the PCPA nor the ECA explicitly authorize cost-benefit or risk-benefit considerations in their respective regulatory decisions.[343] Agriculture Canada recognizes this with respect to the PCPA.[344]

In practice, however, cost-benefit or risk-benefit approaches are finding increasing favour in the views of both industry and federal regulatory officials in Canada, notwithstanding statutory silence on the subject. The Canadian Agricultural Chemicals Association regards adequate assessment of the "benefit" component of the "risk-benefit" relationship in the use of agricultural chemicals for food production, as being of "demonstrated value" and of "particular importance" to the industry.[345] The balancing of decisions based on risk-benifit, according to CACA, includes:

> "On the risk side ... the financial cost of chemical pesticides; any effects on non-target organisms and possible environmental or health problems that could be caused by improper use of toxic compounds. The benefit side includes the enhancement of both the quality and the quantity of food and fiber; the abundance of good food at relatively low cost and the ability of 5 per cent of the population to do this and meet [the] requirements of a large and growing export market ..."[346]

Indeed, the Canadian Chemical Producers' Association, which contains many, if not all of the country's agricultural chemical companies as well, has taken the view that regulatory controls should not be adopted on particular chemicals if the regulation's benefits do not exceed its costs; that is, no regulation unless it results in a "net benefit to society".[347]

Agriculture Canada officials have stated that they would like to see "risk-benefit analysis procedures made a comprehensible, tangible, visible and routine part of the regulatory process".[348] Since 1980, Agriculture Canada has engaged in research, the objective of which, is to assess the feasibility of applying the principles of risk-benefit analysis to the regulation of the use of pesticides.[349] Department officials see risk-benefit analysis as a

means of "organizing and analyzing data" to provide responses to questions surrounding both environmental health and safety effects as well as economic matters. These include such questions as:

> "How many Canadians are currently exposed to the chemical and in what way? How much of the chemical under investigation are Canadians currently exposed to? How many people, if any, may be expected to develop health problems as a consequence of being exposed to the chemical? What would the economic losses be from regulatory action aimed at reducing exposure? What method of reducing exposure to acceptable levels is least costly to the economy?"[350]

The advantages of the risk-benefit approach, according to Agriculture Canada officials, include (1) providing information about the likely effect of different regulatory options for dealing with a pesticide problem (2) providing a detailed discussion of the problem and a comparison of alternate solutions and (3) high-lighting gaps in data or knowledge that limit information on which to base particular decisions.[351] CCREM has also supported the use of risk-benefit assessments.[352] It has stated that:

> "...risk-benefit models on long-range assessments [should] be developed for Canadian conditions and the appropriate benefit and risk components [should] be defined and used in decision-making for registration and re-evaluations."[353]

Aside from the fact that the PCPA does not explicitly authorize risk-benefit or cost-benefit strategies, there may be strong policy concerns surrounding the question of whether the Act should be amended to allow their use. Some scientists have noted that while zero risk may not be attainable:

> "On the other hand, there are those who would attempt to marry toxicology to risk-benefit analysis in an attempt to quantify the risk posed by particular substances in the context of societal norms and the law. At the moment, the uncertainty of such calculations and the difficulty of quantifying benefits casts doubts on the validity of these techniques."[354]

Moreover, risk-benefit or cost-benefit approaches may have other problems associated with their use as decision-making tools besides difficulties in estimating or quantifying risks. These include the delayed effects of many toxic chemicals, including pesticides, which cannot be taken into account; the lack of epidemiological data; the need to measure small effects on large populations; the equity problem that risks and benefits are not evenly distributed among members of society; the difficulties in quantitatively extrapolating animal testing data to humans; the introduction of value-laden assumptions which nonetheless appear to be neutral; and the insistence on these approaches which in fact may be undemocratic attempts to re-orient legislative mandates.[355]

Agriculture Canada decisions, of course, also extend to considering such factors as mutagenicity and carcinogenicity of pesticides.[356] Yet, the views of Agriculture Canada may well vary from those of, for example, Health and Welfare Canada. As federal health officials note:

> "Because they serve different clienteles, and have necessarily different perspectives, all government departments may not look at a risk in the same way. For example, perceptions about the risk from pesticides may be different if considered by an official in a Health Department than if considered by someone whose primary concern is the need to produce more food. Yet, both viewpoints may be valid."[357]

However, only Agriculture Canada makes the registration decision under the PCPA. Thus, even though CCREM has requested that NHW set down its policy on ways to limit environmental exposure to proven carcinogens,[358] it may well be more important to know what is Agriculture Canada's cancer policy with respect to pesticides.

Establishment of cancer policy has occurred in other jurisdictions. In the United States, key federal public health regulatory agencies have articulated methods for identifying carcinogens and assessing the dangers they post to humans. The policy confirms the use of data on animals fed the test substance at a dose rate exceeding expected human exposure as valid indicators of the substance's cancer potential.[359] The policy also concludes that it is "currently unreliable to predict a threshold below which human population exposure to a carcinogen has no effect on cancer risk".[360] The policy further sets out the priorities for regulating carcinogens[361] and the bases for considering regulatory action under various federal statutes.[362]

Recently, however, U.S. Congressional investigating committees have argued that US EPA, under FIFRA's risk-benefit requirements, has changed the scientific principles underlying its risk assessment of carcinogenic pesticides, resulting in an approach that permits greater exposure to cancer-causing agents. The committee notes that:

> "When balancing risks and benefits, [US] EPA has decided to accept as tolerable a level of risk 10 to 100 times higher than routinely accepted in the past. More significant, however, is that the Agency's use of [certain] approaches to decision-making appears systematically slanted towards less stringent regulation of suspected carcinogens."[363]

The committee further notes that the key changes US EPA has introduced include: a new approach to weight of evidence decision-making in which a number of negative studies finding that a pesticide does not cause cancer may be interpreted as offsetting a positive study finding of carcinogenesis; greater emphasis on mutagenicity data in order to classify oncogens (tumours) as epigenetic (not acting on genes) or genotoxic (acting on genes); higher levels of tolerable risks; and less concern over benign tumours.[364]

Apart from case-by-case decision-making with Agriculture Canada making the "final compromises and trade-offs",[365] it is unclear what Canada's cancer policy is as expressed through either Agriculture Canada or Health and Welfare Canada with respect to pesticides. NHW, in discussing chemical carcinogens generally, states that:

> "Experience with laboratory animals has revealed that nearly all compounds that are carcinogenic in man are carcinogenic in one or several animal species even though the tumour type may not be the same as in man...However, the demonstration of carcinogenic activity in experimental animals does not necessarily mean that the chemical is carcinogenic to man under conditions of human exposure...the regulatory approach taken to the control of these chemicals must consider not only the results of animal tests, but must incorporate a rational assessment of the benefit-cost ratios that exposure to particular chemicals entail in man."[366]

Do these general statements accepting benefit-cost approaches also constitute federal policy on pesticide registrations as well, notwithstanding PCPA silence on the use of benefit-cost calculations? Or do these general statements suggest that federal cancer policy is that, as a rule of thumb, pesticides that are carcinogens (animal or human) are not registered? NHW officials have also stated that:

> "...It is clear that we should be more concerned with the more potent compounds that demonstrate classical carcinogenic activity than with those that appear to act by overwhelming biochemical and physiological mechanisms and produce tumours only at near-toxic doses."[367]

Is this statement consistent with the "predominant view of the scientific and regulatory communities...that proven animal oncogens (tumours) must be viewed presumptively as a cancer risk to man?"[368] In the U.S., Congressional committees have observed that a combination of stricter agency standards for data demonstrating that a chemical may be hazardous and a 10 to 100-fold increase in the level of tolerable risk has resulted in a "major shift of policy".[369]

In Canada, comparable assessments of policy shifts in "risk acceptability" are difficult, if not impossible to make, given the dearth of information on what constitutes federal cancer policy on pesticides and how such policies are applied in the registration process.

(iii) Departures from Full Registration Requirements: Research Exemptions and Temporary Registrations

Under the PCPA there are a number of ways in which pesticides may be sold or used in Canada without having to meet the full registration requirements of the Act. These include, but are not limited to:[370] (1) exemptions for control products used for research purposes on approved premises;[371] and (2) temporarily registered pesticides where the applicant agrees to produce additional scientific or technical information on the product or where it is to be sold only for "emergency control of infestations that are seriously detrimental to public health, domestic animals, natural resources or other things".[372] These departures from the Act's full registration requirements, in terms of registration exemptions and less than complete data and testing, are meant to meet legitimate objectives such as development and assessment of new pest control products[373] or controlling of emergency pest situations. However, the possibilities exist for abuse under these categories in which the usual registration requirements intended by Parliament for pest control products, may be circumvented.

Under the regulations, a control product is exempt from registration if it is intended for use by a person for research purposes; on premises owned or operated by that person; or on any other premises not owned or operated by that person, if this use has been approved by the Director of the Plant Products Division of Agriculture Canada.[374] The federal government indicates that as a result of this provision research stations and laboratories of government departments or private companies doing work on the employing agency's research premises "are not encumbered by permit requirements" under the Act.[375] Where work is conducted off the agency's research premises these unregistered pesticides "have already been subjected to considerable study", according to the government, "but additional information is needed on their use under practical conditions."[376] This field testing takes place under conditions that ensure that if food crops are sprayed they will be destroyed or otherwise prevented from entering food market channels.[377] Research is only allowed to occur in forestry areas "when sufficient data indicates that no undue risk to human health or environmental quality will occur."[378]

Federal officials estimate that approximately 500 research permits were approved by Agriculture Canada in 1982, averaging 900 kilograms (400 pounds) of formulated product per approval.[379] The size of a treated area varies from an acre for some agricultural experiments to 500 - 5,000 acres for the largest areas, usually involving forestry uses.[380] Because the data base for a pesticide under a research permit is smaller than for a pesticide with a full registration,[381] and also because there is some indication that the numbers of

research permits are increasing,[382] federal officials admit that there is a reason to be concerned about research permits becoming in effect, operational permits.[383] Moreover, Agriculture Canada may not have the resources to enforce the terms and conditions for all research permits across the country.[384]

As a result of these and related concerns, Agriculture Canada has proposed changes in the PCPA regulations with respect to control products used for research purposes. The regulations, which are to go into effect by January 1984[385] cover such matters as new definitions,[386] permit exemptions,[387] research permit applications,[388] refusals,[389] cancellations,[390] records and data reporting,[391] labeling,[392] sales and distribution,[393] and advertising.[394] Under this scheme different data requirements are proposed for each of three categories of research permit applications.[395] The three types of applications are (1) new uses (i.e. new rates, directions, hosts) for registered products;[396] (2) new formulations containing previously registered active ingredients;[397] and (3) new active ingredients or new sources never before marketed in Canada.[398] Also of interest are proposed controls over the total land areas that may be treated under any one permit[399] and the authorization for multiple year research permits.[400]

The proposed regulations, when read in their entirety, constitute a substantial increase in potential regulatory control over research permit use than has hitherto existed under federal law. It appears that abuse of the existing program,[401] as well as the increase in research permit requests, is what prompted the dramatically more detailed scheme now proposed. Whether the proposal will give federal officials a desirable level of regulatory control or whether problems will persist, remains to be seen.

Current regulations under the PCPA also authorize the granting of temporary registrations for one year, provided the applicant agrees to provide additional scientific or technical information as requested or where the need exists for emergency control of pest infestations.[402] Federal officials indicate that approximately 150 temporary registrations are issued a year.[403] Although pesticides covered by a temporary registration are supported by more data than those covered by a research permit, certain data are still lacking. Since 1980, federal government policy has been that temporary registrations will not be advanced to full registration status in a number of situations. These include situations where such pesticides are supported by IBT data, unless Health and Welfare Canada provides written agreement to such extension.[404]

This does not mean, however, that pesticides with temporary registrations that are supported, in whole or in part, by IBT data will not continue to be able to receive temporary registration approval. For example, in 1981 a CCREM Task Force was established to look into ways and means of improving and speeding up the registration process of pesticides in forest management.[405] In targetting a number of pesticides as high priority for early registration the Task Force prepared a resolution for the consideration of Forestry ministers requesting that they seek approval of these pesticides from the federal government by early 1983.[406] In responding to these requests, the federal agriculture minister, the Hon. Eugene F. Whelan, noted that one of the pesticides involved, Orthene, "has had a temporary registration for forestry use for several years, including 1982."[407] Federal health minister, the Hon. Monique Begin, in her response to these same requests stated with respect to Orthene that "this chemical is

supported by pivotal (major) invalid IBT data including a three generation reproduction study" and that replacement studies would not be in until late 1982 - early 1983.[408] Thus, while temporary registrations for pesticides relying on invalid IBT data may not be expanded to full registration, the example suggests that such pesticides may retain their temporary registration status. If temporary registrations are renewed for several years in a row, it is arguable that this constitutes a back-door to full registration of less than fully evaluated products.[409] Moreover, pesticides that have at one time been temporarily registered have been the subject of negligence actions for inadequate testing.[410]

The use of similar departures from full registration requirements is not unique to Canada. Other jurisdictions, such as the United States, also authorize a number of routes to the sale and use of pesticides that have not gone through a full registration procedure.[411] Only the full registration provision under FIFRA provides that the complete range of health and safety test requirements will be met.[412] A 1982 staff report of a U.S. House Agriculture subcommittee, however, documents the extent to which the full FIFRA registration system has been avoided through the use of "emergency" exemption authority and related techniques. From 1978 to 1982, for example, annual emergency exemptions grew 430 per cent (165 to 727).[413] The staff report characterized this as a "marked upward trend" in the use of approaches that were not intended to substitute for full registration.[414] Earlier Congressional investigations suggested that these approaches were being used as vehicles for circumventing the safety evaluation requirements of full registration.[415]

The use of less than full registration approaches for pesticides has a number of arguments in its favour, including development of new products and uses, as well as control of emergency outbreaks of damaging pests. However, the possibility exists for misuse of such procedures in attempts to avoid registration delays and provision of full environmental health and safety tests.

(iv) The Role of the Public in the Registration Process

The PCPA is silent on the role of the public in the registration process for new pesticides. The effect of this statutory silence is to lock out the public from Agriculture Canada's registration decision-making. Public notice of a registration application for a new product or use is not required under the Act; nor is public access authorized to safety tests relied on in support of the registration application. While a pesticide company is statutorily guaranteed an administrative appeal if a pesticide registration application is denied,[416] no such right is provided to the public when a registration application is granted. This anomolous, if not unfair, situation has parallels in other jurisdictions.[417]

Environmental groups have sought to redress this imbalance by recommending that the federal government amend the Act to permit citizen involvement in the registration process.[418] Some groups have argued that this is particularly necessary to restore public confidence in the registration procedure in light of events such as the IBT scandal.[419] However, government representatives considered this matter at the 1982 CCREM meetings and gave little or no support to allowing the public a stronger role in the registration process for new pesticide products.[420]

b. The Re-Evaluation Process: The Problem of Ensuring the Safety of Existing Pesticides

Once a pesticide is registered under the PCPA, it retains its registration for a five-year period that may be renewed upon application to the Minister.[421] At any time during this period a registered pesticide may be subject to re-evaluation. According to Agriculture Canada officials re-evaluation is "a re-review of the registered uses of a pesticide chemical and the data supporting those uses."[422] The authority for re-evaluation is found in the regulations which direct that:

> "During the period of registration of a control product, the registrant shall, when requested to do so by the Minister, satisfy the Minister that the availability of the control product will not lead to an unacceptable risk of harm to (a) things on or in relation to which the control product is intended to be used; or (b) public health, plants, animals or the environment."[423]

Re-evaluation may correspond with the five-year expiry of a registration or it may be carried out for a group of pesticides used for the same pest problem.[424] Unlike the review and registration of new products, re-evaluation involves pesticides that "have generally been on the market for some time, perhaps 20 years or more."[425] Federal officials suggest that two factors generally trigger the re-evaluation process for existing registered pesticides: (1) a new study showing potential problems not previously recognized; or (2) the need to bring the data base up to date for a long registered pesticide.[426] The Department notes that:

> "Inevitably the data available on these chemicals do not meet current standards. In fact, requirements have changed so drastically in recent years that even products registered five years ago would probably not make it through the current review-process."[427]

Many of the same issues that attach to the registration process also apply to re-evaluation: the adequacy of data and testing on a product;[428] decision-making with respect to determining acceptable risk;[429] and the role of the public.[430] Special problems, however, also affect the re-evaluation process. These include: (1) the slow rate at which the federal government is tackling the re-evaluation of pesticides as exemplified by the small number of such products subject to the process to date; (2) difficulties in establishing a procedure for prioritizing or determining which pesticides to review first; and (3) problems in the federal government's regulatory program occasioned by the IBT falsification of safety data on many already registered pesticides.

(i) Slowness of the Re-Evaluation Process

The general procedure Agriculture Canada follows is to announce its intent to re-evaluate a pesticide to registrants; request old or new data on the chemical from the industry; review the data with other federal departments and determine what data gaps exist; develop regulatory action proposals for the chemical; seek provincial input on these proposals, as well as industry response; and develop an eventual timetable for implementation of the regulatory changes.[431] However, as of mid-1982, only 45 of the approximately 600 existing pesticide active ingredients had been or were undergoing re-evaluation.[432] These include the phenoxy herbicides,[433] chlorophenols[434] and fumigants.[435] Re-evaluations in the 1960's and early 1970's included reviews of the organochlorine pesticides, and pesticides which contained arsenic or mercury.[436]

According to federal officials, the federal government is capable of taking on only 10 - 15 chemicals a year in the re-evaluation process.[437] Even assuming that re-evaluations for each chemical can be completed within one year, and that no new chemicals are registered, it would appear that it will take approximately 37 - 55.5 years for the federal government to complete re-evaluations of just the remainder of the currently registered active ingredients.

Concern over the slowness with which the re-evaluation process is proceeding has been expressed by many federal officials. Some Health and Welfare Canada officials have suggested that: "A more vigorous cyclical re-evaluation of all registered pesticide products should be pursued."[438] They have suggested a 5 or 7 year cycle so that industry would keep its testing and data base more current.[439] Other federal officials have noted that:

> "The basic philosophy of Canadian registration procedures is that registration is granted when the scientific evidence warrants this step, and that the status is continued unless scientific evidence warrants a change. A valid criticism of the procedure may be that re-evaluation of the registered products is not carried out sufficiently frequently, having regard to the greatly improved toxicological information that is generated by modern testing procedures compared with the information that was considered adequate at the time of registration of some of the longest-registered products..."[440]

In fact, in 1979 Agriculture Canada officials admitted that: "Progress on re-evaluations has been slow due to priority being given to the evaluation of new actives and uses" as well as related matters.[441]

(ii) Difficulties in Prioritizing Pesticides For Review

A further concern of federal officials is how priorities are set for which pesticides should be re-evaluated first. Agriculture Canada notes that:

> "We do not now have a scheme for setting priorities. The first pesticides were chosen on the basis of our own perception of the problems and that of our advisors... The choices now are not so obvious. In addition, without an explainable, visible scheme for setting priorities we have become vulnerable to pressures from press, environmental groups and others to jump in and re-evaluate whatever they perceive as the problem of the moment. There is no doubt that all the chemicals looked at in this crisis atmosphere were due for it but whether they were the most critical is seriously open to question."[442]

In this regard, Agriculture Canada officials have expressed strong interest in a US EPA ranking scheme, commenced in the late 1970's-early 1980's which is intended to ensure that old pesticides meet current U.S. standards for registration under s.3 of FIFRA.[443] The program, known as "registration standards," involves making broad regulatory decisions at one time for a group of pesticide products containing the same active ingredient, rather than on a product-by-product basis. Thus, an estimated 600 standards will eventually be developed, representing most of the 35,000 currently registered pesticide products under U.S. federal law.[444] To establish the sequence of processing the approximately 600 active ingredients through registration standards review, active ingredients that have similar uses have been clustered into 48 groups. Currently, the groups are being processed in a sequence resulting from their ranking in an equation based on production volume, human exposure and ecological exposure factors. Each cluster contains chemicals with similar uses which are alternatives for each other.[445] US EPA sees advantages in the cluster approach as including: (1) equity to the registrant

(2) advantages to the user and (3) expedition of the re-registration program under FIFRA, including the Rebuttable Presumption Against Registration Program (RPAR),[446] discussed below. From 1980 to April 1983, 49 registration standards had been completed.[447]

Congressional investigators, however, have noted numerous problems with the registration standards program. These include: determining the order in which to review pesticides; developing an overall management framework; and integrating the development of standards into the FIFRA re-registration program generally, including the RPAR program.[448] Another Congressional arm investigation in 1980 concluded that US EPA had not resolved how the registration standards program was to be implemented. This report noted the need for US EPA to: prioritize pesticides; finalize registration guidelines; call in safety and health-related data; obtain public comment; and establish a pesticide tracking system.[449] Generally, the program has been found to take far longer than originally planned and been delayed by the failure of many registrants to promptly submit required studies.[450]

At the same time, the manner in which US EPA has been administering the registration standards program has been challenged by a coalition of environmental and labour groups in a law suit filed in May 1983. The suit alleges the use by US EPA of private industry-government meetings to develop "industry-assisted pesticide registration standards" which set out the principal health and safety criteria for the registration of a particular pesticide. The suit further alleges that these closed door "decision-conferences" have been

used to (1) assess the validity of industry-submitted scientific data and (2) draft the specific standards themselves.[451]

Given the problems which surround the registration standards program in the U.S. it is unclear whether Canada would be able to avoid the difficulties that have befallen US EPA to date. Even Agriculture Canada officials admit that the U.S. "scheme does not place very much emphasis on known toxicological properties of chemicals or on completeness of data packages."[452] However, the program is viewed by Canadian officials as a way for Canada to solve a "dilemma" in current re-evaluation efforts here.[453]

Another U.S. regulatory approach favoured by some federal officials in Canada and applicable to the problem of pesticide prioritization, is the FIFRA Rebuttable Presumption Against Registration Program (RPAR). This program shifts the responsibility to industry to "show cause" why an existing registered pesticide should not be further restricted. Environment Canada officials regard the RPAR approach as one that would probably make Canadian re-registration and re-evaluation efforts more efficient.[454]

The RPAR (or now special review) program, introduced in 1975 by regulation under FIFRA,[455] was originally designed to screen registered pesticides to identify those whose registrations were based on obsolete or incomplete safety data standards and for which new evidence suggested they posed "an unreasonable risk to man or the environment."[456] The RPAR process commences when the US

EPA determines that experimental evidence or practical experience trips a trigger calling for further assessment of whether a pesticide may cause some form of "unreasonable risk." A series of risk standards or criteria are used as "triggers."[457] If US EPA determines that a pesticide meets at least one of the risk standards or criteria then it publishes a notice in the Federal Register (equivalent of the Canada Gazette) or by certified mail, announcing that those registrants who wish to maintain registration of an existing pesticide can submit evidence rebutting the presumption.[458] Rebuttals can be based on proof that the actual exposure to the pesticide does not cause the expected effects, or that the Agency's determinations that the pesticide meets or exceeds any of the risk criteria are in error.[459]

If the presumption is rebutted, US EPA will terminate the process and will not initiate regulatory action against the pesticide. On the other hand, if the presumption is not rebutted US EPA will undertake a risk-benefit analysis on the pesticide to use in developing different regulatory control options,[460] which can be adopted as final decisions, subject to administrative and court appeal.[461] From 1975 to 1980 the program resulted in the cancellation of some or all uses of approximately 20 "dangerous pesticides."[462]

The program, however, is not without its problems. Key deficiencies in RPAR appear to include that USEAP: (1) does not quickly and thoroughly review pesticides referred to the RPAR program; (2) does not determine which pesticides undergoing RPAR review are the most hazardous and should be reviewed first; (3) does not always have enough accurate test and monitoring date on an important component of RPAR risk assessments-exposure analysis:

and (4) relies on benefits estimates that may mislead the Agency and the public because the estimates are not as precise as they appear to be.[463]

In addition, the manner in which US EPA has been administering the RPAR program has been challenged by a coalition of environment and labour groups who allege in a May 1983 lawsuit that unannounced, closed-door, industry-government meetings have been used to determine whether certain already registered pesticides-suspected of causing cancer, birth defects, nerve damage and other effects-should be subject to intensive scientific review under RPAR.[464] The suit further alleges that these closed door "decision conferences" with the regulated industry have frequently been used to reach the threshold determination of whether RPAR review was necessary as well as to determine whether the particular pesticide should be restricted or banned.[465] In addition, the suit alleges that following meetings with industry representatives, several pesticides have been removed from a pre-RPAR list of candidate pesticides.[466] Finally, the lawsuit alleges that US EPA has unilaterally and without public comment adopted major changes in the criteria for assessing risk of cancer from pesticides' exposure. These changes include tolerating a higher incidence of cancer in the human population, altering previous reliance on animal tests of carcinogenicity, and creating new categorical distinctions for carcinogens used in reaching regulatory decisions. These revised cancer criteria have been used in reaching RPAR decisions, according to the lawsuit.[467]

Interestingly, recent US EPA regulatory reform proposals would merge the RPAR program with the Registration Standards program (and re-name the former "Special Review"). More importantly, key changes to RPAR would involve (1) modifying the triggers used to judge whether to issue an RPAR;[468] and (2) expanding the role of, and reliance on, negotiations with industry registrants involved in RPAR actions in order to come to quicker settlements on particular pesticides.[469] US EPA justification for reducing the future role of RPAR is based on the view that RPAR reviews have already been initiated on virtually all the older suspect pesticides, and that few "bad actors" remain. Morever, the RPAR process is viewed as costly and time-consuming to industry registrants and the Agency. In future, the Agency expects to undertake risk-benefit reviews that were formerly done under RPAR, as part of the Registration Standards process itself.[470]

The principle behind RPAR appears to be a sound one: where a critical standard is exceeded by an already registered pesticide the burden shifts to the industry to show that the pesticide should not be further restricted.[471] However, the changes that are occurring or are proposed for RPAR raise unanswered questions about whether the program, in revised form, would be valuable for federal regulators in Canada to adopt as a means of prioritizing pesticide review. To the extent that Canada is at an earlier stage in dealing with existing "bad actor" pesticides, the original RPAR principles, if not processes, appear more likely to address the prioritization problem than current US EPA actions.

(iii) Existing Pesticides and the Special Problems of Falsified Safety Data: The IBT Situation

As noted above,[472] Industrial Bio-Test Laboratories, Inc. (IBT), an Illinois-based commercial testing laboratory, improperly conducted many of the safety studies it had undertaken on behalf of pesticides manufacturers in Canada and the United States. The studies were conducted to support pesticide registrations as well as to establish tolerances for pesticide residues on foods in Canada and world-wide. Since 1976-77, when the fraud was uncovered in the U.S., 113 pesticides have been audited by the Canadian Government and new replacement studies for the invalid IBT work have been or are being prepared by manufacturers and are in the process of being evaluated by federal officials.[473] Many of the pesticides involved include most of the major insecticides, fungicides and weed killers used in Canada and in the production of virtually all imported foods.[474] It is estimated that the replacement studies for the fraudulent IBT testing will cost the Canadian chemical industry $1 million per chemical, or approximately $100 million.[475] In October 1983, three former IBT officials were convicted in the United States of falsifying chemical safety tests submitted to the U.S. Government.[476]

The IBT issue raises a number of legal and policy concerns in regard to control of existing or already registered pesticides. These include: (A) federal decisions to allow IBT pesticides, the safety of which were suspect, to remain on the market for years while re-testing proceeded; (B) the departures of Agriculture Canada from the recommendations of its fellow departments to ban or restrict the use of certain IBT pesticides whose safety remained in doubt,

in some cases even after replacement studies had been performed and evaluated; (C) the doubt that remains over whether the IBT scandal constituted an aberration or whether the work of other laboratories is of concern and the capability of Canadian regulatory agencies to guard against similar laboratory testing breaksowns in future; and (D) the question of whether pesticide manufacturers themselves knew about the problems at IBT and the implications of this for future regulatory reliance on industry-testing results.

(A) The Federal Decision To Allow Suspect IBT Pesticides To Remain On the Market While Re-Testing Proceeded

The federal government's decision to allow pesticides, supported in whole or in part by faulty IBT test data, to remain on the market while re-testing proceeded has been controversial.[477] In effect it means that during the period of re-testing which has taken years to undertake and is still proceeding, the public and the environment could be exposed to some potentially dangerous pesticides that the federal government could not assure the safety of. The federal government's rationale for this approach hinged on the concern that unless conclusive evidence of hazards existed:

> "precipitous decisions ... could lead to significant effects on the availability and cost of food as well as sharply disrupting the agricultural sector of our economy."[478]

Thus, removal from the market of some or all IBT tested pesticides pending re-testing was not adopted as a matter of policy, regardless of the type of safety data that may have been falsified or invalid.[479] Indeed, while it is arguable that Agriculture Canada's authority under the PCPA regulations to cancel or suspend a pesticide on the basis that "the safety of the control product or its merit or value for its intended purposes is no longer acceptable

to the Minister,[480] would include a situation where the data provided for registration was false, it is not entirely clear that false data alone could be a sufficient basis for cancellation or suspension. In the U.S., FIFRA only allows US EPA to cancel or suspend a pesticide's use if the Agency determines that it poses an "imminent hazard" or causes "unreasonable adverse effects on the environment."[481] A 1980 GAO investigation determined that US EPA:

> "... does not have statutory authority to suspend or cancel registered pesticides when inspections show that the safety tests supporting the registration are not valid."[482]

The GAO noted that the U.S. Federal Food, Drug and Cosmetic Act (FFDCA)[483] does allow the U.S. Food and Drug Administration (FDA) to withdraw approval of a drug when it is determined that the original drug approval application "contains any untrue statement of a material fact."[484] The GAO recommended amendments to FIFRA that would authorize US EPA to take appropriate regulatory action, including suspension, of pesticides which it later determines were not supported by valid safety tests when registered.[485] No such amendments to the PCPA have been proposed to date by the federal government.

It has not been lack of statutory authority to act, however, which has resulted in the Canadian Government's decision to allow suspect pesticides to remain on the market while re-testing proceeded. Rather the impact on food supply and the agricultural sector of the economy have been prominent, if not decisive, reasons for the federal government's stance. The policy, thus adopted, suggests that over the last 20-30 years Canadian agriculture

has become so dependent on chemical pesticides to produce food, that once some chemicals are registered and are used for a period of time, they develop a virtual immunity to remedial regulatory action, in the absence of alternatives. This appears to be the case even in the face of evidence casting doubt on the validity of a significant portion of pesticide safety tests. Whether this is the result intended by Parliament in its last series of amendments to the PCPA in 1969, is seriously open to question.

(B) Departures By Agriculture Canada From Health and Welfare Canada Recommendations To Ban or Restrict Certain IBT Tested Pesticides

As Health and Welfare Canada has, over the past 6 years, audited and validated studies performed by IBT and reviewed manufacturers' replacement studies, it has issued status reports and advisory opinions to Agriculture Canada on what regulatory action it believes is warranted under the PCPA for each pesticide. These recommendations have included registration cancellation, use of special warning labels, retention of current registration status and related regulatory actions.[487] In turn, Agriculture Canada has advised pesticide registrants of its decisions with respect to any revisions in the regulatory status of IBT tested pesticides.[488]

While Health and Welfare Canada recommendations have been adopted by Agriculture Canada in many instances, several key recommendations have not been. These examples illustrate that health and safety are not necessarily determinative of all pesticide decisions in Canada. In the case of the herbicide Randox (allidochlor), for example, the manufacturer, Monsanto Inc., refused to repeat five invalid IBT tests, including pivotal (essential) rat studies on reproduc-

tion and chronic feeding.[489] As a result, Health and Welfare Canada concluded that the data on allidochlor's safety were insufficient to support its continued registration and that therefore the registration should be cancelled.[490] Agriculture Canada, however, following pressure from onion growers concluded that the use of allidochlor was essential for onion production because there was no alternative to the pesticide. It therefore decided to continue allidochlor's registration in British Columbia, Quebec and Ontario under a restricted classification system whereby growers could use the product if they obtained a special permit from provincial regulatory agencies.[491] At the time of the decision, Agriculture Minister, the Hon. Eugene Whelan, stated:

> "I fully appreciate the expert advice provided by Health and Welfare Canada. Health and safety of Canadians is a fundamental responsibility. But my responsibilities are broader than that. The practical realities of [this chemical's] use in Canada cannot be ignored. In the interests of arriving at the best-balanced decision, I have decided to place [it] in a restricted class. I feel it would be most unfair to deprive Canada's onion... producers of a chemical that their competitors in the United States can continue to use."[492]

In another case, involving the fungicide captan, Health and Welfare Canada recommended in 1981, among other things, that commercial applications of captan be such that no residue remain on food at the retail level.[493] All 13 of the original IBT studies on captan had been determined by Health and Welfare, to be invalid,[494] but valid replacement studies still indicated concern over possible effects from captan including cancer, mutations and birth defects.[495] Agriculture Canada was aware of the fact that one of the replacement studies done by captan's manufacturer indicated that the fungicide

caused cancer at high feeding levels.[496] Instead of following the Health and Welfare Canada recommendations, however, Agriculture Canada established a Consultative Committee on IBT which was to consider "all recommendations on IBT pesticides made to Agriculture Canada."[497] The Agriculture Minister, the Hon. Eugene Whelan, stated at the time that "the economic implications of removing some of these pesticides from the market are so serious that we want the benefit of the advice of independent experts."[498] The committee's first duty, according to the Minister, was to study Health and Welfare Canada's captan recommendations because of "scientific controversy and uncertainty involved in interpretation of test-animal cancer studies, and the importance of captan to food production..."[499]

After three days of public hearings,[500] the committee subsequently issued a report in which it concluded that captan caused tumours in mice but that there was no evidence that it caused cancer in humans.[501] Therefore, according to the committee, captan did not pose an unreasonable risk to human health.[502] The committee, however, did admit that it felt:

> "uncomfortable...with the use of material that caused tumours in mice and mutations in bacteria and whose mode of action may be genotoxic."[503]

As a result the committee recommended that captan residues, although at lower levels than previously allowed, should continue to be permitted on certain crops.[504] The federal government accepted the essential committee recommendation that residues continue to be allowed.[505]

Again, as in the allidochlor situation, economics played a key role in the decision-making process with respect to captan. A report prepared for and relied on by the committee on the economic benefits of the fungicide concluded that (1) if captan were discontinued and not replaced by another fungicide, annual losses could equal $100 to $150 million per year and (2) disruption of international trade could be negligible or very significant if fruits and related crops had to be residue free as originally recommended by Health and Welfare Canada.[506]

A distinction may be made between the way the federal government treated the allidochlor and captan situations. While economics was a key factor in Agriculture Canada's decision with respect to both pesticides, in the captan situation the government also appeared to take a new approach to risk in the distinction between tumours in animals and cancers in humans. The use by Agriculture Canada of the consultative committee perhaps highlighted this approach to risk. Health and Welfare Canada, moreover, also appears to support such an approach, as it eventually agreed to reduce but not eliminate captan residue levels on certain fruits.[507]

(c) Faulty Laboratory Safety Testing and IBT: Aberration or Tip of the Iceberg?

Both the federal government and the agricultural chemical industry have argued that the IBT situation was an aberration and not a common occurrence in the laboratory testing of pesticides for safety. Dr. A. B. Morrison, assistant deputy minister, health protection branch, Health and Welfare Canada has been quoted as stating that: "It is not a common practice, I can assure you, for companies to submit falsified data...This situation

appears to have been related to problems at IBT...something which went wrong in a particular company."[508] The agricultural chemical industry has argued that it was not "ever correct to charge that IBT was just the tip of the iceberg."[509] The industry suggests that:

> "This rumour still persists despite the fact that, since 1979, the Food and Drug Administration in the U.S. has concluded good laboratory practice audits to ensure that standards it set in that year are met by all contract laboratories. The rumour persists in the face of the fact that the Director of Bio-research monitoring for FDA formally stated, in June 1981, that 'the laboratories in the United States and in other parts of the world that we have inspected comply with our regulations to an acceptable degree and give us confidence in the quality of their studies."[510]

It would appear, however, that concern about the adequacy of testing done by other laboratories cannot be so easily dismissed. A 1979 US EPA-US FDA report revealed that deficiencies existed in the work of many laboratories reviewed.[511] A 1982 Congressional staff investigation, moreover, raised a number of concerns with both US EPA and US FDA laboratory auditing programs. US EPA officials admitted that the Agency's audit program is less than adequate, with only one full-time professional assigned to the program.[512]

The Congressional investigation reported that 4 of 83 audits conducted since 1977 have produced referrals to the Justice Department for possible criminal action.[513] While US EPA regarded this as a vote of confidence in pesticide testing standards, the Congressional investigation concluded that more review was needed before concurring in the Agency's assertion.[514]

Except for the IBT case, the subcommittee noted that there was "no solid indication...that any decisive regulatory or enforcement actions have been taken as a result of the laboratory audit program."[515] Subcommittee staff were advised by some US EPA officials that the Agency had been lax in carrying out follow-up enforcement actions where problems were identified, including situations where "questionable or possibly fraudulent acts by certain laboratories or companies submitting pesticide safety and health data" to US EPA were involved.[516]

The investigation also noted that in its review of US EPA's audit summaries it found "several serious questions about the practices followed by some laboratories."[517] These included questions about experimental practices that biased test results.[518] Moreover, with the exception of 1978 and 1979, the Congressional investigation found that US EPA's laboratory audit program has not been treated as a high priority within the Agency's pesticide program.[519] Reliance has instead been placed on US FDA's program that audits a laboratory's compliance with good laboratory practices. According to the subcommittee, however,: "EPA...lacks information on how effective a deterrent the FDA audit program is against poor science in pesticide experiments."[520]

Under these circumstances, it is difficult to have complete confidence in the view that the IBT matter was solely an isolated event. U.S. agencies apparently cannot answer this question to anyone's satisfaction because they appear to have some serious problems in their laboratory audit programs. Therefore, Canadian regulatory agencies who are substantially

dependent on U.S. officials to scrutinize laboratory work in the U.S. where most testing is done, are not likely to be in a better position to ensure that these laboratories are producing quality work. Good laboratory practice legislation is, however, under consideration in Canada.[521]

As a result, some groups in Canada have suggested the need for an independent testing facility, such as a Crown corporation, financed from a tax on pesticide registrants or the general chemical industry. This might also ensure greater environmental effects testing under Canadian conditions.[522]

(D) Industry Knowledge of IBT Practices and Future Regulatory Reliance on Industry Testing Results

It has been the federal government's view that pesticide manufacturers did not know of the falsified nature of the data being submitted on their behalf by IBT. Dr. A. B. Morrison, assistant deputy minister, Health and Welfare Canada has been quoted as stating that: "...the pesticide manufacturers involved we don't believe knew about the data being falsified or fiddled with, or distorted. They were as chagrined by this as any of us were..."[523] Indeed, the recently completed IBT trial in the U.S. did not involve the prosecution of any pesticide manufacturers; only former IBT executives.

Documents entered into evidence during the IBT trial, however, suggest that some pesticide manufacturers did in fact know of some of IBT's activities. A 1978 audit by US EPA - US FDA officials of one of IBT's testing laboratories revealed evidence of the falsification of test results and the apparent knowledge of client pesticide manufacturers before the results were submitted to the U.S. Government for federal registration. The federal report stated that there was evidence, for example, that Monsanto Co. of St. Louis, Missouri was aware that extra mice were added to a cancer study done on a herbicide (Machete) in the mid 1970's. As the federal report noted:

> "In some of the studies where final reports made claims for observations that weren't made, the clients were believed to have been well aware of the situation prior to their submitting the final reports to the U.S. Government. In at least one instance, the client [Monsanto] is believed to have been knowledgeable about the usage of unreported extra animals [in the study on Machete] prior to the submission of the final report to the Environmental Protection Agency."[524]

The federal audit also stated that there was "strong evidence" that Monsanto and other co-sponsors were aware of poor animal care, related deficiencies and misrepresentations in two other cancer studies IBT performed on rats and mice with monosodium cyanurate, a swimming pool chlorinator.[525]

There are also recent examples of more systematic industry behavior falling short of fraud, that nonetheless is cause for concern. A 1982 U.S. Congressional investigation focussing on the adequacy of industry pesticide health and safety data submitted to the U.S. Government concluded, for example, that:

> "Pesticide safety and health studies submitted to the EPA, and subsequent Agency-Industry exchanges on the studies, sometimes contain highly questionable scientific arguments and inappropriate statistical procedures that are employed in order to challenge the significance and/or severity of adverse health effects observed in toxicological experiemnts."[526]

Interestingly, because of the IBT affair, the Congressional subcommittee noted that:

> "...several major pesticide manufacturers have built their own toxicology laboratories with a desire to gain complete control over the quality of experiments done on their products. Many of these laboratories have not been audited, nor has the US EPA adopted any new procedures or methods to assure compliance with good laboratory practices in registrants' testing facilities. Uneven quality and quality assurance programs persist in the toxicology testing industry. As currently administered, the EPA's laboratory audit program cannot be expected to detect deficient studies, or to produce standards."[527]

In light of these concerns, proposals for an independent Canadian testing capability with appropriate safeguards as noted above,[528] should be on the agenda for any discussion of PCPA reforms.

C. Suspension and Cancellation of Pesticide Registrations: The Role of the Review Board

The registration of a pest control product may be suspended or cancelled by the Minister of Agriculture when "the safety of the control product or its merit or value for its intended purposes is no longer acceptable to him," based on currently available information.[529] Federal guidelines suggest that in practice this determination can be made whenever:

> "the product is found to present an unacceptable risk of harm to treated crops or domestic animals, to the public health or wildlife forms or to the environment."[530]

Suspension of a registration is the less extreme of the two regulatory options; it affects the registrant, not the retailer or user. If the control product is only suspended, the registrant cannot distribute any further shipments of the suspended product. Material that is already at retail outlets prior to the suspension, however, may be legally sold.[531] On the other hand, cancellation of a registration, the more extreme regulatory action, affects all sources of the pest control product from registrant to the ultimate user.[532]

Suspension or cancellation may be appealed by the registrant and a hearing requested within 30 days of a Minister's notice of intention to take one of the two regulatory actions.[533] The Minister must appoint a Review Board to hold the hearing[534] and the Board must give the registrant "and all other persons who may be affected by the subject matter of the hearing an opportunity to make representations to the Board."[535] The Board must prepare a report, recommendations and its reasons as soon as possible after the hearing and file them with the Minister and the registrant,[536] as well as send all the documents from the hearing to the Minister.[537] The Minister can, after considering the Board's report, take any action he deems advisable and notify the registrant of his decision.[538]

Federal officials indicate that there have been very few control product suspensions or cancellations under the PCPA. Most regulatory actions have

been against particular uses.[539] Indeed, there has been only one instance since the 1972 PCPA regulations were promulgated, in which a Review Board has been empanelled to hear a matter. This occurred in 1977 when the Velsical Corporation of Canada sought permission to use up its remaining inventory of the organophosphorus insecticide leptophos (Phosvel),[540] in the face of federal government intent to cancel the pesticide's registration.[541]

The neurotoxicity of leptophos, noted above,[542] dominated Health and Welfare Canada concern about its continued registration,[543] while economic concerns and the lack of appropriate alternatives to the pesticide dominated registrant, trade association and Ontario agricultural and environmental agency views.[544] The Review Board itself approached its mandate from the viewpoint of a "risk-benefit evaluation."[545] It compared the benefits to be obtained from the use of the leptophos stocks that were available against the potential health hazard to farmers exposed during spraying operations, concluded that the risks outweighed the benefits and therefore recommended that the company's request should be denied.[546] The Board's recommendation was adopted by Agriculture Canada and the insecticide's registration lifted.[547]

In coming to its conclusions the Board considered a number of non-toxicological matters. The Board noted that the non-use of leptophos would not seriously jeopardize tobacco production; an alternative pesticide was available; and it doubted that serious economic impacts would result.[548] The Board also considered Ontario agency contentions that field use of leptophos constituted the safest means of disposal[549] and that

intensive education could be mounted to ensure that farmer-applicators were aware of potential health hazards.[550] The Board doubted, however, that these efforts would be sufficient, and noted that "policing" of farmer application would be impractical.[551]

In considering toxicological matters surrounding possible use of leptophos the Board noted that: it was not possible to determine a "no effect" level for repeated exposures to leptophos; the pesticide was a known inducer of delayed neurotoxic effects in experimental animals; accidental exposures to the compound appeared to leave humans at least as sensitive, if not more so, to delayed neurotoxicity as evidenced by employee central nervous system problems during manufacture of leptophos; mis-diagnosis of delayed neurotoxicity as multiple sclerosis had been documented; delayed neurotoxicity would make cause and effect correlation difficult under field condition usage of leptophos; and the product was extremely persistent and likely to have more severe effects on those exposed to it more than once.[552]

As a result of the above, the Board concluded that: leptophos might constitute an occupational hazard to farmer applicators; zero exposure could not be ensured; monitoring for delayed neurotoxic symptoms would be impossible; there is no antidote for delayed neurotoxicity; and that notwithstanding the lack of reports of adverse affects of leptophos on formulators or applicators in Canada, the above findings rendered the absence of such reports of dubious value.[553]

A number of concerns arise with respect to suspension, cancellation and the role of the review. First, it is not clear why the regulations make a distinction between suspension and cancellation in the sense that the former only legally affects the registrant and not the retailer and user. Given the potential damage a pesticide such as leptophos may cause, the distinction makes no sense from an environmental health perspective.[554] When Health and Welfare Canada officials thought that only suspension was proposed for leptophos, they made their concerns known to the Review Board that cancellation was necessary.[555] Had their views not prevailed, retailors and users would have been legally free to use up their remaining stocks of the pesticide. Indeed, despits the 1977 cancellation of the leptophos registration, a committee of the International Joint Commission reported in 1980 that leptophos was one of 33 chemicals found in the Great Lakes system that is known to cause chronic adverse effects in man.[556] Moreover, an Ontario Government survey of pesticide use reported that in 1978, 160 kilograms of leptophos were used on tobacco in several Ontario watersheds;[557] one year after the pesticide's cancellation. The example suggests regulatory difficulty in ensuring that cancelled pesticides are re-called or otherwise prevented from being used.

A second concern with the procedures relates to who may trigger Review Board consideration of a pesticide. The regulations limit review to either pesticide applicants or registrants. Members of the public are not granted such rights. The inequity of this approach, and possible reforms, have been outlined above.[558]

d. Record-keeping, Inspections and Enforcement

Three inter-related components of the PCPA program include (1) record-keeping (2) inspections and (3) administrative as well as quasi-criminal enforcement actions for violations of labelling or other use prohibitions. These activities constitute a remedial approach to control of pesticide usage in the field, short of suspension or cancellation actions, or changes in registered uses.

All registrants are required to make a record of all quantities of a control product they store, manufacture or sell and must maintain the record for five years and make it available to Agriculture Cnaada upon request.[559]

Inspectors may be designated,[560] with broad powers to enter premises,[561] examine materials[562] and require production of documents[563] for effecting the Act's purposes. Inspectors may also seize and detain control products where they have reasonable grounds for believing the Act or regulations are being violated.[564] Forfeiture and disposal of seized control products are also authorized.[565]

The Act prohibits any person from manufacturing, storing, displaying, distributing or using a control product "under unsafe conditions."[566] The prohibitions extend to importing or selling such products in Canada unless they have been registered, packaged and labelled according to prescribed conditions.[567] In conjunction with labelling requirements,[568] the Minister can prohibit the use of pesticides in a manner inconsistent

with such labelling.[569]

Every person who violates the Act or regulations is upon conviction, liable to two years imprisonment, if indicated,[570] or to punishment on summary conviction.[571] An accused may be convicted of the offence if it was performed by an agent or employee unless he or she establishes that "the offence was committed without his knowledge or consent and that he exercised all due diligence to prevent its commission."[572] The statute of limitations for the institution of proceedings by way of summary conviction under the Act is one year.[573]

Information on pesticide usage is essential if any agency is to undertake key regulatory, monitoring, research and enforcement activities. In the U.S., the General Accounting Office concluded in 1980 that:

> " US EPA needs information about where pesticides are used and in what quantities to administer all its pesticide programs... EPA's pesticide program enforcement strategy is to ensure(1) industry compliance with product registration requirements and (2)user compliance with label directions. To attain these goals, EPA engages in producer establishment inspections, pesticide sampling, pesticide analysis, use surveillance, and legal action against violators. Pesticide usage data is needed for use surveillance."[574]

It is frequently the case, however, that agencies lack such data. Agriculture Canada officials admit, for example, that they lack any statistical studies on the quantities and types of control products used in Canada, particularly since Statistics Canada's annual pesticide sales surveys were

discontinued in 1977.[575] They point instead to use surveys conducted by provinces such as Ontario or New Brunswick, or Manitoba's development of herbicide statistics in Western Canada.[576] While of value, the limitations in a number of these provincial surveys, however, have been noted above.[577]

The only federal survey Agriculture Canada is currently involved in is one being done jointly with Environment Canada. The purpose of this survey of pesticide registrants, authorized by s.26 of the PCPA regulations and s.3(1) of the Environmental Contaminants Act, is to assemble data on usage, by province, of 24 pesticide active ingredients.[578] Registrants are required to file information with both Departments listing the quantity of each active ingredient sold in 1981 and 1982 per province.[579] According to Agriculture Canada, the results of the survey will aid Environment Canada to determine the amounts of each active ingredient reaching the environment in various regions of the country as well as be of assistance in designing environmental sampling and monitoring programs. In turn, this will aid in the identification and assessment of any environmental effects arising from the use of these compounds, which in turn will assist future evaluations conducted by Agriculture Canada.[580]

While this survey appears to be a step forward in cooperation between the two Departments as well as in gathering needed data, there appear to be a number of concerns with the exercise. First, it is unclear whether this

is to be a once only exercise. If this is so then it is hardly a substitute for a program that systematically and regularly obtains information on where these pesticides are used and in what quantities. Second, while the survey is characterized in the Canada Gazette as one pertaining to usage, in fact the only question registrants are asked to respond to in the survey is the quantity of active ingredient sold in each province. Indeed, s.26 of the PCPA regulations limits record-keeping and reporting requirements to information respecting storage, manufacture and sales information, not usage. Section 7 of FIFRA requires U.S. pesticide producers to submit annually to US EPA, information concerning production and sales of active ingredients. While US EPA does not require pesticide producers to estimate the usage of each pesticide, the U.S. GAO was of the opinion that US EPA has the authority to do so.[581] For greater certainty, however, GAO recommended that reporting systematically include submission of pesticide usage data by producers.[582] If the Canadian survey is to be of value, it is submitted that similar estimates of usage, as well as location of usage, be required, if necessary, by amendments to the regulations. Third, a survey of 24 active ingredients, or 4% of the total of 600 active ingredients in Canada, while of value, still leaves much that is unknown about the other 96%. It is unclear whether such surveys will eventually cover other active ingredients, and if so, how frequently.

The lack of timely and comprehensive information on pesticide usage can adversely effect enforcement activities. In the U.S., for example, the GAO

reported in 1980 that:

> "[US] EPA does not have comprehensive information on where pesticides are used and in what quantities although such information is essential to its regulatory and other pesticide program activities."[583]

The problem continues to exist, according to a U.S. Congressional subcommittee, as late as May 1983.[584] It is also doubtful that Canada's enforcement and related programs can be effective in the absence of such data.

To some extent the paucity of federal prosecutions under the PCPA over the past 14 years may in fact be a reflection of the lack of adequate, comprehensive and timely pesticide usage data. Agriculture Canada officials indicate that not more than 7 prosecutions were undertaken by the Department under the PCPA between January 1, 1970 and June 30, 1983.[585] Three convictions were obtained, with small fines assessed in each case.[586] In several cases, procedural difficulties such as the citing of wrong sections of the Act or the missing of statute of limitations periods, have resulted in charges being withdrawn and not relaid.[587] To improve inspection and prosecution procedures, Agriculture Canada compliance officials have been working with officials of the RCMP.[588] A prosecutions procedure manual has also been developed.[589] Some use of the Customs Act on importation matters, has been made, particularly because of the higher fines available under the Act.[590] In addition, when the New Brunswick Supreme Court held that a private prosecution using the PCPA could not succeed against an industry-government consortium responsible for forest spraying operations

in New Brunswick because the Act does not bind Crown agencies, Agriculture Canada amended the PCPA to bind the federal and provincial crown.[591]

What may also account for the few government prosecutions under the PCPA, is the small fines authorized under the summary convictions provisions of the Act. Agriculture Canada may also prefer seizure, detention and related actions, which, because they are handled administratively, are thought by the Department to be more effective enforcement tools.[592] However, it is not clear why Agriculture Canada could not substantially improve fines under the PCPA, as has been done in recent years under the Fisheries Act and the Environmental Contaminants Act.[593] The maximum fines are small under the PCPA, because Agriculture Canada has not moved to change them. With respect to the effectiveness of seizures and detentions as enforcement instruments, the Department estimates that approximately 50 such actions are undertaken a year.[594] The Department also notes, however, that its statistics in this area are not good.[595] Assuming these figures are accurate it is still difficult to evaluate this administrative approach as a substitute for quasi-criminal enforcement or related techniques.

Limited criminal enforcement of federal pesticide laws is not limited to Canada. In the U.S., although US EPA can pursue criminal sanctions in every case where the evidence warrants it, "historically, criminal sanctions have played only a minor role in the Agency's overall enforcement program."[596] The Agency notes that:

> "As a matter of enforcement policy and resource allocation, such an unrestrained use of criminal sanctions is neither warranted nor practical. The commitment of investigative and technical resources necessary for the successful prosecution of a criminal case is high. More importantly, a criminal referral for investigation or prosecution can entail profound consequences for the subject or the referral, and should reflect a considered, institutional judgment that fundamental interests of society require the application of Federal criminal sanctions to a particular set of facts. Accordingly, criminal referrals will be confined to situations that-- when measured by the nature of the conduct, the compliance history of the subject(s)or the gravity of the environmental consdquences--reflect the most serious cases of environmental misconduct."[597]

US EPA does note, however, what offences under FIFRA would trigger, at least in theory, priority criminal enforcement investigations. These offences include: failure to report information on the unreasonable adverse effects of a registered pesticide; falsification of FIFRA records; violation of suspension or cancellation orders; violation of stop sale orders; unlawful uses of pesticides; and illegal distribution of unregistered pesticides.[598] In practice, however, enforcement of FIFRA for pesticide misuse, for example, has been rare. During 1981 Congressional testimony regarding FIFRA one lawyer, who frequently acts for migrant workers and has monitored FIFRA enforcement activities, indicated that: "Within the past 4 years we are aware of only two, perhaps three, FIFRA pesticide misuse prosecutions [brought by US EPA] ."[599]

To a great extent the FIFRA enforcement picture is complicated by two factors. First, the U.S. states have been granted "primary enforcement responsibility" by US EPA. This means that the state is responsible for enforcing FIFRA at the local level and, in the event of pesticide misuse

is responsible for taking the first enforcement action.[600] Second, FIFRA provides for a variety of enforcement techniques besides criminal actions. These include civil-administrative penalties;[601] warning notices;[602] stop sale actions or injunctive relief;[603] stock seizures[604] and certification actions.[605] Most of the enforcement actions, however are civil-administrative penalties.[606]

With respect to state enforcement, US EPA provides states that enter into "cooperative enforcement agreements" with up to 50% of the funds they need for their pesticide enforcement programs.[607] The US EPA has the power to rescind a state's "primary enforcement responsibility" if it finds that the state has not corrected deficiencies in its program within a specified time.[608] US EPA may also intervene if it determines there is an emergency,[609] or that a state has not taken appropriate enforcement action in the event of pesticide misuse, though a state has at least 30 days to act.[610] Critics have argued, however, that this 30-day period is too long as evidence of misuse disappears rapidly.[611] Moreover, US EPA's apparent principal means of monitoring state enforcement is to rely on quarterly and annual reports submitted by the states themselves, that summarize state enforcement initiatives.[612]

Most state laws do not provide the state agency with authority to seek civil-administrative penalties in the event of pesticide misuse.[613] Often state statutes, like provincial laws, authorize the state to prosecute or

to seek licence or permit suspension.[614] However, an observor of instances of involuntary pesticide poisoning among farmworkers, small farmers and rural residents who live near farms, noted that in 1980 over 100 such victims testified before a federal-state pesticide forum where they indicated that:

> "none of their complaints to EPA or state pesticide authorities resulted in a criminal or civil penalty. Not a single warning notice was issued. Not one applicator's licence to spray was suspended or revoked."[615]

Indeed, even the amount of civil-administrative penalties assessed under FIFRA has noticieably declined since 1980. In that year approximately $202,000 in penalties were assessed. In 1981 and 1982, approximately $138,000 and $112,000 in penalties were assessed respectively. For the first four months of 1983, approximately $24,000 in penalties had been assessed.[616] Notwithstanding the problems that exist with implementation of the civil-administrative penalty mechanism, in principal it would appear to be a valid instrument for Canada to consider for supplementing PCPA enforcement.

What some critics have also contended is that governmental enforcement generally under FIFRA also requires supplementation through the authorization of citizen suits. Testimony during the 1981 Congressional hearings on FIFRA noted the perceived benefits to such an approach:

> "There are a number of advantages to [a private right to sue under FIFRA]. First, it provides a responsive instrument of control. If one is injured by careless applications of pesticides or exposed to toxic substances as a result of defective labelling and registration, one need not wait for an over-extended state or [US] EPA to respond. One can seek redress swiftly.
>
> Second, such an enforcement system directly strikes the individual perpetrator for his or her conduct...Those who fail to abide by Federal standards should pay for their carelessness; those who properly handle toxic pesticides will avoid such actions.
>
> A third advantage of such a private enforcement scheme is that it holds out the promise of more effective enforcement of FIFRA without additional [US] EPA funding."[617]

Enforcement problems in Canada may also warrant similar citizen supplementation of the regulatory process through private prosecutions, citizen suits and judicial review applications. While the first of these instruments is not precluded by federal law, the other instruments would require statutory authorization. A number of recent enforcement difficulties in Canada suggest the need for placing such tools in the hands of the citizen. First, while labelling of use is a key element of pesticide control, it has been suggested that vague labelling of pesticides can undermine the PCPA's effectiveness.[618] A comparison of the Canadian and U.S. label for the same pesticide, fenitrothion, revealed that allowable application rates in Canada were 33%-50% higher than those allowed in the U.S. Moreover, the environmental hazard warning about the product and appropriate use conditions, which appeared on the U.S. label, were absent from the Canadian label.[619] Second, concerns have also been raised in Parliament about whether Agriculture Canada policy is in fact to keep labelling vague in order to avoid enforcement actions.[620] Minutes of a 1979 federal-provincial meeting of pest control officers indicate a concern that:

"Too detailed labelling [for forestry uses] could lead to increased violations of the law or to increased charges from environmental groups."[621] Third, even assuming labelling instructions were adequate, widespread violation of labelling requirements, such as those respecting applicator disposal practices for pesticide containers, have been reported.[622] Fourth, despite the fail-safe system that the PCPA is meant to provide, the fungicide Du-ter, whose registration was lifted in 1981 by Agriculture Canada after its manufacturer Ciba-Geigy Ltd. decided not to keep it on the market, has been used in some Ontario potato fields in 1982 and 1983. According to an investigation undertaken by television journalists in 1983:

> "[Du-ter] was originally approved using the questionable data of the IBT labs. It was sprayed recently, by accident, on the wrong field, and at a time when its sale was officially prohibited...The chemical continued to be sold for a year and a half after its registration had lapsed, continued to appear in provincial government directories [including those recommending it for use on Ontario potatoes] and continued to be sprayed by at least one big farm operator, Hostess Foods."[623]

To date, despite calls for enforcement action by some members of Parliament,[624] no charges have been laid by Agriculture Canada under the PCPA.

Overall, the enforcement process under the PCPA is a complex one involving record-keeping and reporting requirements, inspections and a variety of administrative and quasi-criminal authorities. However, the lack of comprehensive and timely pesticide use data may undermine key elements of

this process. Moreover, government use of the quasi-criminal sanction, for a variety of reasons, has essentially fallen into dis-use; a trend that is occurring in other federal jurisdictions as well. The adequacy of the administrative remedies preferred by Agriculture Canada, is difficult to evaluate. The use of civil-administrative penalties, as authorized under U.S. federal law, might provide a valuable supplement to Canadian federal pesticides law. The need, however, also appears to exist for citizen supplementation of governmental enforcement efforts through private prosecutions, citizen suits and judicial review applications, particularly in light of some surprising breakdowns in the regulatory process.

e. Confidentiality of Industry Information: The PCPA and new Federal Access to Information Law

The PCPA is silent on the release of information gathered under its auspices. It has, therefore, been suggested that because no provision under the Act prohibits disclosure, information release is guided by common law principles, government policy discretion and prospectively new federal access to information legislation.[625] The PCPA may also be characterized as containing no affirmative duties requiring the federal government to release environmental health and safety data to the provinces or the public.

The position of industry has been that information submitted to the federal government pursuant to the PCPA should remain confidential. The key elements of this argument were outlined at a special pesticides forum in 1982. This forum occurred at a time when provincial agencies had been

experiencing difficulty in obtaining information from the federal government with respect to the IBT matter.[626] An industry spokesman, J.H. Elliot of the Canadian Agricultural Chemicals Association, noted that:

> "...data are submitted to federal government regulatory authorities in confidence to enable them to discharge their responsibilities for the protection of man and the environment. While always ready to provide this information to government, the chemical industry views government as the trustee of the information and not the owner."[627]

This view has been set out in more detail in industry position statements on the IBT matter generally:

> "While the data on the compromised [IBT] products were being re-developed there was, naturally, a high level of anxiety about the continued presence of these products on the market. Provincial authorities, in particular, did not feel justified in accepting federal assurances that the compromised products could continue to be used while the supporting data on them were re-validated. They felt it was their responsibility to make their own judgments about that and, accordingly, requested the federal authority to give them access to the data on these products.
>
> However, these data had been submitted to the Canadian regulatory agencies in confidence by the organizations that owned the data. This property represented many millions of dollars invested by each developing company and there was great concern that if it were made available to other authorities, competitors would get the information. The concern was not that provincial authorities would disseminate the information but that it would be simpler for Canadian media to get the information and that the more hostile critics of the industry among them would spread the information, claiming it was in the public interest for them to do so.
>
> To understand the reason for the Canadian companies' and the Canadian authorities unwillingness to release this information, it is necessary to understand the position of Canadian industry, and, unfortunately the Canadian economy as a whole, with respect to high technology.

> The fact is we have very little of it that is our own. Most of it is transferred here by foreign companies for use by their Canadian affiliates. This transfer makes possible a great deal of Canadian production and also a great deal of high quality employment in Canada. It also provides the base upon which Canadians may develop their own high technology resources.
>
> Meanwhile, if Canadian industry were to lose the use of this or any new technology, the consequences for the whole economy would be serious. In the case of agricultural chemicals it would severely impair Canada's position as a basic food producer and exporter. If it were demonstrated that confidential data could not be protected in Canada then we would no longer have access to it.
>
> It was for this reason that the Canadian industry resisted the pressure to allow the release of confidential data on the IBT chemicals..."[628]

Government officials have also suggested that with respect to the IBT situation "there were constraints on the release of information which pertained to proprietary data."[629]

The issue of access to information has been a recurring problem throughout the IBT affair. As early as December 1977, Canadian journalists argued that the federal government was refusing to release the list of IBT tested pesticides that were in controversy; they had to go to the U.S. to obtain the list.[630] Indeed, one Canadian environmental group received the results of the joint U.S.-Canada audit of the IBT captan studies done by Health and Welfare Canada, from a legal group in California and not from Canadian authorities.[631] The California group had obtained the documents, all Health and Welfare Canada memoranda written in Ottawa, through a U.S. Freedom of Information Act request filed in Washington, D.C.[632] Ironically, while these audits are still unavailable from Canadian authorities,

all of them have since been reproduced in their entirety in the public record of a U.S. Congressional subcommittee report.[633] The Canadian audits of the IBT captan studies revealed that all 12 studies reviewed by Canada to January 1980, were invalid. Many of the studies were invalid due to fabrication of the data, discrepancies between available raw data and final reports, lack of supporting data and related problems.[634]

Health and Welfare Canada had refused to release any of this data on the basis of a Department of Justice opinion that the information supplied to the Crown, including any IBT studies, pursuant to the PCPA is confidential and subject to the common law protecting trade secrets. Furthermore, if the studies or information derived from them were released, the Crown would be open to legal action from manufacturers and laboratories who could claim that their reputations have been damaged.[635]

In unofficial representations to the Vancouver-based West Coast Environmental Law Association, however, it appears that the Department of Justice had advised Health and Welfare Canada not to release the IBT audits because it would open the floodgates to information requests, not because the audits involved trade secrets.[636] Moreover, it would appear questionable whether "false information" can be protected as a trade secret.[637] Ironically, the entire federal government argument, at least with respect to captan, becomes especially dubious because Chevron, the main U.S. manufacturer of captan for whom IBT performed its studies, waived its claim of confidentiality to the information in the Canadian audits derived from information originally submitted to US EPA by Chevron.[638]

The prospective situation under the new Access to Information Act[639] is unclear. Section 20(1)(a), for example, requires the head of a government institution to refuse to disclose any record requested under the Act that contains the "trade secrets of a third party." However, there is no definition of "trade secret" under the Act. This is extremely important because trade secrets are treated differently than "financial, commercial, scientific or technical information..." and other types of information supplied by third parties to the government as outlined in sections 20(1)(b), (c) and (d). There is a general exemption from disclosure for all the heads of section 20(1), but in the case of third party information supplied under section 20(1)(b), (c) and (d) there is discretion available for the head of a government institution to disclose this information under the balancing test set out in section 20(6).[640] Thus, whether the courts will apply a broad or narrow definition of "trade secret" is crucial. Canadian courts have tended to accept American definitions of trade secrets,[641] including the very broad definition adopted in the Restatement of the Law of Torts which states that:

> "A trade secret may consist of any formula, pattern, device or compilation of information which is used in one's business, and which gives him an opportunity to obtain an advantage over competitors who do not know or use it. It may be a formula for a chemical compound, a process of manufacturing, treating or preserving materials, a pattern for a machine or other device, or a list of customers."[642]

Under this broad definition, agencies and courts in the U.S.[643] and Canada,[644] have treated health and safety tests as "trade secrets." It can be argued that this broad common law definition, developed in the

private law context of protecting business from breaches of contract and confidence on the part of departing employees, should not be applied in the context of the public interest in disclosure of health and safety data. How the courts will respond to such arguments under the AIA, remains to be seen.

According to U.S. Congressional researchers, scientists and public health professionals studying the properties of pesticides require access to complete studies containing the raw data from toxicological and other experiments. Plaintiffs in product liability cases, contending that a pesticide caused injury or property damage, also require access to complete studies.[645] As a result, U.S. federal pesticides law over time has been amended to largely override the trade secrets problem by providing for the release of health and safety data. Compensation schemes or exclusive use provisions are used to protect the initial data submitter.[646]

Steven D. Jellinek, former US EPA assistant administrator for pesticides and toxic substances during the Carter Administration, testified before a Congressional Oversight Committee in 1980 regarding the Agency's position at the time regarding the competing interests of industry and the public on health and safety data disclosure. He indicated that there are two basic issues: (1) what data may be used by any producer to support product registration, and (2) what data should be accessible to the public. According to Jellinek, US EPA's long-held position, which the U.S. Congress

affirmed in the 1978 amendments to FIFRA is that information about pesticide health effects should be available to the public. He maintains that only a narrowly limited class of information, primarily manufacturing, quality control data and confidential formulas, should be withheld from public scrutiny. According to Jellinek, FIFRA substitutes one system for protection of data (compensation or exclusive use) for that which the industry has always preferred (secrecy).[647] He notes that FIFRA's"carefully balanced data scheme takes into account societal goals other than protection of proprietary interests."[648] Jellinek further notes that eighteen months after the 1978 FIFRA amendments, US EPA had seen no evidence that the pesticide-producing industry was suffering from unscrupulous competition arising from the new definition of trade secrets.[649]

More recently, however, U.S. environmental groups have testified before Congressional committees regarding pesticide data access problems. These arise from a possible industry-suggested "moratorium" on US EPA disclosure pending regulation-making to implement provisions of the Act which prohibit disclosure of data to foreign pesticide producers.[650]

In Canada, environmental groups have recommended amendments to the PCPA to authorize public access to pesticide health and safety data, in order to circumvent expected trade secret problems with the new ATA.[651] Federal and provincial environment agencies, however, while supporting release of pesticide health and safety data to the public "when deemed in the public interest", do not support making available to the public "raw data" from

the registration process "because of the confidentiality requirement and because it could only be used by a trained researcher."[652]

3. The Food and Drugs Act

a. The setting of maximum residue limits for pesticides

The general prohibition of the sale of adulterated food is found in section 4 of the Food and Drugs Act (FDA),[653] administered by the Department of National Health and Welfare. Specifically, section 4 prohibits the sale of any article of food that has in or upon it any poisonous or harmful substance; is unfit for human consumption; or is adulterated.[654] While this general section would appear to prohibit pesticide residues on food as pesticides are, by definition, poisonous substances, Division 15 of the FDA regulations establish maximum residue limits for agricultural chemicals which are in effect exemptions to the section 4 prohibition.[655] "Agricultural chemical" is defined in the regulations and includes both substances that have been registered under the Pest Control Products Act as well as other pesticides, not registered in Canada which may result in residues on food.[656]

Maximum residue limits (expressed in parts per million) have been established for approximately 90 agricultural chemicals. Any chemical found exceeding the limit set out in Division 15, Table 4, will be considered adulterated and in breach of section 4(d) of the Act.[657] Pesticide residue limits are set at levels which will cover residues likely to remain in food at point of wholesale marketing; that is, at harvest of a crop, slaughter of an animal, removal from a warehouse in the case of treatment of stored foods, or point of entry into the country in the case of im-

ported foods.[658] The regulations were amended in 1978 to provide that a food is adulterated if it contains more than 0.1 ppm of any agricultural chemical not specifically listed in Division 15.[659] The policy basis for this regulation, as enunciated by the Department of National Health and Welfare is as follows:

> (a) relatively simple legal action can be taken against pesticide residues exceeding 0.1 ppm, without the need to prove hazard or to take action under section 4 of the Act;
>
> (b) many pesticides originally thought to leave no residues on foods (i.e. below the sensitivity of the analytical method) have been subsequently found to leave very low residues which may be toxicologically negligible; and
>
> (c) residue levels below 0.1 ppm which are considered to be considered toxicologically significant may still be listed in Table II, Division 15. (e.g. endrin at .02 ppm in fat portion of dairy products).[660]

However, while this regulation makes enforcement easier, there does not seem to be a scientific justification for the general 0.1 ppm maxmimum residue limit. For example, 0.1 ppm may be too high with regard to certain agricultural chemicals that may cause cancer. It is arguable that there should be no detectable residues allowed for carcinogens.[661]

While there are no administrative procedural manuals or documents used by National Health and Welfare which outline the types of scientific information required to support the establishment of pesticide residue limits in food, the Department does consider that the applicant is responsible for proving the chemical nature, level and safety of any pesticide residues in food.[662]

Detailed information is required from the applicant on a variety of aspects. These include: the amount to be applied; frequency and times of application; satisfactory methods of analysis for determining residues in food; plant and animal metabolism studies; data on the quantity and chemical nature of residues remaining on foods at harvest, slaughter or point of sale; toxicity studies designed to evaluate the hazards of residues to experimental animals; and proposed residue limits in food.[663]

Once the data is submitted by the applicant, a determination of the Acceptable Daily Intake (ADI) of the particular pesticide is made by Health and Welfare. The ADI is the amount of chemical which toxicologists consider to be safe for humans to injest each day for an entire lifetime. Calculations are made of the lowest no effect dose from toxicity studies of the pesticide on each animal species tested. The lowest no effect level is then divided by a safety factor such as 100 to establish the ADI.[664]

A second assessment is then made to determine the allowable maximum residue levels (MRL's). The residue studies submitted are examined, but MRL's are only accepted providing that the total consumption of residues from all food uses will not exceed the ADI estimated for the particular pesticide from the toxicity studies.[665] Canadian eating habits are examined in order to help calculate acceptable residue levels. From 1969 - 73 and again in 1976 - 78 Health and Welfare conducted total diet studies to look at the pesticide load borne by the average adult Canadian.[666]

In these studies, foods comprising a typical Canadian diet are prepared for eating and then analysed for pesticide residues. These studies have now been discontinued.[667] Nutrition surveys and to a lesser extent surveys of households have been used to determine eating habits. The statistics gathered are used to determine consumption of various types of food. However, if a person eats more than the average amount of a certain food, he may be exposed to residues above the acceptable limits. The methods by which MRLs are set have been criticized both in Canada[668] and the United States.

In the U.S., market basket surveys conducted by the Food and Drug Administration have come under attack by the General Accounting Office, an investigative arm of the U.S. Congress. The GAO criticized the market basket analyses for insufficient sample size and the practice of lumping similar foods together into composites, thereby obscuring the kinds and amounts of residues that specific foods contribute.[669] For example, it was found that while a person would have to eat two pounds of raisins a day to exceed the acceptable daily intake of Captan, a medium-sized apple a day could easily provide a person with more than the acceptable level of the chemical.[670] Commentators have noted that the captan example and many others indicate there is no correlation between the ADI and the tolerance levels.[671]

The U.S. Environmental Protection Agency which establishes tolerance levels has been criticized for using statistical averages that grossly underestimate the consumers' pesticide exposure. To set tolerance

levels, EPA first calculates how much of each variety of fruit and vegetable the typical American consumes annually. To arrive at this figure the EPA takes the total U.S. production of the fruit or vegetable in question and divides it by the total population of the United States. The result is an average annual consumption. For example, the annual consumption level for artichokes and avocados is calculated to be 7.5 ounces a year. Therefore, anyone who eats more than this amount may be exposed to pesticide residues in excess of those calculated by EPA to be acceptable.[672] This procedure of setting tolerances also ignores the fact that many people, including chemical workers, farmers, agricultural labourers, and people who live near farms are exposed to pesticides on the job or at home as well as in goods.[673]

The setting of tolerance levels and ADI's for individual pesticides in foods has also been criticized for not taking into account a number of problems relating to pesticide exposure. These problems have been identified as (1) the diets of certain individuals may consist of very high amounts of certain limited food items, rather than a balanced diet; (2) people are not equal in their ability to detoxify and eliminate pesticides (e.g. children and elderly people have limited detoxification capacities); and (3) tolerance levels and ADIs are set for individual pesticides rather than the effects of pesticides acting together (additive, cummulative and synergistic effects).[674]

The tolerance system has also been the subject of a number of reports from Congressional Committees, the GAO and the U.S. Environmental Protection

Agency.[675] In February, 1978, the House Committee on Interstate and Foreign Commerce, Subcommittee on Investigations and Oversight held hearings on chemical contamination of food. The subsequent report issued by the subcommittee concluded that "...American consumers cannot be sure that the meat, poultry, fruits and vegetables they buy are not tainted with potentially dangerous pesticide residues."[676] The report noted specific deficiencies in the regulation of carcinogenic pesticide ingredients and in the food consumption statistics used to set tolerances.

Among the subcommittee's recommendations were (1) that Congress forbid the use of carginogenic, mutagenic and teratogenic pesticides unless it could be established that they left no residues on food, (2) that EPA (a) cancel tolerances for pesticides which leave carcinogenic, mutagenic, or teratogenic residues on food, (b) require all manufacturers to supply missing safety and residue data within a specific period of time, (c) change the method of computing the "food factor" to account for groups that consume higher than average amounts of particular foods, and (d) cancel tolerances for pesticides that do not degrade within a specified time or which degrade into dangerous metabolites.[677]

These recommendations were not adopted and instead were reviewed by EPA's Scientific Advisory Board, which issued a report of its own in 1979, suggesting more moderate reforms to the tolerance setting process.[678] The recent study on EPA's pesticide regulatory program prepared by the staff of the House Subcommittee on Department Operations, Research, and Foreign Agriculture of the Committee on Agriculture found that EPA was slow in implementing even the moderate suggestions made to it for reform. The staff

report concluded that major changes in the tolerance system are needed and inevitable.[679]

Health and Welfare Canada officials have noted a number of possible reforms in the area of data requirements for pesticide residue-setting and evaluation. They have suggested that either the Food and Drug regulations could be amended or guidelines could be developed with Agriculture Canada to incorporate the following initiatives:

(a) prepare guidelines concerning normal data required under the Food and Drug Regulations;

(b) provide for the submission of all available data on any one chemical, including adverse reports;

(c) provide for an automatic expiry date or up-date of residue limits, i.e. to force manufacturers to bring Health and Welfare up to date and provide data according to current standards on each chemical;

(d) require manufacturers to hold all raw data on all scientific studies while the chemical is still registered and being used; and

(e) list negligible residue limits on foods for each pesticide, rather than use a general regulation to cover such chemicals.[680]

Environmental groups have recommended that the Food and Drugs Act be amended to provide that no detectable residue levels be allowed for pesticides found to be carcinogenic, mutagenic or teratogenic to human beings or animals.[680a]

In the United States, the tolerance system has been challenged in the California courts on exactly this point. In 1980, a coalition of 21

plaintiffs launched a lawsuit against the California Department of Food and Agriculture stating that the Department had failed to keep food in the state free from pesticides that cause cancer, birth defects, sterility, and mutations.[681] The plaintiffs demanded that the State eliminate 37 of the most harmful pesticides from food supplies and tighten its regulations on 244 other pesticides. They wanted California to adopt the principle that no residue of any pesticide proven to be carcinogenic, mutagenic, or teratogenic should be tolerated on produce.[682] As noted above Canada currently allows specific MRLs to be established, or the general 0.1 ppm MRL to be applied, for all pesticides, including carcinogens. If one accepts that there are no safe levels for carcinogens, then it would seem prudent to adopt a no detectable limit for residues of proven chemical carcinogens, mutagens or teratogens.[683]

However, this is not the position of the Department of Health and Welfare either in regard to carcinogens or to pesticides registered with insufficient or invalid date. Even after the discovery in 1977 that over 100 chemicals registered in Canada were dependent on fraudulent IBT tests, the Department of Health and Welfare did not revoke the residues for these chemicals. In 1977, 32 of the IBT-tested pesticides had residue limits set under the Food and Drugs Act.[684] As of March 1983, a number of changes in the MRLs had been made to 10 of these chemicals. Only 2 pesticides had their MRLs deleted for food crops, while the other 8 generally had additions of MRLs for various foods not listed before.[685] As of October 1983, 8 chemicals remaining on the list of pesticides waiting for replacement data for invalid pivotal IBT studies still have MRLs established under the Food and Drugs Act above 0.1 ppm.[686]

(i) Captan - a case study in residue-setting

One pesticide that has received a considerable amount of attention in recent years is the fungicide captan. Captan, an IBT-tested pesticide and suspected carcinogen was the focus of the Consultative Committee on IBT Pesticides established by the Minister of Agriculture in September 1981. In 1977, at the time the IBT scandal surfaced, captan had residue limits of 40 ppm, 25 ppm and 2 ppm on various groups of fruits and vegetables.[687] The joint U.S.-Canada audit on captan revealed that all 13 studies done by IBT on captan including carcinogenicity and teratogenicity studies were invalid.[688] A new study submitted by a registrant showing that captan caused tumours in mice and confirming an earlier 1978 study led Health and Welfare Canada to recommend to Agriculture Canada in March 1981 that there be no allowable residues of captan on food.[689] Health and Welfare noted that according to the International Agency for Research on Cancer, the test results in mice indicated that captan should be regarded for practical purposes as if it were carcinogenic to humans. Further, neither of the mouse cancer studies demonstrated a "no-effect level" and therefore Health and Welfare concluded that an acceptable daily intake could no longer be estimated for captan.[690] As discussed earlier, the Consultative Committee on IBT Pesticides did not accept Health and Welfare's recommendations.[691] Yet it is clear that Health and Welfare Canada has the authority under the Food and Drugs Act to reduce the residue levels on captan without Agriculture Canada's agreement,[692] but it failed to do so and instead allowed the residue issue to be placed before the IBT

Consultative Committee. This would appear to be a questionable delegation by Health and Welfare Canada of its statutory authority under the Food and Drugs Act.[693]

The IBT Consultative Committee's recommendations in regard to the residue issue included the following actions: (1) negotiate residue tolerances with Health and Welfare Canada for a 2-year trial period on the order of 0.1 ppm for most foods; 1.0 ppm for apples and pears; and 5.0 ppm for berries, grapes and stone fruits all measured at the retail level; (2) increase pre-harvest intervals for all crops and (3) develop an intensified co-operative residue monitoring program with Health and Welfare Canada and interested provinces.[694]

However, Health and Welfare decided not to follow these recommendations and instead on June 26, 1982, it placed a notice of a proposed amendment to the captan residue limits in the Canada Gazette. The proposed amendment called for a reduction of the maximum residue limits to 5 ppm in certain fruits and vegetables with all other foods to be covered by the general regulation allowing a maximum of 0.1 ppm captan.[695] There were 10 responses to the proposed changes to MRLs for captan, most of which were opposed to the amendments. Six of the ten responses were from companies, politicians and government agencies in the United States. Both Stauffer Chemical Company and Chevron Company argued that there was no real reason to reduce the residue levels in that the IBT Consultative Committee did not find captan to be a carcinogen, mutagen or

teratogen. The companies also argued that the difference between the proposed Canadian residue limits and those of the United States could interfere with the importation of food into Canada.[696]

Various fruit growers associations and the United States Department of Agriculture (USDA) argued that the economic impact of lowering residue units would outweigh the risk of continuing with the residue levels then in place. It was estimated that about $60 million worth of tree fruit exported from California is treated annually with captan and that this could be a direct economic loss if the reductions in residue limits were implemented. The Foreign Agricultural Service, USDA, noted that during 1976-78, the U.S. Food and Drug Administration monitored 4,720 food samples to determine levels and distribution of captan residues. Approximately 5% of the samples contained detectable residues. Yet U.S. D.A. states that the view of the U.S. fresh produce industry is that a reduction of the MRL to 5 ppm would make compliance prohibitive or impossible. This seemed to contradict the earlier statement that only 5% of the samples contained detectable residues.[697] It is interesting to note that in February 1982, the National Food Administration in Sweden proposed that the maximum permissible limit of captan in vegetables and fruits should be lowered from 15 to 3 ppm.[698]

Despite the negative comments, on October 7, 1982, Health and Welfare

notified those people who had made submissions that "in view of our over-riding concern with the health of Canadian consumers of captan treated foods" the proposed amendments would be made without changes. Health and Welfare stated that captan has been "clearly demonstrated to induce intestinal malignant tumours in two separate studies in mice" and that it is "the policy of the Health Protection Branch to eliminate or reduce to a minimum human exposure to potential carcinogens."[699] While manufacturers were given an additional opportunity for comment, the proposed amendments were officially published without change in the Canada Gazette.[700]

The end result after a period of 2 years from Health and Welfare's initial position that there should be no allowable residues of captan was that 12 food crops would be allowed to have a maximum of 0.1 ppm residues of captan. It is interesting that in regard to apples and pears, Health and Welfare's final position of 5 ppm was above the IBT Consultative Committee's suggested unit of 1 ppm. Health and Welfare officials have indicated that their concerns with regard to captan "have been alleviated" and that while captan may be carcinogenic in rodents, it may not be in other species.[701] As discussed earlier, this seems to be a new and dangerous approach to regulating carcinogens.[702]

It also appears that Canadians are still being exposed to levels of captan above 5 ppm. According to Health and Welfare's enforcement program (1981/82), 4 of 18 samples contained residues of captan which exceeded 5 ppm in imported

strawberries.[703] What is interesting is that Health and Welfare found that none of the captan residues in domestic strawberries exceeded 5 ppm. Yet the Ontario Ministry of Agriculture and Food in July 1982 in their submissions regarding the proposed reduction of MRL's for captan noted that 31 samples of strawberries from Georgian Bay and Norfolk county had captan residues above 5 ppm.[704]

Another interesting aspect of the reduction of captan residues was the fact that Health and Welfare published the proposed amendments in the Canada Gazette for public comment. While a number of environmental statutes passed in the 1970's [705] provide for notice and comment periods on proposed regulations, the Food and Drugs Act does not contain such provisions and there is no statutory opportunity for public input into the regulation-making process. The notice and comment period for captan appears to be the first proposed regulation regarding agricultural chemicals published for comment in the Canada Gazette. Environmental groups have recommended that the Food and Drugs Act should be amended to provide for 1) public participation in the regulation-making process including publication of draft regulations in the Canada Gazette with an appropriate time frame established for public submissions; and 2) a mechanism to allow any person to bring to the attention of the Minister of Health and Welfare, new information about adverse health or environmental impacts of any registered pesticide with an established tolerance and to require that the tolerance be re-examined.[706]

b. Monitoring and Enforcement

The federal departments of Agriculture, Fisheries and Oceans, and Health and Welfare as well as a number of provincial ministries carry out pesticide residue analyses.[707] The major evaluation is the agricultural chemical residues compliance program carried out by the Health Protection Branch, Health and Welfare Canada. This program also includes industrial chemicals.

Approximately 1600 - 1700 food samples are analysed each year.[708] If the residues are found to be greater than the permitted MRLs a prosecution can be brought for breach of section 4 of the Food and Drugs Act which prohibits the sale of adulterated food. Section 26(1) set out the penalties available for breaches of the Act or regulations. A first offender on summary conviction may face only a fine up to $500 or up to three months imprisonment, or both. Fines increase for subsequent offences, and proceedings by way of indictment are also available.[709] Section 22(1) sets out the powers of inspectors which include the power to examine books; enter premises; and to seize and detain articles, including food which may contain residues in breach of the Act of Regulations. Section 23(1) provides that any food may be forfeited to the Crown and destroyed with the consent of the owner, or forfeited upon conviction for a violation of the Act or regulations.

Since January 1, 1970 there have been no prosecutions for breach of the Act regarding agricultural chemical residues.[710] The usual enforcement procedure is to send a warning letter when food samples are found to

contain excessive residues. Another enforcement tool is the refusal of entry of foods into Canada.[711] Seizure and possible destruction of products may also occur when excessive residues are found. However, as Health and Welfare officials note, this course of action is limited if the product has been sold and consumed before analytical results are available.[712] From mid 1975 to May 1983 there have been 36 instances where produce had been refused entry, one seizure and 20 instances of voluntary disposals.[713]

The Health and Welfare compliance program attempts to achieve a 1:1 ratio of imported to domestic foods to be sampled and analysed each year.[714] According to Health and Welfare, historically each year around 3 per cent of the samples have residues greater than the permitted MRLs.[715] However, an examination of the statistics frequently show that samples significantly exceeded a 3% level.

For example, since at least 1979 the fungicide ethylenebisdithiocarbamate (EBDC) and its breakdown product ethylenethiourea (ETU) have been identified for special consideration in the compliance program. In 1979-80, 50 imported food samples were analysed for EBDC. Eleven samples or 22% contained residues above the permitted MRLs. None of the 94 domestic samples examined exceeded allowable EBDC residues.[716]

In the case of ETU, according to regulation B01.046(0), a food is adulterated if it contains <u>any</u> amount of that breakdown product. However, Health and Welfare considers specimens to be unsatisfactory if the level of ETU is greater than 0.05 ppm.[717] Using this policy approach, while 10

of 40 imported products contained residues, only 3 were deemed unsatisfactory.[718] Thirty-three of 62 domestic products contained residues of ETU yet only 5 were considered unsatisfactory. The only compliance action taken stronger than a warning letter was the prevention, in one instance, of the sale of canned spinach containing ETU.[719] The effect of Health and Welfare's policy departure from the regulations is to allow residues of ETU that prima facie violate the law to be ignored. This is of particular concern because ETU has been known to cause cancer in rats.[720] Agriculture Canada has had EBDC's under review for some time because of this cancer threat and have reduced domestic class use patterns and increased preharvest intervals.[721]

The evaluation done by Health and Welfare of the 1979-80 compliance program generally concluded that the onus must be left to the regions to select domestic food specimens that are suspected of containing excessive pesticide residues. Health and Welfare stressed that these decisions can only be made after carrying out intensive investigations into the current use of pesticides within each region.[722] Unfortunately, as discussed above, the record-keeping provisions of the Pest Control Products Act are inadequate and do not provide for a mandatory system to monitor pesticide usage across Canada.[723]

The evaluation also recommended that the number of compounds analysed needed to be constantly increased, but not at the expense of those compounds already being analysed. It was also recommended that the emphasis be placed

on imported vegetables where unsatisfactory results had been previously encountered.[724]

In 1980-81 a total of 1653 specimens were analysed of which 4.4% were unsatisfactory. Again imported vegetables accounted for the greatest number of unsatisfactory specimens. With regard to EBDC, sixteen shipments were found to contain levels of EBDC above 0.1 ppm, five of which were refused entry to Canada.[725]

A wide variety of pesticides accounted for the unsatisfactory status of specimens including organochlorines; such as DDT, lindane and toxaphene; organophosphates; carbamates; pyrethrins as well as certain fungicides and herbicides. A number of unsatisfactory residues were IBT-tested chemicals, whose safety status remained uncertain. A significant proportion of the domestic vegetables found unsatisfactory were from the Bradford marsh, Ontario area. The area was sampled heavily as high residue levels had been found previously in this location. In one situation, 18 cases of celery were destroyed, due to excessive levels of diazinon.[726]

In 1981-82, one of the compliance program's objectives was to ensure that the incidence of foods being out of compliance with respect to agricultural and industrial chemical residues did not exceed the historical figures of 2-3%. The evaluation of the 1981-82 program concluded that this objective was not met in that the incidence of foods being out of compliance was 5.5% (4.0% for domestic products, 6.8% for imported products.) The evaluation report also found that adulterated food was prevented from remaining in the

marketplace in only a limited number of cases.[727] As a result of the 1981-82 program Health and Welfare concluded that the objective of ensuring that residues do not exceed 2-3% was not appropriate and that the objective should be to seek out incidences of non-compliance and then to develop strategies to correct these situations.[728] In other words, it appears that rather than increase enforcement actions, Health and Welfare chose to alter their program objective to rationalize an increase in the residue levels that the public is exposed to.

Other findings and recommendations of the 1981-82 evaluation also tended to point out problems with the compliance program. Since imported fruit made up 85% of the fruit consumed in Canada, it was recommended that the ratio of imported to domestic fruit should be increased.[729] In regard to vegetables, Health and Welfare admitted that it doesn't have sufficient resources to carry out a monitoring program which would measure the overall degree of compliance.[730] Of the 870 vegetable specimens sampled in 1981-82, 5% of Canadian produce, 8% of U.S. produce, 25% of Mexican produce and 5% of the vegetables from other countries were found to have unsatisfactory residues.[731] In the case of Mexican produce, excessive residues of parathion, ethion, acephate, BHC and chlorpyrifos were found.[732] Four of these pesticides were IBT-tested and two remain on the list of pesticides where replacement studies still had not been received by October 1983.[733]

These figures raise serious concerns about the effectiveness of health and Welfare's policy of only using certain administrative enforcement tools and not proceeding with quasi-criminal prosecutions available to them. It

is also of concern that the Canadian public may be increasingly subject to unacceptable residues. It would seem that Health and Welfare should re-evaluate its enforcement strategy, including its reluctance to prosecute for breach of the Food and Drugs Act. In addition, civil administrative penalties currently not available to Health and Welfare under the FDA, but used extensively in the United States,[734] may be an enforcement tool worth investigating. Amendments to the Food and Drugs Act would be necessary to implement such penalties.

4. The Environmental Contaminants Act

The purpose of the Environmental Contaminants Act is "to protect human health and the environment from substances that contaminate the environment."[735] Under the Act, the Ministers of Environment and National Health and Welfare are given the authority to ban or restrict the import, manufacture, processing, sale, commercial use or release of a substance, or class of substances, that the Ministers are satisfied does or will constitute "a significant danger....to human health or the environment."[736] The Act, however, is residual in nature. Before acting, the Ministers must be satisfied that the problem will not be eliminated by the use of other federal or provincial laws after consulting, or offering to consult, with the provinces and other federal departments.[737]

The Act also authorizes the Ministers to publish notices in order to gather information on, and to require the testing of, certain chemicals from industry.[738] Mandatory industry reporting is also required within three months of the first time manufacture or import of a chemical compound in excess of 500 kilograms.[739] A further information-gathering device under the Act is the authority to establish advisory committees

to review and assess data collected under other sections of the Act. The advisory committee must advise the Ministers on possible substance control measures; receive representations from "interested parties or concerned members of the public", and publish reports and recommendations.[740]

The Act has been described as possessing a number of important characteristics: (1) it is substance rather than media-oriented, thus all facets of a substance's production, use and release to the environment may be examined; (2) it is designed to be a back-up to other federal or provincial laws and only intended to apply where other authorities fail or neglect to implement appropriate controls; and (3) it is designed to provide the government with a predictive capability with regard to the biological effects of chemicals present in the environment in trace concentrations, thus the Act contains powers to collect information and require testing.[741]

While on its face, the Act would appear to have wide applicability to pesticides, because the Act is of a residual nature, it has had only a marginal impact on pesticide problems. Environment Canada officials noted as early as 1975 that:

> "The Environmental Contaminants Act will not be concerned with pesticides. However, it will be concerned with those chemical substances which are used as pesticides as well as for other industrial or commercial purposes."[742]

There are essentially four initiatives under the Act that have been related to pesticide matters. These include: (1) the ban of the use of one substance that has been used as a pesticide in other jurisdictions

but not in Canada; (2) development of priority and candidate chemicals' lists for information-gathering on substances that have been used as pesticides as well as for other uses; (3) establishment of an advisory committee to investigate a contaminant found in pesticides as well as in other products; and (4) issuance of a notice surveying PCPA pesticide registrants with regard to the sales of 24 active ingredients in Canada.

The first pesticide-related initiative under the Act was with respect to mirex. Mirex is the only substance that has had some use as a pesticide - though not in Canada - for which all commercial, manufacturing and processing uses were banned in 1978 under the Act.[743] Because mirex had never been used in Canada as a pesticide, it was never registered under the PCPA.[744] In Canada, it had been used as a flame retardent in plastics.[745] In the U.S. mirex had been used as an insecticide in the southern states. However, it was produced in the Great Lakes region and became a contaminant particularly of Lake Ontario due to improper disposal practices in the Niagara River area.[746]

The second on-going pesticide related initiative under the Act, is with respect to a number of substances that are under investigation and are categorized in the Canada Gazette as priority or candidate chemicals.[747] Priority chemicals are divided into three categories: (1) those substances which are in the Schedule to the Act and for which further regulations or specific control stragegies are being developed; (2) those substances which are being investigated to determine the nature and extent of the danger they pose to human health and environment and methods needed to

control them and; (3) those substances which may pose a significant danger to human health or the environment and about which more information is needed.[748] Candidate chemicals are those that may be potential problems but for which insufficient concern exists to place on a priority list.[749] The criteria for placement of a chemical on the lists includes: (1) toxic effects; (2) persistence and: (3) quantity and use.[750] The Canada Gazette notes that chemicals that are used solely as pesticides are excluded from consideration on these lists because they are already "scrutinized or controlled under other federal legislation."[751]

Chemicals that have had use as pesticides as well as other uses appear under several of the Act's priority and candidate chemicals lists. Chlorophenols, for example, appear under Category II of the priority chemicals list. Environment Canada states that:

> "Pentachlorophenol, in particular, is of concern because of its toxicity, widespread use and the presence of various impurities in commercial products..."[752]

Some chlorophenols are classed as pesticides and their industrial and agricultural uses (e.g. wood preservation, pesticide and herbicide use) are regulated by Agriculture Canada under the PCPA.[753] They have been identified in samples of water, snow melt, sediment, aquatic biota, agricultural produce and humans.[754] New restrictions on certain uses of chlorophenols were recently imposed under the PCPA.[755]

Organotin compounds are listed under Category III. They are incorporated, for example, as biocides in a variety of synthetic materials. According to Environment Canada, "the widespread use of these substances, coupled with

their stable chemical nature suggests that [they] may be widely distributed and persistent...."[756] Similarly, aromatic amines appear under the candidate chemicals list. Many are produced in large quantities and used for many purposes such as precursors for the manufacture of herbicides and fungicides.[757] Environment Canada indicates that some of these chemicals are carcinogenic or otherwise toxic and have been detected in the Great Lakes.[758]

The third pesticides-related initiative under the Act relates to dioxins, some of which are suspected of causing cancer.[759] In 1981, the Ministers established, under s.3 of the Act, an expert advisory committee on dioxins to provide advice on the sources of dioxins; the pathways by which they enter the environment; the potential and actual exposures of human and non-human populations to dioxins; their toxicity and associated risks.[760] The committee concluded in 1983 that to protect human health and the environment all inputs of dioxins must be reduced to the lowest possible level.[761] The committee listed environmental sources of dioxins as including some pesticides and herbicides (e.g. chlorophenols, 2,4-D and 2,4, 5-T).[762] A companion federal report outlines the federal approach to dioxins' control, which is based on the view that "to reduce or eliminate the major sources of dioxins into the Canadian environment is pramatically and economically more effective than continued rigorous assessment of the risks of dioxins."[763] Control efforts are to centre on the use of dioxin-containing chemicals and the waste disposal associated with their manufacture; and combustion sources of dioxins.[764]

The fourth initiative under the Act is the only one specifically directed to information-gathering on substances predominantly used as pesticides in Canada and registered under the PCPA as such. As discussed above,[765] both Environment Canada and Agriculture Canada under the ECA and the PCPA, respectively, are conducting a survey of pesticide registrants respecting 1981-1982 sales in each province of 24 active ingredients listed in a notice filed in the Canada Gazette.[766] The purpose of the survey has been outlined above.[767] The impetus for Environment Canada's use of the ECA to gather information on pesticides includes: (1) the Department's advisory role with respect to registration and re-evaluation of pesticides can be improved with such data; (2) pesticides are applied directly to the environment, have a high potential for environmental impact and the Department is responsible for detection and assessment of such effects; and (3) pesticides are the highest priority problem experienced by some Department regional offices around the country.[768] In conjunction with the ECA survey, a second survey of farmer use of pesticides is planned. The intent of this survey is to generate information at the user level regarding a number of registered products from which the Department will be able to estimate quantities of pesticides entering the environment in certain river drainage basins.[769] It is unclear whether the results of these surveys will be made public, as it is anticipated that some of the data will be claimed as confidential by pesticide registrants.[770] Other problems with the registrants survey have been outlined above.[771]

In general, the ECA has had limited impact on pesticide problems in Canada.

Restrictions of pesticide-related substances have been limited to mirex, a substance used as a pesticide in the U.S., but not otherwise used as a pesticide in Canada. The Act's predominant involvement with pesticides has been through its information-gathering provisions. This limited involvement with pesticides stems from the residual nature of the statute, notwithstanding that Environment Canada officials report pesticides to be the highest priority toxic chemical problem in some regions of the country. It appears that the question of when a registered pesticide product under the PCPA becomes a contaminant under the ECA, reains a matter that has not been resolved under federal law.

5. Other Federal Laws

There are a number of other federal laws with limited application to certain aspects of pesticide management that are administered by several federal departments. In addition, several provisions of the Criminal Code, at least in theory, are applicable to pesticide-related injury.

The Pesticide Residue Compensation Act,[772] administered by Agriculture Canada, sets up a mechanism for a farmer[773] to receive compensation for pesticide damaged crops that he cannot sell because they contain residues in excess of the permissible limits established under the Food and Drugs Act and Regulations. The farmer can only claim compensation if the pesticide is registered under the Pest Control Products Act, and if in the opinion of the Minister of Agriculture, it was used in accordance with appropriate recommended practices.[774]

In order to be eligible for compensation the farmer must also show that (1) an inspection made under the Food and Drugs Act revealed residue levels which would prohibit the sale of the agricultural product pursuant to that Act; (2) the residue is not present because of the fault of the farmer, his employees or previous land owners;[775] (3) he has taken steps to mitigate the loss;[776] and (4) he has pursued any legal action available to him against the manufacturer or anyone else who was responsible for the excessive residues on his crops.[777] Any amount recovered by the farmer in a legal action has to be taken into account in paying compensation under the Act.[778] Further, the farmer is only eligible to receive up to 80% of the market value of a particular product from the government.[779] One limitation of the Act is that it does not offer compensation for future losses that might result from soil contaminated by highly persistent pesticides.[780]

The farmer may appeal the Minister's decision regarding compensation to an Assessor appointed under the Act.[781] The Assessor, a judge chosen from the Federal Court or provincial superior courts, may confirm, vary or refer the original decision back to the Minister.[782] The decision of the Assessor is final.[783]

The Act has not been used to any significant degree since it was passed in 1969. Although several requests have been made for compensation, only two have met the necessary requirements under the Act. In one case a Saskatchewan farmer discovered he had inadvertently fed his cows a contaminated feed. Their milk was declared unsaleable under the Food and

Drugs Act. The farmer received $25,000.00 in compensation. The other case involved chlordane residues in potatoes in Manitoba.[784] According to Agriculture Canada officials, the reason the Act has fallen into disuse is because the most persistent pesticides, the chlorinated hydrocarbons, are no longer used in Canada.[785] However, another reason may be the lack of systematic inspections of crops. A farmer may have excessive residues on his crops and not be aware of this fact unless Health and Welfare inspectors have done a spot check under the Food and Drugs Act. Finally, with the onus put on the farmer to exhaust all remedies prior to claiming compensation, it is not surprising that there are very few claims to the federal government for compensation.[786]

A number of federal statutes, administered in whole or in part by Environment Canada, have general provisions which could be applicable to pesticide problems. Under the Fisheries Act, no person may deposit deleterious substances into waters frequented by fish.[787] Thus, the improper application or disposal of pesticides into fish frequented waters could be the subject of a Fisheries Act prosecution. However, in Ontario, for example, there have been no prosecutions under the Act with respect to pesticides.[788] One private prosecution for aerial spraying of pesticides has been undertaken in New Brunswick.[789] While the Fisheries Act has general regulation-making authority,[790] no regulations for pesticide discharges from manufacturing or formulating plants have been promulgated.

The Ocean Dumping Control Act requires that no ocean dumping of wastes take place except in accordance with the terms and conditions of a permit,

issued by Environment Canada.[791] Schedule II of the Act provides that pesticides are to be considered restricted substances and would therefore require individual permits, if present in more than trace quantities in such wastes.[792] Other Environment Canada administered legislation with potential applicability to pesticides, include the Clean Air Act,[793] and the Migratory Birds Convention Act.[794]

The Transportation of Dangerous Goods Act, administered by Transport Canada, has as its principal purpose the promotion of "public safety in the transportation of dangerous goods."[795] The Act and proposed regulations would establish a system of compliance respecting documentation, marking, labelling and placarding for dangerous goods, including pesticides. A manifest system for tracking dangerous wastes, including pesticide wastes, during transport is also established under the proposed regulations.[796]

At least three provisions of the Criminal Code[797] may also be applicable to pesticide-related injury. These include criminal negligence,[798] common nuisance,[799] and mischief.[800] Use of these provisions has not been made presumably because of the difficulty of proving the requisite mental intent for such crimes. On the other hand, most federal, as well as provincial, regulatory or public welfare offences are offences of strict liability. As a result, they only require proof of the actus reus and then the onus shifts to the accused to prove on a balance of probabilities that he or she was not negligent or that he or she has a defence of due diligence or reasonable care.[801] Because the burden on the Crown in strict

liability offences is substantially lower than that normally found in using the Criminal Code, it is understandable that the latter has not become an instrument of first choice in environmental health issues. Nonetheless, given the type of damage pesticides may inflict if improperly used or designed, the Criminal Code may be an appropriate enforcement device in the proper circumstances. As noted above, the recently convicted IBT executives in the United States, were convicted of mail and wire fraud offences under U.S. criminal law.

6. Non-Regulatory Programs

Programs not specifically authorized by statute may often have an important influence on legislated requirements. Moreover, they can also suggest areas of future regulatory activity or alternatives that could reduce dependence on pesticide use and resulting enforcement needs. Federal programs examined here include the socio-economic impact analysis policy, development of drinking water guidelines, pest management schemes that may reduce reliance on pesticides, and ad hoc public consultation efforts.

a. The Socio-Economic Impact Analysis Policy

The Socio-Economic Impact Analysis policy (SEIA), administered by Treasury Board of Canada, came into effect in August 1978. It requires all federal departments and agencies proposing major new regulations in the areas of health, safety and fairness to perform socio-economic impact analyses on these rules; and publish the draft regulations and SEIA summaries in the Canada Gazette for public comment, 60 days before the regulations are promulgated.[802] The aim of the policy is to improve the quality of information used for establishing federal regulations and "to make the regulatory process more responsive to the concerns of the private sector."[803] In particular, the policy is meant to: promote systematic analy-

sis of the potential socio-economic impact of new regulations; ensure uniformity in the methods and assumptions used by federal departments in performing such analyses; and provide an opportunity for increased public participation in the regulation-making process.[804]

According to Treasury Board, departments may employ several different methodologies including cost-benefit,[805] risk-benefit[806] and cost-effectiveness[807] methodologies. The chemical industry has argued that the SEIA policy requires the use of the cost-benefit approach and that all new regulations must have a net benefit to society.[808] However, Parliament[809] and some federal departments[810] have indicated that cost-effectiveness analysis may be acceptable where necessary.

The SEIA program has obvious implications for regulation of pesticides under the Pest Control Products Act, the Food and Drugs Act and other federal laws. To the extent that federal departments and the private sector emphasize cost-or risk-benefit analyses with respect to regulation-development, statutory mandates to protect environmental health may be adversely affected.[811] However, no SEIA's have been done under these Acts to date respecting pesticides.

b. Drinking Water Guidelines

There is no federal legislation in Canada that specifically regulates drinking water quality as it pertains to pesticides or other toxic chemicals.[812] The federal government, through Health and Welfare Canada, has instead developed guidelines which are not legally enforceable un-

less promulgated by the appropriate federal or provincial agency,[813] though no agency in Canada has adopted them as regulations to date.

The guidelines recognize that drinking water should be free from hazardous chemicals, among other things, and that it should be "safe, palatable and aesthetically appealing."[814] However, the guidelines also acknowledge that:

> "The chemical characteristics of drinking water are a matter of growing concern because of the increasing number of organic pollutants, metal, and organo-metallic substances that are being introduced into the environment."[815]

In this regard, suggested limits or maximum acceptable concentrations in drinking water supplies have been established for approximately 16 pesticides.[816] These limits are based predominantly on health considerations.[817] Health and Welfare Canada indicates that the principal concerns associated with pesticides and drinking water are as follows:

> "Three groups of pesticides are important in water quality evaluations: chlorinated hydrocarbons and their derivatives; chlorophenoxy herbicides; and the cholinesterase-inhibiting compounds that include the organo-phosphorus chemicals and carbamates. Chlorinated hydrocarbon compounds in water tend to persist in the environment over long periods of time. They may thus cause direct health effects or indirect effects due to biological concentration in man's food chain. Organo-phosphorus compounds and the cholinergic carbamates, although they may have high acute toxicity to mammals, hydrolyse rapidly in the aquatic environment to harmless or less harmful products."[818]

The Department generally suggests, therefore, that it is "desirable that drinking water be free of pesticides, and every effort should be made to prevent pesticides pollution of raw water resources."[819] What is of particular concern, however, is that the list of 16 pesticides

covered by the guidelines "is not comprehensive," according to Health and Welfare Canada, "and constitutes only a small fraction of the number of such substances available in Canada."[820] As noted above, there are approximately 600 pesticide active ingredients registered for use in Canada.[821] Moreover, pesticides are contaminating raw water supplies in the Great Lakes.[822] A 1983 IJC report identified approximately 800 chemicals in the Great Lakes, many of which are pesticides.[823]

The guidelines, while of value, have been criticized on three grounds: (1) the small number of pesticides covered; (2) the guidelines' failure to take into account synergistic effects of chemicals combining in the water supply; and (3) their general non-enforceability.[824] Proposals to remedy these problems have been made in conjunction with suggestions that there is a need for safe drinking water legislation in Canada.[825]

c. Integrated Pest Management Programs

Alternatives to pesticides can not only reduce reliance on these chemicals but can also reduce enforcement needs with respect to controlling pesticide misuse. The principal approach to reducing reliance on chemical pest control is known as integrated pest management (IPM). Agriculture Canada defines IPM as the:

> "combined use of chemical, biological, cultural and genetic methods for effective and economical pest control with a minimum effect on non-target organisms and the environment."[826]

The Department indicates that: "The principle is to apply, whenever possible, biological, biochemical and cultural controls and greatly reduce the

exclusive dependence on chemical pesticides."[827] However, while it is not clear how much federal money goes into non-chemical as opposed to chemical research, Agriculture Canada describes alternatives to chemical control as "still very much in the developmental stage."[828] Moreover, the Department acknowledges that there is a "reluctance on the part of growers to accept integrated pest management as an alternative" to pesticides.[829] Not only are the latter regarded as tried and proven techniques,[830] frequently it is more expensive to use IPM per hectare than to use conventional pesticides.[831] The Department also admits that many of the IPM programs are themselves still heavily dependent on chemical pesticides,[832] though gains have been made in reducing pesticide use within the IPM programs for certain crops.[833]

The impetus for Agriculture Canada IPM efforts has been "concern over the widespread use and reliance on chemicals for insect control,"[834] and a recognition that it would be "unwise... to place all our trust in present day chemical controls."[835] The Department notes, however, that "pesticides will continue to play an important role" even in IPM programs.[836]

d. Ad Hoc Consultative Committees

As noted above, Agriculture Canada established an ad hoc consultative committee to study the implications of controlling more strictly, captan, a fungicide.[837] Currently, the Department is proposing to form another committee to study the role of the public in pesticide regulation generally.[838]

C. The Role of Provincial Governments

1. Overview

Substantial constitutional authority exists for provincial legislation controlling pesticides.[839] Unlike federal law, provincial legislation frequently authorizes the issuance of permits and licences to certain types of pesticide user.[840] These are authorized in conjunction with provincial pesticide classification schemes,[841] which supplement federal control of use. Key problems exist, however, with respect to which pesticides are assigned to particular use classifications, especially where less hazardous alternative products may not be available. This problem has been exacerbated by the IBT affair. Moreover, permit and licence exemptions for certain major users of pesticides, such as farmers, may leave fundamental gaps in provincial control schemes. In addition, two provinces still lack any comprehensive pesticide legislation addressing sale, use or related matters.[841a] The most frequent components of provincial pesticide law include control of transportation, storage, disposal and spills; and a variety of administrative and quasi-criminal enforcement techniques including record-keeping and reporting; provincial inspection authority; administrative orders of various types; the use of advisory committees and appeal boards to deal with specific pesticide problems and quasi-criminal prosecutions. The public can also play an important part in supplementing provincial control of pesticides. A review of key provincial initiatives and their adequacy is undertaken below.

2. Classification of Pesticides and the Issuance of Licences and Permits Controlling Usage

a. Pesticides' Classification

The goal of provincial pesticide laws may be said to be protection of environmental quality, human health and property from the improper use of pesticides.[842] The federal Pest Control Products Act determines which pesticides are acceptable for use and how they may be used in Canada. However, a number of provincial laws refine, if not duplicate, the federal registration scheme, by classifying pesticides into various use schedules. Indeed, before provincial classification can occur, a pesticide must be registered under the PCPA.[843] Under Ontario's Pesticides Act, for example, all pesticide products sold in the province must be classified and assigned to a schedule, and the subsequent marketing and use of each product must be in accordance with the regulations relating to the classification.[844] Licences and permits also identify the schedule from which the licence or permit holder is authorized to sell or use particular pesticides. Six schedules are authorized under Ontario law.[845] Other provinces' systems vary in this regard.[846]

In Ontario, the Pesticides Advisory Committee, established under the Pesticides Act, is responsible for classifying pesticides under the schedules.[847] The committee notes that the Ontario classification system takes into account the pesticide formulation as marketed (i.e. the control product) when considering toxicity, but only the "active ingredient when considering persistence and movement potential of parent compounds or their metabolites."[848] It is not clear why the classification system would make such a distinction since inert ingredients can be of biological concern as well.[849]

Other criteria are also used in scheduling pesticides for particular uses. Both Schedule I and Schedule 5 pesticides, for example, are defined by the

committee as (1) posing serious hazards to public health and/or the natural environment; (2) being persistent or giving rise to persistent metabolites that produce undesirable side effects on non-target organisms either by acute or chronic toxicity; and (3) inflicting through their mode of action, unnecessary suffering to pest vertebrate animals.[850] However, while use of Schedule 1 pesticides requires a specific use permit, use of Schedule 5 pesticides, meant to be applied on agricultural lands, would not require farmers to obtain licences or permits, because of general farmer exemptions under the regulations,[851] discussed more fully below. According to the committee, Schedule 5 pesticides have not been placed in the more restrictive Schedule 1 because of "lack of less hazardous control products which could provide adequate protection to agricultural crops."[852]

Ontario's schedules under the Pesticides Act can be compared with the PCPA registration classification in the following manner. Schedule 1 products are "restricted"; Schedule 2,5,3,6 products are either "restricted" or "commercial;" and Schedule 3 or 4 products are "domestic."[853] Sometimes, however, products remain on what would appear to be inappropriate schedules. For example, the fungicide captan, which is highly suspected of causing cancer,[854] remains on Schedule 3 of Ontario's classification system, and thus is available for possible domestic use.[855] Schedule 3 pesticides are characterized by the committee as posing minimal hazards.[856]

Concern with provincial classification systems for pesticide use increased substantially when uncertainty about the safety of many pesticides on the IBT list became acute. Some environmental groups urged Ontario, for example, to place all IBT tested pesticides with major data gaps in Schedule 1, the

restricted use schedule, pending re-testing. A major data gap was defined as any pesticide lacking scientifically valid studies with respect to tumour/cancer-causation; mutations; birth defects; reproductive or neurotoxic effects.[857] The provincial government did not accede to this request.[858] Given the dependence on chemicals that has come to characterize Canadian agriculture, few provinces felt able to take such regulatory action, particularly when reliance was placed on federal government efforts to resolve the safety status of IBT pesticides.[859] Environmental groups had noted in their submissions to the Ontario Government, that in the past with respect to restricting the use of DDT, the province had not waited for the federal government to act, but had taken the regulatory initiative.[860]

In other instances, not involving IBT-tested pesticides, public pressure to greatly restrict a pesticide's use in a particular province, has resulted in more stringent use classification than at the federal level. This has occurred, for example, in Saskatchewan,[861] Ontario[862] and British Columbia,[863] with respect to the herbicide 2,4,5-T, whose contaminant TCDD, is suspected of causing cancer.[864] This has also occurred in several provinces with respect to other pesticides such as TOK[865] and DDT.[866] The theory behind regulatory schedules is to give provinces greater control of pesticide distribution and use than may occur under the PCPA. In practice, with some exceptions, the provinces have generally tended to follow the lead of federal agencies regarding the availability of certain pesticides for particular uses.

b. Licences and Permits

While the principal regulatory mechanisms for controlling pesticides under federal law may be said to be the registration and labelling requirements under the PCPA, licence and permit requirements qualify as key control mechanisms under provincial law.

Under Ontario law, for example, an elaborate system of licence and permit requirements is authorized, which is typical of the programs of most other provinces. Licences are required for selling pesticides[867] and for operating pest extermination businesses.[868] In addition, professional pesticide applicators require licences[869] which are categorized according to whether they will perform structural,[870] land[871] or water exterminations.[872] Several classes of licences exist for each of these categories, which are normally based on the classification of pesticides to be used.[873] Individuals may also be exempted from structural, land or water extermination licence requirements.[874]

In addition to the licensing system, under Ontario law, permits for land, water and structural exterminations are required in a number of circumstances.[875] These include: (1) use of Schedule 1 pesticides;[876] (2) aerial application of all Schedule 1, 5 and hormone-type Schedule 2 herbicides;[877] and (3) aquatic applications of pesticides other than in enclosed ponds,[878] or drainage ditches containing no moving water at application time.[879] Individuals may also be exempted from permit requirements, as set out below.[880]

The advantage of licensing arrangements is that they may provide general control over the responsibility, knowledge and ability of the particular pesticide applicator.[881] The advantage of permit requirements is that they allow the evaluation of environmental impact at particular site locations, as well as an opportunity for reviewing applicator compliance with the Act, regulations and permit conditions.[882]

The magnitude of provincial licensing and permit programs is illustrated be recent statistics available from Ontario, British Columbia and Alberta. In Ontario, an estimated 15,500 licences were issued or re-issued in 1982-1983, as well as 2,500 permits.[883] In British Columbia in 1981-82, 5,835 pesticide applicators and dispensors were certified; 1,551 vendors or pest control services were licensed; and 502 permits issued for restricted, special or general purposes.[884] In Alberta, the statistics were approximately 5400 licences and 1560 permits issued.[885]

Most provincial laws also authorize the appropriate government agency to (1) refuse to issue or renew a licence;[886] (2) suspend or revoke a licence;[887] (3) refuse to issue a permit, cancel or impose or alter terms and conditions in a permit as the case may be.[888] In comparison with the number of licences or permits issued a year in Ontario, for example, the numbers refused, revoked or suspended are quite nominal.[889] However, other enforcement actions either in conjunction with or instead of these initiatives may be taken, which are discussed below.[890]

Appeal provisions are also authorized under most provincial pesticide laws where a regulatory authority proposes to refuse, suspend or revoke a

licence[891] or to deny or otherwise change a permit.[892] Hearings are usually authorized before appeal boards or committees, established under the provincial statute.[893] Interestingly, the issue of who may initiate such proceedings is treated differently under various provincial pesticide laws. In Manitoba, for example, persons who have their licences or permits suspended by the Minister are automatically entitled to a hearing,[894] while persons who are refused a licence or permit are subject to Ministerial descretion as to whether a hearing will be held.[895] In Alberta, whether a licence or permit is refused, suspended or cancelled, the person "aggrieved" has an automatic appeal right.[896] Similarly, in Ontario only the applicant for a licence or permit or an existing licensee or permittee has an automatic right to appeal an adverse regulatory decision.[897] The Board, under Ontario law, does have the power to specify "such other persons.. as parties to proceedings before the Board..."[898] However, a review of all Appeal Board proceedings from January 1, 1977 to mid-June 1983 revealed that normally the only parties to proceedings were the licensee-permittee and the government.[899]

One departure from most provincial laws on this matter is British Columbia's Pesticide Control Act, which allows an appeal to be filed "by any person with the board against the action, decision or order of the administrator" under the Act.[900] The effect of this provision has been that the issuance of approximately 40 pesticide spraying permits are appealed from a year,[901] and result in hearings before an appeal tribunal. Occasionally, opponents are successful in demonstrating that the issuance of a pesticide permit would result in unreasonable adverse effects on the environment as well as showing that the board followed improper procedures.[902] Generally, however,

appeals against permits are rejected by the board.[903] One suggestion for this is that citizens groups want the board to consider evidence about various pesticides' effects on health and the environment generally, whereas the provincial government and the board view this matter as largely investigated in first instance by Agriculture Canada at the registration stage. Thus, the hearing exercise from the province's perspective, is only for the purpose of determining the impacts of pesticide use under specific local conditions.[904]

Notwithstanding what may be limitations in the inquiry conducted by the British Columbia appeal tribunal, the Act in that province offers the opportunity for public intervention before permit decisions become final. Based on the type of proceedings that have been held in Ontario, where no appeal is available to the general public, the British Columbia approach appears to at least offer the opportunity of a forum for public consideration of such matters. However, given the fact that none of the hearings in British Columbia deal with toxicological or related matters, but rather with geographic factors,[905] the process points up the need for a forum to consider these threshold environmental health matters at an earlier stage. This suggests the need to reform the process under the PCPA, as has been outlined above.[906]

Even if the process in, for example, Ontario was to be reformed along the lines now existing in British Columbia, information on spray permit applications would be necessary to properly inform potential appellants. However, the experience in Ontario has been that spray permits or permit applications themselves are not available; only selected information from

from them after they have been issued, may be released.[907] Access to such information before the hearing itself, would appear to be an integral part of any such inquiry into the adequacy of the permit proposal.

c. Aerial and Water Applications of Pesticides

Aerial[908] and water[909] applications of pesticides have been particularly controversial methods of use, because they pose the potential for widespreal involuntary environmental and human exposure to pesticides, through spray drift or related off-target impacts. As a result, provincial laws frequently emphasize control of such activities through a combination of both licence and permit requirements. In Ontario, for example, licensees performing aerial applications of all Schedule 1, 5 and hormone-type Schedule 2 herbicides require a special permit for the extermination.[910] The permit must indicate the pesticide type, acreage, location and time-period of the spraying,[911] and spray records must be kept of the event and if necessary submitted to the province.[912] Other provinces have similar requirements. Alberta, for example, requires licensees who use aircraft to apply pesticides to also obtain a permit for spraying public forest lands.[913]

Normally, the proposed issuance of a permit with respect to major aerial forestry spraying, for example, does not trigger prior public hearings under provincial pesticide laws. Given the concern that frequently accompanies such proposals, however, provincial governments in recent years have had to address the inadequancy of this essentially informal, if not closed, administrative control approach. The result has been the use of a combination of special commissions of inquiry into the forest pesticide problem,[914] as well as second-generation environmental statutes that are more compre-

hensive in nature.

Under Ontario's Environmental Assessment Act,[915] for example, proponents of undertakings subject to the Act must prepare an environmental assessment, which describes the project, examines its environmental effects, and reviews alternative sites for and methods to the proposal. Any member of the public may seek a public hearing on the undertaking, before it may be approved. Forest management, including aerial spraying of pesticides on Crown lands, for example, is subject to the Act. However, no public hearing has ever been held on such activities since the coming into force of the Act in 1976. This is as a result of a series of exemptions to the Act's application, the provincial Ministry of Natural Resources has been able to obtain while MNR's environmental assessment document is finalized, before a formal application for approval is made. The latest exemption extends to the end of 1983.[916] Use of a class environmental assessment approach to approval could result in only one hearing being held on how MNR will oversee spray operations generally. This would be in substitution for individual hearings on future site-specific spray proposals as they arise.

In contrast, in Quebec, while the province lacks a comprehensive pesticides law,[917] regulations under the province's Environment Quality Act automatically subject certain pesticide spray projects to an environmental impact assessment and review procedure. These include:

> "any programme or project for aerial pesticide spraying for non-agricultural purposes over an area of 600 hectares or more, except for experimental insecticide spraying over a forested region, involving a new technique of application over a total area of less than 5000 hectares."[918]

Other provisions allow any person, group or municipality, after the Minister has received the environmental impact assessment, to apply for the holding of a public hearing on the matter. The Minister, unless he considers the request frivolous, must direct the Bureau of Public Hearings, established under the Act, to hold a hearing and report its findings.[919]

In 1982-1983, the Bureau held public hearings on a proposal by the Ministry of Energy and Resources to undertake a 4-year, 1.6 million hectare aerial insecticide spraying program commencing in 1983, to control the spruce budworm in Quebec.[920] In its 1983 report, the Bureau concluded that the proposed chemical insecticide spraying program was inefficient, uncertain, environmentally risky and potentially capable of prolonging the budworm epidemic or rendering it a chronic condition.[921] Therefore, the Bureau recommended that a more integrated approach to the problem was needed.[922] However, while the Ministry has apparently decided not to abandon its aerial spraying plans in relation to spruce budworm, it has abandoned plans to aerial spray some 27,000 hectares of forest with 2,4,5-T and 2,4-D as a result of public outcry.[923a]

The problem of the need for, and adequacy of aerial spray programs, as well as the statutory and administrative procedures necessary for considering such matters, remains in a state of flux. A combination of (1) licence and permit requirements; (2) more comprehensive

environmental assessment and public hearing procedures; and (3) special commisions of inquiry, seems likely to characterize both law and policy development in this area for the foreseeable future.

d. Exemptions for Farmers

The elaborate system of pesticide permits and licences found under most provincial laws nonetheless contain a number of key exemptions. Chief among are exemptions for farmers from virtually all permit and licence requirements. Given the magnitude of pesticide use in agriculture, as noted below, it could be argued that the provincial permit and licence system for pesticides plays an insignificant role in environmental health protection. Reliance would instead appear to rest on federal registration and labelling requirements as well as provincial classification and enforcement of statutory prohibitions.

Under Ontario law, for example, agriculturalists[924] that perform land exterminations on farm land on which they are engaged in agricultural or forestry production by means of Schedule 2,3,4,5, or 6 pesticide, are exempt from statutory licence requirements.[925] Similarly, farmers who spray their neighbours land, where they have only one pesticide rig in operation at a time, and it is normally used on their own farm, are also exempt from licensing requirements for Schedules 2 - 6 pesticides.[926] Farmers or their full-time employees are exempt from licence requirements for structural exterminations around their farm buildings of structures.[927] Farmers, under Ontario law, are also exempt from permit requirements except if they apply pesticides by aircraft or seek to use Schedule 1 pesticides.[928] In addition, farmers are exempt from permit and licence requirements if they apply pesticides to en-

closed farm ponds.[929] Similar statutory exemptions from pesticide permit and licence requirements can be found for farmers under other provincial laws.[930]

The significance of the farmer exemptions may be seen when the magnitude of pesticide use in the agricultural area is considered. Provincial officials estimate that perhaps 85 per cent of pesticide use in Canada is in agriculture.[931] In 1977, it was estimated by Ontario officials that approximately 75 per cent of all pesticides used in the province were applied on agricultural lands: 15 per cent applied by licensed applicators and 60 per cent by farmers or farmers helping neighbours.[932] Quebec Government advisors indicate that 85 per cent of the estimated 6 million litres of pesticides used in the province in 1978 had been used by farmers. Moreover, pesticide use was expanding at the rate of 10 per cent a year in the province.[933] In Alberta, it has been noted that:

> "Farmers....do not require a licence to apply pesticides on their own land (or that of a neighbour, as long as there is no charge), and this is in fact where the bulk of pesticides is used."[934]

In New Brunswick, of the total quantity of pesticides sold in the province in 1980 through licensed vendors, 96 per cent were used for agricultural purposes, with the majority of this quantity used by private farmers applying chemicals with ground equipment.[935]

The magnitude of the amounts of pesticides used in agriculture raises concerns about the possibilities for misuse.[936] Farmer misuse of pesticides in fact has been recorded in various provinces.[937] However, given the tradi-

tionally historic independence of the farm community from many types of environmental regulation as well as the expanded permit or licence scheme that would be needed if farmers were covered, provincial laws have tended to exempt farmers from such provisions.[938] Provincial officials point to various types of residue analysis, surveillance and monitoring programs to ensure that farm produce is not adulterated by pesticides.[939] Provincial officials do admit, however, that occupational and bystander exposure to agricultural use of pesticides is of concern,[940] as well as environmental damage, such as water pollution.[941]

Whether provincial laws should be amended so as to require some type of certified competency in farmer use of pesticides falling short of permit or licence requirements, while suggested,[942] appears to be an idea whose time has not yet arrived. In the absence of an approach of this type, reliance on registration, labelling and statutory use prohibitions would appear to be the only regulatory controls applicable to farmer use of pesticides.

3. Control of Transportation, Storage, Disposal and Spills of Pesticides

In addition to control of pesticide use, sales and distribution, provincial laws frequently address other stages of pesticide management including transportation, storage, disposal and spills. Interestingly, however, such controls are not always to be found under provincial pesticide laws. Often these elements are in fact controlled through general pollution control legislation which historically focussed on emissions and discharges

of contaminants from manufacturing processes. Many aspects of pesticide transporatation and disposal control, for example, are in place under one or both of these types of laws. However, there are still important components of a comprehensive management system that are in need of development.

Under Ontario's Pesticide Act, for example, transport requirements include securing pesticides to prevent escape or discharge to the environment during transportation;[943] ensuring that pesticides on certain Schedules are not transported with food, drink or household articles;[944] and placing warning signs on vehicles carrying pesticides in bulk.[945] Identification of pesticide products or wastes is not required under this Act. Under the province's Environmental Protection Act,[946] however, waybills for the transport of identified liquid industrial wastes, including pesticide wastes, are authorized.[947] In 1981, approximately 258,000 gallons of liquid pesticide wastes were transported by waste haulers in Ontario.[948] The waybill regulations, however, do not track solid pesticide wastes to determine where, in what quantities and in what manner they are stored or disposed.[949] Stored or disposed of liquid pesticide wastes on the generator's premises also are not covered by the waybill system.[950] Moreover, few other provinces have waybill regulations of any kind though the federal Transportation of Dangerous Goods Act may help alleviate this problem when its regulations are eventually promulgated.[951]

Under Ontario's Pesticide Act, storage of pesticides must not be near food, feed or drink, [952] and certain Schedules of pesticides must be stored in locked, ventilated rooms with warning signs on the door.[953] Pesticide vendors are required to follow certain precautions including warning local

fire departments of the location and hazards of stored pesticides;[954] preventing certain scheduled products from being stored in areas where floor drains could lead to sewers or watercourses;[955] and providing protective clothing and equipment in such areas.[956]

The Pesticides Act also requires notification of the MOE of any deposit of a pesticide into the environment out of the normal course of events (e.g. accident, spill, theft or fire) and authorizes the province to require clean up.[957] Provisions of the Environmental Protection Act, passed in 1979 but not yet in force, would also provide the opportunity for compensation of the innocent victims of a spill of pollutants generally.[958] This could include pesticide spills during storage or transport. Pesticide spill events in other provinces have lead to convictions under provincial law.[959] However, in one recent decision in Saskatchewan, following a pesticide storage spill, an information was quashed when the court held that the particular pesticide involved was not specifically designated as a pesticide in the regulations, as required by the provincial statute in order for its storage to be controlled.[960]

Under Ontario's Pesticide Act, the only requirements for pesticide disposal relate to empty containers for pesticides in Schedules 1, 2 and 5. These containers must be decontaminated in a manner approved by MOE;[961] punctured and buried under 50 cm. of soil that is not near any watercourse or water table;[962] or where the container is cardboard or paper, burned away from roads, buildings or the public.[963] Apart from this limited authority with respect to empty pesticide container disposal, the Act is silent on disposal of pesticide wastes at landfill or other sites.

Because pesticide wastes are often hazardous, they would be covered by the province's hazardous waste management program under the Environmental Protection Act. However, this program is currently in a state of flux. Only a few landfill sites in the province are authorized to take hazardous wastes, including pesticides.[964] Yet, it was estimated that as early as 1974, approximately 1.5 million pounds of empty pesticide containers were disposed of in landfills, and another 2.7 million pounds of liquid pesticide wastes were incinerated in the province.[965] Moreover, the disposal of such containers has been observed by provincial officials to be unsatisfactory in many provinces.[966] In New Brunswick, a 1981 survey found improper container disposal practices to be widespread amongst farmers surveyed:

> "Empty fungicide bags were often submerged in .... streams, metal containers were sometimes partially in the water and others had been discarded on the streambanks...[these] sites were an ideal source of serious aquatic contamination."[967]

Disposal problems at pesticide formulating plants have also been sources of surface and groundwater contamination in Ontario.[968]

Transportation, storage, disposal and spills of pesticides are covered by most provincial laws in varying degrees.[969] Gaps remain, however, particularly in the areas of pesticide waste tracking and container disposal control, though some provinces have commenced regulatory programs to address these problems.[970]

4. Record-Keeping, Inspections and Enforcement

As with federal law, provincial pesticide legislation typically includes several inter-related elements for the purposes of ensuring compliance with legislated requirements. These include (1) record-keeping (2) inspection authority and (3) a variety of enforcement alternatives. Consideration of these and related instruments will be undertaken according to whether they are administrative, quasi-criminal or civil in nature.

a. Administrative Mechanisms

Administrative mechanism include both information-gathering as well as administrative enforcement techniques.

(i) Record-Keeping and Reporting Requirements

Record-keeping and reporting requirements fall essentially into two categories under provincial law: (1) information required of vendors or businesses and; (2) information required of applicators of pesticides under permit or licence.

Under Ontario law, for example, vendors must keep records of sales of pesticides on Schedules 1, 2 or 5 for three years. This information must include the name and address of the purchaser; the type and class of licence or permit, if any, held by the purchaser; and a description of the pesticide including the name, class, unit size and quantity sold.[971] Vendors are also required under Ontario law to provide copies of any such records to the MOE upon written request[972] or to provincial officers during the course of inspections.[973] The Ontario requirements have been criticized because such sales records are not used for the calculation of provincial or regional

pesticide totals.[974] As noted above,[975] such information, in conjunction with use data is frequently important for all aspects of a regulatory program, including enforcement. Interestingly, New Brunswick law requires vendors to keep a record of the total quantity of each commercial pesticide sold and to automatically send a copy to the government at the end of each year.[976] New Brunswick law also requires vendors to send a copy of each transaction involving a restricted pesticide to the government at the end of each year,[977] and to provide records upon the request of a provincial inspector.[978] The New Brunswick requirements have been used in conjunction with use data collection, discussed below, to produce annual provincial surveys of pesticide usage.[979]

The other type of information typically required by provincial pesticide legislation is from applicators of pesticides under permit or licence. In Saskatchewan, for example, all applicators required to obtain permits must keep records of each operation involving pesticide use or application respecting: the name of the person for whom the pesticide was applied; the location and size of the area sprayed; when and why it was applied; the chemical sprayed, the method of application; and the total quantity or the rate of application of the pesticide used.[980] Such records must be held for three years and be made available to provincial inspectors on request.[981] However, the same criticism may be leveled at this Saskatchewan provision as was noted in connection with the Ontario section described above. It does not require the filing of this information with the province on a regular basis. New Brunswick, however, requires that holders of pesticide operators' licences keep a record of, and file annually with the government, the total quantity of each pesticide used or applied; the pesticide name and federal registration

number; the dimensions of the area where the pesticide was applied, except for structural pest control; the quantity of pesticide applied on that area; and, in the case of aerial applications, the application rate for each pesticide.[982] This use information, in conjunction with the sales information that is also required to be filed with the province, is the basis for the production of annual provincial surveys of pesticide use in New Brunswick.[983]

Sales and use information from records is key to developing regulatory programs. Yet reporting requirements are surprisingly uneven amongst the provinces. Given the dearth of information nationally on pesticide usage, greater efforts appear to be necessary provincially to uniformly require annual reporting. Moreover, provincial agencies should be producing annual statistics on the type, quantity and location of pesticides used. New Brunswick's annual survey appears to be one of the few performed in Canada, that produces any of this type of information on an annual basis. Indeed, even New Brunswick's survey provides only very general information on total quantities sprayed by air or on the ground in the province as a whole and total sold by district. More detailed information, such as where particular pesticides were used and in what quantities is lacking. While Ontario's survey of pesticide use is more detailed in this regard, it only comes out twice a decade.[984] Because farmers are exempt from permit and licence requirements, provincial surveys with respect to use, derived from licence reporting requirements, will greatly under-estimate total quantities applied and used in the province. While sales records from vendors will cover sales to farmers as well, this information does not systematically provide needed data on where, when and in what quantities farmers are applying pesticides in the province.

(iii) Inspection Authority

Inspectors may be designated under most provincial pesticide laws,[985] with broad powers to enter premises, examine materials and require production of documents.[986] Persons responsible for pesticides are required to provide information to inspectors when necessary,[987] and not hinder, obstruct or give false information to inspectors who are lawfully performing their duties.[988] Inspectors have a duty to maintain secrecy about information so obtained except with respect to the environmental, human health and property effects of pesticides.[989] There is no affirmative duty, however, to release such environmental health or related information.

The range of inspection responsibilities under most provincial laws is illustrated by the following comments from British Columbia officials:

> "... within each regional office there are one or more inspectors whose duty is to inspect conditions for the storage, display, distribution...of pesticides in licensed vendor premises. These inspectors also inspect licensed pesticide applicator services. Their main role... is to make sure that the different provisions of the Act and Regulations are indeed enforced. They are also involved in decontamination and disposal of accidental spills of pesticides and carry out various related duties...
>
> The [Pesticide Control] Branch is also committed to monitor the large-scale uses of pesticides on publicly (or privately) owned land by sampling vegetation, soil and water substrates, particularly in areas where it was suspected that a pesticide was improperly applied or applied in environmentally sensitive areas."[990]

The number of provincial pesticide inspectors is quite variable from province to province, with 1 in Saskatchewan to 57 in Alberta.[991] There is also some indication, however, that pesticides are not a high priority in terms of provincial agencies assigning inspectors to this area relative

to other environmental regulatory responsibilities. In Ontario, for example, there are 600 inspectors responsible for the four main provincial environmental statutes. Only 20, or 3 per cent of the total, are inspectors for purposes of the province's Pesticides Act.[992] Moreover, given the budgetary constraints most provincial agencies are feeling, it is inevitable that inspections will either stay relatively the same, or decrease over time. In British Columbia, for example, pesticide inspections decreased over 29 per cent (2735 to 2109) between 1980/81 and 1981/82.[993]

Nonetheless, most provincial inspectors conduct a considerable number of inspections a year. In British Columbia for the period April 1, 1981 to March 31, 1982, provincial inspectors conducted 2109 inspections, approximately 15 per cent of which revealed contraventions of the Act or regulations.[994] In one regional district 50 per cent of the inspections revealed contraventions.[995] The level of field inspection and monitoring is, of course, variable from province to province. Some provinces, such as Manitoba, indicate that "minimal field inspection and follow-up of pesticide applications have been conducted" in that province to date.[996] This can inevitably effect the level of prosecution and other enforcement activity.

(iii) Control and Stop Orders and Other Administrative Enforcement Techniques

Provincial governments have a variety of administrative enforcement techniques open to them under pesticide legislation. These include stop and control orders, licence suspension or revocation, permit cancellation and related mechanisms.

Under Ontario law, for example, where a provincial official is of the opinion,

upon reasonable and probable grounds, that an emergency exists arising from a person's handling, storage, use, disposal or transportation of a pesticide, he or she may issue an oral or written stop order to that person.[997] Such person may appeal the order to the Appeal Board under the Act.[998] An emergency is defined to include situations where there's a danger to human health or safety; or immediate risk of environmental impairment, damage to plants, animals or property or the rendering of these items unfit for use by man.[999]

Similarly, control orders may be issued, but the circumstances do not need to constitute an emergency.[1000] Control orders can order the person to limit the pesticide deposit rate; stop it permanently or temporarily; or comply with other directions.[1001] The same appeal provisions as those pertaining to stop orders apply with respect to control orders as well.[1001a] The bases for licence suspension or revocation include: contravention of the Act or regulations; breach of licence term or condition; incompetence of licensee; past conduct; lack of adequate equipment; evidence of gross negligence; or fraudulent misrepresentation by licensee in carrying out his business.[1002] Similar bases are applicable to permit cancellation but also include likely danger to health or likely harm or impairment to the environment, material discomfort to persons or danger to plants, animals or property.[1003] The above appeal provisions are also applicable here.[1004]

Other types of administrative orders include the ordering of environmental restoration, clean-up and decontamination, where necessary.[1005] Reclassification of pesticides into more restrictive use schedules, is also an

administrative enforcement technique that has been noted above.[1006]

For many provincial officials these and related administrative instruments constitute a fundamental component of pesticide regulation, far more so than prosecutions. But even amongst these administrative tools, provincial regulators have evidenced a preference for some types over others. Ontario officials, for example, indicate that in the last three years only four stop orders have been issued[1007] and two control orders.[1008] In contrast, Ontario officials average twelve licence revocations a year. This is regarded as a more effective technique because the threat of licence revocation, essentially places the applicator out of business.[1009] Indeed, in British Columbia in 1981/82, 41 licences were suspended following investigations by provincial inspectors.[1010]

Provincial legislation has exhibited a tendency to maximize the number and type of administrative enforcement techniques available. Alberta officials, for example, have authority to issue orders similar to Ontario's stop orders, that may not exceed 7 days.[1011] Because these orders are of short duration there may be a trend toward their greater use. Six times as many have been issued in Alberta as Ontario.[1012]

The provincial preference for administrative approaches, parallels that which exists at the federal level. Moreover, this approach tends to coincide with a provincial view that pesticide regulation is a management strategy. As such, administrative approaches, in the view of some provincial officials, are better able to foster this management approach than more draconian or cumbersome enforcement strategies.[1013] However,

to the extent that some administrative techniques have the ability to have a severe impact on pesticide users (e.g. licence revocation), the provincial preference for such approaches may simply reflect a desire to stay out of the courts as much as possible. It may also reflect a desire not to ban a pesticide where a lesser approach directed at the user will suffice.

b. Quasi-Criminal and Related Mechanisms

All provincial pesticide laws establish prohibitions and related offences the violation of which may result in prosecution and the assessment of penalties. While there has been substantially greater use of prosecutions as an enforcement tool at the provincial level than at the federal level, their use varies widely from province to province. Indeed, provincial officials express some of the same ambivalence regarding the systematic use of quasi-criminal sanctions as was found at the federal level. The use of private prosecutions by citizens when, for whatever reasons, governments have not acted, has been a noticeable trend in recent years as well.

In addition, provincial coroners investigations may involve instances where pesticides have been implicated in poisoning deaths and recommendations for avoidance of harm in future, have been made.

(i) Prohibitions, Offences, Penalties and Prosecutions

Ontario law exemplifies the range of prohibitions which may be found under provincial pesticides legislation. Under the province's Pesticides Act no person may harm or impair the quality of the environment, human health, plants, animals or property through the improper use of pesticides.[1014] Under the regulations, the use of products not registered under the PCPA is prohibited,[1015] as is the use of pesticides inconsistent with their labelling.[1016]

The provisions have the effect of complementing federal PCPA registration and labelling requirements.

Other prohibitions under provincial legislation may relate to selling pesticides that do not meet certain standards;[1017] using pesticides otherwise than as prescribed;[1018] applying pesticides to water bodies without permits;[1019] disposing of pesticides or containers except at prescribed sites and in the prescribed manner;[1020] carrying on a pesticide business without a licence or permit;[1021] and other matters.

Provincial penalty sections vary widely from province to province. The range of financial penalties authorized by statute runs from a maximum of $1000 in provinces such as Alberta and Saskatchewan[1022] to a $50,000 maximum penalty in New Brunswick for certain offences.[1023] Some provincial laws also authorize imprisonment ranging from a 90-day maximum,[1024] to a 1-year maximum.[1025] Ontario falls somewhere in the middle, with no imprisonment authorized, but with maximum fines ranging from $5,000-10,000 for everyday an offence occurs or continues.[1026]

The reality of actual fines assessed, however, reveals that the maximums are rarely met. New Brunswick officials indicate, for example, that before 1982, when the statutory maximum was raised from $1,000 to $50,000 for certain offences, the New Brunswick courts had never assessed a fine for violation of the Act greater than $200.[1027] In Ontario, between June 1974 and September 1982, the provincial MOE averaged $516 per conviction in prosecutions under the Pesticides Act.[1028]

Indeed, some provincial officials raise what they consider to be more fundamental concerns with the effectiveness of quasi-criminal sanctions as mechanisms for obtaining compliance with provincial pesticide laws. Officials in British Columbia note that while they believe that the province's prosecution provisions are fairly effective for obtaining compliance with the Act, they admit that their success rate has been "much less than 50%" for a variety of reasons. These include:

> "• prosecuting Crown Counsels often seem to treat pesticide prosecutions lightly and often are not adequately prepared prior to court presentation;
>
> • it appears that the staff requires additional formal training in the presentation of evidence before courts;
>
> • occasionally it is difficult to legally connect pesticide residues in soil or water with a person who may have applied that pesticide 3 or 4 months previously;
>
> • the penalties for violating the Pesticide Control Act seem to be too small to act as an effective deterrent; [and]
>
> • ...the time spent in court is very costly to the program budget."[1029]

Because of concerns such as these British Columbia officials indicate that they have contemplated several alternatives. They argue that:

> "• We believe that education of pesticide applicators, in particular, is a preferable means of enforcing the provisions of the Act;
>
> • We are currently contemplating a system of ticketing minor violations and therefore we would avoid the need to use the courts; and
>
> • We have one of the most stringent pieces of pesticide legislation in the country and we suspect that some of our provisions in the Act and Regulations may be too severe."[1030]

Interestingly, other provinces express similar concerns. Alberta officials state that: "We normally rely on education and public awareness programs in our management of pesticides and view prosecutions as a last resort."[1031] While Ontario has one of the more active prosecution records amongst the provinces, [1032] Ontario officials also suggest that if the number of prosecutions increased significantly, then they would regard the province's system of pesticide regulation and management as failing.[1033]

Some provincial responses to citizen complaints, however, suggest that the basis for charges being laid appears to exist more frequently than the province is prepared to act. In one instance in 1982, for example, an Ontario farmer's cattle pasture was aerially sprayed by chemicals instead of the intended adjacent field owned by Hostess Foods. Tests performed by the provincial MOE confirmed the presence of Monitor, an insecticide, and Bravo, a fungicide, in the amount of 0.56 parts per million (ppm) and 2.8 ppm, respectively on the farmer's property, and 15 ppm and 53 ppm, respectively on the Hostess potato field.[1034] MOE stated in correspondence to the farmer that:

> "there is a significant difference between the levels found on your property and the levels detected on the Hostess potato crop.... [T] his difference supports a situation involving spray drift rather than misapplication."[1035]

The MOE concluded that the samples on the farmer's pasture were not sufficient to be detrimental to livestock health or to interfere with the use of the pasture. Therefore, the MOE was "not in a position to successfully prosecute Hostess or the aerial company involved."[1036] In a warning letter to the company the MOE stated that the deposition of pesticides onto the

farmer's property in any quantity was "not an acceptable practice," and outlined additional precautions to be taken.[1037]

What is interesting, however, is that in the time between when the farmer first complained to the MOE and the test samples were taken for analysis, there had been a week lapse during which a heavy rainfall had occurred.[1037a] Thus, it would appear that the testing was neither timely nor accurate as to what the likely residues were at, or around, the time of the spray incident itself. Moreover, a third pesticide, Duter, which was no longer registered for use in Canada,[1038] had also been sprayed, according to Hostess officials.[1039] This would appear to have been contrary to both federal and Ontario law. However, no analysis was performed by MOE to confirm the level at which the pesticide was present,[1040] or to use as a basis for prosecution. Indeed, for whatever reasons, MOE had the samples destroyed before any analyses were performed.[1041]

Events such as these have sometimes lead citizens to use private prosecutions against applicators who misuse pesticides where a province has not done so.[1042] Thus, there would appear to be a potentially significant divergence of viewpoint between provincial governments and citizens groups on the use and effectiveness of the quasi-criminal sanction. This divergence of viewpoint could become quite significant to the extent that provincial officials gravitate toward administrative enforcement techniques in preference to prosecutions. Citizens cannot use administrative enforcement techniques, and to the extent that a citizen's ability to prosecute was to be affected by legislative changes, the result could leave citizens with one less, relatively inexpensive

enforcement tool. Whatever their imperfections, private prosecutions give citizens an opportunity to enforce the law - an important element in a democratic society. They can also stimulate a higher profile of responsibility for those engaging in spray activities. Loss or diminishment of this instrument can only result in greater reliance on administrative tools, which members of the public cannot employ.

(ii) Inquests

Pesticides have resulted in at least one confirmed poisoning death in Canada,[1043] and have been inconclusively implicated in several other deaths in a number of provinces in recent years.[1044] Coroners inquests into these events have, in at least one instance, resulted in major proposals for reform of pesticide laws generally, in order to avoid such occurrences in future.

Under provincial laws, coroners inquests are held where the cause of death is unclear or the death has occurred in unusual circumstances. Where an inquest is held, it must inquire into the circumstances of the death and determine who the deceased was; and how, when, where and by what means the deceased came to his death.[1045] A coroners jury is statutorily precluded from making any finding of legal responsibility or expressing any conclusion of law on the above matters.[1045a] Moreover, any finding that violates this stricture cannot be accepted by the coroner.[1046] However, subject to this constraint, a coroners jury can make recommendations directed to the avoidance of death in similar circumstances or respecting any other matter arising out of the inquest.[1047]

In this regard, a 1983 coroners inquest into the death of a 20-year old British Columbia farm worker ended in a jury finding that his pesticide poisoning was the result of a preventable homicide. Testimony at the inquest indicated that the farm worker was poisoned by the pesticide Monitor at a farm where pesticides were sprayed while workers harvested nearby, pesticide containers were disposed of haphazardly, little protective

clothing or washing facilities were provided to workers, and where they were transported in vans that carried pesticides.[1048]

In addition to this finding of preventable homicide, however, the jury also recommended major reforms to federal and provincial pesticide laws to prevent such a recurrence. These included:

- transfer of responsibility for pesticide registration under the PCPA from Agriculture Canada to Health and Welfare Canada and Environment Canada;
- amendment of the PCPA to provide for public access to pesticide health and safety data;
- federal government financial support for research into alternative pest control programs;
- development of legislation prohibiting pesticide use unless there is no effective alternative;
- increased federal and provincial enforcement staff so that pesticide laws can be adequately enforced;
- establishment by the federal government of an independent testing system to conduct safety studies;
- involvement of farm workers in decisions which involve risks to farm workers;
- elimination of the distinction in British Columbia pesticide law between private and public land for purposes of pesticide regulation with all applications of pesticides in that province's Schedules I-IV applied by certified applicators; and
- registration of all signable pesticides in Schedule I of British Columbia's pesticide law so that a permit and application by a certified applicator is required.[1049]

The extensive nature of such proposed pesticide law reforms in a coroners inquest points to considerable jury uneasiness surrounding damage or injury by pesticides. Federal officials, during the inquest, suggested that there are fewer than a half dozen reported pesticide poisoning incidents in Canada annually, though there is no comprehensive reporting system.[1050] However, in British Columbia alone in 1981/82, 57 poisoning incidents were reported to provincial officials.[1051]

c. The Use of the Civil Courts By Administrative Agencies

A third enforcement approach open to administrative agencies charged with pesticide regulatory responsibilities, is to use the civil courts to restrain violation of pesticide laws. Under Ontario law, for example, where there is a contravention of the Pesticides Act, the Minister can apply to the Supreme Court of Ontario for an order prohibiting the continuation or repetition of the contravention. This is in addition to other remedies or penalties that may have been imposed.[1052]

Provincial governments have rarely used such techniques in practice because of the administrative remedies that have been discussed above. Moreover, the availability of such a civil court remedy is limited to the Minister; no member of the public is authorized to use the provision in the absence of government action. The public can, of course, use the common law to the extent that has been discussed above.[1053] This would include the possibility of seeking an injunction if they have the requisite standing. However, authorization to allow members of the public to seek injunctions to prevent statutory violations regardless of whether they would meet traditional standing requirements, has not been generally reflected in provincial pesticide legislation.

D. The Role of Municipal Governments

Municipalities have become involved in pesticide issues through their dual roles as both regulators and users of pesticides. These two roles may give an ambivalent character to the municipal approach to pesticide management. There has also been increased municipal interest in recent years in right to know by-laws.

1. Regulatory and policy activities

Municipalities, being creatures of provincial legislatures,[1054] derive their authority to address pesticide matters through provincial enabling legislation. Generally, local governments can enact by-laws controlling nuisances, waste disposal, industrial use of sewers, and related matters which have application to pesticides under legislation establishing municipal institutions in the province.[1055] These powers have been limited by the courts in recent years and could not be used to frustrate either provincial or federal pesticide legislation.[1056]

In Alberta, municipalities are given specific regulatory authority under the Agricultural Chemicals Act to appoint inspectors to carry out the provisions of that Act. As of 1983, 348 inspectors were appointed by municipalities throughout Alberta.[1057] It would seem that in some instances, municipalities would be involved in self-regulation, as they are often users of pesticides. This could well place them in a conflict of interest situation in certain circumstances.

Municipalities are more likely to take action under public health legislation which delegates protection of public health to local Boards of Health. These Boards often have broad investigatory powers and authority to address local health issues.[1058] For example, in 1981, the Toronto Department of Public Health wrote to the Federal Minister of Health and Provincial Minister of the Environment concerning the implications of the IBT affair. The Department questioned the fact that the government had taken no action to ban or restrict the use of pesticides until their safety had been proven. The Department also raised the issue of whether there was a "new, dangerous, all-Canadian toxicological principle-erring on the side of danger" in relation to allowing IBT-tested pesticides to remain on the market pending confirmation of their safety status.[1059]

The Toronto Board of Health also decided to investigate whether any of the pesticides used by the City of Toronto or Boards of Education were IBT-tested. A report prepared by the Health Advocacy Unit in June, 1981 found that 12 of 94 pesticides stored or used by the City had been IBT-tested. It was also found that at least another ten were considered to be carcinogenic.[1060] Recommendations were made to (1) suspend the use of both the 12 chemicals on the IBT list, and the 10 potential carcinogenic chemicals unless it could be demonstrated that their use offered greater benefits than risks; (2) set up a formal process to determine the city's use of chemicals in a systematic way (3) review safety precautions of workers and (4) investigate alternative methods of pest control.[1061] A submission by the President of the Ontario Pest Control Association challenged the report

prepared by the Health Advocacy Unit. Interestingly he noted that a number of chemicals still apparently kept in storage by the City of Toronto had either been withdrawn from the market and not offered for sale in Canada for a number of years, or had been banned or severaly restricted in Ontario.[1062]

A subsequent report from the Commissioner of Parks and Recreation indicated that a number of the pesticides were either not used or had acceptable replacements. The end result was that on September 28, 1981 the Local Board of Health recommended that only 5 pesticides seen as essential continue to be allowed to be used, with the other 7 suspended.[1063]

Again, in relation to the IBT Affair, in 1982 the Toronto Department of Health made a submission to the Consultative Committee on IBT pesticides concerning captan. Recommendations were made regarding access to information, public participation in the pesticide regulation-making process as well as an endorsement of the original Health and Welfare recommendations with respect to that fungicide.[1064]

Recently, some municipalities have been taking an advocacy approach to health issues. For example, in 1981, The Toronto Board of Health wrote to Nova Scotia's Minister of Environment in relation to the spraying of 2,4-D and 2,4,5,-T in that province. The letter urged the government not to issue spray permits to Scott Maritimes Ltd. for the Nova Scotia mainland until at least a decision in the Cape Breton spray case had been reached. It

was further recommended that Nova Scotia ban the use of 2,4,5-T.[1065]

The Board of Health also took action after the **spray** case decision came out in September 1983. They recommended that funds be raised to help the plaintiffs meet their costs; that the principle of shifting the legal onus of proof to demonstrate that a chemical does not pose a human health hazard be endorsed; and that public funds should be available to intervenors in environmental health cases.[1066]

2. Municipal Use of Pesticides

The other role that municipalities have is that of user of pesticides. Historically, Parks Departments have used herbicides to rid city parks of weeds, while Boards of Education use pesticides on school playgrounds. In addition, most provinces have some type of weed control legislation requiring that certain noxious weeds be destroyed.[1067] While the legislation usually prescribes a number of methods that can be employed to destroy these weeds,[1068] the use of herbicides is often the chosen method.

Over the past five years, citizens across Canada have tried to curtail the use of pesticides in the urban environment. Their efforts have been largely focused on restricting the use of 2,4,-D in City parks and schoolyards. Some measures have also been taken to reduce the use of chemical pesticides to control cockroaches in schools. For example, in 1979, Ottawa banned the use of 2,4,-D in city parks and schoolyards for three years. In 1982 this decision was reversed, but parents staged dawn to dusk sit-ins to prevent the spraying of neighbourhood parks. As a result of this citizen action, Ottawa City Council in April 1983 again endorsed a two year ban on

2,4,-D despite uncertainty about the cost of a non-chemical program.[1069]

In 1979, a group of concerned citizens and parents from Northumberland County, Ontario formed a group called People Against Senseless Spray (PASS). They were opposed to the spraying of 2,4-D by the Northumberland and Newcastle School Board. Their position was that in light of the mounting evidence of adverse health effects of 2,4-D, the School Board should err on the side of caution and suspend the use of that pesticide. However, after representations by the Ministry of Environment, the School Board decided to spray.[1070] A questionnaire compiled subsequently by the citizen's group showed that about 20 children became ill after exposure to 2,4-D spraying.[1071] However, since that time a number of municipalities have banned the use of 2,4-D from the use on city parks and school yards.[1072]

In September 1979, the City of Toronto Committee on Parks, Recreation and City Property suspended the use of 2,4-D in city parks until the City Board of Health completed a study on the health effects of the pesticide. The Commissioner of Parks was also to report on alternative methods of non-chemical weed control.[1073] On April 22, 1980, the Commissioner reported that the Department treated some 880 acres of parkland with 2,4-D at an annual cost of $22,500.00. He found that the only alternative method of eradicating weeds is by manual labour and that such a program might cost in excess of $1,000,000 annually. His recommendation however was to utilize 2,4-D to control poison ivy and he asked direction as to whether the City would continue to eradicate dandelions and plantain from City Parks.[1074]

The Board of Health in May 1980, ignored the report it commissioned which recommended use of 2,4-D under certain limited conditions,[1075] and instead decided to continue the ban on 2,4-D. The Board also requested that the City Solicitor report on the powers of the City to (1) prohibit the use of 2,4-D within the City limits and to (2) require that if 2,4-D is used, applicators give notice to local residents of the intent to spray.[1076] City Council in June, 1980 decided to continue the ban on 2,4-D with the exception of the control of poison ivy in the City Park system.[1077] This ban continues to date. However, the City Solicitor in May 1981 advised the local Board of Health that there is no legislative authority permitting the city to either prohibit the use of 2,4-D within city limits, or require the giving of notice to local residents of the intent to spray.[1078]

It would appear that the urban use of pesticides by municipalities has been restricted during the past five year. However, because of limited legislative power, municipalities cannot restrict the general use of pesticides within their boundaries. Some municipalities are actively investigating non-chemical alternatives and IPM.[1079]

3. Right to Know Initiatives

There has been increased municipal interest during the past few years in enacting by-laws to require public disclosure by industry of toxic substances used, manufactured stored or emitted into the air within municipal limits. This interest arose because of the "wide-spread production use and disposal of chemicals" about which information, respecting their whereabouts, health and environmental effects is often lacking.[1080] The City of Philadelphia

in 1981 was the first municipality in North America to enact "right to know" ordinances requiring companies to report a wide range of information to the city for public disclosure.[1081] Since that time over 13 municipalities and 10 states have enacted their own right to know legislation.[1082] Several Canadian municipalities have been actively looking into the feasibility of enacting their own right to know by-laws or asking provincial governments for special legislation enabling municipalities to pass these types of by-laws.[1083] Coalitions of environmentalists and workers have been formed to lobby for such legislation.[1084] The incidents of leaks from pesticide drums improperly transported or stored within municipal boundaries have been used to illustrate the need for right to know legislation so that better supervision and care can be taken in regard to these substances.[1085]

V. INTERNATIONAL PROGRAMS AND DEVELOPMENTS

Efforts at the international level with respect to pesticides may have an important influence on domestic governmental action. Canada has been involved in or influenced by, several of these initiatives. Activities briefly surveyed here include: (1) multilateral actions to standardize national governmental pesticide control efforts; and (2) bilateral initiatives by Canada and the United States to protect the Great Lakes, a major boundary water resource between them, from toxic substance, including pesticide, contamination.

A. Multilateral Actions to Standardize National Governmental Pesticide Control Efforts

Given the dramatic world-wide growth in pesticide sales and usage,[1086] it

is evident that pesticides can have an important impact on international economic trade. However, pesticides can also have concomitant adverse effects on environmental health, internationally. According to the World Health Organization (WHO), one person in the underdeveloped countries is poisoned by pesticides every minute.[1087] This amounts to an estimated 500,000 poisonings and 5,000 deaths a year.[1088] As a result, for both economic and environmental health reasons, the regulation of pesticides has become a matter of considerable international concern.

A number of international organizations have responded to the problems posed by pesticides including the Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO), the Organization for Economic Cooperation and Development (OECD), and the United Nations Environment Programme. Initiatives briefly reviewed here, that relate directly or indirectly to pesticides, include: (1) attempts to achieve international harmony in national pesticide registration requirements; (2) establishment of pesticide residue limits on foodstuffs; (3) control of the import, export and "dumping" of hazardous chemicals, including pesticides; (4) development of good laboratory practices for the testing of chemicals; and (5) examination of methods for compensating victims of domestic and transfrontier environmental pollution, including that arising from pesticides' manufacture, use and disposal.

1. Achieving Harmony in National Pesticide Registration Requirements

Since 1977, FAO has endorsed efforts to harmonize national pesticide registration requirements.[1089] A principal impetus for the support for such initiatives was concern that divergences in the registration requirements of various countries could "increase the cost of new pesticides and inhibit

the development or limit the availability" of new pest control materials.[1090]

The FAO sees harmonization as:

> "contributing substantially towards ensuring wider availability of needed pest control products, whilst also reducing the hazards involved in their distribution and use."[1091]

The need for, and principles of, pesticide registration were seen, at the FAO's 1977 conference on this topic as including regulation of the sale and distribution of pesticides, and protecting users, by-standers, the general public, domestic animals, wildlife, the environment and trade from possible adverse effects of potentially hazardous chemicals used for pest control.[1092] Similar purposes were attributed by FAO to pesticide registration at its second international meeting on the subject in 1982.[1093]

In this regard, the principal components of FAO harmonization efforts are directed to (1) data requirements; (2) registration procedures; and (3) national restrictions on pesticide availability, distribution and use.[1094] Data requirements include assessments of chemical and physical properties; pesticide efficacy; human health hazards; agricultural produce residues and environmental effects.[1095] Registration requirements include establishing national regulatory agencies, where necessary; phasing pesticide registration through experimental, limited and full stages; and protecting proprietary rights to registration data through confidentiality provisions and/or compensation schemes.[1096] National restrictions on availability, distribution and use include classification, labelling, packaging, storing and disposing of pesticides and containers.[1097]

FAO has also devoted considerable efforts to developing environmental criteria

for the registration of pesticides.[1098] Efforts in this regard have been directed to predicting potential environmental hazards; improving knowledge of the use pattern of particular pesticides; and developing surveillance and monitoring techniques with respect to the environmental effects of pesticides.[1099] The last activity is regarded by FAO as "not normally part of the registration process,"[1100] but desirable so that the regulatory authority can confirm original environmental predictions or uncover unsuspected harmful effects.[1101]

Efforts by FAO to achieve greater commonality of national registration approaches are expected in future.[1102]

2. Establishment of Pesticide Residue Limits on Foodstuffs

A second international initiative that essentially seeks to achieve harmony in national pesticide residue limits on foods, is exemplified by the Codex Alimentarius Commission-a joint body administered by FAO and WHO. This body attempts to develop standards for food commodities of importance in international trade.[1103] It does so by balancing the unavoidable pesticide residue levels found on foods arising from good agricultural practice, as described by an FAO expert committee, with the acceptable daily intake (ADI) for such pesticides, established by a WHO expert committee.[1104]

The twin principles under which such international efforts are directed relate to (1) allowing unhampered trade; and (2) protecting human health.[1105] The balance that is attempted has been described as follows:

> "Maximum residue limits should be set at levels in accordance with the requirements of public health but not higher than required by good agricultural practice."[1106]

These "standards," however, are, of course, advisory in nature.[1107] The purpose of these international initiatives is to provice leadership in this area. Canadian officials have noted, in discussing these agencies, that:

> "While international agencies can adopt recommendations and advise member countries on acceptable tolerance levels for pesticide residues and contaminants, they have no legislative powers, per se. It is therefore the responsibility of member nations to incorporate international recommendations into national food and environmental control laws. Clearly, international harmonization of such legislation is a very difficult and complex matter as responsible scientists within national governments often have differing views on what constitutes acceptable risk, and thus the quantitative values which can be assigned to tolerances or maximum residue limits."[1108]

Indeed, the actions of international bodies are themselves sometimes highly controversial because of the possibility of unwarranted domestic national reliance on their advice. In 1981, for example, the Canadian delegation informed a Codex committee of chronic toxicity studies carried out on the pesticide, permethrin. One of the studies showed the possibility of carcinogenic effects and the delegation suggested that no proposals for maximum residue limits (MRLs) be advanced pending a complete evaluation of the carcinogenic potential of the chemical. However, the Codex committee still advanced the MRLs to the next stage in the Codex procedures leading to eventual recommendations to national governments.[1109] Permethrin, in 1983, became the subject of litigation in the U.S. because of its suspected carcinogenic potential.[1110] The example suggests that the task of balancing the twin, if conflicting, objectives inherent in tolerance-setting can potentially lead to a lowest common denominator of health protection at the

international level, in some instances.

3. Imports, Exports and "Dumping" of Pesticides

Many countries, including Canada, are net importers of pesticides.[1111] In 1976, for example, Canada imported 116,986,798 pounds of pesticides from the United States.[1112] This was almost as much as that imported from the U.S. by 20 Latin American republics[1113] or Western Europe.[1114] Sometimes these chemicals have been banned or restricted from sale or use in the U.S.[1115] The export or "dumping" of such products by a manufacturer from a country with stringent controls to one with less stringent requirements, has provoked international concern. One European environmental official stated in 1982 that:

> "...we have a duty to break the so-called circle of poison. When pesticides, not allowed any more in industrialized countries, are exported to developing countries, the use on crops there not only causes contamination of soil and water, but also results in contaminated crops that may be imported into the same countries where the use of the exported chemicals is forbidden or restricted".[1116]

One example of an insecticide, leptophos, never allowed to be used commercially in the U.S., but imported by 50 countries, including Canada, for over five years has been noted above.[1117]

The international response to this problem has come from several sources. The General Assembly of the United Nations in December 1981, passed a resolution on the exchange of information or banned hazardous chemicals and unsafe pharmaceutical products. The resolution urged:

> "Member states and other interested parties, including transnational corporations, to cooperate more fully in providing data on banned or severely restricted substances [to U.N. organizations] with responsibility for information exchange in regard to such substances."[1118]

As part of U.N. efforts, UNEP's legal data profiles on selected chemicals, provides countries with information on legal and administrative limitations, bans and regulations placed on potentially toxic chemicals in the producing countries. The list is currently limited in scope but is in the process of being substantially updated and expanded.[1119]

The OECD has investigated various international proposals and efforts relating to the exchange of information on the export of hazardous chemicals.[1120] It has also developed its own draft principles on the subject.[1121] They would require that:

> "Where an exporting country has taken control action to ban or severely restrict the use or handling of chemicals in order to protect health or the environment domestically, such exporting country should make certain information available to importing countries. For purposes of these Guiding Principles, a control action to ban or severely restrict the use or handling of chemicals would include the refusal of a proposed first-time use based on a decision in the exporting country that such use would endanger human health or the environment."[1122]

The OECD proposal also sets out the minimum information that would be needed to alert the importing country to the pending export;[1123] additional information that may be required;[1124] and actions the importing country should undertake to handle and follow-up on such information.[1125]

Some OECD members have also proposed a code of conduct for industries engaging in such export trade based on the principle that: "manufacturers of chemicals... should act in such a manner that they do not endanger man or the environment with their chemicals, preparations or products."[1126] Components of such a

code of conduct would include: comparable quality and standards for domestically used as well as exported products; an information package on the uses and hazards of such products including ways and means of mitigating adverse effects; immediate recall if a product is found to represent a danger to human health and the environment "even when used appropriately"; good faith product advertising; and appropriate record-keeping on exported products including nature, quantity and destination of chemicals which are restricted on the home market and exported to other countries.[1127]

Some national pesticide laws, such as FIFRA in the U.S., currently require the U.S. Government to notify importing countries of pesticides that have been cancelled or suspended in the U.S., [1128] though deficiencies in the U.S. notice procedure have been documented by Congressional investigations.[1129] Amendments were proposed in 1980 to require export control on all products whose manufacture, sale, use or disposal is prohibited or severely restricted in the U.S., [1130] but these and related proposals were never enacted.[1131] Both the Pest Control Products Act and the Environmental Contaminants Act are silent on any such export notice or control requirement.

Canada's status as a net importer of pesticides does not mean that it never exports such products. In 1980, for example, it shipped 15 tonnes of a domestically produced pesticide to India and Nepal amid Parliamentary protestations questioning the product's safety, that were disputed by the federal government.[1132]

In addition to the international notice requirements being investigated by OECD, other organizations such as the U.N. have, by resolution, called for the control of exports unless certain information is provided to the importing country.[1133]

4. Good Laboratory Practices for Chemical Testing

Decision-making concerning the safety of chemicals, including pesticides, is often decisively influenced by the quality of test data.[1134] International interest in ensuring the scientific realiability of such test data evolved in the early to mid-1970's with the general development of national chemical control laws, enacted because of concerns surrounding potential environmental and human health effects of such products.[1135] Revelations surrounding the improper testing of drugs, pesticides and chemicals by IBT, a large contract testing firm in the U.S., served as a further spur to international efforts to ensure the quality of testing methods and laboratory practices.[1136]

Therefore, the OECD established, in 1978, an expert group to develop good laboratory practice quidelines and means of enforcing them.[1137] The OECD sees the application of good laboratory practices as being of crucial importance to national agencies entrusted with assessing test data and evaluating chemical hazards.[1138] The matter is also seen as having international environmental health and trade implications:

> "If countries can rely on test data developed in other countries, duplicative testing can be avoided and costs to government and industry saved. Moreover, common principles and procedures for good laboratory practices would facilitate the exchance of information and prevent the emergence of non-tariff barriers to trade while enhancing environmental and health protection."[1139]

The good laboratory practice report, released by OECD in 1982, provides guidance to testing facilities in order to promote the development of quality chemical testing data.[1140] It also outlines an approach to assuming compliance with the OECD principles at both the national level with respect to laboratory facility inspections and audits of individual studies,[1141] and at the international level regarding multilateral recognition and acceptance of test date meeting these principles.[1142]

The OECD good laboratory practice procedures are likely to influence if not further spur Canada to develop its own legislation on the subject, while recognizing that most chemical pesticide testing still occurs outside the country.[1143]

5. Victim Compensation

Methods of compensating victims of domestic and transfrontier environmental contamination, including that arising from pesticides manufacture, use and disposal, have been investigated by international organizations, such as the OECD, though no consensus on approaches has been reached.[1144]

In many countries, liability is still determined on the basis of negligence principles.[1145] As a result, the obstacles that have arisen in various countries in obtaining recovery for chronic long-term exposure to pollutants, including pesticides, are similar to those noted above in Canada.[1146] Where regimes of strict liability apply, and causation and other proof problems are

overcome, the increasing size of the risks posed by some types of contaminants raises the possibility of either (1) inadequate recovery due to defendant insolvency;[1147] or (2) inadequate private insurance for the defendant being available due to insurers excluding certain types of risks.[1148] In Italy, for example, where in 1976 a major industrial chemical accident released TCDD into the environment, insurance policies excluded recovery for genetic damage and injury resulting from environmental contamination.[1149]

To overcome some of these obstacles to victim recovery, OECD investigations have explored the concept of a compensation fund which would provide an environmentally harmed party with a right to compensation from the fund as well as, or instead of, his right to claim against the individual polluter. Such funds would be financed by a levy placed on potential polluters, assessed according to the risk of damage their products impose.[1150] This concept has applicability to pesticide-related injury as well, with different levies assessed against each tonne of pesticide, depending on toxicity and related factors, manufactured, imported or formulated per year in the country. The fund could have an upper limit or ceiling which would be replenished each year through new levies, as necessary.[1151]

6. Summary

Each of the above noted initiatives being undertaken or investigated by international organizations has implications for the evolution of domestic Canadian responses to pesticide-related problems. Efforts to achieve harmony in national pesticide registration requirements and residue limits may influence how the Pest Control Products Act and the Food and Drugs Act

eventually address such issues in future. In some instances, international concern over trade interference may take precedence over health matters despite the best efforts to balance these two concerns. Harmonization may sometimes have the unintended effect of producing the lowest common denominator of protection. International efforts to control pesticide dumping and establish good laboratory practices are also of key importance to Canada because of its position as a major net importer of pesticides that are normally tested for safety elsewhere. International investigations into the best methods of compensating victims and internalizing the social costs of environmental contamination, including that arising from pesticides, may also influence future domestic law reforms, particularly where chronic long-term exposure is at issue.

B. Bilateral Initiatives to Protect Major Natural Resources from Pesticide Contamination

1. Canada-United States Great Lakes Water Quality Agreement

The Great Lakes are a major boundary water resource between Canada and the United States, containing approximately one-fifth of the world's total fresh surface water supply.[1152] The Lakes have been the subject of Canada-U.S. concern and investigation since the inception of the Boundary Waters Treaty between Great Britain (on behalf of Canada) and the U.S. in 1909.[1153] A six-year pollution study completed in 1970[1154] was the immediate impetus for the Great Lakes Water Quality Agreements of 1972[1155] and 1978[1156] between Canada and the U.S.

The 1909 Treaty required that "the boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health

or property on the other."[1157] The 1978 Agreement's purpose is to "restore and maintain the chemical, physical and biological integrity of the water of the Great Lakes Basin Ecosystem."[1158] To achieve this goal both countries have agreed to make a maximum effort to develop programs and practices to eliminate or reduce "to the maximum extent practicable the discharge of pollutants" into the Lakes.[1159] A key policy agreed to by the Parties is to prohibit the discharge of toxic substances in toxic amounts and virtually eliminate all discharges of "persistent toxic substances," in conjunction with an annex to the agreement.[1160] The International Joint Commission (IJC), a bilateral body originally created under the 1909 Treaty, is given advisory and oversight responsibilities under the Great Lakes Water Quality Agreement.[1161]

The 1978 Agreement, while not primarily focussed on pesticides, does emphasize stringent control of toxic substances generally.[1162] With respect to pesticides, the Agreement commits the Parties to:

> "Measures for the control of pest control products used in the Great Lakes Basin to ensure that pest control products likely to have long-term deleterious effects on the quality of water or its biota be used only as authorized by the responsible regulatory agencies; that inventories of pest control products used in the Great Lakes Basin be established and maintained by appropriate agencies; and that research and educational programs be strengthened to facilitate integration of cultural, biological and chemical pest control techniques."[1163]

The Agreement also establishes general and specific water quality objectives which, while not enforceable by themselves, can have legal effect if adopted under the domestic legislation or regulations of either country. Objectives

for 10 persistent pesticides,[1164] and 4 non-persistent pesticides,[1165] have been established under the Agreement.

Pesticides were one of the earliest classes of toxic substances of concern to the IJC, and under the 1978 Agreement they continue to be the subject of major investigations. In the 1970 IJC report to the two governments pesticides, such as DDT, were of particular concern because of their persistence, toxicity at very low-levels, and ability to bioaccummulate in the environment.[1166] The report noted that pesticides may reach potable water supplies from aerial spraying, agricultural runoff, food processing wastes, accidents, thoughtless disposal of surplus pesticides and direct application to water for qauatic weed control."[1167]

IJC reports under the 1972 and 1978 Agreements have continued to focus on pesticides. A 1979 report on the water quality of the upper Great Lakes recommended that to protect human health, and aquatic life, Canada and the U.S. should ban the manufacture, sale, transport and use of certain persistent pesticides such as DDT, aldrin, dieldrin and all other persistent synthetic organic compounds with known highly toxic effects, which may enter the environment.[1168] Other pesticides were recommended for strict regulation.[1169] A 1980 IJC report to the two governments on the Lower Great Lakes reiterated these recommendations.[1170]

The IJC has, however, raised concerns about the time it is taking the Canadian and U.S. Governments to meet important objectives under the 1978 Agreement. A 1982 IJC report noted that despite the commitment of the parties to

develop and adopt, by specific dates, programs for eliminating the discharge of persistent toxic substances; and addressing the handling, use and disposal of hazardous materials, including pesticides, "no substantial progress" was apparent to the Commission.[1171] The failure of the parties to meet target dates and to make every effort to complete these activities was of particular concern to the IJC because:

> "Degradation of the Great Lakes Basin Ecosystem by toxic and hazardous substances is the major overall problem facing the Parties under the 1978 Agreement. Environmental and human health impacts of such substances are especially significant in view of the slow degradation and often cumulative effects of persistent toxic substances in the environment."[1172]

The Commission concluded in 1982 and again in 1983, after a review of the toxic substances control programs of the states, Ontario and the two federal governments, that there is no overall Great Lakes toxic substances management strategy to assist jurisdictions in coordinating the development of their programe.[1173] Indeed, with over 800 chemicals identified in the Great Lakes, the IJC has noted that the previous trend of decreasing concentrations of certain persistent chemicals and pesticides in lake fish and birds has ended and in some cases concentrations may be increasing again.[1174]

Ironically, the mechanisms and objectives authorized under the 1978 Agreement to control current and future damage from toxic substances, including pesticides, may be inadequate themselves in certain respects. For example, the Agreement lists specific objectives for approximately 30 chemicals, one-half of which are pesticides.[1175] However, the IJC has now identified over 800 chemicals in the lakes.[1176] Thus, the IJC indicates that since specific objectives do not exist for many of the chemicals and pesticides now

entering the Great Lakes, the Commission has "little basis for assessing chemical levels other than a general concern"[1177] Moreover, the IJC further notes that the specific objectives themselves do not consider the potential cumulative effects of many chemicals acting together, which may be much greater than their individual effects considered alone.[1178] Thus, the specific objectives for particular chemicals might need to be changed in order to take into account the actual effects of chemicals on water quality or human health.[1179] The IJC has therefore urged the Parties to reassess and, where necessary, change the specific objectives in light of the potential cumulative impacts of multiple pollutants, in order to more realistically reflect their expected impact in the Great Lakes aquatic environment.[1180]

Overall, the Great Lakes Water Quality Agreement has been a major vehicle for heightening public awareness of the problems facing the boundary waters and for focussing government attention on actions that should be taken. Delays in implementing necessary control programs, however, as well as developing a comprehensive stragety to meet the Agreement's goals on toxic substances generally, have underscored weaknesses in governemtal efforts and the advisory structure of the Agreement. Moreover, inadequacies in the design of some aspects of the Agreement, such as the limited number of specific objectives on toxic chemicals and pesticides as well as the failure of the specific objectives themselves to take into account synergistic and cumulative effects of chemicals acting in combination in water, points to needed reforms in the Agreement itself.

VI. RECOMMENDATIONS FOR PESTICIDE LEGAL AND REGULATORY REFORMS IN CANADA

In the almost fifteen years since major amendments to Canada's principal pesticide law, the Pest Control Products Act, were last enacted, problems surrounding pesticides have not abated. They have merely shifted from a older generation of persistent pesticides, such as DDT, to a newer generation of products whose health and environmental effects, may be more subtle, but no less critical. Pesticide laws, particularly at the federal level, have not kept pace with the challenges posed by the number, diversity and impacts of pesticides that are used in agricultural production, forestry and the home.

Protection of the food and fiber producing sectors of the economy is an important societal goal, but it is doubtful that it was Parliament's intention in the 1969 amendments to the PCPA to achieve this aim at the expense of health and the environment. Events over the last decade-and-a-half have frequently shown, however, that health and the environment have been increasingly vulnerable to potential and actual damage arising from pesticides. Despite attention to the problem at all levels of government, the need especially for federal law reform, has become evident, if not acute. The focus of such law reform should be two-fold: (1) increasing governmental authority to act; and (2) providing, as a matter of law, individual opportunity for participation in governmental decision-making and, where necessary, redress to courts. The recommendations that follow are proposed with these dual objectives in mind.

1. The PCPA or the regulations should be amended to make it mandatory for the Minister to suspend, cancel or refuse to register a pest control product where he finds that it may endanger human health (of workers or bystanders) or the environment as set out in the PCPA regulations. The decision should be based on risks posed alone, without consideration of benefits as the PCPA, it is submitted, does not authorize consideration of pesticide benefits.

In the alternative, the PCPA should at a minimum be amended to make it mandatory for the Minister to suspend, cancel or refuse to register a pesticide where he finds that it may endanger human health. In conjunction with this, the federal government should outline in detail and publish a cancer decision-making policy that is consistent with federal statutory mandates under the PCPA, the Food and Drugs Act and the Environmental Contaminants Act.[1181]

2. Health and Welfare Canada should proceed to introduce good laboratory practice legislation compatible with international principles and in conjunction with this the federal government should establish by law an independent testing facility financed in substantial part by a tax on annual quantities of chemicals and pesticides imported, manufactured, formulated or used in Canada. Such facility should be a principal source of testing data on new pesticides and uses, including development of environmental testing data under Canadian conditions.[1182]

3. The PCPA or regulations should be amended to provide for public notice of registration applications for a new product or use; public access to health and safety tests relied on in support of the registration application; a 60-90 day comment period; and a right of appeal and hearing if a pesticide registration application is granted.[1183]

4. The PCPA should be amended generally to: (1) mandate public access to, and government and agency sharing of pesticide (both active and inert ingredient) health and safety data; and (2) authorize compensation or a period of exclusive use to protect the initial data submittor from competitors seeking access to information, including trade secrets.[1184]

5. The PCPA or regulations should be amended to specify criteria the Minister must use in granting temporary registrations including the information that must be submitted in support of such an application and the number of renewals permitted. Opportunity for notice and public comment should also be required including public availability of health and safety data in support of such applications as well as those respecting research permits.[1185]

6. The PCPA or regulations should be amended by adding a schedule that would incorporate specific timetables for cyclical re-evaluation of all registered pesticides. Suspension or cancellation of a pesticide registration should occur automatically if the registrant fails to comply with the timetable where the pesticide lacks scientifically valid studies respecting cancer, birth defects, mutations, neurotoxic or reproductive effects.[1186]

7. The PCPA or regulations should be amended to authorize establishment of a system of prioritization for pesticide re-evaluation reviews and to screen registered pesticides to identify those whose registrations are based on old or incomplete safety data and for which new evidence suggests they may endanger human health or the environment. Where a pesticide meets or exceeds a critical risk standard (e.g. potential cause of cancer) the federal government should be required to publish a notice announcing to the relevant registrants that they must submit evidence rebutting the presumption of "unacceptable risk" or the government will proceed to apply appropriate restrictions, including suspension or cancellation.[1187]

8. Registrants should be statutorily required to immediately notify the government if studies or other evidence within their knowledge indicates that one of their registered pesticides may cause or contribute to the endangerment of human health or the environment.[1188]

9. Any member of the public should be allowed, by statute, to: (1) petition the Minister to initiate investigations and/or restrictions on a registered pesticide about which new data have come to light regarding adverse health or environmental effects; and (2) cause a Review Board hearing to be held as to whether a pesticide should be suspended, cancelled or its registration continued.[1189]

10. The PCPA should be amended to provide for mandatory suspension or cancellation of registered pesticides where it is shown that the safety tests supporting the registration are invalid. Such suspension or cancellation should continue until new valid tests are submitted demonstrating the product's safety.[1190]

11. Where a pesticide is shown to cause cancer, birth defects, mutations, neurotoxic or reproductive effects, and the Minister is considering suspension or cancellation of the registration, the Act should be amended to require automatic cancellation in such a situation so as to ensure that neither registrants, retailors nor users may use remaining stocks of the product.[1191]

12. The PCPA or regulations should be amended to require the annual reporting to Parliament of the following information: (1) the number of registration applications received by relevant category of application (e.g. new product

new use of existing product etc.); (2) the number of such registrations granted including the type of approval (i.e. domestic, commercial, restricted); (3) the number of applications denied and/or withdrawn and why; (4) the time for handling applications; (5) the number of research and temporary registration applications, including (i) the number of applications by type of exemption sought (e.g. emergency) and the disposition of these applications; (ii) the total kilograms of each active ingredient and the area authorized for application, by province; (iii) actual amount used and area to which applied; (6) the status of re-evaluation reviews for each active ingredient; (7) a complete and updated list and summary of suspended, cancelled or otherwise restricted pesticides and other enforcement actions taken and (8) a list of notices transmitted to officials of foreign governments with respect to exports of banned or restricted products (proposed below).[1192]

13. The Act should be amended to require registrants to annually submit to the government, information concerning the production and sales of active ingredients, and to estimate usage of each such pesticide by province. The Act should be further amended to require the government to publish this information annually in aggregate form by province.[1193]

14. Fines under the PCPA should be increased substantially, at least up to the levels in the Fisheries Act and/or the Environmental Contaminants Act.[1194]

15. The Act should be amended to authorize the use of civil-penalties as an inducement to compliance, without any diminution in the right to publicly or privately prosecute for violations of the Act's provisions.[1195]

16. The Act should be amended to provide Ministerial authority and citizen standing to seek a restraining order to prevent violations of the Act. Citizens should also be granted standing under the PCPA to bring an application for judicial review to enforce any duty under the Act or regulations.[1196]

17. The Act should be amended to require the listing of inert as well as active ingredients on the product label[1197] and at least the same environmental hazard and appropriate use information as appears on the labels of the product in its country of origin.[1198]

18. The PCPA and ECA should be amended to at least require that Canada give notice to foreign governments of the restrictions that exist domestically on pesticides exported to their countries.[1199]

19. The PCPA should be amended to require that a substantial percentage of Agriculture Canada's pest control research budget, including outside contracts, be spent on research into non-chemical alternatives to pest control; including further research into integrated pest management strategies that place less reliance on chemical pesticides.[1200]

20. The Food and Drugs Act should be amended to require that no detectable residue levels be allowed where a pesticide has been found to be carcinogenic, mutagenic, teratogenic or produce adverse neurotoxic or reproductive effects

in humans or animals.[1201]

21. The FDA should be amended to allow any member of the public to: (1) petition the Minister to initiate investigations and/or restrictions on a registered pesticide about which new data has come to light regarding adverse health or environmental effects and; (2) cause a Review Board hearing to be held as to whether a pesticide tolerance should be established or re-examined.[1202]

22. The FDA should be amended to require public notice and opportunity for comment on revisions to the agricultural chemical maximum residue limits under the regulations.[1203]

23. Finally, a number of additional law reforms appear warranted that relate primarily to provincial law. These include:

- systematic provincial production of pesticide usage information through statutorily required record-keeping and reporting requirements.[1204]
- cost-sharing authority under provincial and federal law to enable provincial inspectors to act under provincial and federal legislation with respect to investigations and enforcement;[1205]
- addressing the farmer exemption from all permit and licence requirements, by at least requiring certification of farmer competency in pesticide use or a related technique;[1206]
- better control of pesticide container disposal to prevent surface and groundwater pollution;[1207]
- improvements in provincial manifests to track more hazardous pesticide wastes;[1208]
- appeals and hearings on major permit applications such as aerial spraying of forests and aquatic spraying;[1209]
- authorization of access to information contained in spray permit applications in preparation for such hearings;[1210]

- civil-administrative penalties under provincial law but retention of private prosecution authority;[1211]

- public ability to seek restraining orders for violation of statute; apply for judicial review of administrative actions; and obtain notice and comment on proposed pesticide regulations;[1212]

- enactment of victim compensation legislation, funding for which would come from levies on pesticides manufactured, formulated or used in the province;[1213]

- provincial enabling legislation authorizing municipal right-to-know by-laws; and/or municipal initiative to enact such by-laws.[121

- individual standing to sue in a public nuisance situation without having to first demonstrate that a special interest has been harmed, with the burden of proof shifting to the defendant to show that the harm did not or will not result from his activities once the plaintiff makes a prima facie case; and with the limitation period for such action not beginning to run until the plaintiff knew or ought to have known the identity of the defendant and sufficient facts to indicate that he has a cause of action.[1215] Limiting security for costs or damages and related plaintiff court cost burdens should also be considered.[1216]

VIII. CONCLUSIONS

The increasing use of pesticides for agricultural food production and other purposes in recent years, has occurred concomitantly with a rise in environmental and public health concern surrounding these chemicals. Evidence is clearly available of past as well as present pesticide-related damage including fish and wildlife kills; farmworker deaths, poisonings and other adverse effects from pesticide exposure; human health problems in the general population; and environmental contamination. In addition, scientifically invalid as well as falsified pesticide testing has raised questions regarding the safety of many pest control products now on the market in Canada. Moreover, these problems are occurring at every stage of the regulatory process including registration, use and disposal.

The use of the common law for pesticide problems including actions in private

nuisance, strict liability and negligence may provide adequate redress for short-term health impacts and property damage. However, the analysis in this paper suggests that there are considerable obstacles to obtaining compensation for long-term health effects from pesticide exposure. Moreover, injunctive relief to prevent future harm appears even more difficult to obtain because of the greater speculative nature of the issues. Burden of proof rules, establishing causation and prohibitive court costs may also limit the availability of this approach for the average citizen.

The need for a more systematically preventive regime for pesticide control than the principally reactive common law system provides has resulted in statutory efforts to control such products. Emphasis in this paper has been on federal law, particularly the Pest Control Products Act, because it is the principal federal law establishing what pesticides may be registered in Canada, what uses are allowed, and what enforcement techniques may be employed to ensure compliance. The Act's registration and re-evaluation requirements for new and existing pesticides respectively, which constitute the heart of the federal program, are nonetheless burdened with serious deficiencies. These include inadequate testing requirements and practices; dubious assumptions with respect to acceptable risk of such products; and virtual lock-out of the public from participation in the decision-making process respecting registration or re-evaluation. The registration program also offers the possibility of some pesticides reaching the market and the environment despite lack of adequate health and safety data. These authorized depatures from full registration requirements threaten the integrity of the federal government's program, yet adequate safeguards do not appear to be in place

to prevent abuses.

The re-evaluation program for already registered pesticides also faces problems of slowness in the rate and number of pesticides subject to the process, with some estimates ranging from 35-55 years before all currently registered pesticides will be reviewed. Problems with prioritizing existing pesticides for review as well as the shadow that has been cast over the entire regulatory process by the massive IBT falsification of pesticide safety data, raise serious questions about the adequacy of the current PCPA to perform the job intended for it by Parliament. Public confidence in the Act has also been undermined during the course of the IBT problem because of a lack of information access about pesticide safety. Prospectively, the new federal access to information law may not restore public confidence in the process. This appears to be the case because of continued protection of trade secrets, notwithstanding this is frequently used as a shield preventing release of health and safety data.

The quasi-criminal and administrative enforcement procedures under the Act, including suspension, cancellation, seizure, detention and prosecution are also instruments which the federal government has used in varying degrees to ensure public safety from pesticides. The federal government has shown, however, a preference for administrative tools over quasi-criminal instruments, with the latter falling into virtual dis-use. Evaluation of the effectiveness of the former techniques, however, is difficult, if not impossible, because of scattered statistical information on the viability of these techniques. Key pesticide usage data which is important for virtually all facets of PCPA enforcement and related programs, is not systematically

required to be produced nationally under the Act.

The federal government's efforts with respect to pesticides under other federal laws have concentrated on the setting and enforcing of maximum residue limits and information-gathering. In the former area, whether residue limits for carcinogens can be set, has been a matter of considerable controversy. In the latter area, the need for, and availability of, systematic information on types, quantities and location of pesticide usage nationally has been at issue, and remains unresolved.

Some non-regulatory federal programs such as the socio-economic impact analysis policy, safe drinking water and integrated pest management efforts point to possible areas of greater federal legislative initiatives in future.

Provincial efforts to complement federal regulatory and enforcement control have centred on pesticide classification; issuance of permits and licences with respect to use; and control of transportation, storage and disposal. Key problems with these areas relate to methods of control and opportunities for public involvement in major aerial and water spraying activities. In addition, exemptions for farmers from all or most permit and licensing requirements, despite the fact that agriculture is the predominant area of pesticide use in Canada, have also been of concern. Some provincial governments have evidenced a greater willingness to use the quasi-criminal sanction in pesticide enforcement, but at the same time profess a preference for administrative enforcement and management techniques to address pesticide misuse.

Municipal governments have both regulatory and self-management responsibility

with respect to pesticides, though generally municipal authority to control pesticides is limited by provincial legislative enabling authority. Some municipal governments have expressed interest in obtaining legislative authority that would allow them to know the types, quantities and location of pesticides used in their jurisdiction, though such initiatives are still in their infancy.

International initiatives, which may influence national law include: attempts to harmonize national registration requirements; the setting of pesticide residue limits; control of pesticide dumping; establishing good laboratory practices; exploration of victim compensation schemes; and protection of major natural resources such as the Great Lakes from pesticide contamination. Some of these international efforts reveal the slowness in improvement in national and local control laws. In addition, some of these efforts may sometimes not provide a model for the best health protection approach to pesticide control, as concern for international trade protection is also frequently at issue.

The agricultural chemical industry, the subject of much of the preventive and remedial attention of Canadian pesticide laws, has resisted increased testing or related regulatory controls, citing the need for the government to be more conscious of the economic benefits of pest control products for the food and fibre sectors of the economy. The industry has also resisted greater requirements for access to information on health and safety testing of pesticides, fearing loss of trade secrets to competitors.

In turn, environmental and public health groups have cited the need for Canadian law to: authorize public access to all pesticide health and safety data; require public participation in registration, re-evaluation and regulation-making as well as court access; and authorize automatic suspension or cancellation of registered pesticides where the safety tests supporting registration are shown to be invalid.

Reforms to improve government authority to act as well as allow greater public access to the regulatory and judicial processes with respect to pesticides, are outlined in this paper. Considering the potential damage to human health and the environment from improperly registered, used or disposed of pesticides, it is clear that legislative improvements to both the governmental authority to act and the role of the public in the process are past due.

VIII. NOTES

1. A "pesticide" has been defined as "any substance or mixture of substances intended for preventing or controlling any unwanted species of plants and animals and also includes any substances or mixture of substances intended for use as a plant-growth regulator, defoliant or dessicant." The term "pesticide" also includes "any substance used for the control of pests during the production, storage, transport, marketing or processing of food for man or animals or which may be administered to animals for the control of insects or arachnids in or on their bodies. It does not apply to antibiotics or other chemicals administered to animals for other purposes, such as to stimulate their growth or to modify their reproductive behavior; nor does it apply to fertilizers." Food and Agriculture Organization of the United Nations. Report of the Ad Hoc Government Consultation on International Standardization of Pesticide Registration Requirements. U.N. Doc. AGP:1977/M/9 (Rome: FAO,1977) at 57.

2. According to federal officials, between 1971 and 1981 total pesticide sales in Canada increased twelve-fold in current dollars ($57.3 million to $698 million) and more than four-fold when adjusted according to the Statistics Canada price index for pesticides ($57.3 million to $243 million). Interview with Phil Blagdon, Pesticides Officer, Environmental Protection Service, Environment Canada, Ontario Region. (May 27, 1983, Toronto, Ontario.)

   Increases in sales are reflected in the magnitude of pesticide use around the country. In the Maritimes, the federal government indicates that "pesticides are used both intensively and extensively" with forest spraying representing "the most extensive use" regionally. For example, aerial insecticide use in New Brunswick in 1980 amounted to 613,000 kilograms covering over 1.6 million hectares of forest area. Government of Canada. Toxic Chemicals: An Atlantic Region Profile. (Dartmouth, Nova Scotia: Government of Canada, July 1982) at 20-21.

   Similarly, in Ontario total herbicide use on field crops increased by more than 50 percent (2652 tonnes to 4075 tonnes) between 1973 and 1978. Ontario Ministry of Agriculture and Food. Survey of Pesticide Use in Ontario, 1978. (Toronto: OMAF, August 1979) at 7.

   In Saskatchewan, where herbicide use is regarded as one of the heaviest in Canada, nearly equaling the total usage of the other three western provinces combined, over 8.3 million pounds of herbicides were sold for agricultural use in 1979. Peter von Stackelberg, "Chemical warfare against bugs is big business," The Regina Leader Post, November 10, 1980 at 17, col. 1.

3. In the United States, for example, pesticide usage rose from slightly over 400 million pounds in 1970 to almost 1.2 billion pounds in 1980. At the same time, pesticide sales went from less than $1 billion (U.S.) in 1970 to in excess of $3.5 billion in 1980. United States General Accounting Office. Stronger Enforcement Needed Against Misuse of Pesticides. A Report to Congress by the Comptroller General of the United States. CED-82-5. (Washington, D.C.: GAO, October 1981) at 1-2.

4. International environment organizations have noted that the contribution of pesticides "to increased agricultural production cannot be denied." United Nations Environment Programme. Annual Review 1978. (Nairobi, Kenya: UNEP, 1980) at 7. UNEP has also stated that the "extensive use of chemicals for pest...control... has been a principal factor in boosting agricultural productivity in many parts of the world. This achievement enabled global food and fibre production not to lag too far behind human population growth." United Nations Environment Programme. The State of the Environment, 1979. (Nairobi, Kenya: UNEP, 1979) at 10.

5. Federal agriculture minister, the Hon. Eugene F. Whelan, has stated that: "Food organizations, such as the FAO, have long recognized that an immediate way to boost total food supplies is the increased use of chemicals....[D] eveloping countries lose between $24 and $48 billion worth of food because they cannot control pests....such as weeds, insects, fungi and rodents. The world could do itself a big favour if food producers could use more herbicides to control grasses and weeds, more insecticides, more fumigants, improved rodent control and more plant growth regulators....India, for example, is...in the forefront in using chemicals to protect crops from insect and weeds... North America can do a lot to pull up its socks, too. Some people estimate that one-third of our potential harvest is lost each year to insects, birds, diseases and weeds....Right now, for instance, Canada is putting on a concerted effort to wipe out wild oats and chemicals will be used to help farmers save millions of dollars in lost production. In 1973, prairie grain farmers lost more than $912 million because of wild oat damage to their crops." The Hon. Eugene F. Whelan, Federal Minister of Agriculture. Notes for an address to the Canadian Agricultural Chemicals Association annual conference. (Jasper, Alberta: September 9, 1975).

6. Infra notes 26-53 and accompanying text.

7. UNEP indicates that: "The ingestion of contaminated bread prepared from wheat and other cereals treated with alkyl-mercury fungicides has resulted in a number of epidemics of poisoning in a number of countries. The largest recorded epidemic, in Iraq in 1971-1972, resulted in the admission of over 6,000 patients to hospitals and over 500 deaths..." United Nations Environment Programme. The State of the Environment, 1981.(Nairobi, Kenya: UNEP, 1981) at 13. For a description of the international impacts of the insecticide DDT see infra note 35.

8. Infra Parts III, IV and V.

9. Ross H. Hall. A New Approach to Pest Control in Canada. Report No. 10 (Ottawa: Canadian Environmental Advisory Council, July 1981) at 1.

10. Supra note 2 and infra notes 12-20 and accompanying text.

11. The world expenditure for pestcides in 1975 was estimated at $5 billion. UNEP 1979, supra note 4, at 10. UNEP indicates that: "Chemical pesticides are used globally on an increasing scale. Currently about 1,000 such chemicals are in common use. More than a quarter of a million tonnes of insecticides are sold annually. Public health use accounts for about 10 percent of annual production, the remainder being used in agriculture, forestry, the preservation and storage of food products, horticulture and household use." UNEP 1978 Annual Review, supra note 4, at 7.

12. Statistics Canada. Human Activity and the Environment. (Ottawa: Supply and Services Canada, 1978) at 38.

13. The Hon. Eugene F. Whelan, Federal Minister of Agriculture. Notes for an address to the 24th annual conference of the Canadian Agricultural Chemicals Association. (Ottawa: September 15, 1976).

14. Agricultural Institute of Canada. Pesticides, Agriculture and the Environment. (Ottawa: AIC, January 1981) at 4.

15. Phenoxy herbicides, including 2,4-D, 2,4,5-T, MCPA, fenoprop, dichloprop and mecoprop are used across Canada to control broad-leaved weeds, hardwood trees, and brush on crop and range land, in forests, on rights-or-way, on industrial property, turf and lawns. National Research Council of Canada. Phenoxy Herbicides - Their Effects on Environmental Quality. (Ottawa: NRC, 1978) at 29.

16. Statistics Canada. Sales of Pest Control Products by Canadian Registrants. (Ottawa: Industry, Trade and Commerce Canada, October 1977) at 9; and Statistics Canada. Sales of Pest Control Products by Canadian Registrants. (Ottawa: ITC Canada, October 1978) at 8.

17. "Pesticides" are defined for the purpose of this statistic to include herbicides, insecticides and fungicides.

18. Agriculture Canada. Canada's Agricultural Food System: An Overview. (Ottawa: Supply and Services Canada, 1981) at 22-23.

19. Id. at 22. The increase was almost 75 per cent after adjusting for inflation.

20. Supra note 12, at 26.

21. One of the more comprehensive provincial surveys is the Ontario survey of pesticide use (supra note 2), begun in 1973. However, it only comes out once every five years. Other provincial surveys, while they come out more frequently, offer only very general information such as total quantities of a particular pesticide sprayed by air or on the ground, in the province as a whole. See, for example, Environment New Brunswick. Pesticide Usage in New Brunswick. (Fredericton, N.B.:ENB, 1982) More detailed information, such as where particular pesticides were used in what quantities and related matters, appears frequently to be lacking. Even Statistics Canada's annual pesticide sales surveys were discontinued in 1977.

Because detailed information on pesticides usage is frequently important if an agency is to undertake key regulatory, monitoring, research and enforcement activities, the lack of comprehensive use data has been deplored in other countries. In the United States, for example, the National Academy of Sciences in a 1975 report concluded that: "The pest control enterprise places a billion pounds of toxic materials into the environment each year, but it is 'normal' for us to have only the vaguest idea of how much of each compound was used and where, and even then only after half a decade's lag." National Academy of Sciences. Contemporary Pest Control Practices and Prospects. Vol. 1 (Washington, D.C.: NAS, 1975) at 13.

22. UNEP notes that in addition to boosting agricultural productivity: "Extensive use of chemicals for pest and vector control has dramatically reduced morbidity and mortality due to vector-borne diseases..." UNEP 1979, supra note 4, at 10.

23. According to UNEP the "repeated application of pesticides to a pest population can result in the selection of individuals which can tolerate doses of the pesticide higher than that required to kill the majority. The individual members of "resistant strains" can breed and thus produce resistant populations...Although resistance to pesticides has been known since 1911, it has occurred at a greatly accelerated pace since 1947 as a result of the large-scale introduction and application of synthetic pesticides. Resistance to pesticides has been reported for such diverse groups as insects, mites, ticks, fungi and rodents. The danger of the situation is that there is reason to suppose that all pests are likely to be able to develop resistance to all types of chemical pesticide in time, given appropriate selection pressure. This could seriously and adversely affect the efficiency and economy of pest control operations on a global scale, with corresponding grave effects on both world health and world food production." Id.

The FAO Panel of Experts on Resistance to Pesticides has carried out a series of world surveys of insects and mites. The first survey in 1965, listed 182 resistant strains; the second in 1968, 228 species; the third in 1977, 364 species. Id., at 11. Currently there are at

least 428 resistant species, from a wide range of insects. United Nations Environment Programme. Performance Report: List of Dangerous Chemical Substances and Processes. UNEP/GC/10/5 Add.3. (Nairobi, Kenya: UNEP, 1982) at 25.

The problem of pest resistance to pesticides has been recognized in Canada and has been characterized as a "near-crisis with insecticides and some fungicides." Weed resistance to key herbicides, such as atrazine, has also been noted. Supra note 14, at 7.

24. Id., UNEP 1982, at 25.

25. UNEP 1979, supra note 4, at 10.

26. Environment Canada. Canadian Wildlife Service. Impact on forest birds of the 1975 spruce budworm spray operation in New Brunswick. No. 62. By P.A. Pearce, D.B. Peakall and A.J. Erskine. (Ottawa: CWS, 1976) at 1-3. See also Douglas J. Forsyth, CWS, "Evaluation of Pesticides by the Canadian Wildlife Service." An Address at the Canadian Council of Resource and Environment Ministers Workshop on Pesticides Use in Canada. Proceedings. (Ottawa: CCREM, 1982) at 97.

27. Id., Forsyth, at 96.

28. "Quebec beekeepers hurt by pesticides," The Regina Leader-Post, August 16, 1980 at , col. .

29. R. v. Robert Caswell and Rick L. Caswell, unreported decision of Omestead, J., Provincial Court Judge, [Provincial Court(Criminal Division) County of Grey] (October 28, 1980, Markdale, Ontario); and R. v. Robert Caswell and Rick L. Caswell, unreported decision of Thompson, J., County Court Judge, County of Grey (July 27, 1981) in which the trial judge's findings of fact were upheld, but his acquittal of the defendants was overruled and a conviction instead was entered.

30. British Columbia Coroner's Office. Verdict of Coroner's Jury into the October 30, 1982 death of Jarnail Singh Deol in Surrey, B.C., pursuant to the Coroners Act, R.S.B.C. 19 , c. (March 11, 1983, Vancouver, B.C.). See also "Pesticide death called homicide, The Globe and Mail, March 17, 1983 at 8, col. ; and Arthur Moses, "Finding on B.C. poison death may prompt farm labour action", The Globe and Mail, March 21, 1983 at 8, col. .

31. Matsqui-Abbotsord Community Services. Agricultural Pesticides and Health Survey Results. (Abbotsford, B.C.: MACS, October 1982) at 5-9. See also Kevin Cox, "55% in survey sprayed by pesticides," The Globe and Mail, October 15, 1982 at , col. .

32. Id., MACS Survey, at 9.

33. Catherine Richards and Elizabeth May. "Spruce Budworm Spraying and Pesticide Registration." An Address at the Environment Canada and Canadian Environmental Non-Governmental Organizations Workshops on Toxics. (Ottawa: ENGO, May 1982) at 41.

34. Pollution Probe Foundation. Drinking Water: Make it Safe (Toronto: Probe, 1983) at 12 and Table 9.

35. Canadian Council of Resource and Environmental Ministers. Task Force Report on Toxic Substances. (Toronto: CCREM, 1981) at 12. CCREM notes that: "Bio-accumulation was noted as a particular phenomenon in the case of DDT and with many organo-chlorine preparations. DDT progressively accumulated in animal tissues to higher levels as one ascended the food chain. Ten years after almost total restriction of DDT use in Canada and the United States, significant levels can still be detected in human tissues...[T]hose exposed to DDT when its use was unrestricted (the over 50 year age group) have a tissue level significantly higher than that prevailing in younger non-exposed groups (0 to 14 age group). But the non-exposed still have a high level one decade after the limitations placed on the chemical DDT is still widely used in many other countries." Id., at 11-12.

UNEP indicates that: "The progressive contamination of virtually all global ecosystems with DDT and other chlorinated hydro-carbons is now well-known, with traces present in rainfall and soil, and in organisms ranging from songbirds to oceanic fish, from desert gazelle to Antarctic penquins. In many species, these residues appear to do no harm, in others - notably birds of prey - DDT has caused widespread population crashes and even local extinction....Although the wider environmental effects of DDT have been largely due to agricultural rather than public health uses of insecticides, indoor spraying of DDT may result in undesirable effects. Domestic livestock can become contaminated: in Guatemala the yolks of chicken eggs were found to have about 30 parts per million (ppm) of DDT, most, if not all , of which was being picked up inside sprayed houses. In 1970, in rural areas of Guatemala where DDT spraying for malaria control had been carried on for some 15 years, total DDT in human mothers' milk was found to be from 0.3 to 12.2 ppm. These figures suggest that Guatemala infants were drinking from the breast at least 15 and perhaps nearly 500 times more than the 'acceptable daily intake' of DDT established by the World Health Organization. Iranian samples of human milk, obtained from areas sprayed by malaria eradication teams, show DDT concentrations of 0.4 to 2.5 ppm, which is 18 to 50 times higher than the permitted level in cows' milk sold in the U.S. High levels of DDT in mothers' milk have also been reported from Papua New Guinea and Ghana. The effects of such high human exposure to DDT and other insecticides are not easy to assess. Recent evaluation of the risks to the general public suggests that excessive levels of DDT and other chlorinated hydrocarbons do affect the functions of the liver, could affect cholesterol levels, and might impair the normal development and functioning of the nervous system. Animal studies suggest that

such high milk levels as were found in Iran and Guatemala might be harmful to the normal growth and development of babies." UNEP 1978 Annual Review, supra note 4, at 10.

36. Government of Canada. Report of the Cross-Mission Task Force on Environmental Contaminants Legislation. Appendix A: Report of the Scientific Sub-Committee: Scientific and Technical Aspects of the Environmental Contaminants Problem. (Ottawa: Government of Canada, September 1972) at A9-A10.

37. Supra note 34, at 5,12 and Table 9.

38. International Joint Commission. Water Quality of the Upper Great Lakes. A report to the Governments of Canada and the United States. (Ottawa and Washington, D.C.: IJC, May 1979) at 54.

39. Environment Canada. Environmental Protection Service. Tobin Lake Study: Background Information (Regina, Saskatchewan: Environment Canada, February 17, 1981). See also Peter von Stackelberg, "Tests find mutations in lake animal life," The Regina Leader Post, February 18, 1981 at A3, col. 2.

40. Government of Canada Toxic Chemicals Report, supra note 2 at 62.

41. Id.; see also supra note 34, at Table 1.

42. Reid, Crowther and Partners. Hazardous Wastes in Northern and Western Canada: The Need for a Waste Management Strategy. Vol. 1. Prepared for Environment Canada and the governments of British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, the Yukon and Northwest Territories. (Calgary: Reid, Crowther, 1980) at 151.

43. "New plans for safe disposal of herbicide cans due soon," The Regina Leader Post, April 2, 1983 at , col. .

44. Environment Canada. Environmental Protection Service. Atlantic Region. A Review of Environmental Impacts Associated with Particular Foresty Practices in Eastern Canada. A brief presented to Newfoundland and Labrador Royal Commission on Forest Protection and Management. (Dartmouth, N.S.: Env.Canada, 1981) at 54-56.

45. See, e.g., United States Environmental Protection Agency. Office of Pesticide Programs. Summary of the IBT Program. (Washington, D.C.: USEPA, July 1983) at 1; R. Jeffrey Smith, "Creative Penmanship in Animal Testing Prompts FDA Controls, "Science Vol. 198 (23 December 1977) at 1227-1229; and Keith Schneider, "Faking It: The Case Against Industrial Bio-Test Laboratories," The Amicus Journal. Vol.4, No. 4 (New York City: NRDC, Spring 1983) at 14-26.

Many other countries also relied on toxicity tests performed by IBT to establish the safe use of pesticides. In addition, the World Health Organization used IBT data to recommend to member countries acceptable daily intake and exposure levels for various chemicals and pesticides. Health and Welfare Canada. News Release." Validity of Data on the Safety of Numberous Chemicals Being Investigated." (Ottawa: HWC, August 15, 1977) at 1.

46. United States Environmental Protection Agency. News Release. "Deficiencies in Pesticide Safety Tests Reported by EPA; Audit Requested." (Washington, D.C.: USEPA, August 25, 1977); Id., HWC 1977 Release, at 2; and Health and Welfare Canada. News Release "Pesticide Safety Being Reassessed." (Ottawa: HWC, June 23, 1980) at 1-2.

47. United States Environmental Protection Agency. News Release. "EPA Releases Report on IBT Lab Studies; Warns of Suspension Action." (Washington, D.C.: US EPA, July 11, 1983) at 1.

It has been suggested that the 212 pesticides represent 15 per cent of the pesticides on the market in the U.S. Philip Shabecoff, "E.P.A. Faults Tests on 200 Pesticides; Work by a Laboratory Involves Chemicals Now on Market," The New York Times, May 12, 1983 at A1, col. 6: and "The Scandal in Chemical Testing," The New York Times (Editorial), May 16, 1983 at 16, col. 1.

48. US EPA Summary on IBT, supra note 45, at 2 and Exhibit B.

49. Health and Welfare Canada. News Release. "Current Status of IBT Pesticides." (Ottawa: HWC, May 6, 1982) at 1. While the HWC audit has encompassed as many as 113 pesticides in Canada, earlier estimates of the total involved have fluctuated widely. See, e.g., Michael Keating, "Safety tests faked, but 79 pesticides left on market," The Globe and Mail, April 27, 1981 at 1, col. 1.

50. Health and Welfare Canada. News Release. "Current Status of IBT Pesticides." (Ottawa: HWC, November 2, 1982) at 1.

51. Kevin Cox, "Safety of chemicals queried 10 years after bogus tests," The Globe and Mail, June 30, 1983 at 1, col. 1. Suggestions by some members of the public that some or all of the pesticides tested by IBT be removed from the market pending retesting, have not been adopted by the federal government. The principal governmental concerns appear to be that unless conclusive evidence of hazards exists, " precipitous decisions...could lead to significant effects on the availability and cost of food as well as sharply disrupting the agricultural sector of our exonomy." HWC 1980 Release, supra note 46, at 3.

52. United States of America v. Joseph C. Calandra, et al. No. 81CR235 (June 22, 1981) [United States District Court (Northern District of Illinois-Eastern Division)]. Each of the defendants is charged with mail and wire fraud and submitting false documents to the U.S. government. Id.

53. Id. See also United States Department of Justice. United States Attorney Northern District of Illinois. Information Release. (Chicago, Illinois: June 22, 1981) at 1.

54. An "active ingredient" means "that ingredient of a control product to which the effects of the control product are attributed, including a synergist, but does not include a solvent, diluent, emulsifier or component that by itself is not primarily responsible for the control effect of the control product." Pest Control Products Regulations.C.R.C., 1978, c. 1253, s.2 as amended.

55. A "control product" means " any product, device, organism, substance or thing that is manufactured, represented, sold or used as a means for directly or indirectly controlling, preventing, destroying, mitigating, attracting or repelling any pest, and includes (a) any compound or substance that enhances or modifies or is intended to enhance or modify the physical or chemical characteristics of a control product to which it is added, and (b) any active ingredient used for the manufacture of a control product." Pest Control Products Act, R.S.C. 1970, c.P-10 s.2(1) as amended.

56. Interview with Wayne Ormrod, Director, Pesticides Division, Agriculture Canada (June 30, 1983, Ottawa). In June 1977 there were approximately 475 active ingredients and 3,500 formulated control products. Government of Canada. Pesticide Use and Control in Canada. Prepared for the Canadian Council of Resource and Environment Ministers Meeting of June 1-2, 1977 by Agriculture Canada, Fisheries and Environment Canada and Health and Welfare Canada. (Ottawa: Government of Canada, February 1978) at 13.

57. In many of the pesticides cases, relief is sought under a number of these causes of action. For example, trespass,nuisance, negligence and Rylands v. Fletcher are often pleaded together in cases involving damage from spray drift. Often the courts will find liability under one of these causes of action and decline to make a ruling as to the applicability of the other torts.

58. See Canadian Agricultural Chemicals Association. Pesticides: A Position Statement (Ottawa: CACA, undated) at 2 and supra note 9, for proposition that pesticides are poisonous and deliberately applied to the environment as such.

59. Allen M. Linden, Canadian Tort Law (Third ed., Toronto: Butterworths, 1982) at 537.

60. It is still unclear as to whether, standing alone, injuries to health are actionable under nuisance theory unless there is also interference with the use and enjoyment of land. Id.,at 539.

61. St. Helen's Smelting Co. v. Tipping (1865), 11 H.L. Cas. 642 at 650, 11 E.R.1483.

62. See, e.g. Sturges v. Bridgman. (1879), 11 Ch. D, 852 at 865.

63. See, e.g. Robinson v. Kilvert (1889), 41 Ch.D88 (CA.); Rattray v. Daniels (1959), 17 D.L.R. (2d) 134 (Alta. C.A.).

64. See Salmond on the Law of Torts, (14th ed. London: Sweet and Maxwell Ltd., 1965) at 89,94. See discussion in Linden, supra note 59, at 538, in which he does not make the distinction between material harm to land and personal inconvenience and annoyance. Instead he says courts generally balance the severity of harm caused against the utility of the defendant's conduct in all the circumstances.

65. Newman v. Conair Aviation Ltd. (1972), 33 D.L.R. (3d) 474 at 479 (B.C.S.C.).

66. Salmond on the Law of Torts, 16 ed. (1973) at 52 as cited in Bridges Brothers Ltd. v. Forest Protection Ltd. (1976) 14 N.B.R. (2d) 91, 72 D.L.R. (3d) 335 at 358.

67. Id.

68. Supra note 65.

69. Id., at 479.

70. Id.

71. Id. See e.g. Russell Transport Ltd. v. Ontario Malleable Iron Co. Ltd. [1952]O.R. 621, [1952] 4 D.L.R. 719 (Ont.H.C.).

72. Supra note 66, at 360 (D.L.R.)

73. The defence of prescription refers to a right to pollute acquired by a defendant because he has caused a private nuisance to his neighbour's lands continuously for twenty years. The defence cannot be used with respect to a public nuisance. For a general discussion of the defence of prescription, as well as that of statutory authority, see John P.S. McLaren, "The Common Law Nuisance Actions and the Environmental Battle - Well-tempered Swords or Broken Reeds?" (1972), 10 Osgoode Hall Law Journal 505 at 543-547.

74. Acquiescence involves overt consent to or active encouragement of the defendant's activity. See Linden, supra note 59, at 555.

75. See Salmond on Torts (12th ed.) at 51 and 52 and see Schenck et al. v. Her Majesty the Queen in Right of Ontario (1981), 34 O.R. (2d) 595.

76. Linden, Supra note 59 at 552. See, e.g. Manchester Corp. v. Farnworth, [1930] A.C. 171, [1929] All E.R. Rep. 90, 99 L.J.K.B. 83.

77. R.S.N.B. 1952, c.93.

78. Supra, note 66, at 362-363.

79. (1978), 22 N.B.R. (2d) 147.

80. Id. et 162 - 164. The Order-in-Council also provided that the province would indemnify Forest Protection Limited "with respect to claims for damages for injury to the health of any person directly caused by the application of chemical insecticides used for killing spruce budworms in the spray program for 1976". Id., at 164.

81. Id. at 168.

82. R.S.N.B. 1978, c.24.

83. Id. s. 3 (1.3).

84. Supra note 59, at 89.

85. Id. at 90.

86. A federal government agency has noted that, "The benefits derived from the use of pesticides, although great, are now being increasingly weighed against the unexpected and often adverse effect. Destruction of water fowl populations due to mercurial seed treatments and DDT and the side effects on farm workers and rural populations of aerial applications of chemicals are two well documented examples. Perhaps even more important, though, is the fact that the long term and possibly synergistic effects of exposure to chemicals are virtually unknown with the evidence of adverse effects becoming visible only after many years". Supra note 12, at 25.

87. In seeking a 'quia timet' injunction, while the plaintiff does not have to wait until actual damage occurs, he must show a strong case of probability that the apprehended mischief will, in fact, arise. Attorney General v. Corporation of Manchester, [1893] 2 Ch. 87 at 92.

88. The legal causes of action on which relief was claimed were private nuisance; trespass to land; the rule in Rylands v. Fletcher; the right of landowners to groundwater free of chemical contamination; and breach of the Fisheries Act, R.S.C. 1970, C.F-14

89. Victoria Palmer et al. v. Stora Kopparbergs Bergslags Aktiebolag (Unreported decision of the S.C.N.S.T.D., Nunn, J., September 15, 1983).

90. Cape Breton Landowners v. Stora Kopparbergs Bergslags Aktiebolag (1982) 11 C.E.L.R. 141 (Supreme Court of Nova Scotia (Trial Division)).

91. Id. at 145 The Court summarized the evidence of the plaintiffs as to the adverse health impacts of the herbicides. This included evidence that there was no threshhold below which TCDD will have no effect; that persons living in and around spray blocks will be exposed to and affected by the herbicides and that 2,4,5-T had been suspended for forest use by the U.S. Environmental Protection Agency in 1979 and has been severely restricted in Ontario, Saskatchewan and British Columbia. It then noted that many of the propositions were not disputed by the defendant's experts, although they questioned the validity and relevance of the epidemiological and laboratory studies used by the plaintiff's technical witnesses. The defendant also disputed the plaintiff's

evidence as to the persistence of 2,3,7,8-TCDD in the forest environment, as to its ability to migrate in soil, its solubility in water and the risk that spray will drift is used properly. It was emphatically denied that forest use poses any threat to human or animal life.

92. Supra note 90, at 148.

93. See American Cyanamid Co. v. Ethicon Ltd., [1975] 1 All E.R. 504.

94. See Carlton Realty Co. Ltd. et al. v. Maple Leaf Mills Ltd. et al. (1978), 220.R. (2d) 198; Yule Inc. v. Atlantic Pizza Delight Franchise (1968) Ltd. et al. (1977), 17 O.R. (2d. 505. See discussion in Brian MacLeod Rogers and George W. Hately, Q.C., "Getting the Pre-Trial Injunction", (1982), 60 Canadian Bar Rev. 1.

95. Supra note 89, at 148.

96. Id.

97. Id.

98. Id.

99. Id. at 149.

100. Id. See also Elizabeth May, "The Price of Concern", Probe Post April 1983 at 30; "Court decision to allow spraying called ruinous for losers". The Globe and Mail (Toronto), September 17, 1983 at 13, col. 1. The defendant is entitled to have a hearing to determine any damages it suffered as a result of the interim granting of the injunction on July 1982. The total amount owing may be as high as $500,000.00 See also Douglas Martin, "Canadian Judge Weighs Key Dioxin Case", The New York Times, June 28, 1983.

101. Supra note 89, at 158, 161, 163.

101a. Id.at 55. Dr. Susan Daum, on behalf of the plaintiffs, testified that the latency period with regard to the carcinogenicity of dioxin, is on the average 20 years and may extend to 40 even 50 years.

102. Id.at 168.

103. Id.at 35. (Dr. David Wulfman, Professor of Chemistry, University of Missouri).

104. Id.at 25. The three provinces are Ontario, British Columbia and Saskatchewan.

105. Id.at 115, 121, 122.

106. The New York Times, supra, note 100.

107. Supra note 90, at 143.

107a. Supra note 89, at 161.

107b. Id. at 162-163.

107c. Id.at 183. The Judge ordered costs even though he repeatedly stated that the public interest was involved. Id. at 164.

107d. Supra note 90, at 143.

108. See e.g. John Swaigen, "Environmental Law 1975-1980" (1980), 12 Ottawa L. Rev. 439 at 464-465; J.F. Castrilli "Control of Toxic Chemicals in Canada", (1982), 20 Osgoode Hall Law Journal 322 at 400; Michael F. Sheehan, "Importance of the Burden of Proof in Environmental Legislation", (1982) The Environmental Professional, Vol. 4 at 75. See also,

109. C.A. Wright and A.M. Linden, Canadian Tort Law (Seventh ed., Toronto: Butterworths, 1980) at 17-1.

110. Id.

111. Supra note 90, at 533. See, e.g. Hickey v. Electric Reduction Co. of Canada (1970), 21 D.L.R. (3d) 368 (Nfld. S.C.); Fillion v. New Brunswick International Paper Co. [1934] 3 D.L.R. 22 (N.B.C.A.) where standing to sue in nuisance was denied to fishermen whose livelihood was damaged by poisonous wastes discharged into bodies of water. The courts held the fishermen had suffered differently from the rest of the public only in degree. There was no particular or special injury to the plaintiff

112. Linden, Id. See also Estey, "Public Nuisance and Standing to Sue" (1972), 10 Osgoode Hall Law Journal 563.

It is interesting that in the Nova Scotia Herbicide case, supra, note 89 at 145-146, Mr. Justice Nunn rejected the defendant's argument that the class action for nuisance was not maintainable as it was public nuisance and could only be brought by or with the permission of the Attorney General. The Court held that the action was not a public nuisance as the allegations of serious health risk while relating to a group of persons, did not relate to the public at large. Further, Mr. Justice Nunn found that, even presuming it was a public nuisance, the allegation of serious health risk is always a matter of special damage to each and every plaintiff and therefore the plaintiffs could sue for public nuisance, in any event.

113. Supra note 109, at 17-2.

114. Brian Gory, "Chemical Spray Hits Race Track", The Globe and Mail (Toronto), August 15, 1983.

115. For example, The Law Reform Commission of British Columbia has recommended that "...any member of the public should have the status to bring proceedings in respect of an actual of apprehended violation of a public right, whether it be an infraction of a statute, a public body exceeding its power or a public nuisance, we do not believe that the right to bring such proceedings should remain within the Attorney General's exclusive jurisdiction". See Report on Civil Litigation in the Public Interest (Vancouver: B.C. Law Reform Commn., 1980) at 72.

116. (1868), L.R. 3 H.L. 330; 37 L.J. Ex. 161; affg. L.R.1 Ex. 265 (H.L.)

117. Supra note 59, at 518.

118. Supra note 116.

119. Supra note 90, at 511.

120. (1966), 55 W.W.R. 555, 57 D.L.R. (2d) 269 (Sask. Q.B.)

121. Id.at 272 (D.L.R.)

122. Id.

123. Id. at 273.

124. Id.

125. (1977), 76 D.L.R. (3d) 343, [1977] 2 W.W.R.481; rev'd on other grounds, 82 D.L.R. (3d) 190, 1978 1 W.W.R. 688.

126. Id. 1977 2 W.W.R. 481 at 483.

127. (1978), 90 D.L.R. (3d) 89 (Sask. Q.B.)

128. (1979), 20 A.R.606 (Alta. Q.B.)

129. Supra note 66, at 361 (D.L.R.)

130 Consent can be expressly or implicitly given. The latter is more difficult to determine. Linden, supra note 59 at 524, notes that there has been no movement toward the restriction of the consent defence to strict liability as there has been in the negligence area. He advocates that the person conducting non-natural activities should bear the losses caused unless there has been a clear waiver of legal rights.

131. Default of the plaintiff,recognized as a defence in Rylands v. Fletcher, is akin to the defence of contributory negligence. However, some courts have been reluctant to use contributory negligence as a defence in strict liability cases. Linden, supra note 59, at 524.

132. An Act of God was also recognized as a defence in Rylands v. Fletcher, but has been rarely applied. It will only refer to the extraordinary phenomena of nature which cannot be foreseen. Linden, supra note 59, at 525.

133. Only if the defendant can prove that the escape was caused by a third person's conscious act of volition will he be exempted from strict liability. Linden, supra note 59, at 526.

134. See supra notes 75-76 and accompanying text.

135. Supra note 59, at 519. This theory applying liability in cases involving ultra-hazardous activities is used in American jurisprudence. Restatement, Torts, Second s. 520.

136. Linden, Id. at 522.

137. See discussion and cases cited in Linden, Supra note 59, at 521, 522.

138. McClaren, supra note 73, at 537-539.

139. Id.at 539.

140. See, e.g. Entick v. Carrington (1765), 19 State Trials 1029 (C.P.) Wright and Linden, supra, note 109 at 2-50 to 2-57.

141. See discussion in Bridges Bros. case supra note 66. The defendant was successful in nuisance and negligence and was unsuccessful on the grounds of trespass and the rule in Rylands v. Fletcher.

142. Id.at 361 (D.L.R.)

143. Supra note 79, at 162.

144. Id.

144a. Salmond deals with the distinction between direct and consequential injuries. For example, he says that "to throw stones upon one's neighbour's premises is the wrong of trespass; to allow stones from a ruinous chimney to fall upon these premises is the wrong of nuisance." Salmond on The Law of Torts (12th ed.) at 160-161. Further, as already stated, damage need not be shown to establish liability for trespass. Therefore, the discussion in Bridges on the type of damage which occurred appears to be irrelevant.

145. See e.g. Statement of Claim in Kent v. Canadian National Railway Company and Reichhold Chemicals Limited, June 10, 1980, a case involving the spraying of 2,4-D and 2,4-DP on railway tracks. The herbicides were sprayed on the plaintiffs property allegedly causing health and property damages. The plaintiffs sued on the basis of the rule in Rylands v. Fletcher, negligence, nuisance, assault, battery and trespass of the person. The case was recently settled.

146. Supra note 59, at 38.

147. Id. at 39.

147a. Id. at 41.

148. Id. at 89 - 91 for discussion of causation.

149. Unreported decision of the County Court, Manitoba, November 12, 1979. See, (1982), Canadian Product Safety Guide, CCH Canadian Limited at 15,081 para. 25,051.

150. Unreported decision of the Manitoba Court of Appeal. October 16, 1980. See, (1982) Canadian Product Safety Guide, CCH Canadian Limited at 15,105 para. 25,082.

151. (1979), 20 A.R.606 (Alta, Q.B.).

152. Id. at 609.

153. [1961] Ex. C.R. 263.

154. Id.at 269-70. The defendant tried to rely on an agreement between the province of New Brunswick and the federal government to share the cost of the spray program which the defendant was authorized to undertake. The court held that there was no evidence to indicate that the spraying of the hatchery or the plaintiff's property had taken place with the knowledge and consent of the Canadian Ministry of Resources and Development.

155. Id. at 273-274.

156. Supra note 66, at 358 (D.L.R.).

157. The burden of proof is on the plaintiff to prove on the balance of probabilities that the defendant's actions were the cause of the damage suffered. Foreseeability of damages refers to the extend of liability. See Linden, supra note 59, at 339-40.

158. Id. at 575-576. For early Canadian cases proceeding Donoghue v. Stevenson, [1932] A.C. 562, see Ross v. Dunstall (1921), 62 S.C.R. 393, 63 D.L.R. 63 and Buckley v. Mott (1920), 50 D.L.R. 408 (N.S.).

159. Id.at 602.

160. See e.g. Lambert et al. v. Lastoplex Chemicals Co. Ltd. et al. (1971), 25 D.L.R. (3d) 121; [1972] S.C.R. 568 (S.C.C.).

161. Id.at 125 (D.L.R.).

162. (1958), 14 D.L.R. (2d) 297. (N.S.S.C.).

163. Id. at 315.

164. (1963), 41 D.L.R. (2d) 183, [1964] 1 O.R. 88.

165. Id. at 195-196 (D.L.R.).

166. (1977), 78 D.L.R. (3d) 289, [1977]6 W.W.R. 122 (Sask, Q.B.).

167. (1980), 110 D.L.R. (3d) 686 at 691 The plaintiff recovered only half of the damages originally granted at trial.

168. Unreported decision of the Ontario Supreme Court November 21, 1980. See (1982), Canadian Product Safety Guide at 15,107 para. 25,084.

169. Id.

170. (1976), 68 D.L.R. (3d) 127 (P.E.I.S.C.).

171. Id.at 137.

172. Id. at 157.

173. Id.

174. See discussion in Jack Morrison, "Pesticide Poisoning: Issues in Personal Injury Liability," (1982), 47 Sask. L.R. 97 at 104-106.

175. Id. at 106. Morrison suggests that the federal government "may be held liable where it discovered that certain pesticides licensed for use in Canada were approved on the basis of faulty testing, and where it failed to take them off the market until properly tested and this resulted in injury to persons exposed to them" i.e. the IBT situation.

176. Id.at 107.

177. See e.g. David A. Thomson, "Agent Orange Litigation", Trial December 1980 at 17.

178. Id.

179. Id. See also, "Joseph R. Tybor, "Agent Orange: A Red Alert," The National Law Journal Vol. 3 No. 5, Monday, October 13, 1980 at 33.

180. See Lindsey How-Downing, "The Agent Orange Litigation: Should Federal Common Law Have Been Applied," (1983), 10 Ecology Law Quarterly 611.

180a. The five companies are Dow Chemical, Thompson Hayward Company, Uniroyal Inc., Diamond Shamrock Corporation and the Monsanto Company.

180b. Michael Winerip. "U.S. Judge Clears Way for Trial on Agent Orange," The New York Times, May 13, 1983.

181. Victor Yannacone Jr., a co-founder of the Environmental Defense Fund, was earlier involved in getting DDT banned in the United States. Taylor, supra, note 179 at 32.

182. Supra note 177.

183. Id. at 17.

184. Id.

185. Martin, supra, note 100.

186. The social welfare goal of tort law, (compensating injured consumers); ensuring that manufacturers stand behind their products; deterrance (ie. encouraging safety measures) are among the justifications for imposing strict liability; supra note 51, at 600-601.

187. Id. at 600.

188. Id. Linden advocates changes to existing Canadian products liability law to relieve injured consumers from the onerous burden of proving fault and to require manufacturers to stand behind their defective products, whether negligently produced or not.

189. R.S.N.S. 1954, c.256.

190. Supra note 162, at 318.

191. Id. at 322. The court held that in tort "the test is not what was contemplated as the probable consequences of the breach, but (once culpability is established) whether the damages are the direct consequences of the breach."

192. R.S.P.E.I. 1951, c.144.

193. Supra note 170, at 149.

194. Supra note 59, at 571-574.

195. (1963), 41 D.L.R. (2d) 183.

196. Id. at 188, 195.

197. See e.g. McConnell v. Jarolim et al. (unreported decision of the New Brunswick Queens Bench, June 8, 1982), (1982), Canadian Product Safety Guide, CCH Canadian Limited at 15,153 para. 25,140.

198. See Limitations Act R.S.O. 1980, c. 240, s.45 (1) (g).

199. See, e.g. Cartledge v. E. Jopling & Sons Ltd., 1963 A.C. 758, [1963] 1 All E.R. 341 (H.L.); Archer v. Catton and Co. 1954 1 All E.R. 896; and Robert Simpson Co. Ltd. v. Foundation Co. of Canada Ltd. (1982) , 36 O.R. (2d) 97 (Ont.C.A.) Mr. Justice Cory in Simpson stated that: "in the case of a personal injury not arising out of a contractual relationship, the cause of action arises when the injured party suffers the damage. This is so even though the plaintiff was not and could not reasonably have been expected to be aware that he had suffered such damages... once again the harshness of the decision has been recognized, but only an amendment to the Limitations Act can ameliorate the situation." Id. at 108.

200. See Ontario Ministry of the Attorney General. Discussion Paper on Proposed Limitations Act (Toronto: Government of Ontario, 1977) for recommendation that the limitation period in personal injury actions should not run until the plaintiff has discovered or ought to have discovered the damage.

201. The five private member's bills introduced to date are: The Environmental Bill of Rights, 1979 (Bill 22, 19th Leg. Alta., 1st Sess.). Introduced by Mr. Clark, Lib. Leader of the Opposition; The Ontario Environmental Rights Act,1979 (Bill 185, 31st Leg. Ont., 3rd Sess.). Introduced by Mr. Smith, Lib. Leader of the Opposition; The Environmental Magna Carta Act, 1980 (Bill 91, 31st Leg. Ont., 4th Sess.). Introduced by Ms. Bryden, NDP Environment Critic; The Environmental Magna Carta Act, 1981 (Bill 23, 19th Leg. Sask., 4th Sess.). Introduced by Mrs. Duncan, PC Environment Critic; and Ontario Environmental Rights Act, 1982 (Bill 96, 32nd Leg. Ont., 2nd Sess.). Introduced by Mr. Elston, Lib. Environment Critic.

202. See Infra Part _____ .

203. Constitution Act, 1867, s. 95. Commentators have noted that: "Parliament's jurisdiction over agriculture could justify legislation relating... to pollution by agricultural operators [such as] use of weed killers and pesticides that damage adjoining property or kill wild life..." Dale Gibson, "Constitutional Jurisdiction over Environmental Management in Canada," (1973),23 University of Toronto Law Journal 54 at 80.

204. Id., s. 91(27).

205. Id., preamble to s. 91.

206. Id., s. 91(2).

207. See, e.g., seacoast and inland fisheries (s. 91(12)); inter-provincial works and undertakings (s. 92(10)(a); and works declared by Parliament to be for the general advantage of Canada (s. 92(10)(c)).

208. Supra note 203, s. 95.

209. Id., s. 92(5).

210. Id., s. 92(13).

211. Id., S. 92(16).

212. Id., s. 92(10).

213. Id., s. 92(8).

214. Id., s. 92(15).

215. See, e.g. Pest Control Products Act, R.S.C. 1970, c. P-10, as am.

216. See, e.g. The Pesticides Act, R.S.O. 1980, c. 376, as am. To the extent that there is overlap between federal and provincial legislation with respect to control of use, for example, a long line of decided cases indicate that as long as compliance with provincial law does not result in violation of federal law, both may stand. See, e.g., Provincial Secretary of P.E.I. v. Egan [1941] S.C.R. 396 (S.C.C.); Mann v. The Queen [1966] S.C.R. 238 (S.C.C.); Ross v. Registrar of Motor Vehicles [1975] S.C.R. 5 (S.C.C.); and Multiple Access Ltd. v. McCutcheon [1982], 138 DLR (3d) (S.C.C.). Therefore, the provinces will usually be able to set more stringent requirements within their legislative competence.

217. Supra note 215.

218. (1978), 7 C.E.L.R. 93 (N.B.S.C.Q.B.).

219. FPL sought both certiorari and prohibition of thirty informations laid under two federal statutes by private citizens in New Brunswick. In its application FPL contended that s. 3(1) of the PCPA was ultra vires the Parliament of Canada insofar as it was legislation relating to the use of a control product in the management of public lands, timber, wood and other property in New Brunswick. FPL also alleged that the PCPA was ultra vires Parliament insofar as it authorized the federal cabinet to make regulations relating to the regulation or prohibition of the use of a control product in the management of public lands, timber and wood and other property in New Brunswick. Id. at 96(C.E.L.R.).

220. Id. at 106(C.E.L.R.). On appeal to the New Brunswick Court of Appeal, FPL obtained relief from prosecution under the PCPA on the basis that the Act did not bind the Crown in right of the province.
The Act has since been amended to bind both the federal and provincial Crown. S.C. 1980-81, c. 88, s. 1.

221. Supra note 203, at 87.

222. Constitutional authority for federal legislative control of the disposal of toxic chemicals and hazardous wastes has been the subject of heated debate in Canada. The arguments for and against this authority have been set out in J.F. Castrilli; "Control of Toxic Chemicals in Canada: An Analysis of Law and Policy," (1982), 20 Osgoode Hall L.J. 322 at 357-359; and J.F. Castrilli, Hazardous Waste Management in Canada: The Legal and Regulatory Response (Toronto:CELRF, 1982) at 86-93.

223. Supra notes 42-43 and accompanying text. A 1981 survey of pesticide use practices in a small agricultural watershed in New Brunswick concluded that while the "Pest Control Products Act requires individual applicators such as farmers to follow proper disposal practices through instructions on the container label...from the few containers visible at public waste disposal sites, and the many at private locations, it was obvious that this procedure was not being followed. Improper container disposal can be a risk to ground or surface water systems... Most of the [pesticide] mixing sites...had carelessly discarded containers present. Empty fungicide bags were often submerged in the streams, metal containers were sometimes partially in the water and others had been discarded on the stream banks." Environment New Brunswick A Survey of Pesticide Use Practices in a Small Agricultural Watershed of New Brunswick. (Fredericton, N.B.:ENB, February 1982) at 7.

In the United States it has been estimated that approximately 3.9 million pounds of pesticides a year might be contained in

unrinsed and discarded pesticide pails, drums and bags. Kenneth S. Kamlet. Toxic Substances Programs in U.S. States and Territories: How Well do they Work? (Washington, D.C.:National Wildlife Federation, 1979) at 11.

224. R.S.C. 1970, c. P-10, as am.

225. R.S.C. 1970, c. F-27, as am.

226. S.C. 1974-75-76, c. 72.

227. R.S.C. 1970, c. F-14 (1st. Supp.) as am.

228. The four federal departments are Agriculture Canada (PCPA); Health and Welfare Canada (FDA); Environment Canada (ECA and the anti-pollution provisions of the FA); and Fisheries and Oceans Canada (FA).

229. Agricultural Economic Poisons Act, S.C. 1927, c. . This Act was superceded by the Pest Control Products Act, S.C. 1939, c. 21.

230. Id. See also Thomas Curren, Science and Technology Division, Research Branch, Library of Parliament. Evaluation and Regulation of Pesticides in Canada. (Ottawa:Library of Parliament, September 1980) at 5.

231. S.C. 1939, c. 21.

232. Hon. H. A. Olson, Min. of Agriculture, during second reading debate on Bill C-157, an Act to regulate products used for the control of pests and the organic functions of plants and animals, Can. H. of C. Deb. January 14, 1969, at 4275. The 1939 Act was seen to be limited to regulating the product itself as to composition, packaging and labelling. Id.

233. Id. at 4275.

234. "Inert ingredients" were seen to include "emulsifiers, stickers and stabilizers for use with pesticides..." Id.

235. Id.

236. Id.

237. Id.

238. A. P. Gleave (Saskatoon-Biggar) noted in part that: "...there are chemicals being used by farmers who, as a result of personal contact with them, have ended up in [the] hospital. This is not a general situation but... products have been sold which can cause rather serious sickness on the part of those who use them if they are careless or if they get down-wind of these products often enough." Can. H. of C. Deb. January 14, 1969, at 4278.

239. P.V. Noble (Grey-Simcoe) stated that: "Man is rapidly changing those once immutable features around him, the soil, atmosphere and water, even our seas and their complete production. The basic conflict is between the mounting need for food and fibre and the equally urgent need to preserve the quality of our environment. This is the perspective in which to view the continuing debate over the value and hazards of pesticides..." Id. at 4276.

A.P. Gleave argued that: "...chemicals have been released for use without sufficient consideration as to what they will do to the environment in which they are used... We must consider the actual application on the farm and the general effect of these chemicals on the general environment in terms of water, air and ground pollution... [A] great deal of this chemical does not simply disappear but becomes a permanent part of the environment into which it is released, whether it is the soil or the water." Id. at 4278-9.

240. G.W. Baldwin (Peace River) raised concerns about the cancer-causing potential of some pesticides by citing findings and conclusions from Rachel Carson's Silent Spring: "Human exposures to cancer-producing chemicals (including pesticides) are uncontrolled and they are multiple. An individual may have many different exposures to the same chemical... It is quite possible that no one of "these exposures alone would be sufficient to precipitate malignancy - yet any single supposedly 'safe dose' may be enough to tip the scales that are already loaded with other 'safe doses'." Id. at 4280-1.

P.V. Noble noted medical studies which had found concentrations of persistent pesticides, such as DDT and dieldrin, in humans: "Traces of pesticides were found in the tissues of stillborn and unborn babies. The greatest concentrations were found in the fat tissue, but the liver, kidney and brain also carried... residue." Id. at 4276.

241. Grace MacInnis (Vancouver-Kingsway) proposed that: "Before licences are given for the production and handling of these materials, producers and distributors applying for registration should be required to show proof of their effects and their controllability....[W]e must be careful that under this legislation we do not... permit the slow deterioration or adulteration of foods and of the atmosphere in our homes and cities... [T]here are dangers in...pesticides that perhaps we do not even suspect at present. We do not want to issue licences for slow murder by way of pesticides." Id. at 4282.

A.P. Gleave stated that: "If the Department of Agriculture is to control such chemicals the first thing they must know is

what those chemicals will do to individuals who use them and what they will do to the environment in which they are used." Id. at 4278.

Agriculture Department officials noted during standing committee debate on Bill C-157 that pre-registration testing is performed to ensure that a product will not create an environmental or health hazard. See e.g. testimony of C.H. Jefferson, Director, Plant Products Division, Department of Agriculture. Can. H. of C. Standing Comm. on Agriculture, Proceedings, No. 14 (January 28, 1969) at 439-40.

242. A. P. Gleave argued that: "There are other ways of controlling insects besides dousing them with chemicals. It has been established that insects can be controlled in many cases by biological methods without using chemicals. This alternative method has not been given sufficient attention, and sufficient money has not been spent to develop this method of controlling insects. We continue to douse them with chemicals." Id. at 4279.

243. Testimony of J. Chevalier, Executive Secretary, Canadian Agricultural Chemicals Association and Canadian Manufacturers of Chemical Specialties Association, Can. H. of C. Standing Comm. on Agriculture, Proceedings, No. 16 (February 4, 1969) at 505.

244. Florian Cote, Parliamentary Secretary, Minister of Agriculture. Can. H. of C. Deb. May 14, 1969, at 8705. See now Pest Control Products Act R.S.C. 1970, c. P-10 as am., s. 5(d).

245. Hazen Argue, Sen. Deb., March 13, 1969, at 1199.

246. Olson, supra note 232, at 4275.

247. Bill C-157 received Royal Assent June 27, 1969. Other amendments dealt with authority to regulate manufacturing establishments with respect to control products intended for export or inter-provincial movement and related matters. Id. at 4275-76.

248. See now Pest Control Products Regulations. C.R.C. 1978, c. 1253, as am.

249. R.S.C. 1970, c. P-10, as am.

250. S. 2(2).

251. S. 3(1).

252. S. 4(1)(a)-(c).

253. S. 4(1) and Pest Control Products Regulations. C.R.C. 1978, c. 1253, as am. ss. 6, 9.

254. C.R.C. 1978, c. 1253 as am. s. 45.

255. Id. s. 26.

256. R.S.C. 1970, c. P-10, as am, ss. 7-8.

257. S. 9 (seizures and detentions).

258. S. 10 (prosecutions).

259. Exemptions of certain types of control products are authorized by the regulations. C.R.C. 1978, c.1253, as am. ss. 3,4,5.

260. R.S.C. 1970, c. P-10 as am., s. 4(1).

261. C.R.C. 1978, c. 1253, as am., s. 18(c).

262. Id., s. 18 (d)(i)(ii).

263. Id., s.9(1).

264. Id., s.9(2)(b)(i)(xi).

265. Id. s. 9(2)(b)(i)(ii).

266. The Pesticides Division of Agriculture Canada administers the Pest Control Products Act. Its Evaluation Section reviews data submitted in support of applications for registration of new products and new uses for previously registered products, obtains the comments of expert advisors, and establishes the status of products under the Act. Agriculture Canada. Pesticides Division. The Organization of the Pesticides Division. Trade Memorandum, T-1-201 (Ottawa: Agric. Cda., April 15, 1982) at 1.

267. See, e.g. H.W. Major, President, Canadian Agricultural Chemicals Association. "The Contribution of Industry to the Information Required for Registration." An address at the Canadian Council of Resource and Environment Ministers Pesticides Workshop. (Toronto: CCREM, March 1982) at 48-54.

268. Agriculture Canada. Pesticides Division. Registration Guidelines: Guidelines for Registering Pesticides and Other Control Products Under the Pest Control Products Act in Canada. (Ottawa: Agric. Cda., March 31, 1981).

269. Agriculture Canada. Pesticides Division. Data - Handling Procedures. Trade Memorandum. T-1-212. (Ottawa: Agric. Cda., September 8, 1980).

270. Id. at 1. Labelling requirements under the regulations classify control products into three classifications: (1) Domestic - where the control product is to be displayed and distributed for use in and around a dwelling; (2) Commercial - where the control product is to be displayed and distributed for general use in commercial activities (e.g. farming, commercial pest control etc); and (3) Restricted - where, because of the concern for the health of man or the safety of plants, animals or the environment, additional essential conditions

to be shown on the label respecting the display, distribution, use limitations or qualifications of persons who may use the control product, have been established. C.R.C. 1978, c. 1253 as am., s.27(2)(b).

271. This includes information on active ingredient specifications, product identity, analytical methods, physical and chemical properties. Supra note 269, at 1 (Attachment 1).

272. This includes data on acute oral, dermal, inhalation, skin and eye irritation tests on both technical materials and formulated products; short-term oral, dermal and inhalation tests on technical material; long-term or chronic toxicity feeding studies on rodents and possibly non-rodents; and special studies including reproduction, teratology, mutagenicity, carcinogenicity, neurotoxicity and exposure studies. Id. at 2-3 (Attachment 1).

273. Id. at 3 (Attachment 1).

274. This includes residue data on food crops including analytical methodology and animal metabolism studies. Id.

275. This includes physical-chemical degradation, metabolism, field dissipation, accumulation, storage, disposal and decontamination information. Id.

276. This includes information on toxicological effects on birds, mammals, aquatic organisms and non-target species such as predators, parasites and bees. Id. at 4 (Attachment 1).

277. Id.

278. Interview with Clare Franklin, Chief, Pesticides Division, Environmental Health Directorate, Health and Welfare Canada (June 28, 1983, Ottawa).

279. S.W. Ormrod , Director, Pesticides Division, Food Production and Inspection Branch, Agriculture Canada, "Perspectives on Pesticides Evaluation." An Address at the Canadian Council of Resource and Environment Ministers Workshop on Pesticides Use in Canada. Proceedings. (Ottawa: CCREM, 1982) at 71. See also Agriculture Canada. Pesticides Division. Product Specific Registration (PSR) Policy-Pesticides. Trade Memorandum. T-1- 232 (Ottawa: Agric. Cda., September 8, 1980) at 1.

280. Ormrod, id., at 71-72.

281. Id., at 72.

282. Canada Gazette. Supplement. Regulatory Agendas. (Ottawa: Gov't of Cda., May 28, 1983) at 69.

283. Ormrod, supra note 279, at 72-73.

284. Id., at 73.

285. Supra note 282, at 69.

286. See, for example, the United States Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), 7 U.S.C. ss. 136 (1978) s. 3(c)(1)(D). These latest amendments to this Act divide data into three categories under this section: (1) data submitted after September 30, 1978 in support of a registration application were granted a period of exclusive use for ten years from the date of registration; (2) data submitted after December 31, 1969 were protected by 15 years of compensated use from the date of submittal; and (3) data for which the use and compensation periods had expired were made available for unlimited use. There is no exemption for trade secret or proprietary data from the use and compensation provision. Where the parties cannot agree to a particular amount of compensation, the U. S. Environmental Protection Agency is authorized to fix a particular amount of reasonable compensation. These provisions have generally been upheld in the courts. See, for example, Chevron Chemical Co. v. Castle 641 F. id. 104 (3rd Cir. USCA 1981). However, a recent decision in Missouri, now under appeal, challenges the constitutionality of the section as a taking of private property contrary to the U.S. Constitution. See Monsanto Co. v. Acting Administrator, U.S. Environmental Protection Agency [United States District Court (Eastern District of Missouri-Eastern Division)] Unreported decision of Wangelin, J. April 19, 1983).

287. Ormrod, supra note 56.

288. Supra note 282, at 65.

289. Interview with Dr. Frank Cedar, Agriculture Canada by Clare M. McLellan, Research Officer, Law Reform Commission of Canada (April 21, 1983, Ottawa).

291. Id.

292. Government of Canada, Pesticide Use and Control in Canada. Revised for the Canadian Council of Resource and Environment Ministers Meeting of September 29, 30 and October 1, 1981 by Agriculture Canada, Environment Canada, Fisheries and Oceans Canada and Health and Welfare Canada. (Ottawa: Gov't of Cda., September 1981) at 5.

293. HWC interests include assessment of potential health hazards from occupational and bystander exposure and from residues in food resulting from proposed new uses and existing uses of pesticides. Id . at 22.

294. EC areas of concern in the pesticide review process include aquatic ecosystems wildlife, especially birds, other non-target biota, the efficacy of the pesticide in reducing the damage caused by economically important forest insects and diseases or in managing undesireable vegetation, the potential of the pesticide for contamination of the environment, and the adequacy of disposal instructions provided on the labels. Id. at 21.

295. FOC interests include the effects of pesticides on fish and other non-target aquatic organism and fish habitats. Id.

296. See, e.g. C.R.C. 1978, c. 1253 as am. s. 18.

297. Agriculture Canada and Health and Welfare Canada. Memorandum of Understanding Concerning the Regulatory Control of Agricultural Chemicals. (Ottawa: AC/HWC, December 1982). The memorandum notes that HWC has "broad responsibility for protection of the health of Canadians, and specific responsibility to act as the principal health advisor to other federal departments and agencies on all occupational and public health matters", and Agriculture Canada has "broad responsibilities concerning the promotion of a dependable food supply and an economically healthy agricultural industry." Id. at 1. The memorandum outlines the arrangements that have been made to "clarify the respective roles for control of the use of agricultural chemicals as required to maintain the essential balance of producer, processor, manufacturer and consumer interests." Id.

The memorandum sets out the administrative responsibilities of both departments to give full consideration and advice to the views of the other and notes that Agriculture Canada retains the "legal responsibility for registration of agricultural chemicals." Id. at 3.

298. Formal recognition of Health and Welfare Canada in the Act was proposed in 1980 but never acted upon. Background reasons for the proposal are suggested in the following letter from the HWC deputy minister to her Agriculture Canada counterpart: "Although from the federal perspective the present arrangements seem adequate, provincial health officials and the general public have presented alternate procedures for the registration of pesticides. They feel these new procedures would more adequately address health concerns than those presently employed. I believe that their concerns arise largely from the wording now used in the Pest Control Products Act. That is, groups outside the federal government do not see an active role within the present Act for the Department of National Health and Welfare. Perhaps such a misunderstanding could be eliminated if this Department was named in the Act at some time in the future, when Agriculture Canada presents to Cabinet proposed changes to the Pest Control Products Act. Such an action would make little change in the present working arrangements between the Department of National Health and Welfare and Agriculture Canada in the area of pesticide registration." Correspondence from Pamela A. McDougall, deputy minister, Health and Welfare Canada to Gaetan Lussier, deputy minister, Agriculture Canada (July 16, 1980, Ottawa).

299. See, e.g. Agriculture Canada and Environment Canada. Memorandum of Understanding Concerning the Regulation of Agricultural Chemicals. (Ottawa: AC/EC, December 1982)(Draft).

300. Canadian Council of Resource and Environment Ministers. Position on Registration and Use of Pesticides. Adopted by Council at its Annual Meeting on September 29, 1982. (Toronto: CCREM, November 1982) at 1.

301. As part of an inquest finding of preventable homicide in the pesticide poisoning of a British Columbia farm worker, a coroner's injury recommended that responsibility for registering pesticides should be transferred to Health and Welfare Canada and Environment Canada. Verdict, supra note 30, at 3.

302. The Canadian Environmental Advisory Council recommended to Environment Canada in 1981 the replacement of the current pesticide registration system and establishment of an "independent Pest Control Evaluation Commission with its own statutory authority to make and implement decisions." Hall, supra note 9, at 39.

303. A unit of the city of Toronto's public health department recommended in 1982 that "responsibility for pesticide registration be transferred to Environment Canada, with the Departments of Health and Welfare and Agriculture as consulting agencies." Reasons given for this proposal were: "Agriculture Canada's concern for short-term economic gain from the use of a pesticide rather than the potential long-term effects on health." Linda Rosenbaum and Doug Sanders. Health Advocacy Unit. Department of Public Health. City of Toronto. Submission on Captan to the Consultative Committee on IBT Pesticides. (Toronto: DPH, February 1982) at 20, 23.

304. The Canadian Environmental Law Association and Pollution Probe, two Toronto-based environmental groups have recommended that the Pest Control Products Act be jointly administered by Health and Welfare Canada and Environment Canada or by a Pest Control Evaluation Commission. Canadian Environmental Law Association and Pollution Probe. Captan: The Legacy of the IBT Affair. Submissions on Pesticide Law and Policy to the Consultative Committee on IBT Pesticides. (Toronto: CELA/Probe, February 1982) at 11, 12 and 29.

The West Coast Environmental Law Association, a Vancouver-based environmental group has recommended that the Act and registration of pest control products be transferred to Health and Welfare Canada and Environment Canada. West Coast Environmental Law Association. A Critique of the Pest Control Product Registration Procedure. Submission to the Consultative Committee on IBT Pesticides. (Vancouver: WCELA, March 1982) at 3.

305. The Mrak Commission appointed in 1969 by the United States Secretary of Health, Education and Welfare to investigate pesticide problems recommended that: "approval by the Secretaries of HEW and Interior as well as Agriculture... be required for all pesticide registrations." United States Department of Health, Education and Welfare. Secretary's Commission on Pesticides and Their Relationship to Environmental Health Report. Parts I and II (Washington, D.C.: HEW, 1969) at 7.

Commentators noted at the time that: "...the Secretaries of HEW and Interior (USDI) are given no statutory responsibility for determining what chemical pesticides will be registered for what uses. Their participation in the registration process is advisory only, pursuant to an Interagency Agreement entered into with the Secretary of Agriculture in 1964 and rewritten in March [1970]. Protestations by HEW of USDI that a chemical pesticide may present a hazard to human health or contaminate the environment cannot bar the registration of the chemical by the Secretary of Agriculture. In practice, during the last five years hundreds of pesticide products have been registered for use over the objections of HEW." William H. Rodgers, Jr. "The Persistent Problem of the Persistent Pesticides: A Lesson in Environmental Law" (1970), 70 Columbia Law Rev. 567 at 569-570.

With major amendments to the principal federal pesticides law, authority for pesticides registration and control in the U.S. was transferred to a new agency, the United States Environmental Protection Agency, in 1972.

306. "Caccia urges 'superagency' for pesticides". The Toronto Star, September 19, 1983 at , col. .

307. Agriculture Canada. Pesticides Division. Guidelines for Pesticide Toxicology Data Requirements. Registrants Memorandum. R-1-211. (Ottawa: Agric. Cda., October 30, 1981) at 1. These guidelines were developed by Health and Welfare Canada.

308. Acute toxicity studies define the dosage and range of a single or multiple administration of the pesticide within a 24-hour period or less which is lethal. These include dermal and eye irritation studies and where appropriate no-effect levels (NOEL). Id., at 2.

309. Short-term studies delineate the toxic potential of the pesticide through repeated administration for less than one-sixth of the lifespan of the test species. The data obtained are useful in elucidating such problems as possible cumulative action, variation in species sensitivity and in identifying specific of dosages for chronic studies. Id., at 2-3.

310. Long-term studies provide information on the maximum dosage level which produced no discernible injury to animals when administered over the major portion of the lifespan of the test animals and reveal effects which are not predictable from short-term toxicity studies. Id., at 3.

311. Special studies include tests for mutagenicity, teratogenicity, reproductive and exposure effects and related matters.

312. C.A. Franklin, Chief, Pesticides Division, Environmental Health Directorate, Health and Welfare Canada, "Outline of the Process of Data Evaluation for Registering a Pesticide." An Address at the Canadian Council of Resource and Environment Ministers Workshop on Pesticides Use in Canada. Proceedings. (Ottawa: CCREM, 1982) at 78.

313. Supra note 307, at 1.

314. Curren, supra note 230, at 21-24.

315. Saskatchewan Environmental Advisory Council. Annual Report 1977-78. (Regina: SEAC, 1978) at .

A similar problem was observed in the United States as early as 1974. One Congressional Investigation revealed that: "In registering new pesticides, [the United States Environmental Protection Agency] relied on manufacturers' test data on the pesticides' safety and effectiveness. Even for those pesticides, such as disinfectants and rodenticides, with histories of violations, EPA made only limited tests before registration". Under U.S. federal pesticide law, EPA "must determine whether the pesticide will perform its intended function without unreasonable effects on the environment". The investigative body recommended that to better ensure the U.S. public of pesticide safety, EPA "should test more pesticides that are being marketed and should test some pesticides before registration". United States General Accounting Office. Pesticides: Actions Needed to Protect the Consumer From Defective Products. A Report to Congress by the Comptroller General of the United States. B-133192. (Washington, D.C.: GAO, May 1974) at 2, 25 and 26.

316. Supra notes 45-53 and accompanying text.

317. Id. In 1969, for example, studies performed on the pesticide leptophos by IBT concluded that an examination of tissue from chickens fed leptophos "did not reveal any evidence of demyelination [nerve damage] in any of the chickens tested". The body of the report, however, included numerous descriptions of such neurotoxic systems as "no control of legs"; "very unsteady"; "cannot remain standing"; and "extreme staggering". [Industrial Bio-Test Laboratories, Inc. Report-Demyelination Study-Chickens. IBT No. J7162 to the Velsicol Chemical Corporation (July 29, 1969, Oakbrook, Illinois). Reported in United States Senate. The Environmental Protection Agency and the Regulation of Pesticides. Staff Report to the Subcomm. on Administrative Practice and Procedure of the Comm. on the Judiciary. 94th Cong., 2nd Sess. (Dec. 1976) at 36-37]. A 1974 U.S. EPA review of the same tissue slided found them "impossible to evaluate from the time they were prepared". [Id., at 37.] In 1975-76, workers at one chemical plant showed neurotoxic and related health problems as a result of exposure to leptophos which was being manufactured and packaged there. While leptophos was used only experimentally in the U.S., and is no longer in production there, it was exported to as many as fifty countries, including Canada, between 1971 and 1976. [Id., at 37-39 and 42].

318. Curren, supra note 230, at 22.

319. Canadian Agricultural Chemicals Association. Pesticides-Position Statement Update; After IBT: The Role and Reliability of Contract Testing. (Ottawa: CACA, April 1982) at 1.

320. Health and Welfare Canada and United States Food and Drug Administration. Memorandum of Understanding on Good Laboratory Practices. (Ottawa and Washington, D.C.: HWC/FDA, May 1979).

321. Health and Welfare Canada. Standard For Good Laboratory Practice in Non-Clinical Laboratory Studies. Draft. (Ottawa: HWC, undated).

322. Interview with Jean Riou, Health Protection Branch, Health and Welfare Canada (July 11, 1983, Ottawa).

323. Government of Canada, supra note 292, at 21-22.

324. Blagdon, supra note 2. See also Nuzrat Y. Khan, Pesticides Evaluation Officer, Fisheries and Oceans Canada. "Evaluation of Pesticides in the Department of Fisheries and Oceans." An Address at the Canadian Council of Resource and Environment Ministers Pestcides Workshops. (Toronto: CCREM, March 1982) at 102, respecting this problem and Departmental efforts to supplement such data as exists.

325. Hall, supra note 9, at vi, 20-21.

326. H.A. Hall. The Current Involvement of Environment Canada in Pesticide Related Matters. Prepared for the Toxic Chemicals Management Centre. (Ottawa: Env. Cda., March 1981) at 36.

327. Id., at 37-38.

328. Canadian Agricultural Chemicals Association. Commentary on Dr. Ross H. Hall's A New Approach to Pest Control In Canada. (Ottawa: CACA, May 1982) at 6-7.

329. Supra notes 26-27 and accompanying text.

Similar problems have been experienced in other jurisdictions. For example, in early 1980 in the U.S., high residues of aldicarb (Temik), a pesticide used to control potatoe beetles, were found in domestic water wells on Long Island, New York. As a result, at least 1,000 homeowners had their wells closed or contaminated to the extent that they were advised not to drink from them. The Long Island aquifer (underground water supply) had a high-water table and sandy soil. Had the particular solubility and use patterns of aldicarb been considered in this context, it would have been evident that there was a potential for ground-water contamination. It has been argued in light of this, and related examples, that consideration of groundwater potential be given when pesticides are being proposed for registration for particular crop uses. Currently, s. 3 of FIFRA is silent on groundwater contamination potential. Testimony of Jacqueline M. Warren, Attorney, on behalf of the Natural Resources Defense Council and the Environmental Defense Fund. Ground Water Quality and Quantity Issues. Hearing Before the Subcommittee on Department Operations, Research and Foreign Agriculture of the

House of Representatives Committee on Agriculture, 97th Cong., 1st Sess. (Washington, D.C., July 23, 1981) at 23-24. See also Richard Severs, "Story of 'Safe' Pesticide Ends as Classic Case of Misuse", The New York Times, March 4, 1980 at C1, Col. 8.

330. Supra note 300, at 5.

331. Supra notes 323-327, 329 and accompanying text.

The problem of inadequate or reduced attention to environmental testing in the registration process has also been observed in the United States. Recent commentary on pesticide assessment guidelines under U.S. federal pesticide regulations notes that: "The provisions of Part 158 [FIFRA regulations] express the new emphasis at [US] EPA ... to concentrate on the effects of pesticides on human health, assuming that if these toxins are safe for us, they will then be safe for the rest of our environment. This is a complete about-face from the original stated purpose of [US] EPA, to protect the whole environment both for its own sake and because we cannot survive safely or productively in a poisoned world. We ... urge that testing ... return to the broader scope ... In these [Part] 158 reductions in testing requirements, we are alarmed to find such narrowing of focus from the broad environmental protection for which [US] EPA was established. ... [The Agency] ... claim[s] to be concentrating on human exposure, in the belief that this will somehow protect everything else .... The fallacy here is primarily in the belief that man can protect his immediate surroundings though the total biosphere becomes depleted or poisoned ... "Shirley A. Briggs, Executive Director, Rachel Carson Council, Inc. Comments on [USEPA] Document OPP-30063 Pesticide Assessment Guidelines. (Chevy Chase, Md.: RCC, May 13, 1983) at 1 and 17.

332. C.R.C. 1978, c. 1253, as am., s. 18 (d)(ii).

333. Supra note 313 and accompanying text. Certainly, a considerable evidentiary burden is placed on the applicant to produce various required studies to support a registration application. See, e.g. C.R.C. 1978, c. 1253, as am., s. 9 (2) (a) (i) - (xi). Moreover, the Minister is authorized to determine, among other things, the "safety ... of the control product" from the information required to be submitted by the registration applicant. Id., s. 9(1).

334. It is often impossible to prove scientifically a causal link between specific chemicals and subsequent harm to health or the environment. The impact of the chemical may occur decades later or tens of miles away from the original release. It is even more difficult to prove future harm. Commentators have noted that:

> "Hazardous substance issues can often be characterized as situations in which there is some evidence of a risk of damage, but the likelihood of the risk culminating in damage, cannot be demonstrated with objective certainty. It is largely or entirely speculative".

Robert T. Franson and Alastair R. Lucas. Canadian Law and the Control of Exposure to Hazards. Background Study No. 39 (Ottawa: Science Council of Canada, October 1977) at 55-56.

The U.S. National Academy of Sciences has noted that: "... chronic exposure to a carcinogenic substance may not manifest itself as a noticeable increase in cancer mortality until many years after the substance is introduced into use." NAS, supra note 21, at 5.

Health and Welfare Canada has observed that: "The development of cancer in man usually follows a period of prolonged exposure and may, in fact, be manifested long after exposure stops. The long latent period in conjunction with the difficulty of establishing the carcingenicity of a chemical in man, could result in a potential carcinogen being in use for many years before its activity was recognized, if it was at all". Health and Welfare Canada. The Testing of Chemicals for Carcinogenicity, Mutagenicity and Teratogenicity. (Ottawa: HWC, 1975) at 2.

335. Ormrod, supra note 279, at 74. Mr. Ormrod argues that:

> "The potential risks for pesticides are easily identified. They centre on human and animal health and the environment. But pesticides provide benefits to human health in the form of higher-quality, more-abundant, more-affordable food for Canadians and those abroad. It seems certain that elimination of pesticides from our environment would sharply inhibit food and forest production and prices would rise.
>
> ... Canadian pesticide standards are as tough today or tougher than any other developed country ... how far ... can [we] afford to go as a country. Do we

> really need everything we ask for in safety data terms or can we take a more relaxed position on certain chemicals, say those for use in rural or remote areas where few if any people are around"?
>
> "[B]est-balanced decisions" ... includes consideration of all the divergent interests associated with each pesticide ... we must balance the pesticide's value in the control of the target pest against possible damage to beneficial insects...
>
> We also have to consider the proper balance between human health and environmental safety in the complete range of use situations ... [I]n a home and garden or urban setting ... health considerations are paramount.
>
> On the other hand, some commercial or restricted class chemicals may have an excellent environmental impact rating but may lack a full data package required to prove no potential human health hazard. Then we must ask ourselves how much proof do we need to permit such a chemical to be used in rural or remote areas ...
>
> Superimposed on these kinds of conflicts is the need to support agricultural, forestry and industrial production with useful chemicals".

Id., at 74-75.

Other Agriculture Canada officials note that after a Department officer has reviewed a registration application, "his individual assessment (a judgement) is combined with the comments received from his or her advisors and he or she makes the decision to register or not to register a product or use". Dr. Frank Cedar, Agriculture Canada. The Registration and Regulation of Pesticides in Canada. (Ottawa: Agric. Cda., undated) at 7.

336. C.R.C. 1978, c. 1253, as am., s. 18(d).

337. 7 U.S.C. ss. 136 (1978).

338. s. 3 (c)(5).

339. s.2(bb). The Act defines "unreasonable adverse effects on the environment" to mean "any unreasonable risk to man or the environment, taking into account the economic, social and environmental costs and benefits of the use of any pesticide". Id.

See also testimony of Steven D. Jellinek, Assistant Administrator for Pesticides and Toxic Substances. Extension of Federal Insecticide, Fungicide, and Rodenticide Act. Hearings on H.R. 7018 Before the Subcommittee on Department Investigations, Oversight, and Research of the House of Representatives Committee on Agriculture, 96th Cong., 2nd Sess. (Washington, D.C., April 15 and May 1, 1980) at 173 (s.(3)(c)(5) unconditional registration requires thorough Agency evaluation of all the risks of a pesticide's use, and an Agency determination that the benefits of use outweight the risks.

340. "Cost-benefit" analysis of a proposed government action, according to Treasury Board Canada, is a "systematic attempt to identify and measure in monetary terms all relevant social costs and benefits" of the action. Its "most obvious limitation" is the "difficulty of measuring ... social benefits". Treasury Board Canada. Administrative Policy Manual: Evaluation Methodologies. Chapter 490, Appendix E (Ottawa: Treas. Bd. Cda., December 1979) at 4-6.

"Risk-benefit" analysis compares the risks to life, limb or property of an activity being considered for regulation and balances them against the activity's general economic benefit. Id., at 10-12.

341. S.C. 1974-75-76, c. 72.

342. S.5.

343. Both statutes are silent regarding consideration of economic factors generally. The Ministers under both Acts are authorized to act on the basis of risks to humans or the environment alone without a comparison with benefits.

Ironically, there has been some movement in the United States to change FIFRA's definition of "unreasonable adverse effects on the environment" so as to distinguish between humans and the environment. A coalition of labour, consumer and environmental groups have drafted a Bill, soon to be introduced in the U.S. House of Representitives, that would retain the above test for pesticides that pose risks only to the environment. However, for pesticides that pose risks to humans, a new s.(3)(c)(5) would add a requirement that prior to registering a pesticide the US EPA must find that it will not endanger humans. This separate test for risks to humans is derived from the more stringent "will endanger" test under s.211 of the U.S. Clean Air Act as interpreted in Ethyl Corp. v. EPA, 541 F. 2d 1 (D.C. Cir. 1976). The "will endanger" test would allow US EPA

to act on the basis of risks alone without a strict comparison with benefits. National Coalition Against the Misuse of Pesticides. Executive Summary of the Harpers Ferry (Labor, Environmental, Consumer), Bill to Amend the Federal Pesticide Law (FIFRA). (Washington, D.C.: NCAMP, 1983) at 3, 5.

344. Ormrod, supra note 56.

345. CACA, supra note 319, at 4.

346. CACA, supra note 328, at 7.

347. Testimony of W.A. Neff, Asistant Technical Director, Canadian Chemical Producers' Association, Can. H. of C. Special Committee on Regulatory Reform, Proceedings (Oct. 14, 1980) at 18. CCPA argues that the federal government's Socio-Economic Impact Analysis Program (SEIA), infra, amounts to a "stated government policy ... that the likely benefits of all new social regulations outweigh the costs"; and that "all future regulations [are to] have a net benefit to society". Canadian Chemical Producers' Association. Position Paper: Cost-Benefit Considerations in the Development of Environmental Regulations. (Ottawa: CCPA, 1980) at 4.

348. Ormrod, supra note 279, at 75-76.

349. "Forward", (]983), 18 Canadian Farm Economics --. (Draft).

350. Ed Dunnett, "Regulation of pesticides and risk-benefit analysis: Can it help?", (1983), 18 Canadian Farm Economics 1. (Draft)

351. Id., at 3.

352. CCREM, supra note 300, at 1.

353. Id., at 6.

354. B.L. Smith, Food Directorate, Health Protection Branch, Health and Welfare Canada. "Global Overview of Legislation Aimed at Control of Contaminants and Pesticide Residues in Fats and Oils", (1982), 59 Journal of American Oil Chemists Society 901A, at 902A.

Other HWC officials have noted that: "... we must not delude ourselves into thinking that the current state of the art of quantitative risk assessment will permit its unqualified application in regulatory decision making. The quantification of human risk on the basis of the results of laboratory studies in animals should be approached with great caution. We must not lose sight of the fact that animal studies serve primarily as a qualitative surrogate for humans and that any attempts to quantify responses beyond the realm of biological certainty are open to serious question." I.C. Munro and D.R. Krewski. "Risk Assessment and Regulatory Decision Making", (1981), 19 Food and Cosmetics Toxicology Journal 549, at 558.

In the United States, the National Cancer Institute reported in 1979 to the Food and Drug Administration that: "... Although an attractive idea, quantitative risk assessment involving extrapolations from animal data is not yet sufficiently developed to be used as a primary basis for regulating human exposure to carcinogens. Although we are correct in concluding qualitatively that animal carcinogens are potential human carcinogens, quantitative extrapolations involve potentially large errors, some of which could under-estimate the actual human risk from exposure. Scientific knowledge is currently insufficient to lend precision to this process." See "NCI Draft Memorandum to FDA on Use of Animal Data in Cancer Risk Assessment," (1979), 8 Chemical Regulation Reporter 274, 275.

355. United States Senate and House of Representatives. Risk-Benefit Analysis in the Legislative Process: Summary of a Congress-Science Joint Forum. Prepared by the Congressional Research Service, Library of Congress for the House Subcommittee on Science, Research and Technology of the Committee on Science and Technology and the Senate Subcommittee on Science, Technology, and Space of the Committee on Commerce, Science and Transportation, 96th Cong., 2nd Sess. (March 1980) at 3 - 6.

Similar problems have been identified with respect to cost-benefit analysis. A 1980 Congressional committee concluded that these problems included:

(i) because it is easier to quantify the costs of regulation than its benefits, there has been a general tendency to overstate costs and understate benefits;

(ii) while it is usually easier to estimate costs than benefits, particularly in dollar terms, there are also many problems associated with cost quantification including: agency dependence on industry data that over-estimates compliance costs; failure to reduce cost estimates that might come from recognition of economies of scale; and failure to reduce cost estimates that come from industry's ability to learn over time to comply more effectively with controls;

(iii) the state of the art in quantifying benefits is primitive, as reflected in difficulties in determining how many lives will be saved; how much pain and suffering averted and risk of environmental harm reduced. There are also difficulties in applying dollar values to items that lack a market value (e.g. human life) or of adjusting cost-benefit estimates over the time during which they accrue; and

(iv) cost-benefit analysis is incapable of dealing with questions of equity, i.e. that costs and benefits are often borne by different groups of people within society.

United States House of Representatives. Cost-Benefit Analysis: Wonder Tool or Mirage. Report together with Minority View by the Subcommittee an Oversight and Investigations of the Committee on Interstate and Foreigh Commerce, 96th Cong. 2nd Sess. (Dec. 1980) at 1 - 36.

Discussions surrounding the controversies regarding these approaches can also be found in: William J. Nicholson, ed. Management of Assessed Risk for Carcinogens Vol. 363 (New York City: New York Academy of Sciences, 1981); and Wayne Biddle, "Agencies Debate Assessing Risks of Carcinogens, The New York Times, November 2, 1983 at 12, Col. 1.

356. See, e.g. Hall, supra note 326, at 35.

357. I.C. Munro, A.B. Morrison and L. Bradshaw, Health Protection Branch, Health and Welfare Canada, "Risk and the Government Process", in Risk: A Symposium on the Assessment and Perception of Risk to human Health in Canada: Proceedings. (Toronto: Royal Society of Canada/Science Council of Canada, October 1982) at 187.

358. CCREM, supra note 300, at 12.

359. Government of the United States. Regulatory Council. Regulation of Chemical Carcinogens. (Washington, D.C.: Gov't of the U.S., September 28, 1979) at 6.

The policy document in discussing the use of animal studies to determine whether a chemical substance may cause cancer requires that the following be regarded as precepts unless there is a substantial scientific or legal reason not to: a substance that causes cancer in animals, when tested under appropriate conditions, will be considered a potential human carcinogen; animal tests provide valid information even though the dosage administered to the animals may be higher than humans are likely to experience; animal test results are also relevant to human risks where exposure is by a different route; the occurence of benign tumours

in treated animals is an indication that the substance being tested may produce malignant tumours as well; if a substance has been shown to be carcinogenic under the conditions of a single properly designed and conducted test, it should be considered as posing a risk of cancer to humans; evidence that a chemical is a carcinogen is strengthened by test results indicating carcinogenicity under two or more tests or test conditions and this will be the case if non-carcinogenicity is shown under the same circumstances; and where there are conflicting results from more than one properly designed and conducted test, results failing to demonstrate a carcinogenic response do not detract from the validity of results showing such a response if different species of animals were tested, and they do not detract from such results if the same species were tested. Id., at 6 - 7.

See also Consumer Product Safety Commission, Environmental Protection Agency, Food and Drug Administration and Department of Agriculture Food Safety and Quality Service, "Scientific Bases for Identification of Potential Carcinogens and Estimation of Risks", 44 Federal Register 39858 (July 6, 1979) at 39862 - 39869.

In 1980, an eighteen agency committee in the U.S. that included the above agencies concluded that "established (animal) test protocols, which include administration of high test doses, sometimes by a route different than the expected human exposure route, are appropriate and scientifically valid test methods for identifying carcinogens." United States Government. Toxic Substances Strategy Committee. Toxic Chemicals and Public Protection. A Report to the President. (Washington, D.C.: U.S. Gov't Printing Office, May 1980) at 131.

360. "Scientific Bases," id., at 39876. The Regulatory Council noted that: "Because there is no currently recognized method for determining a no-effect level for a carcinogen in an exposed population, substances identified as carcinogens will be considered capable of causing or contributing to the development of cancer even at the lowest doses of exposure." Id., at 10.

The TSSC concluded that: "methods do not now exist for determining a "safe" threshold level of exposure to carcinogens." Id., at 133.

361. Regulatory Council, supra note 359, at 11 - 12

362. Id., at 13 - 16.

363. United States House of Representatives. EPA Pesticide Regulatory Program Study. Hearing Before the Subcommittee on Department Operations, Research, and Foreign Agriculture of the Committee on Agriculture. 97th Cong., 2nd Sess. (December 17, 1982) at 87.

364. Id., at 238. The report also indicated that:

- USEPA is misusing the international Agency for Research on Cancer's classification system. This system attempts to categorize the adequacy of data to reach determinations regarding a chemical's carcinogenicity to laboratory animals or humans. USEPA is applying the IARC system as if the system's "limited evidence" category is comparable to "limited risk" or "low potential for induction of oncogenicity" in humans.

- USEPA has, in effect, adopted a newly proposed classification scheme as a scientific premise adequately documented and verified to guide regulatory actions. USEPA's cancer assessment group has proposed regulating carcinogens not shown to be genotoxic (i.e. causing gene alteration) by identification of a no observable effect level (NOEL) in conjunction with a safety factor of 1,000. This regulatory strategy would sanction a threshold level of exposure to oncogenic chemicals. The theory of cancer causation underlying this policy change is disputed within the scientific community.

- USEPA has decided that a statistically significant increase in benign tumours in a valid animal experiment is "insufficient evidence" of a chemical's potential to cause cancer; and appears to be seriously taking into account the oncogenic risk associated with proposed or existing uses of a pesticide only if it has caused malignant tumours.

- Negative mutagenicity findings are attributed significance when USEPA evaluates the potential hazards to humans from exposure to a pesticide shown to be oncogenic. Positive mutagenicity results, however, generally are not triggering regulatory action, though they do suggest the need for additional testing.

Id., at 87, 88, 249, 250.

365. Hall, supra note 326, at 35.

366. Health and Welfare Canada, supra note 354, at 334.

367. Munro, supra note 354, at 557. HWC officials have also noted that: "... there is generally insufficient scientific evidence at the moment to support the concept of a (no observable effect level) for a carcinogen. There are exceptions to this, specifically, the epigenetic carcinogens." Franklin, supra note 312, at 79

368. Supra note 363, at 248.

369. Id., at 247.

370. Other exemptions from registration authorized by the regulations include a control product used only in the manufacture of a registered control product; and a control product whose primary purpose is not for controlling pests, but is represented as having such properties or contains an active ingredient possessing such properties and is of a type listed in a schedule to the regulations. C.R.C. 1978, c. 1253, ss.5(a),(c),(i),(ii), as am.

371. Id., s. 5(b).

372. Id., s. 17.

373. Agriculture Canada. Pesticides Division. Control Product Research Programs. Registrants Memorandum. R-1-214. (Ottawa: Agric. Cda., January 7, 1983) at 1.

374. C.R.C. 1978, c. 1253, s. 5(b), as am.

375. Government of Canada, supra note 292, at 6.

376. Id.

377. Id.

378. Id.

379. Ormrod, supra note 56.

380. Id.

381. Franklin, supra note 278.

382. Id.

383. Ormrod, supra note 56.

384. This was a concern voiced by some pesticide officials at a 1979 meeting in New Brunswick. Canadian Association of Pesticide Control Officials (CAPCO). Report of the Thirteenth Meeting. (Fredericton, N.B.: CAPCO, November 15-16, 1979) at 9.

385. Agriculture Canada. Pesticides Division. Control Product Research Programs. Trade Memorandum. T-1-216. (Ottawa: Agric. Cda., November 10, 1982) at 11. (Draft).

386. Three definitions will be added to the regulations: (1) researcher; (2) research establishment; and (3) cooperator. A "researcher" will mean "any person employed by a research establishment who is responsible for making available for use, using or supervising the use of a control product for research purposes." A "research establishment" will mean "any public or private corporation or institution whose employees are engaged in research pertaining to control products." A "cooperator" will mean "any individual, corporation or institution who has agreed to use or allow the use of a control product for research purposes on a site owned or operated by that individual, corporation or institution." Supra note 373, at 1.

387. Section 5(b) of the current regulations will be repealed. A new section will exempt a control product from registration requirements if the Minister has issued a research permit and the control product is to be used only by a qualified researcher for research purposes. In addition, one of the following four circumstances must also apply: (a) the research will only take place on premises owned or operated by a research establishment and the total area treated will not exceed 100 hectares per calendar year for each control product being tested; or (b) the active ingredient in the control product to be tested is contained in a control product(s) registered for other uses; the cumulative total treatment will be no more than 25 hectares per calendar and no single plot to be treated will exceed 5 hectares in size; or (c) the active ingredient in the control product to be tested is contained in a control product(s) registered for other uses and the uses under research are consistent with labelling for the control product being tested except for pest claimed; or (d) the active ingredient in the control product to be tested is contained in a control product(s) registered for other uses; the control product is to be tested in combination with other active ingredients contained in registered control products as tank mixtures or in combination with fertilizers and the uses under research are consistent with the uses on labels of control products containing the active ingredients being tested. Id., at 1 - 2, proposed s.5.1(a) A-D.

388. Research permit applications can be for not more than three years and must include such information as will allow the Minister to determine the safety, merit and value of the research proposal. Id., at 2 - 3, proposed s.5.1.(b).

389. There are six different bases for refusing a research permit. The Minister may refuse a permit if in his opinion: (1) there is insufficient data available for the control product being tested to determine safety, merit or value of the proposed use; (2) some detrimental effects to man or the environment may occur as a result of the research permit; (3) the area proposed for treatment is excessive for the purposes of the research proposal; (4) the research proposal is for any purpose other than to expand the

scientific knowledge of the control product being tested; (5) a research permit is not required; or (6) the application for the research permit or the experimental label does not comply with the Act and regulations. Id., at 3, proposed s.5.1.(c).

390. The Minister is authorized to cancel a research permit if he has reason to believe that any permit condition, provision of the Act or regulations is not being complied with or that based on information available to him, the safety, merit or value of the control product for the intended research is no longer acceptable to him. Id., at 3, proposed s.5.1.(d).

391. Anyone who distributes a control product for research purposes must maintain a record of (1) all quantities of the control product used, sold or distributed by him for research purposes; (2) names and qualifications of the individual participants who will be supervising the experimental work; (3) names, addresses and phone numbers of all cooperators in the research program; (4) exact locations of all areas treated; (5) proximity to human habitation and bodies of potable water; and (6) objectives of the research program. Researchers are required to keep records for five years, results of the research done under the permit and make such information available to the Minister upon request. Id., at 4, proposed s.5.1.(e).

392. Research permit control products require labelling as directed by Agriculture Canada. Id., at 4, proposed s.5.1.(f).

393. Research permit control products cannot be sold or distributed except to a researcher or cooperator involved in the research program and such products can only be used at an application site in accordance with the research permit's terms and conditions or those of any exemption issued under s.5.1.(a). Id., at 4, proposed s.5.1.(g).

394. The only advertising permitted with respect to research permit control products is the posting of treated premises with information consistent with the labelling forthe control product being tested. Id., at 5, proposed s.5.1.(h).

395. Supra note 385, at 3.

396. Agriculture Canada notes that "not all registered pesticides are supported by a data package based upon present day standards." Those research permit applications involving new uses of older registered products therefore could expect submission of additional data to be necessary, such as: new food uses could require limited residue data if the crop will be used for consumption; new animal uses could require safety information and residues for the host animal or animal by-products; and new methods of application that significantly increase the potential for human exposure or environmental impact (e.g. aerial application) could require additional data. Id., at 3.

397. This category could, in addition to the information noted under category 1, also require: composition statements and safety data sheets for the formulation components; if a cooperator is involved or if the product is likely to come in contact with the general public, then toxicological data for the new formulation may be needed; and if the environmental impact is a concern, then some information on the possible effects on non-target species for the formulation components may be "advisable." Id., at 4.

398. Agriculture Canada notes that it is not possible to approve trials for such unknown materials without at least sufficient data to determine short-term occupational hazard and, "in some cases, environmental impact." Usually applications in this category will require further data depending upon the personnel involved and the scope of the research proposal. General requirements could include chemistry, metabolism, residues and toxicity data; environmental chemistry and environmental toxicology data if wider scale use in the environment is anticipated. Data requirements will also differ depending on whether the field trials are performed by (1) research personnel or (2) potential customers (e.g. farmers) who are not research personnel. In the former situation the health data package that would be required would include: acute studies; 90-day feeding studies (rats); mutagenicity studies and pharmaco-kinetics information. In the latter situation the health data package would also require additional dermal and inhalation studies. Id., at 4 - 7.

399. Agriculture Canada indicates that in fact "no attempt has been made to set specific guidelines limiting the area that may be treated under a research permit" due to a variety of crop situations involved. However, the Department states that for this approach to remain realistic the area allowed by a research permit must remain small relative to the total crop area (e.g. less than 10 per cent of the total area of any one farm.) The Department further notes that "requests for research on unreasonably large areas cannot legitimately be defended and must be refused." Id., at 7.

400. Permits for up to 3 years may be granted. However, they may be cancelled at any time if new information becomes available. Also annual reports regarding the previous year's results must be sent to the Department with failure to report being a ground for permit cancellation. Id., at 8.

401. The Department notes, for example, that "any attempt to use the research permit privilege for test marketing, for large-scale operational programs with an unregistered product to circumvent registration delays...may be considered in violation of the...Act and will not be tolerated." Id., at 9.

402. C.R.C. 1978, c. 1253, s. 17 as am. Terms and conditions may also be required under this section.

403. Ormrod, supra note 56.

404. Agriculture Canada, supra note 279, at 2.

405. Canadian Council of Resource and Environment Ministers. Minutes of Annual Meeting. (Toronto: CCREM, September 1982).

406. Id.

407. Correspondence form the Hon. Eugene F. Whelan, Federal Minister of Agriculture to the Hon J.E. Miller, Alberta Minister of Energy and Natural Resources (November 1, 1982, Ottawa).

408. Correspondence from the Hon. Monique Begin, Federal Minister of National Health and Welfare to the Hon. Neil Hardy, Chairman, Canadian Council of Resource and Environment Ministers (October 26, 1982, Ottawa).

409. This concern has been voiced in the U.S. as well where a Congressional investigating body concluded that: "(U.S.) EPA should discontinue the practice of (repeatedly) granting (registration) exemptions for non-emergency uses." United States General Accounting Office. Special Pesticide Registration By The Environmental Protection Agency Should Be Improved. A Report to Congress by the Comptroller General of the United States. CED-78-9. (Washington, D.C.: GAO, January 1978) at 34. This problem was found to be continuing 3 years later. GAO, supra note 3 at 31.

410. Willis, supra notes 170-173 and accompanying text.

411. FIFRA, supra note 286, s.3(c)(7) (conditional registration); s.5 (experimental use permit); s.18 (emergency registration); s.24(c) (special local needs registration).

412. Id., s.3(c)(5).

413. Supra note 363, at 115.

414. Id., at 83.

415. GAO (1978), supra note 409, at 36-37; GAO (1981), supra note 409, at 31-32, 34.

416. C.R.C. 1978, c.1253, ss.23-25, as am.

417. FIFRA, for example, requires a notice to the public of any application for a pesticide registration involving a new active ingredient or use. The notice provides for a 30-day comment period. FIFRA, s.3(c)(4). US EPA, however,is not required to disclose the data that support the registration application until 30 days after the decision to register has been made. FIFRA, s.3(c)(12). Under FIFRA, an applicant denied a registration has the right of appeal. This right is not extended to the general public when a registration is granted. FIFRA, s.3(c)(6); s.6.

U.S. environmental groups have pointed out the inconistencies in the statute's treatment of applicants as opposed to the general public. They have proposed amendments to the Act that would (1) require the data submitted in support of an application to be available at the time that public comment is sought - not 30 days after the comment period has ended; and (2) allow any member of the public to request an administrative hearing when the registration review process is completed. Testimony of Albert H. Meyerhoff and Jacqueline M. Warren, attorneys, Natural Resources Defence Council, on behalf of 16 other groups. Reauthorization of the Federal Insecticide, Fungicide and Rodenticide Act. Hearing Before the Subcommittee on Agricultural Research and General Legislation of the Senate Committee on Agriculture, Nutrition and Forestry, 98th Cong., 1st Sess. (Washington, D.C., May 24, 1983) at 12-13.

418. Daniel Green, La Societe pour vaincre la pollution, on behalf of Canadian Environmental Non-Governmental Organizations. "Reflections and Recommendations on Pesticide Management in Canada," in Canadian Environmental Advisory Council. Report of a Meeting Between the Public Interest Groups and the Canadian Environmental Advisory Council. Held May 26-27, 1980. Report No. 9 (Ottawa: CEAC, April 1981) at 71.

419. WCELA, supra note 304, at 5; and CELA, supra note 304, at 21-22.

420. CCREM, supra note 300, at 5.

421. C.R.C. 1978, c.1253, s.14, as am.

422. J. Taylor, Associate Director, Evaluation Section, Pesticides Division, Agriculture Canada, "Re-Evaluation Process of Registered Compounds." An Address at the Canadian Council of Resource and Environment Ministers Workshop on Pesticides Use in Canada. Proceedings. (Ottawa: CCREM, 1982) at 121.

423. C.R.C. 1978, c.1253, s.19, as am.

424. Blagdon, supra note 2.

425. Taylor, supra note 422.

426. Ormrod, supra note 56.

427. Taylor, supra note 422.

428. Environment Canada officials note that: "The generation of additional data on already registered pesticides is costly and registrants are often unwilling to assume this expense. Removal of these pesticides from the market can be impractical as agricultural or other pest control practices may be dependent on these products and the alternatives might be subject to similar data insufficiencies. Consequently, products may retain their registration despite incomplete data on environmental and human health hazards." Blagdon, supra note 2.

429. As noted above (supra note 349 and accompanying text), Agriculture Canada has, since 1980, been assessing the feasibility of applying risk-benefit analysis principles to pesticide regulation. As part of this process, Department researchers studied economic benefits of the widely used herbicide 2,4-D. The study findings included estimates that if 2,4-D and other phenoxy herbicides were prohibited, increased costs to the farmer in terms of using more expensive, less effective herbicides and reduced crop yields could be at least $66 million and potentially much higher, unless consumers bore more of the cost. The study concluded that the economic benefits of 2,4-D to agriculture are substantial. Ronald Krystynak, "An economic assessment of 2,4-D in Canada: The case of grain," 18 Canadian Farm Economics 5, at 25 (Draft). The study further noted that it was against these benefits that actual or potential risks must be assessed. Id.

It is interesting to note, however, that in other jurisdictions investigators have found that estimates of benefits in studies of this type may mislead agency decision-makers and the public. A 1980 G.A.O. report on pesticide benefits studies in the US EPA's RPAR process (discussed below) concluded that benefits analyses for two pesticides under review relied on "imprecise data and assumptions which are sbujective and not fully explained." However, these analyses presented their estimates as precise dollar amounts and did not (1) reflect data uncertainties; (2) that the estimates were sensitive to assumption changes; or (3) present the estimates in ranges of dollar amounts. As a result the G.A.O. concluded that "these estimates may mislead....decision-makers and the public... because they appear to be more precise than they actually are." United States General Accounting Office. Delays and Unresolved Issues Plague New Pesticide Protection Programs. A Report to Congress by the Comptroller General of the United States. CED-80-32. (Washington, D.C.: GAO, February 1980) at 44-49.

430. Where proposals have been made for the public to be provided the opportunity for a stronger role in the re-registration process for pesticides already on the market, government agencies have given only a low level of support to such recommendations. CCREM, supra note 300, at 5.

431. Taylor, supra note 422, at 121-122.

432. Id., at 125.

433. See, e.g. Agriculture Canada. Pesticides Division. Re-Evaluation of Products Containing 2,4-D, 2,4,5-T and Fenoprop. Registrants Memorandum. R-1-201 (Ottawa: Agric. Cda., August 29, 1980); Agriculture Canada. Pesticides Division. Re-Evaluation of Products Containing 2,4-D, 2,4,5-T and Fenoprop. Trade Memorandum. T-1-236 (Ottawa: Agric. Cda., April 30, 1982); and Agriculture Canada. Pesticides Division. Re-Evaluation of MCPA. Registrants Memorandum. R-1-212 (Ottawa: Agric. Cda., November 4, 1981).

434. Agriculture Canada documents note that the existing literature suggests that certain registered uses of chlorophenol products present "potential occupational, bystander, human and animal health hazards which have been ascribed to the dibenzodioxins, dibenzofurans and other by-products present in technical chlorophenols as micro-contaminants." As a result Agriculture Canada suspended the use of chlorophenols for certain wood preservation, agricultural, industrial and home and garden uses and related purposes. Agriculture Canada. Pesticides Division. Changes in the Regulatory Status of the Chlorophenols. Trade Memorandum. T-1-229 (Ottawa: Agric. Cds., November 28, 1980) at 1-2. The use suspensions for chlorophenols went into effect January 1, 1981. See also F. J. Cedar, Agriculture Canada. "Wood Preservation Issues." An Address at the Annual Meeting of the Canadian Institute of Timber Construction, St. John's Newfoundland. (Ottawa: Agric. Cda., May 28, 1981).

For further discussion of the legal effect of suspension as compared to cancellation or ban see infra notes 531-532 and accompanying text.

435. Agriculture Canada officials note that the fumigants under review now include soil fumigants and fumigants for pest control in buildings and in stored food products. The Department anticipates that when its review of the currently available data is completed "it will be found that none of the fumigants will be supported by data packages that will meet current registration requirements. In fact it appears that some of the data packages are very thin indeed. Certain of the fumigants have definitely been identified as problem compounds, e.g. ethylene dibromide." Taylor, supra note 422, at 123. See also Agriculture Canada. Pesticides Division. Re-Evaluation of Fumigants. Registrants Memorandum. R-1-204 (Ottawa: Agric. Cda., October 27, 1980).

On September 30, 1983, the US EPA suspended the use of ethylene dibromide (EDB) as a soil fumigant and also announced the intent to ban the pesticide as a grain fumigant. Federal researchers have indicated that it causes tumours and other serious defects in laboratory animals. State of Florida health officials describe EDB as a carcinogen. "Florida Bans 10 More Foods On Report of Pesticide Taint," The New York Times, December 30, 1983 at B12, Col. 1.

436. Taylor, id.

437. Ormrod, supra note 56.

438. Franklin, supra note 312, at 81.

439. Interview with Clare Franklin, Chief, Pesticides Division, Environmental Health Directorate, Health and Welfare Canada(June 28, 1983, Ottawa).

440. Dr. J. E. Brydon, Director, Contaminants Control Branch, Environmental Protection Service, Environment Canada. "Registration-Notification of Chemicals." An Address at the CELA-CELRF Roundtable Discussions on Toxic Chemicals Law and Policy in Canada. Proceedings.(Toronto: CELA/CELRF, June 1981) at Appendix F3. Dr. Brydon also noted that the retention of registration status until scientific evidence warrants a change "has become a problem for everyone concerned, because a number of people feel that the need to remove a registration is often delayed long past when it needs to be." Id., at 131.

Delays have also plagued US EPA's efforts since the early 1970's to re-evaluate the safety of 35,000 federally registered pesticide products in the United States. See e.g. United States General Accounting Office. Federal Pesticide Registration Program: Is It Protecting The Public And the Enviroment Adequately from Pesticide Hazards? A Report to the Congress by the Comptroller General of the United States. RED-76-42 (Washington, D.C.: GAO, December 1975) (statutory re-registration and re-evaluation requirements not being carried out in a timely and adequate manner); United States Senate. The Environmental Protection Agency and the Regulation of Pesticides. Staff Report to the Subcommittee on Administrative Practice and Procedure of the Committee on the Judiciary. 94th Cong., 2d Sess. (December 1976) (US EPA quite slow in getting re-registration underway; slow planning and long delays in drafting regulations and guidelines mandated by federal pesticides law responsible for keeping actual re-registration from becoming operational); and GAO, supra note 429 (late 1970's revised program to streamline re-registration process through standards development behind schedule).

441. John Scott, Agriculture Canada at CAPCO meeting, supra note 384, at 7.

442. Taylor, supra note 422, at 125.

443. Id., at 125-126.

444. United States Environmental Protection Agency. Office of Pesticides Programs. Registration Standards Program, (Washington, D.C.: US EPA, 1983) at 1.

445. Id.

446. United States Environmental Protection Agency. "Pesticide Chemical Active Ingredients; Proposed Registration Standards Ranking Scheme." 45 Federal Register 75488 (November 14, 1980) at 75488-75489.

447. Supra note 444. According to US EPA Registration Standards are developed in four phases (1) Data Call-In (where registrants are required to provide US EPA with needed long-term chronic toxicological studies prior to the initiation of registration standard review); (2) Data Gathering; (3) Data Evaluation; and (4) Development of Regulatory Position. Id., at 2-4.

448. Supra note 363, at 146.

449. GAO, supra note 429, at 11-18.

450. Supra note 363, at 146.

451. Natural Resources Defense Council and American Federation of Labour-Congress of Industrial Organizations v. United States Environmental Protection Agency and William D. Ruckelshaus, Administrator US EPA. Civ. Action No. 83-1509; Complaint for Injunctive and Declaratory Relief filed in United States District Court[(District of Columbia) (May 26, 1983, Washington, D.C.)] at 9-13.

The suit notes a number of pesticides that have been dealt with

through the decision conference process. For example:

> "Permethrin, a suspected carcinogen, has been widely used since 1977 under emergency use exemptions. When a full registration was sought, controversy erupted between several EPA scientists as to whether or not permethrin could cause cancer in humans. EPA then held numerous unannounced, closed meetings with industry representatives to discuss permethrin's potential carcinogenicity and to resolve differences between EPA and the industry concerning interpretation of several cancer studies that produced different estimates of human health risks. A "decision conference" with EPA and industry officials was held in January 1982 to assess the status of EPA's review. Despite serious controversy concerning permethrin's ability to cause cancer, EPA announced a proposed food residue tolerance for this pesticide in February 1982. A registration standard is still being developed by the Agency and industry."

Natural Resources Defense Council. News Release. "EPA Sued Over Chemical Company Links; Judicial 'Clean-up' Sought." (Washington, D.C.: NRDC, May 26, 1983) at 1-2.

452. Taylor, supra note 422, at 126.

453. Id.

454. Brydon, supra note 440, at Appendix F3.

455. FIFRA Regulations. 40 CFR Part 162 Subpart A (Registration, Reregistration and Classification Procedures) Section 162.11 (Criteria for determinations of unreasonable adverse effects). [hereinafter 40 CFR 162.11]

456. United States Environmental Protection Agency. "Pesticide Programs; Registration, Reregistration and Classification Procedures". 40 Federal Register 28242 (July 3, 1975) at 28253-28267.

457. The risk criteria categories include acute toxicity; chronic toxicity (oncogenic, mutagenic); other chronic effects (e.g. reproductive, birth defects, neurotoxicity etc.); significant reductions in non-target organisms or endangered species; or lack of emergency treatments or antidotes. 40 CFR 162.11(a)(3).

458. 40 CFR 162.11(a)(1).

459. 40 CFR 162.11 (a)(4).

460. 40 CFR 162.11 (a)(5).

461. 40 CFR 162.11 (b).

462. GAO, supra note 429, at ii.

463. Id., at 28.

464. NRDC v. EPA, supra note 451, at 9, 13-16. The plaintiffs allege that 60-70% of all pesticides now in use in the U.S. have not been fully tested in accordance with contemporary standards for their capacity to cause cancer; 90-93% have not been tested for their capacity to cause genetic mutations; and 60-70% have not been fully tested for their capacity to cause birth defects. Id., at 8.

465. Id. at 13. NRDC noted, for example, that:

> "In late 1980, EPA proposed to cancel or restrict numerous uses of pentachlorophenol, a widely-used pesticide and wood preservant found in homes throughout the United States. Pentachlorophenol and a number of other wood preservants, including creosote and inorganic arsenicals, are suspected of causing cancer, birth defects, and genetic disorders. EPA has since held a series of over ten meetings with chemical company representatives closed to members of the public. On March 30, 1983, EPA announced its proposed final determination on pentachlorophenol, substantially withdrawing from earlier proposed regulation. A single public meeting was announced in order to receive comment on this decision, which was issued on the letterhead stationary of the wood preservant industry."

NRDC News Release, supra note 451, at 2-3.

467. Id., at 16-17.

468. Supra note 363, at 280-281.

469. Id., at 280-282.

470. Id., at 144-145.

471. The GAO, in 1980, characterized RPAR as a "good concept" which can be made more effective. GAO, supra note 429, at 28.

472. Supra notes 45-53 and accompanying text.

473. Health and Welfare Canada. News Release. "Update on IBT Pesticides." (Ottawa: HWC, October 14, 1983) at 1.

474. Dr. T. Anstey, Senior Advisor, International Research and Development, Research Branch, Agriculture Canada, Can. H. of C. Standing Comm. on Agriculture, Proceedings, No. 13 (April 13, 1978) at A1.

475. Dr. A. B. Morrison, Assistant Deputy Minister, Health Protection Branch, Health and Welfare Canada, Can. H. of C. Standing Comm. on Health, Welfare and Social Affairs, Proceedings, No. 4 (July 2, 1980) at 28.

476. "U.S. Lab officials convicted of falsifying chemical tests, "The Globe and Mail, October 26, 1983, at 3, Col. 1.

477. Keating, supra note 49, at 1; Cox supra note 51, at 1. See also exchange between Simon de Jong, NDP Science Critic and Dr. A. B. Morrison, Health and Welfare Canada, supra note 475, at 11-12.

478. HWC 1980 Release, supra note 46, at 3.

479. For the percentage of IBT studies that were invalid with respect to cancer, birth defects, mutations and reproductive effects see supra note 48 and accompanying text.

480. C.R.C. 1978, c.1253, s.20, as am.

481. FIFRA, s.6.

482. GAO, supra note 429, at 54. The GAO noted that:

> "FIFRA does not allow EPA to withdraw a pesticide from the market solely because fraudulent or poor quality data was used to support its initial registration... EPA can require that registrants repeat a test but, in the interim, cannot take other regulatory action, such as suspending use. Some tests take up to 3 years to complete. During this time, the public and the environment can be exposed to potentially dangerous pesticides not supported by valid safety data."

Id.

483. 21 U.S.C. ss. 301-392 (1976).

484. Id. s.505.

485. GAO, supra note 429, at 57. US EPA, however, has not so amended FIFRA to date. Indeed, as late as July 1983 the Agency continued to argue that the option of removing IBT tested pesticides from the market pending re-testing was "not available under the current law which requires valid evidence of risk as opposed to a lack of information before removing a product from use." Supra note 47, at 2.

486. CELA/Probe, supra note 304, at 23-24.

487. See, e.g. HWC 1983 Release, supra note 473. HWC has issued five updates on the IBT situation between June 1980 and October 1983. The October 1983 release indicates that for 65 pesticides of the 113 under review, satisfactory alternate or replacement studies have been submitted for all invalid IBT studies. Thus, these chemicals "return to the normal evaluation procedures followed with all pesticides. New uses or extensions of use will be considered for these chemicals only when evaluation of all available safety data has been completed." Thirty-three other pesticides used in Canada are still of IBT concern because the replacement studies have not yet been received. To date 6 IBT pesticides have been recommended for cancellation. Id., 1-2.

488. Correspondence to Pesticide Registrants from the Hon. Eugene Whelan, Minister of Agriculture regarding regulatory status of IBT tested pesticides (November 4 and May 12, 1982; October 9, 1981, Ottawa).

489. Cox, supra note 51, at 9.

490. Health and Welfare Canada. News Release. "Current Recommendations on IBT Pesticides." (Ottawa: HWC, October 19, 1981) at 1.

491. Agriculture Canada. Press Release, "Pesticide Announcement." (Ottawa: Agric. Cda., January 5, 1982) at 1-2.

492. Id., at 2.

493. Agriculture Canada. Consultative Committee on Industrial Bio-Test Pesticides. Captan Report. (Ottawa: Agric. Cda., April 1982) at ix.

494. US EPA Summary on IBT, supra note 45, at Exhibit B.

495. HWC Release, supra note 50, at 2.

496. Agriculture Canada. Consultative Committee on IBT Pesticides. Facts on Captan. (Ottawa: Agric. Cda., January 1982) at 2.

497. Agriculture Canada. News Release. "Consultative Committee Formed." (Ottawa: Agric. Cda., May 20, 1981) at 1.

498. Id. Apart from the Committee's Captan report, however, the committee approach was not retained to review any other Health and Welfare Canada recommendations. See, e.g. correspondence to the Canadian Environmental Law Association (CELA) from the Hon. Eugene Whelan, Minister of Agriculture (August 3, 1982, Ottawa).

More recently, however, the minister has proposed the formation of a consultative committee to look at the question of public participation in the pesticide regulation process. Agriculture Canada. Press Release. "Public Participation in Pesticide Regulations." (Ottawa: Agric. Cda., December 5, 1983) at 1.

499. Supra note 497, at 2.

500. Because of the time constraints on the committee, all those groups who might have wished to make oral submissions were unable to do so at the three-days of scheduled hearings. Instead, the committee selected a representative number of respondents to make oral representations from each perspective on the captan issue. While this approach is understandable, it may have also resulted in key gaps in the record of the public hearing on major issues. These gaps may also have resulted in the committee coming to conclusions in its final report that were not warranted. For example, Dr. Donald Ecobichon, a committee member, noted during his questioning of Canadian Farmworkers Union representatives that: "...there is no good evidence for a teratological effect of captan." In response, Calvin Sandborn, counsel to the Union noted in part:

> "... a California rural legal assistance group is launching a suit in California on behalf of parents of a child that was born with deformed limbs and the essence of that suit is that they are alleging that that child's condition was caused by the mother's exposure to captan during pregnancy. The lawyer who is doing that suit...had volunteered to come to this hearing to talk about that case and also about his concerns about captan, but he was not invited to attend."

Consultative Comm. on IBT Pesticides, Proceedings, (March 10, 1982, Toronto, Ontario) at 131-132.

The committee in its final report, however, concluded that: "The weight of evidence to date, some of which is controversial, indicates that captan does not appear to pose a mutagenic or teratogenic risk to humans." Supra note 493, at 8.

501. Id., at 9.

502. Id.

503. Id., at 14.

504. Id., at 17.

505. Agriculture Canada. Press Release, "Captan Recommendations." (Ottawa: Agric. Cda., May 31, 1982) at 1-2; and correspondence to captan registrants from the Hon. Eugene Whelan, Minister of Agriculture (October 14, September 20 and July 21, 1982, Ottawa).

506. E. Dunnett, Marketing and Economics Branch, Agriculture Canada. The Economic Benefits of Captan Used in Canada. (Ottawa: Agric. Cda., March 1982) at 1-6.

507. The Minister of Agriculture, the Hon. Eugene Whelan, noted in his correspondence to captan registrants that the regulatory changes proposed for captan were in conjunction with "tolerance reductions proposed by Health and Welfare Canada." These revised tolerances indicate that as much as 5 ppm would be allowed on as many as eleven fruits and vegetables. Supra note 505.

508. Linda R. Pim, The Invisible Additives: Environmental Contaminants in Our Food. (Toronto: Doubleday, 1981) at 39.

509. CACA, supra note 319, at 2.

510. Id.

511. United States Environmental Protection Agency and United States Food and Drug Administration. Health Effects Data Quality Status Report. (Washington, D.C.: EPA/FDA, October 19, 1979).

Among the problems noted were:

- Biometrics, KG of Englewood Cliffs, New Jersey- "A federal grand jury indicted officers of the firm on charges of falsifying research reports. All studies presumed invalid unless audited and certified valid by sponsor," Id., at 3.

- Bio-Tox of Spencerville, Ohio -- "This firm was a wholly-owned subsidiary of Diamond Shamrock. ...the firm undertook several studies which have been rejected by [US EPA] on the basis of questions regarding the conduct of the studies. An audit of these and other studies performed by Bio-Tox has resulted in US EPA's position that studies performed by this firm are unacceptable for regulatory purposes unless audited and certified valid by the sponsor." (Emphasis in original) Id., at 5. The firm has since been sold by Diamond Shamrock. Id.

- Chemiehaus of Orlando, Florida - "All studies performed by this facility are considered to be invalid unless audited and certified valid by the sponsor. Case referred to the Department of Justice." Id., at 6-7.

- Gulf South Research Institute of New Iberia, Louisiana - "Serious deficiencies noted in bioassays done on contract for U.S. National Cancer Institute. These include improper feed mixing procedures, possible cross contamination of diets with other substances being tested concurrently in the same room...discrepancies between the raw data and final report; improper recording of

age of animals at death, questionable animal identification and record-keeping practices." Id., at 9-10.

- Harris Laboratory, Inc. of Lincoln, Nebraska- In the company's rat reproduction study "much raw data... were missing. Record-keeping was confusing and internally inconsistent...Rats listed as 'dead' were also listed as having been mated during the same time frame. Rats were listed as having died twice. Tumours and other adverse effects appear to have been under-reported." Id., at 10-11.

Other laboratories were also reviewed in this report. The agencies noted numerous instances of missing data which frequently precluded them from drawing conclusions about the adequacy of testing performed by the laboratories. Missing data was attributed, in some instances, to laboratory data destruction policies. Id.

See also Peter von Stackelberg, "Pesticide-testing U.S. laboratories suffer deficiencies, "The Leader Post, June 6, 1981, at A3, Col. 1.

512. Supra note 363, at 202.

513. Id., at 203.

514. Id.

515. Id., at 204.

516. Id.

517. Id., at 209.

518. Id.

519. Id.

520. Id.

521. Supra notes 320-322 and accompanying test.

522. CELA/Probe, supra note 304, at 15.

523. Pim, supra note 508, at 39.

524. United States Environmental Protection Agency and United States Food and Drug Administration. Memorandum Report on Inspection of IBT, Decatur, Ill. (Chicago, Ill.: EPA/FDA, 1978) at 22.

525. Id. See also Kevin Cox, "Rats ran wild, laboratory report says; Safety tests on chemicals falsified," The Globe and Mail, November 17, 1983 at 5, Col.1; and Bill Richards, "Papers from Trial of Former IBT Officers Raise Many Questions on Product Safety," The Wall Street Journal, May 13, 1983 at 31, Col. 3.

526. Supra, note 363, at 199. According to the Subcommittee report:

> "Several Agency scientists interviewed by Subcommittee staff lamented over the time and resources needed to detect and evaluate manifestations of pesticide toxicity which are not mentioned or properly analyzed in the studies submitted to the Agency. One current member of the Toxicological Branch says that, while he thought he had encountered 'every trick in the book' during his career evaluating chronic toxicity experiments and data, he has recently been amazed by new levels of 'ingenuity and cleverness' employed by some pesticide registrants. He expressed admiration for the capacity of registrants to advance new arguments minimizing the significance of negative experimental findings, and said that he and his colleagues can detect and pursue only a portion of the incomplete or inappropriate analyses submitted to the Agency."

Id., at 193.

527. Id. at 209.

528. Supra note 522 and accompanying text.

529. C.R.C. 1978, c.1253, s.20, as am.

530. Agriculture Canada Registration Guidelines, supra note 268, at 30. These essentially are the criteria found in ss.18-19 of the PCPA regulations.

531. C.R.C. 1978, c.1253, s.22 as am; Guidelines, id., at 31. For example, as noted above (supra note 434) certain uses of chlorophenols were suspended in January 1981. It is interesting to note, however, that Agriculture Canada's announcement on this matter, indicated that certain uses of chlorophenols had been "banned." Agriculture Canada. News Release. "Use of Chlorophenols Restricted." (Ottawa: Agric. Cda., January 6, 1981) at 1. Strictly speaking it was incorrect for the Department's news release to state that certain uses of chlorophenols were banned from that date on, because in fact the legal effect of a suspension is to allow retailors and users to use up their remaining stocks. A "ban" in the public mind would be more commonly associated with a "cancellation", the legal effect of which is that no one from registrant to retailor to ultimate use may use the product after that date.

532. C.R.C. 1978, c.1253, s.22 as am., and Guidelines, id., at 31.

533. C.R.C. 1978, c.1253, ss. 21, 23 as am.

534. C.R.C. 1978, c.1253, s.24 as am.

535. C.R.C. 1978, c.1253, s.25(1) as am.

536. C.R.C. 1978, c.1253, s.25(2)(a) as am.

537. C.R.C. 1978, c.1253, s.25(2)(b) as am.

538. C.R.C. 1978, c.1253, s.25(3) as am.

539. On a product basis very few are suspended or cancelled (50-60). Most actions are against uses (600-700). Ormrod, supra note 56.

540. Leptophos Review Board. Report to the Hon. Eugene Whelan, Minister of Agriculture. (Ottawa: LRB, May 2, 1977) at 1.

541. Id., at Appendix I. Correspondence to Dr. B. B. Migicovsky, Board Chairman and assistant deputy minister, Agriculture Canada from Dr. A. B. Morrison, assistant deputy minister, health protection branch, Health and Welfare Canada (April 27, 1977, Ottawa).

542. Supra note 317 and accompanying text.

543. Morrison, supra note 541.

544. Board Report, supra note 540, at 2-3 and Appendix II.

545. Id., at 1.

546. Id., at 6.

547. Ormrod, supra note 56.

548. Board Report, supra note 540, at 2.

549. Id., at 3 and Appendix II.

550. Id.

551. Id., at 3.

552. Id., at 3-5.

553. Id., at 5-6.

554. Agriculture Canada officials note however, that:

> "If the hazard is sufficiently acute, Agriculture Canada may cancel all uses of the pesticide immediately. Cancellation means that the pesticide cannot be sold in Canada by anyone, including

> retail outlets which may have the material on their store shelves...[T]his step is taken only if the concern warrants it. The safest way to dispose of a pesticide normally is to use it. If a pesticide is cancelled with large stocks in the marketplace, the problem of disposal often presents a risk greater than the health risk that causes the cancellation."

Cedar, supra note 335, at 9.

This view, however, was specifically rejected by the Leptophos Review Board, supra note 540, at 3. Dr. Morrison, in his correspondence to the Board, also noted Health and Welfare Canada's concerns about usage of remaining stocks as a disposal option for leptophos

> "The option of disposing of the current inventory of leptophos by allowing its usage is untenable. Workers handling this material in the field present a situation whereby control of exposure is variable and difficult, and accidents are possible."

Supra note 540, Appendix II at 2.

556. International Joint Commission. Committee on the Assessment of Human Health Effects of Great Lakes Water Quality. Annual Report. (Windsor, Ont.: IJC, November 1980) at 14.

557. OMAF, supra note 2, at 12, 15, 23.

558. Supra notes 416-420 and accompanying text.

559. C.R.C. 1978, c.1253, s.26(a)(b), as am.

560. R.S.C. 1970, c.P-10, s.6, as am.

561. Id., s. 7(1)(a).

562. Id., s. 7(1)(b).

563. Id., s. 7(1)(c).

564. Id., s. 9(1)(2).

565. Id., s. 9(3)(4).

566. Id., s. 3(1).

567. Id., s. 4(1)(a)-(c).

568. Supra note 270 and accompanying text.

569. C.R.C. 1978, c.1253, s.45 as am.

570. R.S.C. 1970, c. P-10, s. 10(1)(a), as am.

571. Id., s. 10(1)(b). No amount of fine is listed in the PCPA. Therefore, s.722 of the Criminal Code R.S.C. 1970, c. C-34, as am applies; that is a maximum $500 fine or 6 months imprisonment, or both. These fine amounts are substantially smaller than the $50,000-$100,000 maximum fines authorized under the Fisheries Act and the Environmental Contaminants Act.

572. Id., s. 10(2).

573. Id., s. 10 (3).

574. United States General Accounting Office. Need for Comprehensive Pesticide Use Data. A Report to the Congress by the Comptroller General of the United States. B-199618 (Washington, D.C.: GAO, September 1980) at 3,5.

575. Ormrod, supra note 56. Federal researchers have noted that:

> "Pesticide impact studies require extensive information on pesticide use. Data are required on total sales of individual pesticides. Since many pesticides can be used for various crops or purposes, data on the level of usage for each purpose are also required. Such data are limited, especially at the national level. The cancellation by Statistics Canada of the survey of pesticide sales in Canada has left a gap in this area, for the years since 1977."

Krystynak, supra note 429, at 24.

576. Ormrod, supra note 56.

577. Supra note 21 and accompanying text.

578. Department of the Environment. "Environmental Contaminants Act: Survey of Pesticide Registrants." Canada Gazette. Part I. (December 11, 1982) at .

579. Correspondence to Pesticide Registrants from Lynda Austen, Pesticides Division, Agriculture Canada (1982 Pesticides Survey letter, Ottawa).

580. Id.

581. Supra note 574, at 10.

582. Id., at 11.

583 Id., at 10.

584. United States House of Representatives. Federal Insecticide, Fungicide, and Rodenticide Act Extension. Report from the Committee on Agriculture 98th Cong., 2nd Sess. (May 11, 1983) at 6.

585. Interview with Jim Reid, Compliance Section, Pesticides Division, Agriculture Canada (June 30, 1983, Ottawa).

586. Id. See, e.g. R. v. Richfield Farms and Victor [Unreported decision of Judge D.C. Reed, Prov. Ct. of British Columbia (March 1, 1977, Delta, B.C.)]. Prosecution under s.3 (1) PCPA; fine $400; and R. v. Jay Norris Corporation of Canada [Unreported decision of Judge Trudel, Juge de la Cour des Sessions de la Paix de Quebec (November 21, 1977, Montreal, P.Q.)] Prosecution under under s.4(1) PCPA.

587. Reid, supra note 585.

588. Id.

589. Agriculture Canada. Food Production and Inspection Branch. Compliance Division. Manual of Procedures for Prosecution. (Ottawa: Agric. Cda., June 1983).

590. Reid, supra note 585.

591. S.C. 1980-81, c.88, s.1. See also Agriculture Canada. Discussion Paper on Amendments to the Pest Control Products Act. (Ottawa: Agric. Cda., June 12, 1980); and supra note 220 and accompanying text.

592. Reid, supra note 585.

593. Supra note 571.

594. Reid, supra note 585.

595. Id.

596. Memorandum to US EPA administrators from Robert M. Perry, General Counsel. General Operating Procedures for the Criminal Enforcement Program. (October 29, 1982, Washington, D.C.) at 3.

597. Memorandum to US EPAregional counsels from Robert M. Perry, General Counsel. Criminal Enforcement Priorities for the Environmental Protection Agency. (October 12, 1982, Washington, D.C.) at 1.

598. Id., at 10-11.

599. Testimony of Charles Horwitz, Staff Attorney, Migrant Legal Action Program. Federal Insecticide, Fungicide and Rodenticide Act. Hearings Before the Subcommittee on Department Operations, Research and Foreign Agriculture of the House of Representatives Committee on Agriculture, 97th Cong., 1st Sess. (Washington, D.C., June 18, 1981) at 52.

600. FIFRA, s.26. States are granted primary enforcement responsibility for pesticide use violations when the USEPA determines that the state (1) has adopted adequate pesticide use laws and regulations, though these need not be more stringent than federal law; (2) has adopted and is implementing adequate procedures for the enforcement of such state laws and regulations; and (3) keeps records and makes records showing compliance with (1) and (2) above. Id. In addition, where a state enters into a cooperative agreement

with USEPA under s.23 of FIFRA for the enforcement of pesticide use restrictions it is given primary enforcement responsibliity for use violations. Also under s.4 state certification plans allow states to have primary enforcement responsibility with respect to pesticide applicators. Id.

601. FIFRA, s.14(a). Civil penalties are administrative fines assessed by the agency without involving the court system. In determining the amount of the penalty, USEPA must consider the gravity of the violation, the size of the violator's business and the effect the penalty will have on the violator's ability to continue in business. FIFRA, s.14(a)(4).

602. FIFRA, s. 14(a)(2).

603. FIFRA, s. 13 (a).

604. FIFRA, s. 13(b).

605. 40 CFR Part 171.11.

606. Interview with Barbara Paul, Policy Director, Compliance Monitoring Unit, Office of Pesticides and Toxic Substances, USEPA (May 12, 1983, Washington, D.C.).

607. FIFRA, s.23.

608. FIFRA, s.27(b). See also United States Environmental Protection Agency. "FIFRA; State Primary Enforcement Responsibilities." 40 CFR Part 173; and 40 Federal Register 404 (January 5, 1983).

609. FIFRA, s. 27(c).

610. FIFRA, s. 27(a).

611. "The Law Weighs Pesticide 'Benefits and Risks' and Gives States Major Enforcement Role," Rural America March 1980, at 7.

612. GAO, supra note 3, at 24.

613. Paul, supra note 606; and GAO, id, at 15.

614. Paul, id.

615. Horwitz, supra note 599, at 59. The GAO, in a 1981 investigation of USEPA and state pesticide laws also concluded that "EPA and state pesticide enforcement programs do not fully protect the public and the environment." The GAO noted that EPA and the states do not always properly investigate cases and sometimes take questionable enforcement actions. Supra note 3, at 8-18.

616. United States Environmental Protection Agency. Administrative - Civil Actions Under FIFRA For Fiscal Years 1980 - Present. (Washington, D.C.: EPA, May 2, 1983).

617. Horwitz, supra note 599, at 61-62.

618. Richards and May, supra note 33, at 10.

619. Id., at 9-10.

620. See exchange between Simon de Jong, NDP Science Critic and Wayne Ormrod, Director, Pesticides Division, Agriculture Canada. Can. H. of C. Standing Comm. on Agriculture, Proceedings, No. 16 (November 26, 1980) at 7-9.

621. CAPCO, supra note 384, at 8.

622. Supra note 223.

623. CTV-W-5 Show. Transcript. Edition 551. (October 23, 1983, Toronto, Ontario) at 37. See also correspondence to Janis Tufford, CTV-W-5 from James B. Reid, Associate Director, Compliance Section, Pesticides Division, Agriculture Canada (October 20, 1983, Ottawa); and Kevin Cox, "Banned chemical urged for crops," The Globe and Mail, November 5, 1983 at 5, Col.2.

624. Correspondence to the Hon. Eugene Whelan, Minister of Agriculture from Vic Althouse, M.P. (October 24, 1983, Ottawa).

625. W. P. Bryson, Counsel, Legal Services Branch, Agriculture Canada, "Release of Information Gathered under the Pest Control Products Act." An Address at the Canadian Council of Resource and Environment Ministers Workshop on Pesticide Use in Canada. Proceedings. (Ottawa: CCREM, 1982) at 115-116.

626. One provincial official noted during this forum that:

> "Saskatchewan Environment turned its attention to IBT in early 1980. The Saskatchewan Minister of Environment wrote and telexed on many occasions the Minister of National Health and Welfare endeavoring to obtain definitive clarification in respect of the IBT affair. It would be fair to say that clarification of a degree was only really forthcoming in October 1981. Substantially over one and one-half years passed in the process of my Minister corresponding without success with the federal government to obtain information related to health and environmental implications of the

> chemicals involved in the IBT affair... the outcome of the process was to leave a credibility gap', a suspicion which we believe is now shared by some other provincial governments, about the adequacy of the existing registrational process particularly for agricultural chemicals in Canada."

David Penman, M.D., Senior Consulant on Environmental Health, Saskatchewan Environment. An Address at the Canadian Council of Resource and Environment Ministers Workshop on Pesticide Use in Canada. Proceedings. (Ottawa: CCREM, 1982) at 110.

627. J. H. Elliot, Vice-President, Rohm and Haas Canada, Inc. and Secretary Treasurer, Canadian Agricultural Chemicals Association. "Status of IBT Compounds." An Address at the Canadian Council of Resource and Environment Ministers Workshop on Pesticide Use in Canada. Proceedings. (Ottawa: CCREM, 1982) at 154.

628. CACA, supra note 319, at 2-3.

629. S. W. Gunner, Chief, Chemical Evaluation Division, Health Protection Branch, Health and Welfare Canada. "IBT Update." An Address at the Canadian Council of Resource and Environment Ministers Workshop on Pesticide Use in Canada. Proceedings. (Ottawa: CCREM, 1982) at 158.

630. CTV journalist Jack McGaw stated during the program that:

> "The Canadian Government would't release this Canadian list, either to us or to at least one concerned toxicologist. So we went to Washington..."

CTV-Report. Inquiry: The Failing Strategy. Transcripts. (Toronto: CTV, December 1977) at 21.

631. CELA/Probe, supra note 304, at 17.

632. Id.

633. United States House of Representatives. Federal Insecticide, Fungicide, and Rodenticide Act. Hearings Before the Subcommittee on Department Operations, Research, and Foreign Agriculture of the Committee on Agriculture. 97th Cong., 1st Sess.(July 16, 1981) at 386-413.

634. Id. For example, in one IBT study performed to determine if captan caused birth defects in hamsters, five pups in the raw data were described as having "no eyes" but in the final IBT report this is characterized as "lack of eye pigmentation." Id., at 396 [Memorandum from Dr. J. Ruddick to Mr. D. Clegg, Health and Welfare Canada regarding IBT study P5938 on teratology/hamsters (September 21, 1978, Ottawa)] . In another study IBT performed to determine if captan would cause birth defects in Rhesus monkies the Health and Welfare Canada reviewer noted that: "The audit and validation of

this study not only show that the raw data do not support the report but that the test material has a significant embryotoxic effect in causing abortions at the lowest level studied of 10 mg/kg/day." Id., at 413 [Memorandum from Dr. H. M. Cunningham to Mr. D. J. Clegg, Health and Welfare Canada regarding IBT study 621-5519 on teratology/monkeys (June 26, 1979, Ottawa)].

635. Telex to the West Coast Environmental Law Association from W. P. McKinley, Senior Policy Advisor, Task Force for Re-Assessment of Chemical Safety, Health Protection Branch, Health and Welfare Canada (March 12, 1981, Ottawa). Dr. McKinley noted in part:

> "...this Department has had a long standing policy that information supplied by a registrant of a pesticide is the property of the registrant and cannot be shared with a third party without permission of the owner. Recently, members of our Justice Department have provided the following legal advice: 'The submissions together with the IBT studies submitted to the Crown, under the Pest Control Products Act and its regulations, are confidential and are subject to the common law protecting trade secrets. Therefore, information derived from these submissions and studies should be considered confidential. Moreover, should the conclusions of interim reports prove incorrect, the Crown could open itself to legal action from manufacturers and laboratories who may prove that their reputations have improperly been affected." Id.

636. Correspondence to the Canadian Environmental Law Association from the West Coast Environmental Law Association (April 15, 1981, Vancouver, B.C.).

637. Comments of Heather Mitchell, Barrister and Solicitor during Roundtable Discussions on Toxic Chemicals, supra note 440, at 64.

638. Correspondence to Martin H. Flam, Attorney, California Rural Legal Assistance from David O.Bickart, Deputy General Counsel. United States Environmental Protection Agency (November 18, 1980, Washington, D.C.) at 5.

639. S.C. 1980-81-82, c.111.

640. Section 20(6) states:

> "The head of a government institution may disclose any record requested under this Act, or any part thereof, that contains information described in paragraph (1)(b), (c) or (d) if such disclosure would be in the public interest as it relates to public health, public safety or protection of the environment and, if such public interest in disclosure clearly outweighs in importance any financial loss

> or gain to, prejudice to the competitive position of or interference with contractual or other negotiations of a third party."

641. See, e.g. R. I. Crain Ltd. v. Ashton, [1949] 2 D.L.R. 481, at 485-486.

642. Restatement of the Law of Torts, 1st ed. (St. Paul: American Law Institute Publishers, 1931) at art. 757, comment 6.

643. McGarity and Shapiro, "The Trade Secret Status of Health and Safety Testing Information: Reforming Agency Disclosure Policies," (1980), 93 Harv. L.R. 837. The authors note that in the absence of statutory language calling for disclosure, private regulatees have successfully forestalled most efforts by agencies and interested citizens to disclose various documents by claiming that health and safety data are statutorily protected "trade secrets." Id., at 837-838.

644. McKinley, supra note 635 and accompanying text.

645. Supra note 363, at 266.

646. FIFRA, ss. 10(d) and 3(c)(1)(d). See also supra note 286.

647. Testimony of Steven D. Jellinek, assistant administrator pesticides and toxic substances, US EPA. United States House of Representatives. Extension of Federal Insecticide, Fungicide and Rodenticide Act. Hearings Before the Subcommittee on Department Investigations, Oversight and Research of the Committee on Agriculture. 96th Cong., 2nd Sess. (April 15 and May 1, 1980) at 148-149.

648. Id., at 149.

649. Id., at 149-150.

650. Testimony of Jacqueline M. Warren, Attorney, Natural Resources Defence Council. EPA Pesticide Regulatory Program Report. Hearing Before the Subcommittee on Department Operations, Research, and Foreign Agriculture of the House Committee on Agriculture 98th Cong., 2nd Sess. (February 23, 1983) at .

651. Toby Vigod, Counsel, Canadian Environmental Law Association. "Toxic Chemicals Testing: The Aftermath of IBT." Report for a Toxics Seminar with Environment Canada. Proceedings. (Ottawa: Env. Cda., May 1982) at 9.

652. CCREM, supra note 300, at 8.

653. R.S.C. 1970, c. F-27, as amended. The authority to restrict the sale of a food containing a harmful substance has been in existence in Canada since 1860 when "an Act for the prevention of Adulteration of articles of Food and Drug" was passed. In 1884 this became known as the Adulteration Act in 1920,

the name of the legislation became the Food and Drugs Act. See P.R. Bennett, "Establishment of Residue Tolerances under Food and Drug Acts," A.P.S. Report (Ottawa: 1974) at 14.

654. R.S.C. 1970, c. F-27, s.4.

655. Food and Drug Regulations, C.R.C. 1978, c.870 as amended. Part B, Division 15, Table II. The regulation making power is found in section 25 of the FDA. Section 25(1)(a) provides that the Governor in Council may make regulations "declaring that any food or drug or class of food or drugs is adulterated if any prescribed substance or class of substances is present therein or has been added thereto or extracted or omitted therefrom."

656. Id. Part B, Foods, Division 1, B.01.001.

657. Id. Part B, Division 15, B.15.002(3).

658. Bennett, supra note 653, at 15. Apparently many of the older tolerance levels were set at levels requested by the manufacturer provided that they were safe without residue data to support the need for such levels. Id.

659. C.R.C. 1978, C.870 as amended. Part B, Division 15, B.15.002(1). In addition there are some specific exemptions to section 4(d) of the Act for agricultural chemicals such as sulphur, bacillus thuringienosis and inert ingredients. Regulations B.01.046(0) and (P) declare food to be adulterated if it contains any amount of ETU or chlorinated dibenzo-p-dioxins, with the exception of 20 ppt or less of 2,3,7,8-TCDD in fish.

660. Health and Welfare Canada. Answers to questions raised by the Law Reform Commission concerning the Food and Drugs Act in relation to Agriculture Chemicals. (Ottawa: HWC. July 1983) at 4-5.

661. This principle is encompassed by the Delaney Clause to the U.S. Federal Food, Drug and Cosmetic Act which prohibits the use of any food additive that has been shown to cause cancer in human beings or animals. (Section 409(c), 21 U.S.C.s. 348 (c)(3)(A)(1976). However, while pesticides in and on raw agricultural commodities are excluded from the definition of food additive, processed food containing a carcinogenic pesticide residue may be subject to the Delaney Clause if no tolerance level has been established in regard to the raw commodity. In that case, as long as the tolerance level is not exceeded, residues of carcinogenic pesticides are allowed on processed foods. For a discussion of the various anomalies of the FFDCA see, Richard A. Merrill "Regulating Carcinogens in Food: A Legislator's Guide to the Food Safety Provisions of the Federal Food, Drug and Cosmetic Act." 77 Michigan L. Rev. 171 (1978). A 1978 Congressional Subcommittee recommended that EPA cancel tolerances for pesticides which leave carcinogenic, mutagenic or teratogenic residues in food. See infra note 677 and accompanying text.

662. See, correspondence with Dr. Ian Munro, Director General, Food Directorate, Health and Welfare Canada to Mr. Joe Castrilli,

Canadian Environmental Law Association, December 9, 1980. See also, Health and Welfare Canada, "Control of Pesticide Residues in Food." Bulletin No. 51. (Ottawa: HWC, Fall 1980.)

663. Id. Munro correspondence.

664. P.R. Bennett, "Outline of Pesticide Data Evaluation by the Food Directorate, Health and Welfare Canada." An Address at the Canadian Council of Resource and Environment Ministers Workshop on Pesticides Use in Canada. Proceedings. (Ottawa: CCREM, 1982) at 92.

665. Id.

666. Pim, supra note 508, at 62.

667. Pim, Supra note 508, at 64. See Hamj A. McLeod et al, "Pesticide Residues in the Total Diet in Canada, v: 1976 to 1978", Journal of Food Safety 2 (1980) 141-164 for last total diet survey.

668. Pim, Id. at 64.

669. Id., at 65. See also Peter von Stackelberg "Those Juicy Fruits May be Juicier than you Think," Regina Leader Post, September 10, 1980.

670. Scott R. McKercher and Frederick W. Plapp, Jr. "Pesticide Regulation: Measuring the Residue" Environment, Vol. 22, No. 7, September 1980 at 8.

671. Id.

672. See "Pesticidal Produce" San Jose Mercury, Editorial, February 12, 1980. The editorial comments that the method of setting tolerance levels "makes as much sense as taking the average length of all American feet and then marketing only one shoe." See also discussion in US House Subcommittee staff report, supra note 363, at 159-161, 168-173.

673. Editorial, Id.

674. Supra, note 670, at 7.

675. Supra, note 365, at 161. The staff report refers to the report by the House Committee on Government Operations (1969), a GAO report dated December 4, 1975 and a report to the Senate Committee on Administrative Practice and Procedures (Kennedy Report).

676. Id., at 163.

677. Id.

678. The Study Group appointed by the Scientific Advisory Board (SAB) was asked to report on six specific areas (1) exemptions from requirements to obtain a tolerance, (2) definition of safety, (3) safety factors, (4) data requirements and flexibility, (5) estimating exposure and (6) tolerances which exceed the Acceptable Daily

Intake (ADI). In general, the study Group reported that "it supported the idea of a regulatory system which permits the exercise of scientific judgment within publicly defined procedural and scientific limits." On September 5, 1980, EPA issued a draft reply to the SAB report, in which the Agency recommended accepting some recommendations of the report and modifying or rejecting others. Among the SAB recommendations accepted by EPA were (1) that it would not be appropriate to set lower limits on the level of analytical sensitivity in residue testing for tolerance setting, (2) that it would not be appropriate to allow applicants for tolerances to estimate residues based on data from similar chemicals, and (3) that data on removal of residues from raw commodities by processing should not be considered in setting tolerances.

679. Id., at 173

680. Supra note 664, at 92-93.

680a CELA/Probe, supra note 304, at 32.

681. See complaint for Injunctive and Declaratory Relief filed on February 5, 1980 by the California Rural Legal Assistance on behalf of 21 plaintiffs, including environmental groups, unions, farmworkers, doctors and two state assemblymen.

682. Id. See also Peter von Stackelberg, "Examining the Data on Pesticides Difficult" Regina Leader Post, September 10, 1980.

683. This is similar to the Delaney Amendment to the U.S. Food, Drug and Cosmetics Act which prohibits the use of any food additive that has been shown to cause cancer in human being or animals. See discussion supra note 661.

684. Health and Welfare. IBT Pesticides - 1977 List of Residue Limits. (Ottawa: HWC undated) at 1-6.

685. Health and Welfare, IBT Pesticides-Residue Changes Made since 1977 List of Residue Limits. (Ottawa: HWC undated) at 1-6.

686. See Health and Welfare Canada "Update on IBT Pesticides" News Release (Ottawa: HWC, October 14, 1983). The 8 pesticides are ethion, captafol, endosulfan, folpet, formetanate hydrochloride, naled, methamidophos, disulfoton.

687. Supra note 655, Part B Division 15, Table II.

688. US EPA Summary on IBT, supra note 45, at Exhibit B. See also supra note 494 and accompanying text.

689. Health Protection Branch, Health and Welfare Canada. Rationale for the Recommendations of March 31, 1981 on the Status of captan (Ottawa: HWC, June 3, 1981) at 2-5.

690. Id. at 3.

691. Supra note 493.

692. Dr. Freeman McEwan, member of the Consultative Committee commented that "Health and Welfare has the say on tolerances, and if Health and Welfare decided tomorrow that captan should not be in Canadian food supplies, they have the power to effect that by cancelling their tolerances." Supra note at 217.

693.

694. Supra note 493, at 16-20

695. Canada Gazette, Part I (June 26, 1982) at 4688.

696. Health and Welfare Canada Responses to Canada Gazette, Part I, Notification of June 26, 1982, Proposal to Reduce MRL's for captan. (Ottawa: HWC undated).

697. Id. at 4.

698. Correspondence from Bo Wahlstrom, Head of Pesticide Section, Products Control Board to Consultative Committee on IBT Pesticides (February 5, 1982).

699. Correspondence from D.E. Coffin, Ph.D., A/Director-General, Food Directorate, Health and Welfare Canada (October 7, 1982, Ottawa) at 1. The correspondence also clarified that all pesticide residues limits are enforced at the point of sale, that is: (1) harvest; (2) point of entry into the country; (3) wholesale market; or (4) retail sale. Id. at 2. Submissions had been made by various companies that while enforcement at the retail level was acceptable, it would be too difficult to meet the 5 ppm requirement at point of harvest.

700. Canada Gazette, Part II, Vol. 117, No.7. (April 13, 1983).

701. Interview with A. B. Morrison, Assistant Deputy Minister, Health and Welfare Canada. July 11, 1983.

702. Supra note 507 and accompanying text.

703. Health and Welfare Canada. Evaluation-Project FBAO 1981/82. (Ottawa: HWC undated) at 40.

704. Supra note 696, at 1.

705. See for example Clean Air Act S.C. 1970-71-72, C.47 as amended at ss. 7(2) and 13(2).

706. CELA/Probe, supra note 304, at 32.

707. See Donald L. Grant, "Pesticide Residue Trends from Surveys." An Address at the Canadian Council of Resource and Environment Ministers Workshop on Pesticide Use in Canada. Proceedings. (Ottawa: CCREM, 1982) at 133.

708. Id. at 134.

709. R.S.C. 1970, c. F-27 as amended, s.26. For a subsequent offence, on summary conviction, a maximum fine of one thousand dollars or inprisonment for a term not exceeding six months, or both, is available. On indictment, the maximum fine is five thousand dollars or imprisonment up to three years, or both.

710. Supra note 660, at 1.

711. Id.

712. Id., at 2.

713. Health and Welfare Canada. Compliance Activities taken by the Health Protection Branch Relative to Pesticide Residues in Foods (Ottawa: HWC, July 1983).

714. Id., at 3.

715. Id., at 1.

716. Health and Welfare Canada. Project FBAO-"Agricultural Chemical Residues" 1979/80 (Ottawa: HWC, July 21, 1980) at 8.

717. Id., at 9.

718. Id.

719. Id., at 10.

720. Taylor, supra note 422, at 125.

721. Id., at .

722. Supra note 716, at 11.

723. Supra notes 21, 575 and accompanying text.

724. Supra note 716, at 12.

725. Health and Welfare Canada Evaluation of Agricultural Chemical Residues Projects for 1980/81. (Ottawa: HWC)

726. Id., at 4-6.

727. Supra note 703, at 31.

728. Id., at 32.

729. Id., at 37.

730. Id., at 44.

731. Id., at 48.

732. Id., at 30.

733. The two pesticides were ethion and acephate.

734. Supra notes 606 - 616 and accompanying text.

735. S.C. 1974-75-76, c.72.

736. The Ministers' can place substances by order in a schedule to the Act and restrict them by regulations which must first be published in draft form in the Canada Gazette 60 days prior to promulgation. Objections to the draft regulation or order may be lodged during this period by "any person having an interest therein" at which time an Environmental Contaminants Board of Review must be empaneled to hear the objections and related matters and make recommendations to the two Ministers. See generally ss. 5, 6, 7, 8 and 18.

737. S.C. 1974-75-76, c. 72, s. 5(2).

738. Ss. 3 and 4.

739. S. 4(6).

740. Ss. 3(4) and (5).

741. J.E. Brydon, Environment Canada. "The Role of the Environmental Contaminants Act in the Management of Pesticides". APS-Report (Ottawa: Government of Canada, 1975) at 24.

742. Id.

743. Mirex Regulations. S.O.R./78-891; and Schedule to the Act, amendment, S.O.R./78-892.

744. Dr. J.E. Brydon, Director, Commercial Chemicals Branch, Environmental Protection Service, Environment Canada. Responses to Questions Posed by the Law Reform Commission of Canada on Environment Canada's Regulatory and Enforcement Role with Respect to Pesticides. (July 13, 1983, Ottawa).

745. Id. See also Fisheries and Environment Canada and Health and Welfare Canada. Mirex in Canada. Report of the Task Force on Mirex to the Joint Department of Environment and National Health and Welfare Committee on Environmental Contaminants. (Ottawa: Government of Canada, April 1977) at 20.

746. Mirex Report, id., at xi.

747. Departments of the Environment and National Health and Welfare. Environmental Contaminants Act Priority and Candidate Chemicals. Canada Gazette. Part I. (January 16, 1982) at 431.

748. Id., at 432-433.

749. Id., at 435.

750. Id., at 431.

751. Id.

752. Id., at 433.

753. Environment Canada. Environmental Protection Service. Chlorophenols and Their Impurities in the Canadian Environment. EPS 3-EC-81-82. (Ottawa: Supply and Services Canada, March 1981) at i and 41.

754. Id.

755. Supra notes 434, 531 and accompanying text.

756. Supra note 747, at 434.

757. Id., at 435.

758. Id.

759. Health and Welfare Canada and Environment Canada. Report of the Ministers' Expert Advisory Committee on Dioxins. (Ottawa: Government of Canada, November 1983). The report notes for example, that the isomer 2,3,7,8-T_4CDD is "carcinogenic in rats and mice". Id., at 16. However, the report noted that while data on workers suggested an association between cancer and occupational exposure to substances containing dioxins, the presence of "concomitant chemicals prevents concluding that the increased cancer risk was actually due to the dioxins themselves". Id., at 17.

760. Health and Welfare Canada. Health Protection Branch. "Expert Advisory Committee on Dioxins". Information Letter. No. 620 (Ottawa: HWC, April 21, 1982) at 1.

761. Supra note 759, at 2,4.

762. Id., at 23-24.

763. Government of Canada. Interdepartmental Committee on Toxic Chemicals. Dioxins in Canada: The Federal Approach. (Ottawa: Government of Canada, December 1983) at ii.

764. Id., at iv.

765. Supra notes 578-580 and accompanying text.

766. Supra note 578.

767. Supra note 580 and accompanying text.

768. T.D. Leah, Contaminants Control Branch, Environment Canada. "A Canadian Pesticides Inventory". An Address at the Environmental Protection Service, Western and Northern Region. Workshops on Pesticides. (Edmonton, Alberta. Environment Canada, May 11, 1982) at 1.

769. Correspondence to Clare M. MacLellan, Research Officer, Law Reform Commission of Canada from Dr. J.E. Brydon, Director, Commercial Chemicals Branch, Environment Canada. (May 17, 1983, Ottawa).

770. Id.

771. Supra notes 581-582 and accompanying text.

772. R.S.C. 1970, c.P-11 as amended.

773. A farmer is defined as "a producer of primary agricultural products for sale". Id., at s. 2.

774. Id., at s. 3(1)(a) and (b). Recommended practice includes recommendations made by provincial ministries of Agricultrue and approved by Agriculture Canada, or recommendations made by Agriculture Canada itself. Id., at s. 3(1)(b).

775. Id, at s. 3(2)(a) and (b). The Minister of Health and Welfare must provide written confirmation to the Minister of Agriculture that an inspection was carried out and that a sale of the crop would be contrary to the Food and Drugs Act.

776. Id., at 5(1)(a).

777. Id., at s. 5(1)(b)(i) and (ii).

778. Id., at s. 5(2).

779. Pesticide Residue Compensation Regulations. C.R.C. 1978, c. 1254, s. 4.

780. Carswell and Swaigen, eds. Environment on Trial (Revised, Toronto: Canadian Environmental Law Research Foundation, 1978) at 264.

781. Supra note 772, at s. 12(1).

782. Id., at s. 13(1).

783. Id., at s. 13(3).

784. Supra note 780, at 265.

785. Ormrod, supra note 56.

786. This point was brought up in the House of Commons debates prior to passage of the Pesticide Residue Compensation Act. See e.g. comments by Mr. H.W. Danforth (Kent-Essex). "I think the minister is right in his contention that the government will not have to spend great sums of money in implementing this legislation because I believe that under the provisions of the bill there is very little recourse for a farmer to obtain redress when his crops are condemned because they are contaminated by a pesticide residue... Before an individual can present a claim to the government he must on his own initiative exhaust all other courses open to him... Therefore it appears that once more the onus has been placed on the primary producer, the farmer. Not only is he faced with the loss of the sale of his products,...but he is faced with the additional expense of making a claim or pursuing an appeal through the various avenues open to him." Can. H. of C. Deb., January 14, 1969, at 4252.

787. R.S.C. 1970, c. F-14, (1st. Supp.) s. 33(2), as am.

788. Blagdon, supra note 2.

789. Guerin, supra note 218. The Fisheries Act was the second federal statute along with the PCPA, that was prosecuted under by the private prosecutors in this case. Because it explicitly binds the Crown, the informations laid under the Fisheries Act were not dismissed as against the provincial Crown entity.

790. R.S.C. 1970, c. F-14 (1st. Supp.) s. 33.

791. S.C. 1974-75-76, c. 55, s. 4(1).

792. Id., Schedule II.

793. S.C. 1970-71-72, c. 47. The principal application of this Act to pesticide problems would be through the establishment of national emission standards to control air contaminants. However, no such regulations have been proposed to date.

794. See the Migratory Bird Convention Regulations. C.R.C. 1978, c. 1035, s. 35, as am. These regulations prohibit the deposit of harmful substances to water frequented by migratory birds. However, where the deposit is authorized by other federal regulations under other federal laws this prohibition does not apply. Id.

795. S.C. 1980-81, c. 36.

796. Transportation of Dangerous Goods Regulations. First Unit Proposed. Canada Gazette. Part I. Appendix. (June 19, 1982).

797. R.S.C. 1970, c. 34 as am.

798. S. 202. Criminal negligence includes the commission or omission of an act that is the person's duty to do, which shows a "wanton or reckless disregard of the lives or safety of other persons." The "duty" incorporated in this section is one that is "imposed by law". S 202(2).

799. S. 176. Common nuisance includes committing an unlawful act or failing to discharge a legal duty which results in either endangering lives, safety, health, property or comfort of the public; or obstructing the public in the exercise of enjoyment of any right that is common to all the subjects of Her Majesty in Canada.

800. S. 387. The section is primarily, though not exclusively, directed to protection of property. Both public and private property are covered [ss. 387(3)(4)] and actual endangerment to life [s. 387(2)].

801. See, e.g. R. v. Corporation of the City of Sault Ste. Marie. (1978), 40. C.C.C.(2d) 353 (S.C.C.); and R. v. Chapin (1979), 7 C.R. (3d) 225 (S.C.C.).

802. Treasury Board Canada. Administrative Policy Manual: Socio-Economic Impact Analysis. Chapter 490. (Ottawa: Treasury Board Canada, June 1982) at 3.

803. Treasury Board Canada. "Private Sector Has Role in Socio-Economic Impact Analysis". News Releases. (Ottawa: Treasury Board Canada, July 8, 1983).

804. Supra note 802.

805. Supra note 340.

806. Id.

807. "Cost-effectiveness" analysis compares, in monetary terms, the costs of achieving certain benefits from alternative regulatory actions, while describing the benefits themselves in physical, not monetary, terms. Id., at 10.

808. Supra note 347.

809. A 1980 Parliamentary Committee studying regulatory reform concluded that: "A greater appreciation of the use of cost-effectiveness analysis in situations in which a benefit cannot be assessed in dollar terms needs to be developed." Can. House of Commons Special Committee on Regulatory Reform. Report. (December 1980) at 9-10.

810. Treasury Board indicated in 1982 that, with respect to methodology:

> "Environment Canada has stated that cost-benefit analysis will be used where the benefit arising from a proposed regulation can be quantified in monetary terms. Cost-effectiveness will be employed where it is not possible to quantify potential benefits monetarily....The department believes that most cost estimates are approximations at best and that benefit estimates are even less accurate...."

Treasury Board Canada. Socio-Economic Impact Analysis Policy: Summary of 1981-1982 Annual Reports from Departments and Agencies. (Ottawa: Treas. Bd. Cda., October 1982) at 3.

811. Supra notes 345-355 and accompanying text.

812. Toby Vigod and Anne Wordsworth. "Water Fit to Drink? The Need for a Safe Drinking Water Act in Canada." (1982), 11 CELR 80.

813. Health and Welfare Canada. Guidelines for Canadian Drinking Water Quality, 1978. (Ottawa: Supply and Services Canada, 1979) at 15. See also Health and Welfare Canada. Guidelines for Canadian Drinking Water Quality 1978 - Supporting Documentation. (Ottawa: Supply and Services Canada, 1980).

814. Id., at 15.

815. Id., at 16.

816. Id., at 51.

817. Id., at 50.

818. Id.

819. Id., at 51.

820. Id., at 50.

821. Ormrod, supra note 56 and accompanying text.

822. Supra notes 34, 37 and accompanying text.

823. International Joint Commission. Great Lakes Water Quality Board. 1983 Report on Great Lakes Water Quality. (Windsor, Ontario; IJC, November 1983) at 5.

824. Vigod and Wordsworth, supra note 812, at 84-85. It has also been argued that the drinking water guidelines allow the intake of at least two pesticides suspected of causing cancer (lindane and toxaphene). Researchers at Pollution Probe, a Toronto-based environmental group, have argued that "many scientists...believe that there can be no [No Observable Effect Level - NOEL] for carcinogens, because of the probability that cancer is a cellular phenomenon that can be initiated by as little as one chemical...insult." Joanna Kidd "The Need for A Safe Drinking Water Act". Probe Post, Vol. 6, No. 1 (June 1983) at 13.

825. Vigod and Wordsworth, supra note 812, at 84-85, 87-93; Kidd, id.

826. Agriculture Canada. Research Branch. Integrated Pest Management in Agricultural Crops in Canada. (Ottawa: Agric. Cda., May 1980) at i.

827. Agriculture Canada. Research Branch. Progress in Research - 1981. (Ottawa: Supply and Services Canada, 1982) at 42.

828. Supra note 826, at 8.

829. Id., at 29.

830. Id.

831. Agriculture Canada notes, for example, that in protecting apple and pear orchards from codling moths, use of sterile moth controls cost approximately $250 per hectare while chemical sprays cost $100 per hectare. Supra note 826, at 7.

832. Id., at i.

833. Id.

834. Id., at 3.

835. Id., at 9.

836. Id. Critics have suggested that IPM will never have more than a marginal impact in reducing pesticide use unless government policies favouring chemicals over alternatives, are systematically revised. Hall, supra note 9, at 22-32.

837. Supra notes 497-498 and accompanying text.

838. Supra note 498.

839. Supra notes 203, 208-214 and accompanying text.

840. See, e.g. the Pesticides Act R.S.O. 1980, c. 376 as am., ss. 5,6,7.

841. See, e.g. R.R.O. 1980, Reg. 751 as am., ss 20-21 and Schedules 1-6.

841a. The two provinces are Quebec and Nova Scotia. They rely in part on general environmental legislation to address pesticide matters.

842. See, e.g. Pesticides Act R.S.O. 1980, c. 376 as am., s. 4.

843. R.R.O. 1980, Reg. 751, s. 21.

844. R.R.O. 1980, Reg. 751, ss 20-21 and Schedules 1-6. See also Ontario Ministry of the Environment. Pesticides Advisory Committee. Ontario Guidelines For Classification of Pesticide Products. (Toronto: MOE/PAC, November 1983).

845. R.R.O. 1980, Reg. 751, s. 20. See also Guidelines, id.

846. See, e.g. Pesticide Control Act Regulation. B.C. Reg. 319/81. Under Annex 1 to these regulations 5 schedules are created divided between "signable" and "non-signable" pesticides. A "signable" pesticide, found in Schedules I, II and III of Annex 1, is a pesticide in respect of which a record of sale is required. Id., s. 1(1).

Under Alberta regulations 6 schedules are also created but different pesticides would be found in each schedule from Ontario's. See Pesticide Sales, Use and Handling Regulations. A. Reg. 213/80, as am.

847. R.S.O. 1980, c. 376, s. 10, as am.

848. Guidelines, supra note 844, at 1.

849. The Saskatchewan Government noted in a 1982 position paper on the fungicide captan that:

> "The Minister of Agriculture Canada has conceded in correspondence with Saskatchewan Environment that many ingredients of pesticides which are not deemed to be active ingredients at law are nonetheless capable of biological activity."

Government of Saskatchewan. Submissions to the Consultative Committee on IBT Pesticides. Prepared for the March 10-12, 1982 Toronto Public Meeting. (Regina, Sask.: Gov't. of Sask., 1982) at 23.

850. Guidelines, supra note 844, at 2.

851. R.R.O. 1980, Reg. 751, ss. 73-74.

852. Ontario Ministry of the Environment. Pesticides Advisory Committee. Ontario Guidelines for Classification of Pesticide Products. (Toronto: MOE/PAC, May 1982) at 2. This phrase has been removed in the November 1983 version of the Guidelines and in its place it is stated that Schedule 5 pesticides "are essential for the protection of agricultural crops" and "suitable substitutes do not exist". Supra note 844, at 2. Interestingly, the May 1982 Guidelines suggest that apart from persistence Schedule 1 and Schedule 5 pesticides do not appear to differ. Id.

853. Interview with John Onderdonk, Director, Pesticides Control, Ontario Ministry of the Environment (July 27, 1983, Toronto, Ontario).

854. Supra notes 495-496 and accompanying text; cf. notes 501-503.

855. Guidelines, supra note 844, at 18.

856. Id, at 3.

857. "Environmentalists Urge Ontario to Intervene in Pesticide Scandal", (1980), 5 CELA Newsletter 96, at 97.

858.

859. See, e.g. correspondence to Ray Sentes, Health and Safety Director, Alberta Federation of Labour from the Hon. John W. Cookson, Alberta Minister of the Environment (October 1, 1980, Edmonton, Alberta). More recently, Alberta officials have indicated that they have no special policy in relation to IBT-tested pesticides. They rely on restrictions from Agriculture Canada and Health and Welfare Canada. Correspondence to Edward W. Keyserlingk, Project Coordinator, Protection of Life Project, Law Reform Commission of Canada from D.B. Stewart, Section Head, Pesticide Chemicals Branch, Alberta Environment (May 16, 1983, Edmonton, Alberta).

In British Columbia, provincial officials note that in 1981-82, 2 IBT pesticides, allidochlor and chlorobromuron, were transferred from Schedule IV to Schedule I of B.C.'s regulations; presumably following Agriculture Canada regulatory action at the federal level. British Columbia Ministry of the Environment. Annual Report - 1981/82. (Victoria, B.C.: BCMOE, 1982) at 53.

860. Canadian Environmental Law Association and Pollution Probe. Submissions to the Ontario Pesticides Advisory Committee on the IBT Affair. (Toronto: CELA/Probe, October 1980) at .

861. Sask. Reg. 86/80 (prohibition on the use of 2,4,5-T and related herbicides and required disposal of remaining stocks, pursuant to the Pest Control Products (Saskatchewan) Act. R.S.S. 1978, c. P-8).

862. Guidelines, supra note 844, at 30 (placement of all 2, 4, 5-T high volatile esters in Schedule 1, where special use permit necessary; low volatile esters and amines remain in Schedules 3 and 2, respectively).

863. B.C. Reg. 319/81 (placement of 2,4,5-T in Schedule I, where a restricted use permit needed. Provincial officials note that such permits have been "highly discouraged, but their uses have not been absolutely curtailed". Correspondence to Edward W. Keyserlingk, Project Coordinator, Protection of Life Project, Law Reform Commission of Canada from Ron W. Kobylynk, Director, Pesticide Control Branch, British Columbia Ministry of the Environment (May 30, 1983, Victoria, B.C.).

864. Supra note 759.

865. Sask. Reg. 243/80 (prohibition on the use or sale of TOK).

866. R.R.Q., 1981, Q-2, r. 24 (ban of the use of DDT pursuant to the Environment Quality Act).

867. Pesticides Act R.S.O. 1980, c. 376, s. 6, as am.: R.R.O. 1980, Reg 751, ss. 85-97, as am.

868. R.S.O. 1980, c. 376, s. 5(2) as am.; R.R.O. 1980, Reg. 751, ss. 85-97, as am.

869. R.S.O. 1980, c. 376, s. 5(1), as am.

870. R.R.O. 1980, c. 376, ss. 28-29, as am.

871. R.R.O. 1980, c. 376, s. 59 as am.

872. R.R.O. 1980, c. 376, s. 81, as am.

873. Under the regulations 6 structural classes are established (s. 28); 10 land classes (s. 59); and 3 water classes (s. 81).

874. See IV. C.2.d.

875. R.S.O. 1980, c. 376, s. 7, as am.

876. R.R.O. 1980, Reg. 751, s. 30 (structural); s. 60 (land); s. 83 (water), as am.

877. R.R.O. 1980, Reg. 751, s. 67, as am.

878. R.R.O. 1980, Reg. 751, s. 83, as am.

879. R.R.O. 1980, Reg. 751, s. 84, as am.

880. See IV.C.2.d.

881. R.R.O. 1980, Reg. 751, s. 11 (licence examination requirements) as am.

882. D. Waugh, Nova Scotia Department of the Environment. "Monitoring Use and Effect of Pesticides". An Address at the Canadian Council of Resource and Environment Ministers Workshop on Pesticides Use in Canada. Proceedings. (Ottawa: CCREM, 1982) at 127-132.

See also correspondence to Edward W. Keyserlingk, Project Coordinator, Protection of Life Project, Law Reform Commission of Canada from Dr. D.L. Waugh, Chief Environmental Development, Nova Scotia Department of the Environment (August 4, 1983, Halifax, Nova Scotia). Nova Scotia's permit system for pesticide management is handled under its general environmental protection statute, though pesticide legislation has been drafted.

883. Onderdonk, supra note 853.

884. BCMOE Annual Report, supra note 859, at 53-54, 108-109.

885. Stewart, supra note 859.

886. See, e.g. R.S.O. 1980, c. 376, s. 11(2), as am.

887. Id.

888. Id., s. 11(3).

889. In Ontario, for example, approximately 10 licences a year are refused, suspended or revoked. Onderdonk, supra note 353.

890. See IV.C.4.a(iii) and 6(i).

891. See, e.g. R.S.O. 1980, c. 376, s. 13(1)-(6).

892. Id., s. 13(8)-(10).

893. In Ontario, the appeal board mentioned under the Pesticides Act is the Environmental Appeal Board established under the Environmental Protection Act R.S.O. 1980, c. 141, as am. (R.S.O. 1980, c. 376, s. 1(6), as am.)

894. M. Reg. 41/83, s. 9(3), issued pursuant to the Pesticides and Fertilizers Control Act.

895. M. Reg. 41/83, s. 9(4).

896. Agricultural Chemicals Act R.S.A. 1980, c. A-6, s. 21(a).

897. Pesticides Act, R.S.O. 1980, c. 376, s. 13, as am.

898. Id., s. 14(1).

899. Review of all Environmental Assessment Board files pertaining to Pesticides Act appeals by J. F. Castrilli while in attendance at EAB offices (June 1983, Toronto, Ontario).

900. Pesticide Control Act R.S.B.C. 1979, c. 322, s. 15(1).

901. BCMOE Annual Report, supra note 859, at 109.

902. See, e.g. Lewis and Warnock v. Pesticide Control Appeal Board and the Queen (1979), 8 CELR 1 (S.C.B.C.). Following a citizen appeal against permits issued for herbicide application to lakes to control Eurasian Milfoil, the board found that four permits would have adverse environmental effects. The court held that with respect to five other permit appeals that the board had improperly delegated its decision-making powers back to the provincial administrator whose original decision authorizing the permits had been the reason for the citizen application for judicial review.

903. Of 40 appeals against permits filed between April 1, 1981 and March 31, 1982, none were upheld by the Board. BCMOE Annual Report, supra note 859, at 53.

904. Anne Roberts, "Puzzling pesticide permits", The Globe and Mail, June 12, 1982, at 8, col. . See also B.C. Legis. Assembly Deb. August 18, 1977, at 4740-41. (Comments of the Hon. W. Nielson, Minister of the Environment).

905. Id.; Onderdonk, supra note 853.

906. Supra notes 416-420 and accompanying text.

907. The Hon. Harry Parrott, Ontario Environment Minister in 1980, noted that:

> "...first...applications cannot be released prior to the fulfilling of [the Pesticides' Director's] statutory duty of issuing or refusing to issue permits. Secondly,...information on the permit and application is given in confidence and, therefore, the applicant's consent is needed prior to release of permits or permit applications....
>
> ...permits issued under the Pesticides Act cover a variety of exterminations in both the public and private sector... [I]n considering the release of permits... it is necessary to divide permit applications into two categories; those received from individuals and private companies, and those from public agencies and government Ministries.
>
> .... [statements in the first paragraph] relate to the former category....statistics on pesticides, quantities and uses pertaining to such permits are compiled regularly and are available on request.
>
> Information concerning permits issued to government Ministries and municipalities is readily available. This information includes applicant names, pesticides applied, methods and areas of application and pests to be controlled."

Correspondence to Toby Vigod, Counsel, Canadian Environmental Law Association from the Hon. Harry Parrott, Ontario Minister of the Environment (June 13, 1980, Toronto, Ontario).

908. According to a recent federal report focussing on aerial spraying in British Columbia:

> "aerial spray applications can not only produce extensive drift, but also have a high potential of contaminating fishery and wildlife sensitive habitat

Risk Assessment: A Rational Approach to the Management of New Brunswick's Spruce Budworm Enigma", (1982), 11 CELR 109. Concerns regarding the spraying of pesticides generally in New Brunswick has resulted in the establishment of several provincial task forces to study various facets of the problem. See, e.g. Task Force on Chemicals in the Environment and Human Reproductive Problems in New Brunswick. Interim Report. Submitted to the New Brunswick Department of Health. (April 29, 1983, Fredericton, N.B.); and New Brunswick Task Force on the Environment and Cancer. Interim Report. Submitted to the New Brunswick Department of Health. (April 22, 1983, Fredericton, N.B.). Approximately 4 million acres of New Brunswick forest are sprayed annually, with almost 99% of the treatment done with chemicals. Testimony of J.W. Ker, former Dean, Faculty of Forestry, University of New Brunswick, Can. H. of C. Standing Comm. on Fisheries and Forestry, Proceedings, No. 85 (June 7, 1983) at 12.

909. See, e. g. Lewis case, supra note 902; and EPS/BC study where it is noted that:

> "The use of chemicals to control aquatic pests is one that has caused some concern. Although the present controlled use of herbicides such as 2,4-D shows no evidence of hazardous effects on fish and wildlife, the potential for permanent impairment of fishery habitat areas is great if the use of large quantities of herbicides occurs on a regular basis."

Id., at 19.

910. R.R.O. 1980, Reg. 751, s. 67 as am.

911. R.R.O. 1980, Reg. 751, s. 67(2) and Form 5.

912. R.R.O. 1980, Reg. 751, s. 70 and Form 6.

913. A Reg. 213/80, s. 4(1) [Pesticide Sales, Use and Handling Regulations]; and A. Reg. 214/80, s. 3(2) [Pesticide Applicator Licensing Regulation].

914. In Nova Scotia, for example, the question of the forestry use of pest control products, including application methods, has been placed before a Royal Commission on Forestry, expected to report in late 1983. Waugh, supra note 882.

915. R.S.O. 1980, c.

916. O.Reg. 417/83. Order Made Under the Environmental Assessment Act. Exemption - Ministry of Natural Resources.

917. Gouvernement du Québec. Conseil consultatif de l'environnement. Proposition d'un contrôle des pesticides au Québec. (Quebec: Gouvernement du Quebec, Juillet 1980). See also William Marsden, "Tough pesticide laws needed", The Montreal Gazette, December 1, 1981, at 16.

> which are features charactreistic to the British Columbia coastal areas. Drift is an inherent problem of aerial treatment because of the great height of herbicide release, high speed of the aircraft, and extensive air turbulence generated by the propellors which increase the distance of travel and volatility of the herbicide."

Environment Canada. Environmental Protection Service. Pacific and Yukon Region. Environmental Monitoring Studies of Selected Pesticide Spray Operations in British Columbia. (Vancouver, B.C. Env. Cda., January 1983) at 4.

Federal concern regarding insecticide and herbicide aerial spraying in the Maritimes has centred on (1) the potential environmental hazards of the chemicals themselves; and (2) the manner in which they are applied and consequent risks of environmental degradation. A recent federal report raised the possibility of formulated materials being more toxic to fish than the parent compound thereby raising concerns for the approval of spray programs:

> "Concentrations of active ingredient measured in natural waters may be well below levels lethal to fish, but the potential amount of total formulation reaching the aquatic environment can be several times greater than the measured quantity of active ingredient. Combined with the possibilities of highly variable spray deposit and spray swarth overlap, the possibility exists that concentrations of total formulation closer to the lethal thresholds for fish than previously predicted may be reaching the aquatic environment."

Environment Canada Brief, supra note 44, at 2, 9.

In commenting on a Quebec Government proposal involving aerial spraying of chemical and biological insecticides covering 1.6 million hectares of wooded land each year, a provincial hearing inquiry noted that:

> "Because the area of land is so large, the problem caused by spreading of poisons (i.e. chemical insecticides) which are known to be very non-selective is aggravated since the chemicals affect different types of environments and risk poisoning a larger number of individuals".

Government of Quebec. Bureau of Public Hearings on the Environment. Aerial Spraying Program To Control The Spruce Budworm. Report of Enquiry and Public Hearings. (Montreal, P.Q.: Government of Quebec, 1983) at 20.

The chemicals in New Brunswick's 30-year spruce budworm aerial spray program are suspected of causing Reye's Syndrome, a rare often fatal children's disease. Hajo Versteeg, "Environmental

918. General Regulation respecting environmental impact assessment and review. R.R.Q. 1981, Q-2, r. 9, s. 2(q).

919. Environment Quality Act, R.S.Q. 1980, c. Q-2, s. 31.3, as am.

920. Government of Quebec Report, supra note 908, at 42.

921. Id., at 155.

922. Id., at 156-159.

923. See, e.g. "Quebec Ignores Own Inquiry", Probe Post, supra note 824 at 31.

923a. Linda Drouin, "Aerial spraying plans abandoned", The Ottawa Citizen, June 16, 1983, at 12.

924. An agriculturalist means "a person who uses farm land for agricultural or forestry production". R.R.O. 1980, Reg. 751, s. 1(d), as am.

925. R.R.O. 1980, Reg. 751, s. 73, as am.

926. R.R.O. 1980, Reg. 751, s. 74(1). There is no aerial licensing exemption for farmers, however. S. 74(2).

927. R.R.O. 1980, Reg. 751, s. 55(2) as am.

928. R.R.O. 1980, Reg. 751, s. 61(2). Schedule 5 pesticides, however, are the principal ones used in agriculture.

929. R.R.O. 1980, Reg. 751, s. 83(1)(a)(b) as am.

930. See, e.g. Pesticide Control Act Regulation. B.C. Reg. 319/81 s. 44(1); Pesticide Applicator Licensing Regulation. A.Reg. 214/80, s. 4(1)(a)(c); and the Pest Control Products (Saskatchewan) Regulations. S. Reg. 207/76, s. 10(b)(i)(iii).

931. Onderdonk, supra note 853.

932. Interview with D. Wilson, Director, Pesticides Control Branch, Ontario Ministry of the Environment (May 28, 1976, Toronto, Ontario) in J.F. Castrilli. Control of Water Pollution From Land Use Activities in the Canadian Great Lakes Basin: An Evaluation of Legislative, Regulatory and Administrative Programs. (Windsor, Ontario: IJC-PLUARG, 1977) at 127.

933. Gouvernement du Quebec Report, supra note 917, at 29.

934. Environment Council of Alberta. Agriculture and the Environment. (Edmonton, Alberta: ECA, November 1981) at 47.

935. Environment New Brunswick Report, supra note 223, at 3.

936. During questioning in the British Columbia Legislative Assembly in 1982 by Mrs. Wallace, MLA, the Hon. Stephen Rogers, B.C. Environment Minister noted in part that:

> "...I'm getting pressured by a number of people to say that everybody who uses pesticides in the province should have to go to the same hearing and I wonder what your position would be if the farmers also have to submit to the Pesticide Control Appeal Board [now the Environmental Management Board]....we have a double standard. If it's in the forest and if it's on the railroads and on the Hydro rights-of-way, we submit the whole thing to an appeal, and yet if it's on agricultural land or in private use....The biggest misuse happens with the private user, the agriculturalist. In fact, the cost of the pesticides or the herbicides they're using are so prohibitive that they're not going to waste any. But there are people...who think that if one ounce per gallon is good, two ounces will kill them twice as dead, and this is not very good."

B.C. Legis. Assembly Deb., June 30, 1982, at 8550.

937. A 1982 New Brunswick report noted in part:

- "Investigations carried out by the New Brunswick Department of the Environment in 1975 indicated that there were environmental problems associated with pesticide use practices being carried out by New Brunswick farmers. More specifically, farmers were involved with careless sprayer filling procedures and improper pesticide container disposal, which posed a potential environmental hazard to aquatic systems." Environment New Brunswick Report, supra note 223, at 2.

- "...incidents of New Brunswick farmers spraying pesticides in high wind conditions have often been reported to the Department in the past." Id., at 6.

- "The survey...showed that few farmers used proper personal protective equipment because it was too inconvenient, hot, or unimportant. This clearly showed that farmers were directly ignoring label information." Id, at 8.

- "...the survey results indicate that a large majority of farmers are disregarding....Label information which is a direct contravention of the Federal Pest Control Products Act. Since 1963, many cases of environmental damage (i.e. fish kills) resulting from agricultural pesticide misuse have been reported to and documented by federal fisheries officers." Id., at 9.

- "The recent survey [summer 1981]provides clear evidence that individual applications of agricultural pesticides on private land and subsequent container disposal practices are not subject to effective regulatory action at the present time." Id.

938. Ontario officials, for example, indicate that there are approximately 90,000 farmers in Ontario. Onderdonk, supra note 853.

939. Onderdonk, supra note 853.

940. Id.

941. Environment New Brunswick Report, supra note 223, at 7.

942. Depl Inquest, supra note 30; and infra note 1049 and accompanying text.

943. R.R.O. 1980, Reg. 751, s. 105.

944. Id., s. 106.

945. Id., s. 107.

946. R.S.O. 1980, c. 141, as am.

947. R.R.O. 1980, Reg. 313. Regulation respecting Transfers of Liquid Industrial Waste made under the Environmental Protection Act R.S.O. 1980, c. 141, as am.

948. Blagdon, supra note 2.

949. Castrilli, supra note 222, at 61.

950. Id.

951. Id., at 60-62. British Columbia and Alberta enacted legislation in 1982 which would give those provinces such authority.

952. R.R.O. 1980, Reg. 751, s. 98.

953. Id., s. 99.

954. Id., s. 103.

955. Id., ss. 100-101.

956. Id.

957. R.S.O. 1980, c. 141, ss. 22-23; R.R.O. 1980, Reg. 751, s. 27.

958. R.S.O. 1980, c. 141, Part IX (Spills).

959. See, e.g. R. v. Animal Health Supplies Ltd., unreported (April 27, 1982, Provincial Court - Regina, Saskatchewan); and "Firm fined $200 after chemical spill at depot", The Leader Post, April 29, 1982 at , Col. .

960. The Queen v. Canada Warehousing Services Ltd. unreported (August , 1982, Sask. Q.B., Maurice, J.).

961. R.R.O. 1980, Reg. 751, s. 25(2).

962. Id., s. 25(1)(a).

963. Id., s. 25(1)(6).

964. O. Reg. 808.81. Regulation respecting Hauled Liquid Industrial Waste Disposal Sites. Eight sites are listed for the entire province. Id., Schedule 1.

965. Blagdon, supra note 2.

966. Supra notes 42-43 and accompanying text.

967. Environment New Brunswick Report, supra note 223, at 7.

968. Karen Benzing and Cyndi Obee, "Water, Waste and Uniroyal", Probe Post. Vol. 5, No. 4 (December 1982) at 12.

969. See, e.g. Agricultural Chemicals Act R.S.A. 1980, c. A-6, s. 6 (storage and handling); s. 9 (containers and storage); s. 10 (disposal). See also the Pesticide Sales, Use and Handling Regulation. A. Reg. 213/80, s. 25 (transport); s. 26 (disposal); s. 42 (storage).

970. Waybill regulations are under development in British Columbia and Alberta arising from legislation enacted in both provinces in mid-1982. Supra notes 222 and 951.

With respect to container disposal programs see, e.g. "Pesticide Container Disposal Program Announced by Saskatchewan", (1983), 246 Canadian Environmental Control Newsletter 2058. This program is modeled on one that has been in place for four years in Alberta and a similar pilot project in Manitoba. Id.

971. R.R.O. 1980, Reg. 751, s. 97(1)(2).

972. Id., s. 97(3).

973. Id., s. 97(4).

974. Blagdon, supra note 2.

975. Supra notes 21, 574-584 and accompanying text.

976. General Regulation under the Pesticides Control Act. N.B. Reg. 83-57, s. 10.

977. Id., s. 11(2).

978. Id., s. 12.

979. Environment New Brunswick Report, supra note 21. See also Environment New Brunswick. Pesticide Usage in New Brusnwick. (Fredericton, N.B.: ENB, 1981).

980. The Pest Control Products (Saskatchewan) Regulations. S. Reg. 207/76, s. 15(a).

981. Id., s. 15(6).

982. General Regulation under the Pesticides Control Act. N.B. Reg. 83-57, s. 19(f)(g). Some provinces also require the applicator to include the meteorological conditions prevailing at the time of application, including temperature, precipitation and approximate wind speed and direction. See, e.g. Pesticide Applicator Licensing Regulation. A. Reg. 214/80, s. 10(1)(g); and Pesticide Control Act Regulation. B.C. Reg. 319/81, s. 12(1)(h).

983. Supra note 979.

984. Supra note 21.

985. See, e.g. Pesticides Act R.S.O. 1980, c. 376, s. 17(1).

986. Id., s. 17(2)(3).

987. Id., s. 17(4).

988. Id., s. 17(5).

989. Id., s. 19.

990. British Columbia Ministry of the Environment. Pesticide Control At the Provincial Level. Standard Speech. (Victoria, B.C.: BCMOE, undated).

991. The number of provincial inspectors for selected provinces follows: Saskatchewan 1 [Correspondence to E.W. Keyserlingk, Law Reform Commission of Canada from Dale Weisbrot, Pesticides Safety Specialist, Agriculture Saskatchewan(July 21, 1983, Regina, Sask.)]; Alberta 57 with 348 municipal inspectors appointed under the Agricultural Chemicals Act [Stewart, supra note 859]; Ontario 20[Onderdonk, supra note 853]; British Columbia 10 [Kobylnyk, supra note 863]; Manitoba 6 [Correspondence to E.W. Keyserlingk, Law Reform Commission of Canada from A.J. Kolach, Extension Entomologist, Agriculture Manitoba (May 26, 1983,

Winnipeg, Manitoba)] ; and New Brunswick 27 [Correspondence to W.W. Keyserlingk, Law Reform Commission of Canada from K.W. Browne, Director, Pesticides Control, Environment New Brunswick (July 15, 1983, Fredericton, N.B.)].

992. Onderdonk, supra note 853.

993. BCMOE Annual Report, supra note 859, at 108.

994. 335 of 2109, Id.

995. 175 of 350 in Region 1, Id.

996. Correspondence to Edward W. Keyserlingk, Project Coordinator, Protection of Life Project, Law Reform Commission of Canada from K.W. Plews, Pesticide Specialist, Environmental Control Services, Manitoba Environmental Management Division (May 30, 1983, Winnipeg, Manitoba).

997. Pesticides Act R.S.O. 1980, c. 376, s. 20.

998. Id., s. 20(2). Stop orders under the Environmental Protection Act, however, have been quashed by individuals by-passing the administrative tribunal and going directly to a superior court to obtain relief. See, e.g. Re. Canada Metal Company Limited and MacFarlane (1973), 1 O.R. (2d) 577, 41 D.L.R. (3d) 161 (Ont. H.C.).

999. Id., s. 20(1)(a)-(d).

1000. Id., s. 21.

1001. Id., s. 21(2)(a)-(c).

1001a. Id., s. 21(3).

1002. Id, s. 11(2).

1003. Id., s. 11(3).

1004. Id., s. 13(10).

1005. Id., s. 23.

1006. See IV.C.2.a.

1007. Onderdonk, supra note 853. All of these have been verbal stop orders, as allowed by the Act, because pesticides, being by design toxic, require rapid action if imminent environmental impairment or occupational or bystander harm from exposure is to be prevented. Id.

1008. Id.

1009. Id.

1010. BCMOE Annual Report, supra note 859, at 54.

1011. Agricultural Chemicals Act. R.S.A. 1980, c. A-6, s. 17.

1012. Stewart, supra note 859.

1013. Onderdonk, supra ntoe 853.

1014. Pesticides Act R.S.O. 1980, c. 376, s. 4. as am.

1015. R.R.O. 1980, Reg. 751, s. 21(1).

1016. Id., s. 21(2).

1017. The Pest Control Products (Saskatchewan) Act R.S.S. 1978, c. P-8, s.3.

1018. Id., s. 4.

1019. Id., s. 5.

1020. Id., s. 8.

1021. Id., s. 10.

1022. R.S.A. 1980, c. A-6, s. 26; R.S.S. 1978, c. P-*, s. 25.

1023. Pesticides Control Act R.S.N.B. 1982, c. 48, s. 30(1.1).

1024. Supra note 1022.

1025. Supra note 1023.

1026. R.S.O. 1980, c. 376, s. 34.

1027. Browne, supra note 991. See, e.g. R. v. Forest Patrol Ltd. unreported sentencing judgement of Judge Donald R. Allen, New Brunswick Provincial Court (Hampton, 1981). Accused plead guilty to violation of s. 16(2). Pesticides Control Act. Fine : $200.

1028. During this period MOE lawyers undertook 41 prosecutions under the Act and obtained 35 convictions. A total of $22,895 was assessed in fines for the 8-year period; or $2,875 assessed per year; $516 per conviction. The largest fine was for $3,500; the smallest was a suspended sentence. Ontario Ministry of the Environment. Prosecution Activity Under the Pesticides Act. (Toronto: MOE, 1982).

1029. Kobylnyk, supra note 863. In 1980/81, four charges were laid under the Act; in 1981/82, 17 were laid. BCMOE Annual Report, supra note 859, at 108.

1030. Kobylynk, id.

1031. Stewart, supra note 859.

1032. Supra note 1028. It should be noted that Ontario MOE has its own staff of lawyers, seconded from the Ministry of the Attorney General and does not rely on Crown Attorneys or outside counsel in quasi-criminal matters.

1033. Onderdonk, supra note 853.

1034. Correspondence to R. Brewster, Wyevale, Ontario from W.J. Cowie, District Pesticides Officer, Ontario Ministry of the Environment (September 27, 1982, Barrie, Ontario).

1035. Id.

1036. Id.

1037. Correspondence to F. Brox, Director of Farm Operations, Hostess Food Products from W.J. Cowie, District Pesticides Officer, Ontario Ministry of the Environment (September 27, 1982, Barrie Ontario).

1037a. W-5 transcript, supra note 623, at 3.

1038. Supra notes 623-624 and accompanying text.

1039. F. Brox, Hostess Director of Farm Operations, supra note 623, at 4.(W-5).

1040. W-5 transcript, supra note 623, at 4,8.

1041. Id.

1042. In May 1983, for example, in British Columbia the Central Okanagan Regional District was convicted and given a 6-month probationary sentence during which time it must comply with the terms of any pesticide use permit granted it or be fined $1,000 and be liable for further prosecution for breach of probation. The CORD had been convicted for unlawfully applying a pesticide within 300 metres of fish-bearing waters. The charges were laid by local residents and the case conducted as a private prosecution after B.C. Environment Ministry officials did not pursue charges. "CORD pleads guilty to lone spraying charge", Kelowna Daily, May 19, 1983.

1043. Supra note 30 and accompanying text.

1044. Morrison, supra note 174.

1045. Coroners Act R.S.O. 1980, c. , s. 25.

1045a. Id., s. 25(2).

1046. Id., s. 25(4).

1047. Id., s. 25(3).

1048. Supra, note 39.

1049. Coroner's Jury Verdict, supra note 30, at 2-3.

1050. "Improper testing left pesticide risk unknown, inquest told", New Westminister Columbian, April 12, 1983, at 1, col. 1. (Comments of Janet Taylor, associate director, pesticide evaluation, Agriculture Canada).

1051. BCMOE Annual Report, supra note 859, at 108.

1052. R.S.O. 1980, c. 376, s. 37.

1053. See III.

1054. Municipal institutions are a provincial responsibility. The Constitution Act, 1867, s. 92(8).

1055. See, e.g. the Municipal Act, R.S.O. 1980, c. 302.

1056. See, Cox Construction Ltd., v. Township of Puslinch (1982), 36 O.R. (2d) 618, A.G. Ont. v. Mississauga (1981), 10 C.E.L.R. 91 (Ont. C.A).

1057. Stewart, supra note 859. Section 16 (1) of the Agricultural Chemicals Act, R.S.A. 1980, c.A-6 provides that each local authority shall appoint a sufficient number of inspectors to carry out the provisions of this Act within the boundaries of its municipality. Section 16(3) provides that where, in the opinion of the Minister a local authority is not properly enforcing this Act, the Minister may, after serving notice on the local authority, cause one or more inspectors appointed by the Minister to carry out the provisions of this Act within the boundaries of the municipality.

1058. See, e.g. the Public Health Act, R.S.O. 1980, c. 409 and the Health Protection and Promotion Act, 1983, S.O. 1983, c. 10. (to be proclaimed).

1059. Correspondence between Dr. Gerald Caplan, former coordinator of the Health Advocacy Unit, Toronto Department of Public Health, and Monique Begin, Minister of Health and Welfare and Harry Parrott, former Ontario Minister of Environment, (August 25, 1980, Toronto, Ontario).

1060. Toronto Local Board of Health. Medical Officer of Health, Report on Pesticides used by the City of Toronto, (Toronto:LBOH , June 12, 1981) in Tor. City Council, Minutes Appendix "A" Local Board of Health Report No. 13 at 10251. See also Sandro Contenta, "City asked to suspend use of 22 Pesticides", Toronto Star, June 24, 1981 at A25.

1061. City Council Minutes, id., at 10253.

1062. Id., at 10259.

1063. Id., at 10279.

1064. Linda Rosenbaum, Doug Saunders, Health Advocacy Unit, Toronto Department of Public Health, Submissions on Captan to the Consultative Committee on IBT Pesticides. (Toronto: February, 1982) at 22-23.

1065. Correspondence from Anne Johnston, Chairman of the Toronto Local Board of Health to the Honourable J. Greg Kerr Nova Scotia Minister of the Environment. (July 21, 1983, Toronto, Ontario) at 2. See also "Toronto Health Board Opposes Herbicide Spray Permit in N.S.", Globe and Mail, August 1, 1983 at p. 5.

1066. Memo to Local Board of Health from Anne Johnston, Chairman, dated September 26, 1983.

1067. See the Weed Control Act, R.S.O. 1980, c. 530 as amended. Section 4 provides that "every person in possession of land shall destroy all noxious weeds thereon".

1068. R.R.O. 1980, Regulation 944 as amended. Section 4 sets out 5 methods that can be used to destroy weeds. Only one method listed refers to treatment by herbicides. Other methods include mulching, pulling the plants, cutting roots or stalks, and plowing or cultivating the soil in which the plants are growing.

1069. David Evans, "Ottawa imposes two-year ban on use of 2,4-D in Parks", Ottawa Citizen, April 7, 1983.

1070. James Cutting "School board vetoes spray ban", The Port Hope Evening Guide, Friday, May 11, 1979 at 1 and 12. See also correspondence between Toby Vigod, Counsel, Canadian Environmental Law Association and Dr. Harry Parrott, the Ontario Minister of the Environment (May 14, May 29, June 8, July 24, and August 31, 1979, Toronto, Ontario).

1071. See "Kids 2,4-D-sprayed on purpose: Parrott", Toronto Star, June 15, 1979; "2,4-D makes kids ill, Cassidy says", Toronto Star, June 19, 1979.

1072. For example, in 1979, over 15 Ontario school boards had suspended their spray programs. These included the Halton Board of Education, the Victoria Board and the Northumberland Separate School Board.

1073. See Alden Baker, "Ban placed on use of 2,4-D in parks", Globe and Mail, September 19, 1979.

1074. Memo from the Commissioner of Parks and Recreation to the Committee on Parks, Recreation and City property regarding Weed Control (April 22, 1980, Toronto, Ontario).

1075. See report prepared for the Local Board of Health by Dr. S. Safe, "The Impact of 2,4-D", (May 2, 1980, Toronto, Ontario).

1076. See Recommendations made from the Local Board of Health to the Committee on Parks, Recreation and City Property, Tor. City Council, Minute #314, May 2, 1980.

1077. Id.

1078. See Tor. City Council. Minute #306, May 26, 1981.

1079. For example, in January, 1984, the Department of Health sponsored a conference on IPM in the urban setting. They are pursuing the possibility of a pilot project to test the feasibility of non-chemical alternatives for eliminating cockroaches.

1080. City of Toronto. Department of Public Health. Health Advocacy Unit. Our Chemical Society: Chemicals, Environment and Health, prepared by T. Hancock, D. Saunders and D. Cole (Toronto: October, 1981) at 14, 74-77.

1081. City of Philadelphia Fire Code. Ch. 5 as am. (1981). Approximatley 450 substances are subject to the fire code reporting requirements. See also City of Philadelphia, Air Management Code. Ch. 3. as am. (1981).

1082. See Anne Johnston, "Hazardous Substances and the Right to Know: The Public Health Perspective" in Proceedings - Hazardous Substances and the Right to Know. (Toronto: CELRF, October 26, 1983).

1083. See, e.g., City of Windsor. Council Resolution. M24-82 (February 1, 1982). See also John Jackson, "The Right to Know Hazardous Substances in the Community and Workplace: The Municipal Role", a report prepared for the City of Toronto Department of Public Health (June, 1983). On September 23, 1983 the Board of Health authorized the Medical Officer of Health to explore the legislative possibilities for the development of a municipal right to know by-law.

1084. For example, in 1982 the Toxics Coalition was formed in Toronto. It is a loose alliance of individuals from different backgrounds, containing people from law, labour, environmental and citizens groups, and public health professionals. On October 11, 1983, the Coalition presented a brief entitled "The Right to Know - The Need for Access to Information Concerning Hazardous Substances used in the Workplace and Stored in the Community". See also Joanna Kidd "Political Pressures in Canada" in Proceedings-Hazardous Substances and the Right to Know. (Toronto: CELRF, October 26, 1983).

1085. John Jackson, "The Right-to-Know Movement" in Proceedings-Hazardous Substances and the Right to Know". (Toronto: CELRF, October 26, 1983).

1086. Supra note 11.

1087. United States Government. State Department. Strategy Conference on Pesticide Management. Proceedings. (Washington, D.C.: State Dept., June 1979) at 33.

1088. Lawyers Committee for International Human Rights. Memorandum to Sponsors of United Nations General Assembly Resolution 34/173 (December 1979) on the Exchange of Information on Banned Hazardous Chemicals and Unsafe Pharmaceutical Products. (November 3, 1980, New York City) at 3.

1089. Food and Agriculture Organization of the United Nations. Report of the Second Government Consultation on International Harmonization of Pesticide Registration Requirements. U.N.Doc. AGP: 1982/M/5 (Rome: FAO, 1982) at 1.

1090. FAO, supra note 1, at 1.

1091. FAO, supra note 1089, at 1.

1092. FAO , supra note 1, at 3.

1093. FAO, supra note 1089, at 15.

1094. Id., at 5, 15, and 19.

1095. Id., at 5-15.

1096. Id., at 15-19. Both phased registration and protection of confidential data have been extremely controversial issues at the national and international levels.

With respect to phased registration, the benefits of this approach have been seen to include: (1) permitting full development of practical use experience with a product during its development, thereby increasing confidence in full registration decisions; and (2) supplementing the manufacturer's information so that sounder investment decisions can be made; a situation that is not as possible without adequatefield data. The disadvantages of phased registration relate to the view that it is wrong to market products that are not fully tested. FAO has agreed that the regulatory authority should not allow the use to be more widespread in a given phase than the data justify. Id., at 16.

With respect to data confidentiality, the FAO has investigated the ways and means of reconciling the public interest in data submitted to registration authorities with the manufacturers' interest in having some of the information treated as confidential. FAO notes that

the main industry concern is the release of trade secrets (i.e. manufacturing or formulating know-how) that could be used by competitors who have otherwise not shared in the commercial risks of a particular pesticide's development. FAO notes that an international pesticide trade association (GIFAP) has not objected to public access to health and safety data submitted in support of pesticide registrations "so long as this public access does not include the right to copy that proprietary data." Id., at 18. FAO notes that some countries, for example the U.S., provide for a period of exclusive use plus compensation for data used for an additional period by other competitors. Thus, statutory public access to such health and safety data is assured. Id., at 19.

1097. Id., at 19-30.

1098. Food and Agriculture Organization of the United Nations. Second Expert Consultation on Environmental Criteria for Registration of Pesticides. Tech Paper No. 28 (Rome: FAO, 1981).

1099. Id., at 2.

1100. Id.

1101. Id., at 18.

1102. FAO, supra note 1089, at 33.

1103. R.F. Glasser, "Pesticides: The Legal Environment" in Pesticides and Human Welfare, D.L. Gunn and J.G.R. Stevens, eds. (London: Oxford University Press, 1976) at 231-232.

1104. Id., at 232.

1105. J.J. Lambers, State Secretary, Health and Environmental Protection, The Netherlands, Opening Speech at the Fourteenth Session of the Codex Committee on Pesticide Residues. Report. The Hague 14-21 June 1982. ALINORM 38/24A (Rome: Codex Alimentarius Commission, 1983) at 58.

1106. Dr. L. Ginjaar, Minister of Health and Environmental Protection, Opening Speech at the Thirteenth Session of the Codex Committee on Pesticide Residues. Report. The Hague, 15-20 June 1981. ALINORM 83/24. (Rome: Codes Alimentarius Commission, 1983) at 3.

1107. Lambers, supra note 1105, at 58.

1108. Smith, supra note 354, at 902A.

1109. Codex Report, supra note 1106, at 26.

1110. NRDC v. EPA, supra note 451.

1111. The Canadian Agricultural Chemcials Association (CACA) indicates that Canada "has to rely almost totally on foreign suppliers for

its chemical pesticides. The Canadian industry formulates pesticides for use here, but the active ingredients it needs are 96% imported". CACA, supra note 58, at 6.

1112. United States General Accounting Office. Better Regulation of Pesticide Exports and Pesticide Residues in Imported Food is Essential. A Report to the Congress by the Comptroller General of the United States. CED-79-43 (Washington, D.C.: GAO, June 1979) at 87.

1113. According to the GAO, 20 Latin American countries imported 154,627,138 pounds of pesticides from the U.S. in 1976. Id.

1114. For Western Europe in the same year the quantity was 133,379,347 pounds. Id.

1115. The GAO reported in 1979 that:

> "Pesticides suspended, cancelled, or never registered for use in the United States because of hazards associated with their use are exported routinely. Serious injuries have occurred from the use of these pesticides in other countries. The Environmental Protection Agency in many cases has neither informed other governments of pesticide suspensions, cancellations, and restriction in the United States nor revoked tolerances for residues of these pesticides on imported food."

Id., at frontispiece.

1116. Lambers, supra note 1105, at 59.

1117. Supra notes 317, 540-557 and accompanying text.

1118. "Data Profiles: The Legal File", UNEP: International Register of Potentially Toxic Chemicals Bulletin. Vol. 6, No. 1 (September 1983) at 3.

1119. Id.

1120. Organization for Economic Co-operation and Development. Environment Directorate. Chemicals Group and Management Committee. Information Exchange Related to Export of Hazardous Chemicals: Report on Current International Exchange Schemes. ENV/CHEM/CM/83.7 (Paris: OECD, April 1983).

1121. Id., at 39.

1122. Id.

1123. Id., at 40.

1124. Id.

1125. Id., at 41.

1126. Organization for Economic Co-Operation and Development. Environment Directorate. Chemicals Group and Management Committee. German Proposal for a Code of Conduct Concerning the Export of Hazardous Chemicals. ENV/CHEM/CM/83.9 (Paris: OECD, April 1983) at 5-6.

1127. Id., at 7.

1128. 7 U.S.C. 136; s. 17(6).

1129. GAO, supra note 1112; see also correspondence to the Hon. Douglas M. Costle, Administator, U.S. Environmental Protection Agency from Henry Eschwege, Director, Community and Economic Development Division, U.S. GAO (April 20, 1978, Washington, D.C.)

1130. United States Council on Environmental Quality. Environmental Quality: Eleventh Annual Report. (Washington, D.C.: CEQ, December 1980) at 241. Members of Congress had expressed concerns for several years regarding the problem. A Wisconsin Senator in 1978 called for a prohibition on the export of pesticides that are banned in the U.S. and for controls on the export of restricted U.S. pesticide products. This followed information from the U.S. Food and Drug Administration that showed 45 per cent of 55 imported green coffee bean samples tested by the FDA contained illegal residues of pesticides that have been banned or restricted for use in the U.S. Office of Senator Gaylord Nelson. Press Release, "Nelson Calls for Pesticide Export Controls", (January 30, 1978, Washington, D.C.) at 1.

1131. David Weir and Mark Schapiro. Circle of Poison: Pesticides and People in a Hungry World. (San Francisco, Calif.: Institute for Food and Development Policy, 1981) at 63-64 (Update).

1132. See exchange between Simon de Jong, M.P. and the Hon. Monique Begin, Minister of National Health and Welfare, Can. H. of C. Deb. November 26, 1980, at 5091. See also "Pesticide Shipments a Potential Time Bomb", The Regina Leader Post, November 26, 1980 at , col. .; see also "Begin challenges pesticide claim", Winnipeg Free Press, November 27, 1980 at , Col. .

1133. United Nations General Assembly Resolution. UNGA 34/173 (1979) [information exchange and discourage certain exports]; and United Nations General Assembly Resolution. UNGA 37/137(1982) [provide full information to safeguard health and environment in importing country and control certain exports].

1134. Organization for Economic Co-Operation and Development. Environment Directorate. Good Laboratory Practice in the Testing of Chemicals. (Paris: OECD, 1982) at 11.

1135. Id, at 11-12.

1136. Id., at 12.

1137. Id., at 13.

1138. Id., at 3.

1139. Id.

1140. Id., at 9.

1141. Id., at 13.

1142. Id., at 9.

1143. Supra notes 314-321 and accompanying text.

1144. Organization for Economic Co-Operation and Development. Environment Directorate. Compensation for Pollution Damage. (Paris: OECD, 1981) at 5-6.

1145. Emmanuel du Pontavice and Patricia Cordier, "Compensation for 'Indirect or Remote' Pollution Damage in Individual Countries and at the International Level", id, at 7; and Volker Thiem, "Environmental Damage Funds", id., at 144-146.

1146. See III A.-K.

1147. Supra note 1144.

1148. Jean Bigot, "Compensation for Pollution Damage and Insurance", supra note 1144, at 131-133.

1149. Id., at 134.

1150. Thiem, supra note 1145, at 146.

1151. Id., at 169-180.

1152. International Joint Commission. First Biennial Report Under the Great Lakes Water Quality Agreement of 1978. (Ottawa and Washington, D.C.: IJC, June 1982) at 1.

1153. Treaty Between the United States and Great Britain Relating to Boundary Waters, and Questions Arising Between the United States and Canada (January 11, 1909). See also Boundary Waters Treaty Act R.S.C. 1970, c. .

1154. International Joint Commission. Report on Pollution of Lake Erie, Lake Ontario and the International Section of the St. Lawrence River. (Ottawa and Washington, D.C.: IJC, 1970).

1155. Canada and the United States of America. Great Lakes Water Quality Agreement of 1972. (Ottawa and Washington, D.C.: Gov'ts. of Cda. and the U.S.A., November 1972).

1156. Canada and the United States of America. Great Lakes Water Quality Agreement of 1978. (Ottawa and Washington, D.C.: Gov'ts of Cda. and the U.S.A., November 1978).

1157. Treaty, supra note 1153, Art. IV, para. 2.

1158. GLWQA 1978, supra note 1156, Art. II.

1159. Id.

1160. Id., Art. II. a and Annex 12.

1161. Id. Art VII.

1162. The Agreement's toxic substances provisions have been reviewed in Castrilli, supra note 222, at 385-388.

1163. GLWQA 1978, supra note 1168, Art. VI. 1. (e)(i).

1164. Id., Annex 1, I.A.

1165. Id., Annex 1, I.B.

1166. IJC, supra note 1154, at 26-27, 58.

1167. Id., at 27.

1168. IJC, supra note 38, at 74.

1169. Id.

1170. International Joint Commission. Pollution in the Great Lakes Basin from Land Use Activities. A report to the Governments of Cda. and the U.S. (Ottawa and Washington, D.C.: IJC, March 1980) at 104.

1171. International Joint Commission. Addendum to the First Biennial Report under the Great Lakes Water Quality Agreement of 1978. (Ottawa and Washington, D.C.: IJC, August 1982) at 21.

1172. Id.

1173. Id., at 25; supra note 823, at 6.

1174. Supra note 823, at 7.

1175. IJC, supra note 1171, at 5.

1176. IJC, supra note 823, at 5.

1177. IJC, supra note 1171, at 33.

1178. Id.

1179. Id.

1180. Id.

1181. Supra notes 337-369, 802-811 and accompanying text.

1182. Supra notes 322-331, 521-522, 1049, 1134-1143 and accompanying text.

1183. Supra notes 416-420, 900-907 and accompanying text.

1184. Supra notes 286, 625-652, 1049 and 1096 and accompanying text.

1185. Supra notes 370-415, 1096 and accompanying text.

1186. Supra notes 431-441 and accompanying text.

1187. Supra ntoes 442-471 and accompanying text.

1188. This has been proposed with respect to toxic chemicals generally, supra note 222, at 398-399.

1189. Id., at 399-400.

1190. Supra notes 477-485 and accompanying text.

1191. Supra notes 554-557 and accompanying text.

1192. Supra notes 21, 574-584 and accompanying text. This type of reform has specifically been proposed by a U.S. Congressional subcommittee, supra note 584, at 7-8.

1193. Supra notes 21, 574-584 and accompanying text.

1194. Supra note 593 and accompanying text.

1195. Supra notes 601, 606, 613-616 and accompanying text.

1196. Supra notes 617-624 and accompanying text.

1197. Saskatchewan officials have noted that:

> "Existing labelling of pesticides in Canada under the [PCPA] requires that only 'active ingredients' be listed. This means that many ingredients of formulated pesticides need not be listed on the label since legally they are not defined as a 'active ingredient'".

Supra note 849, at 22. Inerts may be biologically active. Id, at 23.

1198. Supra notes 618-619 and accompanying text.

1199. Supra notes 1111-1133 and accompanying text.

1200. Supra notes 826 -836 and accompanying text.

1201. Supra notes 661-704 and accompanying text.

1202. Supra note 706 and accompanying text.

1203. Supra note 706 and accompanying text.

1204. Supra notes 971-984 and accompanying text.

1205.

1206. Supra notes 924-942 and accompanying text.

1207. Supra notes 961-968 and accompanying text.

1208. Supra notes 943-951 and accompanying text.

1209. Supra notes 908-923a and accompanying text.

1210. Supra note 907 and accompanying text.

1211. Supra notes 1014-k042 and accompanying text.

1212. Supra notes 1052-1053 and accompanying text.

1213. Supra notes 1144-1151 and accompanying text.

1214. Supra notes 1080-1085 and accompanying text.

1215. Supra notes 198-201 and accompanying text.

1216. Supra note 201 and accompanying text.