

**NEW DIRECTIONS FOR
ENVIRONMENTAL IMPAIRMENT LIABILITY INSURANCE IN CANADA**

by

LARRY A. REYNOLDS

B. A., The University of Alberta, 1980
B.Ed., The University of Alberta, 1983
LL.B., The University of Alberta, 1987

**A THESIS SUBMITTED IN PARTIAL FULFILMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF LAWS**

in

**THE FACULTY OF GRADUATE STUDIES
&
FACULTY OF LAW**

We accept this thesis as conforming to the required standard:

THE UNIVERSITY OF BRITISH COLUMBIA
October, 1995
© Larry A. Reynolds, 1995

AUTHORIZATION

In presenting this thesis in partial fulfilment of the requirements for an advanced degree at the University of British Columbia, I agree that the Library shall make it freely available for reference and study. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by the head of my department or by his or her representatives. It is understood that copying or publication of this thesis for financial gain shall not be allowed without my written permission.

Faculty of Law

The University of British Columbia
Vancouver, Canada

Date October 10, 1995

ABSTRACT

A theme which currently dominates environmental regulation in Canada is for a strengthening of the "polluter pays" approach to environmental regulation. This trend sees those who impair the environment held increasingly financially responsible for their actions through such mechanisms as a new generation of statutory liabilities which include liability for environmental response and cleanup charges, the requirement of security in the event of environmental contamination, and the creation of statutory civil causes of action designed to assist claimants in recovering for losses resulting from environmental contamination. These mechanisms are supplemented by an increasing willingness by the courts to give serious consideration to innovative new approaches by private claimants to hold polluters civilly accountable for toxic tort related claims.

As a result, those in Canada with potential exposure to this new generation of environmental liabilities will inevitably turn to the insurance industry for coverage. Ironically, it is these same new liabilities which will make it increasingly difficult for insurers to provide the desired coverage. Further, in the event that such coverage is provided, insurers will be required to be especially diligent in evaluating and delineating those environmental risks which they are prepared to cover. Many industrial and commercial enterprises will require environmental impairment insurance in order to carry out operations subject to environmental risk. Insurers providing environmental insurance in this context will effectively find themselves cast into the somewhat unlikely role of environmental regulators within Canadian society.

For more than fifty years the insurance industry in Canada has provided a wide range of insurance products for liability resulting from impairment of the natural environment. In developing and marketing environmental impairment insurance products the insurance industry has primarily relied upon the risk-based analysis which it has historically utilized to provide

coverage for more traditional insurance products such as fire, automobile, and marine insurance. However, it is submitted that the attempts by the industry to provide environmental impairment insurance has been fraught with problems, and the success of the products which have been provided has been limited. This in turn raises serious questions as to the ability of the insurance industry to assume responsibility for the regulation of environmental impairment in the future.

It is the primary hypothesis of this thesis that the insurance industry has experienced significant difficulties in providing environmental impairment liability insurance in Canada, and that these difficulties are due in large part to the inability of the industry to accurately predict the incidence of loss associated with environmental impairment in Canada. Further, the difficulties with prediction experienced by the insurance industry are primarily the result of its failure to take into account perceptions of environmental risk by the Canadian public and by environmental decision-makers. Finally, this inability to accurately predict has been accompanied by the failure of the insurance industry to recognize the problem, resulting in overconfidence by the industry with respect to its environmental impairment liability products.

TABLE OF CONTENTS

	Abstract	ii
	Table of Contents	iv
	List of Tables	ix
1.0	Introduction	1
2.0	Conceptions Of Environmental Risk	6
2.1	Introduction	6
2.2	Conceptions Of Risk	6
2.2.1	Environmental Risk Practitioners' Approach	7
2.2.1.1	Risk Assessment	8
2.2.1.2	Risk Perception	9
2.2.2	Canadian Insurance Industry Approach	11
2.2.2.1	Purpose And Nature Of Insurance	12
2.2.2.2	Conception Of Risk	14
2.3	Conclusions	15
3.0	Historical Review Of Environmental Impairment Liability Insurance In Canada	17
3.1	Introduction	17
3.2	Third Party Comprehensive General Liability Policies	18
3.2.1	The Early Days: "Accident" Based Coverage	20
3.2.2	The Development of "Occurrence" Policies	23
3.2.3	The "Sudden and Accidental" Pollution Exclusion	28
3.2.3.1	Approach No. 1	32
3.2.3.2	Approach No. 2	32
3.2.3.3	Approach No. 3	33
3.2.3.4	Approach No. 4	33
3.2.3.5	Approach No. 5	34

		v.
3.2.4	The "Absolute Pollution Exclusion"	37
3.2.5	Recent Attempts To Provide Environmental Liability Insurance In Canada	39
3.2.5.1	The "Claims Made" CGL Policy	39
3.2.5.2	The "Limited Pollution Liability" Policy	40
3.2.5.3	The "Limited Pollution Liability" Endorsement	43
3.3	Conclusions	46
4.0	The New Generation Of Statutory Civil Environmental Liabilities	48
4.1	Introduction	48
4.2	Civil Action Upon Conviction Of Offence Under Regulatory Legislation	50
4.3	Civil Action To Protect The Public Trust	52
4.4	Statutory Civil Liability For Preventive Response And Cleanup Of Contaminated Sites	55
4.4.1	The United States Experience	55
4.4.2	Canadian Preventive Response And Cleanup Liability Legislation	62
4.5	Financial Security For Preventive Response And Environmental Cleanup	65
4.6	Conclusions	66
5.0	The New Generation Of Common Law Civil Environmental Liabilities	74
5.1	Introduction	74
5.2	Compensation For Increased Chance Of Injury	75
5.2.1	Injury To Immune System	76
5.2.2	Fear Of Future Injury	78
5.2.3	Ongoing Medical Monitoring	80
5.3	Conclusions	90

		vi.
6.0	Problems Within The Legal System In Addressing Environmental Impairment Issues	93
6.1	Introduction	93
6.2	Empirical Research Summary	94
6.2.1	Purpose And Objectives	94
6.2.2	Methodology And Procedures	95
6.2.2.1	Inclusion Criteria	95
6.2.2.2	Identification Of Potential Respondents	97
6.2.2.3	Data Collection Strategy	98
6.2.2.4	Response	98
6.2.2.4.1	Legal Counsel	100
6.2.2.4.2	Expert Scientific Witnesses	103
6.2.2.5	Survey Questionnaires	109
6.2.2.5.1	Questionnaire Design	109
6.2.2.5.2	Review And Testing	113
6.2.2.5.3	Ethics Review	114
6.2.2.6	Confidentiality	114
6.2.2.7	Data Transfer	115
6.2.2.8	Data Analysis	115
6.2.2.9	Statistical Significance Of Research Data	115
6.3	Empirical Research Findings	116
6.3.1	Interface #1: The Quality Of Scientific Information Presented To Courts	116
6.3.2	Interface #2: Communication/Comprehension Of Scientific Concepts	117
6.3.2.1	Problems In The Communication Of Scientific Information	117
6.3.2.2	Problems In The Comprehension And Understanding Of Scientific Information	120

		vii.
6.3.3	Interface #3: Scientific Uncertainty Concerning Environmental Issues	122
6.3.3.1	Scientific Uncertainty And Legal Standards Of Proof	125
6.3.3.1.1	The Traditional Approach: Reactive Decision-Making	129
6.3.3.1.2	The Precautionary Approach	129
6.3.4	Interface #4: Legislative Standards	133
6.3.4.1	Establishment Of Standards	134
6.3.4.1.1	Quantitative Standard Environmental Legislation	134
6.3.4.1.2	Normative Standard Environmental Legislation	138
6.3.4.2	Translating Scientific Information Into Standards	140
6.3.5	Interface #5: Legal System Poorly Suited To Address Scientific Issues	142
6.4	Conclusions	144
7.0	A New Approach To Environmental Impairment Liability Insurance In Canada	146
7.1	Introduction	146
7.2	Validity Of Primary Hypothesis	147
7.3	Public Policy Considerations	148
7.3.1	Into The Future: The Changing Market For Environmental Impairment Liability Insurance In Canada	149
7.3.2	The Insurance Industry As Environmental Regulator	152
7.4	A New Approach To The Delivery Of Environmental Impairment Liability Insurance	156

	viii.
Appendix 1 Judiciary Survey Questionnaire	160
Appendix 2 Legal Counsel Survey Questionnaire	181
Appendix 3 Expert Scientific Witness Survey Questionnaire	202
Appendix 4 Survey Questionnaire Covering Letter	224

LIST OF TABLES

Table 1	Survey Questionnaire Response	100
Table 2	Problems With The Quality Of Scientific Information At Environmental Trials	117
Table 3	Problems With Communication Of Scientific Information At Environmental Trials	120
Table 4	Problems With Comprehension Of Scientific Information At Environmental Trials	121
Table 5	Problems Where Scientific Evidence Results In Uncertainty With Respect To Scientific Issues At Environmental Trials	123
Table 6	Problems Where There Is Contradictory Or Conflicting Scientific Information At Environmental Trials	124
Table 7	Translating Scientific Certainty And Uncertainty Into Legal Standards Of Proof	127
Table 8	Problems With Using Scientific Information To Establish Decision-Making Standards Used In Environmental Trials	134
Table 9	Failure Of Quantitative Standards To Accurately Reflect The Current State Of Scientific Information With Respect To Effects Of Pollution On The Environment	137
Table 10	Too Little Emphasis On Scientific Information When Establishing Quantitative Standards	138
Table 11	Problems With Translating Scientific Information Into Decision-Making Standards Which Are Used At Environmental Trials	140
Table 12	Relating Scientific Information To Normative Standards Found In Environmental Legislation	141
Table 13	Relating Scientific Information To Quantitative Standards Found In Environmental Legislation	142
Table 14	Problems In The Use Of Legal Decision-Making Institutions And Legal Procedures For The Resolution Of Scientific Issues In Environmental Decision-Making	143
Table 15	Suitability Of The Existing Legal Process To Address Scientific Issues	144

1.0 INTRODUCTION

A theme which currently dominates environmental¹ regulation in Canada is for a strengthening of the "polluter pays" approach to environmental regulation. This trend sees those who impair the environment held increasingly financially responsible for their actions through such mechanisms as a new generation of statutory liabilities which include liability for environmental response and cleanup charges, the requirement of security in the event of environmental contamination, and the creation of statutory civil causes of action designed to assist claimants in recovering for losses resulting from environmental contamination. These mechanisms are supplemented by an increasing willingness by the courts to give serious consideration to innovative new approaches by private claimants to hold polluters civilly accountable for toxic tort related claims.

As a result, those in Canada with potential exposure to this new generation of environmental liabilities will inevitably turn to the insurance industry for coverage. Ironically, it is these same new liabilities which will make it increasingly difficult for insurers to provide the desired coverage. Further, in the event that such coverage is provided, insurers will be required to be especially diligent in evaluating and delineating those environmental risks which they are prepared to cover. Many industrial and commercial enterprises will require environmental impairment insurance in order to carry out operations subject to environmental risk. Insurers providing environmental insurance in this context will effectively find themselves cast into the somewhat unlikely role of environmental regulators within Canadian society.

¹ For the purpose of this Thesis the terms "environment" and "environmental" refer to the natural environment, and include environmental health issues.

For more than fifty years the insurance industry in Canada has provided a wide range of insurance products for liability resulting from impairment of the natural environment. In developing and marketing environmental impairment insurance products the insurance industry has primarily relied upon the risk-based analysis which it has historically utilized to provide coverage for more traditional insurance products such as fire, automobile, and marine insurance. However, it is submitted that the attempts by the industry to provide environmental impairment insurance has been fraught with problems, and the success of the products which have been provided has been limited. This in turn raises serious questions as to the ability of the insurance industry to assume responsibility for the regulation of environmental impairment in the future.

It is the primary hypothesis of this thesis that the insurance industry has experienced significant difficulties in providing environmental impairment liability insurance in Canada, and that these difficulties are due in large part to the inability of the industry to accurately predict the incidence of loss associated with environmental impairment in Canada. Further, the difficulties with prediction experienced by the insurance industry are primarily the result of its failure to take into account perceptions of environmental risk by the Canadian public and by environmental decision-makers. Finally, this inability to accurately predict has been accompanied by the failure of the insurance industry to recognize the problem, resulting in overconfidence by the industry with respect to its environmental impairment liability products. This thesis attempts to establish the validity of this hypothesis through consideration of four sub-hypotheses which are based upon an investigation of the experiences of the insurance industry in providing environmental impairment liability insurance in Canada, and upon consideration of present and future challenges which the industry faces in attempting to provide this product. In this regard this thesis undertakes the following:

1. Chapter Two will introduce the concept of risk, and in particular will focus on the differing conceptions of risk as contemplated by environmental risk practitioners and by the insurance industry.
2. Chapter Three will provide a detailed review of environmental impairment liability insurance products provided in the Canadian marketplace during the past fifty years. It is anticipated that this review will establish the first sub-hypothesis, that the insurance industry in Canada has experienced numerous difficulties in providing environmental impairment liability insurance, and that many of these difficulties were due to the fact that the insurance industry has been unable to accurately assess the nature and extent of the incidence of loss resulting from environmental impairment. Finally, this review is intended to provide the foundation for establishing that a number of these difficulties were due in part to the operation of three additional factors, each of which will be considered as sub-hypotheses in subsequent chapters.
3. Chapter Four will examine the second sub-hypothesis, that in entering into the environmental impairment liability insurance marketplace the insurance industry has failed to anticipate recent legislative reforms which have created a new generation of statutory based civil environmental liabilities. It is further submitted that this failure to anticipate legislative reform is directly related to the failure of the industry to recognize a change in the Canadian public's perception of risk of environmental impairment which reached its peak during the late 1980's and early 1990's.
4. Chapter Five will explore the third sub-hypothesis, that in entering into the environmental impairment liability insurance marketplace, the insurance industry may encounter additional difficulties in the event that it fails to anticipate the development of a new

generation of common law civil environmental liabilities which may further impair the ability of the insurance industry to predict the incidence of loss in environmental cases. It is further submitted that these changes in the common law are directly related to a growing perception amongst judges that environmental impairment cases may raise unique issues and that traditional tort law may not be adequate to compensate injured parties for their losses in these cases. Finally, it is suggested that in response these judges appear prepared to acknowledge the validity of new and innovative common law civil environmental liabilities which are intended to ensure that those responsible for pollution will be required to fully compensate those who have suffered loss resulting from that pollution.

5. Chapter Six will consider the fourth sub-hypothesis, that in attempting to predict the risk associated with the provision of environmental impairment liability insurance the insurance industry has failed to take account of problems which may exist within the legal system in addressing environmental impairment cases involving complex scientific evidence. Recently completed empirical research indicates that there is a perception amongst participants in legal environmental decision-making processes that significant confusion and uncertainty currently exist within the judicial system with respect to the handling of complex scientific information in environmental cases, which in turn may result in the insurance industry having an unjustified degree of confidence in its ability to predict the nature and extent of liabilities for environmental impairment.
6. Chapter Seven will conclude the thesis by evaluating the validity of the primary hypothesis of this thesis in light of the four sub-hypotheses. This chapter will also consider the public policy implications which may flow from the difficulties experienced

by the industry in providing this form of coverage. Finally, recommendations will be made for the purpose of improving the ability of the Canadian insurance industry to predict the incidence of loss in this area, and consequently improve its ability to provide environmental impairment liability insurance products.

2.0 CONCEPTIONS OF ENVIRONMENTAL RISK

2.1 Introduction

In recent years there has been growing support for addressing environmental issues through the vehicle of risk decision-making. This trend is illustrated by one risk authority as follows:

Even a casual review of headlines over the past decade brings memories of our self-inflicted environmental and technological wounds flooding back: nuclear power accidents at Three Mile Island and Chernobyl; the release of lethal gas in Bhopal; the creation of the ozone hole in the Antarctic; the *Exxon Valdez* oil spill in Prince William Sound; the fire and subsequent chemical spill on the Rhine River in Basel, Switzerland; the Alar-in-apples scare.

Concerns about hazards such as these have spurred the recent growth in the field of risk analysis.²

This chapter will provide an overview of the concept of environmental risk as it exists both for environmental risk practitioners and for the Canadian insurance industry.

2.2 Conceptions of Risk

While there appears to be considerable support in Canada for the proposition that a risk-based approach to decision-making is desirable, there is currently a degree of uncertainty with respect to the nature of the concept of risk itself in an environmental context. This lack of agreement with respect to the concept of risk is acknowledged by Fischhoff, et al. in their seminal paper "Defining Risk":

Managing the risks of technologies has become a major topic in scientific, industrial, and public policy. It has spurred the development of some industries and prompted the demise of others. It has expanded the powers of some agencies and overwhelmed the capacity of others. It has enhanced the growth of some disciplines, distorted the paths of others. It has generated political campaigns and counter campaigns. The focal ingredient in all this has been concern over risk. Yet, the meaning of "risk" has always been fraught with confusion and controversy. Some of this conflict has been overt, as when a professional body argues about the proper measure of "pollution" or "reliability" for incorporation in a health or safety standard. More often, though,

² Theodore S. Glickman and Michael Gough, eds., *Readings in Risk*. (Washington D.C.: Resources For The Future), 1990 at xi.

the controversy is unrecognized; "risk" is used in a particular way without extensive deliberations regarding the implications of alternative uses. Typically, that particular way follows custom in the scientific discipline initially concerned with the risk.³

Recognizing that any attempt to attach a meaning to the concept of environmental risk is inherently controversial, and that no interpretation of the term will be universal, this section will nevertheless examine and compare the concept of risk as it is currently perceived by many environmental risk practitioners with the view taken by the insurance industry.

2.2.1 Environmental Risk Practitioners' Approach

While the study of environmental risk is generally not considered to have reached the point of coalescing into a distinct discipline, it is a focus of a variety of disciplines which has the potential for developing a recognizable framework for a risk-based approach to environmental decision-making. A review of the expanding body of academic, professional and trade literature in this area indicates that the interdisciplinary study of environmental risk possesses a unique hybrid character which has evolved into a community which encompasses a wide variety of practitioners from both the natural and social sciences.

As with any new area of study, environmental risk is faced with the difficult task of developing a philosophical basis, which in turn allows for the delineation of the fundamental concepts upon which the area of study is focused. It has recently been suggested that the philosophical basis for environmental risk is in its infancy, and consequently environmental risk practitioners are only beginning to recognize competing views with respect to conceptions of risk in the context of the natural environment:

³ Baruch Fischhoff, et al., "Defining Risk", *Policy Sciences* (Vol. 17), 1984 123 at p. 123. Reprinted in Theodore S. Glickman and Michael Gough, eds., *Readings in Risk*. (Washington D.C.: Resources For The Future), 1990, 30 at 30.

Most literature on risk either proposes or presupposes a general conception of risk, then proceeds immediately to offer definition and qualification of the favored conception without acknowledging the existence of alternatives. This practice might reflect a belief that risk is an uncontested concept. Such a view would entail that the concept of risk is more like the concept of water than like contested concepts. There are certainly disagreements about the value of water, and opportunities for confusion or miscommunication about what is water and what is not. These differences do not entail that people share competing conceptions of water. It is implausible to think that philosophical issues that might arise in connection with such differences would turn upon systematically incompatible interpretations of the term 'water'.

However, discussions of risk do not differ from many discussions of justice or truth in respect to presuming a shared conception at the outset. Yet the contested character of these concepts is widely acknowledged. The omission of any reference to the contested nature of risk need not, therefore, reflect a belief that risk is an uncontested concept. Unlike the concepts such as justice or truth, however, debate over the interpretation of risk does not enjoy a long philosophical history.⁴

While there may be disagreement with respect to the concept of environmental risk from a philosophical perspective, environmental risk practitioners have been more successful in functionally defining the concept of risk when applied to actual environmental decision-making. This has occurred through the identification of several components which exist in environmental risk study. Of particular interest to this Thesis are the elements of risk assessment and risk perception. Each of these will be considered in turn.

2.2.1.1 Risk Assessment

The nature and application of environmental risk assessment, also commonly referred to as risk analysis, has been summarized by one leading environmental risk scholar as follows:

The process of quantitatively predicting the likelihood of an adverse response in humans or wildlife due to exposure to one or more chemicals is collectively known as environmental risk assessment. Quantitative risk assessment has been practiced in the United States and Canada for nearly 20 years and is the basis for most environmental and many occupational health regulations in Canada.⁵

⁴ Paul B. Thompson and Wesley R. Dean, "Competing Conceptions of Risk". Not yet published, but available through the University of Alberta *Eco-Research* Chair in Environmental Risk Management Occasional Paper Series.

⁵ Dennis J. Paustenbach, "The Practice Of Health Risk Assessment In The United States (1975-1995): How the U.S. and Other Countries Can Benefit From That Experience", *Human and Ecological Risk Assessment* (1995, Vol. 1, No. 1.) 29 at 29.

The importance of risk assessment as a tool in addressing environmental issues is described by another leading authority:

... quantitative risk assessment has no logical alternative. With the exception of a policy of no risk, which is impossible to implement in a modern industrial society, risk assessment is the only systematic tool for analysing various regulatory approaches to health and safety. All other frameworks involve some sort of intuitive balancing that is inappropriate where quantitative analysis is possible and where the stakes are high.⁶

Thus risk assessment is generally considered to be a scientifically analytical process:

Risk analysis is a formal method for determining the degree of risk. It is concerned with probability of an event occurring and with its impacts or consequences. This requires a modelling of the "risk system" from the initiating event or cause through to final outcome or consequence. Risk analysis so conceived is intended to be a rational, objective, scientific approach that consciously seeks to exclude emotive aspects and value judgments.⁷

Yet it must be acknowledged that risk is not a tangible entity. It is only something one attempts to predict, not something which can be measured by strictly objective means. Any prediction will be subject to the judgment of those making a prediction. Further, risk predictions can never truly be verified, as the variables which actually exist are never exactly the same as those contained in a prediction.

2.2.1.2 Risk Perception

Environmental risk practitioners are quickly coming to recognize that, in order to be effective, environmental risk decision-making processes must go beyond the parameters of quantitative analysis and include consideration of the human component of such decisions. Leading the way in in this area is the study of risk perception. While there are many definitions

⁶ Lester Lave, *Quantitative Risk Assessment in Regulation*. Washington, D.C.: The Brookings Institution, 1982, at 2.

⁷ A. Whyte and I. Burton, "Perception Of Risks In Canada" in I. Burton, et al. eds., *Living with Risk: Environmental Risk Management in Canada*, (Toronto: University of Toronto Institute for Environmental Studies, 1982) at 42.

of the study of risk perception,⁸ perhaps the most satisfactory definition is that provided by Professor Paul Slovic in his seminal article "Perception of Risk":

Studies of risk perception examine the judgments people make when they are asked to characterize and evaluate hazardous activities and technologies.⁹

Professor Slovic goes on to relate this definition to the objectives of risk perception studies:

This research aims to aid risk analysis and policy-making by (i) providing a basis for understanding and anticipating public responses to hazards and (ii) improving the communication of risk information among lay people, technical experts, and decision-makers. This work assumes that those who promote and regulate health and safety need to understand how people think about and respond to risk. Without such understanding, well-intended policies may be ineffective.¹⁰

It is important to note that there is a clear distinction between risk assessment and risk perception. This distinction has been described as follows:

Economists, engineers, and decision scientists have developed sophisticated technical models to assist in managing environmental risks. However, the public frequently rejects the recommendations of these models. Risk-perception research attempts to explain this discrepancy by arguing that technical assessments of risk fail to take account of all the dimensions or characteristics that concern the public. Whereas risk assessments tend to focus on expected lives

⁸ There are also many theories regarding its application. Current theories of risk perception include:

1. "Knowledge Theory" which suggests that things are perceived to be dangerous because a person has actual knowledge that they are dangerous. (National Research Council, *Improving Risk Communication*, (Washington: National Academy Press, 1989)).
2. "Cultural Theory" holds that individuals decide what is an acceptable risk and what is not based on what supports their cultural view of the world. Therefore it is argued that egalitarians perceive greater risks attached to technological development than do hierarchists, as egalitarians perceive that society may take unfair advantage of the environment whereas hierarchists possess a belief that society can control its effects on the environment. (M. Thompson and A. Wildavsky, "A Proposal to Create a Cultural Theory of Risk", in *The Risk Analysis Controversy: An Institutional Perspective*, H.Kunreuther and E. Lev, eds. (Berlin: Springer-Verlag, 1983).
3. "Economic Theory" takes the approach that the public's perceptions of risk are based on a relationship between economic gain and technology. Traditionally this theory suggests that the wealthy members of society are more willing to assume the environmental risks associated with technological development as they perceive themselves as receiving a greater benefit and greater protection from harmful effects of that technology than do other sectors of society. Another view sees the newly wealthy members of society as being less willing to assume the environmental risks associated with technological developments in that their values have shifted from acquisition of material wealth to non-material concerns such as health. (R. Inglehart, *The Silent Revolution: Changing Values and Political Styles Among Western Publics*, (New Jersey: Princeton University Press, 1977)).

⁹ P. Slovic, "Perception of Risk", *Science*, April 1987, Vol. 236, 280 at 280. Professor Slovic is professor of psychology at the University of Oregon and president of Decision Research, Eugene, Oregon.

¹⁰ *Ibid.*

lost or expected dollar damages, psychometric studies conducted by psychologists, sociologists, and other risk-perception researchers argue for the inclusion of measures such as dread, catastrophe, voluntariness, equity, newness, perceived risk and familiarity as part of risk-management decision processes.¹¹

Put another way,

Risk analysis is thus a technical specialized function that is carried out by trained experts or professions for others. The risk analyst calculates the risks to which others are exposed. He may or may not be exposed to the risk himself. In any case, he endeavours to exclude his own personal feelings from the analysis and to think in terms of "target populations" or "those at risk" as being a collection of other human beings. The experience suggests that this is on the whole successfully done. This is the main strength of risk analysis. It is also a weakness, in that risk analysis does not necessarily reflect the emotions or values or preferences of those at risk. Such persons may reject the objective findings of a risk analysis on the grounds that it does not reflect their own preferences.¹²

This is an important distinction, in that whereas risk assessment is primarily concerned with identifying, and if possible, quantifying environmental risk without regard for the consequences of that assessment, risk perception addresses the issue of the acceptability of the identified and/or quantified environmental risk to members of society. Risk perception studies are therefore useful to both forecast and explain the acceptability or unacceptability of environmental risks by members of society.¹³

2.2.2 Canadian Insurance Industry Approach

The approach to risk decision-making taken by the Canadian insurance industry in the context of environmental impairment liability insurance is essentially the same as that which the industry has historically employed in the context of more traditional insurance products such as fire, automobile and general liability insurance. Specifically, motivated by the possibility of profit

¹¹ R. Gregory and R. Mendelsohn, "Perceived Risk, Dread and Benefits", *Risk Analysis*, 1993, Vol. 13 No. 3, 259 at 259.

¹² *Supra*, note 7 at 42. However, the reference to "objective" findings of a risk analysis is open to dispute, in that it may be argued that risk assessments can yield strictly objective findings. They always yield predictions, and predictions are subject to the underlying beliefs of the predictor.

¹³ P. Slovic, et al., *Advances in Environmental Psychology*, I. Baum and J.E. Singer, eds., vol. 3, at 157.

the insurance industry provides insurance coverage with respect to those risks which it predicts will not result in claims which exceed an acceptable margin of profit from the pool of coverage premiums.

2.2.2.1 Purpose And Nature Of Insurance

In order to understand the concept of environmental risk as it is generally understood by the Canadian insurance industry, it is first necessary to gain a basic understanding of the purpose and nature of insurance. A leading insurance law text, *Cases on the Canadian Law of Insurance* sets out the purpose of insurance as follows:

Speaking generally with respect to all insurance other than life, the purpose of insurance is to relieve the insured in whole or in part from the financial impact of some contingent event, by shifting the risk of the insured's possible loss to the shoulders of the insurer, a person who for a pecuniary consideration is willing to assume the risk, up to a maximum amount stated in the contract, of the peril insured against.¹⁴

The nature of insurance reflects this purpose:

... insurance may be defined as any formally organized scheme for the distribution of an adventitious economic loss over a large number of persons subject to the risk of such loss, with a view to replacing the uncertain risk of loss by a predictable cost. The loss is distributed by transferring the risk to an insurer, who may be an independent entrepreneur or may be simply the group of persons insured, operating through some corporate or agency device. The loss may be distributed in advance by charging a premium, or after the event by assessment, or by a combination of the two. For the enterprise to be commercially successful, the incidence of the loss should be reasonably predictable for some class of persons from which the participants will be drawn, and therefore for any sufficiently large number of such participants taken at random. Much difficulty in the early development of fire insurance grew out of the inadequate predictability of the incidence of loss because of the catastrophic burning of large cities.¹⁵

The basic elements of a contract of insurance were stated in Britain as early as 1904 by Channel J. In *Prudential Insurance Co. v. Commissioners of Inland Revenue*:

¹⁴ Bradley Crawford, et al., *Cases on the Canadian Law of Insurance*. (Toronto: Carswell, 1971) at 5-6. In this context the term "risk" means the chance of a loss of a specified magnitude.

¹⁵ Kimball, *Insurance and Public Policy*, at 5.

A contract of insurance, then, must be a contract for the payment of a sum of money, or some corresponding benefit such as the rebuilding of a house or the repairing of a ship, to become due on the happening of an event, which event must have some amount of uncertainty about it, and must be of a character more or less adverse to the interest of the person effecting the insurance.¹⁶

Unfortunately, there is considerable confusion surrounding the requirement of uncertainty.

It is submitted that there are really two levels of uncertainty. The first level is the one referred to by Channel J., where there is some probability that an event will occur, but it is not a sure thing. This may be termed "uncertainty as to event". Thus, for example, when a die is tossed the outcome is uncertain, as any number from one to six may result. The second type of uncertainty is "uncertainty as to ability to predict a range of possible outcomes". Using the die example, there would be uncertainty as to how many times one will roll a "six". However, if the die is fair, there is a reasonable certainty that if the die is tossed many times, there should be an equal distribution of appearances amongst each of the six numbers. It is this second type of uncertainty which is of primary concern to the insurance industry. In order to minimize the uncertainty as to ability to predict a range of possible outcomes the insurance industry will generally create a pool of possible outcomes large enough to create an equal distribution of these outcomes. This approach has proven to be very effective for the insurance industry with respect to losses for traditional forms of insurance such as fire and automobile where a range of possible outcomes has become well established over many events. However, as may be seen throughout this thesis, there exists considerable uncertainty as to the range of possible environmental impairment outcomes (both type and magnitude of loss), and therefore the industry is experiencing a high degree of uncertainty in predicting outcomes in environmental impairment insurance.

¹⁶ [1904] 2 K.B. 658 at 662.

2.2.2.2 Conception Of Risk

It is submitted that this profit motivated desire by the insurance industry to predict with a high degree of confidence the probability of the occurrence or non-occurrence of a particular event and the results of such an occurrence or non-occurrence, shapes the industry's conception of risk, which in turn leads the insurance industry to assess risk in terms of a relationship between probability and the occurrence or non-occurrence of future events. This definition is well summarized in *Risk Management and Insurance*, wherein the authors define risk as:

... the variation in the outcomes that could occur over a specified period in a given situation. If only one outcome is possible, the variation and hence the risk is 0. If many outcomes are possible, the risk is not 0. The greater the variation, the greater the risk.

The most commonly used statistical yardstick measures the extent to which the possible outcomes differ from the outcome that would be expected to occur on the average in the long run. The degree of risk is inversely related to the ability to predict which outcome will actually occur. If the risk is 0, the future is perfectly predictable. If the risk in a given situation can be reduced, the future becomes more predictable and more manageable.¹⁷

When considered from this perspective, the concept of risk is directly related to the ability of insurers to predict the probability of a particular event or outcome. This relationship is recognized in the following terms:

Risk, therefore, is a characteristic of the entire probability distribution, whereas a separate probability exists for each outcome. In a two-outcome situation for which the probability of one outcome is 1 and the probability of the second outcome is 0, the risk is 0 because the actual outcome is known. Clearly, risk and probability, as defined in this text, are different concepts.¹⁸

It therefore follows that as the insurance industry gains experience in dealing with a particular type of risk the industry usually acquires an increasing degree of confidence in its ability to predict the probability of outcomes. However, in the event that an established risk changes or a new risk is acquired, this confidence may diminish.

¹⁷ C. Arthur Williams Jr. and Richard M. Heins, *Risk Management and Insurance* (Toronto: McGraw-Hill Book Company) 1989, at 8.

¹⁸ *Ibid.*

2.3 Conclusions

Environmental practitioners and the insurance industry share a common goal - the ability to predict with a high degree of confidence the probability of the occurrence or non-occurrence of a particular environmental impairment event. They also share a reliance on precise analytical approaches based on proven models and formulas for the assessment of the factors which provide much of the basis for environmental risk decisions. However, there is a fundamental difference between environmental risk practitioners and the insurance industry in their approach to the human element of the environmental risk decision-making equation. While recognizing the importance of a precise analytical approach to environmental assessment, environmental risk practitioners are also becoming aware of the need to factor human concerns into any environmental decision-making process. In contrast, it is submitted that the insurance industry has largely ignored the human element in its environmental risk decision-making processes.

Specifically, many environmental risk practitioners focus their attention on the probability of a negative environmental event occurring, but considers that probability in the context of the acceptability of the risk to all or a portion of society. This approach may be contrasted to that generally adopted by the insurance industry, which, like environmental risk practitioners, focuses its attention on the probability of a negative environmental event occurring, but unlike environmental risk practitioners, considers that probability strictly in terms of the cost of providing indemnity in the event of a loss occurrence compared with revenues from insurance premiums. Based on this information insurers decide whether or not to insure the risk, and if so, at what premium to the consumer.

It is submitted that the differences in approach to the human component of environmental risk decision-making between environmental practitioners and the insurance community is not

surprising when one considers the motivations of the two entities. The environmental risk community is concerned with the study of risk for the purpose of enabling society to make risk based decisions which are acceptable to all or part of that society. Thus, in making environmental risk decisions the environmental risk community must not only look at the probability of a particular environmental impairment event occurring, it must also take into consideration public perception of the acceptability of environmental risks into any environmental decision-making process. This may be contrasted with the insurance industry, whose motivation for risk analysis is to be able to predict with certainty the occurrence or non-occurrence of environmental impairment events for the purpose of providing environmental impairment liability products which maximize the insurer's profits.

However, there is evidence that public perception of the acceptability of environmental impairment risks may now be as important to the insurance industry as it is to environmental risk practitioners. The implications of the insurance industry's failure to consider public perceptions of environmental impairment when making its environmental risk decisions will be the focus of much of the remainder of this thesis.

3.0 HISTORICAL REVIEW OF ENVIRONMENTAL IMPAIRMENT LIABILITY INSURANCE IN CANADA

3.1 Introduction

For more than half a century the insurance industry has expressed an active interest in providing environmental impairment liability insurance in the Canadian market. This chapter will provide a detailed review of environmental impairment insurance products provided in the Canadian market during the past fifty years. In tracing the evolution of environmental impairment insurance in Canada it is submitted that the first sub-hypothesis will be established, that the insurance industry in Canada has experienced numerous difficulties in providing environmental impairment insurance, and that many of these difficulties were due to the fact that the insurance industry has been unable to accurately assess the nature and extent of the incidence of loss resulting from environmental impairment.

In conducting this review emphasis will be placed on tracing the evolution of the primary source of environmental impairment insurance, namely third party liability products in comprehensive general liability (CGL) policies. As many Canadian environmental impairment liability insurance products have their origins in the United States, the American roots of these products will be examined where appropriate.

3.2 Third Party Comprehensive General Liability Policies

The Comprehensive General Liability (CGL) policy is the insurance industry's leading form of commercial insurance coverage.¹⁹ It has also become the primary source of environmental impairment insurance.²⁰ For more than fifty years insurance coverage for environmental liability has been provided by the Canadian insurance industry through the

¹⁹ Tyler and Wilcox, "Pollution Exclusion Clauses: Problems in Interpretation and Application Under the Comprehensive General Liability Policy" (1981), *Idaho Law Review*, Vol. 17, 497 at 498.

²⁰ Other policies which may provide environmental impairment insurance coverage include the standard motor vehicle policy. However, this form of insurance has also created problems for the insurance industry in the context of environmental impairment coverage.

As Canadian motor vehicle insurance policies are governed exclusively by provincial and territorial legislation, there is some variation in policies from jurisdiction to jurisdiction. However, most jurisdictions provide a broad form of occurrence based coverage similar to that provided by the Ontario standard form automobile policy O.P.F. 1, which replaced the S.P.F. 1 in order to reflect changes to Ontario motor vehicle insurance contained within the *Insurance Statute Law Amendment Act, 1990* (S. O. 1990, c.2):

The insurer agrees to indemnify the insured ... against the liability imposed by law upon the insured ... for loss or damage arising from the ownership, or directly or indirectly from the use or operation of the automobile, and resulting from bodily injury to or death of any person or damage to property.

Thus, the Motor Vehicle policy *prima facie* provides coverage for all liability arising out of the ownership, use or operation of the motor vehicle. However, even this form of insurance policy has resulted in inconsistent consideration by the courts when applied to an environmental liability context. For example, in *R. C. Stevenson v. Reliance Petroleum Ltd. and Canadian General Insurance Company*, [1956] S.C.R. 937 the Supreme Court of Canada considered the issue of whether a motor vehicle policy which purported to provide coverage for loss or damage "... arising from the ownership, use or operation of a vehicle ..." was sufficient to provide coverage to the owner of a fuel truck whose driver negligently allowed the escape of gasoline from the truck while pumping gasoline into service station storage tanks, which escape subsequently resulted in a fire. The Court held that the insurer was liable for indemnity under the policy in that the policy "... expressly insured against liability 'arising from the ownership, use or operation' of the vehicle, and the loss clearly arose from the 'use' of the tank truck within the meaning of the insuring clause" (at 945). This interpretation was subsequently applied in *Irving Oil Company v. Canadian General Insurance Company*, [1958] S.C.R. 590 (S.C.C.) and *Peters v. Northstar Oil Ltd.* (1965), 53 W.W.R. 321. However, that decision may be contrasted with a subsequent decision of the Ontario Court of Appeal in *R.A. Beamish Stores Co. Ltd. v. F. W. Argue Ltd.* (1966), 57 D.L.R. (2d) 691. In that case the operator of a fuel oil truck negligently allowed the escape of fuel oil on the claimant's premises. A fire resulted. The defendant insurer argued that the claimant was statute barred from recovering pursuant to section 147 (1) of the Ontario *Highway Traffic Act* (R.S.O. 1960, c. 172) which *inter alia*, imposed a twelve month limitation on actions "... for the recovery of damages occasioned by a motor vehicle". However, the Court determined that the statutory bar did not apply and that the claimant could recover. In giving the Court's decision Laskin J.A. stated:

I find nothing ... incompatible with the view I would take of s. 147 (1), namely, that it applies only where the damage is occasioned by a motor vehicle which is used in that character and not where it is used for another purpose to which it has been adapted, as, for example, a stationary pumping machine. (*Ibid.*, at 702).

It should be noted that the form of motor vehicle policies is strictly regulated by provincial and territorial legislation, and without exception the policy forms do not allow an insurer to include a pollution exclusion. However, the absence of a pollution exclusion can be a mixed blessing. As one insurance industry executive observed:

It should be noted that where the lack of a pollution exclusion is beneficial for the majority of automobile operators, it is detrimental to those specifically operating as hazardous waste disposal companies or carriers of hazardous chemicals. The exposure, of course, rises substantially with these operations and most insurers tend to avoid the risk by refusing to place coverage at all. The existence of pollution coverage under this standard policy makes it very difficult for truckers hauling dangerous products to obtain even simple road hazard coverage. (Arthur W. Despard, "Environmental Insurance Issues - The Insurance Industry's Response (1991), *Uberrima Fides*, Vol. 1 No. 2, 25 at 28).

Comprehensive General Liability (CGL) policy.²¹ Prior to the introduction of the CGL policy in both Canada and the United States in 1941, environmental insurance was only available through an *ad hoc* collection of public liability policies which provided coverage for bodily injury and property damage resulting from the carrying out of a variety of specified activities²² The CGL policy provided significantly broader coverage in that it provided indemnity for bodily injury and property damage irrespective of the type of activity from which the liability arose. However, it has been suggested that the term "comprehensive" is a misnomer, as:

... the CGL does not afford the insured protection against all forms of legal liability which may arise from tort and contract. The risk intended to be insured by the CGL is the possibility that the operations being conducted upon the insured's premises, the insured's products or the insured's work (once relinquished or completed) will cause bodily injury or damage to the property of others.²³

As Canadian insurance legislation does not place any standard coverage requirements on CGL policies, insurers are at liberty to modify standard form wordings in order to provide such products as they determine appropriate in the marketplace.²⁴ While this has resulted in some variation in CGL policies, most insurers conform with the standard form policies issued by the Insurance Bureau of Canada, and therefore this thesis will focus on those policies.

²¹ In 1986 the Canadian insurance industry renamed the "Comprehensive General Liability" policy the "Commercial General Liability" policy in response to a perceived willingness by the courts to make reference to the term "comprehensive" in interpreting the scope of these policies. For further discussion on this point see T. R. M. Davis, "The New IBC Standard Form Commercial General (Claims Made) Liability Policy" (1987), *Canadian Journal of Insurance Law*, Vol. 5, 77 and the decision of the Supreme Court of Canada in *Canadian Indemnity Co. v. Walkem Machinery and Equipment Ltd.*, [1987] 1 S.C.R. 309. For the purposes of this article no distinction will be drawn between these two policies, which will simply be referred to as "CGL" policies.

²² Policies were provided for landlords, contractors, etc.. For a detailed discussion of these early policies see D. Malecki, et al., *Commercial Liability Risk Management and Insurance* (2nd ed. 1986), at 238.

²³ Eric A. Dolden, "The Comprehensive General Liability Policy: Responding to Modern Business Risks" (1990), *Canadian Insurance Law Review*, Vol. 2, 11 at 16.

²⁴ Such considerations may include attempting to meet an individual customer's needs, avoiding recent adverse judicial decisions, etc.

3.2.1 The Early Days: "Accident" Based Coverage

From the time of its introduction in 1941 until 1966, CGL policies in the United States provided coverage with respect to claims arising out of either bodily injury or property damage resulting from an "accident".²⁵ Typical policy wording of this type is found in the 1966 version which required the insurer to:

... pay on behalf of the Insured all sums which the insured shall become legally obligated to pay as damages because of bodily injury or property damage caused by accident.²⁶

Evidence indicates that in adopting this wording the insurance industry wished to provide coverage for liability arising from environmental impairment caused by mishaps which were both "unintentional" and "unexpected" on the part of the policyholder. One insurance industry spokesman summarized the industry's intentions in this way:

... [b]y limiting coverage to that injury or damage which is 'caused by accident', insurers expected that they were eliminating coverage not only for conduct deliberately intended to injure or damage someone, but for irresponsible and willful conduct, borne of gross indifference to the public safety which results in foreseeable injury or damage.²⁷

However, these policies failed to define the term "accident", which resulted in considerable judicial interpretation of this term in American courts, often with unpredictable results.²⁸ The first problem encountered was in determining what was meant by the term "accident". This issue

²⁵ In the United States the CGL policy has been characterized as a "... series of standard form policies based on a set of forms drafted, promulgated, and periodically revised by a national rating bureau and service organization of subscribing insurers, currently known as the Insurance Services Office ...". (Hendrick and Wiesel, "The New Commercial General Liability Forms - An Introduction and Critique" (1986), *Federation of Insurance and Corporate Counsel Quarterly*, Vol. 36, 319 at 319). The Insurance Services Office (ISO) was preceded by the Mutual Insurance Rating Bureau (MIRB) and the Insurance Rating Board (IRB), which in turn was preceded by the National Bureau of Casualty Underwriters (NBCU). The insurance industry first issued a standard form CGL policy in 1941 and subsequently released a series of standard form revisions in 1947, 1955, 1966 and 1973. For a discussion of the historic evolution of the CGL policy in the United States see *American Home Products Corporation v. Liberty Mutual Insurance Company*, 565 F. Supp. 1485, 1500 - 1503 (S.D.N.Y. 1983), affirmed as modified, 748 F. 2d 760 (2d Cir. 1984). See also Hourihan, "Insurance Coverage for Environmental Damage Claims" (1980), *Forum*, Vol. 15, 551 at 552.

²⁶ Wilmarth, "Pollution Liability - What are the Insurance Companies Doing in This Area?" (1971), *Federation of Insurance and Corporate Counsel Quarterly*, Vol. 18, 18 at 23.

²⁷ G. Bean, "The Accident Versus the Occurrence Concept" (1959), *Insurance Law Journal*, 550 at 555.

²⁸ See Snow, "Occurrence vs. Accident - Just What Is Covered" (1954), *Insurance Counsel Journal*, Vol. 21, 30.

was addressed as early as 1959 by the California Supreme Court, in *Geddes & Smith Inc. v. St.*

Paul Mercury Indemnity Co., which observed:

No all-inclusive definition of the word "accident" can be given. It has been defined "as 'a casualty - something out of the usual course of events, and which happens suddenly and unexpectedly and without design of the person injured.' *Rock v. Travelers' Ins. Co.*, 172 Cal. 462, 465, 156 P. 1029, 1036, L.R.A. 1916E, 1196; *Richards v. Travelers Ins. Co.*, 89 Cal. 170, 175, 26 P. 762, [23 Am. St.Rep. 455]." *Zuckerman v. Underwriters at Lloyd's*, 42 Cal. 2d 460, 473, 267 P. 2d 777, 784. It " 'includes any event which takes place without the foresight or expectation of the person acted upon or affected by the event.' " *Richards v. Travellers Ins. Co.*, 89 Cal. 170, 176, 26 P. 762, 763; see also, *Ritchie v. Anchor Casualty Co.*, 135 Cal. App. 2d 245, 252-253, 286 P. 2d 1000; *Moore v. Fidelity & Casualty Co.*, 140 Cal. App. 2d Supp. 967, 971, 295 P. 2d 154. "Accident, as a source and cause of damage to property, within the terms of an accident policy, is an unexpected, unforeseen, or undesigned happening or consequence from either a known or an unknown cause." *Hauenstein v. Saint Paul-Mercury Indemnity Co.*, 242 Minn. 354, 65 N.W. 2d 122, 126.²⁹

This in turn led to the difficulty of differentiating "accidents" from "non-accidents".

Particular difficulty was experienced in deciding whether bodily injury or property damage which resulted from slowly or gradually occurring events should fall within the term "accident". This problem was identified by Sofaer J. In *American Home Products Corporation v. Liberty Mutual Insurance Co.*:

The word "accident" suggested an intent to cover only sudden, unexpected but identifiable events. The courts were left in doubt as to whether, and to what extent, the standard policy was meant to cover liability for injuries that resulted from gradual processes, rather from sudden events.³⁰

A further difficulty was encountered in attempting to determine the precise point in time when an "accident" took place. A striking illustration of this problem is found in the following hypothetical example:

... a skier was skiing along a trail maintained by the insured resort operator at the top of a snowy mountain. It was one minute before midnight on December 31st, and the resort operator's accident-based general liability policy expired at midnight, to be immediately replaced by a new policy which incepted at midnight. The trail was negligently maintained, causing the skier to slip and start careening out of control down the mountain. He continued out of control for five

²⁹ 334 P. 2d at 884.

³⁰ 565 F. Supp. 1485, 1501 (S.D.N.Y. 1983).

minutes before crashing into a tree and suffering serious injuries. Because the accident, *i.e.*, the slip, happened during one policy period and the damage, *i.e.*, the injuries due to hitting the tree, was sustained in another policy period, there would be no coverage under either policy.³¹

Further, other American courts provided the term "accident" with surprisingly broad interpretations. For example, in *McGroarty v. Great American Insurance Co.*³² the New York Court of Appeals held that the term "accident" should be given an "... expansive, all-embracing meaning." In reaching this conclusion the Court suggested that the central issue is the consequences of an insured's activities as a whole, as opposed to any particular cause of those consequences. On the basis of this reasoning the Court held that when an insured's excavation operations caused a neighbouring building to gradually crack, the risk was within the meaning of the term "accident".

Still other courts interpreted the term "accident" with respect to the "effect" of an incident on an injured party rather than with reference to the nature of the "cause" of the incident by the insured. For example, in *Moffatt v. Metropolitan Casualty Insurance Company of New York*³³ it was held that coverage would exist even when the insured knew or reasonably ought to have known the likelihood of his products causing damage. Again, in *Lancaster Area Refuse Authority v. Transamerica Insurance Company*,³⁴ a court found that the "accident" requirement failed to exclude coverage in situations where the insured's conduct was intentional or reckless.

³¹ *Shell Oil Co. v. Accident & Casualty Insurance Co.*, No. 278953 (Cal. Super. Ct., San Mateo County, December 20, 1988) appeal pending, as set out in Mitchell L. Lathrop, *Insurance Coverage For Environmental Claims* (New York: Matthew Bender & Co, 1993) at 3-49.

³² *McGroarty v. Great American Insurance Co.*, 36 N.Y. 2d 358 (1975).

³³ 238 F. Supp. 165 (M.D. Pa. 1964).

³⁴ 214 Pa. Super. 80, 251 A. 2d 739, *affd.* 437 Pa. 493, 263 A. 2d 368 (1970).

3.2.2 The Development of "Occurrence" Policies

In response to a number of factors including the uncertain manner in which the judiciary had interpreted "accident" based CGL policies in environmental impairment claims³⁵, acquiescence to expansive judicial interpretations of the term "accident",³⁶ and in an attempt to respond to what was perceived by the insurance industry as a potentially lucrative new market,³⁷ in 1966 the United States Mutual Insurance Rating Bureau (MIRB)³⁸ and the National Bureau of Casualty Underwriters (NBCU)³⁹ released a revised standard form CGL policy wherein the insurer typically agreed that it would:

... pay on behalf of the insured all sums which the insured shall become legally liable to pay as damages because of bodily injury or property damage to which this insurance applies caused by an occurrence ...⁴⁰

An "occurrence" was initially defined as:

An accident, including injurious exposure to conditions, which results, during the policy period, in bodily injury, or property damage neither expected nor intended from the standpoint of the insured.⁴¹

³⁵ Mitchell L. Lathrop in his text *Insurance Coverage For Environmental Claims* (New York: Matthew Bender & Company, 1993, 3-49/50) offers the opinion that it was "... inconsistent determinations by the courts as to what an "accident" was that prompted the insurance industry to change the wording of the grant of coverage section of the general liability policy."

³⁶ See discussion in *Broadwell Realty Service, Inc. v. Fidelity and Casualty Company of New York*, 218 N.J. Super. 516, 531 - 535, 528 A. 2d 76, 84-85 (1987).

³⁷ For example, in Canada Arthur W. Despard, Sr. Vice - President of Reed Stenhouse Limited suggests that the change was precipitated by "... insurers enthusiasm to compete and broaden coverage ...". ("Environmental Insurance Issues - The Insurance Industry's Response" (1991), *Uberrima Fides*, Vol. 1 No. 2, 25 at 26). In the United States see discussion in *Broadwell Realty Service, Inc. v. Fidelity and Casualty Company of New York*, 218 N.J. Super. 516, 531 - 535, 528 A. 2d 76, 84 -85 (1987).

³⁸ *Supra*, note 25.

³⁹ *Supra*, note 25.

⁴⁰ Soderstrom, "The Role of Insurance in Environmental Litigation" (1976), *Forum*, Vol. 11 No., 764.

⁴¹ *American Home Products Corporation v. Liberty Mutual Insurance Company*, *supra*, note 30 at 1489. This definition was subsequently modified in the 1973 revision to read:

An accident, including continuous or repeated exposure to conditions which results, during the policy period, in bodily injury, or property damage neither expected nor intended from the standpoint of the insured.

The revision does not appear to have affected the scope of the coverage. See *Olin Corporation v. Insurance Company of North*

Thus, this policy revision contained two significant changes over its predecessor. First, in order to ensure that coverage was limited to occurrences which were "unintended" and "unexpected" by an insured rather than by a party injured by the event, the definition of the term "occurrence" attempted to make it clear that it was to be defined solely with reference to the expectations and intentions of an insured. Second, in an attempt to broaden the temporal scope of policy coverage for environmental impairment, the requirement of suddenness suggested by the term accident was removed. This was accomplished by replacing the phrase "caused by accident" with the term "caused by an occurrence". In so doing it was hoped that coverage would include not only sudden unexpected and unintended occurrences but also gradual ones, such as might occur where an innocent polluter was unaware of the leak of a substance with known contaminating effects or where an apparently harmless discharge would later be found to impair the environment. As one author observed:

With the lesson in accident-based coverage fresh in their minds, the insurers used new language to remove only the suddenness barrier and to cover pollution liability that arose from gradual losses. The standard policy made it clear that the loss had to be unexpected and unintended from the standpoint of the insured.⁴²

Another writer summarized the insurance industry's intentions in this way:

The insurance industry sold the new CGL policy as a boon to policyholders, particularly to manufacturers who might be liable for gradual pollution damage. Insurance industry spokespersons claimed that the new CGL policy not only continued to provide coverage for unexpected or unintended pollution damage, as it always had, but that it greatly expanded such coverage. For example, in November 1965, Gilbert L. Bean, Assistant Secretary of Liberty Mutual Insurance Company, stated in a paper presented to the Mutual Insurance Technical Conference: "[I]t is in the waste disposal area that a manufacturer's basic premises operation coverage is liberalized most substantially." Bean went on to explain:

America, 762 F. Supp. 548, 556 (S.D.N.Y. 1991).

⁴² E. Joshua Rosenkranz, "The Pollution Exclusion Clause Through the Looking Glass" (1986), *Georgetown Law Journal*, Vol. 74, 1237 at 1247.

Smoke, fumes, or other air or stream pollution have caused an endless chain of severe claims for gradual property damage. These waste disposal cases have been difficult ones because when the injury or damage first starts to emerge, no corrective action is taken in many cases, because the manufacturer is reluctant to admit his waste disposal is causing it. This is probably an honest doubt. When the cause is pinpointed, it may or may not be easy to make a quick elimination of the cause. The cost of an alternative method of waste disposal may be terrifically expensive or might even force the manufacturer out of business, and even if it can be made, it may take months to convert.

Bean illustrated his point as follows:

[I]f the injury or damage from waste disposal should continue after the waste disposal ceased, as it usually does, it could produce losses on each side of a renewal date, and in fact, over a period of years, with a separate policy applying in each year ... Manufacturing risks producing insecticides, plant foods, fertilizers, weed killers, paints, chemicals, thermostats or other regulating devices, to name a few, have severe gradual [property damage] exposure. They need this protection and should legitimately expect to be able to buy it, so we have provided it.⁴³

Of course, the insurance industry expected to be well compensated for providing this expanded coverage. In the words of one observer, the occurrence based CGL policy "... was perceived and intended to be a broadening of the coverage - compensated by a premium surcharge".⁴⁴

Despite an awareness of the problems which the "accident" based CGL policy had encountered within the American judicial system, the Canadian insurance industry took a more cautious approach in adopting an "occurrence" based approach within its CGL policies. It seems that "Many Canadian CGL insurers, expecting to protect themselves against the potentially wide application of the term "occurrence", have instead chosen to condition indemnity upon the happening of an accident".⁴⁵ However, this strategy has proven to be of questionable value in light of the broad interpretation of the term "accident" applied by the Canadian courts. In

⁴³ Carl A. Salisbury, "Pollution Liability Insurance Coverage, The Standard-Form Pollution Exclusion, And The Insurance Industry: A Case Study In Collective Amnesia" (1991), *Environmental Law*, Vol. 21 No. 2, 357 at 364 - 366.

⁴⁴ Pfennigstorf, "Environment, Damages, and Compensation (1979), *American Business Foundations Resources Journal.*, 349 at 438.

⁴⁵ *Supra*, note 23 at 60.

Canadian Indemnity Co. v. Walkem Machinery & Equipment Ltd. the Supreme Court of Canada set out the following definition for the term "accident" in the context of liability insurance coverage:

... any unlooked for mishap or an untoward event which is not expected or designed, or any unexpected personal injury resulting from any unlooked for mishap or occurrence. The test of what is unexpected is whether the ordinary reasonable man would not have expected the occurrence, it being irrelevant that a person with expert knowledge, for example of medicine, would have regarded it as inevitable.⁴⁶

This has led one author to conclude:

This expansive definition of "accident" suggests that there is no real basis for distinguishing American environmental damage cases in which the liability of the insurer is predicated upon the happening of an occurrence.⁴⁷

However, the occurrence based policy fared little better than its predecessor in providing the insurance industry with the form of environmental impairment insurance which it had envisioned. For example, considerable uncertainty has remained with respect to the scope of environmental liability coverage provided by this form of CGL policy. In *Grand River Lime Co. v. Ohio Casualty Insurance Co.*⁴⁸ a class action suit was brought against an insured quarry and manufacturing company as a result of damage to nearby residential property caused by large quantities of corrosive industrial wastes which had been emitted from the insured's smoke stacks. The residents alleged nuisance and trespass, arguing that Grand River "...knew or should have known that [the corrosive waste] would come to rest on the person, houses, automobiles and chattels of the [residents] and damage the same ...".⁴⁹ Grand River brought an application for a declaration establishing its insurer's duty to defend against the suit. The insured argued that in

⁴⁶ *Canadian Indemnity Co. v. Walkem Machinery & Equipment Ltd.*, [1976] 1 S.C.R. 309, [1975] 5 W.W.R. 510 at 514, per Pigeon J.

⁴⁷ *Supra*, note 23 at 60.

⁴⁸ 32 Ohio App. 2d 178,(1972).

⁴⁹ *Ibid.*, at 181.

1966 the insurance industry had clarified the insuring agreement by changing the policy coverage from "accident" to "occurrence". The new policy purported to preclude coverage for intentional injury or damage but covered injury or damage resulting from intentional acts or events.⁵⁰ The insurance company countered that the changes of policy language clarified the coverage provided and prevented a reoccurrence of previous judicial confusion over the difference between accidental means and accidental results. Despite the fact that the insurance industry had supposedly introduced the occurrence based policy to expand the scope of coverage, it was the insurer's position that the term "occurrence" should be read in conjunction with "accident" and that "... the occurrence or accident must result in bodily injury or property damage neither expected nor intended from the standpoint of the insured."⁵¹ In finding for the insured, the Court held that "... the word 'occurrence' is much broader than the term 'accident' ".⁵² Further, the Court concluded that "...while the activity which produced the alleged damage may be fully intended, and the residual results fully known, the damage itself may be completely unexpected and unintended."⁵³ Thus, in addition to giving the occurrence based policy a broad interpretation, the decision left uncertain the liability of the insurance industry under this form of policy with respect to insureds who should, but do not know the consequences of their actions.

⁵⁰ *Ibid.*, at 182.

⁵¹ *Ibid.*, at 184.

⁵² *Ibid.*, at 184.

⁵³ *Ibid.*, at 185.

3.2.3 The "Sudden and Accidental" Pollution Exclusion

By 1970 there is evidence that the insurance industry in the United States was already beginning to have second thoughts about its plan to expand insurance coverage for environmental impairment which occurred on a gradual basis such as the release of contaminants during the regular course of business.

At the request of the American insurance industry, in 1970 the Insurance Services Office (ISO)⁵⁴ issued an endorsement for inclusion in CGL policies which purported to limit insurance coverage for environmental impairment.⁵⁵ This endorsement, which is commonly referred to as the "Sudden and Accidental Pollution Exclusion" typically states that a CGL policy does not apply:

To bodily injury or property damage arising out of the discharge, dispersal, release or escape of smoke, vapors, soot, fumes, acids, alkalis, toxic chemicals, liquids or gases, waste materials or other irritants, contaminants or pollutants into or upon land, the atmosphere or any watercourse or body of water; but this exclusion does not apply if such discharge, dispersal, release or escape is sudden and accidental.

During its campaign to gain governmental approval for the exclusion the insurance industry advised government regulators that the sole purpose of the Sudden and Accidental Pollution

⁵⁴ *Supra*, note 25.

⁵⁵ The motivation for the creation of the Sudden and Accidental Pollution Exclusion is a matter of some controversy. Some observers see it as a "... response to the growing number and severity of environmental impairment claims ..." which were being made in the United States at the time. (See Mitchell L. Lathrop, *supra*, note 20 at 3-83). Other evidence indicates that the Sudden and Accidental Pollution Exclusion was actually created in response to a perceived need within the insurance industry to once again add clarification to the nature of the environmental risk being underwritten in the "occurrence" form of CGL policy:

In a letter of explanation to its members, the MIRB used now-familiar language to express the drafters' intent: "The above exclusion clarifies this [pollution coverage] situation so as to avoid any question of intent. Coverage is continued for pollution or contamination caused injuries when the pollution or contamination results from an accident"

Perhaps more important than what the insurance companies said about the pollution exclusion among themselves, however, were the statements that insurance industry representatives made before insurance commissioners and state insurance regulatory agencies in 1970 during the course of seeking approval for the new exclusion. These public representations reveal a consistent and unified intent that the new pollution exclusion was drafted merely to clarify existing coverage under the "neither expected nor intended" definition of "occurrence". (Carl A. Salisbury, *supra*, note 44 at 371 - 372).

Exclusion was to add clarification to the scope of the environmental impairment coverage found in the "occurrence" form of CGL policy. For example, a letter was sent by the Insurance Rating Board (IRB)⁵⁶ to the State of Georgia Insurance Department which described the purpose of the Sudden and Accidental Pollution Exclusion as follows:

The impact of the new proposals in the vast majority of risks would be no change. It is rather a situation of clarification which will make for a complete understanding by the parties to the contract of the intent of coverage. Coverage for expected or intended pollution and contamination is not now present as it is excluded by the definition of occurrence. Coverage for accidental mishaps is continued ...⁵⁷

However, at the same time the industry was telling its members that the purpose of the new exclusion was to ensure that it was clear that the policy only provided limited coverage for environmental impairment:

Coverage for pollution may not be provided in most cases under present policies because the damages could be said to be expected or intended and would thus be excluded by the definition of occurrence and, therefore, the adoption of an exclusion could be said to be a clarification, but a necessary one to avoid any question of intent.⁵⁸

This shift in approach by the American insurance industry did not go unnoticed. As one author has observed:

⁵⁶ *Supra*, note 25.

⁵⁷ *Claussen v. Aetna Casualty & Surety Company*, 676 F. Supp. 1571, at 1583 and Appendix B (S.D. Ga. 1987).

⁵⁸ Minutes of the Meeting of the General Liability Governing Committee of the Insurance Rating Board on March 17, 1970. A similar statement was issued to Insurance Rating Board members in a confidential circular dated May 15, 1970:

Coverage for pollution or contamination is not provided in most cases under present policies because the damages can be said to be expected or intended and thus are excluded by the definition of occurrence. The exclusion clarifies this situation so as to avoid any question of intent. Coverage is continued for pollution or contamination caused injuries when the pollution or contamination results from an accident. (Greenlaw, "The CGL Policy and the Pollution Exclusion Clause: Using the Drafting History to Raise the Interpretation Out of the Quagmire" (1990), *Columbia Journal of Law and Social Problems*, Vol. 23, 233 at 247).

The statement regarding pollution coverage not being provided in "most cases" is plainly wrong. On the contrary, ... the 1966 CGL policy was drafted and marketed to policyholders, with accompanying increases in premium rates, as "tailor made" to cover most pollution-causing events.⁵⁹

In any event, "It is implicit in their comments that coverage would not be available for environmental damage caused by the routine business activities of insured persons, because those activities are deliberate, and in no sense fortuitous".⁶⁰

The retrenching of the American insurance industry's position with respect to the scope of environmental impairment coverage found within the standard CGL policy became clear in the position which the industry took in the courts when litigating the interpretation of the Sudden and Accidental Pollution Exclusion. The industry took the position that the term "accidental" meant "unexpected" and "unintended", and that the term "sudden" created an additional temporal requirement of speed. This appears to be a complete reversal of the earlier approach of the American insurance industry when it replaced the "accident" based CGL policy with the broader "occurrence" requirement for the ostensible purpose of appealing to that sector of the marketplace made up of so called "innocent" polluters whose day to day operations had the potential of resulting in gradual environmental impairment over an extended period of time.⁶¹

At this time there was also a growing concern in the Canadian insurance industry with respect to environmental impairment claims, as evidenced by the Insurance Bureau of Canada's 1972 recommendation that an environmental exclusion endorsement be included in all CGL

⁵⁹ *Supra*, note 43 at 370.

⁶⁰ *Supra*, note 23 at 64.

⁶¹ "Ambiguity and incomprehensibility seem to be the favorite tools of the insurance trade in drafting policies. Most are a virtually impenetrable thicket of incomprehensible verbosity. It seems that insurers generally are attempting to convince the customer when selling the policy that everything is covered and convince the court when a claim is made that nothing is covered. The miracle of it all is that the English language can be subjected to such abuse and still remain an instrument of communication."

policies.⁶² However, such an exclusion was not drafted until 1976, when the Insurance Bureau of Canada issued its first "pollution exclusion" for CGL policies in the form of endorsement IBC 2023.⁶³

It is agreed that this policy does not apply to bodily injury or property damage arising out of the discharge, dispersal, release or escape of smoke, vapours, soot, fumes, acids, alkalis, toxic chemicals, liquids or gases, waste materials or other irritants, contaminants or pollutants into or upon land, the atmosphere or any water of any description no matter where located or how contained, or into any watercourse, drainage or sewage system, but this exclusion does not apply if such discharge, dispersal, release or escape is sudden and accidental.

Similar in wording to the Sudden and Accidental Pollution Exclusion adopted in the United States in 1970, the Canadian version attempted to broaden the extent to which it applied to water and watercourses, including within this classification drainage and sewage systems. This endorsement was subsequently included as a standard provision within the standard form CGL policy 2000/2001 issued by the Insurance Bureau of Canada in 1978.

The importance to the Canadian insurance industry of the development of an effective pollution exclusion is well summarized by author Eric Dolden:

The exclusions are important to insurers, because the courts have interpreted "accident" to include any unexpected event even if its occurrence was practically inevitable. It is the effect of the insured's conduct, not the operating cause of that effect, which is regarded as the crucial focus of inquiry. In respect of asbestos-related lawsuits, the current American approach is to characterize both the installation of the hazardous material, and the subsequent continuous discharge of the asbestos fibre itself, as occurrences. In Canada, where the use of the term "accident" is more common, the better view is that it is only the phenomenon of discharge which is "accidental". On either view, insurers are exposed to very substantial claims for indemnity unless the exclusion for environmental damage can limit their liability.⁶⁴

However, it appears that neither the Canadian or the American versions of the Sudden and Accidental Pollution Exclusion have had the results anticipated by the insurance industry. In

⁶² Insurance Bureau of Canada Bulletin 72-23, September 5, 1972.

⁶³ The wording of this pollution exclusion is virtually identical to the Sudden and Accidental Pollution Exclusion adopted by the Insurance Services Office (ISO) in the United States in 1970.

⁶⁴ *Supra*, note 23 at 78.

the United States the courts have used at least five different approaches to interpreting the Sudden and Accidental Pollution Exclusion.⁶⁵ These approaches are summarized as follows.

3.2.3.1 Approach No. 1

The first approach has been to interpret the terms "sudden" and "accidental" in the context of the "cause" of the occurrence, with these terms comprising two separate and distinct requirements, each of which must be met in order for the exclusion not to apply. Most cases which have adopted this approach interpret the term "accidental" to mean an "unexpected" and "unintentional" cause, with the term "sudden" imposing the additional temporal requirement of a brief time period which is narrowly construed. Thus, with this approach a leak from an underground storage tank which takes place over an extended period of time does not fall within the exception to the pollution exclusion.⁶⁶

3.2.3.2 Approach No. 2

As with the first approach, the second approach has been to interpret the terms "sudden" and "accidental" in the context of the "cause" of the occurrence, with these terms comprising two separate and distinct requirements, each of which must be met in order for the exclusion not to apply. As stated above, cases which have adopted this approach usually interpret the term "accidental" to mean an "unexpected" and "unintentional" cause, with the term "sudden" imposing

⁶⁵ This list should not be considered to be exhaustive. As the courts struggle to deal with this issue new and even more inventive approaches will likely be used. However, a more troubling consideration is whether these varied approaches to interpreting the Sudden and Accidental Pollution Exclusion are *bona fide* attempts at interpreting the intended meaning of the parties upon entering into the contract of insurance, or whether they are simply legal fictions devised to provide justification for a particular desired result, in which case it may be impossible to ever achieve any degree of certainty in this area. It is submitted that this focus on result rather than approach has resulted in many writers and judges classifying these approaches in result-oriented terms such as "pro-coverage" or "anti-coverage" rather than in the context of the interpretative approach taken.

⁶⁶ See for example, *United States Fidelity & Guaranty Co. v. Murray Ohio Manufacturing*, 693 F. Supp. 617 (M.D. Tenn. 1988).

the additional temporal requirement of a brief time period. However the temporal requirement is broadly and often creatively interpreted, such that while an underground storage tank may have been leaking for an extended period of time, the initial leak must have taken place over a short time period.

3.2.3.3 Approach No. 3

The third line of case authority also interprets the terms "sudden" and "accidental" in the context of the "cause" of the occurrence, but considers these terms to comprise the single phrase "sudden and accidental" which in turn operate together to give the meaning of "unexpected" and "unintentional", with no reference to a temporal element. Thus, by this approach the exclusion will not apply if it is established that the cause of the occurrence was unexpected and unintentional on the part of the insured.⁶⁷

3.2.3.4 Approach No. 4

The fourth approach to this issue has been for the courts to interpret the terms "sudden" and "accidental" in the context of whether the "effect" rather than the "cause" of the occurrence was "unexpected" and "unintentional".⁶⁸

⁶⁷ See for example, *Lansco, Inc. v. Department of Environmental Protection*, 138 N.J. Super. 275, 350 A.2d 520 (1975), affirmed 145 N.J. Super. 433, 368 A. 2d 363 (1976), cert. denied, 73 N.J. 57, 372 A. 2d 322 (1977).

⁶⁸ See for example, *Jackson Township Municipal Utilities Authority v. Hartford Accident & Indemnity Co.*, 186 N.J. Super 156, 451 A. 2d 990 (1982); *Travellers Indemnity Co. v. Dingwell*, 414 A. 2d 220 (1980); and *Allstate Insurance Co. v. Klock Oil Co*, 73 A.D. 2d 486, 426 N.Y.S. 2d 603 (1980).

3.2.3.5 Approach No. 5

The fifth and final approach has been for the courts to find that the term "sudden and accidental" contains a degree of ambiguity, and that upon application of the principle of *contra proferentum*, the policy should be strictly construed against the insurer.⁶⁹

While Canadian case law has been slower to develop,⁷⁰ initial indications are that our courts are travelling down the same path of uncertainty as their American counterparts in developing a judicial interpretation of the Sudden and Accidental Pollution Exclusion. For the most part the Canadian courts have adopted the approaches of their American counterparts.

For example, in *BP Canada Inc. v. Comco Service Station Construction & Maintenance Ltd.* et al.⁷¹ the Ontario High Court of Justice was asked to interpret the Sudden and Accidental Pollution Exclusion in the context of an application brought by an insured service station owner for an order declaring that the insurer must defend a lawsuit brought by a claimant petroleum supplier for recovery of cleanup costs resulting from an underground storage tank which had been leaking from 1970 to 1980.⁷² In finding that the exclusion clause applied and that the insurer did

⁶⁹ See for example, *National Grange Mutual Insurance v. Continental Casualty Insurance*, 650 F. Supp. 1404 (S.D.N.Y. 1986).

⁷⁰ Likely due to an absence of statutory liabilities for environmental impairment such as have existed in the United States for a number of years such as the liability for cleanup of contaminated sites under CERCLA. However, with Canadian jurisdictions now beginning to incorporate this form of environmental liability into its legislation, an increase in environmental insurance litigation is expected. See discussion, *infra*.

⁷¹ (1990), 73 O.R. (2d) 317. For a discussion of this case see Kathryn L. Feldman, "Interpreting The Pollution Exclusion Clause" (1990), *Environmental Law Alert*, Vol. 2 No. 2, 1.

⁷² In Canada the general rule with respect to an insurer's "duty to defend" was summarized by McLachlin J. on behalf of the Supreme Court of Canada in *American Home Assurance Co. v. Nichols*: (1990), 68 D.L.R. (4th), 321, at 327-328 as follows:

... general principles relating to the construction of insurance contracts support the conclusion that the duty to defend arises only where the pleadings raise claims which would be payable under the agreement to indemnify in the insurance contract. Courts have frequently stated that "[t]he pleadings govern the duty to defend": *Bacon v. McBride* (1984), 6 D.L.R. (4th) 96 at p. 99, 51 B.C.L.R. 228, 5 C.C.L.I. 146 (S.C.). Where it is clear from the pleadings that the suit falls outside of the coverage of the policy by reason of an exclusion clause, the duty to defend has been held not to arise: *Opron Maritimes Construction Ltd. v. Canadian Indemnity Co.* (1986), 73 N.B.R. (2d) 389, 19 C.C.L.I. 168, [1987] I.L.R. 1-2108 (C.A.), leave to appeal refused by this court, [1987] 1 S.C.R. xi, 76 N.B.R. (2d) 360n, 76 N.R. 399n.

At the same time, it is not necessary to prove that the obligation to indemnify will in fact arise in order to trigger the duty to defend. The mere possibility that a claim within the policy may succeed suffices. In this sense, as noted earlier,

not have a duty to defend, the Court adopted Approach No. 1, holding that the terms "sudden" and "accidental" should be afforded separate and distinct meanings within the exclusion. With respect to the term "sudden" the Court went on to state:

In my opinion the term "sudden and accidental" in the exception to the environmental exclusion in the Gore policy definitely includes a temporal element and is clearly not to be extended to include unintended consequences that are not sudden.⁷³

The Court also concluded that a leak which had occurred over a period of ten years was not sudden.

In *Murphy Oil Co. Ltd. et al. v. Continental Insurance Co.*⁷⁴ the Court considered the applicability of a Sudden and Accidental Pollution Exclusion in a fact situation where a leaking underground pipe allowed the escape of gasoline into a neighbouring water well. In finding that

the duty to defend is broader than the duty to indemnify. O'Sullivan J.A. wrote in *Prudential Life Insurance Co. v. Manitoba Public Insurance Corp.* (1976), 67 D.L.R. (3d) 521 at p. 524, [1976] 4 W.W.R. 182, [1976] I.L.R. 1 - 771 (Man. C.A.):

Furthermore, the duty to indemnify against the costs of an action and to defend does not depend on the judgment obtained in the action. The existence of the duty to defend depends on the nature of the claim made, not on the judgment that results from the claim. The duty to defend is normally much broader than the duty to indemnify against a judgment.

(Emphasis added). In that case it was unclear whether the insurer might be liable to indemnify under the policy, so the duty to defend was held to apply. In the court's view it would have been unjust for the insurers to be able to assert that "the claim is probably groundless, or will probably end up falling outside of the indemnity coverage. Since we have no proof that we owe an indemnity in this case, we take the position that we owe no duty to defend."

Other Canadian authority overwhelmingly supports the view that normally the duty to defend arises only with respect to claims which, if proven, would fall within the scope of coverage provided by the policy: see *Dobish v. Garies* (1985), 63 A.R. 63, 15 C.C.L.I. 69 (Q.B.); *Thames Steel Construction Ltd. v. Northern Assurance Co.* (1988), 55 D.L.R. (4th) 639, 67 O.R. (2d) 158, [1989] I.L.R. 1-2399 (C.A.); *Vancouver General Hospital v. Scottish & York Insurance Co.* (1987), 41 D.L.R. (4th) 657, 15 B.C.L.R. (2d) 178, 28 C.C.L.I. 148 (S.C.).

For a detailed discussion on the duty to defend in Canada see Robert Kligman, "The Duty to Defend in Canada" (1992), *Canadian Insurance Law Review*, Vol. 3, 23.

⁷³ *Ibid.*, at 329 per Sutherland J.

⁷⁴ (1981), 33 O.R. (2d) 853 (Ont. Co. Ct.).

the pollution exclusion did not apply, the Court applied Approach No. 2.⁷⁵ The consideration by the Court of the various elements of this approach are instructive. The Court first found that the terms "sudden" and "accidental" must be considered in terms of the cause of the occurrence and not its effect:

It must be borne in mind that upon a close reading of this clause it is the emission that must be sudden and accidental, not the damages resulting therefrom, in order to afford the plaintiffs coverage under the policy. Let us consider a situation when the cause of the emission was an explosion and not leakage. Clearly the explosion would be sudden. Let us further suppose that the explosion did not cause immediate contamination but as a result thereof the petroleum product which escaped seeped into a well over a period of time. Could this defendant then be heard to say that the damages were only caused gradually and that there is no coverage under the policy? If that is what was intended by the clause now being considered, then the language used is quite inadequate to express it.⁷⁶

The court went on to consider the interpretation of the terms "sudden" and "accidental" separately.

With respect to the term "sudden" the Court stated as follows:

The question reduces itself to this: Would the cause of the emission, which I have found to be leakage, be sudden and accidental? The Oxford dictionary defines "sudden" as follows: "occurring or come upon or made or done unexpectedly or without warning, abrupt, abnormally rapid, hurried". If a leak occurs in a pipe, I would think that, whether it be minor or major in extent, it occurs suddenly for whatever reason. At one point the pipe is not defective and is properly serving the purpose intended, i.e., to contain a substance. At another point in time the pipe becomes defective in that it "springs" a leak (as common parlance describes it). I cannot bring myself to believe that a leak in a pipe is caused in any way other than "suddenly". In this context it is not necessary to consider the cause of the leak. If the pipe was in some way weakened by corrosion or loosening at the connections then so be it.⁷⁷

⁷⁵ See also *Zatko et al. v. Patterson Spring Service Ltd. et al.* (1985), 14 C.C.L.I 251 (Ont. S.C.) wherein the application of Approach #1 resulted in the exclusion not applying. The approach was used where the exclusion was found to apply in *Park Plaza Cleaners Ltd. v. Saskatchewan Government Insurance*, [1983] I.L.R. 1-1598 (Sask. Q.B.).

⁷⁶ *Ibid.*, at 857.

⁷⁷ *Ibid.*, at 857.

The Court also interpreted the term "accidental":

The word "accidental" is defined in the Oxford Dictionary as follows: "happening by chance, undesignedly, or unexpectedly"/The word has been judicially reviewed in a number of decisions, each turning on its own particular facts. In essence, these decisions hold that a cause to be accidental must not have been intended; it must not have occurred by natural causes arising from human activity.⁷⁸

The failure of the Canadian Sudden and Accidental Pollution Exclusion to consistently preclude coverage for gradual environmental impairment claims, and its impact upon environmental liability insurance in Canada has led one observer to conclude:

The environmental exclusion clause is itself subject to an exception in respect of deleterious emissions which are "sudden and accidental." The courts have rendered exclusion clauses effectively meaningless in many cases by according a very wide meaning to that phrase. The slow seepage of toxic industrial substances or pollutants is "sudden and accidental" if the damage thereby caused is unexpected. It appears that only if a business enterprise is specifically aware of the likely consequences of its activity will coverage be denied. Even so, the denial is not based on the environmental exclusion, but rather on the exclusion which bars recovery for intentional conduct. In this manner the environmental exclusion clause has not served to define and limit the risks covered by CGL policies, but has if anything expanded those risks. The result has been the development of new forms of exclusion clauses by the insurance industry which are unqualified in their terms.⁷⁹

3.2.4 The "Absolute Pollution Exclusion"

Concerned with the unexpected judicial interpretations being afforded the Sudden and Accidental Pollution Exclusion both in Canada and the United States, in 1986 the Insurance Bureau of Canada released a new pollution liability exclusion which has come to be known as the "Absolute Pollution Exclusion", which states as follows:

This insurance does not apply to:

1. Pollution Liability
 - a. "Bodily injury" or "property damage" arising out of the actual, alleged, or threatened

⁷⁸ *Ibid.*, at 857-858.

⁷⁹ *Supra*, note 23 at 78.

discharge, dispersal, release or escape of pollutants:

- 1) At or from premises owned, rented or occupied by an insured;
 - 2) At or from any site or location used by or for an insured or others for the handling, storage, disposal, processing or treatment of waste;
 - 3) Which are at any time transported, handled, stored, treated, disposed of, or processed as waste by or for and insured or any person or organization for whom the insured may be legally responsible; or,
 - 4) At or from any site or location on which an insured or any contractors or subcontractors working directly or indirectly on behalf of an insured are performing operations:
 - a) if the pollutants are brought on or to the site or location in connection with such operations; or,
 - b) if the operations are to test for, monitor, cleanup, remove, contain, treat, detoxify or neutralize the pollutants.
- b. Any loss, cost or expense arising out of any governmental direction or request that an insured test for, monitor, cleanup, remove, contain, treat, detoxify, or neutralize pollutants.

"Pollutants" means any solid, liquid, gaseous, or thermal irritant or contaminant, including smoke, vapour, soot, fumes, acids, alkalis, chemicals and waste. Waste includes materials to be recycled, reconditioned or reclaimed.

Sub-paragraphs 1) and 4)a) of paragraph a. of this exclusion do not apply to "bodily injury" or "property damage" caused by heat, smoke, or fumes from a hostile fire. As used in this exclusion, a "hostile fire" means one which becomes uncontrollable or breaks out from where it was intended to be.

While the Absolute Pollution Exclusion has been successful in excluding coverage for all types of environmental liability, this exclusion has been seen by many within the insurance industry as little more than a "stop gap" measure until such time as the insurance industry is able to grapple with the problems of providing environmental impairment insurance.

3.2.5 Recent Attempts To Provide Environmental Liability Insurance In Canada

3.2.5.1 The "Claims Made" CGL Policy

A major concern of the Canadian insurance industry has been its inability to assess its exposure to environmental impairment claims which come to light long after an "occurrence" form CGL policy has expired. The duration of coverage provided by an occurrence based CGL policy has been described as one which:

... provides coverage against liability arising out of injury or damage that occurs during the policy period, regardless of when a claim alleging such liability actually is lodged against the insured. Since occurrence policies may cover liabilities imposed many years after the injury or damage which results in liability occurs, they are said to cover "long-tail" liabilities.⁸⁰

As a result, in 1986 the Insurance Bureau of Canada released a new "claims made" CGL policy, the IBC 2200.⁸¹ While the terms of the IBC 2200 are almost identical to those found in the occurrence based IBC 2100, the "claims made" IBC 2200 policy differed significantly from the "occurrence" based IBC 2100 policy in that while bodily injury or property damage must still have been caused by an "occurrence", the claim would be covered under the policy only if the "claim" for that bodily injury or property damage occurred during the policy period or within a specified time after its expiry:

Claims made policies typically cover only claims made against the insured during the policy period and reported to the insurer during the policy period or within a specified time following the end of the policy period.⁸²

It was hoped by the insurance industry that a "claims made" policy would eliminate much of the uncertainty in the industry which had arisen as a result of the ongoing problem of new claims

⁸⁰ Kenneth S. Abraham, *Environmental Liability Insurance Law: An Analysis of Toxic Tort and Hazardous Waste Coverage Issues* (New Jersey: Prentice Hall Law & Business, 1991), 23.

⁸¹ For a detailed discussion of this policy see Neil C. Wittmann, "The "Claims Made" Commercial General Liability Policy: A Discussion of Some Important Aspects" (1987), *Canadian Journal of Insurance Law*, Vol. 5 No. 3, 35.

⁸² *Supra*, note 35, at 3-51.

based on old policies which had plagued the "occurrence" policy. In the words of one writer:

"The objective of matching the premium for a policy period with a claim made within the policy period so as to eliminate long tail business or at least reduce the same as much as possible is understandable. The underwriters may return to risk oriented underwriting and presumably be better able to measure the risk and charge accordingly.⁸³

However, the "claims made" environmental liability policy has created a special problem of its own. Specifically, considerable controversy has arisen as to when coverage is triggered. Since a "claim" is not an "occurrence", the question becomes one of coverage in the situation where an occurrence takes place within the policy period but a claimant delays in making a claim until after the policy has expired.

3.2.5.2 The "Limited Pollution Liability" Policy

Another attempt to provide environmental impairment insurance in Canada was undertaken in 1985 by a consortium of insurers known as the Pollution Liability Association⁸⁴ (PLA). The PLA undertook to provide reinsurance to insurers wishing to provide a limited form of coverage through a policy rider known as the "Limited Pollution Liability" (LPL) policy.⁸⁵ The policy rider may be included within standard form CGL policies.⁸⁶ The Pollution Liability Association described its purpose in introducing this policy rider in the following terms:

⁸³ *Supra*, note 81 at 42.

⁸⁴ The Pollution Liability Association was formed in 1985 by a group of insurers for the purpose of underwriting insurance for pollution liability in Ontario. For a full discussion of the Limited Pollution Liability Policy see Harry Poch, *Corporate and Municipal Environmental Law* (Toronto: Carswell, 1989), 84 - 108. See also comments in Mario Faieta, "Liability Insurance For Environmental Contamination In Ontario" ((1992), *The Graduate*, Vol. 1 No.1, 1 at 29).

⁸⁵ Not to be confused with the "Limited Pollution Liability" (LPL) endorsement (IBC 2313), see discussion section *infra*.

⁸⁶ A similar product had been offered for some time in the United States through a standardized policy issued by the Insurance Services Office (ISO). For a summary of environmental insurance policies available in the United States during this period see U.S. Department of the Treasury, *Hazardous Substance Liability Insurance* (National Technical Information Service, March 1982).

The PLA is not in the environmental impairment liability field. It is neither panacea for liability woes nor is it a blanket cover for all the liability imposed by law and it is certainly not a provider of protection for frequent or deliberate polluters.

Pollution and coverage against its consequences, is a very complex subject. The PLA does not attempt to address all the attendant problems. It does, however, provide a means to protect, at a reasonable cost, a large number of commercial operations which have innocuous, passive or moderate exposures. Its original and unchanged purpose is to provide capacity for risks with identifiable exposures whether a primary insurer keeps a risk net or uses PLA facilities, careful underwriting remains crucial to the continued availability of capacity.⁸⁷

While the LPL policy rider purports to provide the standard coverage for environmental liability, this policy is particularly noteworthy for its intended coverage of statutorily imposed environmental cleanup costs.⁸⁸ Section 1. B. of the policy states, *inter alia*, that "We will pay the insured for reasonable and necessary "clean-up costs" incurred by the insured as a result of the performance by the insured of an obligation imposed by law on the insured ... ". However, a number of limitations are imposed on this coverage. First, the policy contains a requirement that "... "clean-up costs" are incurred because of "environmental damage" to which this insurance applies...". Environmental damage is defined as "... the injurious presence of "pollutants" in or upon land, the atmosphere, or any watercourse or body of water.

Further, the LPL policy rider requires that "... the "environmental damage" is caused by a "pollution incident" which commences during the policy period and is reported to us during the policy period or within thirty days after its termination". The term "pollution incident" is defined at section 9 of the policy as follows:

9. "Pollution Incident" means an unexpected and unintentional discharge of any "pollutants" from or out of a structure or container provided

(a) such discharge is detected by any person within 120 hours after the commencement of the discharge; AND

⁸⁷ K.C. Walduck, "The PLA: Waiting to Serve Industry" (1988), *Canadian Insurance*, July 1988, 12 at 12.

⁸⁸ See discussion, *infra*. The policy is silent with respect to coverage for costs associated with undertaking preventive response measures.

- (b) such discharge results in "environmental damage"; AND
- (c) such discharge does not occur in a quantity or with a quality that is routine or usual to the insured's operation.

Thus the LPL policy rider implements a new approach to the ever-present dilemma of attempting to provide "claims based" coverage for environmental claims which are both "unintentional" and "unexpected" on the part of the insured, and which are "sudden" rather than "gradual" in nature. It does so by including a provision which requires that the environmental contamination upon which a claim is made be the result of "... an unexpected and unintentional discharge of any pollutants...", which is "... detected by any person within 120 hours after the commencement of the discharge...", and that the discharge, dispersal, release or escape be "... reported to the insurer within 120 hours of being detected...". This provision appears to include the element of suddenness originally obtained in the "accident" based policies, while effectively removing from the courts the definitional issues associated with the term "sudden" which created such difficulty for the Sudden and Accidental Pollution Exclusion.

Issued as a "claims made" policy, coverage is limited to pollution incidents for which a claim "... is first made against the insured during the policy period or within one year after its termination ...".⁸⁹

It must further be noted that the LPL endorsement is limited in its application in that it is not intended to provide coverage for environmental contamination which originates from underground sources such as underground storage tanks and landfills. This type of contamination is specifically excluded by section 3(j) of the endorsement, which states:

⁸⁹ Limited Pollution Liability Policy at s. 1. A. (a)(2).

3. This insurance does not apply to:

- (j) "Bodily injury," "property damage" or "clean-up costs" caused by a "pollution incident" originating
 - (1) below the surface of the ground or water, or
 - (2) from "pollutants" which have, at any time, been buried under the surface of the ground or water, and then subsequently exposed by erosion, excavation or other means;

3.2.5.3 The "Limited Pollution Liability" Endorsement

The Absolute Pollution Exclusion proved to be unsatisfactory to the Canadian insurance marketplace which by the late 1980's was beginning to become aware of potential exposure to a new generation of environmental liabilities. Further, the insurance industry still wanted to provide limited coverage for environmental claims by offering products for pollution events which were in its view "sudden and unexpected".⁹⁰

Thus, in April, 1989 the Insurance Bureau of Canada released a new "Limited Pollution Liability" (LPL) endorsement,⁹¹ the IBC 2313 which could be inserted in CGL policies in situations where replacement of the Absolute Pollution Exclusion was required by a customer. This endorsement, which combined many of the elements of the Absolute Pollution Exclusion with the 1985 Limited Pollution Liability Policy rider, attempted to provide a "... 'middle ground approach' to coverage for pollution liability".⁹² The endorsement is comprised of two components. The first component attempts to exclude coverage for pollution liability:

⁹⁰ Arthur W. Despard, "Environmental Insurance Issues - The Insurance Industry's Response" (1991), *Uberrima Fides*, Vol. 1 No. 1, 25 at 26. See *supra*, note 38.

⁹¹ Not to be confused with the "Limited Pollution Liability" (LPL) policy offered by the Pollution Liability Association. See discussion *supra*.

⁹² Mario Faieta, "Liability Insurance For Environmental Contamination in Ontario" (1992), *The Graduate*, Vol. 1, 1.

This insurance does not apply to:

1. Pollution Liability

- (a) "Bodily injury" or "property damage" arising out of the actual, alleged, or threatened discharge, dispersal, release or escape of pollutants:
- I) At or from premises owned, rented or occupied by an insured;
 - ii) At or from any site or location used by or for an insured or others for the handling, storage, disposal, processing or treatment of waste;
 - iii) Which are at any time transported, handled, stored, treated, disposed of, or processed as waste by or for an insured or any person or organization for whom the insured may be legally responsible; or
 - iv) At or from any site or location on which an insured or any contractors or subcontractors working directly or indirectly on behalf of an insured are performing operations:
 - (A) if the pollutants are brought on or to the site or location in connection with such operations; or,
 - (B) if the operations are to test for, monitor, cleanup, remove, contain, treat, detoxify or neutralize pollutants.
- (b) Any loss, cost or expense arising out of any governmental direction or request that an insured test for, monitor, cleanup, remove, contain, treat, detoxify, or neutralize pollutants.

The second component of the LPL endorsement provides exceptions to the pollution liability exclusion, as follows:

Sub-paragraph (I) and (iv)(A) of paragraph (a) of this exclusion do not apply to "bodily injury" or "property damage" caused by:

- (a) heat, smoke, or fumes from a hostile fire. As used in this exclusion a "hostile fire" means one which becomes uncontrollable or breaks out from where it was intended to be.
- (b) an unexpected or unintentional discharge, dispersal, release or escape of pollutants:
 - (I) results in the injurious presence of pollutants in or upon land, the atmosphere, drainage or sewage system, watercourse or body of water; and

- (ii) is detected within 120 hours after the commencement of the discharge, dispersal, release or escape; and
- (iii) is reported to us within 120 hours of being detected; and
- (iv) does not occur in a quantity or with a quality that is routine or usual to the business of the insured.

"Pollutants" means any solid, liquid, gaseous, or thermal irritant or contaminant, including smoke, vapour, soot, fumes, acids, alkalis, chemicals and waste. Waste includes materials to be recycled, reconditioned or reclaimed.

While the LPL endorsement has yet to receive judicial consideration in Canada, like the LPL policy rider⁹³, it appears to address a number of the most significant problems experienced with previous environmental impairment policies. Specifically, it attempts to provide "occurrence" based coverage for environmental claims which are both "unintentional" and "unexpected" on the part of the insured, and which are "sudden" in nature. It does so by including a modified version of the 120 hour time limit clause found in the LPL policy rider which requires that the environmental contamination upon which a claim is made be the result of "... an unexpected or unintentional discharge, dispersal, release or escape of pollutants ...", which is "... detected within 120 hours after the commencement of the discharge, dispersal, release or escape...", and that the discharge, dispersal, release or escape be "... reported to the insurer within 120 hours of being detected...". This provision appears to include the element of suddenness originally obtained in the "accident" based policies, while effectively removing from the courts the definitional issues associated with the term "sudden" which created such difficulty for the Sudden and Accidental Pollution Exclusion.

However, the LPL endorsement may not be the final answer for the Canadian insurance industry. For example, while paragraph 1(b) specifically adopts coverage exclusion for "... loss,

⁹³ See discussion, *supra*.

cost or expense arising out of any governmental direction or request that an insured test for, monitor, cleanup, remove, contain, treat, detoxify, or neutralize pollutants" found within the Absolute Pollution Exclusion, it is worth noting that the endorsement contains no similar exclusion for statutory liability for preventive response to the release of contaminants into the environment.⁹⁴ Further, the LPL endorsement fails to make it clear that the requirements that the pollution be "unexpected" and "unintentional" must be determined in terms of being unexpected and unintentional on the part of the insured, rather than the claimant. Finally, the LPL endorsement fails to address the new generation of toxic tort claims which are now appearing in the United States.⁹⁵

3.3 Conclusions

Two themes emerge from this analysis. First, the insurance industry has established a consistent pattern of difficulties in providing environmental impairment liability insurance. The second theme is that many of the difficulties which the insurance industry has experienced may be directly attributable to the inability of the insurance industry to accurately assess the nature and extent of the incidence of loss resulting from environmental impairment. This in turn has prevented the industry from delineating with precision the nature and extent of the insurance coverage for environmental impairment which it is prepared to underwrite. This difficulty appears to have two origins.

First, it appears that from the outset the insurance industry did not have a clear understanding of the nature and magnitude of the risk which it was prepared to underwrite in this

⁹⁴ See discussion, *infra*.

⁹⁵ See discussion, *infra*.

area. This point is vividly illustrated in the difficulties experienced by the industry in deciding whether or not it wished to provide coverage for unexpected and unintentional pollution that was "gradual" in nature.

Second, the insurance industry has been unable to communicate with sufficient clarity to its policyholders and to the courts the industry's intentions with respect to coverage, as set out in the various insuring agreements and amendments. As one author has observed:

The pollution risk was not foremost in the minds of the authors when traditional insuring language was developed. These risks do not fit comfortably within the language of coverage; "accident," "occurrence," "injury," "damage," "loss," are all words which may include pollution risks but undoubtedly this is more from inadvertence than intention.⁹⁶

This problem has been compounded by the willingness of the courts to find coverage within environmental impairment liability insurance policies whenever possible. In the words of one observer, "... Case law in the rapidly developing field of "toxic torts" strongly indicates that the courts will apply the theory of liability which maximizes the availability of coverage."⁹⁷

⁹⁶ David F. Sutherland, "Pollution And Contamination Insurance Claims", *Pollution and Contamination Insurance Claims* (Vancouver: Continuing Legal Education Society of British Columbia 1990) 8.1.01.

⁹⁷ *Supra*, note 23 at 78.

4.0 THE NEW GENERATION OF STATUTORY CIVIL ENVIRONMENTAL LIABILITIES

4.1 Introduction

The third sub-hypothesis suggests that in entering into the environmental impairment liability insurance marketplace the insurance industry has failed to anticipate recent legislative reforms which have created a new generation of statutory based civil environmental liabilities. It is further submitted that this failure to anticipate legislative reform is directly related to the failure of the industry to recognize a change in the Canadian public's perception of risk of environmental impairment in the late 1980's and early 1990's.

In the past, civil lawsuits commenced on the basis of environmental impairment have generally been framed in one or more of the traditional common law causes of action, which include the familiar negligence, private nuisance, trespass to land, the *Rule In Rylands v. Fletcher*,⁹⁸ and breach of riparian rights.⁹⁹ However, motivated in part by a public perception that environmental impairment is a serious societal problem, and in part by a belief commonly held by the public that polluters have not been held sufficiently responsible for their actions, in recent years there has been a growing belief amongst legislators that a "polluter pays" principle must be more clearly established in environmental legislation. This in turn has led to the creation of a new generation of statutory civil liabilities. While the embodiment of this principle in legislation first gained notoriety in the United States in the *Comprehensive Environmental*

⁹⁸ (1866), L. R. 1 Ex. 265 (C.A.); affirmed L.R. 3 H. L. 330 (H. L.).

⁹⁹ For a discussion of these common law causes of action in an environmental context in Canada see Katherine M. van Rensburg, "Civil Liability For Environmental Harm In Ontario" (1991), *Ubertima Fides*, Vol. 1 No. 1, 2; Christopher Harvey and Cynthia M. Macdonald, "Environmental Clean Up Costs and Damages: The Common Law (1992), *The Advocate*, Vol. 50 Pt. 1, 33.

*Response, Compensation and Liability Act*¹⁰⁰ (CERCLA), the impact of the polluter pays principle is also beginning to be felt in Canadian legislation. For example, as part of its public consultation process prior to enacting the *Environmental Protection and Enhancement Act*¹⁰¹ the Province of Alberta released a document entitled *A Guide To The Proposed Alberta Environmental Protection And Enhancement Legislation*¹⁰² which set out the environmental principles which it wished the new legislation to reflect. Included within these principles was the following reference to the expansion of the cost and coverage of the polluter pays principle:

The proposed Alberta Environmental Protection and Enhancement legislation seeks to place responsibility on parties who use the environment for any adverse effects they may cause. One of the most important principles requires polluters to pay for environmental damage and for the cost of corrective action.

Two applications of the polluter pays principle which should be of particular interest to insurers. The first is the creation of statutory liability for breaches of environmental regulatory legislation. The second is the creation of statutory civil liability for the cleanup of contaminated sites and responding to prevent the release of contaminated substances. This chapter will examine the new generation of legislative reforms and the statutory liabilities which they have spawned. This examination will also consider their implications for the insurance industry in Canada, and will explore the issue of why the insurance industry was largely unable to anticipate these reforms. It should be noted that while the focus of this chapter will be on Canadian law, the

¹⁰⁰ Pub. L. No. 96-50, 94 Stat. 2767 (codified at 42 U.S.C. at ss. 9601 - 9657 (1982 & Supp. 1989)). The Act was subsequently amended and reauthorized in 1986 by the *Superfund Amendments and Reauthorization Act*, (SARA), Pub. L. No. 99 - 499, 100 Stat. 1613, (codified at 42 U.S.C.A. at ss. 9601 - 9675 (Supp. 1988)). The Act was again reauthorized in 1990, Pub. L. No. 101 - 508, 104 Stat. 1388 - 319, (codified at 42 U.S.C.A. at ss. 9601 - 9675).

¹⁰¹ R.S.A. 1980, c. E-13.3. This legislation was proclaimed into force on September 1, 1993.

¹⁰² Alberta Environment, *A Guide To The Proposed Alberta Environmental Protection And Enhancement Legislation* (Edmonton: Queen's Printer, 1991).

roots of many of the statutory liabilities are to be found in the United States legal system, and thus American law will be examined where appropriate.

4.2 Civil Action Upon Conviction Of Offence Under Regulatory Legislation

The first new type of statutory cause of action is one which creates a civil cause of action against a polluter who has been convicted of an offence under regulatory legislation.¹⁰³ An example of this cause of action is found in the recently enacted Alberta *Environmental Protection and Enhancement Act*.¹⁰⁴ That Act creates a civil cause of action for a conviction of an offence under the Act. Section 207 of the Act provides as follows:

207 Subject to section 208, where a person is convicted of an offence under this Act, any person who suffers loss or damage as a result of the conduct that constituted the offence may, in a court of competent jurisdiction, sue for and recover from the convicted person an amount equal to the loss or damage proved to have been suffered.¹⁰⁵

¹⁰³ A variation on this theme is found in the *Canadian Environmental Protection Act* (R.S.C. 1985, c.15.3), which empowers a court to issue a form of restitution order compelling a person convicted of an offence under the Act to pay compensation for property loss or damage resulting from the commission of the offence. Section 131.(1) of that Act states:

131.(1) Where an offender has been convicted of an offence under this Act, the court may, at the time sentence is imposed and on the application of the person aggrieved, order the offender to pay to that person an amount by way of satisfaction or compensation for loss of or damage to property suffered by that person as a result of the commission of the offence.

Further, once such an order is filed, it is entered as a judgment and becomes collectable in the same manner as a civil judgment, pursuant to section 131.(2):

131.(2) Where an amount that is ordered to be paid under subsection (1) is not paid forthwith, the applicant may, by filing the order, enter as a judgment, in the superior court of the province in which the trial was held, the amount ordered to be paid, and that judgment is enforceable against the offender in the same manner as if it were a judgment rendered against the offender in that court in civil proceedings.

This raises the issue of whether such an order, once filed as a judgment, is covered under environmental impairment policies.

¹⁰⁴ *Supra*, note 101.

¹⁰⁵ *Supra*, note 101 at s. 207.

The purpose of this form of statutory cause of action is ostensibly to make it easier for a person who has suffered loss or damage¹⁰⁶ as a result of the actions of a polluter who has been convicted of an offence under the Act to bring a civil action and recover compensation from the polluter. The legislation accomplishes this goal by effectively removing two of the usual requirements for the prosecution of a civil action. First, it removes the requirement that the claimant establish that the defendant owed the claimant a duty of care. Second, it also removes the requirement that the claimant establish the standard of care to be met and that the defendant failed to meet that standard. Thus, the burden on the claimant is reduced to establishing on the balance of probabilities that the defendant was convicted of an offence under the Act and that there is a causal link between the conduct that constituted the offence and the loss or damage suffered.

This type of legislation creates a number of problems for insurers wishing to provide environmental impairment coverage. First, in order to prevent this form of liability from arising it becomes necessary for the insurer to become involved in the defence of the regulatory charge itself. This creates a problem for the industry in that while insuring agreements generally stipulate that an insurer has the right to conduct the defence to a civil claim brought against its insured pursuant to its subrogated interest in the litigation, few policies provide insurers with the right to defend quasi-criminal charges under regulatory legislation.¹⁰⁷ This raises the difficult question of whether insurers should be allowed to participate in the defence of an insured charged

¹⁰⁶ It is interesting to note that this legislation uses the term "loss or damage" rather than the usual "personal injury or property damage". This suggests that this cause of action may also be available to claimants who have suffered pure economic loss.

¹⁰⁷ This problem is similar to the one which faces insurers in civil claims arising from motor vehicle accidents where insureds are charged with motor vehicle offences, and a conviction could have a negative impact upon the outcome of the civil litigation. One solution to this problem is for the insurance industry to incorporate a provision in environmental impairment liability policies which would allow them to deny coverage in the event of a conviction under regulatory environmental legislation, similar to provisions involving impaired driving in motor vehicle policies. However, since most environmental impairment events are now subject to some form of regulatory sanction, this approach would significantly minimize the value of most environmental impairment policies to policy holders.

with violations of environmental regulatory legislation in that such charges carry penal consequences. For example, it is not difficult to envision a conflict of interest arising between an insurer and insured in a situation where a guilty plea to a pollution charge might result in an accused insured receiving a small fine, but where such a conviction would expose an insurer to a potentially large civil claim.

Second, even if insuring agreements are revised to allow insurers to participate in the defence of such charges, the insurance industry must consider whether it wishes to assume the high costs associated with this expensive form of litigation.

Finally, in the event that an insured is convicted of a regulatory offence, an insurer may be confronted with the issue of identifying what if any defences are available to its insured under a statutory cause of action. For example, the Alberta *Environmental Protection and Enhancement Act* is silent on the issue of whether the standard common law defences such as due diligence will be available in defending a civil action brought pursuant to this legislation.¹⁰⁸ In the absence of an established body of case law in this area, insurers are at a decided disadvantage in defending such an action.

4.3 Civil Action To Protect The Public Trust

A second form of statutory cause of action has recently been implemented in some jurisdictions which attempts to combine the "polluter pays principle" with the "public trust doctrine". This hybrid form of legislation allows residents residing within a jurisdiction to bring a civil action under one or more of the common law causes of action against a polluter on behalf

¹⁰⁸ This silence appears to have been intentional. Drafters of this legislation commented that the availability of common law defences to this statutory civil cause of action would not be included within the Act as it was felt that this was a matter which should be left to the courts to decide. (Conversation with Ms. Marilyn Kinsky and Ms. Kim Lalonde, Alberta Environment, October 17, 1992).

of another person or on behalf of the public trust, irrespective of whether the claimant resident has suffered any personal loss as a result of the actions of the polluter. An example of this type of legislation is found in the Northwest Territories *Environmental Rights Act*.¹⁰⁹ Section 6(1)(2) of that Act states that:

6.(1) Every person resident in the Territories has the right to protect the environment and the public trust from the release of contaminants by commencing an action in the Supreme Court against any person releasing any contaminant into the environment.

(2) No person is prohibited from commencing an action under subsection (1) by reason only that he or she is unable to show

- (a) any greater or different right, harm or interest than any other person; or
- (b) any pecuniary or proprietary right or interest in the subject matter of the proceeding.

This legislation also provides the courts with the power to award damages to any person adversely affected by the pollution whether they are a party to the action or not, and to the Government of the Northwest Territories on behalf of the public trust. Section 6(3) of the Act provides, *inter alia*, that:

6.(3) The Supreme Court, in respect of an action commenced under subsection (1), may,

(c) order the defendant to pay an amount by way of satisfaction or compensation for loss or damage resulting from the release to

(i) any person having an interest in property that is adversely affected by the release of the contaminant into the environment, and

(ii) the Minister;

Any money awarded to the Minister must be placed in a special account which is to be used exclusively for environmental repair and enhancement. Section 6(4) of the Act states:

¹⁰⁹ R.S.N.W.T. 1990, c. 83 (Suppl.).

6(4) Any money received by the Minister pursuant to an order under paragraph 3(c) shall be deposited in an account in the Consolidated Revenue Fund and disbursed for the following special purposes:

- (a) the repair of any damages caused by the release of the contaminant; or
- (b) where action is not practicable under paragraph (a), the enhancement or improvement of the environment.

This new form of statutory civil liability for environmental impairment also creates special problems for the Canadian insurance industry. First, in allowing a resident claimant to bring an action on behalf of any person or the public trust for loss or damage resulting from the release of a contaminant into the environment, the source and extent of claims for environmental impairment increase dramatically.

Second, insurers will in all likelihood be faced with considerable uncertainty in their attempts to quantify the value of environmental damage to the public trust. Apart from the practical difficulty of attempting to attach market values to publicly held environmental assets, there is a suggestion that the courts may be willing to attach a value to those components of the natural environment which comprise the public trust which is in excess of market value. For example, in *Scarborough (Municipality) v. R.E.F. Homes Ltd.*,¹¹⁰ the City of Scarborough successfully brought an action against a home builder for the negligent cutting of three large maple trees located within a City road allowance. At trial damages were assessed at \$900.00. This assessment was subsequently increased to \$4,000.00 by the Ontario Court of Appeal. In considering the issue of damages that Court recognized that while publicly owned lands such as road allowances do not have "market value" in the conventional sense, such lands are held by a municipality in trust for its residents and the loss incurred by a community as a result of environmental damage to those lands is compensable beyond mere replacement value of the area

¹¹⁰ (1979), 10 C.E.L.R. 40 (Ont. C.A.).

damaged. In reaching this conclusion Lacourciere J.A. observed:

In our judgment, the municipality is, in a broad general sense, a trustee of the environment for the benefit of the residents in the area of the road allowance and, indeed, for the citizens of the community at large. While the diminution in value of the road allowance stands on a different footing than that of private land deprived of ornamental shade trees, it is nevertheless a real and substantial loss.¹¹¹

Lacourciere J.A. went on to state:

No argument was addressed to us as to how one assesses damages for the loss to a municipality of the intrinsic or environmental value of trees which have been destroyed; therefore consideration of the compensability or calculation of that element of damage must be left to be determined in an appropriate case.

... In our view, however, the appellant has suffered a greater loss than the mere replacement value which appears to have been assessed at trial.¹¹²

4.4 Statutory Civil Liability For Preventive Response And Cleanup Of Contaminated Sites

4.4.1 The United States Experience

In response to a growing concern over environmental pollution,¹¹³ in 1980 the United States Congress enacted the *Comprehensive Environmental Response, Compensation and Liability Act*¹¹⁴, commonly referred to as "CERCLA" or "Superfund". This legislation embodied a four part scheme for dealing with the issue of environmental contamination:

¹¹¹ *Ibid.*, at 41-42.

¹¹² *Ibid.*, at 42.

¹¹³ Including such high profile environmental problems as Love Canal in Niagara Falls, New York and Valley of the Drums in Shephardsville, Kentucky.

¹¹⁴ *Supra*, note 100.

- 1) First, it established a framework for the acquisition and analysis of information relating to contaminated sites, which information would be available to both the federal and state governments in setting up response strategies.¹¹⁵
- 2) Second, it empowered the United States Government through the Environmental Protection Agency (EPA) to take such action as deemed necessary to respond to prevent potential environmental contamination and to effect remediation of existing contaminated sites.¹¹⁶
- 3) Third, it created a statutory liability on the person or persons deemed to be responsible for a contaminated site.¹¹⁷
- 4) Fourth, it authorized creation of the Hazardous Substances Trust Fund to cover the costs of remediation when a person or persons responsible for a contaminated site could not be identified.¹¹⁸

¹¹⁵ *Supra*, note 100 at ss. 102 - 103, 42 U.S.C. ss.9602 - 9603 (1988).

¹¹⁶ *Supra*, note 100 at s. 104, 42 U.S.C. at s. 9604 (1988). The response options open to the EPA have been summarized as follows:

Under CERCLA, once the EPA receives notice that a hazardous waste site is releasing hazardous substances into the environment (or that such a release is threatened), the EPA has several choices. It can obtain an injunction to compel the polluter to clean up the site, postponing litigation of liability. Alternatively, the EPA can notify the responsible party and give it an opportunity to voluntarily clean up the waste site. A third option is for the government to conduct the cleanup and sue the responsible party for reimbursement.

(Kathryn L. Cervon, "CERCLA Cleanup Costs As "Damages" Under the CGL Policy: Is the Cost of Hazardous Waste Cleanup Merely Small Change for the "Deep Pockets" of Insurers?" (1991), *FICC Quarterly*, 391 at 395).

¹¹⁷ *Supra*, note 100 at ss. 106 -106, 42 U.S.C. ss. 9606 -9607 (1988).

¹¹⁸ *Supra*, note 100 at s. 111, 42 U.S.C. at s. 9611 (1988). In 1980 Congress authorized an initial budget of \$1.6 billion for cleanup costs. When reauthorized in 1986 by the *Superfund Amendments and Reauthorization Act* of 1986 (SARA) this amount was increased to \$8.5 billion (42 U.S.C. at ss. 9607, 9611). Upon once again receiving reauthorization in 1990, Congress approved a \$5.1 billion budget for the period of October 1, 1991 to September 30, 1994.

It is the third part of this statutory scheme, that of liability for preventive response and cleanup of existing contaminated sites which has caused difficulties for the American insurance industry. Section 907(a)(4) of this legislation provides as follows:

907(a)(4) any person who accepts or accepted any hazardous substances for transport to disposal or treatment facilities, incineration vessels or sites selected by such person, from which there is a release, or a threatened release which causes the incurrence of response costs, of a hazardous substance, shall be liable for -

(A) all costs of removal or remedial action incurred by the United States Government or a State or an Indian tribe not inconsistent with the national contingency plan;

(B) any other necessary costs of response incurred by any other person consistent with the national contingency plan;

(C) damages for injury to, destruction of, or loss of natural resources, including the reasonable costs of assessing such injury, destruction or loss resulting from such a release; and

(D) the costs of any health assessment or health effects study carried out under section 9604(I) of this title.¹¹⁹

Potentially responsible parties (PRP's) under CERCLA have turned to their insurers for coverage, usually under their CGL policies. Insurers have resisted many of these claims, and as a result a great deal of litigation is currently underway in the United States to determine whether CGL policies provide coverage for preventive response and cleanup costs under CERCLA.¹²⁰ In this regard, the insurance industry has primarily relied upon three defences. First, insurers

¹¹⁹ *Supra*, note 100 at s. 107(a), 42 U.S.C. at s. 9607(a)(4) (1988).

¹²⁰ The volume of litigation arising from CERCLA has also increased as a result of PRP's attempting to reduce their exposure to liability by identifying additional PRP's. As one author notes:

While the Environmental Protection Agency has identified all the toxic waste sites in the country, it has become overwhelmed by the task of naming the many potentially responsible parties (PRP's). As cleanup costs can be high, the named PRP's want other PRP's identified before costs are assessed. This impasse has brought the cleanup process to a grinding halt, since the high volume of litigation raises costs and delays results. (Kathleen E. Flood and Henry L. Strong, "The Environmental Crisis: Why Is Cleanup Taking So Long?" (1991), *Risk Management*, August 1991, 20 at 20).

attempted to invoke the "Sudden and Accidental" pollution exclusion discussed earlier.¹²¹ Second, insurers have attempted to deny coverage on the basis that statutorily imposed cleanup costs do not constitute "damages" as required under CGL policies.¹²² With respect to this second defence it may be recalled that CGL policies generally limit their coverage to sums which the insured becomes "... legally liable to pay as damages ...". Insurers have argued that statutorily imposed cleanup costs do not constitute "damages" as contemplated within CGL policies. This second defence has met with mixed success, with two opposing lines of case authority currently developing. The first line of cases has held that there is no coverage under a CGL policy for a CERCLA claim in that such claims are classified as being "equitable" in nature, and thus do not fall within the "legal" remedy of damages contemplated by the policy.¹²³ However, the majority of cases have rejected this narrow interpretation of the term "damages" and have held that the plain meaning of that term is sufficiently broad to include both preventive response and cleanup

¹²¹ See discussion, *supra*.

¹²² For a detailed discussion of this issue see Kathryn L. Cervon, "CERCLA Cleanup Costs As "Damages" Under the CGL Policy: Is the Cost of Hazardous Waste Cleanup Merely Small Change for The "Deep Pockets" of Insurers?" (1991), *FICC Quarterly*, 391; Jordan S. Stanzler and Charles A. Yuen, "Coverage For Environmental Cleanup Costs: History Of The Word "Damages" In The Standard Form Comprehensive General Liability Policy" (1990), *Columbia Business Law Review*, Vol. 1990 No. 3, 449; Stephen Mountainspring, "Insurance Coverage of CERCLA Response Costs: The Limits of "Damages" in Comprehensive General Liability Policies" (1989), *Ecology Law Quarterly*, Vol. 16 No. 3, 755.

¹²³ Cases which have adopted this approach include *Maryland Casualty Co. v. Armco Co.*, 822 F. 2d 1348 (4th Cir. 1987), cert. denied, 484 U.S. 1008 (1988); *Continental Insurance Co. v. Northeastern Pharmaceutical & Chemical Co.*, 842 F. 2d 977 (8th Cir. 1987), cert. denied, 488 U.S. 821 (1988).

costs.¹²⁴ This view was well summarized in *Boeing Co. v. Aetna Casualty and Surety Co.*¹²⁵

Courts consistently agree that the 'common sense' understanding of damages within the meaning of the policy 'includes a claim which results in causing [the policy-holder] to pay sums of money because his acts or omissions affected adversely the rights of third parties.'¹²⁶

Third, with respect to claims for preventive response costs, the insurance industry has strongly resisted claims which assert that insurers are liable for costs incurred by the EPA under CERCLA for response to prevent the release of contaminants into the environment. While not expressly stated it appears that the position taken by the industry is that costs associated with taking precautions to prevent a contaminant release are essentially business costs to be borne by insureds. In response to these claims insurers have argued that the definition of the term "property damage" found in most CGL policies (which defines "property damage" as "... injury to or destruction of tangible property") precludes coverage for statutorily imposed response costs.

Some courts have agreed with the position taken by insurers. For example, in *Mraz v. Canadian Universal Insurance Company*¹²⁷ in concluding that preventive response did not come within the definition of "property damage" as defined within a CGL policy the Court stated:

¹²⁴ See for example *AIU Insurance Co. v. Superior Court*, 274 Cal. Rptr. 820, 834 (Cal. 1990); *C.D. Spangler Construction Company v. Industrial Crankshaft & Engineering Co.*, 326 N.C. 133, 388 S.E. 2d 557 (1990); *Minnesota Mining & Manufacturing Company v. Travellers Indemnity Co.*, 457 N.W. 2d 175 (Minn. 1990); and *Hazen Paper v. United States Fidelity & Guarantee Company*, 407 Mass. 689, 555 N.E. 2d 576 (1990).

¹²⁵ 113 Wash. 2d 869, 784 P. 2d 507 (1990).

¹²⁶ *Ibid.*, at 512, quoting from *United States Fidelity & Guarantee Co. v. Thomas Solvent Co.*, 683 F. Supp. 1139, 1168 (W.D. Mich. 1988).

¹²⁷ 804 F. 2d 1325 (4th Cir. 1986).

... property damage and response are independent; for example, the government may take response action in cases of a substantial threat of a release of hazardous substances before any damage ever occurs. One cannot equate response costs with "injury to or destruction of tangible property," this policy's definition of property damage. Instead, response costs are an economic loss.¹²⁸

However, other courts have found that preventive response costs are covered by the CGL policy in that the release of contaminants into the environment causes injury to or destruction of tangible property.¹²⁹ Still other cases have found coverage for preventive response costs if such costs are lower than the cleanup costs which would have been incurred if preventive response actions had not been taken.¹³⁰

The statutory liabilities for preventive response and contaminated site cleanup created by CERCLA have created a number of major problems for the American insurance industry in the provision of environmental impairment insurance. First, these liabilities are imposed on the basis of the status of the insured, irrespective of fault. As one writer has observed:

Probably the biggest problem with the Superfund laws, from an insurance industry standpoint, is the fact that the present laws are written without regard to fault. Liability is imposed merely by virtue of the insured's status as owner or operator of a waste site or its status as a generator or hauler of a toxic material that ultimately finds its way to a waste site. Strict liability for cleanup is imposed solely on the basis of whether or not a party fits into a category listed within the statute.¹³¹

In creating a form of liability whereby an insured may be liable for part or all of preventive response or contaminated site cleanup costs solely on the basis of its connection to a contaminated site, insurers are effectively precluded from assessing with any degree of certainty the probability and magnitude of environmental liability which may be associated with an insured.

¹²⁸ *Ibid.*

¹²⁹ *Port of Portland v. Water Quality Insurance Syndicate*, 796 F. 2d 1188 (9th Cir. 1986); and *AIU Insurance Company v. Superior Court (FMC Corp.)*, 51 Cal. 3d 807, 799 P. 2d 1253, 274 Cal. Rptr. (1990).

¹³⁰ *Bankers Trust Co. v. Hartford Accident and Indemnity Co.*, 518 F. Supp. 371 (S.D.N.Y., 1981).

¹³¹ Thomas W. Murphy and Nancy K. Caron, "Insurance Coverage and Environmental Liability" (1988), *FICC Quarterly*, 353 at 359.

Second, the legislation imposes "strict liability"¹³² which precludes an insured PRP from raising the defences that would ordinarily be available at common law.¹³³

Third, the liability imposed by CERCLA is "joint and several". Thus, an insured PRP can be held responsible for preventive response or cleanup costs which are disproportionate to its actual contribution to the environmental problem. In extreme cases an insured whose contribution to an environmental problem is minor in nature could potentially be held responsible for the entire cost of a preventive response or cleanup.

Fourth, liability for cleanup costs is retroactive. Therefore, insurers who underwrote environmental impairment policies prior to the enactment of CERCLA had no opportunity to identify the scope and magnitude of the potentially insurable liabilities which the statute created. This in turn resulted in the insurance industry setting both premiums and reserves at much lower levels than were justified by the risk. Further, the apparent willingness of the United States Government to take the unusual step of enacting retroactive legislation to deal with environmental contamination issues has created a climate of uncertainty as to possible future environmental legislation amongst an industry which survives by its ability to predict with a reasonable degree of certainty the probability of future events.

Finally, an insurer may be made a direct party to a claim for recovery of preventive response or cleanup costs.¹³⁴ While this provision was originally included within CERCLA to

¹³² "Strict liability" in American legal parlance is approximately equivalent to "absolute liability" under Canadian law..

¹³³ In the absence of the strict liability component of CERCLA one possible defence would be that the insured had taken state-of-the-art precautions. (See *U.S. v. Otatti and Goss, Inc.*, 630 F. Supp. 1361 (D.N.H. 1985). A second potential defence would be that the toxic effect of the substance which caused the contamination was unknown at the time of its release. (See *U.S. v. Conservation Chemical*, 619 F. Supp. 162 (W.D. Mo. 1985).

¹³⁴ 42 U.S.C., at s. 9608(c).

prevent the situation where insurers could deny coverage of an EPA cleanup claim against an insured, thereby effectively removing themselves from the direct reach of the EPA, this provision had the unfortunate side effect of seriously eroding the ability of insurers to regulate the environmental behaviour of insureds through denial of coverage in the event of a policy breach.¹³⁵ For example, in agreeing to underwrite an environmental impairment policy an insurer may include within the insuring agreement special conditions relating to environmental safety which the insurer is obligated to observe. Should an environmental contamination claim arise as a result of a breach of the special conditions the insurer is allowed to deny coverage under the policy. However, if the claim arises within CERCLA, a denial of coverage by an insurer will often result in the insurer being added as a direct party to the action. As a result, the only recourse available to insurers in this situation is to deny coverage, be added as a party to a cleanup cost recovery action and bring a subsequent action outside of the CERCLA claim against its insured. From a practical perspective this approach may be of limited utility, in that many insureds will be unable to satisfy a large environmental cleanup claim.

4.4.2 Canadian Preventive Response And Cleanup Liability Legislation

Statutory civil liability for response measures to prevent the release of contaminants into the environment is now being included in Canadian environmental legislation. The purpose of this legislation is similar to that of CERCLA, and a number of Canadian enactments reflect this similarity. Typical of the Canadian approach are recent amendments to the British Columbia

¹³⁵ In the event that an insured to which coverage had been denied was unable to satisfy the EPA claim, the EPA would have been left in the position of depending upon the success of the insured in an action against its insurer for indemnity.

*Waste Management Act*¹³⁶. Section 10(2) of the Act sets out the powers of the Province of British Columbia to order a person to take steps to prevent the release of contaminants into the environment:

10.(2) Where a person has possession, charge or control of any polluting substance, the minister may, where he considers it reasonable and necessary to lessen the risk of an escape or spill of the substance, order that person

- (a) to undertake investigations, tests, surveys and any other action the minister considers necessary to determine the magnitude of the risk and to report the results to the minister,
- (b) to prepare, in accordance with the minister's directions, a contingency plan containing information the minister requires, and
- (c) to construct, alter or acquire at the person's expense any works, or carry out at the person's expense any measures that the minister considers reasonable and necessary to prevent or abate an escape or spill or the substance.

Statutory civil liability for the cleanup of contaminated sites is also now being included within Canadian environmental legislation. As with the area of preventive response, the purpose of this legislation is similar to that of CERCLA, and the statutes reflect this similarity. This approach may be seen in recent amendments to the British Columbia *Waste Management Act*.¹³⁷ Section 22 of that Act sets out the powers of the Province of British Columbia to order a person responsible for a release to undertake cleanup procedures:

22.(1) Where a manager is satisfied on reasonable grounds that a substance is causing pollution, the manager may order

- (a) the person who had possession, charge or control of the substance at the time it escaped or was emitted, spilled, dumped, discharged, abandoned or introduced into the environment,
- (b) any other person who caused or authorized the pollution, or

¹³⁶ R.S.B.C. 1979, c. 428.5. See also section 114 of the Alberta *Environmental Protection and Enhancement Act*, *supra*, note 101.

¹³⁷ *Ibid.* See also section 114 of the Alberta *Environmental Protection and Enhancement Act*, *supra*, note 101.

- (c) the person who owns or occupies the land on which the substance is located or on which the substance was located immediately before it escaped or was emitted, spilled, dumped, discharged, abandoned or introduced into the environment

to do any of the things referred to in subsection (2).

(2) An order under subsection (1) shall be served on the person to whom it applies and may require that person, at his own expense, to

- (a) provide to the manager information that the manager requests relating to the pollution,
- (b) undertake investigations, tests, surveys and any other action the manager considers necessary to determine the extent and effects of the pollution and to report the results to the manager,
- (c) acquire, construct or carry out any works or measures that are reasonably necessary to control, abate or stop the pollution,
- (d) adjust, repair or alter any works to the extent reasonably necessary to control, abate or stop the pollution,
- (e) abate the pollution, and
- (f) carry out remediation in accordance with any criteria established by the director and any additional requirements specified by the manager.

As stated above, in the event that a PRP refuses to comply with an order to clean up a contaminated site, most legislation of this type contains provisions which allow the government to step in and effect the cleanup and charge the costs incurred to the persons responsible. For example, the Alberta *Environmental Protection and Enhancement Act* states:

204(1) If the person to whom an enforcement order is directed fails to comply with the enforcement order, the Director may take whatever action the Director considers necessary to carry out the terms of the enforcement order.

- (2) Costs incurred by the Director under this section are recoverable by the Government
 - (a) in an action in debt against the person to whom the enforcement order was directed, or

- (b) by order of the Minister directing any person who has purchased land from the person to whom the enforcement order was directed to pay to the Minister instead of the vendor an amount not exceeding the amount owing in respect of the costs.¹³⁸

Due in large part to the relative newness of statutorily imposed liabilities for preventive response measures necessary to prevent the release of contaminants into the environment and the cleanup of contaminated sites in Canada, there have been few instances where Canadian governments have undertaken a preventive response or cleanup and have subsequently attempted to recover their costs from a PRP. As a result, there is presently insufficient case law in this area to provide guidance as to whether Canadian insurers may be required to provide coverage for this type of claim under CGL policies. However, as governments come to use this new power, and as insureds inevitably request coverage for this type of claim, Canadian insurers may be forced to follow their American counterparts in denying coverage for such claims. This would allow insurers to avoid the unwelcome prospects of providing coverage for what they consider to be "business costs" associated with taking preventive measures necessary to prevent a release of contaminants into the environment, or paying cleanup costs the nature and extent of which insurers were unaware at the time these policies were underwritten.

4.5 Financial Security For Preventive Response And Environmental Cleanup

Finally, some new environmental legislation in Canada now contains provisions whereby government regulators can require that financial security be provided sufficient to cover potential environmental cleanup and preventive response costs, both during and after the life of an activity which has the potential for environmental contamination. For example, the Yukon *Environment Act* provides:

¹³⁸ *Supra*, note 101 at s.204(1)(2).

Financial assurance

167.(1) The Minister may include in a permit or environmental protection order in respect of a development or activity a requirement that the person to whom the permit is issued or the order is directed provide financial assurance to the Minister for

- (a) the performance of any action specified in a permit or environmental protection order; and
- (b) measures appropriate to prevent significant adverse effects upon and following the closing of the development or the cessation of the activity, including post-closure monitoring.¹³⁹

While the requirement that potential polluters provide financial security for environmental cleanup and preventive response is relatively new in Canada, the growing realization by governments of the potentially enormous costs associated with the cleanup of contaminated sites and preventive responses combined with the current climate of fiscal restraint may soon make this a more viable option. This in turn would likely place increased demands upon the Canadian insurance industry to provide such security in the form of environmental impairment insurance.

4.6 Conclusions

In the discussion of the concept of environmental risk management in Chapter 2 it was pointed out that the perceptions of risk of environmental impairment are often as important, and in some cases more important, than technical estimates of risk. In this regard it is submitted that the Canadian public's concern for the environment has gone through a series of cycles in the past three decades, with each cycle characterized by identifiable legislative responses.¹⁴⁰ The first of these cycles, which took place in the 1960's, saw an increased public awareness of environmental concerns wherein Canadians perceived a need for the development of government institutions for

¹³⁹ S.Y. 1991. c.5 at s. 167(1).

¹⁴⁰ See Michael Clow, "The Environment As A National Political Issue In Canada", Master of Arts Thesis, Dalhousie University, 1979.

the protection and management of the environment.¹⁴¹ This “institutional phase” saw the creation of various environmental political portfolios and supporting departments across Canada. The second cycle occurred in the 1970’s, and was characterized by an increase in public concern with respect to hazardous waste issues. This resulted in legislation such as the *Environmental Contaminants Act*.¹⁴² Finally, the most recent rise in public concern for the environment began in the early 1980’s and reached its peak in the late 1980’s and early 1990’s. This peak had as a primary focus environmental impairment, and was primarily responsible for the series of recent legislative reforms which have created a new generation of statutory based civil environmental liabilities.¹⁴³

The increase in public concern with respect to risk of environmental impairment may be found from a review of recent surveys of public opinion in Canada. First, public opinion polls indicate that in the 1980’s a perception began to develop amongst Canadians that the environment is a very important issue. In speaking about Canadians’ views about the environment at an environmental law conference in 1989, Mr. Keith Neuman, a senior associate with Environics Research Group Limited offered the following observations:

Today, it is an established fact that the environment is one of the top issues on the minds of the Canadian public. We know this because even the most conservative of our institutions now acknowledge this fact:

¹⁴¹ This is in contrast to earlier legislation which had as its primary focus the protection and management of natural resources.

¹⁴² This resulted in legislation such as the *Environmental Contaminants Act*, R.S.C. 1985, c. E-12, which received Royal Assent on December 2, 1975.

¹⁴³ The examples cited here represent a series of “peaks” of environmental concern by the Canadian public, which are separated by corresponding “valleys” of low public opinion. However, it is suggested that as environmental concerns have become institutionalized the peaks of public concern are becoming higher and the valleys shallower.

For further discussion of this issue generally see Lyon, V., “Green Politics: Parties, Elections, and Environmental Policy”, in Boardman, R. ed., *Canadian Environmental Policy: Ecosystems, Politics, and Process* (Toronto: Oxford University Press, 1992); Bakvis, H. and Nevitte, N., “The Greening of the Canadian Electorate: Environmentalism, Ideology, and Partisanship”, in Boardman, R. ed., *Canadian Environmental Policy: Ecosystems, Politics, and Process* (Toronto: Oxford University Press, 1992); and Paehlke, R., *Environmentalism and the Future of Progressive Politics* (New Haven: Yale University Press, 1989).

- The media have discovered the environment in the past year, so that many environmental stories now start off with an acknowledgment of the high level of public concern.
- Governments - federal, provincial and even municipal in some cases - are now proclaiming the environment to be their top priority, as if discovered by some divine revelation.

Those of us who study public opinion through survey research know the environment is high on the public agenda because it shows up loud and clear in our studies. Environics has been tracking public opinion on a regular basis since 1976, and every quarter we ask Canadians what they believe to be the most important issue facing Canada today (probing their "top of mind" view).

Through the early 1980's, the environment was barely a blip on the screen, with the usual economic issues - unemployment, inflation, the economy in general - dominating the worry agenda. In the mid-80's, mention of environmental concerns began to climb noticeably. This past June, the environment emerged as the number one issue mentioned by Canadians, ahead of concerns about unemployment, the deficit or free trade.¹⁴⁴

This trend is verified by other polls. For example, a poll conducted by Angus Reid in July, 1989 found that 31% of Canadians indicated that they were most concerned about the environment.¹⁴⁵ This compares with only 5% in February, 1988.¹⁴⁶ A poll in September/October 1989 commissioned by the Canadian Institute for International Peace and Security found that 51% of Canadians said the environment was the most important issue.¹⁴⁷ A 1990 poll conducted for the Canadian Gas Association by Goldfarb Consultants revealed that 92% of Canadians surveyed had at least some concern about the environment.¹⁴⁸ Finally, a survey conducted in February and

¹⁴⁴ Neuman, K., "Public Opinion On The Environment: Trends and Implications for Law and Public Policy in the 1990's", *Into The Future: Environmental Law And Policy For The 1990's* (Edmonton: Environmental Law Centre, October 19-20, 1989).

¹⁴⁵ Poll of 1,521 adult Canadians conducted by Angus Reid Group, Winnipeg, Manitoba for the Southam Environmental Project. Margin of error of +/-2.5% 19 times out of 20.

¹⁴⁶ Poll of 1,523 adult Canadians conducted by Angus Reid Group, Winnipeg, Manitoba. Margin of error of +/-2.5% 19 times out of 20.

¹⁴⁷ Poll of 890 adult Canadians conducted by Dr. Don Munton of the Institute of International Relations for the Canadian Institute for International Peace and Security. Margin of error of +/-3.5% 19 times out of 20. For a complete report of this study see D. Munton and M. Driedger, "Rethinking Security: Public Attitudes in Canada", *Canadian Institute for International Peace and Security Working Paper*, December, 1989.

¹⁴⁸ Poll of 1,000 adult Canadians conducted by Goldfarb Consultants, for the Canadian Gas Association. Margin or error of +/- 3.0% 19 times out of 20.

March of 1991 by the University of Alberta Population Research Laboratory shows that 37% of Albertans said they were “very concerned” about the state of the environment, with an additional 49% expressing concern, albeit to a lesser degree. However, when questioned again 12 months later, 60% of these same respondents indicated that their concerns with the environment had increased over the year.¹⁴⁹

Second, the public opinion polls indicate that Canadians currently hold some strong perceptions with respect to their personal health risks as a result of environmental impairment. For example, a 1989 Decima Research study found that 81% of Canadians felt that environmental issues affected their health and the health of their families either “very much” or “a fair amount”.¹⁵⁰ Again, in a 1990 Angus Reid poll 60% of Canadians feel that foods are unsafe because of exposure to agricultural chemicals.¹⁵¹ Finally, a 1993 Goldfarb Consultants survey revealed that 45% of Canadians feel that “There are serious environmental health problems where I live.”¹⁵² That same study found that approximately 88% of Canadians were of the view that chemical pollution presented either a “high” or “moderate” health risk to the Canadian public, while approximately 75% took a similar view with respect to PCB’s or Dioxins.

Third, studies indicate that the Canadian public is willing to take its perceptions regarding environmental issues to the political arena. A 1988 Angus Reid poll found that 84% of Canadians

¹⁴⁹ Poll of 1,245 adult Albertans as part of the annual Alberta Survey conducted by the University of Alberta Population Research Laboratory, Edmonton, Alberta. Margin of error of +/- 3.0% 19 times out of 20.

¹⁵⁰ *Decima Research and Public Affairs International*, 1989, at 19.

¹⁵¹ Poll of 1,500 adult Canadians conducted by Angus Reid Group, Winnipeg, Manitoba. Margin of error of +/-2.5% 19 times out of 20.

¹⁵² Poll of 1506 adult Canadians conducted by Goldfarb Consultants for the Government of Canada, Department of Health and Welfare. Margin of error of +/- 2.5% 19 times out of 20. Complete results of this survey may be found in *Health Risk Perception in Canada*, Minister of Supply and Services Canada, 1993.

think that governments could do more to protect the environment.¹⁵³ A 1989 Angus Reid poll found that Canadians were willing to translate their dissatisfaction with the environmental performance of their governments into votes, with 20% of adults saying they would definitely vote for a new political party that makes environmental protection its top priority. An additional 52% said they would “seriously consider” supporting such a green party.¹⁵⁴ Consistent with this, a poll conducted in September/October 1989 commissioned by the Canadian Institute for International Peace and Security found that 66% of Canadians said that pollution and related issues should be at the top of the Canadian policy-making agenda by the year 2000.¹⁵⁵

With respect to the type of actions they wish their governments to take regarding environmental issues, in a 1989 Angus Reid poll 77% indicated that they believed that governments must get tough with polluters, stating that they would support stiffer jail sentences.¹⁵⁶ A further 52% strongly agreed with the statement “Governments should take serious action against polluters even if it means closing down some factories and losing jobs in my community”. Equally significant, this view did not change despite tough economic times. In a 1991 Angus Reid Poll 76% of adult Canadians questioned indicated that during a recession the government should maintain environmental protection as a priority, even if reducing it would put more people back to work.¹⁵⁷

¹⁵³ Poll of 1,501 adult Canadians conducted by Angus Reid Group, Winnipeg, Manitoba. Margin of error of +/-2.5% 19 times out of 20.

¹⁵⁴ *Supra*, note 145.

¹⁵⁵ *Supra*, note 147.

¹⁵⁶ *Supra*, note 145.

¹⁵⁷ Poll of 1,503 adult Canadians conducted by Angus Reid Group, Winnipeg, Manitoba. Margin or error of +/- 2.5% 19 times out of 20.

Evidence of a causal connection between the shift in the Canadian public's perception of risk of environmental impairment which began in the early 1980's and peaked in the late 1980's - early 1990's, and the creation of a series of recent legislative reforms which have created a new generation of statutory based civil environmental liabilities, may be seen in the proliferation of environmental legislation which was developed in Canada during this period. The list includes the Northwest Territories *Environmental Rights Act*¹⁵⁸ (1990), the Yukon *Environment Act*¹⁵⁹ (1993), the Alberta *Environmental Protection and Enhancement Act* (1993),¹⁶⁰ and significant amendments to the British Columbia *Waste Management Act*¹⁶¹ (1994).

Evidence of public perception of environmental impairment translating into legislative reform in Canada is particularly apparent in the development of the Alberta *Environmental Protection and Enhancement Act*.¹⁶² This Act was proclaimed into force in September, 1993 after an extensive public consultation process which took more than 4 years to complete. As part of that process the Alberta Government requested written comments from the public with respect to their expectations for the new legislation. In commenting on the more than 4,000 responses which the Government received, then Alberta Environment Minister Ralph Klein gave the following interview to the *Edmonton Journal* newspaper only one week prior to introducing the proposed legislation in June, 1990:

¹⁵⁸ *Supra*, note 109.

¹⁵⁹ *Supra*, note 139.

¹⁶⁰ *Supra*, note 101.

¹⁶¹ *Supra*, note 136.

¹⁶² *Supra*, note 101.

Businessmen should face jail for crimes against the environment, and pulp mills should be replaced with recycled paper, Albertans have told their environment minister.

The suggestions are just two of several dozen included in a sampling of public opinion which Ralph Klein says will help guide him in preparing new provincial environment legislation.

"I think what they're saying to us is they want more enforcement, they want higher fines, ... they want information, and they want access to that information," Klein said. ...

Klein said he was astounded by the number of Albertans who were interested enough to write in.

"They had to write out their thoughts. It wasn't a matter of simply checking off a box."

The overview found that the majority of respondents want polluters to be "accountable at all costs" and they should pay all costs associated with cleaning up pollution. ...

Others suggested the province force businesses to put up performance bonds large enough to cover potential environmental damage.¹⁶³

In retrospect, there is evidence that in enacting the Alberta *Environmental Protection and Enhancement Act* the Alberta Government did listen to the views of the Provincial electorate, with the Act levying higher fines for environmental crimes, providing increased access to information, creating a framework whereby polluters would be liable for clean-up costs, and instituting a system for environmental performance bonds.

The implications for the insurance industry of this shift in public perception with respect to environmental impairment should not be ignored. It is submitted that in using a rigid analytical approach to environmental risk assessment the insurance industry has overlooked the "human" side of environmental risk decision-making. That is, in its concern with profit based on predictability, the insurance community has failed to consider the human components of risk such as risk perceptions which create a demand for legislation such as that which has created a new generation of statutory liabilities. Therefore in assessing its ability to accurately predict the incidence of loss associated with environmental impairment in Canada in the future, it will be

¹⁶³ Brian Laghi, "Stiffer penalties sought for polluters, poll finds", *Edmonton Journal*, June 20, 1990.

necessary for the insurance industry to be accurately evaluate its ability to anticipate and react to changes in legislation likely to occur as a result of changes in the perceptions of the Canadian public with respect to the issue of environmental impairment. Thus, prior to offering environmental impairment liability insurance products into the Canadian marketplace it is recommended that insurers give careful consideration to the possibility of new statutory civil liabilities for environmental impairment such as civil actions upon conviction of offences under regulatory legislation, civil actions to protect the public trust, liability for preventive response and cleanup of contaminated sites, and financial security for preventive response and environmental cleanup. They will need to be able to understand the connection between public opinion and resulting legislation so that they can interpret shifts in public opinion in terms of likely effects on legislation. By monitoring the perceptions of the Canadian public regarding environmental impairment issues in advance of developing and marketing environmental impairment liability insurance products the insurance industry should be able to provide a better product, and break out of the pattern which the industry has established over the past five decades of modifying and in some cases removing these products in reaction to unanticipated legislative change.

5.0 THE NEW GENERATION OF COMMON LAW CIVIL ENVIRONMENTAL LIABILITIES

5.1 Introduction

The fourth sub-hypothesis suggests that in entering into the environmental impairment liability insurance marketplace the insurance industry may encounter additional difficulties in the event that it fails to anticipate the development of a new generation of common law civil environmental liabilities which may further impair the ability of the insurance industry to predict the incidence of loss in environmental cases.¹⁶⁴ It is further submitted that these changes in the common law are directly related to a growing perception amongst judges that environmental impairment cases may raise unique issues and that traditional tort law may not be adequate to compensate injured parties for their losses in these cases. Finally, it is suggested that in response these judges appear prepared to acknowledge the validity of new and innovative common law civil environmental liabilities which are intended to ensure that those responsible for pollution will be required to fully compensate those who have incurred injury resulting from that pollution. Specifically, a new generation of environmental claims is emerging which seek compensation on the basis of "increased chance of injury" rather than "actual injury". These new theories of recovery have their origins in the rapidly expanding field of toxic tort litigation in the United States, and it is likely that these claims will find their way into Canadian courts in the near future.¹⁶⁵ This chapter will examine this new generation of common law civil liabilities and their implications for the environmental insurance industry in Canada.

¹⁶⁴ Other changes to the common law such as opening up the rules surrounding standing (*R. v. Findlay*, [1993] 2 S.C.R. 1009 S.C.C.) have expanded the types of claimants who may advance toxic tort claims.

¹⁶⁵ For a detailed discussion on this topic see Richard H. Willis and Joseph M. Melchers, "Compensation For Imagination: Emerging (And Persistent) Theories Of Recovery In Toxic Tort Cases", *Environmental, Hazardous Waste and Toxic Tort Litigation Symposium* (Chicago: Defense Research Institute Inc., March 18 -20 1993. A-1). See also "Decreasing The Risks Inherent in Claims for Increased Risk of Future Disease", 43 *University of Miami Law Review* 1081 (1989).

5.2 Compensation For Increased Chance Of Injury

In the United States persons who have been wrongfully exposed to toxic substances but who have no immediately apparent injuries are now attempting to advance claims for damages based upon an increased chance of developing future illness as a result of that exposure. While new to North America, similar approaches to recovery for exposure to toxic substances are currently in use in a number of European legal systems. In essence, a cause of action based on increased chance of future injury contemplates that a claimant who is wrongfully exposed to a contaminant with a known propensity for causing a particular illness at some future date is awarded damages in direct proportion to the probability of the illness actually occurring. Thus for example, if a claimant is wrongfully exposed to a chemical compound which contains a carcinogen which has a scientifically established probability of causing cancer in 10% of the population so exposed, the claimant is entitled to damages in the amount of 10% of what would be received if a similar cancer developed immediately upon exposure. The advantages of this system are that it provides defendants and their insurers with certainty and immediacy with respect to their quantum of liability, while at the same time relieving claimants of the burden of proving the existence of latent injuries. However, this system has two significant disadvantages. First, this approach is misguided in that the percentage of the population who will develop cancer in response to a given exposure cannot be known with either reasonable precision or acceptable accuracy. Second, this approach also overcompensates those who never develop injuries and undercompensates those who actually do develop illness. In the past both Canadian and American courts have generally avoided awarding damages to claimants based upon an increased chance

of injury resulting from wrongful exposure to an environmental contaminant.¹⁶⁶ This avoidance has been primarily based on the notion that such an approach is directly antithetical to the fundamental principle of tort law that there can be no compensation in the absence of actual injury, which injury must be established by proof on the balance of probabilities. Additional arguments against allowing claims based upon an increased risk of injury include the fact that the risk is usually unquantifiable, such a claim relies primarily upon speculative evidence, and that to allow such claims would encourage a flood of speculative lawsuits. However, there are indications that the courts may be willing to allow claims for damages for increased risk of future injury in certain circumstances, and are doing so by adopting innovative approaches which allow for such recovery without unduly impairing the fundamental principles of tort law. This section will examine three of these emerging theories of recovery.

5.2.1 Injury To Immune System

A few cases have held that claims resulting from wrongful exposures which do not manifest themselves in the form of actual physical injuries in the conventional sense, but which cause injury to the immune system, thereby increasing the probability of future injury in the form of contracting future illness, are compensable. This theory of recovery is currently identified by a variety of names including "Chemically Induced AIDS", "Chemically Induced Immune Disregulation Syndrome" (CIIDS) or "Systemic, Progressive Chemical Intoxication".

¹⁶⁶ A few courts, however, have given approval in principle to allowing claims based on the enhanced chance of future injury. See for example *Sterling v. Velsicol* (647 F. Supp. 303 (W.D. Tenn 1986)) where a Tennessee District Court allowed such a claim on the basis that an injury had occurred in that an increased chance of injury is equivalent to an existing injury. It should be noted that while part of this decision was reversed on appeal (855 F. 2d 1188 (6th Cir. 1988)) on the grounds that the plaintiff did not successfully meet the standard of proof, the appellate court left intact that part of the decision which gave approval to allowing claims based on increased risk.

For example, in *Barth v. Firestone Tire and Rubber Co.*¹⁶⁷ a California court considered an application by a defendant tire manufacturer to dismiss a claim by a former employee which alleged, *inter alia*, injury to the claimant's immune system which would render him more susceptible to developing various forms of cancer as a result of exposure to toxic chemicals in the course of his employment. The court dismissed the application, finding that a valid cause of action existed:

The Court here notes the troubling and complex issues raised regarding the nature of a legal injury. In this case, the plaintiff has already pled a current legally cognizable injury by alleging damage to his immune system ...¹⁶⁸

Again, in *Elam v. Alcolac, Inc.*¹⁶⁹ the Missouri Court of Appeals upheld a jury finding at trial that the defendant was liable to multiple plaintiffs for injuries to the plaintiffs' immune systems. In that case 31 plaintiffs brought actions against a defendant chemical manufacturer for *inter alia*, injuries to their immune systems resulting from toxic spills and air emissions from a chemical facility owned and operated by the manufacturer. It was accepted by the courts both at trial and on appeal that the evidence established that the plaintiffs exhibited manifestations of disease and dysfunction from chronic systemic chemical intoxication, and that these manifestations were caused by wrongful exposure to toxic chemicals produced by the defendant.

¹⁶⁷ 661 F. Supp. 193 (N.D. Cal. 1987).

¹⁶⁸ *Ibid.*, at 197, per Aguilar J.

¹⁶⁹ 765 S.W. 2d 42, 189, 213 (Missouri App. 1988).

5.2.2 Fear Of Future Injury

While courts in both Canada and the United States have been very reluctant to allow claims based on a risk of manifestation of an injury, there are indications that American courts are becoming less reluctant to allow claims based upon a fear of developing an injury in the future as a result of an exposure which increases the chance of incurring that injury. This form of claim is essentially an extension of the traditional common law cause of action for nervous shock recognized in both Canada and the United States. The fear of future injury claim allows a plaintiff to recover for nervous shock resulting from a fear of the future manifestation of injury. The majority of American courts which have allowed this type of claim appear to have done so in the context of a fact situation where it is established that the emotional stress was either caused by an actual physical injury or impact resulting from a wrongful exposure, or caused an actual physical injury as a result of the exposure.¹⁷⁰

Other courts have maintained the requirement that actual physical injury must have occurred, but have given a broad interpretation to the concept of actual physical injury. Particularly noteworthy are those cases where the courts have found that the contracting of an immune disorder from an exposure satisfies the actual physical injury requirement and is therefore compensable. For example, in *Anderson v. W.R. Grace and Co.*,¹⁷¹ a Massachusetts court considered an application by corporate defendants for summary judgment with respect to a claim by a group of plaintiffs for, *inter alia*, emotional distress resulting from a fear of developing leukemia after ingesting water contaminated with chemicals including trichloroethylene and tetrachloroethylene. The defendants argued that these claimants were not entitled to recover as

¹⁷⁰ See for example, *Eagle-Picher Industries v. Cox* (481 So. 2d at 529 (Fla. App. 1985)).

¹⁷¹ 628 F. Supp. 1219 (D. Mass. 1986).

the plaintiffs' emotional distress was not caused by nor did it cause any physical injury. The court rejected this argument, finding that subcellular damage, which could not be detected by the victim but could be detected by medical experts was sufficient to meet the requirement that the emotional distress was the result of physical injury. The court summarized its findings in this way:

None of these claims for emotional distress arise from physical injuries caused by defendants' conduct. Accordingly, they are not compensable under ... ordinary principles of recovery for mental suffering.

However, certain elements of plaintiffs' emotional distress stem from the physical harm to their immune systems allegedly caused by the defendants' conduct and are compensable.¹⁷²

Finally, some courts have gone so far as to allow this type of claim in circumstances where emotional distress has occurred as a result of exposure where no injury is immediately apparent, but there is a reasonable ground for the plaintiff's fear that a latent injury has been suffered which may manifest itself at some later date. The leading case in this area is *Hagerty v. L&L Marine Services Inc.*¹⁷³ In that case a plaintiff seaman brought an action against his employer for damages, *inter alia*, for mental anguish due to fear of developing cancer, incurred as a result of his being soaked by toxic chemicals. The defendant was granted summary judgment by the District Court for the Eastern District of Louisiana on the ground that no cause of action had accrued. The plaintiff appealed. The United States Court of Appeals (5th Circuit) reversed that decision, holding that regardless of the existence of actual physical injury, a plaintiff is entitled to recover damages for serious mental distress arising from fear of developing an injury where his fear is reasonable and causally linked to the defendant's negligence. In giving the reasons for its decision the court stated:

¹⁷² *Ibid.*, at 1228 per Skinner J.

¹⁷³ 788 F. 2d at 318 (5th Cir. 1986).

The physical injury requirement, like its counterpart, the physical impact requirement, was developed to provide courts with an objective means of ensuring that the alleged mental injury is not feigned. W. Prosser, *The Law of Torts* 54, at 330-333 (4th ed. 1971). We believe that notion to be unrealistic. It is doubtful that the trier of fact is any less able to decide the fact or extent of mental suffering in the event of physical injury or impact. With or without physical injury or impact, a plaintiff is entitled to recover damages for serious mental distress arising from fear of developing cancer where his fear is reasonable and causally related to the defendant's negligence. The circumstances surrounding the fear-inducing occurrence may themselves supply sufficient indicia of genuineness. It is for the jury to decide questions such as the existence, severity and reasonableness of the fear.¹⁷⁴

5.2.3 Ongoing Medical Monitoring

The third new risk-based theory of recovery which is currently developing in toxic tort litigation in the United States is for compensation for the costs associated with determining on an ongoing basis the existence, nature and extent of injuries which have occurred or which may occur in the future.¹⁷⁵ Various known as "ongoing medical monitoring" or "surveillance damage", this theory of recovery takes the generally accepted principle of personal injury law that a person who is injured as a result of an occurrence has the right to undergo and recover the cost of such medical examinations as are necessary to determine the existence, nature and extent of such injuries, and expands that principle in situations of exposure to environmental contaminants to include examinations of an ongoing nature in cases where the *prima facie* presence of injury is immediately apparent or detectable and even in cases where it is not.¹⁷⁶ While the law in the

¹⁷⁴ *Ibid.*, at 318, per Reavley JA.

¹⁷⁵ This may be distinguished from claims for enhanced risk of injury, "... which seek compensation for the anticipated harm itself, proportionately reduced to reflect the chance that it will not occur." (Clark, 755 F. Supp. at 1477).

¹⁷⁶ The standard policy argument against the principle of ongoing medical monitoring in personal injury cases as a whole has been that such an approach is unfair to defendants (and their insurers) in that the quantum of damages remains uncertain over an extended period of time. For this reason the traditional approach to determining damage awards has been for experts appearing on behalf of plaintiffs and defendants to provide evidence to the courts which consist of predictions as to the nature and extent of both present and future injuries incurred by plaintiffs as a result of an occurrence, and for the courts to make immediate and final decisions on the basis of that evidence. While this approach may ultimately lead to individual plaintiffs being over or under compensated for their injuries, it does provide defendants and their insurers with a high degree of immediate certainty with respect to the quantum of their liability. There are indications that this traditional policy consideration may be overshadowed by a growing perception amongst judges that environmental impairment cases may raise unique issues which require ongoing medical monitoring in order to adequately to compensate injured parties.

United States is still somewhat unsettled with respect to the requirements for the recovery of damages in the form of ongoing medical monitoring costs, the courts in many states now appear to be willing to make awards for ongoing medical monitoring in cases where a wrongful exposure results in an immediately apparent or detectable injury to the plaintiff and there is a medically justifiable reason for ongoing medical monitoring. However, there is currently considerably more controversy with regard to the second situation, that of awarding costs for ongoing medical monitoring in cases where a wrongful exposure results in an increased chance of injury, but no injury is immediately apparent or detectable, and in fact may never occur.

The basis for this approach has been well summarized as follows:

Those courts accepting medical monitoring as a new cause of action or element of damages often do so despite the absence of physical injury, reasoning that the necessity for periodic medical exams in order to determine the onset of injury is a real and present damage in itself. But for the wrongful exposure, plaintiffs would not be required to seek medical attention, therefore the costs of specific medical surveillance incurred as a result of the wrongful exposure, if proved by competent expert testimony, are recoverable.¹⁷⁷

There are also at least five practical rationales which also support the awarding of costs for ongoing medical monitoring in situations where an exposure to a contaminant may result in an injury which may not be readily apparent.¹⁷⁸ First, there may be a latency period with contaminant exposure wherein an illness resulting from the exposure may not manifest itself for months or even years. Ongoing medical monitoring may be able to detect the early stages of the illness, thereby reducing the time period for awareness and treatment of the illness. Second, early detection of a latent illness may be critical to establishing a claim within the time allotted by the

¹⁷⁷ Richard H. Willis and Joseph M. Melchers, *supra*, note 165 at A-27-28.

¹⁷⁸ For a detailed discussion on this topic see Slagel, *Medical Surveillance Damages: A Solution to Inadequate Compensation of Toxic Tort Victims*, *Indiana Law Journal*, Vol. 63, 1988, 849 and Gara, *Medical Surveillance Damages: Using Common Sense in the Common Law to Mitigate the Dangers Posed by Environmental Hazards*, *Harvard Environmental Law Review*, Vol. 12, 1988, 265.

various statutes of limitation.¹⁷⁹ Third, in the absence of ongoing medical monitoring it may be difficult to establish a causal link to the earlier contaminant exposure when an illness finally appears. Fourth, in the absence of ongoing medical monitoring an illness with a latency period opens the door to the defence of “intervening cause”.¹⁸⁰ It is suggested that this possibility increases in proportion to the length of the latency period. Finally, the longer that a contaminant caused illness remains undetected the greater is the possibility that a potential plaintiff will be unable to locate a solvent defendant.

A series of recent cases in the United States support a plaintiff’s ability to recover for ongoing medical monitoring in situations where no injury is immediately discernable or detectable. For example, in 1984 in *Friends For All Children Inc. v. Lockheed Aircraft Corp.*,¹⁸¹ the United States Court of Appeals (District of Columbia Circuit) upheld a claim for periodic medical testing of children for the purpose of detecting latent injuries which may have been suffered due to aircraft cabin depressurization during an airlift out of Vietnam on the basis that:

¹⁷⁹ The acceptance by the courts of a cause of action for the recovery of ongoing medical monitoring costs in situations where an injury is not immediately apparent or detectable may assist the plaintiff in bringing an action within applicable statutory limitation periods, but leaves unanswered the issue of whether the plaintiff is statute barred in situations where the injury manifests itself outside of the limitation period. For a discussion of this subject see “Claim Preclusion in Modern Latent Disease Cases: A Proposal for Allowing Second Suits”, 103 *Harvard Law Review* (1990).

A related issue is whether the principle of *res judicata* precludes a plaintiff who successfully brings an action for recovery of ongoing medical costs associated with a wrongful exposure event from later bringing a second action for recovery of additional damages in the event that a physical injury manifests itself. In this regard the comments of Reavley JA. of the United States Court of Appeals (5th Cir.) in *Hagerty v. L & L Marine Services Inc.* (788 F. 2d 315 at 317) are interesting:

Finally, we volunteer our dissatisfaction with the single cause of action rule in face of the recurring problem of injured people facing the possibility of cancer. Those victims should be entitled to recover for present injuries and, also, for the cancer when and if it later develops; they should neither be entitled nor compelled to recover for cancer damages until those damages can be realistically assessed.

¹⁸⁰ An intervening cause may be defined as:

... an independent cause which intervenes between the original wrongful act or omission and the injury, turns aside the natural sequence of events, and produces a result which would not otherwise have followed and which could not have been reasonably anticipated. An act of an independent agency which destroys the causal connection between the negligent act of the defendant and the wrongful injury; the independent act being the immediate cause, in which case damages are not recoverable because the original wrongful act is not the proximate cause. (Black’s Law Dictionary, 5th. ed. (St. Paul: West Publishing Company, 1979), at 736).

¹⁸¹ 746 F. 2d 816, 825 (D.C. Cir. 1984).

... it is difficult to dispute that an individual has an interest in avoiding expensive diagnostic examinations just as he or she has an interest in avoiding physical injury.¹⁸²

Also in 1984 a New York court in *Askey v. Occidental Chemical Corp.*,¹⁸³ held that a plaintiff exposed to toxic chemicals emanating from a landfill who had no immediate apparent physical injury but who established on the evidence the reasonable probability of future physical injury resulting from that exposure was entitled to recover for the cost of ongoing medical monitoring:

Damages for the prospective consequences of a tortious injury are recoverable only if the prospective consequences may with reasonable probability be expected to flow from the past harm. Consequences which are contingent, speculative, or merely possible are not properly considered in ascertaining damages. If a plaintiff seeks future medical expenses as an element of consequential damage, he must establish with a degree of reasonable medical certainty through expert testimony that such expenses will be incurred.

In light of the foregoing, it would appear that under the proof offered here persons exposed to toxic chemicals emanating from the landfill have an increased risk of invisible genetic damage and a present cause of action for their injury, and may recover all "reasonably anticipated" consequential damages.¹⁸⁴

Finally, in 1988 a Pennsylvania court in *Merry v. Westinghouse Electric Corp.*¹⁸⁵ heard an application for summary judgment against plaintiff property owners whose water wells had been contaminated by toxic substances and who brought an action for, inter alia, ongoing medical monitoring costs. In rejecting the summary judgment application the court held that "... a plaintiff need not exhibit symptoms of a disease before medical surveillance is sought ..."¹⁸⁶

¹⁸² *Ibid.*, at 826.

¹⁸³ 102 A.D. 2d 130, 477 N.Y.S. 2d 242 (1984).

¹⁸⁴ *Ibid.*, at 136-137, 477 N.Y.S. 2d at 247.

¹⁸⁵ 684 F. Supp. 847 (M.D. Pa. 1988).

¹⁸⁶ *Ibid.*, at 849. See also *Laxton v. Orkin Exterminating Co.* 639 S.W. 2d 431 (Tenn. 1982), where a Tennessee court allowed a claim for medical testing where a plaintiff ingested contaminated water, despite the fact that there were not immediate apparent or detectable injuries, and the ingestion was eventually found to be harmless.

However, the leading case in the United States in support of a plaintiff's ability to recover for ongoing medical monitoring in situations where no injury is immediately discernable or detectable is the 1990 decision of the United States Court of Appeals (Third Circuit) in *In Re Paoli Railroad Yard PCB Litigation*.¹⁸⁷ In that case the appellate court heard an appeal from a decision of the Pennsylvania District Court granting summary judgment against 38 plaintiffs who had brought a class action suit against the defendant railyard for damages as a result of exposure to PCB's. In upholding the appeal and dismissing the summary judgment the court, inter alia, held that the plaintiffs had a valid cause of action in their claim for ongoing medical monitoring despite the fact that some of the plaintiffs had no immediately apparent or detectable injuries. In setting out its rationale for this finding the court stated:

Medical monitoring is one of a growing number of non-traditional torts that have developed in the common law to compensate plaintiffs who have been exposed to various toxic substances. Often, the diseases or injuries caused by this exposure are latent. This latency leads to problems when the claims are analyzed under traditional common law tort doctrine because, traditionally, injury needed to be manifest before it could be compensable. Thus, plaintiffs have encountered barriers to recovery which "arise from the failure of toxic torts to conform with the common law conception of an injury."¹⁸⁸

In reaching its decision the court in *Paoli* considered the argument that the awarding of costs for ongoing medical monitoring in the absence of an immediately apparent or detectable injury would create a flood of speculative lawsuits,¹⁸⁹ and the related argument that potential defendants should not be required to pay ongoing medical monitoring costs solely on the basis of an increased chance of injury, in that if no injury ever develops under the principles of tort law the plaintiff has no cause of action against the would-be defendant. Put another way, there

¹⁸⁷ 916 F. 2d 829 (3rd Cir. 1990).

¹⁸⁸ *Ibid.*, at 849, per Becker, JA. The quotation in the judgment is from Medical Surveillance Damages: A Solution to the Inadequate Compensation of Toxic Tort Victims, 63 *Indiana Law Journal* 849 at 852 (1988).

¹⁸⁹ In this regard see *Rheingold v. E.R. Squibb and Sons*, No. 74 Civ. 3420 (S.D.N.Y. Oct. 8, 1975).

can be no legal remedy without actual injury.¹⁹⁰ In rejecting these arguments the court characterized the need for ongoing medical monitoring as an injury, with the result being that once a need for ongoing medical monitoring to detect a latent injury is established on a balance of probabilities by the evidence, a potential tortfeasor is as liable to a potential plaintiff for any ongoing medical monitoring costs resulting from the wrongful act in question as for any actual physical injuries which the plaintiff might have sustained. In the words of the court:

The injury in an enhanced risk claim is the anticipated harm itself. The injury in a medical monitoring claim is the cost of the medical care that will, one hopes, detect that injury. The former is inherently speculative because courts are forced to anticipate the probability of future injury. The latter is much less speculative because the issue for the jury is the less conjectural question of whether the plaintiff needs medical surveillance.¹⁹¹

In characterizing a need for ongoing medical monitoring as a compensable injury in the absence of actual physical injury, the court in *Paoli* relied on a similar characterizations in the earlier cases of *Friends For All Children Inc.*,¹⁹² *Askey v. Occidental Chemical Corp.*,¹⁹³ and in *Merry v. Westinghouse Electric Corp.*¹⁹⁴

In reaching its decision, the court in *Paoli* suggested the following test for determining the eligibility of plaintiffs to recover for ongoing medical costs where there are no immediately apparent or detectable injuries:

1. Plaintiff was significantly exposed to a proven hazardous substance through negligent acts of the defendant;

¹⁹⁰ States whose courts have rejected awarding costs for ongoing medical monitoring in the absence of immediately apparent or detectable injury on this basis include West Virginia (*Ball v. Joy Mfg. Co.*, 755 F. Supp. 1344 (S.D.W. Va. 1990)); Illinois (*Morrissy v. Eli Lilly & Co.*, 76 Ill. App. 3d., 753, 394 N.E. 2d. 1369 (1979)); and New York (*Rheingold v. E.R. Squibb and Sons*, No. 74 Civ. 3420 (S.D.N.Y. Oct. 8, 1975)).

¹⁹¹ *Supra*, note 187 at 850-851.

¹⁹² 746 F. 2d 816, 825 (D.C. Cir. 1984).

¹⁹³ 102 A.D. 2d 130, 477 N.Y.S. 2d 242 (1984).

¹⁹⁴ 684 F. Supp. 847 (M.D. Pa. 1988).

2. As a proximate result of exposure, plaintiff suffers a significant increased risk of contracting a serious latent disease;
3. That increased risk makes periodic diagnostic medical examinations reasonably necessary;
4. Monitoring testing procedures exist which make the early detection and treatment of the disease possible and beneficial.¹⁹⁵

This test or similar tests have been adopted by a number of courts in cases involving latent injuries. The results have been mixed, with the focus of most cases being on the second requirement, whether as a proximate result of exposure a plaintiff suffers a significant increased risk of contracting a serious latent disease. Not surprisingly, this often results in a typical "battle of the experts" as each side to the litigation adduces scientific evidence in an attempt to prove on the balance of probabilities that the plaintiff does or does not have a significant increased risk of contracting a latent disease as a result of the wrongful exposure.

While most of the attention in this area of law has focused upon situations where a potential plaintiff is exposed to a "proven hazardous substance"¹⁹⁶ as found in the first part of the test in *Paoli*, there are indications that this principle may eventually be extended to situations where there is suspicion but no conclusive scientific proof that exposure to a particular element may cause illness. This scenario raises an additional philosophical rationale for the use of ongoing medical monitoring. In response to situations of scientific uncertainty two approaches are generally taken by decision-makers. The traditional approach, which may be referred to as the "reactive" model of decision-making, takes account of potential negative environmental effects only when the factual existence of these effects is established with a high degree of certainty, at

¹⁹⁵ *Ibid.*, at 852, per Becker, JA.

¹⁹⁶ It is suggested that the term "proven hazardous substance" is a flawed concept from a scientific perspective. All substances, including elements necessary to ecosystem survival such as oxygen, nitrogen and water have the potential to be hazardous. Therefore the degree of exposure to a particular substance is the critical test.

which point the decision-maker will react to the problem.¹⁹⁷ The second, more recent approach is more cautious in nature, and consequently has become known as the “precautionary approach”.¹⁹⁸ The precautionary principle seeks official recognition by decision-makers of the probability of environmental risks which can not be established with a high degree of certainty. There is growing support for the view that a middle ground between the extremes of the reactive and precautionary approaches to environmental decision-making may be achieved by moving away from the traditional legal decision-making structure which views environmental decisions as “final”, and moving toward a “progressive decision-making process” wherein the finality of a decision is directly tied to the degree of scientific certainty upon which the decision is based.

A leading example of the progressive decision-making process through use of the ongoing monitoring approach in the context of scientific uncertainty is to be found in the continuing debate over negative health effects from exposure to non-ionizing electromagnetic radiation such as that emitted by electrical transmission lines. In *Rausch et al. v. The School Board of Palm Beach County, Florida*¹⁹⁹ the Florida Circuit Court considered a case where the School Board of Palm Beach County constructed the Sandpiper Shores Elementary School in close proximity to a Florida Power and Light right-of-way containing two 230kV electrical transmission lines and one 138kV line.²⁰⁰ A class action suit was brought by a group of parents of children attending the school against the School Board, seeking, *inter alia*, an order closing the School, or, in the alternative an order imposing a liberal student transfer policy which would allow parents with a

¹⁹⁷ See *infra*, section 6.3.3.1.1 “The Traditional Approach: Reactive Decision-Making”.

¹⁹⁸ See *infra*, section 6.3.3.1.2, “The Precautionary Approach”.

¹⁹⁹ *Rausch et al. v. The School Board of Palm Beach County*, Florida, (unreported), Case No. CL-88-10772-AD (Fla. Cir. Ct.).

²⁰⁰ At its closest point, the school cafeteria, the school building was located within 135 feet of the nearest transmission line, with the nearest classroom 440 feet away.

genuine concern about possible health effects associated with exposure to non-ionizing electromagnetic radiation to transfer their children to other schools.

The trial, which heard the testimony of nine expert witnesses - four of whom appeared on behalf of the Plaintiff parents and five in support of the Defendant School Board - was a classic case of a court being asked to make a decision involving an area of scientific controversy in order to resolve a jurisprudential issue.²⁰¹ Upon considering this evidence the Court concluded:

The evidence is clear that both electrical and magnetic fields affect the human body. Both fields are produced by lines such as those adjacent to Sandpiper Shores. Depending upon the dosage, the result can be harmful to the human body, increasing the incidence of cancer and other disease.²⁰²

However, the Court went on to accept evidence presented on behalf of the School Board that the ambient magnetic field to be expected in homes and schools is approximately .8 milligauss to 1.0 milligauss, and that a worst-case scenario would see the transmission lines used to a maximum of 41% of their capacity. This would result in an ambient magnetic field of 1.13 milligauss at a distance of 440 feet from the nearest transmission line,²⁰³ which was considered by the Court to be within acceptable safety levels.

One expert witness who testified on behalf of the Plaintiff parents suggested that the Court should disregard the 41% maximum line loading figure and:

... assume that power would be used at 100% of capacity for two reasons: because power companies are efficient and because it is "prudent" to assume the worst.²⁰⁴

²⁰¹ For a detailed discussion of this topic see *infra* Chapter 6, "Problems Within The Legal System in Addressing Environmental Impairment Issues".

²⁰² *Supra*, note 199 at 4.

²⁰³ *Supra*, note 199 at 9.

²⁰⁴ *Supra*, note 199 at 9.

However, the Court rejected that approach, stating:

... there is no need to assume an unrealistic worst-case scenario just to be 'prudent': we have the capability of easily monitoring the situation in the future. The public should not be subjected to the terrible waste of closing the school to satisfy the abstract idea of 'prudence' in this circumstance.²⁰⁵

Upon refusing the Plaintiff's request to order the closure of the School, the Court went on to consider the application for an order providing for a liberal student transfer policy. The Court concluded that this would not provide a workable solution. As Poulton, J. put it:

The court was tempted by this suggestion, but we have finally abandoned the idea because we simply have been unable to come up with a workable formula. For example, what if a parent says, 'I have looked into the situation and I am very concerned.' Would this always be adequate for transfer, or never adequate for transfer, or sometimes adequate for transfer? I fear that the result would be the creation of a 'transfer at will' situation, which cannot be reconciled with other necessary school policies.²⁰⁶

However, in what must be considered an unusual decision, the Court went on to find as follows:

The situation is sufficiently worrisome that the court should retain jurisdiction ... for the purpose of revising this judgment in the event that later facts show a need to do so. The court suggests that such facts might be, for example: proof of increased power usage in the lines in question, results of the National Cancer Institute recently commissioned study, actual measurements different from Dr. Dietrich's [School Board expert witness], plans to install additional lines in the right-of-way in question, or plans to conduct summer school.²⁰⁷

In addition, the Court further ordered that a regular monitoring program was to be implemented to determine exposure levels, and that students were prohibited from using the school grounds between the School and the transmission lines for recesses or school activities.²⁰⁸

²⁰⁵ *Supra*, note 199 at 9.

²⁰⁶ *Supra*, note 199 at 10.

²⁰⁷ *Supra*, note 199 at 11.

²⁰⁸ *Supra*, note 199 at 12.

5.3 Conclusions

As noted earlier, the perception of environmental risk is often as important, and in some cases more important, than the technical estimate of risk. It is submitted that this principle applies not only to the public at large, but also to environmental decision-makers such as members of the judiciary. Further, it is suggested that the primary impetus for the development of a new generation of toxic torts based upon a chance of injury rather than actual immediately apparent or detectable injury is to be found in a growing perception by members of the judiciary in the United States that traditional tort law may not be adequate to compensate injured parties for their losses in environmental impairment cases, and that innovative new approaches such as liability on the basis of chance of injury may better serve this fundamental principle of tort law. When asked to consider the validity of a claim for injuries based directly on a claim of an increased chance of contracting cancer as a result of wrongful exposure to a toxic substance, one California District Court judge observed:

This issue goes to the very heart of our tort system, and it divides courts and commentators. The tort system evolved to redress the wrongs of a society where injuries were much more direct. The issues of lengthy latency periods and increased risks of cancers are relatively new to our system of laws. The greatest lesson that we can draw from the common law of torts to apply here is that the system must evolve to meet the needs of society.²⁰⁹

A clear example of this judicial perception translating itself into law is found in *Paoli*, where in recognizing the need for the creation of a tort to allow plaintiffs wrongfully exposed to a contaminant to recover for ongoing medical monitoring in the absence of an immediately apparent or detectable injury, the United States Court of Appeals (3rd. Circuit) also expressly recognized that such a tort was necessary in "... a toxic age...":

²⁰⁹ *Barth v. Firestone Tire and Rubber Company*, 661 F. Supp. 193 at 196 per Aguilar J. (N.D. Cal. 1987).

The policy reasons for recognizing this tort are obvious. Medical monitoring claims acknowledge that, in a toxic age, significant harm can be done to an individual by a tortfeasor, notwithstanding latent manifestation of that harm. ... Allowing plaintiffs to recover the cost of this care deters irresponsible discharge of toxic chemicals by defendants and encourages plaintiffs to detect and treat their injuries as soon as possible.²¹⁰

It is suggested that similar perceptions are beginning to appear within the ranks of the Canadian judiciary. For example, in *Metropolitan Toronto (Municipality) v. Siapas*,²¹¹ in considering a charge brought against an officer of an electroplating company for breach of a Toronto anti-pollution by-law Austin J. offered the following comments with respect to his perception of the value of the by-law as a deterrent to water pollution:

In my view, however, there is a wider perspective which must be considered. That is pollution. Much of our society does not yet appear to have grasped the notion that land and water are finite resources and must be treated as such. One of the by-products of this failure is laws such a Metro By-law 148-83. That by-law does not prohibit pollution; rather it attempts to regulate it in such a fashion that our children and perhaps even our grandchildren will have the benefit of some of "our" land and water. By exceeding the by-law limits Shoppe [electroplating company] encroached on the expectations and rights of those children and grandchildren. By his conduct Siapas [company officer] has encouraged that encroachment.²¹²

In passing sentence on the company officer, Austin J. went on to give notice as to how his court intended to address environmental impairment issues in the future:

It is often said that the first objective of sentencing must be protection of the public. In a very real sense, that is the case here. In my view the message to Siapas personally and to the public generally, must be that persons and industries who pollute the environment or assist in that pollution must be, and will be, dealt with firmly.²¹³

²¹⁰ 916 F. 2d 829 at 852 (3rd Cir. 1990), per Becker JA. Unfortunately, this is a sad misconception. It is submitted that every age of human existence on the planet has been toxic, and humans have always been guaranteed of dying of some illness. The only difference in the present age is that humans are more healthy now than at anytime in history, and our ability to speculate on causes of death has become more "scientific".

²¹¹ (1988), 3 C.E.L.R. 122 (Ont. H.C.).

²¹² *Ibid.*, at 153-154.

²¹³ *Ibid.*, at 156.

The implications of these judicial perceptions for the insurance industry with respect to environmental impairment liability insurance are obvious. In assessing its ability to accurately predict the incidence of loss associated with environmental impairment in Canada in the future, it will be necessary for the industry to accurately evaluate its ability to anticipate and react to changes to tort law which are likely to take place as a result of a growing perception by members of the judiciary that traditional tort law may not be adequate to compensate injured parties for their losses in environmental impairment cases, and that innovative new approaches such as liability on the basis of risk of injury may better serve this fundamental principle of tort law. This means that prior to offering environmental impairment liability insurance products into the Canadian marketplace insurers should give careful consideration to the development of new toxic torts such as those based on compensation for increased risk of injury, which include injury to immune system, fear of future injury, and ongoing medical monitoring. By monitoring the perceptions of the judiciary in advance of developing and marketing environmental impairment liability insurance products the insurance industry should be able to provide a better product, and break out of the pattern which the industry has established over the past five decades of modifying and in some cases removing these products in reaction to unanticipated judicial interpretations.

6.0 PROBLEMS WITHIN THE LEGAL SYSTEM IN ADDRESSING ENVIRONMENTAL IMPAIRMENT ISSUES

6.1 Introduction

It may be recalled that the fourth sub-hypothesis proposes that in attempting to predict the risk associated with the provision of environmental impairment liability insurance the insurance industry has failed to take account of problems which may exist within the legal system in addressing environmental impairment cases involving complex scientific evidence. Recently completed empirical research by the author indicates that there is a perception amongst participants in legal environmental decision-making processes that significant confusion and uncertainty currently exist within the judicial system with respect to the handling of complex scientific information in environmental cases, which in turn may result in the insurance industry having an unjustified degree of confidence in its ability to predict the nature and extent of liabilities for environmental impairment.

The ability of both courts and administrative tribunals to effectively address scientific information has been the subject of considerable dialogue in recent years. However, most of the research in this area has been anecdotal in nature, with little in the way of empirical data to support the proposition that the courts and administrative tribunals have been experiencing significant difficulties with scientific evidence in environmental trials and administrative hearings. In order to fill this void, empirical research has recently been completed which *inter alia*, tends to confirm that significant problems do currently exist within both the judicial and administrative systems with respect to the handling of scientific information in environmental trials and administrative hearings.

In order to test the validity of the fourth sub-hypothesis this chapter considers that portion of the empirical research which relates to the use of scientific evidence only in environmental trials and other legal proceedings. This chapter will review the literature in this area, examine some of the findings of this new research, and consider the implications for the Canadian insurance industry.

6.2 Empirical Research Summary

In January, 1994 an empirical research project entitled "Environmental Decision-Making: The Interfaces of Science and Law" (hereinafter referred to as the "Research Project") was undertaken by the Author in affiliation with the University of Alberta *Eco-Research* Chair in Environmental Risk Management. The details of the Research Project, which was concluded in January of 1995, are summarized in this subsection.

6.2.1 Purpose And Objectives

The overall purpose of the Research Project was, *inter alia*, to examine the perceptions of four of the primary participants in environmental trials and other legal proceedings - the judiciary, administrative tribunal members, legal counsel and members of the scientific community who appear as expert scientific witnesses, for the purpose of identifying problems which may exist with respect to the ability of the Canadian legal system to address scientific issues in environmental cases.

In order to achieve this objective each of the three studies examined the perceptions of study participants with respect to five contact points or "interfaces" between the scientific and legal systems which it is submitted are required for the effective introduction of scientific

information into legal environmental/environmental health decision-making structures and processes:

- 1) The quality of scientific information which is introduced into the decision-making process at trials involving environmental/environmental health issues.
- 2) The communication of scientific information at environmental/environmental health trials, and the comprehension of that information by participants in such trials.
- 3) The issue of scientific uncertainty in environmental/environmental health trials.
- 4) The use of scientific information to establish the decision-making standards which are used by the legal system, and the translation of scientific information into those standards at environmental/environmental health trials.
- 5) The suitability of legal decision-making institutions (such as courts of law) and legal procedures (such as rules of court and rules of evidence) for the resolution of scientific issues in environmental/environmental health trials.

6.2.2 Methodology And Procedures

6.2.2.1 Inclusion Criteria

Inclusion criteria for study subjects required past or present participation in environmental²¹⁴ trials or other legal proceeding involving the resolution of one or more scientific²¹⁵ issues by individuals who:

²¹⁴ The term "Environmental" refers to the natural environment, and includes public health issues as they relate to the natural environment.

²¹⁵ The term "Scientific" was meant to refer to all relevant scientific and technical disciplines within the natural and applied sciences (for example, engineering, geography, hydrogeology, biology, limnology, botany, zoology, chemistry, ecology, geology, soil sciences, forestry, medicine and public health).

- 1) fall within any of the following three occupational categories:
 - a) the judiciary;²¹⁶
 - c) legal counsel;²¹⁷ or
 - d) expert scientific witnesses,²¹⁸

- 2). within any one or more of the following five Canadian jurisdictions:
 - a) Alberta;
 - b) British Columbia;
 - c) Ontario;
 - d) Northwest Territories; and
 - e) Yukon Territory.

²¹⁶ The term "Judiciary" was intended to denote judges appointed to Provincial, Superior or Appellate courts in either Alberta, British Columbia, Ontario, the Northwest Territories or Yukon territory who heard a court trial (criminal/quasi-criminal or civil) or other legal proceeding (such as an injunction application or an application for judicial review of an administrative decision) in a matter involving an environmental issue.

²¹⁷ For the purposes of this Research Project the term "Legal Counsel" was intended to denote any member of one or more of the law societies of Alberta, British Columbia, Ontario, the Northwest Territories and Yukon Territory of Canada who either:

- 1) appeared as legal counsel; or
- 2) assisted as second counsel

in a court trial (criminal/quasi-criminal or civil) or other legal proceeding (such as an injunction application or an application for judicial review of an administrative decision) in a matter involving an environmental issue.

²¹⁸ For the purposes of this Research Project the term "Expert Scientific Witnesses" was intended to denote any member of the scientific community who either:

- 1) appeared as an expert scientific witness; or
- 2) appeared as an independent expert scientific witness appointed by the courts; or
- 3) acted as a scientific advisor (assisting legal counsel on scientific issues without actually appearing as an expert scientific witness)

in a court trial (criminal/quasi-criminal or civil) or other legal proceeding (such as an injunction application or an application for judicial review of an administrative decision) in a matter involving an environmental issue.

6.2.2.2 Identification Of Potential Respondents

In order to obtain a broad and representative sample of the target population, study subjects were identified for recruitment through a variety of sources, including:

- 1) Legal and scientific directories²¹⁹;
- 2) Reported and unreported legal cases²²⁰;
- 3) Environmental organization mailing lists²²¹; and
- 4) Personal contacts²²².

²¹⁹ Directories which were used for the identification of potential respondents include:

- 1) Canadian Bar Association Alberta Branch Environmental Law Section Membership List (1994).
- 2) Canadian Bar Association British Columbia Branch Environmental Law Section Membership List (1994).
- 3) Canadian Bar Association Environmental Law National Section Membership List (1994).
- 4) Canadian Bar Association Northwest Territories Branch Environmental Law Section Membership List (1994).
- 5) Canadian Bar Association Ontario Branch Environmental Law Section Membership List (1994).
- 6) Canadian Bar Association Yukon Territory Branch Environmental Law Section Membership List (1994).
- 7) Alberta Association of Professional Engineers, Geologists and Geophysicists 1994 Directory.

²²⁰ Reported cases were identified through a number of Canadian legal encyclopaedia and case reporting services, including:

- 1) Canadian Abridgment.
- 2) Canadian Encyclopaedic Digest (C.E.D.) Western.
- 3) Quick Law (QL) Systems.
- 4) Supreme Court Reports (S.C.R.).
- 5) Dominion Law Reports (D.L.R.).
- 6) Western Weekly Reports (W.W.R.).
- 7) Alberta Reports (A.R.).
- 8) Alberta Law Reports (A.L.R.).
- 9) British Columbia Reports (B.C.R.).
- 10) Ontario Reports (O.R.).
- 11) Northwest Territories Reports (N.W.T.R.).
- 12) Yukon Territory Reports (Y.T.R.).
- 13) Canadian Environmental Law Reports (C.E.L.R.).
- 14) Fisheries and Pollution Reports (F.P.R.).

²²¹ These organizations included:

- 1) Environmental Law Centre, Edmonton, Alberta.
- 2) Canadian Environmental Defence Association, Toronto, Ontario.

²²² Personal contacts included judges, legal counsel and expert scientific witnesses with whom the author became acquainted during several years of environmental law practice in the Province of Alberta.

6.2.2.3 Data Collection Strategy

Once study subjects were identified, a systematic effort was made to contact as many members of the target population as possible. In this regard potential subjects identified as falling within the inclusion criteria (above) were initially contacted by a letter delivered via mail which briefly introduced the study and requested their participation by completing and returning a survey questionnaire enclosed with the letter. A copy of the contact letter was also printed on the inside front cover of all survey questionnaires. The initial contact letter is set out at Appendix 5. Each survey questionnaire included a pre-addressed, postage paid envelope to facilitate return.

Preliminary investigations indicated that in order to obtain responses from the judiciary respondent group it would in almost all cases be necessary to make personal contact with potential respondents in the form of meetings and/or telephone calls prior to providing the initial contact letter and questionnaire. In order to increase response rates within the legal counsel and expert scientific witness respondent groups personal contact techniques were also used whenever possible.

Potential respondents who did not initially respond to the survey questionnaire were contacted with a follow-up letter and/or telephone call.

6.2.2.4 Response

Survey questionnaire response numbers are set out in Table 1. Total Distribution numbers refer to the total number of survey questionnaires which were distributed to each subject group. The Combined Response category sets out the total number of completed survey questionnaires which were returned. It is important to note that questionnaire booklets distributed to the legal counsel and expert scientific witness subject groups included two questionnaires - one for those

who had experience with environmental trials and other legal proceedings and a second for those who had experience with administrative environmental hearings.²²³ Thus the Total Response figures for the legal counsel and expert scientific witness subject groups includes questionnaires which were completed and returned by respondents who had experience in either environmental trials and other legal proceedings, administrative environmental hearings, or both. The Trial Experience Response column represents the total number of questionnaires which were completed and returned by respondents who had experience with environmental trials and other legal proceedings (and therefore are of interest to this Thesis). The Gross Response Rate is calculated by multiplying the Trial Experience Response by 100 and dividing the result by the Total Distribution. A significant number of survey questionnaires were returned by potential respondents who indicated that they were not eligible to participate in the Research Project. These responses are set out in the Returned Not Applicable column. The Adjusted Total Distribution column The Adjusted Response Rate is determined by comparing the number of respondents who returned completed questionnaires to those who indicated that they were not eligible to participate, and by assuming that the proportion of non-eligible members of the original target population is similar to the proportion observed in returned questionnaires. The Adjusted Response Rate is calculated by multiplying the Trial Experience Response by 100 and dividing the result by the Adjusted Total Distribution.

²²³ As information was unavailable as to whether individual potential respondents from the legal counsel and expert scientific witness study groups had experience with environmental trials and other legal proceedings, experience with administrative environmental hearings, or both, it was deemed necessary to combine questionnaires relating to each of these environmental decision-making processes within each questionnaire booklet. Potential respondents would then indicate their eligibility to respond to either or both of the questionnaires.

Table 1
Survey Questionnaire Response

Study Group	Total Distribution	Combined Response	Trial Experience Response	Gross Response Rate	Returned Not Applicable	Adjusted Total Distribution	Adjusted Response Rate
Judiciary	20	18	18	90%	0	20	90.0%
Legal Counsel	1757	101	88	5.0%	112	773	11.4%
Expert Scientific Witnesses	390	107	76	19.5%	25	293	25.9%

It is submitted that the high (90%) response rate received from the judges respondent group strongly indicates that these responses are representative of the judiciary within the study boundaries. While there remains a statistical possibility that those respondent groups which received lower (adjusted) response rates (expert scientific witnesses 25.9% and legal counsel 11.4%) may not be representative of their respective constituency groups, it is submitted that this is an unlikely possibility in that Research Project data indicate that these respondents appear to be representative of a diverse population within their constituencies. The nature of this diversity is described below.

6.2.2.4.1 Legal Counsel

The diversity of the legal counsel population is evidenced through the following factors:

1) Jurisdictions

The percentage of respondents who were involved in an environmental trial or

other legal proceeding in one or more of the five jurisdictions included within the Research Project is as follows:²²⁴

a)	Alberta	34.1%
b)	British Columbia	34.1%
c)	Ontario	40.9%
d)	Northwest Territories	11.4%
e)	Yukon Territory	2.3%

2) Experiences

Legal counsel respondents also indicated that they had a wide range in terms of numbers of experiences as legal counsel at environmental trials and other legal proceedings. A total of 88 respondents indicated that they had “ ... acted as legal counsel (or assisted as second counsel) in a court trial (criminal, quasi-criminal or civil) or other legal proceeding (such as an injunction application or an application for judicial review of an administrative decision) in a matter involving an environmental issue”. The number of experiences of these respondents is as follows:

<u>No. Of Experiences</u>	<u>No. Of Respondents</u>
1	7
2	12
3	5
4	7

²²⁴ Some respondents indicated that they were involved in environmental trials or other legal proceedings in two or more of the five study jurisdictions. Therefore percentages need not add up to 100%.

5	4
6	7
7	4
8	3
10	6
11	1
12	1
15	8
20	4
25	7
30	2
35	1
40	1
50	3
80	1
100	2
125	1
300	1
—	—
Total 1636	88

6.2.2.4.2 Expert Scientific Witnesses

The diversity of the expert scientific witness population may also be seen in the following factors:

1) Area of Specialization

The 88 respondents in the expert scientific witness category represent 64 areas of scientific specialization, including:

- | | |
|------------------------------|------------------------------|
| 1. Agriculture | 33. Geological Engineering |
| 2. Air Quality | 34. Geology |
| 3. Analytical Chemistry | 35. Geomorphology |
| 4. Aquatic Biology | 36. Geotechnical Engineering |
| 5. Aquatic Ecology | 37. Groundwater Chemistry |
| 6. Aquatic Entomology | 38. Hydraulic Engineering |
| 7. Aquatic Toxicology | 39. Hydrogeology |
| 8. Atmospheric Chemistry | 40. Hydrology |
| 9. Biochemistry | 41. Industrial Hygiene |
| 10. Biology | 42. Marine Biology |
| 11. Botany | 43. Mechanical Engineering |
| 12. Chemical Engineering | 44. Meteorology |
| 13. Chemistry | 45. Occupational Medicine |
| 14. Civil Engineering | 46. Organic Chemistry |
| 15. Climatology | 47. Pathology |
| 16. Contaminant Hydrogeology | 48. Plant Ecology |
| 17. Diffusion Meteorology | 49. Pollution Biology |

18. Ecology	50. Pollution Control
19. Environmental Assessment	51. Project Engineering
20. Environmental Chemistry	52. Project Management
21. Environmental Engineering	53. Public Health
22. Environmental Health	54. Pulmonary Medicine
23. Environmental Medicine	55. Resource Management
24. Environmental Planning	56. Risk Management
25. Environmental Science	57. Quaternary Geology
26. Environmental Spills Science	58. Soil Chemistry
27. Environmental Toxicology	59. Soil Science
28. Experimental Design	60. Toxicology
29. Fisheries Biology	61. Veterinary Medicine
30. Food Science	62. Waste Management
31. Forestry	63. Water Quality
32. Geography	64. Zoology

2) Scientific Training

Respondents indicated that they possessed the following scientific training:

a) Practical Experience	65.4%
b) High School	53.3%
c) Workshops/Seminars/Short Courses	63.6%
d) Technical School	11.2%
e) University College Level Courses	57.0%

f)	Bachelor's Degree	73.8%
g)	Master's Degree	58.9%
h)	Ph.D	39.3%
I)	Post-Doctoral	17.8%

3) Type Of Employment

Respondents indicated that they are involved in a variety of employment types:²²⁵

a)	Administrative Tribunal	0.9%
b)	Corporation	6.5%
c)	Government	34.6%
d)	Private Consultant	46.7%
e)	University/College	11.2%

4) Jurisdictions

The percentage of respondents who were involved in an environmental trial or other legal proceeding in one or more of the five jurisdictions included within the Research Project is as follows:²²⁶

a)	Alberta	49.0%
b)	British Columbia	44.7%
c)	Ontario	25.9%
d)	Northwest Territories	8.2%
e)	Yukon Territory	9.4%

²²⁵ Respondents indicated only one employment type per individual respondent. Therefore percentages should add up to 100%.

²²⁶ Some respondents indicated that they were involved in environmental trials or other legal proceedings in two or more of the five study jurisdictions. Therefore percentages need not add up to 100%.

5) Experiences

Expert scientific witness respondents also indicated that they had a wide range in terms of numbers of experiences as either expert scientific witnesses, independent expert witnesses and/or scientific advisors at environmental trials and other legal proceedings. A total of 85 respondents indicated that they had participated “ ... in a court trial (criminal, quasi-criminal or civil) or other legal proceeding (such as an injunction application or an application for judicial review of an administrative decision) in a matter involving an environmental issue”. These 85 respondents participated as either expert scientific witnesses, independent expert scientific witnesses appointed by the courts, or acted as a scientific advisor (assisting legal counsel on scientific issues without actually appearing as an expert scientific witness), in the following numbers:

a) Expert Scientific Witnesses

<u>No. Of Experiences</u>	<u>No. Of Respondents</u>
1	20
2	12
3	13
4	7
5	5
6	1
10	10
20	5

	25	1
	30	1
	35	1
	—	—
Total	432	76

b) Independent Expert Witness

<u>No. Of Experiences</u>	<u>No. Of Respondents</u>
1	6
2	2
3	1
6	2
10	1
20	1
—	—
Total	55
	13

c) Scientific Advisor

<u>No. Of Experiences</u>	<u>No. Of Respondents</u>
1	16
2	11
3	13
4	2
5	6
6	1
7	2
8	1
10	1
15	1
20	1
100	1
200	1
—	—
Total 488	57

In the unlikely event that those respondent groups which received lower response rates were not representative of their constituencies, it is submitted that the significance of the results obtained from the Research Project would remain largely undiminished, in that the number of experiences of those persons who did respond are sufficient to justify the conclusion that

problems do in fact exist, irrespective of the perceptions of the remainder of the populations within these constituencies. For example, the 88 legal counsel who indicated that they had experience at an environmental trial or other proceeding represented a combined total of 1636 experiences. The 85 expert scientific witnesses who have participated in the legal process have a total of 975 experiences.

6.2.2.5 Survey Questionnaires

Survey questionnaires for each of the three study groups were developed and printed. A copy of each of the survey questionnaires have been set out in the Appendices (Judges Appendix 1, Legal Counsel Appendix 2, Expert Scientific Witnesses Appendix 3).

6.2.2.5.1 Questionnaire Design

Each of the survey questionnaires contained the following ten components:

1. Front cover;
2. Initial contact letter (inside front cover);
3. Instructions;
4. Preliminary question cluster;
5. Scientific information interface question cluster;
6. Communication and comprehension interface question cluster;
7. Scientific uncertainty interface question cluster;
8. Environmental standards interface question cluster;
9. Institutional/procedural interface question cluster; and
10. Instructions for return of survey questionnaire.

The survey questionnaires utilized a "cluster" design wherein questions relating to each of the five interfaces are grouped together, with each cluster preceded by brief comments in bold type which indicate the area of questioning which is to follow. Each question cluster was itself comprised of sub-clusters which address individual issues within the larger study area. For example, the "quality of scientific information" interface question cluster included the following three question sub-clusters:

1. Quality and type of scientific information provided to environmental decision-making processes.
2. Screening of those persons qualified to provide scientific information in environmental decision-making processes.
3. Use of "local knowledge/traditional knowledge" from aboriginal and non-aboriginal witnesses as an alternative form of scientific information.

Each question sub-cluster was itself preceded by a "filter question" wherein respondents were requested to provide their response to statements which suggest that problems exist with respect to a particular aspect of the use of scientific information in environmental decision-making. In order to maintain consistent question design throughout the survey questionnaires, a format was adopted whereby statements contained within filter questions provide subjects with five possible responses:

- 1) Strongly Agree
- 2) Agree
- 3) Undecided
- 4) Disagree
- 5) Strongly Disagree

Respondents who either Strongly Agreed, Agreed or were Undecided with respect to the statement in the filter question were requested to answer the remaining questions (referred to as “filtered questions”) in the sub-cluster which probed the perceived problem in more detail. Those respondents who either Disagreed or Strongly Disagreed with the statement in the filter question moved immediately to the next question sub-cluster where they answered the next filter question. To assist subjects in understanding questions, most questions had key words underlined. A sample filter question taken from the “quality of scientific information” interface is set out below:

The next set of questions asks you to consider issues relating to the quality of scientific information which is put into the environmental decision-making process at environmental trials and other legal proceedings.

7. What is your opinion with respect to the following statement?				
<i>"Problems exist in environmental trials and other legal proceedings with respect to the quality of scientific information provided in the form of expert evidence by expert scientific witnesses."</i>				
Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
↓	↓	↓	↓	↓
[Continue Answering Question 8]			[Go to Question 9] →	

↓

Questions which follow the filter question, (filtered questions) within each sub-cluster provide subjects with five possible responses:

- 1) Major Problem
- 2) Minor Problem
- 3) Not a Problem
- 4) Undecided/No Opinion
- 5) Unfamiliar with Concept

A sample question from the “quality of scientific information” interface is as follows:

8. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings with respect to the <u>quality of scientific information provided in the form of expert evidence by expert scientific witnesses</u> :						
		Major Problem	Minor Problem	Not a Problem	Undecided/ No Opinion	Unfamiliar with Concept
a)	Inadequate understanding by expert scientific witnesses of the <u>trial or other legal proceeding</u> in which they are participating	<input type="checkbox"/>				

Finally, each sub-cluster of questions concluded with an open-ended question which asked respondents to provide any comments which they may have with respect to the issues raised in the sub-cluster.

As discussed in the Introduction (above), research in this area has been primarily anecdotal, with little or no quantitative or qualitative research having been undertaken. Therefore, in designing questions for inclusion in the survey questionnaires it was not possible to employ questions with demonstrated statistical reliability and validity. However, the questions were designed to provide a high degree of “face validity” and “content validity”. In order to ensure face validity a number of steps were taken:

- 1) Review of questionnaires by members of the University of Alberta Department of Sociology with extensive experience in population research.
- 2) Pre-testing of legal counsel and expert scientific witness questionnaires.
- 3) Including within all filtered questions a response option “Unfamiliar with Concept” to avoid responses based on uninformed speculation. This response option received a very low response rate.
- 4) Including at the end of all question clusters an opportunity to provide comments with respect to the issues raised in the cluster. These comments were taken into consideration when interpreting responses.

Content validity was achieved through the development of questionnaires which covered a wide range of issues relevant to the subject matter. Content was derived from a number of sources, including:

- 1) Review of relevant literature in Canada, the United States, Great Britain and Australia.
- 2) Personal interviews were conducted with representatives of each of the respondent groups who are considered by their respective professional communities to possess a high level of knowledge in the subject area.
- 3) Review of draft questionnaires was conducted by representatives from each of the respondent groups who are considered by their respective professional communities to possess a high level of knowledge in the subject area.

6.2.2.5.2 Review And Testing

Prior to distribution to study participants, draft copies of each of the three survey questionnaire designs were forwarded to members of the judiciary, legal counsel and scientific/technical experts who have participated in environmental decision-making processes for their review and comments.

"Pre-testing" of the survey questionnaires was also conducted with members of the legal counsel and expert scientific witness respondent groups for the purpose of identifying technical weaknesses within these questionnaire designs. Pre-testing was not conducted on the questionnaire developed for the judiciary as the numbers of the judicial respondent group were sufficiently limited that it was considered impractical to reduce the number of potential respondents from this group through involvement in a pre-testing exercise.

6.2.2.5.3 Ethics Review

An ethics review for research on human subjects is required by both the University of British Columbia and the University of Alberta. As the survey questionnaires were distributed through the *Eco-Research* Chair at the University of Alberta, it was considered appropriate to apply for ethical review to the University of Alberta Faculty of Medicine Ethics Review Committee for Human Experimentation. A request for ethical review was submitted on March 4, 1994 and approval of the application was granted on March 18, 1994.

6.2.2.6 Confidentiality

A number of precautions were taken to ensure that all information provided in survey questionnaires is strictly confidential and that individual respondents can not be identified. These precautions included the following:

- 1) No person (including the author) was to be able to attribute survey questionnaire responses to an identifiable respondent. Survey questionnaire identification numbers were located on the inside back cover of the questionnaires, and were used solely for the purpose of facilitating follow-up reminder correspondence to potential respondents who did not return the surveys within the allotted time. These identification numbers were immediately removed from returned survey questionnaires by a single designated *Eco-Chair* staff member, which questionnaires were stored in a secure area pending data entry.
- 2) Survey questionnaires were then forwarded to a Population Research Laboratory employee whose sole responsibility was entry of the raw data (responses) into the University of Alberta MTS computer system.

- 3) Data obtained from survey questionnaires completed and returned by members of the judiciary in Alberta, British Columbia, Ontario, the Northwest Territories and Yukon Territory have been pooled together and considered as a single statistical unit. This precaution has been taken to ensure that individual or small numbers of judicial respondents from a single jurisdiction such as the Northwest Territories or Yukon Territory can not be indirectly identified.

6.2.2.7 Data Transfer

With the assistance of the University of Alberta Population Research Laboratory raw data were processed by the University MTS computer program, and then transferred into a statistical computer program (Statistical Program for the Social Sciences (SPSS)) which, *inter alia*, correlates data and allows for comparison of results.

6.2.2.8 Data Analysis

Data generated by each of the three empirical studies were analyzed for the purpose of comparison of perceptions between each of each of the three study groups.

6.2.2.9 Statistical Significance of Research Data

Because a census approach rather than random sampling was used to identify potential respondents, statistical significance tests are inappropriate and therefore were not performed.

6.3 Empirical Research Findings

Analysis of the data generated by each of the three empirical studies provided a number of findings of significance. The research results tend to support the sub-hypothesis, with the results indicating that significant confusion and uncertainty currently exists within the judicial system with respect to the handling of complex scientific information in environmental cases. This may in turn translate into problems for insurers attempting to predict the nature and extent of liabilities for environmental impairment. Relevant research findings with respect to each of the five interfaces are discussed below.

6.3.1 Interface #1: The Quality Of Scientific Information Presented To Courts

The first interface between the scientific and legal systems which was examined relates to the quality of scientific information which is introduced into the environmental decision-making process. This may be referred to as the "scientific information interface". Indicators suggest the existence of a fundamental problem in environmental decision-making within this interface, which is that in some circumstances the scientific information provided by expert scientific witnesses at environmental trials for the purpose of assisting decision-makers in addressing scientific issues found within jurisprudential disputes may be of deficient quality, thereby compromising the factual basis upon which the jurisprudential decisions are founded and negatively impacting upon the predictability of case outcomes.

The Research Project provided some interesting results with respect to the perceptions of respondents regarding the quality of scientific information introduced before the courts. For example, 55.6% of judges, 63.6 % of legal counsel and 78.5% of expert scientific witnesses either agreed or strongly agreed with the proposition contained in a filter question that "Problems exist

in environmental trials and other legal proceedings with respect to the quality of scientific information provided in the form of expert evidence by expert scientific witnesses" (Table 2).

Table 2
Problems With The Quality Of Scientific Information At Environmental Trials

<i>"Problems exist in environmental trials and other legal proceedings with respect to the quality of scientific information provided in the form of expert evidence by expert scientific witnesses. "</i>				
	Judges	Legal Counsel	Expert Scientific Witnesses	Combined Average
Agree/ Strongly Agree	55.6%	63.6%	78.5%	65.9%
Undecided	27.8%	10.6%	10.1%	16.1%
Disagree/ Strongly Disagree	16.7%	19.7%	11.4%	15.9%

6.3.2 Interface #2: Communication/Comprehension Of Scientific Concepts

The second interface between science and law in environmental/environmental health decision-making is concerned with the communication of scientific information at environmental/environmental health trials and the comprehension/understanding of that information by trial participants such as judges and legal counsel. This may be referred to as the "communication/comprehension interface".

6.3.2.1 Problems In The Communication Of Scientific Information

The primary means of introducing scientific information into the legal environmental decision-making process is through the communication of that information by members of the scientific community to environmental decision-makers. However, indicators suggest that a

significant language incompatibility may exist between the scientific and legal communities.

Just as science and law have developed their own unique values, philosophies and procedures, so too have they developed their own languages for the purpose of effectively communicating the ideas developed within each discipline. Unfortunately, while these languages may be effective in communicating information within each discipline, the same cannot be said for interdisciplinary communication. The problem is illustrated by an anecdote in a speech delivered by the Honourable Howard T. Markey, Chief Judge of the United States Court of Appeals for the Federal Circuit:

Another crying need is for the practitioners of science and law to understand each other -indeed even to talk to each other. I once had the honor of speaking to that extreme rarity, a meeting of scientists and lawyers. I opened with "because you have read my article Science and Law - a Dialogue on Understanding, my speech is *res judicata*. But then *res Ipsa loquitur*. Fortunately, there is no collateral estoppel or exclusionary rule. Yet there is no subpoena, *ad testificandum* or *duces tecum*, or writ of habeas corpus. I am calendared, and there is not writ of certiorari and no question of venue. To interrogatories on my deposition I plead *nolo contendere*. I may demand a bill or particulars, proper execution, and a Brandeis brief." Not one scientist had the slightest idea of what I had said. The lawyers knew I said, "my speech has been pre-judged. But then it speaks for itself. Fortunately, it is not prevented by the article and cannot be excluded as having been illegally obtained. Yet I have not been forced to speak or to bring anything with me, not even my body. I am scheduled, and you can't change my errors or move me elsewhere. To questions on what I say, I plead no contest. I may demand that you be specific, deliver your questions to me properly, and base them on the facts."

I then said, "I admit my empirical data were obtained in vitro and may not meet parameters developed in Vivo." Not one lawyer had the slightest idea of what I had said. The scientists knew. I said, "my facts were obtained by experience in the laboratory of my chambers and may not measure up to experiences in life."

We need to think long and hard about the future of a society as technologically oriented and as law-soaked as ours when our scientists and lawyers cannot even talk to each other.²²⁷

In considering the issue of communication problems between the scientific and legal communities, two Judges of the United States Nuclear Regulatory Commission's Atomic Safety

²²⁷ Howard T. Markey, "Science and Law: The Friendly Enemies" (1989), *Idea: The Journal of Law and Technology*, Vol. 30 No. 1, 13 at 17-18. The article was based upon a speech delivered for the Francis W. Davis Lecture on Law and Technology, Franklin Pierce Law Center, Concord, New Hampshire, March 22, 1989, as found in Howard T. Markey, "Law and Science - Equal but Separate" (1982), *Natural Resources Lawyer*, Vol. 15 No. 3, 619. See also, Howard T. Markey, "Science and Law: A Dialogue on Understanding" (1982), *American Bar Association Journal*, Vol. 68, 154.

and Licensing Board Panel have suggested that they view the "... use of jargon as reflecting perhaps a more subtle problem in interdisciplinary communication".²²⁸ That problem involves the fact that with respect to a given environmental problem the scientific and legal communities "... will approach the problem from a different perspective and with different values".²²⁹ These result from differences in their training and experience". The Judges summarized their view as follows:

We believe that jargon is just the most easily recognized manifestation of those differences, and that effective interdisciplinary communication depends not only on understanding and eliminating jargon, but also (and more importantly) on understanding differing points of view and values.²³⁰

Results obtained from the Research Project tend to confirm the existence of problems in the communication of scientific information at environmental trials. When questioned on this issue, 61.1% of judges, 61.4% of legal counsel and 81.2% of expert scientific witnesses all confirmed in a filter question that they perceived that "Problems exist in environmental trials and other legal proceedings with respect to the communication of scientific information provided in the form of expert evidence by expert scientific witnesses (Table 3).

²²⁸ Oscar Paris and John Frye "Symposium on Law-Science Cooperation Under the National Environmental Policy Act: Appendix" (1982), *Natural Resources Lawyer*, Vol. 15 No. 3, at 655.

²²⁹ *Ibid.*, at 656.

²³⁰ *Ibid.*

Table 3
Problems With Communication Of Scientific Information At Environmental Trials

<i>"Problems exist in environmental trials and other legal proceedings with respect to the communication of scientific information provided in the form of expert evidence by expert scientific witnesses."</i>				
	Judges	Legal Counsel	Expert Scientific Witnesses	Combined Average
Agree/ Strongly Agree	61.1%	61.4%	81.2%	67.9%
Undecided	11.1%	11.4%	9.4%	10.6%
Disagree/ Strongly Disagree	27.8%	27.2%	9.4%	21.4%

6.3.2.2 Problems In The Comprehension And Understanding Of Scientific Information

Even if scientific information which is provided to an environmental decision-maker is of high quality and is communicated in an effective manner, there is still a concern that problems may inhibit or even preclude the comprehension of such information by legal environmental decision-makers. In the words of former assistant United States Attorney General Lee Loevinger:

... lawyers, including judges and legislators, with rare exceptions have little comprehension of science or technology. Although the law continuously faces problems of quantum and weight of evidence, it has not yet learned to deal with uncertainty and probability as science does. ... Legal reception of scientific evidence would be much more advanced if lawyers generally knew more about the nature of the scientific method and the process of securing, testing and validating scientific data. In their impact on law, science and technology have changed,... and have increasingly provided data, or evidence, on a variety of specific questions. However, they have scarcely touched the foundations of the law, the logic and the thinking habits of lawyers and judges.²³¹

This view is echoed by many within the scientific community. As one leading ecologist has observed:

²³¹ Lee Loevinger, "Science, Technology and Law in Modern Society" (1985), *Jurimetrics Journal*, Vol. 26 No.1, at 8.

It is very frustrating as a scientist to deal with lawyers ... who want to have all of the facts immediately, even if the data have not been collected. They do not seem to understand the scientific process, which unearths new facts over time. They do not understand the ecological processes embodied in these principles, or that the natural principles cannot be altered.²³²

The Research Project offers strong support for this view. For example, when questioned (filter question) with respect to their perceptions as to the "... comprehension/understanding by the courts and/or legal counsel of scientific information presented in the form of expert scientific evidence by expert scientific witnesses" at environmental trials and other legal proceedings, 55.6% of judges, 72.7% of legal counsel and 78.8% of expert scientific witnesses either agreed or strongly agreed with the proposition that problems exist in this area (Table 4).

Table 4
Problems With Comprehension Of Scientific Information At Environmental Trials

<i>"Problems exist in environmental trials and other legal proceedings with respect to the comprehension/understanding by the courts and/or legal counsel of scientific information presented in the form of expert scientific evidence by expert scientific witnesses."</i>				
	Judges	Legal Counsel	Expert Scientific Witnesses	Combined Average
Agree/ Strongly Agree	55.6%	72.7%	78.8%	69.0%
Undecided	16.7%	8.0%	11.8%	12.1%
Disagree/ Strongly Disagree	27.8%	19.3%	9.4%	18.8%

²³² Beatrice E. Willard, "Symposium on Law-Science Cooperation Under the National Environmental Policy Act: Panel Discussion" (1982), *Natural Resources Lawyer*, Vol. 15 No. 3, 605 at 609. Dr. Beatrice Willard in Head of the Department of Environmental Sciences and Engineering at the Colorado School of Mines.

6.3.3 Interface #3: Scientific Uncertainty Concerning Environmental Issues

The third interface between science and law in the context of environmental/environmental health trials and other legal proceedings investigated by the Research Project concerns the issue of scientific uncertainty. This issue has generated considerable attention in recent years, and is summarized by one American legal scholar as follows:

*A recurring issue in environmental law is scientific and technological uncertainty. ... Lawyers like to think that scientists have clear and definitive answers to certain factual questions - is this level of pollution harmful, and precisely what damage will it produce? The answer is likely to reflect a judgment, rather than a statement of fact. ... The resolution of such mixed questions - questions of fact which carry the law with them - is one of the earmarks of environmental law. It is also one of the reasons for the problems of government agencies that seem to lag in the promulgation of standards. The impatience with agencies may be justified - but the delays in regulation and in adjudication are understandable because the field is very complex. ... There do not seem to be any answers as yet to the many good questions lawyers and administrators ask the scientists.*²³³

There is considerable support for the view that much of this problem is rooted in the difficulty of proving cause and effect relationships in science. In a recent book entitled *Phantom Risk: Scientific Inference and the Law*, the authors make the following observation:

The legal controversy arises, in part, from the difficulty that science has in proving cause-and-effect relationships in individual cases. We are all surrounded by carcinogens, natural and synthetic. Many of us develop cancer sometime in our lives. Yet rarely can science identify the specific cause of any person's tumor. Some of us will bear children with grave defects - yet rarely can science identify the cause. We all get sick and die - yet the cause of most chronic diseases is unknown.²³⁴

This view was echoed by a California judge asked to consider the validity of a cause of action for injuries based directly on an increased risk of contracting cancer resulting from wrongful exposure to certain toxic chemicals:

The plaintiff argues, and this Court agrees, that many of the problems presented are due to failures in the current state of medical science and in the development of the legal system. Current medical science cannot state whether or how exposure to toxic chemicals affects individuals. It cannot yet detect the present effect of the exposure, and, therefore, it cannot supply

²³³ Frank P. Grad, *Treatise on Environmental Law, Volume I*, (New York: Matthew Binder & Co. Inc., 1973 (1992 Supplement)), at 1-25 - 1-26.

²³⁴ Kenneth R. Foster, *et al.*, *Phantom Risk: Scientific Inference and the Law* (Cambridge: M.I.T. Press, 1993) at 431.

to the legal system information concerning the nature of present injury or of causation. In the absence of that information, the legal system now struggles to adapt.²³⁵

The Research Project explored the perceptions of each of the three respondent groups with respect to the ability of the courts to effectively deal with scientific uncertainty in environmental trials and other legal proceedings. Asked the filter question of whether "Problems exist in environmental trials and other legal proceedings where the scientific information provided in the form of expert evidence results in uncertainty with respect to one or more scientific issues", 77.8% of judges, 60.2% of legal counsel and 83.5% of expert scientific witnesses either agreed or strongly agreed that problems do in fact exist (Table 5).

Table 5
Problems Where Scientific Evidence Results In Uncertainty With Respect To Scientific Issues At Environmental Trials

<i>"Problems exist in environmental trials and other legal proceedings where the scientific information provided in the form of expert evidence results in uncertainty with respect to one or more scientific issues."</i>				
	Judges	Legal Counsel	Expert Scientific Witnesses	Combined Average
Agree/ Strongly Agree	77.8%	60.2%	83.5%	73.8%
Undecided	5.6%	12.5%	14.1%	10.7%
Disagree/ Strongly Disagree	16.7%	27.2%	2.4%	15.4%

Setting aside for the moment the sources of scientific uncertainty which may occur in an environmental trial or other legal proceeding involving a scientific issue, the existence of such uncertainty is most often communicated to the courts in the form of conflicting scientific

²³⁵ *Supra*, note 209 at 196 per Aguilar J. (N.D. Cal. 1987).

information presented by expert scientific witnesses appearing on behalf of the respective parties to a legal dispute. The Research Project data revealed that a very high percentage of respondents considered the existence of conflicting scientific information to constitute a problem for the courts in resolving scientific issues in environmental trials. In a filter question 61.1% of judges, 56.8% of legal counsel and 84.7% of expert scientific witnesses indicated that they either agreed or strongly agreed with the statement "Problems exist in environmental trials and other legal proceedings where contradictory or conflicting information in the form of expert evidence is provided by expert scientific witnesses" (Table 6).

Table 6
Problems Where There Is Contradictory Or Conflicting Scientific Information At Environmental Trials

<i>"Problems exist in environmental trials and other legal proceedings where contradictory or conflicting scientific information in the form of expert evidence is provided by expert scientific witnesses."</i>				
	Judges	Legal Counsel	Expert Scientific Witnesses	Combined Average
Agree/ Strongly Agree	61.1%	56.8%	84.7%	67.5%
Undecided	16.7%	13.6%	14.1%	14.8%
Disagree/ Strongly Disagree	22.2%	29.5%	1.2%	17.6%

In considering the significance of scientific uncertainty in environmental decision-making it is important to realize that the repercussions of this problem extend far beyond the failure of science to provide the solid factual basis sought by the legal system for its decisions. Some of the problems associated with scientific uncertainty in environmental decision-making which are of importance to the insurance industry are considered below.

6.3.3.1 Scientific Uncertainty And Legal Standards Of Proof

The first fundamental problem in environmental decision-making which may be found within the uncertainty interface is the incompatibility between scientific uncertainty and legal requirements of proof. Indicators of this problem are found in the numerous difficulties experienced in environmental decision-making associated with the use of scientific information to meet legal standards of proof. The legal system in both Canada and the United States has a long-established tradition of placing a burden on one or more parties to a legal proceeding to establish its case to a pre-determined standard of certainty. For example, in the criminal and quasi-criminal context environmental protection legislation may require the prosecution to establish its case "beyond a reasonable doubt". In civil litigation the common law burden is one of "proof on the balance of probabilities". However, the scientific community does not share the legal system's penchant for precise measurements of certainty. In science, uncertainty is considered to be an important component of the investigative process which not only accepts but actually encourages validly held differences of opinion. As such, the greatest degree of scientific certainty, that of consensus within the scientific community, is often difficult to achieve,²³⁶ and will be quickly discarded in the event that new scientific developments call the consensus opinion into question. As a result, the legal principle of *res judicata* has no equivalent within the scientific system.

It is submitted that these widely differing views held by the scientific and legal communities with respect to standards of certainty in scientific information create a significant problem for environmental decision-making by courts in Canada. Specifically, it is often difficult for an environmental decision-maker to determine whether the degree of certainty with which a

²³⁶ See for example Ted. F. Schrecker, *Political Economy of Environmental Hazards*, (Ottawa: Minister of Supply and Services, 1984), at 26, where it is suggested that the standard of certainty required for scientific consensus is approximately 95%.

particular view is held within the scientific community translates into the standard of certainty required by the legal burden of proof. For example, does the criminal and quasi-criminal "proof beyond a reasonable doubt" require that the Crown establish that a consensus exists within the scientific community with respect to each element of its case involving scientific issues, or is the standard something less? Where on the scale of scientific certainty does the civil legal burden "on the balance of probabilities" fit? This problem was recognized by respondent judges, legal counsel and expert scientific witnesses who participated in the Research Project. When respondents who either agreed, strongly agreed or were undecided with respect to the filter question set out in Table 15, (and thus were eligible to respond to the remainder of the questions in that question cluster) were questioned as to possible sources of uncertainty in environmental trials and other legal proceedings, 80.0% of judges, 85.9% of legal counsel and 95.2% of expert scientific witnesses responded that a major or minor problem was in "Translating the level of scientific certainty and uncertainty found within scientific information provided in the form of expert evidence at environmental trials and other legal proceedings into the level of legal certainty and uncertainty required to meet legal standards of proof (such as "proof beyond reasonable doubt" required in criminal/quasi-criminal trials or "proof on the balance of probabilities" required in civil trials and by the due diligence defence in criminal/quasi-criminal trials)" (Table 7).

Table 7
Translating Scientific Certainty And Uncertainty Into Legal Standards Of Proof

<i>“Translating the level of scientific certainty and uncertainty found within scientific information provided in the form of expert evidence at environmental trials and other legal proceedings into the level of legal certainty and uncertainty required to meet legal standards of proof (such as “proof beyond reasonable doubt” required in criminal/quasi-criminal trials or “proof on the balance of probabilities” required in civil trials and by the due diligence defence in criminal/quasi criminal trials).”</i>				
	Judges	Legal Counsel	Expert Scientific Witnesses	Combined Average
Major Problem	53.3% (44.4%)	54.7% (34.7%)	71.1% (55.1%)	59.7% (44.7%)
Minor Problem	26.7% (22.2%)	31.3% (19.8%)	24.1% (18.7%)	27.3% (20.2%)
Not a Problem	20.0% (33.4%)	10.9% (43.5%)	0.0% (0.0%)	10.3% (25.6%)
Undecided/ No Opinion	0.0% (0.0%)	1.6% (1.0%)	3.6% (2.8%)	6.6% (1.2%)
Unfamiliar With Concept	0.0% (0.0%)	1.6% (1.0%)	1.2% (0.9%)	0.9% (0.6%)

The issue of whether scientific information can ever truly meet legal standards of proof has major implications for environmental decision-making, in that scientific uncertainty has the potential to be used as a tool to facilitate the manipulation of the outcome of environmental decisions through the legislative structuring of burdens of proof. This form of manipulation is acknowledged by Smith and Wynne in the context of the sociology of scientific knowledge:

... the social and historical analysis of scientific knowledge has demonstrated the extensive and subtle ways in which 'natural' categories and facts may act as vehicles for implicit social values and political or economic interests. Although a simple 'dominant interests determine scientific knowledge' model has long since been superseded, more sophisticated analysis in current sociology of science continues to connect scientific knowledge to its social context ... ²³⁷

²³⁷ Roger Smith and Brian Wynne, *Expert Evidence: Interpreting Science in the Law* (London: Routledge, 1989) at 6.

Smith and Wynne go on to further illustrate the point:

... the very act of referring an issue to the courts, rather than to some other forum where different kinds of evidence might be legitimate, inadvertently favours the defendant because of the legal-procedural requirement of proof (according to standards that are in principle unobtainable). Sociology of scientific knowledge is important here in that it has shown how 'adequate evidence' is fundamentally problematic in the context of unremitting scepticism. Hence the requirement of proof can always be legally exploited in demands for better science by well-briefed and well-funded lawyers.²³⁸

This also makes the distinction between information uncertainty and knowledge uncertainty discussed earlier an important one in the context of environmental decision-making:

There is no clear demarcation between information uncertainty and knowledge uncertainty; the marginal point at which information becomes so difficult or expensive to collect that it is effectively unobtainable will often be indistinct. Nevertheless, the dichotomy is significant from a legal perspective because the consequences of allocating the burdens of production and proof may vary greatly depending on the nature of the uncertainty presented. Information uncertainty can be eliminated if the value of the missing data makes collection worthwhile. A doctrine designating one party responsible for resolution of information uncertainty presents that party with a realistic choice: either provide the information or surrender the point. Which alternative is selected depends on how the designated party perceives the relative costs and benefits of production. The picture is quite different when knowledge uncertainty is involved. Research may be directed toward a critical problem, but there is rarely any assurance that the desired knowledge can be acquired, especially within the time frame associated with a specific legal controversy. Thus, a rule assigning legal responsibility for knowledge uncertainty also determines the eventual result in most cases: whoever bears that burden generally loses.²³⁹

In both Canada and the United States the manipulation of scientific uncertainty to satisfy the sociological context is generally a function of the philosophical approach which is adopted to decision-making in situations of scientific uncertainty. Two such approaches currently dominate environmental regulation in Canada.

²³⁸ *Ibid.* at 6.

²³⁹ *Ibid.*, at 357.

6.3.3.1.1 The Traditional Approach: Reactive Decision-Making

When faced with situations of scientific uncertainty, environmental decision-makers have traditionally relied upon a "reactive" model of decision-making wherein account of potential negative environmental effects is only taken when the factual existence of these effects is established with a high degree of certainty, at which point the decision-maker will react to the problem. To achieve this result, the reactive model often relies upon a legislative framework which places a burden of proof on the party challenging the environmental safety of an activity. This has two effects. First, placing the onus of proof on the challenging party favours the proponent in that the degree of scientific certainty required to meet the legal standard of proof may be difficult to achieve in a legal context, with the level of advantage given to the proponent directly related to the legal standard which must be satisfied. Second, if there is sufficient scientific uncertainty so that the legal burden of proof is not satisfied, the decision will favour the proponent of the activity by default.²⁴⁰

6.3.3.1.2 The Precautionary Approach

In recognition of the serious environmental problems which have resulted from the application of the reactive approach to environmental decision-making in situations of scientific uncertainty, some jurisdictions have opted for a more cautious approach in addressing this problem. This cautious approach has recently become recognized as a distinct decision-making process under the name "precautionary approach" or "precautionary principle".

The essence of the precautionary principle of environmental regulation has been well summarized as follows:

²⁴⁰ *Ibid.*, at 357.

Briefly stated, the precautionary principle ensures that a substance or activity posing a threat to the environment is prevented from adversely affecting the environment, even if there is no conclusive scientific proof linking that particular substance or activity to environmental damage. The precautionary principle is a *guiding* principle. Its purpose is to encourage - perhaps even oblige - decisionmakers to consider the likely harmful effects of their activities on the environment before they pursue those activities.

Definitions vary widely, from the general notion that it is desirable to prevent pollution, to the requirement that polluters establish by some appropriate burden of proof that their activities are not releasing potentially eco-reactive substances in to the environment and thereby causing damage. Proponents of the precautionary principle, as a new and progressive policy instrument, strive for a reversal of, or at the very least, a shift away from the current position whereby polluters can continue to discharge a wide variety of substances into the biosphere.²⁴¹

The antithesis of the reactive approach, the inclusion of the precautionary principle into the legal system is achieved through official recognition by decision-makers of the probability of environmental risks which can not be established with a high degree of certainty. In this regard it has been noted that:

The appeal of the precautionary principle is that it forces a debate about the types and quantities of human-induced harm to the environment that are acceptable. The legal process attached to the application of the principle institutionalizes caution: when there is sufficient evidence that an activity is likely to cause unacceptable harm to the environment, the precautionary principle requires that responsible public and private powerholders prevent or terminate the activity.²⁴²

From a practical perspective, the precautionary approach may be achieved either by reducing the standard of proof for parties alleging possible negative environmental effects or by developing and implementing environmental legislation which shifts the burden of proof from the party challenging the environmental safety of an activity (as generally occurs under a "reactive" approach) to the proponent of the activity. As one author has observed:

²⁴¹ James Cameron and Juli Abouchar, "The Precautionary Principle: A Fundamental Principle of Law and Policy for the Protection of the Global Environment" (1991), *Boston College International and Comparative Law Review*, Vol. 14 No. 1, 1 at 2.

²⁴² *Ibid.*, at 3.

The precautionary principle shifts the burden of proof from those who would protect the environment having to prove damage, to industry which must not so much prove safety ... but must assume that any unnatural substances or natural substances in unnatural quantities, has the potential for harm and must therefore be either contained, or not used at all, especially if there is evidence of toxicity.²⁴³

The implications of such a shift in the burden of proof are significant, in that by placing the burden of proof on the proponent to establish that an activity is safe, failure to discharge this burden as a result of scientific uncertainty results in a "default decision" by the decision-maker to not allow or to terminate the activity.

The precautionary approach to environmental decision-making appears to have its roots in reports which emanated from the Great Lakes Science Advisory Board in 1984, wherein the limitations of scientific knowledge relating to the toxicological effects of industrial chemicals was recognized.²⁴⁴ The approach first received official international acceptance at the Second International Conference on the Protection of the North Sea,²⁴⁵ with the issuance of a Ministerial Declaration which made the following references to the precautionary principle:

... in order to protect the North Sea from possibly damaging effects of the most dangerous substances, a precautionary approach is necessary which may require action to control inputs of such substances even before a causal link has been established by absolutely clear scientific evidence ; ...²⁴⁶

²⁴³ P.J. Taylor, "The Precautionary Principle: Implications for the Paris Commission" (1988).

²⁴⁴ Johnston and MacGarvin, "Assimilating Lessons from the Past" (1990), *Greenpeace Paper No. 28*, 2 at 14.

²⁴⁵ The Conference took place in London, England on November 24 - 25, 1987 and was attended by representatives from Belgium, Denmark, France, the Federal Republic of Germany, the Netherlands, Norway, Sweden, the United Kingdom and the European Economic Community.

²⁴⁶ *Ministerial Declaration, Second International Conference on the Protection of the North Sea*, article VII.

[The parties] therefore agree to ... accept the principle of safeguarding the marine ecosystem of the North Sea by reducing polluting emissions of substances that are persistent, toxic and liable to bioaccumulate at source by the use of the best available technology and other appropriate measures. This applies especially when there is reason to assume that certain damage or harmful effects on the living resources of the sea are likely to be caused by such substances, even where there is no scientific evidence to prove a causal link between emissions and effects ("the principle of precautionary action").²⁴⁷

The principle has subsequently been incorporated in varying degrees into the environmental protection legislation of the signatory states.²⁴⁸

Some legislation in Canada already contains elements of the precautionary principle. For example, on an international level the *Canadian Environmental Protection Act* .²⁴⁹ provides, *inter alia*:

61(1) ... where the Ministers have reason to believe that an air contaminant emitted into the air ... by a source or by sources of a particular class or classes in Canada

(a) creates or may reasonably be anticipated to create air pollution in a country other than Canada ...

the Minister shall recommend to the Governor in Council regulations with respect to the source or sources for the purpose of controlling or preventing the air pollution or correcting or preventing the violation.²⁵⁰

Nationally, the federal *Ocean Dumping Control Act*²⁵¹ contains a broad prohibition against the dumping of any substance into Canadian coastal or inland marine waters. At the provincial level, the Alberta *Environmental Protection and Enhancement Act* provides that the mere threat of damage resulting from the release of a substance into the environment is sufficient for a conviction under the Act:

²⁴⁷ *Ibid.*, at article XVI(1).

²⁴⁸ *Supra*, note 241 at 6-10.

²⁴⁹ R.S.C. 1985, c. 16, as amended.

²⁵⁰ *Ibid.*, at s. 61(1)(a).

²⁵¹ R.S.C. 1985, c. 0-2. This legislation was enacted in fulfilment of Canada's obligations under the international *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matters*, December 29, 1972, 26 U.S.T. 2403.

98(1) No person shall knowingly release or permit the release into the environment of a substance in an amount, concentration or level or at a rate of release that causes or may cause a significant adverse effect.²⁵²

Other jurisdictions are giving serious consideration to the inclusion of the precautionary principle into future environmental legislation. For example, in a recent legislation discussion paper the Province of British Columbia's Ministry of Environment, Lands and Parks made the following recommendation with respect to the proposed *British Columbia Environmental Protection Act* (BCEPA):

Recommendation 18:

The BCEPA should provide a strong basis to not allow or to control a discharge if damage or harmful effects are likely to be caused, even where there is inadequate or inconclusive scientific evidence to prove a conclusive link between emissions and effects.²⁵³

6.3.4 Interface #4: Legislative Standards

The fourth interface between science and law in environmental decision-making is comprised of both the use of scientific information to establish the decision-making standards which are used by the legal system, and the translation of scientific information into those standards at environmental trials. These two processes may be collectively referred to as the "environmental standards interface". It is submitted that the Research Project indicates problems within the approaches which are currently employed by legislators in establishing standards within environmental legislation, and in translating scientific information into those standards. Each of these issues will be considered in turn.

²⁵² *Supra*, note 101 at s. 98(1). See also the Ontario *Water Resources Act*, R.S.O. 1980, c. 361, s. 16(1).

²⁵³ Province of British Columbia Ministry of Environment, Lands and Parks, *New Approaches to Environmental Protection in British Columbia: A Legislation Discussion Paper* (1992) at 20.

6.3.4.1 Establishment Of Standards

With respect to the issue of problems with the establishment of standards, 27.8% of judges, 47.7% of legal counsel and 72.9% of expert scientific witnesses either agreed or strongly agreed with the filter question that "Problems exist in using scientific information to establish the decision-making standards used in environmental Trials" (Table 8).

Table 8
Problems With Using Scientific Information To Establish Decision-Making Standards Used In Environmental Trials

<i>"Problems exist in using scientific information to establish the decision-making standards which are used by the legal system in environmental trials and other legal proceedings."</i>				
	Judges	Legal Counsel	Expert Scientific Witnesses	Combined Average
Agree/ Strongly Agree	27.8%	47.7%	72.9%	49.4%
Undecided	44.4%	29.5%	21.2%	31.7%
Disagree/ Strongly Disagree	33.3%	22.7%	5.9%	20.6%

Environmental decision-making standards generally fall into one of two categories, quantitative standards and normative standards. Each of these approaches is considered below.

6.3.4.1.1 Quantitative Standard Environmental Legislation

The first approach often used in establishing standards within environmental legislation requires the legislator in its role as "primary" decision-maker to review the available scientific information, including any scientific uncertainties which it may contain, and integrate the information into a decision-making process which considers a variety of factors prior to making what is essentially a political decision as to the appropriate quantitative "standard". Such

standards most often take the form of precisely described measurable levels set out within regulations enacted under the authority of parent environmental legislation.

With the quantitative standard approach, the issue of resolving scientific uncertainty rests primarily with the legislator. While to the casual observer this form of legislation may appear to resolve or at least minimize scientific uncertainty, in reality it is often little more than a compromise solution to a difficult environmental issue. It has been well said that:

Pollution control legislation is typically drafted in language which suggests that implementation is a straightforward, almost mechanical process, when in fact government officials are attempting to cope with unstated unresolved scientific, political, technical and economic factors.²⁵⁴

However, the standard-based approach does have the advantage of removing much of the uncertainty from decisions faced by "secondary" environmental decision-makers such as judges and members of administrative boards and tribunals.²⁵⁵ For example, in the quasi-criminal context the decision-maker is only required to look retrospectively at past events to determine whether the conduct of an accused resulted in a release of a contaminant in excess of the standard prescribed in the legislation. While an additional element of uncertainty faces secondary decision-makers in an administrative law context, in that they are required to prospectively decide whether a resource development or planning proposal will meet prescribed legislative standards, these decision-makers face no uncertainty with respect to setting the standard itself, only with respect

²⁵⁴ Kernaghan Webb, "Between Rocks and Hard Places: Bureaucrats, Law and Pollution Control" in Robert Paehlke and Douglas Torgerson, eds., *Managing Leviathan: Environmental Politics and the Administrative State*, (Peterborough: Broadview Press, 1990) at 7.

²⁵⁵ Other advantages of the standard-based approach include the utilization of existing government resources such as environment and health departments to assist in determining standards; allowing these government departments to continue to monitor the situation and change the standards in response to scientific development; reducing the cost of litigation associated with effect based legislation, as it is not necessary for litigants to establish what the standard is before determining whether it has been met; it allows the public to more easily review the government's enforcement record; it increases public confidence in the system as discretion is employed at the initial stage, which is industry wide, rather than later on an individual basis; and it creates a climate of certainty with respect to what the standard is.

to the issue of a proponent's future ability to meet it.

It is submitted that in its present format the quantitative standard approach creates a fundamental incompatibility between the scientific and legal systems in environmental decision-making, in that whereas the scientific community is concerned with providing the best available technical information relating to environmental issues, such information is only one element to be considered by the legislator, who may also consider such diverse factors as public perceptions of environmental issues, politics, economics and social concerns in its environmental standard setting process.²⁵⁶ This may result in the establishment of environmental standards which do not reflect scientific realities. The absence of scientific realities within environmental standards may in turn make the translation of scientific information into such standards little more than a legal fiction, in that the meeting or failure to meet such standards may have no rational connection with environmental harm. In fact, additional responses received from respondents who either agreed, strongly agreed or were undecided with respect to the filter question set out in Table 26, (and thus were eligible to respond to the remainder of the questions in that question cluster) indicates that there is a strong perception amongst legal counsel (73.5%) and the scientific community (82.5%) that “ ‘Quantitative’ standards established by governments which specify prohibited levels of pollution within environmental legislation (for example, prohibiting the “... release of chemical X into the environment in a concentration in excess of 1 part per million” do not accurately reflect the current state of available scientific information with respect to the effects of pollution on the environment” (Table 9). While only 36.4% of the judiciary expressed a similar view, a large percentage of judges (54.5%) were either undecided or had no opinion.

²⁵⁶ For a detailed discussion on this point see Kenneth P. Jensen, "Risk Assessment" *Environmental Science For Lawyers* (Vancouver: Continuing Legal Education, 1993) ch. 7; D.J. Paustenbach, *The Risk Assessment of Environmental and Human Health Hazards* (New York: John Wiley & Sons).

Table 9

Failure Of Quantitative Standards To Accurately Reflect The Current State Of Scientific Information With Respect To Effects Of Pollution On The Environment

<i>“‘Quantitative’ standards established by governments which specify prohibited levels of pollution within environmental legislation (for example, prohibiting the “... release of chemical X into the environment in a concentration in excess of 1 part per million” do not accurately reflect the current state of available scientific information with respect to effects of pollution on the environment..”</i>				
	Judges*	Legal Counsel	Expert Scientific Witnesses	Combined Average
Major Problem	18.2% (11.1%)	44.1% (29.7%)	51.2% (38.3)	37.8% (26.3%)
Minor Problem	18.2% (11.1%)	29.4% (19.8%)	31.3% (23.4%)	26.3% (18.1%)
Not a Problem	9.1% (38.9%)	10.3% (39.6%)	12.5% (9.3%)	10.6% (29.2%)
Undecided/ No Opinion	54.5% (33.3%)	16.2% (10.9%)	5.0% (3.7%)	25.2% (15.9%)
Unfamiliar With Concept	0.0% (0.0%)	0.0% (0.0%)	0.0% (0.0%)	0.0% (0.0%)

* No Response (5.6%)

Further, the Research Project data also revealed a strong perception amongst eligible legal counsel (64.7%) and expert scientific witnesses (76.2%) that “Governments place too little emphasis on scientific information when establishing “quantitative” standards which specify prohibited levels of pollution within environmental legislation” (Table 10). While only 27.3 % of eligible judges either agreed or strongly agreed with this view, a large percentage (72.7%) were either undecided or had no opinion.

Table 10
Too Little Emphasis On Scientific Information When Establishing Quantitative Standards

<i>“Governments place too little emphasis on scientific information when establishing ‘quantitative’ standards which specify prohibited levels of pollution within environmental legislation.”</i>				
	Judges	Legal Counsel	Expert Scientific Witnesses	Combined Average
Major Problem	9.1% (5.6%)	35.3% (23.8%)	36.2% (27.1%)	26.8% (18.8%)
Minor Problem	18.2% (11.1%)	29.4% (19.8%)	40.0% (29.9%)	29.2% (20.2%)
Not a Problem	0.0% (33.3%)	22.1% (47.6%)	13.7% (35.5%)	11.9% (38.8%)
Undecided/ No Opinion	72.7% (44.4%)	13.2% (8.9%)	10.0% (7.5%)	31.9% (20.2%)
Unfamiliar With Concept	0.0% (0.0%)	0.0% (0.0%)	0.0% (0.0%)	0.0% (0.0%)

6.3.4.1.2 Normative Standard Environmental Legislation

The second approach commonly employed in establishing standards in environmental legislation in Canada involves the legislator setting normative (non-quantitative) standards based on the "effects" of an event. It may be recalled that an example of this effect-based approach in a quasi-criminal context is found in section 35.(1) of the Canadian *Fisheries Act*, which states:

35.(1) No person shall carry on any work or undertaking that results in the harmful alteration, disruption, or destruction of fish habitat.²⁵⁷

While the Act clearly provides that the standard is one of "harm", the decision as to what actually

²⁵⁷ R.S.C. 1970, c. F-14, as amended.

meets this standard is left up to the individual secondary decision-maker to decide on a case by case basis.

An example of the effect-based approach in a resource development and planning context is to be found in Alberta's *Waste Management Regulation*,²⁵⁸ which provides local health boards with the power to control waste management facilities within the Province through a permitting system. Section 13 of the Regulation provides *inter alia*, that:

- 13 A local board may refuse an application for an approval or an application for a permit where
- (b) it is in the public interest to do so.²⁵⁹

While the effect-based approach eliminates the need for the legislator to address the inevitable uncertainty associated with the creation of quantitative standards, it often replaces it with even greater uncertainty, in that decision-making responsibilities are transferred to a second level of decision-makers who are required not only to reach a conclusion as to whether a particular standard has been met, but also to determine what the standard actually is. For example, a common problem which occurs with normative standards is that they are subject to significant variation from decision to decision. This is due to a wide range of factors, most notable of which is the degree of opposition which is faced in a proceeding. That is, whereas little or no opposition in environmental trials may result in the establishment of relatively low environmental standards, strong opposition, including the presentation of certain types of expert scientific evidence, may have the effect of raising the standard to unreasonably high levels. It is this high degree of uncertainty associated with normative environmental standards which has lead industry to label such standards as "moving targets" and to express a preference for quantitative

²⁵⁸ Alberta Regulation 253/84, enacted pursuant to the Alberta *Public Health Act*, R.S.A. 1980, c. P-4.

²⁵⁹ *Ibid.*, at s. 13.

standards. It is submitted that this uncertainty associated with the establishment of normative environmental standards on the basis of inconsistent scientific information is fundamentally incompatible with a legal system which places a high value upon certainty.

6.3.4.2 Translating Scientific Information Into Standards

The Research Project findings also indicate the existence of problems in the translation of scientific information into the decision-making standards which are established within environmental legislation, with 38.9% of judges, 56.8% of legal counsel and 78.6% of expert scientific witnesses either agreeing or strongly agreeing with the filter question "Problems exist in translating scientific information into the decision-making standards which are used by the legal system in environmental trials and other legal proceedings" (Table 11).

Table 11
Problems With Translating Scientific Information Into Decision-Making Standards Which Are Used At Environmental Trials

<i>"Problems exist in translating scientific information into the decision-making standards which are used by the legal system in environmental trials and other legal proceedings."</i>				
	Judges	Legal Counsel	Expert Scientific Witnesses	Combined Average
Agree/ Strongly Agree	38.9%	56.8%	78.6%	58.1%
Undecided	38.9%	19.3%	15.5%	24.5%
Disagree/ Strongly Disagree	22.2%	23.9%	6.0%	17.3%

In particular, Research Project data lends strong support for the proposition that problems currently surround the translation of scientific information into normative standards at environmental trials and other legal proceedings. In fact, 64.3% of judges, 86.6% of legal counsel

and 86.1% of expert scientific witnesses who either agreed, strongly agreed or were undecided with respect to the filter question set out in Table 11, (and thus were eligible to respond to the remainder of the questions in that question cluster) responded that they saw as either a major or minor problem “Relating scientific information provided in the form or expert evidence at environmental trials to the “normative” (non-quantitative) standards found within environmental legislation (for example, prohibitions against causing “... a negative environmental impact” or “... harm to fish habitat” which do not specify prohibited levels of pollution” (Table 12).

Table 12
Relating Scientific Information To Normative Standards Found In Environmental Legislation

“Relating scientific information provided in the form of expert evidence at environmental trials to the “normative” (non-quantitative) standards found within environmental legislation (for example, prohibitions against causing “... a negative environmental impact” or “... harm to fish habitat” which do not specify prohibited levels of pollution.”				
	Judges	Legal Counsel	Expert Scientific Witnesses*	Combined Average
Major Problem	21.4% (16.7%)	44.8% (29.7%)	51.9% (38.3%)	39.3% (28.2%)
Minor Problem	42.9% (33.3%)	41.8% (27.7%)	34.2% (25.2%)	39.6% (28.7%)
Not a Problem	21.4% (38.9%)	4.5% (36.7%)	1.3% (26.1%)	9.0% (33.9%)
Undecided/ No Opinion	14.3% (11.1%)	7.5% (5.0%)	12.7% (9.3%)	11.5% (12.3%)
Unfamiliar With Concept	0.0% (0.0%)	1.5% (1.0%)	0.0% (0.0%)	0.5% (0.3%)

* No Response (0.9%)

The Research Project data also suggests that there is a lesser but nevertheless strong perception amongst eligible respondents that problems exist in translating scientific information

into quantitative standards at environmental trials. Specifically, 50.0% of judges, 62.7% of legal counsel and 70.9% of expert scientific witnesses indicated that there was either a major or minor problem with respect to “Relating the scientific information provided in the form of expert evidence at environmental trials and other legal proceedings to the “quantitative” standards found within environmental legislation which specify prohibited levels of pollution...”(Table 13).

Table 13
Relating Scientific Information To Quantitative Standards Found In Environmental Legislation

<i>“Relating the scientific information provided in the form of expert evidence at environmental trials and other legal proceedings to the “quantitative” standards found within environmental legislation which specify prohibited levels of pollution (for example, prohibiting the “...release of chemical X into the environment in a concentration in excess of 1 part per million).”</i>				
	Judges	Legal Counsel	Expert Scientific Witnesses*	Combined Average
Major Problem	14.3% (11.1%)	13.4% (8.9%)	26.6% (19.6%)	18.1% (13.2%)
Minor Problem	35.7% (27.8%)	49.3% (3.7%)	44.3% (32.7%)	43.1% (21.4%)
Not a Problem	21.4% (43.6)	23.9% (49.5%)	20.3% (15.0%)	21.8% (36.0%)
Undecided/ No Opinion	28.6% (22.2%)	11.9% (7.9%)	8.9% (6.5%)	16.4% (12.2%)
Unfamiliar With Concept	0.0% (0.0%)	1.5% (1.0%)	0.0% (0.0%)	0.5% (0.3)

*No Response (0.9%)

6.3.5 Interface #5: Legal System Poorly Suited To Address Scientific Issues

The fifth and final interface between science and law in environmental decision-making is the use of legal decision-making institutions such as courts of law, and legal procedures such as are found in rules of court and rules of evidence for the resolution of scientific issues in

environmental decision-making. This may be referred to as the "institutional/procedural interface". Results obtained from the Research Project strongly indicate that there is a perception amongst judges, legal counsel and expert scientific witnesses who have participated in environmental trials and other legal proceedings that problems exist in this area. Specifically, 61.1% of judges, 52.3% of legal counsel and 85.9% of expert scientific witnesses either agreed or strongly agreed with the filter question that "Problems exist in the use of legal decision-making institutions (such as courts of law) and legal procedures (such as Rules of Court and rules of evidence) for the resolution of scientific issues in environmental decision-making" (Table 14).

Table 14
Problems In The Use Of Legal Decision-Making Institutions And Legal Procedures For The Resolution of Scientific Issues In Environmental Decision-Making

<i>"Problems exist in the use of legal decision-making institutions (such as courts of law) and legal procedures (such as Rules of Court and rules of evidence) for the resolution of scientific issues in environmental decision-making."</i>				
	Judges	Legal Counsel	Expert Scientific Witnesses	Combined Average
Agree/ Strongly Agree	61.1%	52.3%	85.9%	66.4%
Undecided	16.7%	14.8%	12.9%	14.8%
Disagree/ Strongly Disagree	22.2%	32.9%	1.2%	18.7%

In fact, of those respondents who either agreed, strongly agreed or were undecided with respect to the filter question set out in Table 32, (and thus were eligible to respond to the remainder of the questions in that question cluster) 71.4% of judges, 79.7% of legal counsel and 89.2% of expert scientific witnesses responded that they perceived "The existing legal process is poorly suited to address scientific issues" to be either a major or minor problem (Table 15).

Table 15
Suitability Of The Existing Legal Process To Address Scientific Issues

<i>"The existing legal process is poorly suited to address scientific issues."</i>				
	Judges	Legal Counsel	Expert Scientific Witnesses*	Combined Average
Major Problem	35.7% (27.8%)	33.9% (19.8%)	60.2% (46.7%)	43.2% (31.4%)
Minor Problem	35.7% (27.8%)	45.8% (26.7%)	28.9% (22.4%)	36.8% (25.6%)
Not a Problem	14.3% (33.3%)	13.6% (49.5%)	1.2% (22.4)	9.7% (35.0%)
Undecided/ No Opinion	14.3% (11.1%)	6.8% (4.0%)	9.6% (7.5%)	10.2% (22.6%)
Unfamiliar With Concept	0.0% (0.0%)	0.0% (0.0%)	0.0% (0.0%)	0.0% (0.0%)

* No Response (0.9%)

6.4 Conclusions

In order to be able to predict with a sufficiently high degree of confidence the incidence of loss which is likely to be associated with its environmental impairment liability products the Canadian insurance industry must not only be able to accurately assess the scientific and technical issues which form the basis of environmental impairment risk assessments, it must also be able to predict the manner in which the judicial system will assess those scientific and technical issues on a case by case basis.

Anecdotal evidence referred to by a variety of scholars in the foregoing analysis suggests that the legal system is currently experiencing significant problems in addressing scientific issues found within jurisprudential disputes. The empirical study carried out in five Canadian jurisdictions which examines the perceptions of judges, legal counsel and expert scientific witnesses gives further support to the proposition that the Canadian legal system has difficulty

in the handling of complex scientific information in environmental cases. This study reveals that a significant number of judges, legal counsel and expert scientific witnesses who have participated in environmental trials perceive problems with respect to each of the five interfaces which exist between science and law in environmental decision-making:

- 1) the quality of scientific information presented to courts;
- 2) the communication/comprehension of scientific concepts;
- 3) scientific uncertainty concerning environmental issues;
- 4) the use of scientific information to establish legislative standards and the translation of scientific information into those standards; and
- 5) use of legal decision-making institutions such as courts of law, and legal procedures such as are found in rules of court and rules of evidence for the resolution of scientific issues in environmental decision-making.

Given the nature and extent of the problems which currently exist in this area, the insurance industry must carefully evaluate the degree of confidence which it has in its ability to predict the incidence of loss, as determined by the courts, with respect to its environmental impairment liability products.

7.0 A NEW APPROACH TO ENVIRONMENTAL IMPAIRMENT LIABILITY INSURANCE IN CANADA

7.1 Introduction

As stated in Chapter 1, it is the primary hypothesis of this thesis that the insurance industry has experienced significant difficulties in providing environmental impairment liability insurance in Canada, and that these difficulties are due in large part to the inability of the industry to accurately predict the incidence and magnitude of loss associated with environmental impairment in Canada. Further, the difficulties with prediction experienced by the insurance industry are primarily the result of its failure to take into account perceptions of environmental risk by the Canadian public and environmental decision-makers. Finally, this inability to accurately predict has been accompanied by the failure of the insurance industry to recognize the degree of uncertainty which exists with respect to its ability to predict, resulting in overconfidence by the industry with respect to its environmental impairment liability products.

This chapter will conclude the thesis by evaluating the validity of the primary hypothesis in light of the four sub-hypotheses. This chapter will also consider the public policy implications which may flow from the difficulties experienced by the industry in providing this form of coverage. Finally, recommendations will be made for the purpose of improving the ability of the Canadian insurance industry to predict the incidence of loss in this area, and consequently improve its ability to provide environmental impairment insurance products.

7.2 Validity Of Primary Hypothesis

It is submitted that the validity of the primary hypothesis is established by the four sub-hypotheses.

First, Chapter Three established the first sub-hypothesis, that the insurance industry in Canada has experienced numerous difficulties in providing environmental impairment liability insurance, by documenting a number of those difficulties. In addition, the examples cited in Chapter Three also support the proposition that many of these difficulties were due to the fact that the insurance industry has been unable to accurately assess the nature and extent of the incidence of loss resulting from environmental impairment.

Second, Chapter Four established the second sub-hypothesis, that in entering into the environmental impairment liability insurance marketplace the insurance industry has failed to anticipate recent legislative reforms which have created a new generation of statutory based civil environmental liabilities. This is clear because much of the exposure arose through the CGL policy which was not conceived for the explicit purpose of environmental impairment liability. When environmental impairment liability became a market interest, environmental impairment liability coverage was marketed but no protection was sought. It is further submitted that this failure to anticipate legislative reform is directly related to the failure of the industry to recognize a change in the Canadian public's perception of risk of environmental impairment in the late 1980's and early 1990's.

Third, Chapter Five established the third sub-hypothesis, that in entering into the environmental impairment liability insurance marketplace the insurance industry may encounter additional difficulties in the event that it fails to anticipate the development of a new generation of common law civil environmental liabilities which may further impair the ability of the

insurance industry to predict the incidence of loss in environmental cases. It is further submitted that these changes in the common law are directly related to a growing perception amongst the judiciary that environmental impairment cases may raise unique issues and that traditional tort law may not be adequate to compensate injured parties for their losses in these cases. Finally, it is suggested that in response some judges appear prepared to acknowledge the validity of new and innovative common law civil environmental liabilities which are intended to ensure that those responsible for pollution will be required to fully compensate those who have incurred injury resulting from that pollution.

Fourth, Chapter Six established the fourth sub-hypothesis, that in attempting to predict the risk associated with the provision of environmental impairment liability insurance the insurance industry has failed to take account of problems which may exist within the legal system in addressing environmental impairment cases involving complex scientific evidence. Recently completed empirical research indicates that there is a perception amongst participants in legal environmental decision-making processes that significant confusion and uncertainty currently exists within the judicial system with respect to the handling of complex scientific information in environmental cases, which in turn may result in the insurance industry having an unjustified degree of confidence in its ability to predict the nature and extent of liabilities for environmental impairment.

7.3 Public Policy Considerations

With the establishment of the primary hypothesis, consideration must be given to the public policy issues which may flow from the difficulties facing the Canadian insurance industry in the provision of environmental impairment liability insurance. These issues are set out below.

7.3.1 Into The Future: The Changing Market For Environmental Impairment Liability Insurance In Canada

While the insurance industry has made a variety of attempts to provide environmental liability insurance products in the Canadian marketplace, until recently the actual demand for environmental liability insurance has been relatively limited.²⁶⁰ A good example of this situation is to be found in the fate of an Environmental Impairment Liability (EIL) policy offered in Canada in the mid-1970's by Lloyds broker Clarkson Puckle²⁶¹ in response to the growing trend amongst insurers at that time to exclude environmental liability, usually by including the "Sudden and Accidental" pollution exclusion in their CGL policies.²⁶² One of the first Canadian insurance products designed specifically to provide environmental liability coverage,²⁶³ this policy was written to indemnify an insured for "environmental impairment", which the policy broadly defined as:

The emission, discharge, dispersal, seepage, release or escape of any liquid, solid, gaseous or thermal irritant, contaminant or pollutant into or upon land, the atmosphere or any watercourse or water.

The generation of smell, noises, vibrations, light electricity, radiations, changes in temperature or any other sensory phenomena arising out of or in the course of the insured's operations, installations or premises

²⁶⁰ See A. Ross, "Pollution & the Industry: Catastrophe or Control" (1990), *Canadian Insurance*, Vol. 95 No. 7, 20; and All-Industry Research Advisory Council, *Pollution Liability: The Evolution of a Difficult Insurance Market* (Illinois: Oak Brook 1985), chs. 2 & 3.

²⁶¹ J. Z. Swaigen, *Compensation of Pollution Victims in Canada* (Ottawa: Canadian Environmental Law Research Foundation and the Westwater Research Centre, University of British Columbia, (1981).

²⁶² For a detailed discussion on this issue see G.T.G. Scott, "Environmental Impairment Liability: A Background To Recent Developments In Canada (1984), *Canadian Underwriter*, March 1984, 15; and D.G.M. Smith, "Pollution Liability Coverage" (1988), *Canadian Insurance*, December 1988, 8.

²⁶³ Similar products were offered in the United States from the early 1970's to the mid-1980's. See Smith, "Environmental Damage Liability Insurance - A Primer" (1983), *Business Lawyer*, Vol. 39, 333.

Thus, this policy was "... intended to cover gradual pollution resulting from deliberate, continuous, legal industrial emissions whose adverse impacts aren't foreseen."²⁶⁴ However, the policy specifically excluded "wilful pollution", which it described as "... the grossly negligent disregard of the consequences likely to arise from the conscious non-observance of regulations designed for the environment's protection". The policy also excluded coverage for illegal activities, intentional acts, fines, penalties, punitive damages, pollution of an insured's own property, injury to an insured's employees, product liability and genetic damage.

The Clarkson Puckle Environmental Impairment Policy was eventually discontinued due to a lack of marketplace interest.²⁶⁵ In commenting in 1975 on the poor initial sales for the Clarkson Puckle Environmental Impairment Liability policy, one author observed:

Given the low probability of compensatory payment as compared to the premiums anticipated under E.I.L., it would make economic sense from the industry's point of view, to defer E.I.L.²⁶⁶

In point of fact, the policy "... was available for six or seven years and eventually faded, not as a result of adverse loss of experience but customer disinterest. Quite simply, it failed due to lack of sales."²⁶⁷ There are a number of theories as to the cause of this disinterest:

²⁶⁴ J. Frederick Sagel and Kent Thomson, "Environmental Impairment Insurance: Canadian Perspective (Part III) (1986), *Canadian Journal of Insurance Law*, Vol. 4 No. 1, 2.

²⁶⁵ These products include a "Pollution Event Insurance" policy from Ian Elliot Ltd., underwritten by insurers such as Royal, General Accident, Canadian General and Simcoe & Erie. Similar products are also currently available through American Home Assurance Company and the American International Group [**Are they the same?**]. In addition, Knox, Vickers and McLean Insurance Brokers are offering a policy underwritten by the Zurich Insurance Company which is specifically designed to provide coverage for underground storage tanks.

²⁶⁶ Charles A. Morrison, "Towards the Formulation of New Schemes and Strategies for the Compensation of Victims of Environmental Activities: Part II" (1975), Ministry of the Environment.

²⁶⁷ *Supra*, note 90 at 27.

The answer to the question of why people or corporations did not buy the Clarkson Puckle product is open for conjecture. Some theorize that there was apathy towards environmental issues at that time. The product has been said to have been marketed too early because the teeth of new environmental laws had not yet fully shown themselves. A further theory is that major corporations considered the issue as one that was simply too large to address. It is possible that this attitude still exists in some instances inasmuch as the available limit of insurance can do little to protect the financial health of a company faced with a billion-dollar problem. It is commonly thought that environmental contamination and its clean up is one that can only be handled properly by the government. This generates an attitude of "lets leave it to government".

Since Clarkson Puckle's failure, several other products have been introduced into the insurance market to address the environmental impairment problem. These have also failed, probably as a result of the same apathy.²⁶⁸

Despite the relative apathy which has greeted Canadian environmental impairment insurance products in the past, there are indications that the environmental impairment insurance marketplace is on the brink of a significant change. As we have seen, the current shift from government regulation of environmental behaviour of industrial and commercial entities to self-regulation by the private sector, and incorporation of the "polluter pays" principle in the new generation of environmental legislation provides a strong indication that legislators in both Canada and the United States no longer intend to assume primary responsibility for environmental impairment issues. Implementation of this shift in financial responsibility for environmental impairment from governments to the private sector is being accomplished through a variety of mechanisms such as a new generation of statutory liabilities which include liability for environmental response and cleanup charges, the requirement of security in the event of environmental contamination, and the creation of statutory civil causes of action designed to assist claimants in recovering for losses resulting from environmental contamination. These mechanisms are supplemented by an increasing willingness by the courts to give serious consideration to innovative new approaches by private claimants to hold polluters civilly

²⁶⁸ *Ibid.*, at 27 - 28. This lends support for the proposition that the Canadian insurance industry had company in the form of corporate Canada in failing to anticipate the losses associated with environmental impairment.

accountable for toxic tort related claims. It is submitted that these factors will result in those industrial and commercial interests with potential exposure to environmental impairment liability turning in increasing numbers to insurers to provide coverage for this new generation of environmental risks. However, as we have seen these new risks will also make it more difficult for insurers to provide the required coverage.

7.3.2 The Insurance Industry As Environmental Regulator

As a result, the Canadian insurance industry is facing the important decision of whether to provide readily available environmental impairment insurance products or whether the risks are sufficient to justify a partial or complete withdrawal from the environmental impairment insurance market. This decision will have major implications not only for the insurance industry, but also for industrial and commercial interests across Canada.

Should the insurance industry in Canada conclude that it is unable to predict with sufficient confidence the incidence of loss associated with the new generation of environmental liabilities, thereby making the risk of providing a readily available environmental impairment insurance product too high, the industry may decide to offer this type of coverage only with prohibitively expensive premiums, or to partially or completely remove this type of product from the marketplace. The implications of such a scenario are enormous. Simply stated, if either government or private sector industrial and commercial interests within Canada determine that the risk presented by potential liabilities for environmental impairment are sufficient to make environmental impairment insurance a prerequisite to undertaking activities which involve a degree of risk of environmental impairment, the high cost and/or unavailability of such insurance

would likely have a significant chilling effect upon industrial and commercial interests with operations which carry with them some degree of environmental risk.

While such a scenario is always a possibility, it is submitted that a more likely result of the numerous difficulties facing the Canadian insurance industry in the provision of environmental liability insurance will be an attempt by insurers to maintain this form of coverage under strict risk management guidelines and increased supervision over insureds. Therefore, while the insurance industry may have limited control over such factors as the judicial interpretation of environmental impairment policies, the enactment of new statutory pollution liabilities, or the development of new theories of liability in toxic tort claims, it does have the power to decide who it is prepared to insure. The Canadian insurance industry appears to have recognized this fact, with the Insurance Bureau of Canada advising as follows:

Pollution which is inherent to certain economic activities cannot be considered accidental and is therefore generally uninsurable. IBC members are encouraged to refuse to insure such businesses against costs arising from environmental damage unless necessary safeguards or process changes are adopted to ensure that such damage could only result from an unfortunate accidental occurrence.²⁶⁹

Further it also has the power to maintain strict control over those to whom it issues this type of policy coverage. For example, prior to entering into an insuring agreement it is open to insurers to conduct a careful assessment of the proposed risk, usually through an "environmental risk assessment" of a prospective insured.²⁷⁰ Further, the insurance contract itself may include special conditions such as environmental safety requirements which an insured must observe, the

²⁶⁹ Insurance Bureau of Canada, "A Statement of Principles Regarding Insurance and the Environment", Position Paper, February 1991, 2.

²⁷⁰ In this regard see Neil C. Wittmann and John Kingman Phillips, "Insurance Coverage and Pollution: An Evolution Behind The Times" (1991), *Ubertima Fides*, Vol. 1 No. 2, 18 at 24. This assessment often will attempt to identify both pre-existing liabilities and the potential for future liabilities based upon the existing and future operations of a prospective insured.

requirement that an insured immediately report to an insurer any changes material to the risk, and broad ongoing rights of inspection by an insurer. In this regard the Insurance Bureau of Canada's Board of Directors has issued the following guidelines to its member companies with respect to the treatment of insurance for risks associated with the environment:

For businesses whose economic activities involve clear but measurable risk of environmental damage, insurance can usually be purchased if such firms are willing to provide an independent environmental assessment report certifying that the necessary safeguards for the prevention of environmental damage are in place and remain in good working order, as evidenced by periodic additional inspections. IBC member companies, in keeping with the principles of loss prevention, are encouraged to insist on such environmental assessments.²⁷¹

Should an insured fail to comply with any conditions contained within the policy it is always open to the insurer to deny coverage.²⁷²

If the insurance industry decides to offer environmental impairment insurance under strict guidelines as outlined above, insurers may effectively find themselves cast in the unlikely role of unofficial environmental regulators with respect to a significant portion of the environmental risk in Canada.²⁷³ That is, in applying risk management principles which will determine whether an entity will obtain environmental impairment insurance, and if so, under what conditions,²⁷⁴ the

²⁷¹ *Supra*, note 269 at 2.

²⁷² This form of control by insurers over their insureds should prove to be considerably more effective in Canada than in the United States, in that even if an American insurer denies coverage, CERCLA includes provisions whereby an insurer may be made a direct party to a claim for recovery of preventive response or cleanup costs (see 42 U.S.C., s. 9608(c)). While an insurer could then bring a subsequent action outside of the CERCLA claim against its insured, many insureds will be unable to satisfy such a claim. See Cheek, "Risk-Spreaders or Risk Eliminators? An Insurer's Perspective on the Liability and Financial Responsibility Provisions of RCRA and CERCLA" (1982), *Virginia Journal of Natural Resources Law*, Vol. 2, 152 at 172.

²⁷³ For a detailed discussion of this topic in an American context see Cheek, "Risk-Spreaders or Risk Eliminators? An Insurer's Perspective on the Liability and Financial Responsibility Provisions of RCRA and CERCLA" (1982), *Virginia Journal of Natural Resources Law*, Vol. 2, 152; Steven A. Kunzman, "The Insurer As Surrogate Regulator Of The Hazardous Waste Industry: Solution Or Perversion?" (1984), *The Forum*, Vol. 20, 469.

²⁷⁴ Typical conditions currently include regular site inspections and the requirement that the insured immediately report to the insurer any changes in the insured's situation which are material to the risk.

insurance industry may in effect be imposing a new form of environmental regulation across Canada. In a recently released position paper the Insurance Bureau of Canada appears prepared to accept this role:

Insurance owes its very existence to the need to manage and minimize the impact of accidental occurrences. The application of well-established principles of loss prevention and loss-control engineering - including, for example, the promotion of safe driving, the establishment of fire prevention standards and the periodic inspection of boilers and pressure vessels - is fundamental to the underwriting process.

This experience uniquely equips the property and casualty insurance industry to assist individuals, industry, commerce and governments in both preventing environmental damage and in managing existing risks to the environment.²⁷⁵

However, an additional layer of environmental regulation by the insurance industry could also have a number of undesirable effects. First, as we have seen the past experience of the insurance industry in attempting to provide environmental impairment insurance has been fraught with difficulties. Second, the insurance industry is motivated by maximization of profit rather than by environmental welfare, and therefore it is likely that "... wherever risk reduction conflicts with profit maximization, the latter, it is contended, shall prevail".²⁷⁶ Third, it is unlikely that such regulation would be uniform in application in that large commercial interests which are self-insuring would be able to avoid this form of regulation, thereby giving them an advantage over their less wealthy competitors who would be forced to rely on insurance to cover their environmental risk.²⁷⁷ Finally, it is unlikely that such a system would be cost efficient in that it

²⁷⁵ *Supra*, note 269 at 1.

²⁷⁶ Steven A. Kunzman, "The Insurer As Surrogate Regulator Of The Hazardous Waste Industry: Solution Or Perversion?" (1984), *The Forum*, Vol. 20, 469 at 481.

²⁷⁷ Cheek, "Risk-Spreaders or Risk Eliminators? An Insurer's Perspective on the Liability and Financial Responsibility Provisions of RCRA and CERCLA" (1982), *Virginia Journal of Natural Resources Law*, Vol. 2, 152 at 173.

is probable that there would be considerable overlap and duplication between the insurance industry and government regulators.

Despite these drawbacks it is submitted that an unofficial layer of environmental regulation administered by the Canadian insurance industry as a consequence of the provision of environmental impairment insurance may have three important advantages. First, this would ensure that environmental decisions would be based upon a loss prevention rather than reactive management approach. Second, in determining whether to provide environmental impairment insurance the insurance industry will not only examine the nature and extent of the potential physical risk, it will also likely investigate the past record of the prospective insured. Third, while the insurance industry is motivated by maximization of profit rather than by environmental welfare, environmental regulation by a private entity such as the insurance industry would preclude the political considerations which often dominate environmental decisions made by government bodies. Thus, it is submitted that while environmental regulation by the insurance industry should not be seen as a replacement for existing legislative regulation, in the future Canadian insurers may make an important contribution to environmental decision-making.

7.4 A New Approach To The Delivery Of Environmental Impairment Liability Insurance

As we have seen, for more than five decades the insurance industry in Canada has attempted to provide a variety of insurance products for liability resulting from impairment of the natural environment. However, a review of the history of environmental impairment insurance in Canada suggests that these attempts have been fraught with problems, and the success of the products which have been provided has been limited to date, with few signs of

significant improvement in sight. This raises serious questions with respect to the future of environmental impairment insurance, particularly given the fact that the market availability of such insurance is likely to take on increasing importance for industries and commercial enterprises with operations which carry with them some degree of environmental risk. In the event that the industry decides to provide readily available environmental impairment insurance products in the Canadian marketplace, it raises equally serious questions as to the ability of the insurance industry to assume the role as a key component of environmental impairment regulator in Canada.

In the event that the insurance industry decides to provide readily available environmental impairment insurance products in the Canadian marketplace, it is recommended that the industry take careful note of the problems which it encountered in the past and consider abandoning its traditional approach to addressing risk and replace it with a strategy which takes advantage of modern risk techniques. With this in mind, the remainder of this chapter will set out a series of recommendations for the Canadian insurance industry in the provision of environmental impairment liability insurance.

- 1) The insurance industry must adopt new approaches to accurately and reliably assess the nature and extent of the risk presented by the complexities of modern environmental impairment.
- 2) In assessing its ability to accurately predict the incidence of loss associated with environmental impairment in Canada in the future, it will be necessary for the industry to accurately evaluate its ability to anticipate and react to changes in legislation which are likely to take place as a result of perceptions by the Canadian public that environmental impairment is an important issue and that the various levels of government should be acting to hold polluters responsible for their

actions. This means that prior to offering environmental impairment liability insurance products into the Canadian marketplace insurers should give careful consideration to the possibility of new statutory civil liabilities for environmental impairment such as civil action upon conviction of offence under regulatory legislation, civil action to protect the public trust, liability for preventive response and cleanup of contaminated sites, and financial security for preventive response and environmental cleanup. By monitoring the perceptions of the Canadian public regarding environmental impairment issues and their resulting impact on legislation in advance of developing and marketing environmental impairment liability insurance products the insurance industry should be able to provide a better product, and break out of the pattern which the industry has established over the past five decades of modifying and in some cases removing these products in reaction to unanticipated legislative change.

- 3) In assessing its ability to accurately predict the incidence of loss associated with environmental impairment in Canada in the future, it will be necessary for the industry to accurately evaluate its ability to anticipate and react to changes to tort law which are likely to take place as a result of a growing perception by members of the judiciary that traditional tort law may not be adequate to compensate injured parties for their losses in environmental impairment cases, and that innovative new approaches such as liability on the basis of risk of injury may better serve this fundamental principle of tort law. This means that prior to offering environmental impairment liability insurance products into the Canadian marketplace insurers should give careful consideration to the development of new toxic torts such as

those based on compensation for increased risk of injury, which include injury to immune system, fear of future injury, and ongoing medical monitoring. By monitoring the perceptions of the judiciary in advance of developing and marketing environmental impairment liability insurance products the insurance industry should be able to better anticipate the reception which its products will receive from the courts, and break out of the pattern which the industry has established over the past five decades of modifying and in some cases removing these products in reaction to unanticipated judicial interpretations.

- 4) In order to accurately predict the nature and extent of liabilities for environmental impairment the insurance industry must take account of problems within the legal system in addressing environmental impairment cases involving complex scientific evidence.

JUDICIARY SURVEY QUESTIONNAIRE



University of Alberta

Eco-Research Chair in Environmental Risk Management

in affiliation with

Graduate Studies Program, Faculty of Law

University of British Columbia



invite you to participate in research currently being conducted with respect to

**"Environmental Decision-Making:
The Interfaces of Science and Law"**

INSTRUCTIONS

Please answer survey questionnaire by checking (✓) the box next to the most appropriate answer, or by writing your answer in the blank space provided.

This survey questionnaire may contain questions which do not apply to you. In order to minimize the time required to complete the survey questionnaire some answers are followed by instructions [Go To Question X] which will take you past questions which you are not required to answer.

Upon completing the survey questionnaire please return it in the pre-addressed, postage-paid envelope provided.

1. Approximately how many trials (criminal/quasi-criminal or civil) or other legal proceedings (such as injunction applications or applications for judicial review of administrative decisions) involving an environmental¹ issue have you had the opportunity to hear? _____
2. Of those trials or other legal proceedings which you have had the opportunity to hear which have involved an environmental issue:
 - a) what percentage would you estimate could be classified as falling within the area of criminal/quasi-criminal law? _____ %
 - b) what percentage would you estimate could be classified as falling within the area of civil law? _____ %
 - c) what percentage would you estimate could be classified as falling within the area of administrative law? _____ %
 - d) what percentage would you estimate involved the presentation of scientific² information by one or more expert witnesses? _____ %
 - e) what percentage would you estimate involved the presentation of scientific information by one or more independent expert witnesses appointed by the court? _____ %
 - f) what percentage would you estimate involved participation by legal counsel representing one or more parties in the matter? _____ %
 - g) what percentage would you estimate involved the use of one or more scientific advisors retained to assist legal counsel with respect to scientific issues without actually appearing as an expert scientific witness? _____ %
 - h) what percentage would you estimate involved the introduction of scientific information through affidavit evidence deposited to by a scientific expert who did not appear before the courts in person to give expert scientific evidence? _____ %
 - i) what percentage would you estimate involved the use of "local knowledge/traditional knowledge" from aboriginal and non-aboriginal witnesses as an alternative form of expert scientific evidence? _____ %

¹ For the purposes of this study the term "environmental" refers to the natural environment, and includes public health issues as they relate to the natural environment.

² For the purposes of this study the term "scientific" refers to all relevant scientific and technical disciplines within the natural and applied sciences (for example, engineering, geography, hydrogeology, biology, limnology, botany, zoology, chemistry, ecology, geology, soil sciences, forestry, medicine and public health).

3. What, if any scientific training have you received? (Please check (✓) as many responses as apply).

- Practical Experience
- High School
- Workshops/Seminars/Short Courses
- Technical School
- University/College Level Courses
- Bachelor's Degree
- Master's Degree
- Ph.D.
- Post-Doctoral
- Other (please describe) _____

4. What, if any training have you received with respect to hearing scientific evidence presented by expert witnesses at a trial or other legal proceeding? (Please check (✓) as many responses as apply).

- Judicial Experience
- Lectures
- Workshops/Seminars/Short Courses
- University/College Level Courses
- Other (please describe) _____

The next set of questions asks you to consider issues relating to the quality of scientific information which is put into the environmental decision-making process at environmental trials and other legal proceedings. ¹⁶⁵

5. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings with respect to the quality of scientific information provided in the form of expert evidence by expert scientific witnesses."

Strongly Agree Agree Undecided Disagree Strongly Disagree

↓ ↓ ↓ ↓ ↓

[Continue Answering Question 6] [Go to Question 7] →

6. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings with respect to the quality of scientific information provided in the form of expert evidence by expert scientific witnesses:

	Major Problem	Minor Problem	Not a Problem	Undecided /No Opinion	Unfamiliar with Concept
a) Inadequate understanding by expert scientific witnesses of the <u>trial or other legal proceeding</u> in which they are participating	<input type="checkbox"/>				
b) The inability of expert scientific witnesses to function effectively within the <u>adversarial system</u> used in environmental trials and other legal proceedings	<input type="checkbox"/>				
c) The inability of expert scientific witnesses to deal with the <u>psychological stresses</u> associated with environmental trials and other legal proceedings	<input type="checkbox"/>				
d) <u>Professional ethical restraints</u> on the public contradiction or criticism of other expert scientific witnesses in environmental trials and other legal proceedings	<input type="checkbox"/>				
e) A <u>competitiveness factor</u> , wherein expert scientific witnesses are motivated to attempt to "win" environmental trials and other legal proceedings and "defeat" opposing parties (and their expert scientific witnesses) involved in the litigation	<input type="checkbox"/>				
f) A tendency on the part of expert scientific witnesses to <u>assist the party to the litigation who retains their services</u>	<input type="checkbox"/>				
g) A desire by expert scientific witnesses to have <u>specific scientific theories or models validated/recognized by the courts</u>	<input type="checkbox"/>				
h) An underlying belief by expert scientific witnesses that " <u>any environmental problem can be overcome</u> " through application of scientific knowledge	<input type="checkbox"/>				

	Major Problem	Minor Problem	Not a Problem	Undecided /No Opinion	Unfamiliar with Concept
i) <u>The "compartmentalization" of the roles played by expert scientific witnesses in environmental trials, wherein expert scientific witnesses provide scientific evidence within their areas of expertise without a full appreciation of the factual and scientific context of the trial or other legal proceeding in which they are participating</u>	<input type="checkbox"/>				
j) <u>Influence from legal counsel in the preparation of expert scientific witnesses prior to giving evidence at environmental trials and other legal proceedings</u>	<input type="checkbox"/>				
k) <u>Influence from legal counsel in the preparation of affidavits containing scientific information deposed to by scientific experts who do not appear before the courts in person to give expert scientific evidence</u>	<input type="checkbox"/>				
l) <u>Influence from scientific advisors retained to assist legal counsel in the preparation of expert scientific witnesses prior to these witnesses giving evidence at environmental trials and other legal proceedings</u>	<input type="checkbox"/>				
m) <u>Influence from the audience observing environmental trials and other legal proceedings</u>	<input type="checkbox"/>				
n) <u>Influence from the media (including television, radio, newspapers, etc.)</u>	<input type="checkbox"/>				
o) <u>Influence from financial or other remuneration paid to expert scientific witnesses for their participation in environmental trials and other legal proceedings</u>	<input type="checkbox"/>				
p) Do you have any comments with respect to any problems which you have identified, or are there any other problems which you perceive exist in environmental trials and other legal proceedings with respect to the quality of scientific information provided in the form of expert evidence by expert scientific witnesses?					

7. Please indicate your response with respect to your perception of the role(s) of expert witnesses in giving expert scientific evidence at environmental trials and other legal proceedings:

	Primary Role	Secondary Role	Not Their Role
a) To assist the party to the litigation who retains their services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) To assist legal counsel who retains their services on behalf of a client	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) To assist the court	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) To assist no one, only to provide scientific information to everyone involved in the litigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings with respect to the screening by the courts of those persons who are qualified to provide the courts with scientific information as expert witnesses."

Strongly Agree Agree Undecided Disagree Strongly Disagree

↓ ↓ ↓ ↓ ↓

[Continue Answering Question 9] [Go to Question 10] →



9. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings with respect to the screening by the courts of those persons who are qualified to provide the courts with scientific information as expert witnesses:

	Major Problem	Minor Problem	Not a Problem	Undecided /No Opinion	Unfamiliar with Concept
a) The "qualification" procedures which are employed by the courts in qualifying witnesses to give scientific evidence as expert witnesses	<input type="checkbox"/>				
b) Failure of the courts to define with sufficient precision the areas of expertise in which witnesses are qualified to give expert scientific evidence	<input type="checkbox"/>				
c) Failure of the courts to limit the scientific evidence provided by expert witnesses to those defined areas of expertise in which they are qualified to give expert scientific evidence	<input type="checkbox"/>				
d) Verification by the courts of the qualifications of witnesses to give expert scientific evidence	<input type="checkbox"/>				
e) Distinguishing between the qualifications of expert scientific witnesses in situations where two or more experts in the same field give expert scientific evidence	<input type="checkbox"/>				
f) Do you have any comments with respect to any problems which you have identified, or are there any other problems which you perceive exist in environmental trials and other legal proceedings with respect to the screening by the courts of those persons who are qualified to provide the courts with scientific information as expert witnesses?					

10. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings with respect to the use of "local knowledge/traditional knowledge" from aboriginal and non-aboriginal witnesses as an alternative form of expert scientific evidence."

Strongly Agree



Agree



Undecided



Disagree



Strongly Disagree



[Continue Answering Question 11]

[Go to Question 12] →



11. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings with respect to the use of "local knowledge/traditional knowledge" from aboriginal and non-aboriginal witnesses as an alternative form of expert scientific evidence:

	Major Problem	Minor Problem	Not a Problem	Undecided /No Opinion	Unfamiliar with Concept
a) The <u>willingness</u> of the courts to accept "local knowledge/traditional knowledge" from aboriginal and non-aboriginal witnesses as an alternative form of expert scientific evidence	<input type="checkbox"/>				
b) The <u>unwillingness</u> of the courts to accept "local knowledge/traditional knowledge" from aboriginal and non-aboriginal witnesses as an alternative form of expert scientific evidence	<input type="checkbox"/>				
c) Assigning <u>evidentiary weight</u> to expert scientific evidence in the form of "local knowledge/traditional knowledge"	<input type="checkbox"/>				
d) The " <u>qualification</u> " <u>procedures</u> which are employed by the courts in qualifying witnesses to give scientific evidence in the form of "local knowledge/traditional knowledge" as expert witnesses	<input type="checkbox"/>				
e) <u>Failure of the courts to define with sufficient precision the areas of expertise</u> in which witnesses are qualified to give expert scientific evidence in the form of "local knowledge/traditional knowledge"	<input type="checkbox"/>				
f) <u>Failure of the courts to limit the scientific evidence</u> provided by witnesses qualified to give expert scientific evidence in the form of "local knowledge/traditional knowledge" to those <u>defined areas of expertise</u> in which they are qualified to give expert scientific evidence	<input type="checkbox"/>				

The next set of questions asks you to provide your views with respect to the communication of scientific information in environmental trials and other legal proceedings, and the comprehension/understanding of that information by participants in environmental trials and other legal proceedings such as judges and legal counsel.

14. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings with respect to the communication of scientific information provided in the form of expert evidence by expert scientific witnesses."

Strongly Agree Agree Undecided Disagree Strongly Disagree

↓ ↓ ↓ ↓ ↓

[Continue Answering Question 15] [Go to Question 16] →

15. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings with respect to the communication of scientific information provided in the form of expert evidence by expert scientific witnesses:

	Major Problem	Minor Problem	Not a Problem	Undecided /No Opinion	Unfamiliar with Concept
a) The use of <u>technical language</u> including jargon and terms of art which may not be understood by participants in environmental trials and other legal proceedings such as judges and legal counsel	<input type="checkbox"/>				
b) The <u>failure of expert scientific witnesses to effectively communicate scientific information</u> to participants in environmental trials and other legal proceedings such as judges and legal counsel	<input type="checkbox"/>				
c) The <u>distortion of scientific information</u> as a result of the use of <u>cross-examination</u> by opposing legal counsel	<input type="checkbox"/>				
d) The <u>meanings to be attributed to technical terms</u> (such as jargon and terms of art) may <u>vary between expert scientific witnesses</u> (for example, the meaning which a civil engineer associates with the term "physical stress" may be very different from the definition of that term which would be provided by a biologist)	<input type="checkbox"/>				
e) The <u>translation of technical language</u> (such as jargon and terms of art) into languages such as aboriginal languages which do not have equivalent terminology	<input type="checkbox"/>				
f) Do you have any comments with respect to any problems which you have identified, or are there any other problems which you perceive exist in environmental trials and other legal proceedings with respect to the communication of scientific information provided in the form of expert evidence by expert scientific witnesses?					

16. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings with respect to the comprehension/understanding by the courts and/or legal counsel of scientific information presented in the form of expert scientific evidence by expert scientific witnesses."

Strongly Agree



[Continue Answering Question 17]

Agree



Undecided



Disagree



[Go to Question 18] →

Strongly Disagree



17. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings with respect to the comprehension/understanding by the courts and/or legal counsel of scientific information presented in the form of expert scientific evidence by expert scientific witnesses:

	Major Problem	Minor Problem	Not a Problem	Undecided / No Opinion	Unfamiliar with Concept
a) The <u>courts</u> do not sufficiently understand the methods of <u>scientific inquiry and proof</u>	<input type="checkbox"/>				
b) <u>Legal counsel</u> do not sufficiently understand the methods of <u>scientific inquiry and proof</u>	<input type="checkbox"/>				
c) The <u>courts</u> do not comprehend the <u>merits and pitfalls of statistical analysis</u> provided by expert scientific witnesses	<input type="checkbox"/>				
d) <u>Legal counsel</u> do not comprehend the <u>merits and pitfalls of statistical analysis</u> provided by expert scientific witnesses	<input type="checkbox"/>				
e) The <u>courts</u> do not comprehend the <u>value premises and professional biases which underlie scientific information</u> provided by expert scientific witnesses	<input type="checkbox"/>				
f) <u>Legal counsel</u> do not comprehend the <u>value premises and professional biases which underlie scientific information</u> provided by expert scientific witnesses	<input type="checkbox"/>				
g) The <u>courts</u> do not comprehend the <u>key doctrines and premises</u> of whatever scientific discipline is involved in scientific information provided by expert scientific witnesses	<input type="checkbox"/>				
h) <u>Legal counsel</u> do not comprehend the <u>key doctrines and premises</u> of whatever scientific discipline is involved in scientific information provided by expert scientific witnesses	<input type="checkbox"/>				

19. Please indicate your response with respect to the qualities which you perceive that legal counsel look for when choosing expert witnesses to give expert scientific evidence at environmental trials and other legal proceedings:

	Very Desirable	Desirable	Doesn't Matter	Undesirable	Very Undesirable
a) <u>Reputation and standing within the scientific community</u>	<input type="checkbox"/>				
b) <u>Academic/professional credentials</u>	<input type="checkbox"/>				
c) A proven " <u>track record</u> " as an expert witness	<input type="checkbox"/>				
d) Ability to <u>effectively communicate</u> scientific information	<input type="checkbox"/>				
e) Ability to <u>work well</u> with legal counsel, scientific advisors and/or other expert witnesses as <u>part of a "team"</u>	<input type="checkbox"/>				
f) Ability to <u>persuade a court</u> with respect to a scientific issue	<input type="checkbox"/>				
g) A <u>low professional fee</u> for participation in the trial or other legal proceeding in order to <u>minimize expert witness costs</u>	<input type="checkbox"/>				
h) An expert witness who <u>usually appears only on behalf of one side</u> or the other in a trial or other legal proceeding (for example, only appears as an expert witness for the prosecution/plaintiff rather than the defence)	<input type="checkbox"/>				
i) In situations where scientific evidence presented by the other side to a dispute is widely held by the scientific community, an expert witness who holds a <u>minority view</u> or <u>has a new theory</u>	<input type="checkbox"/>				
j) A <u>willingness to assist the party to the litigation who retains their services</u>	<input type="checkbox"/>				
k) Is <u>susceptible to "influence"</u> by legal counsel or <u>scientific advisors</u> during preparation for, and in giving expert scientific evidence in environmental trials and other legal proceedings	<input type="checkbox"/>				
l) Has the <u>ability to successfully withstand cross-examination</u> by opposing legal counsel	<input type="checkbox"/>				
m) Is able to <u>assist legal counsel in the preparation of cross-examination</u> of expert scientific witnesses appearing on behalf of the opposing party in environmental trials and other legal proceedings	<input type="checkbox"/>				

The next set of questions asks you to provide your views with respect to the issue of scientific uncertainty in environmental trials and other legal proceedings.

20. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings where the scientific information provided in the form of expert evidence results in uncertainty with respect to one or more scientific issues."

Strongly Agree



[Continue Answering Question 21]

Agree



Undecided



Disagree



Strongly Disagree



[Go to Question 22] →

21. Please indicate your response with respect to the following possible/potential sources of the problem of uncertainty in environmental trials and other legal proceedings with respect to scientific issues.

	Major Problem	Minor Problem	Not a Problem	Undecided /No Opinion	Unfamiliar with Concept
a) Translating the level of <u>scientific certainty and uncertainty</u> found within scientific information provided in the form of expert evidence at environmental trials and other legal proceedings into the level of <u>legal certainty and uncertainty</u> required to meet <u>legal standards of proof</u> (such as "proof beyond reasonable doubt" required in criminal/quasi-criminal trials or "proof on the balance of probabilities" required in civil trials and by the due diligence defence in criminal/quasi-criminal trials)	<input type="checkbox"/>				
b) Where it appears that scientific information necessary to reduce or eliminate the uncertainty relating to a scientific issue <u>is available</u> , but such information is <u>not presented</u> as evidence at an environmental trial or other legal proceeding	<input type="checkbox"/>				
c) Where it appears that scientific information necessary to reduce or eliminate the scientific uncertainty relating to a scientific issue <u>is not immediately available</u> for presentation at an environmental trial or other legal proceeding, but <u>could be obtained</u> with additional scientific investigation	<input type="checkbox"/>				
d) Where it appears that scientific information necessary to reduce or eliminate the scientific uncertainty relating to a scientific issue <u>is not available</u> for presentation at an environmental trial or other legal proceeding, and <u>cannot reasonably be obtained</u> given the present state of science	<input type="checkbox"/>				

22. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings where contradictory or conflicting scientific information in the form of expert evidence is provided by expert scientific witnesses."

Strongly Agree



[Continue Answering Question 23]

Agree



Undecided



Disagree



Strongly Disagree



[Go to Question 24] →



23. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings in situations where contradictory or conflicting scientific information in the form of expert evidence is provided by expert scientific witnesses:

	Major Problem	Minor Problem	Not a Problem	Undecided /No Opinion	Unfamiliar with Concept
a) Assigning <u>evidentiary weight</u> to the contradictory or conflicting scientific information	<input type="checkbox"/>				
b) Distinguishing between <u>scientific information which is widely accepted in the scientific community</u> from <u>minority views, new theories</u> or what is commonly referred to as " <u>junk science</u> "	<input type="checkbox"/>				
c) Lack of understanding by the courts as to <u>how scientists knowledgeable within the area where conflicting evidence exists would decide</u> which information they would find most credible	<input type="checkbox"/>				
d) Choosing the scientific evidence of one expert witness over another based upon their respective " <u>performances</u> " in giving evidence, rather than on the basis of the scientific information itself.	<input type="checkbox"/>				
e) Do you have any comments with respect to any problems which you have identified, or are there any other problems which you perceive exist in environmental trials and other legal proceedings in situations where contradictory or conflicting scientific information in the form of expert evidence is provided by expert scientific witnesses?					

The next set of questions asks you to provide your views with respect to the issue of using scientific information to establish the decision-making standards which are used by the legal system, and the translation of scientific information into those standards at environmental trials and other legal proceedings.

24. What is your opinion with respect to the following statement?

"Problems exist in using scientific information to establish the decision-making standards which are used by the legal system in environmental trials and other legal proceedings."

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
↓	↓	↓	↓	↓
[Continue Answering Question 25]			[Go to Question 26] →	

25. Please indicate your response with respect to the following possible/potential problems in using scientific information to establish the decision-making standards which are used by the legal system in environmental trials and other legal proceedings:

	Major Problem	Minor Problem	Not a Problem	Undecided /No Opinion	Unfamiliar with Concept
a) <u>"Quantitative" standards established by governments which specify prohibited levels of pollution within environmental legislation (for example, prohibiting the "... release of chemical X into the environment in a concentration in excess of 1 part per million") do not accurately reflect the current state of available scientific information with respect to effects of pollution on the environment</u>	<input type="checkbox"/>				
b) Governments place <u>too little emphasis on scientific information</u> when <u>establishing "quantitative" standards</u> which specify prohibited levels of pollution within environmental legislation	<input type="checkbox"/>				
c) Governments place <u>too much emphasis on scientific information</u> when <u>establishing "quantitative" standards</u> which specify prohibited levels of pollution within environmental legislation	<input type="checkbox"/>				
d) Out of a concern that governments may place too much or too little emphasis on scientific information when establishing "quantitative" standards which specify prohibited levels of pollution within environmental legislation, <u>scientific experts providing advice to governments in the setting of such standards may make recommendations which do not accurately reflect the current state of scientific information</u> (for example, recommending lower concentrations of pollution than are scientifically justifiable to ensure that adequate safety is maintained)	<input type="checkbox"/>				

26. What is your opinion with respect to the following statement?

"Problems exist in translating scientific information into the decision-making standards which are used by the legal system in environmental trials and other legal proceedings."

Strongly Agree



Agree



Undecided



Disagree



Strongly Disagree



[Continue Answering Question 27]

[Go to Question 28] →

27. Please indicate your response with respect to the following possible/potential problems in translating scientific information into the decision-making standards which are used by the legal system in environmental trials and other legal proceedings:

	Major Problem	Minor Problem	Not a Problem	Undecided /No Opinion	Unfamiliar with Concept
a) Relating the scientific information provided in the form of expert evidence at environmental trials and other legal proceedings to the <u>"quantitative"</u> standards found within environmental legislation which specify prohibited levels of pollution (for example, prohibiting the "...release of chemical X into the environment in a concentration in excess of 1 part per million")	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Relating scientific information provided in the form of expert evidence at environmental trials and other legal proceedings to the <u>"normative"</u> (non-quantitative) standards found within environmental legislation (for example, prohibitions against causing "... a negative environmental impact" or "... harm to fish habitat" which do not specify prohibited levels of pollution)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Do you have any comments with respect to any problems which you have identified, or are there any other problems which you perceive exist in translating scientific information into the decision-making standards which are used by the legal system in environmental trials and other legal proceedings?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>				

The next set of questions asks you to provide your views with respect to the suitability of legal decision-making institutions (such as courts of law) and legal procedures (such as Rules of Court and rules of evidence) for the resolution of scientific issues in environmental decision-making.

28. What is your opinion with respect to the following statement?

"Problems exist in the use of legal decision-making institutions (such as courts of law) and legal procedures (such as Rules of Court and rules of evidence) for the resolution of scientific issues in environmental decision-making."

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
↓	↓	↓	↓	↓
[Continue Answering Question 29]			[Disregard Question 29 – Return Survey Questionnaire As Per Instructions on Page 1]	



29. Please indicate your response with respect to the following possible/potential problems with the use of legal decision-making institutions (such as courts of law) and legal procedures (such as Rules of Court and rules of evidence) for the resolution of scientific issues in environmental decision-making:

	Major Problem	Minor Problem	Not a Problem	Undecided /No Opinion	Unfamiliar with Concept
a) The existing legal process is <u>poorly suited</u> to address scientific issues	<input type="checkbox"/>				
b) Courts of law are <u>unable to effectively use scientific information</u> in environmental decision-making	<input type="checkbox"/>				
c) The use of the legal <u>adversarial approach</u> in environmental trials and other legal proceedings <u>promotes a confrontational climate which inhibits obtaining a consensus</u> in resolving scientific issues.	<input type="checkbox"/>				
d) The <u>motivations of expert scientific witnesses and legal counsel in environmental trials and other legal proceedings are incompatible</u> , in that the primary goal of scientists is the attainment of scientific truth, whereas the primary objective of legal counsel is to resolve jurisprudential disputes which may contain scientific issues	<input type="checkbox"/>				
e) Decisions by courts of law are <u>final and can not be reopened/reconsidered</u> at a later date, even if the scientific information upon which a decision is based is later determined by the scientific community to be incorrect	<input type="checkbox"/>				

LEGAL COUNSEL SURVEY QUESTIONNAIRE



University of Alberta

Eco-Research Chair in Environmental Risk Management

in affiliation with

Graduate Studies Program, Faculty of Law

University of British Columbia



invite you to participate in research currently being conducted with respect to

"Environmental Decision-Making:

The Interfaces of Science and Law"

INSTRUCTIONS

Please answer survey questionnaire by checking (✓) the box next to the most appropriate answer, or by writing your answer in the blank space provided.

This survey questionnaire may contain questions which do not apply to you. In order to minimize the time required to complete the survey questionnaire some answers are followed by instructions [**Go To Question X**] which will take you past questions which you are not required to answer.

Upon completing the survey questionnaire please return it in the pre-addressed, postage-paid envelope provided.

1. What, if any scientific¹ training have you received? (Please check (✓) as many responses as apply).

- Practical Experience
- High School
- Workshops/Seminars/Short Courses
- Technical School
- University/College Level Courses
- Bachelor's Degree
- Master's Degree
- Ph.D.
- Post-Doctoral
- Other (please describe) _____

2. Have you acted as legal counsel (or assisted as second counsel) in a court trial (criminal/quasi-criminal or civil) or other legal proceeding (such as an injunction application or an application for judicial review of an administrative decision) in a matter involving an environmental² issue?

Yes

↓

**[Continue Answering Questions
3 - 31]**

↓

No

↓

**[Skip Questions 3 - 31 and
Go Directly to Question 32
on Page 19] →**

3. In approximately how many trials or other legal proceedings involving an environmental issue have you had the opportunity to act as legal counsel or assist as second counsel? _____

¹ For the purposes of this study the term "scientific" refers to all relevant scientific and technical disciplines within the natural and applied sciences (for example, engineering, geography, hydrogeology, biology, limnology, botany, zoology, chemistry, ecology, geology, soil sciences, forestry, medicine and public health).

² For the purposes of this study the term "environmental" refers to the natural environment, and includes public health issues as they relate to the natural environment.

4. In which of the following jurisdictions have you acted as legal counsel or assisted as second counsel in a trial or other legal proceeding involving an environmental issue? (Please check (✓) as many responses as apply).

- Alberta
- British Columbia
- Ontario
- Northwest Territories
- Yukon Territory

5. What, if any training have you received to present a case involving scientific evidence presented by expert witnesses at a trial or other legal proceeding? (Please check (✓) as many responses as apply).

- Trial Experience
- Lectures
- Workshops/Seminars/Short Courses
- University/College Level Courses
- Other (please describe) _____

6. Of those trials or other legal proceedings in which you have acted as legal counsel or assisted as second counsel which have involved an environmental issue:

- a) what percentage would you estimate could be classified as falling within the area of criminal/quasi-criminal law? _____ %
- b) what percentage would you estimate could be classified as falling within the area of civil law? _____ %
- c) what percentage would you estimate could be classified as falling within the area of administrative law? _____ %
- d) what percentage would you estimate involved the presentation of scientific information by one or more expert witnesses? _____ %
- e) what percentage would you estimate involved the presentation of scientific information by one or more independent expert scientific witnesses appointed by the courts? _____ %
- f) what percentage would you estimate involved participation by legal counsel representing one or more parties in the matter? _____ %
- g) what percentage would you estimate involved the use of one or more scientific advisors retained to assist legal counsel with respect to scientific issues? _____ %
- h) what percentage would you estimate involved the introduction of scientific information through affidavit evidence deposed to by scientific experts who did not appear before the courts in person to give expert scientific evidence? _____ %
- i) what percentage would you estimate involved the use of "local knowledge/traditional knowledge" from aboriginal and non-aboriginal witnesses as an alternative form of expert scientific evidence? _____ %

The next set of questions asks you to consider issues relating to the quality of scientific information which is put into the environmental decision-making process at environmental trials and other legal proceedings.

7. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings with respect to the quality of scientific information provided in the form of expert evidence by expert scientific witnesses."

Strongly Agree Agree Undecided Disagree Strongly Disagree

↓ ↓ ↓ ↓ ↓

[Continue Answering Question 8] [Go to Question 9] →

8. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings with respect to the quality of scientific information provided in the form of expert evidence by expert scientific witnesses:

	Major Problem	Minor Problem	Not a Problem	Undecided/ No Opinion	Unfamiliar with Concept
a) Inadequate understanding by expert scientific witnesses of the <u>trial or other legal proceeding</u> in which they are participating	<input type="checkbox"/>				
b) The inability of expert scientific witnesses to function effectively within the <u>adversarial system</u> used in environmental trials and other legal proceedings	<input type="checkbox"/>				
c) The inability of expert scientific witnesses to deal with the <u>psychological stresses</u> associated with environmental trials and other legal proceedings	<input type="checkbox"/>				
d) <u>Professional ethical restraints</u> on the public contradiction or criticism of other expert scientific witnesses in environmental trials and other legal proceedings	<input type="checkbox"/>				
e) A <u>competitiveness factor</u> , wherein expert scientific witnesses are motivated to attempt to "win" environmental trials and other legal proceedings and "defeat" opposing parties (and their expert scientific witnesses) involved in the litigation	<input type="checkbox"/>				
f) A desire by expert scientific witnesses to have <u>specific scientific theories or models validated/recognized by the courts</u>	<input type="checkbox"/>				
g) An underlying belief by expert scientific witnesses that " <u>any environmental problem can be overcome</u> " through application of scientific knowledge	<input type="checkbox"/>				

	Major Problem	Minor Problem	Not a Problem	Undecided/ No Opinion	Unfamiliar with Concept
h) The " <u>compartmentalization</u> " of the roles played by expert scientific witnesses in environmental trials, wherein expert scientific witnesses provide scientific evidence within their areas of expertise <u>without a full appreciation of the factual and scientific context of the trial or other legal proceeding</u> in which they are participating	<input type="checkbox"/>				
i) <u>Influence from legal counsel</u> in the preparation of expert scientific witnesses prior to giving evidence at environmental trials and other legal proceedings	<input type="checkbox"/>				
j) <u>Influence from legal counsel</u> in the preparation of affidavits containing scientific information deposed to by scientific experts who do not appear before the courts in person to give expert scientific evidence	<input type="checkbox"/>				
k) <u>Influence from scientific advisors</u> retained to assist legal counsel in the preparation of expert scientific witnesses prior to these witnesses giving evidence at environmental trials and other legal proceedings	<input type="checkbox"/>				
l) <u>Influence from the audience</u> observing environmental trials and other legal proceedings	<input type="checkbox"/>				
m) <u>Influence from the media</u> (including television, radio, newspapers, etc.)	<input type="checkbox"/>				
n) <u>Influence from financial or other remuneration</u> paid to expert scientific witnesses for their participation in environmental trials and other legal proceedings	<input type="checkbox"/>				
o) Do you have any comments with respect to any problems which you have identified, or are there any other problems which you perceive exist in environmental trials and other legal proceedings with respect to the quality of scientific information provided in the form of expert evidence by expert scientific witnesses?					

9. Please indicate your response with respect to your perception of the role(s) of expert witnesses in giving expert scientific evidence at environmental trials and other legal proceedings:

	Primary Role	Secondary Role	Not Their Role
a) To assist the party to the litigation who retains their services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) To assist legal counsel who retains their services on behalf of a client	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) To assist the court	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) To assist no one, only to provide scientific information to everyone involved in the litigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings with respect to the screening by the courts of those persons who are qualified to provide the courts with scientific information as expert witnesses."

Strongly Agree Agree Undecided Disagree Strongly Disagree

↓ ↓ ↓ ↓ ↓

[Continue Answering Question 11] **[Go to Question 12] →**

11. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings with respect to the screening by the courts of those persons who are qualified to provide the courts with scientific information as expert witnesses:

	Major Problem	Minor Problem	Not a Problem	Undecided/ No Opinion	Unfamiliar with Concept
a) The " <u>qualification</u> " procedures which are employed by the courts in qualifying witnesses to give scientific evidence as expert witnesses	<input type="checkbox"/>				
b) <u>Failure of the courts to define with sufficient precision the areas of expertise</u> in which witnesses are qualified to give expert scientific evidence	<input type="checkbox"/>				
c) <u>Failure of the courts to limit the scientific evidence</u> provided by expert witnesses to those <u>defined areas of expertise</u> in which they are qualified to give expert scientific evidence	<input type="checkbox"/>				
d) <u>Verification by the courts of the qualifications</u> of witnesses to give expert scientific evidence	<input type="checkbox"/>				
e) <u>Distinguishing between the qualifications</u> of expert scientific witnesses in situations where two or more experts in the same field give expert scientific evidence	<input type="checkbox"/>				
f) Do you have any comments with respect to any problems which you have identified, or are there any other problems which you perceive exist in environmental trials and other legal proceedings with respect to the screening by the courts of those persons who are qualified to provide the courts with scientific information as expert witnesses?					

12. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings with respect to the use of "local knowledge/traditional knowledge" from aboriginal and non-aboriginal witnesses as an alternative form of expert scientific evidence."

Strongly Agree Agree Undecided Disagree Strongly Disagree

↓ ↓ ↓ ↓ ↓

[Continue Answering Question 13] [Go to Question 14] →

13. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings with respect to the use of "local knowledge/traditional knowledge" from aboriginal and non-aboriginal witnesses as an alternative form of expert scientific evidence:

	Major Problem	Minor Problem	Not a Problem	Undecided/ No Opinion	Unfamiliar with Concept
a) The <u>willingness</u> of the courts to accept " <u>local knowledge/traditional knowledge</u> " from aboriginal and non-aboriginal witnesses as an alternative form of expert scientific evidence	<input type="checkbox"/>				
b) The <u>unwillingness</u> of the courts to accept " <u>local knowledge/traditional knowledge</u> " from aboriginal and non-aboriginal witnesses as an alternative form of expert scientific evidence	<input type="checkbox"/>				
c) Assigning <u>evidentiary weight</u> to expert scientific evidence in the form of " <u>local knowledge/traditional knowledge</u> "	<input type="checkbox"/>				
d) The " <u>qualification</u> " procedures which are employed by the courts in qualifying witnesses to give scientific evidence in the form of " <u>local knowledge/traditional knowledge</u> " as expert witnesses	<input type="checkbox"/>				
e) <u>Failure of the courts to define with sufficient precision the areas of expertise</u> in which witnesses are qualified to give expert scientific evidence in the form of " <u>local knowledge/traditional knowledge</u> "	<input type="checkbox"/>				
f) <u>Failure of the courts to limit the scientific evidence</u> provided by witnesses qualified to give expert scientific evidence in the form of " <u>local knowledge/traditional knowledge</u> " to those <u>defined areas of expertise</u> in which they are qualified to give expert scientific evidence	<input type="checkbox"/>				

The next set of questions asks you to provide your views with respect to the communication of scientific information at environmental trials and other legal proceedings, and the comprehension/understanding of that information by participants in environmental trials and other legal proceedings such as judges and legal counsel.

16. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings with respect to the communication of scientific information provided in the form of expert evidence by expert scientific witnesses."

Strongly Agree Agree Undecided Disagree Strongly Disagree

↓ ↓ ↓ ↓ ↓

[Continue Answering Question 17] [Go to Question 18] →

17. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings with respect to the communication of scientific information provided in the form of expert evidence by expert scientific witnesses:

	Major Problem	Minor Problem	Not a Problem	Undecided/ No Opinion	Unfamiliar with Concept
a) The use of <u>technical language</u> including jargon and terms of art which may not be understood by participants in environmental trials and other legal proceedings such as judges and legal counsel	<input type="checkbox"/>				
b) The <u>failure of expert scientific witnesses to effectively communicate scientific information</u> to participants in environmental trials and other legal proceedings such as judges and legal counsel	<input type="checkbox"/>				
c) The <u>distortion</u> of scientific information as a result of the use of <u>cross-examination</u> by opposing legal counsel	<input type="checkbox"/>				
d) The <u>meanings to be attributed to technical terms</u> (such as jargon and terms of art) <u>may vary between expert scientific witnesses</u> (for example, the meaning which a civil engineer associates with the term "physical stress" may be very different from the definition of that term which would be provided by a biologist)	<input type="checkbox"/>				
e) The <u>translation of technical language</u> (such as jargon and terms of art) into languages such as aboriginal languages which do not have equivalent terminology	<input type="checkbox"/>				
f) Do you have any comments with respect to any problems which you have identified, or are there any other problems which you perceive exist in environmental trials and other legal proceedings with respect to the communication of scientific information provided in the form of expert evidence by expert scientific witnesses?					

18. What is your opinion with respect to the following statement?

Problems exist in environmental trials and other legal proceedings with respect to the comprehension/understanding by the courts and/or legal counsel of scientific information presented in the form of expert scientific evidence by expert scientific witnesses.

Strongly Agree Agree Undecided Disagree Strongly Disagree

↓ ↓ ↓ ↓ ↓

[Continue Answering Question 19] [Go to Question 20] →

19. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings with respect to the comprehension/understanding by the courts and/or legal counsel of scientific information presented in the form of expert scientific evidence by expert scientific witnesses:

	Major Problem	Minor Problem	Not a Problem	Undecided/ No Opinion	Unfamiliar with Concept
a) The <u>courts</u> do not sufficiently understand the methods of <u>scientific inquiry and proof</u>	<input type="checkbox"/>				
b) <u>Legal counsel</u> do not sufficiently understand the methods of <u>scientific inquiry and proof</u>	<input type="checkbox"/>				
c) The <u>courts</u> do not comprehend the <u>merits and pitfalls of statistical analysis</u> provided by expert scientific witnesses	<input type="checkbox"/>				
d) <u>Legal counsel</u> do not comprehend the <u>merits and pitfalls of statistical analysis</u> provided by expert scientific witnesses	<input type="checkbox"/>				
e) The <u>courts</u> do not comprehend the <u>value premises and professional biases which underlie scientific information</u> provided by expert scientific witnesses	<input type="checkbox"/>				
f) <u>Legal counsel</u> do not comprehend the <u>value premises and professional biases which underlie scientific information</u> provided by expert scientific witnesses	<input type="checkbox"/>				
g) The <u>courts</u> do not comprehend the <u>key doctrines and premises</u> of whatever scientific discipline is involved in scientific information provided by expert scientific witnesses	<input type="checkbox"/>				
h) <u>Legal counsel</u> do not comprehend the <u>key doctrines and premises</u> of whatever scientific discipline is involved in scientific information provided by expert scientific witnesses	<input type="checkbox"/>				

21. Please indicate your response with regard to the qualities which you perceive that legal counsel look for when choosing an expert witness to give expert scientific evidence at environmental trials and other legal proceedings:

	Very Desirable	Desirable	Doesn't Matter	Undesirable	Very Undesirable
a) <u>Reputation and standing within the scientific community</u>	<input type="checkbox"/>				
b) <u>Academic/professional credentials</u>	<input type="checkbox"/>				
c) A proven " <u>track record</u> " as an expert witness	<input type="checkbox"/>				
d) Ability to <u>effectively communicate</u> scientific information	<input type="checkbox"/>				
e) Ability to <u>work well</u> with legal counsel, scientific advisors and/or other expert witnesses as <u>part of a "team"</u>	<input type="checkbox"/>				
f) Ability to <u>persuade a court</u> with respect to a scientific issue	<input type="checkbox"/>				
g) A <u>low professional fee</u> for participation in the trial or other legal proceeding in order to <u>minimize expert witness costs</u>	<input type="checkbox"/>				
h) An expert witness who <u>usually appears only on behalf of one side</u> or the other in a trial or other legal proceeding (for example, only appears as an expert witness for the prosecution/plaintiff rather than the defence)	<input type="checkbox"/>				
i) In situations where scientific evidence presented by the other side to a dispute is widely held by the scientific community, an expert witness who holds a <u>minority view</u> or <u>has a new theory</u>	<input type="checkbox"/>				
j) A <u>willingness to assist the party to the litigation who retains their services</u>	<input type="checkbox"/>				
k) Is <u>susceptible to "influence" by legal counsel or scientific advisors</u> during preparation for, and in giving expert scientific evidence in environmental trials and other legal proceedings	<input type="checkbox"/>				
l) Has the <u>ability to successfully withstand cross-examination</u> by opposing legal counsel	<input type="checkbox"/>				
m) Is able to <u>assist legal counsel in the preparation of cross-examination</u> of expert scientific witnesses appearing on behalf of the opposing party in environmental trials and other legal proceedings	<input type="checkbox"/>				

The next set of questions asks you to provide your views with respect to the issue of scientific uncertainty in environmental trials and other legal proceedings.

22. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings where the scientific information provided in the form of expert evidence results in uncertainty with respect to one or more scientific issues."

Strongly Agree Agree Undecided Disagree Strongly Disagree

↓ ↓ ↓ ↓ ↓

[Continue Answering Question 23] [Go to Question 24] →

23. Please indicate your response with respect to the following possible/potential sources of the problem of uncertainty in environmental trials and other legal proceedings with respect to scientific issues:

	Major Problem	Minor Problem	Not a Problem	Undecided/No Opinion	Unfamiliar with Concept
a) Translating the level of <u>scientific certainty and uncertainty</u> found within scientific information provided in the form of expert evidence at environmental trials and other legal proceedings into the level of <u>legal certainty and uncertainty</u> required to meet <u>legal standards of proof</u> (such as "proof beyond reasonable doubt" required in criminal/quasi-criminal trials or "proof on the balance of probabilities" required in civil trials and by the due diligence defence in criminal/quasi-criminal trials)	<input type="checkbox"/>				
b) Where it appears that scientific information necessary to reduce or eliminate the uncertainty relating to a scientific issue <u>is available</u> , but such information is <u>not presented</u> as evidence at an environmental trial or other legal proceeding	<input type="checkbox"/>				
c) Where it appears that scientific information necessary to reduce or eliminate the scientific uncertainty relating to a scientific issue <u>is not immediately available</u> for presentation at an environmental trial or other legal proceeding, but <u>could be obtained</u> with additional scientific investigation	<input type="checkbox"/>				
d) Where it appears that scientific information necessary to reduce or eliminate the scientific uncertainty relating to a scientific issue <u>is not available</u> for presentation at an environmental trial or other legal proceeding, and <u>cannot reasonably be obtained</u> given the present state of science	<input type="checkbox"/>				

24. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings where contradictory or conflicting scientific information in the form of expert evidence is provided by expert scientific witnesses."

Strongly Agree Agree Undecided Disagree Strongly Disagree

↓ ↓ ↓ ↓ ↓

[Continue Answering Question 25] [Go to Question 26] →

25. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings in situations where contradictory or conflicting scientific information in the form of expert evidence is provided by expert scientific witnesses:

	Major Problem	Minor Problem	Not a Problem	Undecided/ No Opinion	Unfamiliar with Concept
a) Assigning <u>evidentiary weight</u> to the contradictory or conflicting scientific information	<input type="checkbox"/>				
b) Distinguishing between <u>scientific information which is widely accepted in the scientific community</u> from <u>minority views, new theories</u> or what is commonly referred to as " <u>junk science</u> "	<input type="checkbox"/>				
c) Lack of understanding by the courts as to <u>how scientists</u> knowledgeable within the area where conflicting evidence exists <u>would decide</u> which information they would find most credible	<input type="checkbox"/>				
d) Choosing the scientific evidence of one expert witness over another based upon their respective " <u>performances</u> " in giving evidence rather than on the basis of the scientific information itself	<input type="checkbox"/>				
e) Do you have any comments with respect to any problems which you have identified, or are there any other problems which you perceive exist in environmental trials or other legal proceedings in situations where contradictory or conflicting scientific information in the form of expert evidence is provided by expert scientific witnesses?					

The next set of questions asks you to provide your views with respect to the issue of using scientific information to establish the decision-making standards which are used by the legal system, and the translation of scientific information into those standards at environmental trials and other legal proceedings.

26. What is your opinion with respect to the following statement?

"Problems exist in using scientific information to establish the decision-making standards which are used by the legal system in environmental trials and other legal proceedings."

Strongly Agree Agree Undecided Disagree Strongly Disagree

↓ ↓ ↓ ↓ ↓

[Continue Answering Question 27] [Go to Question 28] →

27. Please indicate your response with respect to the following possible/potential problems in using scientific information to establish the decision-making standards which are used by the legal system in environmental trials and other legal proceedings:

	Major Problem	Minor Problem	Not a Problem	Undecided/No Opinion	Unfamiliar with Concept
a) <u>"Quantitative" standards</u> established by governments which specify prohibited levels of pollution within environmental legislation (for example, prohibiting the "... release of chemical X into the environment in a concentration in excess of 1 part per million") <u>do not accurately reflect the current state of available scientific information</u> with respect to effects of pollution on the environment	<input type="checkbox"/>				
b) Governments place <u>too little emphasis on scientific information</u> when establishing <u>"quantitative" standards</u> which specify prohibited levels of pollution within environmental legislation	<input type="checkbox"/>				
c) Governments place <u>too much emphasis on scientific information</u> when establishing <u>"quantitative" standards</u> which specify prohibited levels of pollution within environmental legislation	<input type="checkbox"/>				
d) Out of a concern that governments may place too much or too little emphasis on scientific information when establishing "quantitative" standards which specify prohibited levels of pollution within environmental legislation, <u>scientific experts providing advice to governments in the setting of such standards may make recommendations which do not accurately reflect the current state of scientific information</u> (for example, recommending lower concentrations of pollution than are scientifically justifiable to ensure that adequate safety is maintained)	<input type="checkbox"/>				

The next set of questions asks you to provide your views with respect to the suitability of legal decision-making institutions (such as courts of law) and legal procedures (such as Rules of Court and rules of evidence) for the resolution of scientific issues in environmental decision-making.

30. What is your opinion with respect to the following statement?

“Problems exist in the use of legal decision-making institutions (such as courts of law) and legal procedures (such as Rules of Court and rules of evidence) for the resolution of scientific issues in environmental decision-making.”

Strongly Agree Agree Undecided Disagree Strongly Disagree

 ↓ ↓ ↓ ↓ ↓

[Continue Answering Question 31] [Go to Question 32] →

31. Please indicate your response with respect to the following possible/potential problems with the use of legal decision-making institutions (such as courts of law) and legal procedures (such as Rules of Court and rules of evidence) for the resolution of scientific issues in environmental decision-making:

	Major Problem	Minor Problem	Not a Problem	Undecided/ No Opinion	Unfamiliar with Concept
a) The existing legal process is <u>poorly suited</u> to address scientific issues	<input type="checkbox"/>				
b) Courts of law are <u>unable to effectively use scientific information</u> in environmental decision-making	<input type="checkbox"/>				
c) The use of the legal <u>adversarial approach</u> in environmental trials and other legal proceedings <u>promotes a confrontational climate which inhibits obtaining a consensus</u> in resolving scientific issues.	<input type="checkbox"/>				
d) The <u>motivations of expert scientific witnesses and legal counsel in environmental trials and other legal proceedings are incompatible</u> , in that the primary goal of scientists is the attainment of scientific truth, whereas the primary objective of legal counsel is to resolve jurisprudential disputes which may contain scientific issues	<input type="checkbox"/>				
e) Decisions by courts of law are <u>final and can not be reopened/reconsidered</u> at a later date, even if the scientific information upon which a decision is based is later found to be incorrect	<input type="checkbox"/>				

APPENDIX 3

EXPERT SCIENTIFIC WITNESS SURVEY QUESTIONNAIRE



University of Alberta

Eco-Research Chair in Environmental Risk Management

in affiliation with

Graduate Studies Program, Faculty of Law

University of British Columbia



invite you to participate in research currently being conducted with respect to

"Environmental Decision-Making:

The Interfaces of Science and Law"

INSTRUCTIONS

Please answer survey questionnaire by checking (✓) the box next to the most appropriate answer, or by writing your answer in the blank space provided.

This survey questionnaire may contain questions which do not apply to you. In order to minimize the time required to complete the survey questionnaire some answers are followed by instructions [**Go To Question X**] which will take you past questions which you are not required to answer.

Upon completing the survey questionnaire please return it in the pre-addressed, postage-paid envelope provided.

1. What, if any scientific¹ training have you received? (Please check (✓) as many responses as apply).

- | | |
|----------------------------------|--------------------------|
| Practical Experience | <input type="checkbox"/> |
| High School | <input type="checkbox"/> |
| Workshops/Seminars/Short Courses | <input type="checkbox"/> |
| Technical School | <input type="checkbox"/> |
| University/College Level Courses | <input type="checkbox"/> |
| Bachelor's Degree | <input type="checkbox"/> |
| Master's Degree | <input type="checkbox"/> |
| Ph.D. | <input type="checkbox"/> |
| Post-Doctoral | <input type="checkbox"/> |
| Other (please describe) _____ | |

2. What is your area(s) of scientific specialization (for example, civil engineering, geography, hydrogeology, biology, etc.)? _____

3. With respect to your area(s) of scientific specialization, are you primarily involved in:

- | | | | |
|---|--------------------------|----|--|
| Basic/fundamental science (for example, research) | <input type="checkbox"/> | OR | |
| Applied science (for example, the application of basic/fundamental science to practical problems) | <input type="checkbox"/> | | |

4. What, if any, legal training have you received? (Please check (✓) as many responses as apply).

- | | |
|----------------------------------|--------------------------|
| Practical Experience | <input type="checkbox"/> |
| High School | <input type="checkbox"/> |
| Workshops/Seminars/Short Courses | <input type="checkbox"/> |
| University/College Level Courses | <input type="checkbox"/> |
| Bachelor's Degree | <input type="checkbox"/> |
| Master's Degree | <input type="checkbox"/> |
| Other (please describe) _____ | |

¹ For the purposes of this study the term "scientific" refers to all relevant scientific and technical disciplines within the natural and applied sciences (for example, engineering, geography, hydrogeology, biology, limnology, botany, zoology, chemistry, ecology, geology, soil sciences, forestry, medicine and public health).

5. Have you:

- appeared as an expert scientific witness; OR
- appeared as an independent expert scientific witness appointed by the courts; OR
- acted as a scientific advisor (assisting legal counsel on scientific issues without actually appearing as an expert scientific witness)

in a court trial (criminal/quasi-criminal or civil) or other legal proceeding (such as an injunction application or an application for judicial review of an administrative decision) in a matter involving an environmental² issue?

Yes

↓

**[Continue Answering
Questions 6 - 36]**

↓

No

↓

**[Skip Questions 6 - 36 and
Go Directly to Question 37 on
Page 20] →**

6. In approximately how many trials or other legal proceedings involving an environmental issue have you had the opportunity to appear as an expert scientific witness? _____

7. In approximately how many trials or other legal proceedings involving an environmental issue have you had the opportunity to appear as an independent expert witness appointed by the courts? _____

8. In approximately how many trials or other legal proceedings involving an environmental issue have you had the opportunity to act as a scientific advisor? _____

9. In which of the following jurisdictions have you:

- appeared as an expert scientific witness; OR
- acted as an independent expert scientific witness appointed by the courts; OR
- acted as a scientific advisor

in a trial or other legal proceeding involving an environmental issue? (Please check (✓) as many responses as apply).

- Alberta
- British Columbia
- Ontario
- Northwest Territories
- Yukon Territory

² For the purposes of this study the term "environmental" refers to the natural environment, and includes public health issues as they relate to the natural environment.

10. What, if any training have you received:

- to give evidence as an expert scientific witness; OR
- to give evidence as an independent expert scientific witness appointed by the courts; OR
- to act as a scientific advisor

in a trial or other legal proceeding? (Please check (✓) as many responses as apply).

- | | |
|---|--------------------------|
| Practical Experience | <input type="checkbox"/> |
| Lectures | <input type="checkbox"/> |
| Workshops/Seminars/Short Courses | <input type="checkbox"/> |
| University/College Level Courses | <input type="checkbox"/> |
| Preparation by legal counsel prior to a trial or other legal proceeding | <input type="checkbox"/> |
| Other (please describe) _____ | |

11. Of those trials or other legal proceedings involving an environmental issue in which you have:

- appeared as an expert scientific witness; OR
 - acted as an independent expert scientific witness appointed by the courts; OR
 - acted as a scientific advisor:
- a) what percentage would you estimate could be classified as falling within the area of criminal/quasi-criminal law? _____ %
 - b) what percentage would you estimate could be classified as falling within the area of civil law? _____ %
 - c) what percentage would you estimate could be classified as falling within the area of administrative law? _____ %
 - d) what percentage would you estimate involved the presentation of scientific information by one or more expert witnesses? _____ %
 - e) what percentage would you estimate involved the presentation of scientific information by one or more independent expert scientific witnesses appointed by the courts? _____ %
 - f) what percentage would you estimate involved participation by legal counsel representing one or more parties in the matter? _____ %
 - g) what percentage would you estimate involved the use of one or more scientific advisors retained to assist legal counsel with respect to scientific issues? _____ %
 - h) what percentage would you estimate involved the introduction of scientific information through affidavit evidence deposited to by scientific experts who did not appear before the courts in person to give expert scientific evidence? _____ %
 - i) what percentage would you estimate involved the use of "local knowledge/traditional knowledge" from aboriginal and non-aboriginal witnesses as an alternative form of expert scientific evidence? _____ %

The next set of questions asks you to consider issues relating to the quality of scientific information which is put into the environmental decision-making process at environmental trials and other legal proceedings.

12. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings with respect to the quality of scientific information provided in the form of expert evidence by expert scientific witnesses."

Strongly Agree Agree Undecided Disagree Strongly Disagree

↓ ↓ ↓ ↓ ↓

[Continue Answering Question 13] [Go to Question 14] →

13. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings with respect to the quality of scientific information provided in the form of expert evidence by expert scientific witnesses:

	Major Problem	Minor Problem	Not a Problem	Undecided/No Opinion	Unfamiliar with Concept
a) Inadequate understanding by expert scientific witnesses of the <u>trial or other legal proceeding</u> in which they are participating	<input type="checkbox"/>				
b) The inability of expert scientific witnesses to function effectively within the <u>adversarial system</u> used in environmental trials and other legal proceedings	<input type="checkbox"/>				
c) The inability of expert scientific witnesses to deal with the <u>psychological stresses</u> associated with environmental trials and other legal proceedings	<input type="checkbox"/>				
d) <u>Professional ethical restraints</u> on the public contradiction or criticism of other expert scientific witnesses in environmental trials and other legal proceedings	<input type="checkbox"/>				
e) A <u>competitiveness factor</u> , wherein expert scientific witnesses are motivated to attempt to "win" environmental trials and other legal proceedings and "defeat" opposing parties (and their expert scientific witnesses) involved in the litigation	<input type="checkbox"/>				
f) A desire by expert scientific witnesses to have <u>specific scientific theories or models validated/recognized by the courts</u>	<input type="checkbox"/>				
g) An underlying belief by expert scientific witnesses that " <u>any environmental problem can be overcome</u> " through application of scientific knowledge	<input type="checkbox"/>				

	Major Problem	Minor Problem	Not a Problem	Undecided/No Opinion	Unfamiliar with Concept
h) <u>The "compartmentalization" of the roles played by expert scientific witnesses in environmental trials, wherein expert scientific witnesses provide scientific evidence within their areas of expertise without a full appreciation of the factual and scientific context of the trial or other legal proceeding in which they are participating</u>	<input type="checkbox"/>				
i) <u>Influence from legal counsel in the preparation of expert scientific witnesses prior to giving evidence at environmental trials and other legal proceedings</u>	<input type="checkbox"/>				
j) <u>Influence from legal counsel in the preparation of affidavits containing scientific information deposed to by scientific experts who do not appear before the courts in person to give expert scientific evidence</u>	<input type="checkbox"/>				
k) <u>Influence from scientific advisors retained to assist legal counsel in the preparation of expert scientific witnesses prior to these witnesses giving evidence at environmental trials and other legal proceedings</u>	<input type="checkbox"/>				
l) <u>Influence from the audience observing environmental trials and other legal proceedings</u>	<input type="checkbox"/>				
m) <u>Influence from the media (including television, radio, newspapers, etc.)</u>	<input type="checkbox"/>				
n) <u>Influence from financial or other remuneration paid to expert scientific witnesses for their participation in environmental trials and other legal proceedings</u>	<input type="checkbox"/>				
o) Do you have any comments with respect to any problems which you have identified, or are there any other problems which you perceive exist in environmental trials and other legal proceedings with respect to the quality of scientific information provided in the form of expert evidence by expert scientific witnesses?					

14. Please indicate your response with respect to your perception of the role(s) of expert witnesses in giving expert scientific evidence at environmental trials and other legal proceedings:

	Primary Role	Secondary Role	Not Their Role
a) To assist the party to the litigation who retains their services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) To assist legal counsel who retains their services on behalf of a client	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) To assist the court	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) To assist no one, only to provide scientific information to everyone involved in the litigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings with respect to the screening by the courts of those persons who are qualified to provide the courts with scientific information as expert witnesses."

Strongly Agree Agree Undecided Disagree Strongly Disagree

↓ ↓ ↓ ↓ ↓

[Continue Answering Question 16] **[Go to Question 17] →**

16. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings with respect to the screening by the courts of those persons who are qualified to provide the courts with scientific information as expert witnesses:

	Major Problem	Minor Problem	Not a Problem	Undecided/ No Opinion	Unfamiliar with Concept
a) The <u>"qualification" procedures</u> which are employed by the courts in qualifying witnesses to give scientific evidence as expert witnesses	<input type="checkbox"/>				
b) <u>Failure of the courts to define with sufficient precision the areas of expertise</u> in which witnesses are qualified to give expert scientific evidence	<input type="checkbox"/>				
c) <u>Failure of the courts to limit the scientific evidence</u> provided by expert witnesses to those <u>defined areas of expertise</u> in which they are qualified to give expert scientific evidence	<input type="checkbox"/>				
d) <u>Verification by the courts of the qualifications</u> of witnesses to give expert scientific evidence	<input type="checkbox"/>				
e) <u>Distinguishing between the qualifications</u> of expert scientific witnesses in situations where two or more experts in the same field give expert scientific evidence	<input type="checkbox"/>				
f) Do you have any comments with respect to any problems which you have identified, or are there any other problems which you perceive exist in environmental trials and other legal proceedings with respect to the screening by the courts of those persons who are qualified to provide the courts with scientific information as expert witnesses?					

17. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings with respect to the use of "local knowledge/traditional knowledge" from aboriginal and non-aboriginal witnesses as an alternative form of expert scientific evidence."

Strongly Agree Agree Undecided Disagree Strongly Disagree

↓ ↓ ↓ ↓ ↓

[Continue Answering Question 18] **[Go to Question 19] →**

18. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings with respect to the use of "local knowledge/traditional knowledge" from aboriginal and non-aboriginal witnesses as an alternative form of expert scientific evidence:

	Major Problem	Minor Problem	Not a Problem	Undecided/ No Opinion	Unfamiliar with Concept
a) The <u>willingness</u> of the courts to accept " <u>local knowledge/traditional knowledge</u> " from aboriginal and non-aboriginal witnesses as an alternative form of expert scientific evidence	<input type="checkbox"/>				
b) The <u>unwillingness</u> of the courts to accept " <u>local knowledge/traditional knowledge</u> " from aboriginal and non-aboriginal witnesses as an alternative form of expert scientific evidence	<input type="checkbox"/>				
c) Assigning <u>evidentiary weight</u> to expert scientific evidence in the form of "local knowledge/traditional knowledge"	<input type="checkbox"/>				
d) The " <u>qualification</u> " <u>procedures</u> which are employed by the courts in qualifying witnesses to give scientific evidence in the form of "local knowledge/traditional knowledge" as expert witnesses	<input type="checkbox"/>				
e) <u>Failure of the courts to define with sufficient precision the areas of expertise</u> in which witnesses are qualified to give expert scientific evidence in the form of "local knowledge/traditional knowledge"	<input type="checkbox"/>				
f) <u>Failure of the courts to limit the scientific evidence</u> provided by witnesses qualified to give expert scientific evidence in the form of "local knowledge/traditional knowledge" to those <u>defined areas of expertise</u> in which they are qualified to give expert scientific evidence	<input type="checkbox"/>				

The next set of questions asks you to provide your views with respect to the communication of scientific information in environmental trials and other legal proceedings, and the comprehension/understanding of that information by participants in environmental trials and other legal proceedings such as judges and legal counsel.

21. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings with respect to the communication of scientific information provided in the form of expert evidence by expert scientific witnesses."

Strongly Agree Agree Undecided Disagree Strongly Disagree

 ↓ ↓ ↓ ↓ ↓
[Continue Answering Question 22] **[Go to Question 23] →**

22. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings with respect to the communication of scientific information provided in the form of expert evidence by expert scientific witnesses:

	Major Problem	Minor Problem	Not a Problem	Undecided/No Opinion	Unfamiliar with Concept
a) The use of <u>technical language</u> including jargon and terms of art which may not be understood by participants in environmental trials and other legal proceedings such as judges and legal counsel	<input type="checkbox"/>				
b) The <u>failure of expert scientific witnesses to effectively communicate scientific information</u> to participants in environmental trials and other legal proceedings such as judges and legal counsel	<input type="checkbox"/>				
c) The <u>distortion</u> of scientific information as a result of the use of <u>cross-examination</u> by opposing legal counsel	<input type="checkbox"/>				
d) The <u>meanings to be attributed to technical terms</u> (such as jargon and terms of art) <u>may vary between expert scientific witnesses</u> (for example, the meaning which a civil engineer associates with the term "physical stress" may be very different from the definition of that term which would be provided by a biologist)	<input type="checkbox"/>				
e) The <u>translation of technical language</u> (such as jargon and terms of art) into languages such as aboriginal languages which do not have equivalent terminology	<input type="checkbox"/>				
f) Do you have any comments with respect to any problems which you have identified, or are there any other problems which you perceive exist in environmental trials and other legal proceedings with respect to the communication of scientific information provided in the form of expert evidence by expert scientific witnesses?					

23. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings with respect to the comprehension/understanding by the courts and/or legal counsel of scientific information presented in the form of expert scientific evidence by expert scientific witnesses."

Strongly Agree



[Continue Answering Question 24]

Agree



Undecided



Disagree



Strongly Disagree



[Go to Question 25] →

24. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings with respect to the comprehension/understanding by the courts and/or legal counsel of scientific information presented in the form of expert scientific evidence by expert scientific witnesses:

	Major Problem	Minor Problem	Not a Problem	Undecided/ No Opinion	Unfamiliar with Concept
a) The <u>courts</u> do not sufficiently understand the methods of <u>scientific inquiry and proof</u>	<input type="checkbox"/>				
b) <u>Legal counsel</u> do not sufficiently understand the methods of <u>scientific inquiry and proof</u>	<input type="checkbox"/>				
c) The <u>courts</u> do not comprehend the <u>merits and pitfalls of statistical analysis</u> provided by expert scientific witnesses	<input type="checkbox"/>				
d) <u>Legal counsel</u> do not comprehend the <u>merits and pitfalls of statistical analysis</u> provided by expert scientific witnesses	<input type="checkbox"/>				
e) The <u>courts</u> do not comprehend the <u>value premises and professional biases which underlie scientific information</u> provided by expert scientific witnesses	<input type="checkbox"/>				
f) <u>Legal counsel</u> do not comprehend the <u>value premises and professional biases which underlie scientific information</u> provided by expert scientific witnesses	<input type="checkbox"/>				
g) The <u>courts</u> do not comprehend the <u>key doctrines and premises</u> of whatever scientific discipline is involved in scientific information provided by expert scientific witnesses	<input type="checkbox"/>				
h) <u>Legal counsel</u> do not comprehend the <u>key doctrines and premises</u> of whatever scientific discipline is involved in scientific information provided by expert scientific witnesses	<input type="checkbox"/>				

26. Please indicate your response with respect to the qualities which you perceive that legal counsel look for when choosing expert witnesses to give expert scientific evidence in environmental trials and other legal proceedings:

	Very Desirable	Desirable	Doesn't Matter	Undesirable	Very Undesirable
a) <u>Reputation and standing within the scientific community</u>	<input type="checkbox"/>				
b) <u>Academic/professional credentials</u>	<input type="checkbox"/>				
c) A proven " <u>track record</u> " as an expert witness	<input type="checkbox"/>				
d) Ability to <u>effectively communicate</u> scientific information	<input type="checkbox"/>				
e) Ability to <u>work well</u> with legal counsel, scientific advisors and/or other expert witnesses as part of a "team"	<input type="checkbox"/>				
f) Ability to <u>persuade a court</u> with respect to a scientific issue	<input type="checkbox"/>				
g) A <u>low professional fee</u> for participation in the trial or other legal proceeding in order to <u>minimize expert witness costs</u>	<input type="checkbox"/>				
h) An expert witness who <u>usually appears only on behalf of one side</u> or the other in a trial or other legal proceeding (for example, only appears as an expert witness for the prosecution/plaintiff rather than the defence)	<input type="checkbox"/>				
i) In situations where scientific evidence presented by the other side to a dispute is widely held by the scientific community, an expert witness who holds a <u>minority view</u> or <u>has a new theory</u>	<input type="checkbox"/>				
j) A <u>willingness to assist the party to the litigation who retains their services</u>	<input type="checkbox"/>				
k) Is <u>susceptible to "influence" by legal counsel or scientific advisors</u> during preparation for, and in giving expert scientific evidence in environmental trials and other legal proceedings	<input type="checkbox"/>				
l) Has the <u>ability to successfully withstand cross-examination</u> by opposing legal counsel	<input type="checkbox"/>				
m) Is able to <u>assist legal counsel in the preparation of cross-examination</u> of expert scientific witnesses appearing on behalf of the opposing party in environmental trials and other legal proceedings	<input type="checkbox"/>				

The next set of questions asks you to provide your views with respect to the issue of scientific uncertainty in environmental trials and other legal proceedings.

27. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings where the scientific information provided in the form of expert evidence results in uncertainty with respect to one or more scientific issues."

Strongly Agree Agree Undecided Disagree Strongly Disagree

↓ ↓ ↓ ↓ ↓

[Continue Answering Question 28] [Go to Question 29] →

28. Please indicate your response with respect to the following possible/potential sources of the problem of uncertainty in environmental trials and other legal proceedings with respect to scientific issues:

	Major Problem	Minor Problem	Not a Problem	Undecided/ No Opinion	Unfamiliar with Concept
a) Translating the level of <u>scientific certainty and uncertainty</u> found within scientific information provided in the form of expert evidence at environmental trials and other legal proceedings into the level of <u>legal certainty and uncertainty</u> required to meet <u>legal standards of proof</u> (such as "proof beyond reasonable doubt" required in criminal/quasi-criminal trials or "proof on the balance of probabilities" required in civil trials and by the due diligence defence in criminal/quasi-criminal trials)	<input type="checkbox"/>				
b) Where it appears that scientific information necessary to reduce or eliminate the uncertainty relating to a scientific issue <u>is available</u> , but such information is <u>not presented</u> as evidence at an environmental trial or other legal proceeding	<input type="checkbox"/>				
c) Where it appears that scientific information necessary to reduce or eliminate the scientific uncertainty relating to a scientific issue <u>is not immediately available</u> for presentation at an environmental trial or other legal proceeding, but <u>could be obtained</u> with additional scientific investigation	<input type="checkbox"/>				
d) Where it appears that scientific information necessary to reduce or eliminate the scientific uncertainty relating to a scientific issue <u>is not available</u> for presentation at an environmental trial or other legal proceeding, and <u>cannot reasonably be obtained</u> given the present state of science	<input type="checkbox"/>				

29. What is your opinion with respect to the following statement?

"Problems exist in environmental trials and other legal proceedings where contradictory or conflicting scientific information in the form of expert evidence is provided by expert scientific witnesses."

Strongly Agree Agree Undecided Disagree Strongly Disagree

↓ ↓ ↓ ↓ ↓

[Continue Answering Question 30] [Go to Question 31] →

30. Please indicate your response with respect to the following possible/potential problems in environmental trials and other legal proceedings in situations where contradictory or conflicting scientific information in the form of expert evidence is provided by expert scientific witnesses:

	Major Problem	Minor Problem	Not a Problem	Undecided/ No Opinion	Unfamiliar with Concept
a) Assigning <u>evidentiary weight</u> to the contradictory or conflicting scientific information	<input type="checkbox"/>				
b) Distinguishing between <u>scientific information which is widely accepted in the scientific community</u> from <u>minority views, new theories</u> or what is commonly referred to as " <u>junk science</u> "	<input type="checkbox"/>				
c) Lack of understanding by the courts as to <u>how scientists</u> knowledgeable within the area where conflicting evidence exists <u>would decide</u> which information they would find most credible	<input type="checkbox"/>				
d) Choosing the scientific evidence of one expert witness over another based upon their respective " <u>performances</u> " in giving evidence rather than on the basis of the scientific information itself	<input type="checkbox"/>				
e) Do you have any comments with respect to any problems which you have identified, or are there any other problems which you perceive exist in environmental trials and other legal proceedings in situations where contradictory or conflicting scientific information in the form of expert evidence is provided by expert scientific witnesses?					

The next set of questions asks you to provide your views with respect to the issue of using scientific information to establish the decision-making standards which are used by the legal system, and the translation of scientific information into those standards at environmental trials and other legal proceedings.

31. What is your opinion with respect to the following statement?

"Problems exist in using scientific information to establish the decision-making standards which are used by the legal system in environmental trials and other legal proceedings."

Strongly Agree Agree Undecided Disagree Strongly Disagree

 ↓ ↓ ↓ ↓ ↓
[Continue Answering Question 32] **[Go to Question 33] →**

32. Please indicate your response with respect to the following possible/potential problems in using scientific information to establish the decision-making standards which are used by the legal system in environmental trials and other legal proceedings:

	Major Problem	Minor Problem	Not a Problem	Undecided/ No Opinion	Unfamiliar with Concept
a) <u>"Quantitative" standards</u> established by governments which specify prohibited levels of pollution within environmental legislation (for example, prohibiting the "... release of chemical X into the environment in a concentration in excess of 1 part per million") <u>do not accurately reflect the current state of available scientific information</u> with respect to effects of pollution on the environment	<input type="checkbox"/>				
b) Governments place <u>too little emphasis on scientific information</u> when establishing <u>"quantitative" standards</u> which specify prohibited levels of pollution within environmental legislation	<input type="checkbox"/>				
c) Governments place <u>too much emphasis on scientific information</u> when establishing <u>"quantitative" standards</u> which specify prohibited levels of pollution within environmental legislation	<input type="checkbox"/>				
d) Out of a concern that governments may place too much or too little emphasis on scientific information when establishing "quantitative" standards which specify prohibited levels of pollution within environmental legislation, <u>scientific experts providing advice to governments in the setting of such standards may make recommendations which do not accurately reflect the current state of scientific information</u> (for example, recommending lower concentrations of pollution than are scientifically justifiable to ensure that adequate safety is maintained)	<input type="checkbox"/>				

The next set of questions asks you to provide your views with respect to the suitability of legal decision-making institutions (such as courts of law) and legal procedures (such as Rules of Court and rules of evidence) for the resolution of scientific issues in environmental decision-making.

35. What is your opinion with respect to the following statement?

“Problems exist in the use of legal decision-making institutions (such as courts of law) and legal procedures (such as Rules of Court and rules of evidence) for the resolution of scientific issues in environmental decision-making.”

Strongly Agree Agree Undecided Disagree Strongly Disagree

↓ ↓ ↓ ↓ ↓

[Continue Answering Question 36] [Go to Question 37] →

36. Please indicate your response with respect to the following possible/potential problems with the use of legal decision-making institutions (such as courts of law) and legal procedures (such as Rules of Court and rules of evidence) for the resolution of scientific issues in environmental decision-making:

	Major Problem	Minor Problem	Not a Problem	Undecided/No Opinion	Unfamiliar with Concept
a) The existing legal process is <u>poorly suited</u> to address scientific issues	<input type="checkbox"/>				
b) Courts of law are <u>unable to effectively use scientific information</u> in environmental decision-making	<input type="checkbox"/>				
c) The use of the legal <u>adversarial approach</u> in environmental trials and other legal proceedings <u>promotes a confrontational climate which inhibits obtaining a consensus</u> in resolving scientific issues.	<input type="checkbox"/>				
d) The <u>motivations of expert scientific witnesses and legal counsel in environmental trials and other legal proceedings are incompatible</u> , in that the primary goal of scientists is the attainment of scientific truth, whereas the primary objective of legal counsel is to resolve jurisprudential disputes which may contain scientific issues	<input type="checkbox"/>				
e) Decisions by courts of law are <u>final and can not be reopened/reconsidered</u> at a later date, even if the scientific information upon which a decision is based is later found to be incorrect	<input type="checkbox"/>				

