

Reforming Risk Regulation in Canada The Next Policy Frontier?

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1 Introduction

(a) *Contradictions and paradoxes*

We live in an age in which attitudes toward risk¹ are a strange bundle of paradoxes, if not contradictions. Consider just the following:

(1) Governments often mandate the expenditure of over \$100 million per “life saved” to comply with a new regulation expected to save a handful of lives each year—all while ignoring other opportunities to save many more lives at a cost to society of far less than \$1 million each (see Hahn 1996; Tengs and Graham 1996). Graham (1996: 184) has described this as “a syndrome of paranoia and neglect.” (See also MacQueen 1999.)

(2) “A growing body of evidence . . . shows that many recent expenditures on risk reduction have done very little to actually reduce risks. Indeed, in some cases, those investments are likely to have increased risks to human health” (Hahn 1996: vii).

Notes will be found on pages 245–53.

(3) Life expectancy reached a record high in 1999: 75.1 years for men and 81.4 years for women (McIlroy 1999b: A1). In other words, the effects of all risks has declined—most people die of old age.² Yet, at the same time, there are increasing demands for government to create a “risk-free society.”

(4) We have “created entire economies around activating this fear system under safe conditions in the form of theme-park rides and Stephen King novels and films that have us on the edge of our seats. It is as if an archival survival circuit in our brains has become a cathartic button that gets pushed at great profit” (Hall 1999: 45).

(5) Between February 1993 and January 1994, some two million residents of the Los Angeles area were directly touched by disaster-related death, injury, or damage to homes and businesses by an earthquake, floods, firestorms, and a riot. The earthquake in January 1994 alone caused some US\$42 billion in damage. According to a comprehensive account of these and other hazards, “cataclysm has become virtually routine” in the area of Los Angeles (Davies 1998: 7). Most notable is the idea that “Los Angeles has deliberately put itself in harm’s way . . . it has transgressed environmental common sense” and the result has been a long series of avoidable tragedies (Davies 1998: 9).

(6) The number of participants in “extreme sports”³ has increased markedly in Canada, the United States, and other western industrialized countries.

(7) It could reasonably be argued that *much* government activity is aimed at dealing with a wide variety of risks to physical and economic security—rather than responding to traditional market failures.⁴

(b) Classifying risks

A surprising amount of government activity can reasonably be described as actions aimed at managing risks. This includes efforts to reduce risks, ameliorating the consequence of adverse events for certain people, providing information to assist individuals in better coping with risks, and providing some form of insurance with respect to certain risks. Appendix 1 (page 239) provides a classification of the risks that are subject to some form of action by the Canadian federal government.⁵ While the categories are not mutually exclusive and exhaustive, they seem useful in highlighting several points.

(1) A wide range of *types* of risks are subject to government action within the metacategories of risks to life, limb, (i.e., accidents), health, and wallet (risks to income or wealth). Most relate to *physical* rather than economic risks, i.e., harm to one’s body including the risk of death.

(2) There are many types of safety regulation reflecting (albeit imperfectly) the large range of hazards we face in everyday life. (This is not to suggest we live in a risky world, certainly not by the standards of history or of people currently living in developing countries.)

(3) Some of the risks subject to government action include those that go to the *raison d'être* of government itself, namely the protection of persons and property from villains within the nation and outside it.

While economic regulation (focusing on price and entry control) has declined dramatically since the 1980s, “social regulation” has increased substantially. Much social regulation is risk regulation and most risk regulation focuses on harms to human health and safety. While some forms of health and safety regulation have their roots deep in the past (e.g., mine safety, railroad safety, pure food and drugs laws), much of the current large stock of health and safety regulation was put in place in the past three decades. The biggest component is called “environmental protection regulation” but most of it is concerned, directly or indirectly, with the well-being of people rather than plants, animals, and ecosystems.⁶ Risk regulation is important not only because it constitutes a major part of government activity (particularly when major income transfers are interpreted as a means of addressing risks to income flows) but also because by far the largest costs relating to risk regulation occur *outside* of government, i.e., in the private sector. This fact makes it easy for those who would reduce risk through government regulation to underestimate the social costs of such intervention.

(c) Categories of government actions in dealing with risks

If we consider all the risks that are subject to action by the federal government in Canada, we can identify the following categories of government actions in dealing with risks. First, government can implement regulation with the objective of *directly* reducing the probability or size of the hazard, or of reducing the risk of some citizens' exposure to the hazard. In some cases, government may prohibit certain forms of behaviour by individuals or certain actions by firms. Regulation may involve the *mandatory* disclosure of information about hazards, e.g., warnings on cigarette packages; and prospect for securities to be sold to the public. Here the objective is to reduce risks *indirectly* by giving individuals information that permits them to avoid or reduce their exposure to certain risks.

Second, government can create liability rules; establish courts; and enforce judgments of those courts. All the actions are designed to facilitate efficient *private* legal actions. Third, government can act as the last-resort bearer of risks, e.g., pay some compensation in the face of

natural disasters. This is often done on an *ad hoc* basis after politicians see which way the wind is blowing. In some cases, government acts as a re-insurer for private insurers for truly catastrophic risks or the very small chance that a number of very large losses cluster in a few years and overwhelm the company's reserves, i.e., the government provides compensation for losses beyond those covered by private insurance.

Fourth, government generates and provides information to the public to predict risks and facilitate actions to reduce losses, e.g., weather forecasting, provision of information to consumers to aid in purchasing decisions such as product labelling, and trade-mark laws. This category also includes monitoring and surveillance activities that may have effects on private-sector behaviour. Fifth, government creates and operates insurance scheme(s)—particularly where private insurance is not available. In many cases, however, public schemes are not true insurance schemes at all but devices to subsidize and redistribute income, e.g. so-called unemployment insurance and flood insurance. Four provinces in Canada operate automobile insurance schemes that pursue a number of “social” policy objectives besides providing liability insurance.

(d) Purpose and structure of this chapter

The main purpose of this chapter is to propose ways of improving the way the federal government in Canada manages risks.⁷ Improvements in risk management,⁸ however, depend upon a reasonably accurate diagnosis of the problems that currently beset the government's risk-management activities. This term is taken to include risk analyses, risk assessment, the generation of alternative policy actions (including not intervening) and the implementation of policies.⁹ In short, the focus of this paper is on government decision-making relating to efforts to control, reduce and cope with risks to life, limb and wallets.

The main body of the paper is organized as follows. Section 2 examines some aspects of risks that are important to risk-management activities of governments. Section 3 describes a number of “pathologies” of the federal government's management of risks. Section 4 sets out my proposals for improving risk management by the federal government in Canada. In particular, government must greatly improve its risk communication as a means of addressing the large gap in risk perceptions. Finally, the conclusions are in section 5.

2 Background: Aspects of risk relevant to risk management by government

Risk is a complex, multi-faceted phenomenon. There is a large literature devoted to the issue, including the academic and professional journal, *Risk Analysis*.¹⁰ In this context, it is necessary to be highly

selective and to focus on matters that appear to be most relevant to risk management by government.

(a) Fear and risk

Fear is an important part of the way people characterize risks. Indeed, the essence of risk is some probability of *adverse* consequences for people. Fear can be both rational and irrational. Irrational fears are those that have no basis in objective reality. Rather they are the creation of our imagination. Irrational fears lead to irrational behaviour—this is the problem created by severe anxiety disorders¹¹ (Hall 1999: 44).

Humans are made fearful, even when the “cause” of such fears is patently irrational, because of our prodigious imaginative capacity, which stirs the amygdala and so creates fear and anxiety. Our imagination often enhances—and possibly greatly exaggerates—risky situations. Even very remote harms (in probabilistic terms) can seem to be both immediate and large. We can psychologically simulate disasters easily. (On the other hand, it appears that testosterone-poisoned teen-aged males have too little imagination when it comes to dealing with risk situations involving driving, extreme sports, addictive drugs, and criminal activity.)

Research by neuroscientists shows that fear can be generated in the brain not only by direct experience but also by learning, hearsay, rumour, suggestion, word of mouth, subliminal suggestion. The amygdala is activated even when one hears about a fearful situation (Hall 1999: 70). Hall suggests that “fear, and its fellow traveler anxiety, in some ways represent a hard-wired alarm system in the brain in search of [or at least ready for] genuine life-threatening dangers” (1999: 45). He argues that physical dangers (e.g., large predators) have been replaced by “social predators and situations—the boss at work, the intolerant mate, the teacher, the bully.” To this list we might add the dangers of the technological age: man-made carcinogens, computer failures that destroy a hard drive holding a huge amount of information central to one’s work, teethers that are said to leach toxic chemicals and, of course, the risk of a nuclear “event.”¹²

Fear generated by the perception of a risky situation cannot be so easily labelled as “irrational” for several reasons: (a) the degree of risk aversion varies from individual to individual; (b) there is no optimal degree of risk aversion—it is a matter of preference; and (c) citizens do not characterize risks simply in terms of the variance or probability (of death or injury)—at least several other attributes are relevant, as we shall see.

Human imagination is a double-edged sword. The negative side is our ability to imagine possibilities that are extremely remote or not even possible at all and to paint them in vivid colours with depth and

shading so that they seem real.¹³ Anxiety is caused by the negative anticipation of future events, a capability that is possessed by humans but apparently not by other animals. A prominent neuroscientist has said: “A rat can’t worry about the stock market crashing. But we can” (quoted in Hall 1999: 45).

Real fear induces two primary atavistic responses in humans: fight or flight. Ancient programming tells us that spending time on analysis, gathering more information, and engaging in dialogue could be very hazardous to our health or even continued existence. Such programming was helpful for our ancestors living among sabre-toothed tigers and other plentiful, hungry carnivores but it is positively unhelpful in dealing with most of the “new risks” today (e.g., mad-cow disease, bovine growth hormone additions to feed, and scores of man-made carcinogens).¹⁴

(b) *Disparities in the perception or characterization of risks*¹⁵

Policy analysts have long emphasized the importance of problem definition for policy analysis and the choice of policy actions by government. Part of the task of problem definition is determining whether there is a problem at all or, if there is a problem, whether it is of sufficient importance to merit analysis of alternative possible “solutions.”

Risk management by government is often made very difficult by the fact that many risk issues are characterized so differently by citizens and experts. What is seen by experts as a tiny risk to which very few people are exposed and so unworthy of any government action may be seen by at least some citizens as a serious risk for which government should impose new regulations regardless of the cost. If these citizens are represented by a vocal interest group, government may respond to the citizens’ fears and ignore the experts’ advice.

At the outset of this section, a few preliminary observations are in order. First, the perception of risk is inherently subjective, even if different observers agree about all of the objective characteristics of a risky situation. Among the most important are the probabilities of various types of harms and the number of persons exposed to the hazard. But, other characteristics are often deemed important by lay-people: for instance, the extent to which exposure to the hazard is voluntary and the extent to which the risk can be controlled. Paul Slovic (1992), the father of the analyses of risk perceptions, notes that “there is no such thing as ‘real risk’ or ‘objective risk.’”¹⁶ The way we view risks is a “social construction.” People use different frameworks for the way they describe (characterize) and relate to risks. Second, in this context, the perception of a risk really refers to the utility or disutility related to the risky situation in question. Third, there is no optimal degree of risk

aversion. A person's propensity to take or accept risks is essentially a "taste" variable. People have different tastes for risk as they do for all goods and services.

"Experts typically define risk in a narrow, technical way. The public has a richer, more complex view" (Chociolko 1995: 21). It is fairly common for experts to define risks very simply as the probability or likelihood that certain harm(s) will occur. Often, the focus is on the probability of death. A slightly more comprehensive characterization by experts usually includes the following attributes:

- types of harm that may occur;
- likelihood that each type of harm will occur;
- exposure to harm (i.e., how many people are subject to the risk);
- some description of the quality of the information relating to the first three variables.¹⁷

In the United States, the Presidential/Congressional Commission on Risk Assessment (1997) proposed the following questions to characterize risks in a much broader fashion than has been common by experts:

- Considering the hazard and the exposure, what is the nature and likelihood of the health risk?
- Which individuals or groups are at risk? Are some people more likely to be at risk than others?
- How severe are the anticipated adverse impacts or effects?
- Are the effects reversible?
- What scientific evidence supports the conclusions about risk? How strong is the evidence?
- What is uncertain about the nature or magnitude of the risk?
- What is the range of informed views about the nature and probability of the risk?
- How confident are the risk analysts about their predictions of risk?
- What other sources cause the same type of effects or risks?
- What contribution does the particular source make to the overall risk of this kind of effect in the affected community? To the overall health of the community?
- How is the risk distributed in relation to other risks to the community?

- Does the risk have impacts besides those on health or the environment, such as social or cultural consequences?

Citizens (collectively, if not individually) generally have a more complex characterization of risk. Much of this has been captured by Y.I. Vertzberger in what he calls “the texture of risk.” The components as he describes them are as follows:

(1) *Risk transparency*. How ambiguous or well understood are the risky consequences of a decision? Debates among experts and policy advisors are likely to increase doubts among the decision-makers regarding whether the risks of a particular policy are really understood . . . ¹⁸

(2) *Risk severity*. How serious and damaging are the perceived consequences of a decision or situation?

(3) *Risk certainty*. How certain is any particular adverse outcome to materialize? If risks cannot even be guessed at, the level of perceived risk will be much higher because of the possibility of surprise and the possible lack of resources to cope with whatever risk emerges . . .

(4) *Risk horizon*. How close in time are the adverse consequences? The closer in time they are, the more vivid and salient they will seem and the more weight they will be given. Distant negative consequences are underweighed and perceived as less likely to occur; they therefore have only a minor impact on decisions . . .

(5) *Risk complexity* . . . can be assessed using four criteria:

- (a) Measurability of risk, with risk dimensions being more elusive and difficult to assess the less quantifiable they are.
- (b) Variability of issue dimensions, that is, the range of issue-areas affected by risk dimensions (e.g., economic, military, political).
- (c) Multiplicity of time dimensions, that is, whether or not all risky effects are expected to occur within the same time frame (i.e., whether they are all short-term or long-term consequences, or both).
- (d) Interactivity of risk dimensions, that is, whether change in one risk dimension affects the level of risk in other dimensions, with the risk calculus becoming more complex with greater interaction among the risk dimensions.

(6) *Risk reversibility*. Are risky decisions reversible once they are made, and at what cost?

(7) *Risk controllability and containability.* Are the risks generated by the decisions controllable and containable? The answer matters even when risk decisions are irreversible.

(8) *Risk accountability.* Will decision-makers be held responsible by the public for adverse consequences? If so, what is the magnitude of the personal political cost that they will have to bear? "As a general rule, the more directly accountable a decision-maker is to the public, the more likely it is that public perceptions will receive consideration in priority setting" [reference omitted].

(Vertzberger 1998: 26–27)

But even this characterization of risks fails to capture some attributes that research has shown to be important to citizens. A very important one is the extent to which exposure to the risk is *involuntary*. In general, involuntary risks have a disutility up to 1000 times that of voluntary risks, e.g., mountain climbing, hang gliding, amateur automobile racing. Another is the extent to which citizens believe they can trust the estimates of the risk provided by government (rather than other actors, e.g., an interest group).

Slovic et al. (1987), in their factor analysis of citizens' risk perceptions, identified three dimensions: (a) dread risk (lack of controllability, threat, catastrophic potential, fatal, unfair distributional consequences); (b) unknown risk (risks seen as unknown, not perceivable, new, delayed negative consequences); and (c) scale (number of people exposed to the risk). Slovic concluded that there is hardly any systematic relation that seems to exist between the perceived risks of an activity or technology and its benefits.

(c) Is the gap the result of differences in framing?

"Persistent disagreements about risk appear to have their origin in different belief and value systems" (Vaughan and Seifert 1992: 120). These shape the way people define, weigh, and frame dimensions of risk. The framing of a risk issue (indeed, any issue) is how a problem is conceptualized and, therefore, how it is interpreted to a large extent.¹⁹ A frame seeks to define what an issue is "really about." Frames are based on broadly shared beliefs and values and people use them in order "to give meaning, sense, and normative direction to their thinking and action in policy matters" (Schon and Rein 1994: viii). "Framing not only defines the issue, but it also suggests the solution" (Menashe and Siegel 1998: 310).²⁰

Vaughan and Seifert (1992: 123) suggest that three ways in which risk problems are framed "particularly seem to intensify conflicts."

These are (a) the scientific or economic frame versus the equity and fairness frame; (b) risks to the population as a whole versus the frame in which the risk population is highlighted, particularly those who are the most vulnerable; and (c) the frame that focuses on potential gains versus the frame that focuses on potential losses (i.e., Kahneman and Tversky's prospect theory).

While experts often speak of statistical risk estimates for the population as a whole or for the entire population, citizens often frame the issue in terms of *personal* risk (including personal susceptibility). This often leads to a consideration of who in the community bears the risk and which are the most vulnerable persons (e.g., children). It has been argued that the public's apparent high degree of risk aversion for even minute amounts of a potential carcinogen is "associated with a normative expectation for a reference point of zero risk, and an overemphasis on certainty" (Vaughan and Seifert 1992: 130).

"When dissimilar frames are adopted, information, regardless of its quality, may do little to narrow differences because information compatible with one framework is judged to be of little use from another perspective" (Vaughan and Seifert 1992: 124). Yet one of the main tasks of risk communication²¹ aimed at "closing the gap" is to get groups that have different frames "to see and understand the legitimacy of alternative ways of defining policy issues." This may involve negotiating a more widely shared perceptual framework (Vaughan and Seifert 1992: 131).

(d) Other possible explanations

Experts commonly observe that citizens want and expect government to provide a risk-free or zero-risk world. A 1992 survey of 1,506 Canadians found that over 60 percent believed that "a risk-free environment is an attainable goal in Canada" (Strauss 1995: A1). Experts frequently point out that this goal is not attainable even in theory, let alone in practice. Zero risk is an illusion. The same survey found that women ranked all but one of the 38 hazards as riskier than men. In most cases, the difference was over ten percentage points.²²

Experts tend to focus on saving lives (preventing pre-mature deaths) in general in the most cost-effective fashion.²³ On the other hand, citizens seem to want government to address the most fearful risks²⁴ of which they are aware. Citizens do not address risk issues in a synoptic fashion (as do many experts). Rather, they respond to information about those risks that come to their attention (often by the actions of an interest group). The way citizens deal with risk is an example of Lindblom's (1959) idea of policy-making as disjointed incrementalism.

Experts have more formal education in risk issues. They are used to the idea of trying to use reason and logic to address what in the first instance are visceral fears. At the same time, studies of expert judgment indicate that disagreement among experts is common and is often the result of legitimate differences in interests and perspectives (Chociolko 1995: 19). When dealing with risk, expert judgment, research shows, is subject to a number of biases: (a) unstated assumptions and mind-sets based on experience and conventional wisdom in their field; (b) structural biases, notably the way the problem is presented (or framed) and the organization and presentation of data; (c) motivational biases, notably one's ego or self interest; and (d) cognitive biases (overconfidence, anchoring, availability).²⁵

Experts, to understand a risk, implicitly (if not explicitly) compare it to other risks. Comparisons are much easier if only few attributes are used and these attributes can be described in numerical terms.²⁶ It appears that most citizens instinctively translate information on a risk into personal or family terms. Deaths are not statistics on paper; rather they mean the agony of attending the funeral of a child or a friend or a neighbour. Thus they tend to "frame" risk issues differently than do experts.

Citizens feel little obligation to explain or defend their responses to various types of risk: "That's just the way I see it." Experts have to explain their assessments of risks and methods of reasoning. Efforts by officials to confront citizens outraged by a risk (or prospective risk) in the sense of asking them to justify highly expensive (and usually restrictive) actions by government in the face of minute risks to a few people is likely to increase citizens' frustration. With few exceptions, citizens seem to care little about the costs to society of reducing risks.

Moreover, we are living in an era in which purely subjective feelings have been given extraordinary respect. The cry of Descartes, "I think, therefore I am," has given way to "I feel very strongly about this, so nobody should question me on it." On the other hand, it has been suggested by a scientist that "there is unquestionably a tendency among scientists to ignore or minimize dangers growing out of scientific activity" (Rollin 1995: 70). Further, he suggests that "We lack the ability to predict everything that can possibly go wrong" (72). Murphy's Law is always with us.

(e) Nature of the gap

The gap between experts and citizens in the perception of risks appears to be of two types. The first gap is between experts' and citizens' estimation of the probability (or rank-ordering by probability) of a wide range of hazards. Research indicates that citizens usually overestimate

rare causes of death and underestimate more common causes of death (see Slovic, Fischhoff and Lichtenstein 1979). When estimating the number of deaths each year from a collection of hazards, low frequencies were overestimated and high ones were underestimated (with a few exceptions). On the other hand, experts' judgments corresponded closely to statistical frequencies of death.

The second gap relates to what actions government should take (if any) to reduce risks. Some experts describe some of the federal government's actual policies—largely reflecting citizens' priorities—as “haphazard,” “idiosyncratic,” “inefficient,” or characterized by both “paranoia and neglect.” The pathologies associated with the federal government's risk-management policies are the subject of section 3.

Today, experts often characterize risk issues on more comprehensive terms (e.g., Presidential/Congressional Commission on Risk Assessment 1997) than they once did and many of the attributes they use are similar to those used by citizens. However, when providing policy advice, it appears that experts tend to focus on what they believe to be the more *objective* attributes of a risk, namely the type(s) of harm, the probability of each type, and the number of people exposed to the harms. In addition, they add what is necessarily a subjective element: an assessment of the quality of their estimates.

It is possible to distinguish the more objective characteristics of a hazard from its more subjective characteristics. The *meaning* of a hazard (or risky situation), even when each person agrees on the facts, can vary greatly across individuals. The meaning of a risk is what economists are trying to capture when they speak of the utility (or disutility) of a risk. That is why research indicates that citizens are particularly fearful of hazards that they perceive as being imposed upon them (involuntary risks), not controllable, have the possibility of being a catastrophe, and generated by new exotic technologies.

To summarize, there are notable differences in the way most experts or specialists talk about risk and the way citizens do so. A number of important differences are summarized in figure 1.

It appears that the gap between experts and citizens in the perception of the more subjective attributes is an important explanatory factor in some of the pathologies of government's management of risks.

3 What's wrong with risk management?

Routine pathologies

While the primary objective of this chapter is to propose ways to improve risk management, particularly risk regulation, by the federal government, the effectiveness of the remedies depend upon the quality of the diagnosis. This axiom applies as much to policy analysis as

Figure 1 Comparing the perceptions of experts and ordinary citizens about risk

Experts and Specialists	Ordinary Citizens
<p>There is no such thing as zero risk or perfect safety.</p>	<p>I want to be perfectly safe. I expect there to be zero risk.</p>
<p>We live in a stochastic world—there are no certainties (except death).</p>	<p>I expect the world to be deterministic (“is or is not; no grey areas”).</p>
<p>As a practical matter, we have to define “acceptable levels of risk” in making public policy.</p>	<p>The objective of public policy should be the safety of the public. Period.</p>
<p>Policy makers necessarily have to focus on “statistical deaths” since they consider risks in probabilistic terms.</p>	<p>Statistical deaths are an abstraction. It is specific people who die—they have a family and friends who care about them. Policy must recognize this fact.</p>
<p>In general, a death is a death but a person’s age at death matters, so government should use loss of years of life expectancy as a measure of the harm created by a wide range of hazards.</p>	<p>When one person dies it matters. My child’s death means the world to me. Accidental deaths ought to be prevented at all costs.</p>
<p>Useful comparisons of risk can be made across a wide variety of risks using only the number of deaths (or other standardized harms such as accidents or illnesses) and the probability that they will occur (per unit of time).</p>	<p>The most acceptable comparisons of different types of risks are (a) same type of risk at different times, (b) risks versus a well accepted standard, and (c) different estimates of the same risk.</p>
<p>Risks are seen as hazards of various kinds. Comparisons are instinctive in order to appreciate the hazard under study.</p>	<p>Risk is an outrage, particularly when it is involuntary, hard to detect, could result in catastrophic consequences, or attributable to new and exotic technologies.</p>

to persons with an illness. Thus, the purpose of this section is to offer a diagnosis by describing the routine pathologies of the federal government's risk-management activities.

Pathology #1 Insufficient or poor economic analysis

Risk regulators in Canada rarely conduct a cost-benefit analysis²⁷ of proposed new regulations aimed at reducing risks.²⁸ Consider the following recent important example. The federal government devoted nine years to the study of the physical consequences of permitting the use of recombinant bovine growth hormone (rbST) for the purpose of increasing a cow's production of milk.²⁹ On January 14, 1999, Health Canada announced that it would not approve rbST for sale in Canada³⁰ even though the scientific panel found no risk to human safety through ingestion of products from rbST-injected animals (Royal College of Physicians and Surgeons of Canada 1999).³¹ The rationale for rejection: rbST causes certain health problems in cows (although there was no suggestion that these are passed on and adversely affect humans).³² The Department's statement (two pages) was notable for its brevity. None of the vast amount of work done by or for the Department assessing the risks of rbST involved a cost-benefit analysis. Yet, the whole point of using the hormone is to increase milk production—an economic benefit. If there is no harm to humans, surely it makes sense to ask if the social benefits (an increase in milk production of about 15 percent)³³ exceed the social costs (greater frequency of certain illnesses in cows; the costs of rbST itself; the costs of treatment for cows; etc.). The result is that Canadians have no idea of the (likely) opportunity cost of banning rbST.³⁴ How is the failure to use this tool of rationality (cost-benefit analysis) to be explained to our children?

More generally, the Federal Regulatory Policy of November 1995 spells out six "policy requirements" that all federal regulatory authorities must meet barring "exceptional circumstances," in which case they "must justify and document the exception" (Regulatory Affairs Directorate 1995). Efficiency is the subject of two requirements.³⁵ How can one assess the efficiency of new regulations without cost-benefit analysis or at least cost-effectiveness analysis? It appears that the federal government understands this point but fails to put it into practice.

Since 1986, Treasury Board policy has specified that a Regulatory Impact Analysis Statement be prepared for all new regulations and spelled out what it must contain (Stanbury 1992). For new "major"³⁶ regulations, departments and agencies are to prepare a cost-benefit analysis.³⁷ Yet research by Fazil Mihlar (1997: 11–13) on new regulations created in 1995 and 1996 indicates that this policy requirement is seldom met. While over 80 percent of the Regulatory Impact Analysis

Statements (or other analyses) identified who would benefit from the new regulation, only in 17 percent (1995) and 34 percent (1996) of the cases did the analyses quantify the benefits.³⁸ The cost was quantified in about the same percentage of analyses, 11 percent (1995) and 37 percent (1996). In only a small percentage of cases did the estimate of costs include the cost of compliance to industry or the public (11 percent in 1995; 25 percent in 1996) and in an even smaller percentage was the cost to government included (4 percent in 1995; 12 percent in 1996).

One reason why so few cost-benefit analysis are done for regulations aimed at reducing risks is that it would that require the analyst put an economic value on human life (i.e., the average value to society of premature deaths averted). This raises difficult issues for the government of the day and that probably explains Pathology #2.

Pathology #2 No guidance on the economic value of life

A large amount of risk regulation is aimed at preventing premature death. Therefore, to estimate the economic benefits of such regulation it is necessary to use an estimate for the economic value of life. The federal Treasury Board has failed to provide any guidance on this matter. In some of its studies of proposed new safety regulations in the 1980s, the Department of Transport used a value based on the costs of fatal accidents (\$325,000 in 1985 dollars). This is not a satisfactory measure because it does not reflect people's willingness to pay to reduce the probability of a life-threatening risk. More recently, Transport Canada (1994: 43) states that it uses the figure of \$1.5 million (1991 dollars) as the value of a fatality avoided in all modes of transport. This figure is said to be "based on a review of international studies and practices." Transport Canada proposes that a sensitivity analysis be performed using \$500,000 and \$2.5 million for the economic value of a life saved.

More generally, the federal government places no maximum on the amount it will require Canadians to pay for each statistical premature death averted by means of regulation or other form of government action.³⁹ The absence of a maximum on the "value of life" makes it easier for the government to adopt regulations that have an implicit cost far beyond estimates of the economic value of life derived from individual's observed willingness to pay for reductions in the risk of losing their own life (see Viscusi 1992). From a score of studies, Viscusi concludes that "most of the reasonable estimates of the value of life are clustered in the [US1990] \$3 million to \$7 million range" (1992: 73).⁴⁰ Note that the low point on Viscusi's range is over twice the figure used by Transport Canada (CDN\$1.5 million in 1991 dollars).

One of the effects of not placing an upper bound on the cost of lives saved by regulation is that government regulators adopt some

regulations that have a very high cost indeed. Consider the following examples:⁴¹ Viscusi's (1992: 264) review of 21 proposed federal regulations in the United States in the period from 1980 to 1989 found that the implicit cost per life saved exceeded \$100 million in 12 cases; four of these regulations were adopted. Another compilation of health and safety regulations, in the *Regulation Program of the United States Government, 1991/92*, found that the implicit cost of 14 of 53 regulations created between 1967 and 1991 exceeded \$50 million per life saved. Hahn (1996b) reviewed 37 health, safety, and environmental regulations created by the American government between 1984 and mid-1995. The implicit cost per life saved exceeded \$100 million for eight regulations. Hahn (1996) and others suggest that a larger fraction of *recent* risk reduction regulations in the United States have imposed costs on society of over \$100 million per premature death averted.

The principal benefit of using a consistent quantitative measure for the economic value of a premature death averted by government initiatives that reduce risks is to achieve efficiency in the total portfolio of regulatory and other programs whose objective is to reduce the number of deaths.⁴² In practical terms, it seems reasonable to use a figure of (say) \$10 million for the general *limit* on the costs mandated by government to save a statistical life. Ministers would be free to override this limit provided they gave a reasoned explanation for doing so.⁴³ (Of course, it is very difficult to get cabinet ministers to reduce the vast amount of discretion they have.)

Pathology #3 Idiosyncratic selection of risks for government action

Government targeting of risks for regulation or other action seems idiosyncratic⁴⁴ or "haphazard,"⁴⁵ and is undoubtedly inefficient in terms of the number of lives saved for the current level of resources used to reduce risks to human health and safety. It must be understood, however, that the ways in which ordinary citizens characterize and perceive risks makes this statement of little import to them. The difference in the way expert policy analysts and citizens perceive risk has been discussed in section 2 above.

Stephen Breyer (1993) describes this pathology as "random agenda selection." He notes that often much regulatory effort is focused on what experts or objective information suggests is a low risk or a hazard with modest harm, usually the former. Also government risk agendas are often driven by pressure from interest groups (often reinforced by extensive coverage in the media). More important risks are ignored or have a much lower priority. It appears that cancer risks are over emphasized in the United States.⁴⁶ There has been a mismatch between funding priorities (set by Congress) and those of particular agencies.

Both in Canada and in the United States, it is estimated that cigarettes cause 30 percent of all avoidable deaths from cancer, while 2 percent to 3 percent of all cancers are associated with environment pollution, and 3 percent to 6 percent associated with radiation. Yet a very great deal of regulation focuses on cancers caused by pollution.⁴⁷ The whole vastly expensive panoply of environmental regulations might prevent one-quarter of one percent of cancer deaths.⁴⁸

The billions of dollars spent on health and safety regulation or risk regulation more generally have almost nothing to do with the leading causes of death. Heart disease, the number-one cause of death, carries off eight times as many Canadians as do all types of accidents. Yet most accidents occur in contexts that are unregulated or only lightly regulated, i.e., in one's house. The most intensive forms of health and safety regulation occur in areas where the number of lives lost are small relative to the other causes of death.

Pathology #3 takes several forms. I consider three. First, there are many government interventions (e.g., risk-reduction regulation) that focus on risks that, in fact, currently result in relatively few deaths each year.⁴⁹ (Note that about 228,000 Canadians died in 1999.) Thus the potential gains from additional regulation are not large, even if the intervention is perfectly successful. For example, about 5,000 women die from breast cancer each year but only about 40 die in commercial air travel accidents (Statistics Canada 1996). Thus a reduction of one percent in the deaths due to breast cancer will save more lives than a 100 percent reduction in deaths due to commercial air travel. *A priori*, does it make sense to add more air-travel safety regulations? Would it not be better to apply the additional resources to a much "richer" target like breast cancer?

An enormous amount of government regulation in Canada is devoted to reducing risks associated with transportation—from airlines⁵⁰ to motor vehicles to railways to maritime traffic (including small pleasure craft). Such regulation appears to have been successful in that, despite our vast amount of travel in Canada, only about 1.7 percent of all deaths are attributed to transport-related accidents (3,425 in 1994). Further, if accidents involving motor vehicles are excluded, only 237 people died in accidents in all other modes of transport in 1994.

To use a mining metaphor, transport safety regulators, particularly those not dealing with motor vehicle and highway safety, are continuing to dig in mines that are—frankly—almost played out. In 1997, for example, only 107 people died in railroad accidents in Canada, 76 in aviation accidents, 24 in water-related accidents and 3,064 in road-related accidents.⁵¹ There is very little additional gold to be found in the sense of more lives to be saved aside from road-related accidents—

compared to other areas. But, even the number of road-related deaths has been declining. The estimate for 1998 (2,672) is only 40 percent of the number of road-related deaths 25 years ago when motor-vehicle traffic was one-half the level of 1998.⁵² Thus, the death rate for road accidents in Canada is now far lower than what it was 25 years ago.

There would appear, then, to be a strong case against further government action unless there is clear evidence that the number of deaths is increasing much faster than the population.⁵³ Note that the present low number of deaths in a specific area may be partly due to the existing stock of government regulation or other programs designed to reduce risks. The idea is not to eliminate existing risk-reduction regulations but to avoid adding inefficient new ones. The point is that zero deaths is the obvious limit on risk-reduction activities. Further, when the number (or the rate) is close to zero, it is unlikely that further government actions to reduce fatalities will be justified in terms of benefit-cost analysis. Over the past two decades, an average of 2.3 persons died each year in tug-and-barge accidents. Yet, the federal government persists in making more regulations to improve safety—and do so without doing a cost-benefit analysis (see Stanbury 2000).

Second, the federal government in Canada focuses extensive resources on some risks while it virtually ignores other risks—even though the number of deaths associated with the risks to which it pays less attention is far greater.⁵⁴ Even casual observation will confirm Canadians do not, in fact, express the same concern in rhetorical and tangible ways about all causes of death. A most obvious current example is the reaction to two diseases: AIDS⁵⁵ and breast cancer.⁵⁶ Breast-cancer activists know that the millions of dollars directed into AIDS research by governments in industrialized countries eventually resulted in not one but two scientists claiming to have found the cause. In 1992, Health Canada pledged \$25 million over five years to the Breast Cancer Initiative. At the same time, it allocated \$203.5 million for a five-year national AIDS strategy.⁵⁷ And yet, since 1982, just over 9,500 Canadians have died of AIDS,⁵⁸ while more than 60,000 died of breast cancer (Mallet 1996: D3). In 1994, 1,628 people died of AIDS⁵⁹ or about one-third the number who died of breast cancer.⁶⁰

The disparity in the support for research into breast cancer and AIDS research continues. On May 28, 1998, the federal Minister of Health announced that \$42.2 million would be spent on AIDS research annually with no requirement that the program be reviewed for the renewal of the funds (Canadian Press Newswire May 28, 1998). On June 19, 1998, the federal Minister of Health announced that \$45 million would be spent on breast-cancer research over the next five years (including \$10 million by the Medical Research Council)—an increase

from \$25 million over the previous five years. No wonder that Reform MP Grant Hill is quoted as saying: “I was shocked when I came to Ottawa to discover that the government has no objective formula to decide which diseases will get what proportion of their health budget. Apparently, they just give the most money to whoever shouts the loudest” (*Alberta Report*, June 8, 1998).⁶¹

The third form of Pathology #3 consists of government interventions that may have a moderate (or high) cost per statistical life saved (premature death averted) but have a very high cost per additional *year* of life saved. This occurs when we spend the same amount to save the life of a person over age 65 as we do for a teenager. Obviously, the latter has many more years to live.

Before looking at the details, it is useful to look at the big picture. The data for 1994 indicate that at the time of their death 70 percent of men and 81 percent of women in Canada were age 65 or older.⁶² At the other end of the distribution, only 5.62 percent of males and 2.56 percent of females died before they reach the age of 30. Thus, the gains in number of lives saved is fairly modest ($n = 10,271$), but the number of additional years of life would be considerable if they live a “normal life span,” i.e., about 73 for men and 79 for women.

Among the ten leading causes of potential years of life lost (PYLL) before age 75 in Canada in 1993,⁶³ only one (motor-vehicle accidents) is the object of intensive risk regulation though it ranks number 3 for men and number 4 for women (Wilkins 1995). This is because it is the leading cause of death among young males (Wilkins 1995). The three leading causes of PYLL among males were ischaemic heart disease (13 percent of total PYLL), suicide (9 percent) and motor-vehicle accidents (9 percent). For women, the leading causes of PYLL were breast cancer (9 percent), lung cancer (7 percent) and ischaemic heart disease (7 percent).⁶⁴ If the central goal of a risk-reduction strategy is to reduce the number of years of life lost due to premature death, then the focus of such strategies should be on (a) the absolute number of years of life now lost to various causes, and (b) the cost to society of saving each additional year of life.

It should be noted that Canada, unlike the United States, has never tried to rank order, even roughly, its priorities for government actions aimed at reducing risks to human health and safety.⁶⁵ The failure to do so is symptomatic of the “silo management” approach to risk reduction policy.

Pathology #4 “Silo management”

Risk-reduction activities (notably by means of regulation) of the federal government are conducted within a host of different departments or agencies essentially independent of each other. Risk regulators operate

in a system that effectively encourages “institutional myopia” in the sense that their mandate is to focus on a comparatively narrow range of problems and eliminate or reduce them to insignificance. The big risk regulators (e.g., Transport Canada, Health Canada,⁶⁶ Agriculture Canada, Environment Canada) each may deal with a range of types of risks but none is forced to look outside its own relatively narrow domain. Thus, officials responsible for maritime safety are very unlikely to tell their minister that it would be better to not add more safety regulations in their area because the “return” would be much lower than it would be by investing society’s scarce resources elsewhere.

Of course, it is desirable to exploit Adam Smith’s principles of specialization and division of labour. Given the exotic nature of some of the risks addressed by government, specialization is absolutely necessary. The problem is that we have in Canada too much of a good thing. The result is that government forces citizens to invest in risk reduction activities beyond the point where the additional benefits exceed the additional costs. (One reason for this may be the fact that the federal government does not have a *general* policy for risk reduction or risk management. It has scores of both—and most are very difficult to find.)

Stephen Breyer (1993) describes this pathology as “Tunnel-Vision (or the last 10 percent).” It involves the single-minded pursuit of a single goal that goes too far. Policy-makers fail to recognize diminishing returns within a department and fail to consider other risks across government (“silo thinking”). Removing the last 10 percent of harm can be hugely expensive (because the function is non-linear).

Efforts to regulate the transportation of dangerous goods by the federal Department of Transport provide a good example of “silo management.” The average number of reportable accidents involving dangerous goods declined from an average of 520 in the period from 1987 to 1989 to 311 in the period from 1994 to 1996.⁶⁷ The average number of *deaths* due to dangerous goods for the same periods fell from three to 0.33. Yet the Department states that the number of such deaths “obviously remain a cause for concern.” The stated goal is “to reduce, and possibly eliminate all potential danger through activities such as improving standards related to road cargo tanks, rail tank cars and intermodal containers.”⁶⁸

The key point is that there is no *centralized* effort by the federal government in Canada or the United States to identify and measure the costs and benefits of reducing a wide variety of risks to life and limb and to rank priorities given scarce resources (Sub-Committee on Regulations and Competitiveness 1993).⁶⁹ Each proposal to reduce risks appears to be considered on its own merits (as noted above) against department-specific criteria that are rarely in the public domain (the Health Protec-

tion Branch is an exception). The autonomy of individual departments is increased because the federal government refuses to provide a reference-point value of life above which the minister responsible would have to explain publicly why it makes sense to spend far more than the reference value to save lives using this particular new regulation.

The federal government does have a regulatory policy (see Regulatory Affairs Directorate 1995) but it is very general and focuses on regulations (subordinate legislation) rather than regulation as a governing instrument.⁷⁰ The federal government has no general risk reduction policy that is overseen by a central agency. Nor, does it have a standardized risk-management protocol⁷¹ for dealing with crisis situations or normal ones. The present situation could be likened to handling government expenditures (a) without a central budget to control expenditures at both the departmental and government-wide level and (b) not having a Treasury Board to assess, monitor, and control expenditure plans. Yet, risk regulation alone certainly imposes huge costs on society if not on government itself.⁷²

The issue here is the same raised by a number of students of government regulation generally when they have advocated that the federal government adopt a “regulatory budget” (see Litan and Nordhaus 1983; Stanbury 1992: chap. 8). Such a budget brings an element of “horizontality” to what is now a host of separate “silos.”⁷³ Also, a “risk-reduction budget” would force government to incorporate into its decision-making, and to economize on, the private-sector costs of reducing risks per government action, rather than considering only the government’s administrative costs, which are only a small fraction of the former.

Silo management can mean that even if additional risk reduction in area *X* meets the $B > C$ test, the net benefits of a comparable investment in area *Y* may yield far higher benefits. Effective risk-management techniques developed in department *A* may not be transferred to other departments that employ less effective ones. Further, it is likely that specialists in area *D* can benefit from the perspective of those with a reasonable level of knowledge of risk issues in areas *E*, *F*, *G*, *H*, *I* and so on.

Along the lines of this pathology, Breyer (1993) notes that there are in the United States a variety of “inconsistencies” within and among both programs and agencies that focus on risks:

- they use different methods of estimating risks of death;
- they apply different economic values of life in doing risk management;
- agencies ignore interdependencies among risk regulation programs; and

- regulation of small risks can cause more harm to health than is prevented (atrogenic regulation) and the “income effect” of regulation is ignored.

All of these can fairly be attributed to the problem of “silo management.”

Pathology #5 Government actions are too often based on the preferences of the most fearful

A major policy (and ethical) problem arises when government action to deal with risk is based on the risk preferences of the most fearful in society.⁷⁴ Stephen Strauss, a reporter for the *Globe and Mail* has suggested: “People are not reasoning machines, they are fearing machines and, when there’s a scare, politicians and scientists better tremble” (quoted in Powell and Leiss 1997: 21). (Recall the discussion in section 2[a] above.)

It must be emphasized again that public policy toward risks does not exhibit any consistent pattern in the sense of (a) focusing on larger risks, (b) focusing on risks that generate large numbers of deaths, (c) focusing on risks where the difference between the benefits and costs of action is the greatest. I suggest that to the extent government actions focus on very remote risks, where only a minute percentage of the population is expected to benefit and where the costs per life saved are huge, it is reasonable to describe such actions as serving the interests of the most fearful in society.

Government actions to deal with risks based on the preferences of the most fearful is largely the result of interest groups that are able to create and then exploit the public’s fear for their own organizational purposes, e.g., to obtain publicity in the news media or to raise money.⁷⁵ In this effort, groups are aided by the news media’s strong preference for “bad news” stories. It is front-page news when a terrorist threatens to blow up a single airline flight. It is not news if several million people around the world arrive safely from many thousands of flights every day for months on end. In general, the federal government has made little effort to engage in a risk communication process that “counters” the claims of interest groups with facts, comparison of risks, and explanations of the trade-offs involved (see Powell and Leiss 1997).

To a surprising degree, a few zealots drive the activities of interest groups.⁷⁶ Their fears (which may be highly idiosyncratic) can shape public policy by creating fears in others through the adroit use of the media (see Fumento 1999). One strategy is to focus on (new) absolute risks and ignore the fact that relative to other more familiar risks, the risk is low. Interest groups in this context often focus on a single issue and do not want to recognize the need for trade-offs among various

types of risks. Nor do they want to make trade-offs between additional costs to society and additional benefits of risk reduction.

Efforts to regulate risks are driven by crises and disasters that get extensive coverage in the news media. In such crises, the abstract is made real, identifiable individuals die (or their life is threatened), latent fears and insecurities are tapped, and news coverage generates I-told-you-so responses. “Disasters” (such as the crash of TWA flight 800 off Long Island on July 17, 1996) have both advantages and disadvantages in influencing public policy concerning risk reduction:

- they get people’s attention and create a receptive audience;
- they may induce panic “solutions” that may be very costly to society;
- they often prompt a more general examination of the problem though this may occur *after* government has taken some action;
- they may focus limited political energy on what is, in fact, a less significant risk when one looks at the larger picture.

In some cases, a “crisis” can be “manufactured” by interest groups, e.g., the “Alar” pesticide scare in 1989 was the creation of the Natural Resources Defense Council. It was helped by actress Meryl Streep, who testified before a United States congressional committee and received extensive coverage in the media. Greenpeace made a great effort to pressure governments in Europe and North America into banning the use of phthalates as a softener in children’s toys and teethingers made of PVC (see Stanbury et al. 2000).

What are the consequences of making public policy based on the preferences of the most fearful? First, society (rather than simply the most fearful) pays a large risk premium (often to reduce very tiny probabilities of death to very few people).⁷⁷ Second, there is a redistribution of income from the less to the more fearful. Unlike private insurance, the redistribution resulting from government regulation is involuntary (all buyers have to pay higher prices for the regulated product, not just the most fearful). Third, the freedom of individuals is reduced, perhaps needlessly. This is true where the provision of more or better information by government would permit individuals to act to reduce the risks they face in such a way as to maximize their utility. Fourth, for any given size of social budget for reducing risks, devoting more resources to the risks most feared by the most fearful citizens means that fewer lives can be saved than could be if amounts in the budget were reallocated on the basis of saving lives at least cost first, then gradually working one’s way up the list to more costly actions (Breyer 1993; Stanbury 1992).

Pathology #6 One-size-fits-all types of government action

To date, Canada's public policy toward risks (such as it is) has suffered from the one-size-fits-all syndrome. Put another way, we have "over socialized" many risks when it was possible and practicable to adopt strategies that would help individuals (families) to bear the amount (types) of risk that maximizes *their* utility. Consider the following example. The province of British Columbia is considering imposing a "thrill tax" of 0.5 percent on a wide range of adventure-sport products and services including ski-lift tickets. The expected revenue of \$2 million per year is to help pay for the rising costs of rescuing errant adventurers (Cheney 1999: A1). In 1989/1990 there were 350 rescues; in 1994/1995 there were 684. By 2000, the number may hit 1400. In addition, a fine of \$500 might be imposed on persons who ski or snowboard in prohibited areas. It should be noted that British Columbia's 77 search-and-rescue teams are staffed largely by volunteers. The Attorney General said that the proposal was based on the user-pay idea.

My colleague Paul Kedrovsky (1999) has described the proposed tax as a "wonky bit of policy making." Why? "Instead of making the people who need to be rescued pay, [the Attorney General] proposes making everyone pay." He notes that while the tax would bring in about \$1000 per rescue, the estimated cost (based on American figures) is in the range of \$8,000 to \$12,000 per "hapless hiker—considerably more if the hiker is seriously injured." Kedrovsky points out the obvious problem of moral hazard⁷⁸ as well as the unfairness of taxing the vast majority of persons who never need to be rescued. Why not spend a modest amount of government money advertising the fact that a "rescued-person pays" policy is in force and that the average estimated cost is \$10,000. Further, persons who ski or hike in prohibited areas will pay a civil monetary penalty equal to the actual cost of the rescue, i.e., they will pay double. Apparently, hikers in the Grand Canyon already "face the sobering thought that they will be financially responsible for their own rescue" (*National Post* editorial, March 9, 1999: A19).⁷⁹

The one-size-fits-all approach to risk regulation is undesirable for several reasons. (1) It can result in the moral hazard problem as noted in the example above and so may not deter the behaviour of those most prone to take risks. (2) It results in a misallocation of scarce resources. (3) It results in unfairness: people are forced to buy insurance for amounts far above the actuarial value of the risks to which they are exposed.

The case for allowing the greatest (practical) degree of individuation in the response to risks is based on two main propositions: (a) the utility of the same objectively defined risk varies greatly across indi-

viduals and (b) greater individuation in responding to risks is often both more efficient and respectful of individuals' freedom. Exposure to specific hazards varies greatly: non-skiers do not bear the risk from skiing; people who live in small cities with no heavy industry do not breathe in the harmful substances in smog. Individuals can reduce the risks to which they are exposed, e.g., they can drive a larger, heavier car (at the expense of higher fuel consumption) and practise defensive driving. They can avoid travelling with a "testosterone-poisoned" young male. They can avoid "extreme sports" and stay within the designated areas on ski hills. Recently two teenaged female snow-boarders were killed when they went into an area clearly marked out of bounds (see Hume 2000).

People often believe that the risks to the category do *not* apply to them. This may be true in the sense that the individual can or does take actions that reduce the odds for him, e.g., an 18-year-old male can (a) drive less, (b) drive more carefully, (c) limit driving at night, (d) drive a larger and heavier car, (e) never drink and drive, or (f) let his girlfriend do half the driving. All of these reduce the risk that *this* person will be involved in a fatal auto accident, even though he cannot change his sex or age.

The strategies governments can use to facilitate beneficial individuated responses to risks are described in section 4 below.

Pathology #7 Potential misuse of the precautionary principle

Here I address a pathology in the making, one that—if environmental and other activists get their way—will have large adverse effects on the well-being of Canadians.

In about two decades, the precautionary principle has come to have a major influence on public policy, partly because it so evocatively links us to the "folk wisdom" embedded in the aphorisms "It is better to be safe than sorry" and "An ounce of prevention is worth more than a pound of cure."

There are numerous versions of the precautionary principle.⁸⁰ In general terms, they state that where an activity raises the threat of harm to the environment or human health, precautionary measures should be taken even if certain cause-and-effect relationships are not established scientifically. For example, Principle 15 of the Rio Declaration of 1992 (signed by Canada) is that "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."

VanderZwaag (1996) notes that Canada has shown support for the precautionary principle in a number of policy actions: Canada has

signed international agreements that incorporate some version of the precautionary principle; the federal government adopted “reverse listing” approach in the Pest Control Products Act; pollution-control provisions in the Fisheries Act are consistent with the precautionary principle; it can be found in the 1993 Comprehensive Air Quality Management Framework for Canada and in the growing number of statutes that embrace sustainable development (of which the precautionary principle is a subsidiary principle).

One of the 13 “guiding principles” in the development of the federal government’s health-protection legislation is to “inscribe in law the principle that Health Canada should take remedial action in cases where there is evidence of a potential health risk to Canadians, even though the risk cannot be proven or measured with certainty” (Health Canada 1999b: 1). This glittering generality begs a few hard questions: How much evidence? Of what kind? How great a health risk? To how many Canadians? Known with what degree of certainty? At what cost? How could the action be reversed if the perceived danger proves to be far less than initially believed? In summary terms, this looks like an excellent example of the misuse of the precautionary principle. Even worse, it is to be embedded in law.

Steven Milloy argues: “The precautionary principle is now simply an excuse, rather than a reason to take action against politically unpopular technologies, chemicals and products” (Milloy 2000: C7). He notes that Greenpeace insists that the use of the principle should not rely on a risk assessment, the scientific process for measuring potential harms. The ADM Working Group on Risk Management (2000: 5) indicates that the precautionary principle is one of the four common elements in the federal government’s framework of public risk management. This could be a serious problem.

Use of the precautionary principle makes a great deal of sense in dealing with risky situations characterized by large potential harms that are *also* irreversible (or at least very difficult, costly or slow to remedy or reverse). Note that sometimes even “catastrophic” harms are reversible with the application of sufficient resources (loved ones cannot be replaced, of course). Irreversibility implies not only can the *status quo ante* not be achieved but that the harm is of a very serious nature, i.e., there are no even reasonably close substitutes. Also, the precautionary principle encourages citizens and policy makers to anticipate the possible adverse consequences of new technologies, substances, production processes, and so on. It may be true that the costs of preventing harm may be far less than remediation after the harm has come to pass but this is not always the case. Further, using the precautionary principle as a general frame may well help society to deal better with changes where the

potential benefits are large and nearly immediate while the adverse effects are subtle, delayed, and possibly imposed on the next generation.

The rub comes when the precautionary principle is applied on a broad basis, i.e., far beyond the few situations where there are even small risks of large potential harms that are also irreversible. Widespread adoption of the precautionary principle would put the onus on the proponents of, say, a new technology (particularly one expected to harm the environment) to prove that it is “safe” (so-called reverse-onus approach). Theoretically, it is impossible to prove that an action will cause no harm. Also, there is, in reality, no such thing as zero risk or perfect safety.⁸¹ The *status quo* is not risk free—it is just that the risks are more familiar (or people are not aware of many risks).

According to Marlo Lewis the “fatal flaw” in the precautionary principle is its “complete one-sidedness.” He continues, “Environmentalists demand assurances of no harm only with respect to actions that government might regulate, never with respect to government regulation itself. But government intervention often boomerangs, creating the very risks precautionists deem intolerable” (Lewis 1997). Elizabeth Whelan argues that widespread application of the precautionary principle is undesirable for several reasons.

First, it always assumes worst-case scenarios. Second, it distracts consumers and policy makers alike from the known and proven threats to human health. And third, it assumes no health detriment from the proposed regulations and restrictions. By that I mean that the Precautionary Principle overlooks the possibility that real public health risks can be associated with eliminating minuscule, hypothetical risks. As an ancient philosopher said, “It is a serious disease to worry over what has not occurred. (Whelan 1996: 4)

Of course, environmental regulation entails physical risks of its own, including perverse side effects that undermine the intended benefits of the regulation. Alternatives to regulated activities can produce unanticipated physical risks.⁸² Similarly, regulating a substance may result in the loss of the substantial benefits for public health or the environment that the substance provided. Risks of remediation are a third set of physical risks of environmental regulation that Cross identifies.

Finally, two of the proponents of the precautionary principle note that it “offers no guidance as to what precautionary measures should be taken . . . [or] how many resources should be committed or which adverse outcomes are the most important” (Costanza and Cornwell 1992: 3). In the extreme application, all actions that pose risks for society are banned until the proponents can prove that they are “safe.”

Pathology #8 Poor risk communication

As noted earlier, risk management is a broad term and it usually includes the following components: risk analysis (the identification, description, and measurement of risks); risk assessment (consideration of whether government should intervene, an examination of the options that are likely to be effective and politically feasible), and risk communication.

The United States National Research Council (1989) defined risk communication as the “interactive process of exchange of information and opinion among individuals, groups and institutions concerning a risk or potential risk to human health or the environment.” After a review of several authors’ definitions, Gutteling and Wiegman define risk communication as “the systematic planning of information transfer, based on scientific research, to prevent, solve or mitigate the risk problem with adjusted and customized information (risk messages) for specific target groups” (1996: 42). They also emphasize that risk communication, is “a social process in which different types of communication (i.e., one-way, two-sided, or multi-sided dialogues) will be applied depending on the circumstances and the phase of the planning process” (1996: 42–43).

A broader and, I believe, more useful definition is given by Powell and Leiss. They describe risk communication as “the process of exchanges about how best to assess and manage risks among academics, regulatory practitioners, interest groups, and the general public” (1997: 33). They go on to say that “exchanges can mean anything from a presentation of relatively straightforward information to arguments over contested data and interpretations, to sincere or disingenuous concern, to what is in the eyes of some just plain misinformation (inadvertently misleading data) or disinformation (deliberately misleading data)” (Powell and Leiss, 1997: 33–34).

Powell and Leiss have examined in detail a number of major risk controversies in Canada. They were critical of the federal government’s risk communication efforts.

(1) In the case of “mad-cow disease,” “leadership by abdication may be the Canadian way but, given both the public discussion of BSE [bovine spongiform encephalopathy] to date and the newest scientific findings, such a strategy must be regarded as irresponsible and archaic” (Powell and Leiss 1997: 22).

(2) On the dioxin issue:

In Canada, so far as one can tell, those in government appear to believe that, in cases (like dioxins) where they throw huge amounts

of resources at scientific research and risk assessment programs, the *meaning* of the results of those efforts will somehow be diffused serendipitously throughout the public mind . . . those in government who are in charge of environmental and health protection programs simply do not believe that constructing an effective risk communications dialogue with the public is part of their responsibilities. (Powell and Leiss 1997: 67).⁸³

Referring to the Minister of the Environment's speech when tabling the new Canadian Environmental Protection Act in December 1996, Powell and Leiss continue, "the most recent Canadian federal government actions [were] pointless and indeed self-defeating" (1997: 72).

(3) With respect to the VTEC family of toxins generated by *E. coli* bacteria often found in hamburgers, regulatory agencies in the United States have been active participants in the evolving debate over changes in policy but, "once again, Canadian authorities are largely quiet" (1997: 98). The Auditor General (1999: ch. 15) has recently criticized the Canadian Food Inspection Agency's handling of one of the largest outbreaks of food-borne disease in Canada in 1998.

(4) "Health Canada engaged in no risk communications on rbST [bovine growth hormone], failed to explain risk assessment assumptions (let alone the entire risk assessment process), and utterly failed to take responsibility on the issue of rbST approval" (Powell and Leiss 1997: 148). It also failed to recognize that a variety of socio-economic concerns surround the decision on rbST and not just the scientific issues that Health Canada had insisted be the sole basis of decision making.

(5) "It is Health Canada policy [in 1992] not to issue press releases on any product decisions; it is up to the companies to do so" (Powell and Leiss 1997: 148). Note that Health Canada did issue a brief news release announcing its decision on rbST on January 14, 1999.

(6) PCBs appear to share with dioxins the "dubious distinction of being stigmatized substances." The federal government provided no publicly understandable authoritative information to supplement the diet of stories in the news media about PCB-related incidents. "For more than two decades, neither Environment Canada nor Health Canada, the two regulatory agencies responsible for the risk assessment of PCBs, made a concerted attempt to challenge the characterization of PCBs in media stories as "cancer-causing" or to communicate the fact that at current levels of exposure, most people are very unlikely to be affected adversely by these compounds" (Powell and Leiss 1997: 195).⁸⁴

Woody Allen once said: “Sixty per cent of life is just showing up.” Federal departments and agencies—with few exceptions—have not learned this lesson when it comes to risk communication. It usually leaves the field to interest groups, individual activists, newspaper editorials of various types, junk science, and the usually defensive utterances of those businesses whose activities are under attack.

4 Prescription: Proposals for improving risk management

Having offered my diagnosis of what is wrong with the federal government’s management of risk, I turn now to my prescription to remedy the pathologies identified in section 3. The federal government’s risk-management policies need to be modified in several major ways.

Remedy #1 Take a longer-run perspective

The federal government needs to take a *longer-run* perspective. This means thinking in terms of a decade or more, not just until the next election.⁸⁵ This will involve, among other things, developing better coordination across government departments and agencies, perhaps through “horizontal mechanisms” (see Remedy #2 below). The government will have to recognize the role of emotion, fear, and possibly distorted perceptions play in political pressures on government (notably politicians) and modify their risk-management efforts accordingly. This means putting risk communication at the centre of its efforts (see Remedy #8 below). For this change to be put into practice, government will need to educate all of its regulators (including experts and scientists) on importance of risk communication.

Like any other major change, better risk management will require leadership by cabinet ministers—explaining, educating, exhorting, and making the institutional changes necessary. These will include ensuring that more and better analysis is done before committing the government to action (see Remedy #4 below) and routinely making more information about its risk management activities available to the public (see Remedy #3 below).

Better risk communications (Remedy #8 below) will include efforts by political leaders to encourage citizens to reflect upon the hard choices embodied in public policy—it is their lives and their resources and most of these choices involve *value* judgments. It will also require changing the future of risk regulation in Canada. The regulation of risk has expanded greatly in the past two decades in the name of saving lives and reducing the damage of accidents and illness although it appears that a large number of resources is being devoted to slight or even quite remote dangers while much more substantial and well-documented risks are all but ignored.

Political leadership (aside from that which consists of echoing the latest public opinion polls) is always in short supply. Innovations in public policy are usually seen as highly risky in political terms. Politicians tend to be quite risk averse when they believe that their future may be adversely affected by the inevitable objections to change.

Remedy #2 Create “horizontal mechanisms”

The federal government needs to make a number of changes to combat the problems flowing from the pathologies of “silo management” and so increase the “horizontality” of its policies relating to risk. “Silo management” amounts to excessive reliance on specialization and division of labour. Too much of a good thing can produce negative consequences and has done so in the case of risk management. Some types of risks are regulated beyond diminishing returns while other, greater, risks are (virtually) ignored (recall Pathology #4 in section 3 above).

Unlike other major areas of government intervention, the federal government has no *general* policy aimed at creating coherence among its risk-management activities. This defect must be remedied. To begin with, it is essential that the general policy statement specify the objectives of the government’s risk-management efforts. These can be made more operational by spelling out the criteria to be applied to specific decisions. Here Fraiberg and Trebilcock (1998) have some useful suggestions. In general, government should adopt four cardinal rules in risk-management decision-making:⁸⁶ (a) maximize expected value, i.e., expected net benefits or social benefits minus social costs, both discounted to present value; (b) avoid catastrophes (i.e., apply the precautionary principle to risks involving very large amounts of harm or large harms that are also irreversible); (c) dismiss extremely remote possibilities, i.e., those that are less than one in one million; and (d) adopt equitable regulations, i.e., even those that fail to meet criterion (a) if they prevent inequitable treatment of certain groups. The general policy statement should spell out the following:

- (1) the standardized risk assessment procedures (protocol) to be used by all departments/agencies;⁸⁷
- (2) the economic value of life to be used in cost-benefit analyses (CBAs);
- (3) the discount rate to be used in CBAs or cost-effectiveness analyses;
- (4) risk levels above which government will take action and below which it will not.

Items (2) and (4) are bound to be highly controversial. As I have discussed, the case for an “official” value of economic life above, I shall concentrate on the last item. In the United Kingdom, the Health and

Safety Executive (established in 1974) has proposed the following dividing lines for policy action in relation to risks.

- (1) The government *will* act to reduce risks where (a) the annual risk of death for workers is greater than 1 in 1000, and (b) where the annual risk for members of the public that is imposed on them in the wider interest of society exceeds 1 in 10,000.
- (2) In general, the government *will not* act where the annual risk of death for individual members of the public (including workers) is less than 1 in 1 million (see McQuaid and Le Guen 1998: 30).

I do not suggest that these are the right levels of risk for the two thresholds. Rather, I wish to encourage ministers, public servants, and citizens to engage in a debate that will derive appropriate probabilities.

Further, the general (i.e., government-wide) policy should specify (a) that regulatory agencies are to make use of the best available scientific information in conducting risk assessments and (b) that, when scientific knowledge about risk is imperfect (and it usually is), agencies are to employ probabilistic methods of uncertainty analyses.⁸⁸ Also, the policy should indicate the conditions under which the precautionary principle should be applied (preferably not beyond situations in which, although there may be a very low probability of harm, the potential harm is both huge and *irreversible*).

In general, similar techniques should be applied to risk management as have been applied to traditional expenditure programs by the Treasury Board, cabinet committees and sub-committees, and the budget process. The social costs of risk regulation are largely external to government. It is citizens as a whole who pay the freight for both expenditure programs and risk regulation. Both types of outlays come out of the same economy (scarce resources). It is inefficient to fail to weigh both together and to make necessary trade-off across both types of information.

There is a strong case for the federal government to adopt a “risk-reduction budget,” which would be, in effect, a subset of a more general regulatory budget (see Litan and Nordhaus 1983; Stanbury 1992). Given the substantial reduction in economic regulation since the 1980s (see Ostry and Stanbury 1999), by far the largest expenditures relate to risk regulation and other actions by government designed to deal with risks. The key objectives of a “risk-reduction budget” are (a) to get regulators to take into account private sector-costs of compliance (so as to properly measure total costs to society), (b) to save more lives for whatever outlay on risk reduction ministers believe is desirable,⁸⁹ and (c) to force the ministers and officials to rationalize their proposed actions to reduce risks across all (competing) departments and agencies.

Finally (and this will be hard to do), the federal government's risk management policies must take into account the fact that the key policy makers in risk management are also at risk in terms of career prospects, status, and reputation. Risk to citizens create risks for cabinet ministers and, to a lesser extent, for the officials who advise them and implement policy.

Remedy #3 Routine disclosure of more and better information

It is hard to overemphasize the importance in Canada of getting vastly more information into the public domain about all governments' efforts to manage risks. The traditions of secrecy endemic in the Westminster model have severely handicapped independent analysts in Canada. That is why it has not been possible to provide documentation to support the arguments in this paper. The fact that so little information is publicly available is *prima facie* cause for alarm. If risk management was being well done by government, ministers would have an incentive to shout the good news. In general, their silence is deafening.

By comparison, there is much more information about how the United States federal government is going about risk regulation. For example, on the matter of the costs and benefits of new regulations, Hahn (1996: 213) reviewed 92 regulations created by five American agencies between 1990 and mid-1995. He found that for 80 the benefits were quantified but for only 23 were they monetized. The cost or savings were assessed for 91 of 92 new regulations. As noted in section 3, while cost-benefit analyses of proposed major regulations has been required of all regulatory agencies since 1986, Mihlar (1997) shows that this requirement is seldom being met.⁹⁰ But this type of information is only part of what needs to be disclosed routinely about risk management in the federal government.

While disclosure is far from perfect in the United States, there is vastly more information routinely available there than in Canada. That is one of the reasons why there is so much more analytic and commentary literature in the United States on risk management by government. To summarize: without much more information disclosure by the federal government about its risk-management activities, it will not be possible to offer better critiques and more closely targeted suggestion for improvement. Lack of information may serve the interests of ministers but it does *not* serve the interests of the citizens—and they are the ones who really bear the risks.

To help to establish a *baseline* for future government policy toward risks, it would be useful to conduct a careful review of the current stock of risk regulation (and other actions by government to manage risks). This would include the following:

- a compilation of all statutes, regulations, and policy guidelines classified into the major categories of risk regulation (and other actions by government to deal with risks)
- estimates of the government's outlays for the administration of risk regulation in each major category
- estimates of the costs to the private sector of complying with the laws, regulations, and guidelines for each major category of risk regulation
- estimates of the benefits of government action in each category, e.g., lives saved, injuries and illness avoided, property damage avoided, and so on.

Ideally, the cost-benefit analysis should be sufficiently detailed to provide estimates of *incremental* costs and benefits associated with each major component of regulation within each category.

Each department or agency that engages in risk regulation should make public the following:

- the risk assessment protocol it uses in both crisis and routine situations (the Health Protection Branch already does this; see Health Canada 1993)
- a statement of its main risk-management policies including its priorities for future action and risk assessments for the proposed regulations if not included in the Regulatory Impact Analysis Statement (RIAS) as presently required by the Treasury Board.⁹¹

Remedy #4 More and better analysis that is externally reviewed and enforceable

The federal cabinet should live up to the policy established in 1986 to require departments and agencies to conduct a cost-benefit analysis of proposed new major regulations. As noted in section 3, this requirement has not been enforced—largely because cabinet ministers do not like to regulate their own behaviour and they occupy the apex of political power in Canada.

The federal government should require all departments or agencies engaged in risk management to prepare and publish promptly a formal risk assessment where it proposes major regulations as part of its risk-management activities. Further, the risk assessment should be subject to a peer review by a panel of independent experts, to be paid for, and published promptly, by the federal government.⁹²

The government should, as part of the CBA, require regulatory agencies to provide details on the distributional aspects of the risks to

be regulated. I expect ministers will be more interested in this part of the analysis than the efficiency issue.

Further, affected citizens should be given the necessary standing to seek judicial review where government departments and agencies fail to conduct a cost-benefit analysis of a major regulation. For the courts to exercise judicial review, the requirement to do a CBA for major regulations must be embedded in subordinate legislation. From 1986 to 1998, it was part of the Treasury Board's Administrative Policy; now it is merely a policy statement of the Privy Council Office (PCO).

Remedy #5 Try to anticipate risk controversies

The federal government should put in place a carefully crafted management protocol and team to deal with crises relating to risk-regulation issues. The objective is to reduce the odds that risk controversy crises will lead to government actions (e.g. new regulations) that embody egregious errors because of intense pressure from interest groups reflected in extensive coverage in the news media.

The federal government should devote more effort to anticipating risk-management problems before they "blow up in our faces." Some are rooted in new technologies. Some are rooted in changing values. Some may be due to changing demographics.⁹³ Powell and Leiss emphasize that "some astute forecasting capacity is absolutely essential, for timeliness is everything in effective risk communication: overcoming entrenched perceptions that are broadly dispersed in the social environment is a thankless task with almost no chance of succeeding" (1997: 219).

Here is a list of issues "likely to engender long-term endemic public controversies over the next ten years . . . food safety generally,⁹⁴ endocrine disruptors (including dioxins); greenhouse gases and global climate change; biotechnology, especially agriculture applications; and health impacts of atmospheric pollutants" (Powell and Leiss 1997: 220). To this list, one might add the following: electromagnetic fields surrounding wireless communications devices (see Royal Society of Canada 1998); level of taxes paid to finance the government pension plans; and a range of risks to health attributable to lifestyle choices.⁹⁵

Once future risk issues have been identified, it would be highly desirable to rank (even if very roughly) these prospective risks.⁹⁶ The goals are two-fold: to reduce the element of surprise and so be less subject to regulating under crisis conditions, and to avoid major errors such as committing large (huge!) amounts of scarce resources to obtain small reductions in very low probabilities of hazards to which only a tiny number of people are exposed.

Remedy #6 Rank risks and establish priorities for government action

To counteract the “risk issue of the month” syndrome or “risk panics” created by interest groups, the federal government should commission an independent study (about every three years), which would rank order a wide range of risks on a multi-dimensional basis for the purpose of assisting ministers in setting priorities for government action.⁹⁷ The analysis should reflect the ranking priorities of both experts and panels of ordinary citizens. The methodology for doing this is quite well developed (e.g., see Davies 1996; Science Advisory Board 1991). The study should be widely distributed (e.g., perhaps available on the Treasury Board’s website).

The ranking of environmental risks has been done twice in the United States by or for the EPA.⁹⁸ Both studies indicated that the priorities for government action suggested by experts and specialists were quite different from those of the most vocal environmental groups. Several states and cities in the United States have conducted a number of types of comparative-risk assessments (see Minard 1996). Note that most comparative-risk assessments (CRAs) distinguish (a) various risk issues in order of seriousness, (b) ranking of risk-issues problems in the order government should take action, (c) ranking the manageability of risk issues, e.g., in terms of existing public awareness, existing legal authority, existing control programs, and the costs related to government action. Of course, the rankings of risks can, albeit with more difficulty, reflect the richer characterization of risks often made by citizens (see, for example, Morgan et al. 1996).

Remedy #7 Adopt policies that facilitate individuated responses to risks

Why do the perceptions of many risks held by ordinary citizens (often described as “irrational”) constitute a public-policy problem? “Irrational” tastes for an enormous variety of goods and services are seen as an opportunity for business people and one of the virtues of a competitive market economy, which is able to do a remarkable job in satisfying highly diverse tastes (and budgets).

The great variability in the perception of the same risk across citizens is a strong argument for governments risk-management actions to consider first whether it can help to facilitate individuated responses to a given risk situation.

Government strategies to facilitate individual responses to risks would include the following:

(1) providing unbiased, accurate (as reasonably possible) information about risks (types of harms, probabilities, timing) so that individuals

can better decide what they want to do (this may include pressing the government for certain actions);

(2) providing similar information on the *exposure* of various groups in the population (e.g., by age, sex, location, occupation, etc.); and

(3) providing a list of possible actions individuals can take to reduce their *personal* exposure (hence risk), e.g.,

- using sunscreen to reduce the risk of skin cancer,
- buying insurance for houses, etc. on a flood plain,
- avoiding consumption of certain foods, drugs, etc.
- avoiding high crime areas, cities, etc. and purchasing products that have more safety precautions.⁹⁹

The point is that if there are big differences in the utility of certain risks and there are reasonable actions the *individuals* can take, then the case for a one-size-fits-all strategy by government is very weak.

It must be remembered that the biggest health risks by far are what are very largely *voluntary* life-style choices. For example, to reduce the risk of cancer, individuals can reduce or eliminate smoking, increase their consumption of fruits and vegetables, control infections, avoid intense exposure to the sun, increase physical activity, and reduce the consumption of alcohol (Ames and Gold 1996: 4). Most of the risks that seem to provoke the most fear may involve involuntary exposure but they also reduce the odds of a normal life span by very, very little. In other words, the fault lies not in the stars, but in ourselves.

Remedy #8 Greatly improve risk communication

The federal government must devote far more time, money, and skill to what is called risk communication but is better thought of as consultation with citizens throughout the whole enterprise of risk management. Risk communication must be moved to the centre of the risk management process¹⁰⁰ (see figure 2). “There is simply no cheap solution [for governments to deal effectively with risk controversies], and in an era of declining overall budgets this entails the reallocation of resources toward public communication efforts” (Powell and Leiss 1997: 219).

Using better risk communications to bridge the gap between the risk perceptions of experts and those of citizens does not mean simply trying to move the citizen’s characterization of risk closer to that of the experts.¹⁰¹ It also means having the experts assess risks using attributes found to have been most important to citizens. Closing the gap will be

Figure 2 Increasing the Role of Risk Communication in Risk Management



Source: Canadian Food Inspection Agency

difficult and may not even be possible. At the very least, it will involve an intensive, on-going dialogue (see Rollin 1995).

Better risk communications will not be a glamorous job. Each “victory” will be small and unlikely to be politically popular. Worse from the perspective of ministers, the benefits will usually be widely diffused. I believe that effective risk communication by government will involve, among other things, having cabinet ministers exercise leadership by actively engaging citizens and interest groups (notably the “danger lobby”) to discuss, explain, listen to fears and to get citizens to confront the complex policy choices involved in regulating risks.

Powell and Leiss (1997) frequently refer to the “risk-communications vacuum” in their compendium of studies of risk-management controversies. In doing so, they fall into a trap that they describe in the book, namely the misleading use of a familiar metaphor. What their studies show is not a vacuum, i.e., the absence of risk communication, but rather extensive communications by some actors (most notably the opponents of new technologies such as rbST)¹⁰² and a paucity of communications by government (most notably, the agency responsible for the regulation of the product in question.) It would be better to say that

their very useful case studies were characterized by a large asymmetry in the communication flows where official government sources are far less visible (and audible) than other participants.

Risk communication activities must be centred upon policy and decisions. These activities are not about conducting a seminar on the risk issues in question. They must be conducted with a clear appreciation of their likely impact on trust and credibility (see Peters, Corello, and McCallum 1997; Jungerman 1997; Slovic 1993). These vital attributes are hard to achieve and easy to lose. There is no “silver bullet”—even if the budget were unconstrained—and searching for one is certain to delay the adoption of strategies likely to be useful in addressing the complexities of risk controversies. The need to settle in for the long haul and to stay the course with what seems to be a substantial commitment of resources is not the natural forte of cabinet ministers. Not only is the policy unglamorous, the time horizon is all wrong in terms of the political oestrous cycle.

Government regulators with the mandate to deal with the risk issue are also responsible for effective risk communication. Thus, they must confront “the issues as they are posed in society, not [only] how they appear in science-based risk assessments” (Powell and Leiss 1997: 224). Therefore, government will have to face up to the charge that its “attempting to manipulate the public.” Countering misinformation, disinformation, illogical arguments, and schools of red herrings hardly qualifies as “manipulation.” But, when an issue is highly contentious, some participants will use any weapon at hand. Advancing the public interest in the best sense of that term often requires government to be constructively engaged with the other actors in the political arena.

Leiss and Chociolko (1994) suggest that effective risk communication requires, at a minimum, that (a) the assumptions underlying the government’s risk assessment be made clear, (b) the nature of the public’s concerns be understood by government decision makers, and (c) a government agency take responsibility for the government’s risk communications efforts and attempt to forge a consensus about what actions should be taken.

Powell and Leiss (1997: 30) argue that good risk-communication practices involve, among other things:

- “translating” the science into terms understandable by the general public;
- explaining the uncertainty ranges, knowledge gaps, and ongoing research programs that characterize a risk controversy;
- addressing the issue of credibility and trust;

- understanding the public as opposed to the expert “framing” of the risk issue;
- providing, as far as possible, answers to questions that arise in this domain; and
- establishing the kinds of interactions between the organization and the public appropriate to the issues at stake.

The United States Environmental Protection Agency’s (EPA) rules for risk communication seem obvious and simple but they are often ignored. (1) Accept and involve the public (early) as a legitimate partner in risk management processes. (2) Plan carefully and evaluate the performance of risk-communication strategies. (3) Listen to your audience including the emotions and symbolic meanings. (4) Be honest, frank and open (information, trust, and credibility are the keys). (5) Coordinate and collaborate with other credible sources. (6) Meet the needs of the news media—they are the source of most of the information on risks obtained by citizens. Speak clearly and with compassion using language ordinary people can understand. Use comparisons to provide perspective, particularly those which respond to the distinctions the public usually makes.¹⁰³

Improving the federal government’s risk communication will be a difficult task. At least three factors are likely to limit efforts to improve risk communication: lack of knowledge of *how* to do it; citizens’ lack of trust in government generally; and the idea that more risk communication could be perceived as another attempt by government to manage the news. See Appendix 2.

5 Conclusions

In this section, I will do three things: outline in skeletal terms the central argument in this paper, summarize my recommendations for the federal government to improve its management of risks, and sketch the federal government’s most recent effort to improve risk management—in Health Canada. The key elements of my main argument are as follows.

- (1) The management of a wide variety of risks is a very important part of the federal government’s activities.
- (2) The government’s risk management activities, particularly those relating to risk regulation, are subject to a number of “routine pathologies.” They are
 - insufficient or poor economic analysis;
 - no guidance (from the Treasury Board) on the economic value of life;

- idiosyncratic or haphazard selection of risks for government action;
- “silo management” or a lack of “horizontal mechanisms” to implement a general risk management policy across a score of specialized departments and agencies;
- government actions too often based on the preferences of the most fearful;
- one-size-fits-all types of government action to deal with risks;
- potential misuse of the precautionary principle; and
- poor risk communication.

(3) It appears that the most important causal factor underlying these pathologies is the well-documented gap between the perception of experts of a wide variety of risks and that of ordinary citizens. In general, citizens have a richer characterization of risk issues than do experts (but experts have conducted much useful research into the ways citizens perceive risks). In many (perhaps most) risk controversies, the government adopts a characterization closer to that of citizens (often shaped by aggressive interest groups).

(4) The gap presents a problem for governments primarily in those circumstances where government must take coercive action such as regulation aimed at reducing risks. Where government actions focus on helping individuals to respond more effectively to risks, for example, by providing useful information, there is no coercion.

(5) Efforts to improve the management of risks by the federal government should take two principal forms: (a) improvements in risk communication focusing on closing the gap and (b) actions to remedy directly the specific pathologies identified above.

(6) Improving the government’s risk communication will be difficult for several reasons: lack of knowledge about the risk communication (despite a considerable and growing literature), lack of trust in government generally, and the possibility that better risk communication will be perceived more as an effort at news management by government than as genuine communication.

(7) Effort to address the pathologies of risk regulation will require government to take a long-run perspective (i.e., far beyond the current electoral circle) and require cabinet ministers to exercise leadership (often in short supply).

(8) Specifically, the following actions should be taken by the federal government to remedy the other routine pathologies of risk management:

- (a) Create a number of “horizontal mechanisms” to combat “silo-management”:
 - establish a government-wide risk-management policy to guide the many departments and agencies which design and implement government actions on risk issues;
 - apply to risk management activities the same sort of oversight as Treasury Board now applies to expenditures; and
 - create a “risk-reduction budget,” to rationalize society’s mandated expenditures for risk reduction.
- (b) Increase the amount of information routinely disclosed about risk-management activities (e.g., risk-assessment protocols, risk-management policies, and risk assessments).
- (c) Mandate more and better analysis of risks e.g., risk assessments, and cost-benefit analysis, which is already required but not enforced. In addition, both types of analysis should be subject to independent peer review. Citizens should also be allowed to seek judicial review to enforce these provisions.
- (d) Try to anticipate (and manage better) future risk controversies by forecasting.
- (e) Make a systematic effort to rank risks in terms of their importance and establish priorities for government action.
- (f) Adopt policies that facilitate individuated responses to risks.

Finally, citizens and experts should not be too sanguine that these apparently reasonable ideas will be adopted. But, stranger things have happened. That is why the study of the management of risks is so interesting and also so frustrating.

In mid-1998, the federal government launched a review of its extensive health-protection legislation, an enormous body of risk regulation. Extensive consultations were held in the fall of 1998 and a report on these was issued in April 1999 (Health Canada 1999b). In mid-1999, the government decided to slow down the proposed pace of change (Kennedy 1999). There is to be another discussion paper in the winter of 1999 or spring of 2000 before revised health-protection legislation is introduced. Thus, it could be several years before it passes Parliament.

The consultations indicate that Canadians have extraordinarily high expectations for the Health Protection Program. The dominant messages included the following: (a) health and safety must take pre-

cedence over economic and other considerations; (b) Health Canada should be more accountable to the people of Canada; (c) HPB's activities and decision-making processes need to be more transparent to the public; (d) Health Canada needs to explain better the methods it uses to manage health risks; (e) industry's goal is generally not deregulation but the updating of existing regulations to reflect contemporary conditions better (Health Canada 1999b: vi).

The federal government proposes to separate clearly risk assessment, which defines the nature and degree of risk based on scientific evidence, and risk management, which develops and implements appropriate government interventions. The latter "needs to take account of other things besides science, including gender, social, economic, cultural, political and policy considerations" (Health Canada 1999b: 3). The government indicates that "there is no universally acceptable level of risk" and that Health Canada should take into account "the different needs, values and perspectives of women, cultural minorities, seniors, children and other groups, each of which may be affected differently" (Health Canada 1999b: 3). Aside from a fulsome expression of political correctness, what does the last statement mean? Does it mean that where, say, women¹⁰⁴ rather than men are exposed to a certain risk, that policy will closely reflect their risk preferences? But what if—as one would expect—there are big variations in the degree of risk aversion across women? Which particular level will be chosen? What if a risk affects several of the named groups of particular concern to the federal government? Will Health Canada try to supply a differentiated policy—one that varies with each group's perceptions of the risk in question? How will it do this in a practical sense? Would the differentiated policy stand up to a challenge under the *Charter of Rights and Freedoms*.

It is good to hear that Health Canada (1999b: 5) "must be considerably more active in the area of risk communication." The paper suggests that the content of such communication will include the nature and extent of health risks, the methods used to assess such risks, the results of the assessment, the level of confidence in the assessment, the factors taken into account in the development of the risk strategy and the margin of safety afforded by government action. If implemented, this approach has much to commend it. But, I find it hard to believe that had the policy been in place in 1998, that Health Canada would tell Canadians frankly about the *political* calculus that underlay its decisions with respect to the allegedly toxic teething rings and children's toys during the risk scare raised by Greenpeace (see Stanbury et al. 2000).

It is good to see that Health Canada recognizes that "effective communication is especially important in cases where the public perceives a risk to be high, although scientific assessment might show a

moderate or low level of risk” (1999b: 5). Realistically, to deal with risk scares induced by interest groups, the federal government will have to take a far more active role in combatting information that is incomplete, distorted, or misinterpreted by activists. This will require a major change in policy—one that can only be effected by the cabinet. So we are back to the matter of political leadership, something that always appears to be in short supply. It appears that both ministers and senior officials in Ottawa have a growing interest in improving the government’s extensive risk management efforts. As of April 2000, a number of initiatives were underway that may bear fruit in time (see ADM Working Group on Risk Management 2000).

Appendix 1 Classification of risks subject to government intervention

Transportation-related

- automobiles
- motorcycles
- trucks
- railroads
- ships and barges (including non-commercial)
- watercraft or pleasure craft
- pipelines (oil, gas, commodities)
- electricity (electromagnetic field around major power lines)

Environment-related

- climate change and global warming
- air, water, and land pollution
- timber harvesting practices
- toxic and hazardous chemicals (including pesticides)
- migratory birds
- wildlife habitat

Hazardous products

- automobiles and small trucks (seatbelts, bumpers, high rear-mounted stoplights, daylight running lights)
- drugs (for humans and animals)
- medical devices
- pesticides
- children's toys, clothing, cribs, car seats, teethingers
- explosives
- pleasure boats (including personal water craft such as "Seadoos")
- tires

Plant and animal health

- harm to animals from growth hormones
- living conditions for animals
- infectious diseases

Financial or economic risks

(a) Related to financial instruments and institutions

- securities (debt and equity)

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- banking and other financial institutions (which accept deposits)
- insurance companies
- pension plans
- deposit insurance

(b) *Related to purchase of products*

- product labelling (including trademarks)
- weights and measures
- misleading advertising
- deceptive marketing practices
- quality assurance, e.g., birth control devices
- efficacy of drugs (versus harmful effects)
- efficacy of professional services

(c) *Related to income level and flow*

- employment insurance (was UI)
- Canada Pension Plan; Old Age Pension
- welfare payments (various income transfers)
- worker's compensation
- crop insurance
- disaster relief (*ad hoc*)

Risks related to resource exploitation

- Regulation of the utilization of renewable resources: fish, timber, water, wildlife
- Regulation of non-renewable resources:¹⁰⁵ petroleum (e.g., failure to recover the maximal economically recoverable amount); natural gas; minerals.

Food-related

- prevent contamination in production and distribution of food
- chemicals used in processing or in growing animals or crops for food
- pesticide residues on food
- bovine growth hormone in milk
- irradiation of food

Occupation-related¹⁰⁶

- accidents
- job-related diseases, e.g., miner's lung
- job-related disabilities, e.g., carpal tunnel syndrome

New (high) Technology

- biotechnology, e.g., synthetic hormones
- genetic engineering, e.g., cloning
- new information technologies used to deliver government programs

Nuclear power-related

- reactor accidents with release of nuclear materials
- storage of spent fuel rods
- mining of uranium
- water pollution (heat)

Other Safety-related Risks

(a) Infrastructure (some overlap with transportation-related category)

- dams
- bridges
- electric power lines
- roadways
- natural gas lines

(b) Exogenous risks

- weather (hurricanes, ice storms, tornados, floods, drought)
- earthquakes
- nuclear accident in other countries
- forest fires (due to lightning)

Security-related

(a) National security

- defence against invasion or attack by other means (e.g., missiles)
- protection against subversion from within

(b) Personal (physical) security of citizens

- police, to maintain domestic order
- fire prevention and suppression

Rights-related

- human rights (including the *Charter of Rights and Freedoms*)
- collective bargaining
- humane slaughter of animals

Appendix 2 Problems in trying to improve risk communication

Here I review three factors that are likely to limit efforts to improve risk communication: (1) lack of knowledge of *how* to do it; (2) citizens' lack of trust in government; and (3) the idea that more risk communication could well be perceived as another attempt at news management by government.

1 Lack of knowledge

While there is a quickly growing literature on risk communication¹⁰⁷ (the term was first coined in 1984), it is fair to say that our knowledge of how to do risk communication *effectively* is still quite limited. There is no clear formula for which there is a high probability of success. Generally, see Gutteling and Wiegman 1996.

For example, one aspect of improving risk communication is helping citizens gain some perspective on risks more generally during the heat of a particular risk controversy. This means comparing various risks; but comparing risks is a difficult task.¹⁰⁸ The degree of acceptability to the public of various types of comparisons varies a great deal. However, this information should not be taken as creating a set of absolute constraints. Rather, the public's views about comparing risks should be treated as part of the gap between experts and the general public that is to be addressed by improved risk communication.

2 Citizens' lack of trust in government

A growing number of writers on risk management, particularly risk communication, emphasize the importance of trust in efforts to communicate with the public about situations perceived to be fraught with risk (see Slovic 1993). If this is so, it is no wonder that governments' pronouncements of risk issues may be treated with scant respect by citizens. They are affected by the significant decline in confidence in almost all of society's institutions over the past three decades.

Further, critics (and ordinary citizens) can point to plenty of examples where governments have a questionable record of dealing with risk issues (see Powell and Leiss 1997). One of the larger recent scandals is the failure of the federal government in regulating the Red Cross as administrator of the national blood system: the Krever Inquiry found that not only were top officials of the Red Cross negligent but also that Health Canada's top officials and ministers failed to supervise the Red Cross properly. The result was that Canada's blood supply became con-

taminated with HIV and Hepatitis C. The federal and provincial governments' latest offer of compensation (at taxpayer's expense) totals \$1.1 billion but the final bill will be more.

Official government pronouncements on risk issues are usually influenced by cabinet ministers' strong desire to put a positive spin on almost all issues. In general, our political leaders abhor "bad news" because they feel that voters will punish them for "telling it like it is." They appear to have some justification—just think about the fate of candidates and parties that told voters during election campaigns that if elected they would raise taxes or cut services.¹⁰⁹

It must be appreciated that ministers face an institutionalized opposition that interprets its role as doing almost everything it can to "tear the guts out of the Government" (with a view to replacing it forthwith or at the next election). Also, there is some evidence to suggest that some elements in the news media see themselves as the true opposition to the Government of the day rather than neutral purveyors of facts. It must be kept in mind at all times that the press (print or electronic) is in the competitive business of delivering audiences to advertisers. The market for "infotainment" is larger and more lucrative than that for detailed dispassionate reportage. Thus the emphasis on scandals, disasters (natural and man-made), personalities (particularly the unhealthy attributes thereof), and all manner of "bad news."

Why should citizens believe government statements about the risks of various hazards when it has become routine for federal ministers of finance to manipulate the numbers in the (tax) budget to create a certain picture or image (and hence to shape expectations). Government itself is at least partly responsible for the "credibility gap." "Spinning" by ministers and their paid helpers has become a major activity (see Fox 1999). Substance counts for little. The game (and that is the correct description) is one of "impression (or image) management."

Governments cannot routinely attempt to con the public and reasonably expect to be believed on other occasions when they deem that "it really matters." The problem for governments seeking to improve the management of risks is this: improvements in risk management depend in part on increasing citizen's trust of the experts and risk analysts employed by government,¹¹⁰ but governments routinely act in ways which cause citizens to distrust them. How is the circle to be squared?

3 Is more and better risk communication just another attempt at news management by government?

For governments, the objective of the elaborate and expensive communication efforts is *management* of the news that the public relies so heavily upon for its understanding and opinions of the world. The

central goal is to convey certain impressions or images rather than to convey substantive content. There is a conflict between scientific inquiry, which flourishes only when information flows are not constrained,¹¹¹ and the responsibilities of senior officials. To serve the interests of ministers, they are expected to manage the flow of information relevant to policy-making.

In Canada, the failures of government efforts to communicate with the public (usually via the news media) are more subtle than flat-out lying. Rather it is a matter of the following:

- (1) Information is used in a selective fashion (namely that which supports the government's position).
- (2) Great emphasis is placed on those facts that tend to make the government look good (or least bad).
- (3) The whole story is not always told, at least at one time. The details are often discovered and revealed publicly and, then, reluctantly acknowledged by government spokespersons. In general, this involves papering over embarrassing information by resorting to the claim of confidentiality.
- (4) "Bad news" is made public when it is least likely to obtain much visibility in the news media.

Spin is central to government's efforts to manage the news. The concept of spin by government officials and spokespersons has become so common that Howard Kurtz, in his new book, *Spin Cycle* (331 pages), nowhere defines "spin" or "spin cycle."¹¹²

What is spin? In general, it involves efforts by a newsmaker (or by someone on his behalf) to directly or indirectly influence how what he has said or done will be portrayed in the news media. Overall, these efforts attempt to obtain a more favourable interpretation of what has been said or done.

It appears that when the press focuses on government activities there is a "battle" over the competing messages to be sent to the public. It is frequently argued (e.g., Kurtz 1998) that in covering the government the press wants to focus on scandal, error, malfeasance, misfeasance, embarrassment to the powers that be, and inconsistency by policy makers. On the other hand, the politicians in power want to use the news media to deliver their own message and not to stray from that message despite intense pressure by reporters. They want the press to report their accomplishments and to project an image of caring and compassion as well as to project competence and being on top of breaking issues.

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Notes

- 1 The literature dealing with basic ideas about risk includes Adams 1995; Bayerische 1993; Bernstein 1996; Douglas and Wildavsky 1982; Douglas 1992; Fischhoff, Watson, and Hope 1984; Rescher 1983.
- 2 Accidents were the leading cause of death in 1996 for persons under the age of 44. The most important categories were motor vehicle accidents (38 percent), falls (31 percent), poisoning (9 percent), drowning and suffocation (5 percent), and fires (4 percent) (McIlroy 1999: A3). In the twentieth century, the life expectancy of Americans has increased from 48 to 73 years for men and from 51 to 80 years for women (Crossen 1996: B1).
- 3 These include hang gliding, mountain biking, flying ultralight aircraft, some types of snow boarding, heli-skiing, and para-sailing. See Buhasz 1999 and Canadian Press 1999.
- 4 One might interpret a good part of government efforts to deal with risks as a response to rent-seeking behaviour.
- 5 For another classification that focuses on health and safety risks, see Powell and Leiss 1997: 218.
- 6 It must be noted that some environmentalists promote the idea of biocentrism, namely that man should not be given a higher priority than other living things. Indeed, for some environmentalists, man is seen as inherently destructive of the natural environment.
- 7 Risk regulation in some form goes back over a century in Canada. For example, federal health-protection regulation began in 1875 with provisions aimed at preventing the adulteration of food, beverages, and drugs (Aubuchon 1999: 1). Generally, see Priest and Wohl 1980.
- 8 Generally, see Anon. 1993; Brunk, Harworth, and Lee 1991; Cumming 1981; Finkel 1990; Garrick and Gekler 1991; Graham and Rhomberg 1996; Hadden 1984; Hallenback 1993; Lave 1982; Molak 1996; Morgan 1993; Morgan and Henrion 1992; Nichols and Zeckhauser 1986; Presidential/Congressional Commission on Risk Assessment and Risk Management 1997; Wilson and Crouch 1987.
- 9 Risk management is not, as suggested by Health Canada (1998a: 15) in its white paper for the renewal of health protection legislation, "a scientific process for identifying health hazards and deciding what to do about them." Although science dominates the risk assessment component of

- risk management, other normative elements are necessarily present. The scientific paradigm is itself a normative proposition based on the norm of rationality (see Rollin 1995). Unfortunately, rationality is under siege in various areas these days.
- 10 See, for example, Covello and Mumpower 1985; Fischer et al. 1991; Keeney 1984, 1990; Konheim 1988; Kraus et al. 1992; Lund 1995; McDaniels et al. 1992; Mertz et al. 1998.
 - 11 These were officially categorized in 1980 and now estimated to be the most common form of mental illness among Americans, afflicting some 23 million people.
 - 12 Recall the grim joke to the effect that one nuclear event can ruin an entire day.
 - 13 “And yet imagination, especially about the future, is precisely the engine that drives so many fears—fear of the unknown, fear of nuclear holocaust and in recent years—fear of contracting AIDS” (Hall 1999: 45). Greenpeace created fear about the leaching of softeners used in some children’s teethers and toys. See Stanbury et al. 2000.
 - 14 A very useful discussion of a variety of risk controversies is contained in Neal and Davies 1998 and Powell and Leiss 1997.
 - 15 Generally, see Fischer et al. 1991; Fischhoff 1991, 1994, 1995; Gilroy 1993; Howard 1984; Jasanoff 1993; Johnson and Covello 1987; Kasperson et al. 1988; Kasperson and Kasperson 1996; Keeney 1994; Kraus et al. 1992; Powell 1998; McDaniels et al. 1992; Mertz et al. 1998; Nelkin 1985; Shrad-er-Frechette 1991; Slovic 1987, Slovic et al. 1985a, 1987; Slovic, Fischhoff, and Lichtenstein 1979, 1982; Slovic, Flynn, Mertz and Mullican 1993.
 - 16 There are, however, some attributes of a hazard (risky situation) that are largely objective.
 - 17 The federal Health Protection Branch risk-assessment framework since 1993 sets out the following criteria for the analysis of options for public policy: (1) weighing of health risk against health benefits, uncertainties in the risk estimates, or application of such principles such as ALARA (“as low as reasonably achievable”) or *de minimis* (i.e., the risk is too small that most people are uninterested in giving up the risk-producing activity); (2) individual and societal perspective on the issue; (3) public’s perception of the risk; (4) feasibility of the proposed options, their economic and environmental impact; and (5) societal, political and cultural implications of each option (Health Canada 1993).
 - 18 These debates may create an ever greater degree of cognitive dissonance among the general public.
 - 19 Generally, see Iyengar 1991; Schon and Rein 1994; Tannen 1993.
 - 20 The way an issue is framed need not be static; it can evolve over time. Therefore, the way a risk problem is conceptualized changes.
 - 21 See the discussion under Pathology #8, Section 3.
 - 22 Note that an American study found that women scientists find the world to be a riskier place than do their male counterparts (Strauss 1995: A3).
 - 23 There are some notable exceptions: (a) risks of small probability whose adverse consequences are large and irreversible (e.g., nuclear plant melt-

- down), (b) the minimax rule is used where our knowledge of a risk is subject to serious uncertainty (see Fraiberg and Trebilcock 1998).
- 24 The most fearful risks are those that create the greatest disutility for the individual where utility incorporates all attributes relevant to the individual.
 - 25 See Chociolko 1995: 19–20; Rollin 1995. Experts have biases, to be sure, but then so do lay persons, even if we simply label theirs as a richer characterization of risks. The real issue is which set of biases will be given more weight.
 - 26 On the problems with comparing risks, see Slovic et al. 1990; and the discussion in Gutteling and Wiegman 1996: 135–38. The latter also discusses the use of graphic aids in making comparisons (135–42).
 - 27 Generally, see Arrow et al. 1996; Lave 1996; Leonard and Zeckhauser 1986.
 - 28 See Mihlar 1997. Fraiberg and Trebilcock (1998) propose that federal departments and agencies be given a set of core assumptions upon which to base the mandatory cost-benefit analysis for major new regulations. Also, they propose that the CBA be subject to a notice and comment period and a peer review, which would be published.
 - 29 This history up to early 1997 can be found in Powell and Leiss 1997.
 - 30 This went on sale in the United States in February 1994.
 - 31 Health Canada itself had made this determination in 1986 (Powell and Leiss 1997: 125).
 - 32 According to a news release from Health Canada (1999a), there is “an increased risk of mastitis of up to 25 percent, of infertility by 18 percent and of lameness by up to 50 percent. These increased risks and overall reduced body condition lead to a 20–25 percent increased risk of culling from the herd.” Note that the criteria for not approving a new veterinary product in Canada include harm to animals.
 - 33 The Expert Panel of the Canadian Veterinary Medical Association, set up at the request of Health Canada, reported that rbST increased milk yield an average of 11.3 percent in primiparous cows and 15.6 percent in multiparous cows (CVMA Expert Panel 1998).
 - 34 Note that because the decision on rbST did not involve a new regulation, Health Canada did not have to conduct a cost-benefit analysis. See Health Canada 1999a.
 - 35 Note, however, that discussions with senior officials who administer the policy indicates that the concept of efficiency adopted by the government is far more elastic than what economists mean by the term.
 - 36 The Regulatory Affairs Directorate (1995) defines a new major regulation as one (a) for which the estimated present value of costs is over \$50 million or (b) the present value of costs is from \$100,000 to \$50 million and the “degree of acceptance” is deemed to be “low.” It appears that the costs in this context include income transfers (see Consulting and Audit Canada 1995).
 - 37 It should be noted that the manual prepared by the Canada Consulting Group (1995) to assist government officials in applying CBA to new regulations has notable flaws related to the definition of true social costs and social benefits as opposed to taxes and income transfers.

- 38 For example, no estimate of the total benefits was made for the three sets of water-pollution regulations applied to the pulp and paper industry effective May 1992 despite an estimated social cost of almost \$5 billion. See Stanbury 1992: 146.
- 39 A few studies for the federal government have used a specific number. For example, Abt Associates (1986) in a CBA for the federal government stated that the value of a life saved lies in the range of \$1 million to \$10 million. In Abt Associates 1988 a value of \$5 million was used. Transport Canada (1985, 1986a, 1986b) used a value of \$325,000 (in 1985 dollars) based on the “minimum cost of a road accident” involving a fatality. This number was not intended to be an estimate of the economic value of a statistical life.
- 40 The range reflects differences in the type of risks studied to ascertain the willingness of individuals to pay to reduce a small risk or the amount demanded to accept slightly higher risks.
- 41 Because so few proper cost-benefit analyses are performed in Canada, it is not possible to provide Canadian examples.
- 42 Tengs and Graham (1996: 172) found that 185 life-saving interventions in the United States averted about 56,700 premature deaths (592,000 life years) annually at a cost of \$376,000 per life saved. They show that if the total “budget” of \$21.4 billion was spent in the most cost-effective fashion, an additional 60,200 lives could be saved at an average cost of \$183,000. If the analysis is done to maximize the number of years of life saved when a premature death is prevented, the same budget would save 1,230,000 years of life annually—an increase of over 100 percent.
- 43 Tengs and Graham (1996: 178) propose the following rule of thumb: invest in all interventions to save lives costing up to US\$5 million per life saved and none in interventions costing more.
- 44 Graham says that American government policy toward risks is characterized by “a syndrome of paranoia and neglect” (1996: 184).
- 45 This is the term Tengs et al. (1995) apply to the American government’s investment in life-saving interventions.
- 46 The Delaney Amendment passed by the United States in 1957 requires the federal government to ban from processed food any trace of synthetic substances implicated as human carcinogens. It ignores natural carcinogens that may pose vastly greater hazards. When the Amendment was passed, it was assumed that environmental exposures to synthetic chemicals accounted for up to 90 percent of all cancers. Further, instruments could only measure parts per million. Today, better information indicates that such chemicals account for a tiny fraction of cancers and instruments can detect parts per quadrillion. In 1993, the Clinton Administration proposed to amend the Delaney Amendment to incorporate the test of “negligible risk” as proposed by the National Academy of Sciences (see Easterbrook 1995: 447–48).
- 47 Recently, Ames and Gold have said that pollution appears to account for less than 1 per cent of human cancer (1996: 4). Tobacco accounts for about one-third of cancer (and about one-quarter of heart disease) (1996: 9).

Note, however, that in Canada the federal and most provincial governments have imposed very high taxes on cigarettes with the stated objective of reducing consumption.

- 48 Based on figures for the United States. The figures for Canada would be comparable. Gratt indicates that the estimated number of annual cancer cases caused by a pollutant in the United States is from 1,726 to 2,706 (1996: 253). These include some of the most strictly regulated substances, e.g., acrylonitrile (13), arsenic (68), asbestos (88), benzene (181), coke-oven emissions (7), dioxin (2 to 125), vinyl chloride (25), hydrazine (6), and trichlorethylene (7).
- 49 While we do not have comparable data for Canada, I note that Viscusi's (1992) summary of 33 risk-reducing regulations created between 1980 and 1989 in the United States indicated that the number of lives saved per year ranged from 0.001 to 1,850. For 25 of the regulations, the number was less than ten per year; for 11, the number was less than one per year.
- 50 For example, the air navigation system alone costs about \$900 million per year.
- 51 Vancouver Sun, March 23, 1999: B2, reporting Transport Canada data.
- 52 Vancouver Sun, March 23, 1999: B2.
- 53 In 1994, all transport-related deaths amount to only 26 percent of all deaths in Canada due to "external causes." But, this category includes suicides and homicides, which account for 32 percent of all "external causes" of death. Thus, all accidental deaths (8,591 in 1994) accounted for only 4.3 percent of all deaths in 1994. Given the government's intense focus on accidental deaths, it appears that it is working on problems whose incidence is tiny to modest in the larger scheme of things.
- 54 On setting priorities for risk reduction activities, generally see Applegate 1992; EPA 1987; Grabowski and Vernon 1977; Lave et al. 1994; Moffet 1996.
- 55 Note that in parts of Africa and India, AIDS is a vastly more important cause of death. See National Post, April 14, 1999: A17.
- 56 One could also make the comparison between AIDS and prostate cancer. In 1996, about 18,200 men were diagnosed and about 4,000 will die from the disease (see Trevor Lautens column, Vancouver Sun, November 2, 1996: A19).
- 57 In 1994, Ottawa spent \$43.4 million on AIDS research versus \$4 million on breast cancer (see Bueckert 1995).
- 58 By 1998, the number was up to 11,400 (see Globe and Mail, December 2, 1998: A7). Therefore, the comparable number of deaths due to breast cancer would be 70,000.
- 59 1,489 men and 139 women. See Statistics Canada 1996.
- 60 The National Cancer Institute of Canada (1998) put the average lifetime probability of a woman developing cancer at 0.35 and the risk of dying of cancer at 0.224. For breast cancer, the figures are 0.108 and 0.04 respectively—the highest of all types of cancer. The figures for lung cancer by comparison are 0.047 and 0.042 respectively.

- 61 For example, an AIDS activist argues that the much higher spending per death on AIDS research is justified because AIDS is not just another disease: "it's a disease without a cure; its relatively new; there are comparatively fewer treatments available for people affected by HIV diseases." John Chenier, editor of *The Lobby Monitor* suggests that "the funding [of various diseases] reflects the power of those not only who have the disease, but those who fear the disease, and those who are prepared to re-search it. All of those groups have lobbies" (Bueckert 1995: A9).
- 62 It is hard to avoid the conclusion that, in the most general terms, old age is by far the most important cause of death in Canada: in 1994, three-quarters of those who died were 65 or older and almost 39 percent were over age 80.
- 63 Note that 56 percent of males and 38 percent of females who died in 1993 were less than 75 years of age.
- 64 The data for the United States can be found in Gratt 1996: 249.
- 65 I refer to the two efforts by or for EPA; see Science Advisory Board 1991; EPA 1987. Efforts by American states are described in Minard 1996.
- 66 For example, The Health Protection Branch of Health Canada employs 2,922 people (two-thirds of whom are scientists and science-support staff) and spends about \$230 million annually (Aubuchon 1999: 2). Activities relating to the Food and Drugs Act account for one-third of HPB's budget. Between 1994/1995 and 1998/1999, HPB's budget was cut by only 8 percent compared to 32.9 percent for Environment Canada, 30 percent for Fisheries and Oceans, and 58.4 percent for Natural Resources.
- 67 Transport Canada website: tc.gc.ca, Transportation of Dangerous Goods.
- 68 Transport Canada, Performance Report, 1996/97 (website: tc.gc.ca).
- 69 The good news is that the federal government is beginning to examine the issue of risk management (see ADM Working Group on Risk Management 2000). In the United States, the EPA made an effort in 1989 to rank risks with a view to establishing priorities for further regulation. See also Science Advisory Board 1991. In general, environmental groups have been critical of these efforts.
- 70 Regulations are used to implement all governing instruments. Regulation consists of government-made rules backed by penalties designed to modify the economic behaviour of individuals or organizations in the private sector.
- 71 For the Health Protection Branch's protocol, see Health Canada, 1993. It is being updated; see Health Protection Branch 1999. See also Scofield 2000.
- 72 It is possible that the benefits outweigh the costs but there is no way of knowing this at present in Canada.
- 73 The initial steps for a regulatory budget (easily adapted to a risk-reduction budget) for the federal government are set out in Stanbury 1992: 186-87.
- 74 The fear of risks is more complex than can be described by conventional measures of risk aversion. I use the phrase to refer to sum of the richer characterization of risks employed by ordinary citizens described in section 2 above.

- 75 See Neal 1999; Neal and Davies 1998; Stanbury et al. 2000. "Any group that's lobbying for money is going to try to maximize the number of deaths from their particular malady," according to math professor and author of *A Mathematician Reads the Newspaper*. He continues, "Then the numbers are often stated baldly, without context, definition or how they're arrived at" (Crossen 1996: B1). A good example is a 1996 cover story on prostate cancer in *Time* magazine. It stated that men have one chance in five of getting prostate cancer. But, this is the risk over a lifetime (almost 80 years). For a man aged 40, the risk of getting this form of cancer (not dying of it) in the next ten years is .001; over the next 20 years, it is .01. Even at age 70, the risk of getting prostate cancer is .05. The data show that men are far more likely to die of heart disease (Crossen 1996: B1). Greenpeace's efforts to obtain a ban on children's toys and teethingers made of PVC containing phthalates by the use of fear is described in Stanbury (Stanbury et al. 2000b).
- 76 The archetypes are Ralph Nader and, on health issues, Jeremy Rifkin.
- 77 See Federal Focus Inc. 1991: table C-2; Hahn 1996.
- 78 The term "moral hazard" comes from the insurance industry and refers to the idea that insured persons may be able to influence the timing, frequency, or size of payment(s) by their insurance companies. In this example, hikers would not pay the full cost of their rescue and so would not have the greatest incentive to avoid getting lost.
- 79 I have been told that a similar policy prevails in Switzerland for hikers who need to be rescued.
- 80 A more extensive list can be found in VanderZwaag 1996.
- 81 "A zero risk policy is the functional equivalent of exorcism" (Powell and Leiss 1997: 223).
- 82 See Cross 1996 and Graham and Weiner 1995 on risk-risk tradeoffs.
- 83 They note that the federal government's few statements on dioxins raise more questions than they answer and that there are inconsistencies among them (see Powell and Leiss 1997: 73-74).
- 84 The subsequent near hysteria in Canada when the United States decided to permit the export of PCB-laden wastes for disposal shows that the federal government's handling of risk communication in this area has not improved.
- 85 In practical terms, this means that the cabinet will have to act to put new institutions and policies in place early in its mandate. This means that senior public servants (largely Privy Council Office) will have to have detailed plans drafted before a new government takes office.
- 86 The first three criteria were previously proposed by Rescher (1983).
- 87 Some differentiation in terms of details or extension of the standard components will be necessary to meet the needs of particular departments and agencies.
- 88 This point comes from Graham 1996.
- 89 See Tengs and Graham 1996.
- 90 There is a notable exception. The Department of Transport has done an outstanding job of conducting a CBA for proposed new regulations

- relating to automobile safety, e.g., seat belts, side-door impact beams, daylight running lights, and high, rear-mounted stop lights.
- 91 In 1999, the responsibility for administering the Regulatory Impact Analysis Statement and other aspects of the regulations-making process was shifted to the Privy Council Office (PCO).
 - 92 This was also proposed by Fraiberg and Trebilcock (1998).
 - 93 For example, if the number of persons in their child-bearing years increases, government can expect more demands to ensure the safety of children.
 - 94 The flurry of newspaper stories in 1999 on genetically modified (GM) foods is an example. See Abergel et al. 1999; Dyer 1999; Johnson 1999; Kravis 1999; Munroe 1999; Powell 1999. Further, GM foods have been the focus of a major risk scare in the United Kingdom. See Neal 1999.
 - 95 The US Surgeon General's top six priorities for saving lives and preventing disease all involve change in the individual's lifestyle: stop smoking, reduce consumption of alcohol, eat less and eat smarter, have periodic checkups for major disorders, and use seatbelts and obey speed limit (Huber 1991: 159–60).
 - 96 For more suggestions, see Bennett and DiLorenzo 1998; Wolf 1992; Heubner and Chilton 1998.
 - 97 A survey of 1000 American citizens by the Harvard Center for Risk Analysis in November 1993 found that over 80 percent agreed that “the government should use risk analysis to identify the most serious environmental problems and give them the highest priority in spending decisions” (*Risk in Perspective* 2, 1: 1994).
 - 98 See EPA 1987; Science Advisory Committee 1991.
 - 99 Airbags are not mandated by Transport Canada (for good economic reasons). Yet consumer preferences are such that virtually all automobile makers sell cars in Canada with at least a driver's airbag and most models also have a passenger airbag.
 - 100 Note that more laws and regulations in Canada are mandating some form of risk communication: these include toxics-release inventories, environmental assessments, waste-management plans, permits required under land-use planning, and the regulatory agenda (which was recently discontinued).
 - 101 Citizens' “irrational” attitudes toward many risks constitute a problem for government only where government actions to deal with those risks generate negative externalities for other citizens. Ironically, these externalities are likely to be greatest when a group with a common set of perceptions (utility for certain risks) is able to persuade government to institute policies that coerce other citizens.
 - 102 I note that this formulation ignores the communication conducted in the scientific community through journals, monographs, books, conferences, and teaching. Bits of this evolving body of work is reflected in public risk communications—often in a selective and biased fashion. While formally public, the scientific literature and disclosure is largely separate from the communications flows related to risk controversies and public policy making.

- 103 Adapted from the summary in Gratt 1996: 285–87.
- 104 Later, the paper states that federal decision-makers “would be required, among other things, to take stock of how a given risk or risk management strategy might affect elderly, pregnant or immigrant women” (Health Canada, 1999b: 4). Why was the further differentiation of the population limited to these three categories?
- 105 The main focus is on efficient exploitation.
- 106 Most provinces regulate at least 40 occupations by licensure or certification. The regulation of occupations focuses on both physical harms and possible economic losses.
- 107 See, for example, Bostrom et al. 1994; Covello 1991; Covello and Allen 1988; Flynn et al. 1993; Garreck and Gekler 1991; Gray et al. 1998; Kasperson and Stallen 1991; Konheim 1988; Lundgren 1994; National Research Council 1989; Otway 1987; Powell and Leiss 1997; Sandman 1986; Viscusi and Zeckhauser 1996.
- 108 Generally, see Covello 1991; Davies 1996, 1994; Finkel and Golding 1993; Morgan et al. 1996; Roth, Morgan, Fischhoff, Lane, and Bostrom 1990; Slovic et al. 1990.
- 109 Sacrifices may be noble but they are best made by others. Other evidence of the public’s (apparent) desire for “good news” is the new interpretation by American television networks of the news as “infotainment” or “edutainment” (notably the growing number of news magazine shows pioneered by 60 Minutes). Along the same lines is the growth of television time and newspaper space devoted to news about the entertainment industry (the pioneer here was Entertainment Tonight). Yet, the news is dominated by “bad news”: war, accidents, natural disasters, political conflict, and any number of harms inflicted on groups and individuals. Many environmental groups since the 1970s have emphasized “bad news” and even promoted apocalyptic scenarios. Fear, it seems, sells for environmental-groups (see Stanbury 1999).
- 110 Generally, see Frewer et al. 1992; Slovic 1993.
- 111 See Hutchings et al. 1997.
- 112 “In recent years the modern practice of spin has come to occupy a sort of gray zone between candor and outright falsehood” (Kurtz 1998: xviii). Spin is also very much about the visuals, which include not only the foreground but also the backdrop, as Ronald Reagan’s media advisors emphasized. This is, after all, the age of television.

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