A Proposal for a National Risk Assessment Clearinghouse

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I. INTRODUCTION

Over the past two decades, the focus of the environmental protection movement has shifted from efforts to clean up visible air and water pollution to efforts to deal with the even greater hazards[1] posed by toxic chemicals.[2] Although toxic chemicals are often invisible to the human eye, they pervade our daily lives, presenting hazards in the workplace, in our homes, and out-of-doors. Our current efforts to clean up both visible and invisible pollution in the environment, protect workers and the general population, and prevent the creation of future hazards are referred to as "risk management."[3] Risk management decisions are based on "risk assessments"[4] prepared by toxicologists. The methods used by toxicologists in the risk assessment process, however, are riddled with uncertainties and assumptions, and the data produced is often inconclusive as to the toxicity of the chemical being assessed. Therefore, risk management decisionmakers must supplement the information provided by the science of toxicology with careful choices of public policy.

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1. It is important to distinguish between the concepts of "risk" and "hazard." A "hazard" is a threat to us as humans and to what we value. "Risk," which is often expressed in quantitative terms, is a conditional probability of suffering harm. *See* Hohenemser, Kates & Slovic, *The Nature of Technological Hazard*, 220 SCIENCE 371 (1983).

2. In 1972 public opinion polls on environmental issues showed that most people were worried about water and air pollution — especially smog. Now, even though those problems remain largely unsolved, polls show that as a public concern air and water pollution runs behind a new environmental threat — toxic chemicals. Commoner, *A Reporter at Large: The Environment*, THE NEW YORKER, June 15, 1987, at 46, 52.

3. Risk management is the process through which steps are taken to "reduce or eliminate the risk that has been revealed by the risk assessment." M. KAMRIN, TOXICOLOGY—A PRIMER ON TOXICOLOGY PRINCIPLES AND APPLICATIONS 137 (1988).

4. A risk assessment, usually expressed in quantitative terms, is an attempt to determine "the potential toxic effects due to chemical exposure in a particular situation." *Id.*

Because risk management is a complicated process, Congress has delegated authority to make risk management decisions to powerful administrative agencies including the Environmental Protection Agency (EPA),[5] the Occupational Safety and Health Administration (OSHA),[6] the Food and Drug Administration (FDA)[7], and the Nuclear Regulatory Commission (NRC)[8]. But, as citizens in a democracy, the public retains the right to be informed about the nature of specific risks, and demands a right to participate in risk management decisions. Former EPA administrator William Ruckelshaus observed, "We have decided, in an unprecedented way, that the decisionmaking responsibility involving risk issues must be shared with the American people, and we are very unlikely to back away from that decision."[9]

Yet, most laypeople do not understand general concepts of risk, and they have not been educated with respect to the risk management process. Further, they are uninformed or poorly informed about specific risks which they confront personally or which are the subject of agencies' risk management decisions.

The consequences of poor risk communication are costly to our society. Many individuals become unduly alarmed with respect to minimal risks while ignoring risks of much greater magnitude. The public distrusts administrative agencies and contests or, at a minimum, does not readily accept their risk management decisions. Further, agencies do not receive the informed public input they need.

In order to earn the public's trust and gain its input, administrative agencies must be compelled to share risk information in a meaningful, consistent manner. In *The Need for a National Risk Assessment Communication Policy*, I proposed a National Risk Assessment Communication Policy Act (RACPA) designed to promote that goal in two phases.[10] First, the Act would set up an Advisory Board and guidelines to be used by the Board. The Board would establish a format to be used by agencies in describing specific risks to the public. Second, the Act would include an educational

5. National Environmental Policy Act of 1969, 42 U.S.C. § 4321 (1982).

6. Occupational Safety and Health Act of 1970, 29 U.S.C. §§ 651-678 (1982).

7. Federal Food and Drugs Act, 21 U.S.C. §§ 1-15 (1906), *amended by* Federal Food, Drug and Cosmetic Act, 21 U.S.C. §§ 301-392 (1938).

8. Energy Reorganization Act of 1974, 42 U.S.C. §§ 5801-5879, 5891 (1982).

9. Ruckelshaus, *Communicating about Risk*, in RISK COMMUNICATION 5 (1987).

10. Stenzel, *The Need for a National Risk Assessment Communication Policy*, 11 HARV. ENVTL. L. REV. 381 (1987).

component through which Congress would require administrative agencies to actively disseminate risk assessments to the public through the news media, pamphlets, workshops, and similar educational programs.

This article expands on the second phase of the proposed Act. In addition to, and especially in the absence of affirmative risk education programs, the public needs and is entitled to open access to the risk assessments used by administrative agencies in their risk management decisions. This article first reviews the public's general need to understand risk and examines its specific need for access to risk assessments. Secondly, it demonstrates that risk assessments are not readily available even to those who actively seek them. The process of obtaining a risk assessment is time-consuming and cumbersome. Further, risk assessments are conveyed in a form which is difficult for laypeople to understand. A centralized source, through which risk assessments would be made readily accessible to the public, is needed.

To this end, I propose a National Risk Assessment Clearinghouse. This article describes the operation of the proposed Clearinghouse and cites precedent for such a program. What the Clearinghouse can accomplish is described; potential criticisms are evaluated; and limitations of a Clearinghouse are discussed. Overall, it is illustrated that establishment of a Risk Assessment Clearinghouse is one of a series of steps we must take as we strive for open, two-way risk communication between administrative agencies and the public.

II. Background—The Public's General Need to Understand Risk and Specific Need for Access to Risk Assessments

The public's need to understand the nature of risk and the risk assessment and management processes is crucial. Risk-related decisions are of great consequence: they can determine the state of our health and even life and death. Risk-related decisions pervade our daily lives as we choose food and water, select an occupation, accept or reject employment, choose a place in which to live, and purchase consumer products. To varying degrees, depending on their willingness and ability to do research before undertaking such activities, people make many risk-related decisions on an individual basis. For that reason alone, individuals need to

be well-informed about the nature of risk and the significance (including limitations) of the data presented in a risk assessment.

We rely on administrative agencies to make many risk management decisions for us, however, because the information needed to make informed decisions is complicated and lengthy. Thus, to some extent, we rely on the Food and Drug Administration to keep "unsafe" foods off the grocery shelves, and we rely, again to some extent, on the Occupational Safety and Health Administration to monitor our work environment.

One of the reasons frequently cited for creating agencies and for delegating decisions to them is that an agency has the resources which enable it to focus on a specific problem in detail and provide expert advice and decisions.[11] This ideal might be achieved in the case of risk assessment if scientists within agencies could provide us with "facts" about toxic effects of chemicals. However, as discussed *infra*,[12] the "data" produced by toxicologists is riddled with uncertainties and, moreover, such data does not exist for many chemicals. Therefore the risk management decisions of regulatory agencies rely substantially on public policy to supplement the incomplete scientific "data."

The policy choices, made by agencies as they supplement the gaps in information resulting from uncertainties, are made both consciously and unconsciously. Such policy choices are involved, for example, when our country encourages one industry over another concern by granting tax incentives or through its regulatory structure. In recent years the United States government has given greater incentives to the development of nuclear power plants than to the development and implementation of solar power. Currently, our government gives greater encouragement and more assistance to trash-to-electricity incinerators than to recycling in an attempt to deal with the disposal of toxic and nontoxic garbage. Similarly, value choices are involved as agencies, courts, and other governmental decisionmakers distribute burdens and benefits among various populations and among present and future generations, and when these decisionmakers place "dollar" values on health and life.[13] For example, a decision to

11. K. DAVIS, DISCRETIONARY JUSTICE 46 (1969).

12. *See infra* text accompanying notes 30-43 (discussing the limitations of data produced through a quantitative risk assessment).

13. *See* Bazelon, *Science and Uncertainty: A Jurist's View*, 5 HARV. ENVTL. L. REV. 209, 211 (1981) (discusses conscious and unconscious policy choices made in environmental law-

allow higher levels of asbestos in the workplace atmosphere may save two million dollars for an employer and save a hundred jobs. The "cost" of these "benefits" may be ten additional employee deaths from lung disease over the next ten years. Thus, the employers (including their managers and shareholders) benefit from the higher levels of asbestos. However, the benefit to others is questionable in view of the risks of illness and death imposed on employees and the hardships imposed on their families. Such cost/benefit analyses are usually the basis for our agencies' risk management decisions.[14] Yet, the use of such cost/benefit analyses has been strongly criticized by various researchers because this method of analysis provides an illusion of certainty and fails to acknowledge the value of choices that were made as the cost/benefit result was compiled.[15]

Because of the prevalence of value-laden decisions in the area of risk management, we should therefore limit our reliance on agencies and their experts in that area. In the alternative, it is crucial that individual citizens participate in those agencies' decisions. When value choices are involved, the opinion of a layperson is as valuable as that of any expert or scientist. With respect to the policy decisions in risk management, any layperson can form an opinion about those policy decisions based on values, morals, ethics, or other internal beliefs. No "expert" has the ability to tell another person whether it is better to allow higher levels of exposure and save a hundred jobs at the expense of ten lives, or to save those lives at the expense of lost jobs and lost corporate earnings. Any layperson may contribute a valid and valuable perspective to the decisionmaking process.

Further, our democratic political system is based on the premise that citizen participation in such policy-based decisions is es-

suits and emphasizes that those choices affect all members of society, not just the parties to the lawsuit).

14. *See generally* K. SHRADER-FRECHETTE, SCIENCE POLICY, ETHICS, AND ECONOMIC METHODOLOGY (1984) (provides in-depth discussion of risk/cost-benefit analysis, and illustrates that this analysis pervades our risk management decisions, and criticizes its use as a decisionmaking methodology in risk management).

15. In spite of the prominent role of cost-benefit analysis in regulatory decision-making today, placing a dollar value on the loss of human life or health is both morally objectionable and impossible. *See* Kennedy, *Cost-Benefit Analysis of Entitlement Problems: A Critique*, 33 STAN. L. REV. 387 (1981). *See also* Shaw & Wolfe, *A Legal and Ethical Critique of Using Cost-Benefit Analysis in Public Law*, 19 HOUS. L. REV. 899 (1982) (criticizes the use of cost-benefit analysis as a decisionmaking methodology.)

sential. Policy[16] choices involve the selection of goals and guiding principles from among various available alternatives. Thus, the exercise of discretion is integral to the policymaking process. In the United States, we adhere to the premise that a primary task of our government and its institutions is to provide a forum for the voicing of divergent viewpoints. Through our political process, competing viewpoints can be aired before the exercise of discretion takes place.[17] The more important the policy being chosen, the more crucial it is that there be an open, vigorous airing and discussion of the perspectives and desires of individual citizens. Therefore, it is particularly offensive for policy decisions directly involving human health and life to be made without full discussion and consideration of citizens' viewpoints.[18]

When agencies do not encourage citizen participation and do not engage in two-way communication with the public with respect to policy decisions, citizens disrespect or contest the agencies' actions. The EPA's handling of the 1984 controversy over the pesticide EDB (ethylene dibromide) presents an example of the public's antagonism toward an agency resulting from the agency's poor risk communication. When the EPA banned most agricultural uses of EDB, the EPA was operating "in an area of enormous scientific uncertainty."[19] That uncertainty, however, translated into a public perception of evasiveness. Further, the EPA failed to inform the public of the options available in terms of siting, technology, or other means of waste "disposal" and failed to discuss publicly who would bear the costs of various options.[20] Risk perception expert Baruch Fischhoff says that the EPA's failure to discuss options and the consequences of those

16. Policy can be defined as "the general principles by which a government is guided in its management of public affairs, or the legislature in its measures. . . . This term, as applied to a law ordinance, or rule of law, denotes its general purpose or tendency considered as directed to the welfare or prosperity of the state or community." BLACK'S LAW DICTIONARY 1041 (5th ed. 1979).

17. Felix Frankfurter said, "[T]he essential task of law — and its greatest triumph — is to devise peaceful accommodations, expressive of the dominant ideals of western democratic civilization, for the clash of interests and feelings in a dynamic society." Frankfurter, *Foreward*, 47 YALE L. J. 515 (1938).

18. *See generally* Stenzel, *Toxic Substance Regulation: A Compelling Situation for Revival of the Delegation Doctrine*, 24 AM. BUS. L.J. 1, 15-17 (1986) (argues that citizen involvement is crucial in making toxic substance regulatory policy).

19. Press, *Science and Risk Communication*, in RISK COMMUNICATION 14 (1987).

20. Fischhoff, *Managing Risk Perceptions*, 2 ISSUES SCI. & TECH. 83, 95 (1985).

options left "a confused impression of the issues and the agency's concern for the public's welfare."[21] A panel of experts reviewing the controversy agreed that the EDB episode was not a public health crisis, but, rather, "a crisis in communication."[22]

The consequences of poor risk communication can be seen in an ongoing controversy in Michigan. In April 1986, a public outcry arose in response to the city of Detroit's plans to build the world's largest trash-to-electricity incinerator. Initially, public awareness and protest were provoked when the Michigan Department of Natural Resources (DNR) released a study which it prepared in an effort to persuade the City of Detroit to change its original plans and employ new technology for air filtering.[23] Among other concerns, citizens were outraged because they learned of the plant only upon the release of that report even though the plant had been planned for over ten years. The EPA became involved and threatened to file a lawsuit to stop construction of the plant on the grounds that the incinerator would not meet federal Clean Air Act requirements.[24] The EPA dropped its plans for litigation when it realized that it had given its tacit approval to the project through an EPA audit conducted in 1985,[25] but a lawsuit was filed by several environmental groups and a community group. They sought an injunction to stop construction of the incinerator or at least force the City to employ the new air filtering technology available. Although the lawsuit was dismissed in federal court, an appeal is pending and active citizen opposition to the project continues.[26]

Access to risk assessments and better risk communication in general will not eliminate public opposition to agency decisions relating to the siting of a trash incinerator or a waste dump, or decisions about the types and quantities of pesticides that will be allowed in our foods. If the public is well informed about risk in

21. *Id.*

22. Johnson, *EDB (Ethylene Dibromide)*, in RISK COMMUNICATION 83-85 (1987).

23. The new technology for air filtering was not available in 1984 when the DNR originally granted a permit for the incinerator. Detroit Free Press, Apr. 4, 1986, at 1, col. 4.

24. On May 12, 1986, the EPA's regional administrator announced that the incinerator would not meet Federal Clean Air Act requirements and that the EPA would go to court to force the City of Detroit to reduce pollution levels if it did not do so voluntarily. Detroit Free Press, May 13, 1986, at 1, col. 5.

25. Detroit Free Press, Sept. 23, 1986, at 1, col. 5.

26. *See also* Stenzel, *supra* note 10, at 382-85 (discusses examples of agencies' failure to satisfy the public's desire for information about risks and its desire for influence over their management).

general, however, it will be capable of evaluating new risk information more rationally. Moreover, if the public can readily obtain the risk assessments available to administrative agencies, it can more quickly "get down to the business" of evaluating and dealing with the risks involved instead of struggling to obtain that information from an agency which appears to be evasive or even antagonistic.[27]

Therefore, in keeping with our democratic tradition, it is crucial that administrative agencies communicate with the public about the nature of risk and specific risk decisions. Meaningful citizen input in the regulatory process can only be achieved if the public understands the risk assessment and risk management processes. Understanding of these processes requires further comprehension of the nature and limitations of the data used. In addition, in order to participate in specific risk management decisions, the public must be provided with "enabling information:"[28] the risk assessments which the administrative agency is using in the decisionmaking process.[29]

A. *Risk Communication is a Complicated Process*

Due to the nature of the risk assessment process, it is particularly difficult to educate and inform the public about risk. The complex subject matter cannot be adequately conveyed to the public in a haphazard or unplanned fashion due to a number of complicating factors including: (a) uncertainties inherent in the risk assessment process; (b) the manner in which people evaluate risk information; and (c) popular distrust of scientists, the risk assessors.

27. *Id.* at 410-12 (discusses benefits of open communication about risk in managing specific hazards).

28. The work of sociologist James S. Coleman is relevant to this discussion. He asserts that until recently our society virtually ignored the information rights of individuals. Recently, those rights have been addressed in an ad hoc, inadequate manner through such legislation as the Federal Freedom of Information Act (5 U.S.C. § 552 (1982)). Professor Coleman calls for the development of a political theory of information rights to guide us as we attempt to provide citizens with the information they need to participate in the political process in a meaningful way. *See generally* J. S. COLEMAN, THE ASYMMETRIC SOCIETY (1982); J. S. COLEMAN, POWER AND THE STRUCTURE OF SOCIETY (1974).

29. "[B]efore access can become meaningful, there must be sufficient information in the hands of the public for citizens to be effective participants. The process of supplying this information is at the heart of risk communication." Ruckelshaus, *Communicating About Risk*, in RISK COMMUNICATION 6 (1987).

Quantitative risk assessments (which are compiled as the result of a toxicity assessment[30] and an exposure assessment[31]) are the basis for risk management decisions.[32] Yet, uncertainties pervade the process of compiling quantitative risk assessments. In order to proceed in spite of those uncertainties, scientists make numerous assumptions as they assess the toxicity of a chemical and as they assess the exposure of a human population.

There are four main types of tests used to assess toxicity, three of which are based on animal bioassays. A single exposure test is used to determine the LD^{50} (lethal dose for 50 percent of the animals studied).[33] In the "subacute" test, the effects of daily exposure of a group of animals to a chemical are studied.[34] To test for chronic (long-term) toxicity, the most commonly used test is the carcinogenesis bioassay in which high doses are used to produce cancer in groups of about fifty animals.[35] The high-dose animal study data is used to estimate a low-dose value for humans. The data produced using each of these three tests is based on a series of assumptions. For example, society is concerned about a risk to one human in 100,000 or a million, yet finances limit tests to thousands or hundreds of animals. Therefore, toxicologists use data from small numbers of animals to estimate effects on large numbers of people. The species used may be more or less sensi-

30. Toxicity assessment is the "evaluation of the toxicity of a chemical based on all available human and animal data." M. KAMRIN, *supra* note 3, at 138.

31. Exposure assessment is the attempt to determine the risks of a chemical to a particular human population. *Id.* at 59.

32. It should be noted that the EPA views the risk assessment as consisting of four components:

(1) Hazard identification: in which hazards and potential toxic effects of a contaminant are identified.

(2) Dose-response assessment: determines the dose or amount of a contaminant which may produce an adverse effect in humans.

(3) Human exposure assessment: assesses the potential for humans to come in contact with the contaminant.

(4) Risk characterization: combines the above three components to estimate the potential health impacts from the contaminant.

Guidelines for Carcinogen Risk Assessment, 51 Fed. Reg. 33,994-99 (1986). The EPA's "hazard identification" and "dose-response assessment" correspond to the process described in this article as "toxicity assessment." It is worthwhile to note that the EPA's "risk characterization" provides more than a quantitative risk assessment by presenting some of the uncertainties associated with the particular risk assessment.

33. M. KAMRIN, *supra* note 3, at 45-48; M.A. OTTOBONI, THE DOSE MAKES THE POISON: A PLAIN-LANGUAGE GUIDE TO TOXICOLOGY 61-62 (1984).

34. M. KAMRIN, *supra* note 3, at 48-50; M.A. OTTOBONI, *supra* note 33, at 33, 78.

35. M. KAMRIN, *supra* note 3, at 51-53; M.A. OTTOBONI, *supra* note 33, at 77-82.

tive than humans to the substance being tested. Various dose-response models are used to extrapolate from high-dose animal study data to an estimated low-dose value for humans.[36] But these extrapolations produce predictions, not "facts."

The fourth main tool for "testing" toxicity is epidemiology: the retrospective or prospective study of human populations to establish correlations between a particular toxic substance and a specific effect such as cancer.[37] Retrospective studies, which depend on recollections of people being studied or on medical or occupational records, are problematic.[38] Recollections may be selective or otherwise unreliable. Prospective studies can eliminate problems of recall, but they involve other problems.[39] Records may lack necessary data. People taking part in a study may behave differently once they become subjects and, for example, become more health or exercise conscious than the norm. Because ours is a mobile society, study subjects may also be difficult to track over long periods of time. An additional result of the long-term nature of these studies is that it takes years before data and conclusions, if any, will be available. Scientists admit, "[E]pidemiology is at best a crude science"[40] and that, overall, "[T]oxicity testing is done in the face of basic biological and chemical ignorance."[41]

The exposure assessment, the second stage in compiling a risk assessment, is similarly riddled with uncertainties and assumptions.[42] Present concentrations of a chemical in the air or water can be measured, but, generally, data needed to determine past concentrations is not available. The scientist extrapolates backward in time making the assumption that conditions in the past were identical to present conditions. Further, for present or past exposure, assumptions about length of exposure (hours per day and years) are made for a hypothetical average person. Thus, under its Carcinogen Risk Assessment Guidelines, the EPA assumes that an individual has been exposed to the chemical being

36. M. KAMRIN, *supra* note 3, at 51-53.

37. *Id.* at 53; J. URQUHART & K. HEILMANN, RISK WATCH: THE ODDS OF LIFE 31 (1984).

38. M. KAMRIN, *supra* note 3, at 54; M.A. OTTOBONI, *supra* note 33, at 81-82.

39. M. KAMRIN, *supra* note 3, at 55; M.A. OTTOBONI, *supra* note 33, at 81-82.

40. Leape, *Quantitative Risk Assessment in Regulation of Environmental Carcinogens*, 4 HARV. ENVTL. L. REV. 92 (1980).

41. M. KAMRIN, *supra* note 3, at 57.

42. *See generally* M. KAMRIN, *supra* note 3, at 59-61 (discusses uncertainties inherent in the exposure assessment).

assessed for twenty-four hours daily for seventy years.[43] (It should be noted that the EPA is considering the adoption of the new assumptions that a person is exposed two to sixteen hours per day for ten to thirty-five years.)[44] Whichever set of assumptions is used, however, the assumptions seldom if ever, will accurately summarize the exposure of an actual exposed individual. Yet, there is no way the agency can do anything but generalize, because individuals' exposures do vary widely. Therefore, it is imperative that the agency convey the assumptions it has used as it communicates a risk assessment. Then, an individual will be able to compare his or her situation to the assumptions and begin to reframe the risk assessment into some sort of individualized perspective.

Overall, administrative agencies and their scientists cannot eliminate the uncertainties inherent in the risk assessment process. Agencies and their scientists must identify and openly acknowledge the existence of the uncertainties. At the same time, citizens must learn to recognize and deal with the uncertainties in order to participate in the risk management process in a meaningful way.

Yet, many non-scientists do not understand the uncertainties and are unaware of the assumptions used in the risk assessment process. Frequently, their understanding of the character and magnitude of a specific risk is uninformed. When people do not have statistical evidence with which to evaluate risks, they rely on general inferential rules known as "heuristics" to help them reduce difficult mental tasks to more manageable ones.[45] The application of one such rule results in a tendency to simplify complex decisions.[46] This is illustrated when people demand that risk managers state whether a food, chemical, or technology is safe or unsafe. They fail to realize that safety is a continuous variable.[47] With reference to research on the health effects of pollution, Senator Edmund Muskie said he was looking for a "one-armed" scientist who does not say, "On the one hand, the evi-

43. Guidelines for Carcinogen Risk Assessment, 51 Fed. Reg. 33,992 (1986).

44. Remarks made at a symposium on February 12, 1988 by Peter Preuss, Director of EPA's Office of Technology Transfer and Regulatory Support, as reported in 1988 Chem. Reg. Rep. 1806.

45. Slovic, Fischhoff & Lichtenstein, *Perceived Risk: Psychological Factors and Social Implications*, A376 PROCEEDINGS ROYAL SOCIETY LONDON 17, 18 (1981).

46. Fischhoff, *Managing Risk Perceptions*, 2 ISSUES SCI. & TECH. 83, 86 (1985).

47. *Id.* at 86.

dence is so, but on the other hand. . . ."[48] This desire for simple answers is reflected in the inclusion of the Delaney Clause in the Federal Food, Drug and Cosmetic Act,[49] which prohibits the use of any food additive which in any amount has been found to induce cancer in animals or humans.[50] This provision is an attempt to force regulators to categorize a food as being "safe" or "unsafe."[51]

Another example is California's controversial "Proposition 65" which states, "No person in the course of doing business shall knowingly and intentionally expose any individual to a chemical known to the state to cause cancer or reproductive toxicity without first giving clear and reasonable warning to such individual. . . ."[52] The consumer warning requirements will apply to any chemical on a list put out (and periodically updated) by California's governor.[53] The warnings for consumer products will read, as appropriate, "WARNING: This product contains a chemical known to the State of California to cause cancer," or "WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm."[54] Similar wordings will be required for alcoholic beverages, fresh fruits, vegetables or nuts.[55] Critics of Proposition 65 argue that it fails to distinguish between major causes of human cancer as compared to minimal risks. In view of the fact that our conclusions

48. As quoted in Allman, *Staying Alive in the 20th Century*, 85 SCIENCE 30, 33 (1985).

49. 21 U.S.C. §§ 301-392 (1982).

50. 21 U.S.C. § 348(c)(3)(A) (1982).

51. It should be noted, however, that the Food and Drug Administration currently applies a "de minimis" (negligible risk) standard as it interprets the Delaney Clause. Under the "de minimis" standard the FDA permits the use of "a carcinogenic food additive when those uses are shown to present a potential carcinogenic risk that is so trivial, based on conservative statistical analyses, as to be the functional equivalent of no risk at all." 50 Fed. Reg. 51,551 (1985) (to be codified at 21 C.F.R. Pt. 700) (explains "de minimis" standard and applies it to use of methylene chloride in decaffeinated coffee, concluding that action with respect to that use is not necessary).

52. Safe Drinking Water and Toxic Enforcement Act of 1986, CAL. HEALTH & SAFETY CODE § 25,249.6 (West 1986).

53. *Id.* § 25,249.8.

54. CAL. ADMIN. CODE tit. xxii, § 12,601(b)(4). For consumer products other than alcohol, for which there is a separate list of options, the regulations allow businesses to choose among three types of warnings. The three options for consumer products are:

(1) Labels affixed to the product or its packaging;

(2) identification at the retail outlet through signs, shelf labels, or other means; or

(3) a system of advertising, signs and toll-free information services, or "any other system, that provides clear and reasonable warnings." *Id.* § 12,601(b)(1).

55. *Id.* § 12,601(b)(4).

about causes of human cancer are frequently based on data obtained from animal testing, one critic of Proposition 65 emphasizes, "No human diet can be entirely free of mutagens or agents that can be carcinogenic in rodent systems."[56] By asking that a food or other product be labeled as cancer producing or not, or as causing birth defects or not, people are trying to compel regulators (or product manufacturers) to respond to complex questions with simple "yes or no" answers. However, such simple "solutions" may only complicate matters by raising unfounded health scares, obscuring priorities, and causing limited resources to be spent in unwise ways, leaving other more serious health risks unaddressed.[57]

People use other general inferential rules which further distort or inhibit their understanding of risks. The "availability heuristic" is a rule stating that people remember what they see or experience or what is familiar to them. Thus, they overestimate causes of death which are dramatic and sensational (such as fires, toxic spills, and homicides) and they underestimate the frequency of less spectacular events (stroke, diabetes, and smallpox vaccinations.)[58]

56. Biochemist Bruce Ames commenting on Proposition 65, as quoted in Wall St. J., June 15, 1987, at 26, col. 1. Dr. Ames' opposition to Proposition 65 has been outspoken and well publicized. This reference to Dr. Ames does not indicate my concurrence with his position with respect to Proposition 65. However, further discussion of Proposition 65 and of Dr. Ames' views is beyond the scope of this article.

57. Proposition 65 may cause harm as well as good. Philip Abelson, Deputy Editor of *Science* magazine says, "Labeling a large number of items as carcinogens because they contain parts per billion of something of doubtful carcinogenicity will not enable the public to act more judiciously in safeguarding health." He cites Milton Russell, a former assistant administrator for Policy Planning and Evaluation at the EPA who said in a different but similar context:

> Real people are suffering and dying because they don't know when to worry, and when to calm down. They don't know when to demand action to reduce risk and when to relax, because health risks are trivial or simply not there. I see a nation on worry overload . . . . Anxiety and stress are public health hazards in themselves. When the worry is focused on phantom or insignificant risks it diverts personal attention from risks that can be reduced.

Abelson, *California's Proposition 65*, 237 SCIENCE 1553 (1987).

Scientists are concerned because the public devotes more attention to some risks than is appropriate. For example, "[M]any scientists feel that the recent and continuing preoccupation with risk management of dioxins represents an exaggerated response to a risk which is of lesser importance than others which have received less attention." M. KAMRIN, *supra* note 3, at 67.

58. Press, *Science and Risk Communication*, in RISK COMMUNICATION (1987); Slovic, Fischhoff & Lichtenstein, *supra* note 45, at 18.

In addition, once people (both laypeople and scientists included) make up their minds, it is difficult to change them. They are unaware of the uncertainties and tenuous assumptions on which their own assessments of risk are based,[59] and they fail to look for and examine contradictory information. One risk perception expert commenting on this queried, "[H]ow many environmentalists read *Forbes* and how many industrialists read the Sierra Club's *Bulletin* to learn about risks (as opposed to reading those publications to anticipate the tactics of the opposing side)?"[60]

Laypeople need more education about risks in general *and* information about specific risks so that they will not have to rely on heuristics to evaluate them. Regulators and their scientists must communicate more openly about risks with the public in order to learn what the public has to say about risks.[61]

Even conscious efforts by scientists and regulators to communicate risk information to the public face an additional barrier which can be characterized as "popular" distrust of scientists. People doubt the conclusions reached by scientists. They demand certainty where there is none[62] and generally expect more of scientists than they are able to provide.[63] This tendency can be alleviated, however, by educating the public about the risk assessment process and by communicating openly about risks.[64]

59. Slovic, Fischhoff & Lichtenstein, *supra* note 45, at 20-21.

60. Fischhoff, *supra* note 46, at 87.

61. Risk communication must be a two-way process. The regulatory community and scientists have much to learn from the public about factors the public uses in defining risk and in evaluating specific risks. "Experts" tend to define risk and rank a risk according to the number of fatalities it has caused in the past. Laypeople, on the other hand, consider a variety of other factors as they evaluate the severity of a risk. It is crucial that "experts" be informed about criteria which are important to laypeople as they evaluate risks. However, in-depth discussion of educating and informing experts about laypeople's perspectives is beyond the scope of this article. *See generally* Stenzel, *supra* note 10, (discusses need for two-way risk communication and proposes mechanisms to promote it).

62. *See supra* text accompanying notes 46-57.

63. M.A. OTTOBONI, *supra* note 33, at 178.

64. Irrational distrust of science transcends the more particularized problems created by inadequate communication about risks and risk assessments. A better general science education in the public schools would help to alleviate irrational distrust of science and would help reduce the public's unrealistic expectations of scientists. This applies with respect to the public's expectations for risk assessments as well as their expectations of other "data" obtained through scientific study.

B. *Current Avenues for Risk Communication in General Are Inadequate.*

Problems of risk communication have been actively discussed among toxicologists, medical doctors, sociologists, and psychologists for the past decade. But, within our society in general, and within regulatory agencies, risk communication has only recently been recognized as an important subject.[65] Thus, we are only in the very early stages of devising effective means of risk communication.

The public is not being formally educated about the nature of the risk assessment process. Toxicology, which provides the data used in preparing a risk assessment, is a relatively new science which has developed since the 1960s.[66] Most adults have not studied toxicology as a part of their general public school education. Further, even today there is no comprehensive program designed to include such materials in the public schools' curriculum. Therefore, education of laypeople about concepts integral to the risk management process is left to more informal mechanisms, if any.

The public relies on the news media for environmental and risk information. "[T]he media often play the role of transmitter and translator of information between government agencies and citizens . . . ."[67] For example, in a recent study, New York residents were questioned about their sources of environmental information. That survey found that the three most extensively used sources were, first, television; second, radio; and third, newspapers.[68]

The news media, however, are inadequate sources of risk information. Experts from various fields criticize the news media for presenting risk information in a manner which frightens laype-

65. Davies, *Introduction*, in RISK COMMUNICATION 1 (1987).

66. The first national recognition of toxicology as a distinct science came in 1961 with the formation of the Society of Toxicology. In academic institutions, departments having toxicology as part of their title were created starting in the mid-1970s and 1980s. As a result, there are few scientists specifically trained in toxicology. M. KAMRIN, *supra* note 3, at 2.

67. Covello, von Winterfeldt & Slovic, Risk Communication: An Assessment of the Literature on Communicating Information about Health, Safety and Environmental Risks, Draft Preliminary Report to the Environmental Protection Agency (Jan. 11, 1986) (available from the National Science Foundation, Washington, D.C.).

68. P. Yarbrough & F. Yarbrough, Pesticides and Related Environmental Issues: A Study of the Opinions and Behaviors of New York Adults 46 (1985) (available from the Department of Communication Arts, Cornell University).

ople and overwhelms them with exaggerated predictions of risk. For example, toxicologist M. Alice Ottoboni cites headlines including, "Pesticide Poisonings, Harvest of Illness," "Now, Cancer in the Crib," and "Cancer in a Spray Can."[69] Doctors John Urquhart and Klaus Heilmann assert that the media's "faddish" way of reporting risk-related stories makes it difficult for the public to rationally evaluate risks.[70] Studies confirm that the news media devote a disproportionate amount of coverage to catastrophic causes of death.[71] The research of risk perception experts confirms that biased news coverage leads to distorted perceptions of risks in our society.[72]

Yet, the news media should not receive all blame for the phenomena labelled "news media toxicology."[73] When there is a toxic leak from a factory or a community learns that its water supply is contaminated with chemicals, significant press coverage is an appropriate response to the public's desire for information. Further, it is unrealistic to expect the news media to be the primary source of risk education and risk information in our society.

Many responsible reporters welcome the opportunity to obtain clear, consistently-presented risk information from administrative agencies.[74] It is their job to talk to experts and "get the story." But, as one researcher observes, "the difficult part of getting most environmental stories is that no one has them to give."[75]

There are some small scale programs designed to answer the public's questions and facilitate access to risk information. They include, for example, the Center for Environmental Toxicology at Michigan State University and the New England Community En-

69. M.A. OTTOBONI, *supra* note 33, at 10.

70. J. URQUHART & K. HEILMANN, *supra* note 37, at 98-100.

71. W. LOWRANCE, OF ACCEPTABLE RISK 118 (1976); Combs & Slovic, *Newspaper Coverage of Causes of Death*, 56 JOURNALISM Q. 837 (1979).

72. *See generally* Combs & Slovic, *supra* note 71.

73. Stenzel, Book Review, 13 ECOLOGY L. Q. 361, 364 (1986) (reviewing J. URQUHART & K. HEILMANN, RISK WATCH: THE ODDS OF LIFE (1984)).

74. When faced with a decision as to what arsenic air pollution standard should be imposed on a Tacoma, Washington air smelter, the EPA made a special effort to involve the public. "The media were really very cooperative, not on the editorial page but in the news stories, in trying to present information as accurately as possible." Ruckelshaus, *supra* note 9, at 7.

75. Fischhoff, *Protocols for Environmental Reporting: What to Ask the Experts*, [Winter 1985] JOURNALIST 11.

vironmental Education Project.[76] However, such programs are not widely available within individual states or across the United States.

Therefore, a substantial portion of the task of risk education and information dissemination must be assumed by the administrative agencies charged with managing risks. Administrative agencies should convey risk information directly to the general public and to intermediaries such as the news media, which, in turn, will convey it to the public. Yet, our administrative agencies' approaches to risk communication are uncoordinated and inconsistent from one situation to another. In spite of the fact that risk communication may be the most crucial element in risk management today, our agencies have no overall policy or program for educating the public about risks. Therefore, in *The Need for a National Risk Assessment Communication Policy*,[77] I proposed legislation through which Congress would require agencies to actively disseminate risk information to the public. A primary objective of the Risk Communication Policy would be to provide citizens with background understanding of the nature of risk and an information base which would assist them in understanding and evaluating specific risks.

In addition to the general understanding of the nature of risk, the public needs access to specific risk assessments. When a citizen learns of a toxic spill or of a chemical in his or her drinking water, that person wants to know, "What is the chemical?" Then he or she asks, "Is it harmful?" "What can it cause?" "To whom?" "In what amounts?" "After how much exposure?" This is the kind of information which administrative agencies seek to provide in a risk assessment. This information is necessary so that individuals may translate information about "macro" risks (generalized societal risks) into "micro" risk information (risks to an individual human being).[78] Individuals want and deserve to

76. For information about these programs, contact the Center for Environmental Toxicology, Holden Hall, Michigan State University, E. Lansing, Michigan, and the New England Community Environmental Education Project, West Hartford, Connecticut.

77. *Supra* note 10.

78. For example, one commentator states, "It is macro language that estimates the global likelihood that a given chemical will lead to cancer. The pronouncements are not in micro language that would tell the housewife whether she should buy a cake powder tinged with traces of EDB." Press, *Science and Risk Communication*, in RISK COMMUNICATION 11, 16 (1987).

know, to the extent feasible, "What does this risk assessment mean to me and to my family members?"

C. *The Public's Need for Access to Risk Assessments*

Laypeople need access to risk assessments. Ellen Silbergeld, a Senior Scientist with the Environment Defense Fund, emphasizes that in order to wield power in the area of environmental politics, citizens need opportunities for choice and equal access to resources. She explains that such resources include the technical information provided in risk assessments.[79]

The need for access to risk assessments is clear in the "crisis" situation in which the public learns of a toxic spill on a highway, suspects that its community water supply is contaminated, or wishes to respond to proposals for new pollution-emitting facilities in their communities. For example, in the early 1980s in Woburn, Massachusetts, citizens became aware of an abnormally high incidence of childhood leukemia in certain neighborhoods in their community.[80] Upon investigation, the families of victims learned that their water supplies were contaminated with chemicals including trichloroethylene (TCE) and tetrachloroethylene (perchlorethylene) (PCE). One of their next steps, of course, was to seek risk assessments for those chemicals.[81] Similarly, citizens involved in the Detroit, Michigan incinerator controversy[82] need access to specific risk assessments for the dioxins, furans, heavy metals and other pollutants found in the ash residue produced by such incinerators.[83]

Beyond discussion provoked by a crisis, the public is showing increasing awareness of the existence of risks in daily life. One cannot pick up a newspaper without reading about some risk-related situation, whether it is asbestos in workplace buildings, airborne toxins in an urban area, or pesticides in foods. Awareness leads to increased demands for information.

79. Silbergeld, *Panel on Responsibilities of Risk Communicators*, in RISK COMMUNICATION 27, 34 (1987).

80. Wald, *Jury in Cancer Death Suit Says Factory Polluted Wells*, N.Y. Times, July 29, 1986, at A8, col. 1; TIME, Apr. 7, 1986, at 27.

81. *Id.*

82. *See supra* text accompanying notes 23-26.

83. *See generally* Detroit Trash Incinerator: We Say No! (undated 16 page collection of essays and articles opposing the incinerator, distributed April, 1988 by The Evergreen Alliance, c/o P.O. Box 02455, Detroit, Michigan, 48202.)

Such awareness has also led to the enactment of new legislation designed to require that the existence of risks be revealed to the public. Implementation of such legislation, in turn, increases the public's demands for access to assessments of those risks.

One example of such legislation is OSHA's 1983 "Hazard Communication Standard" which requires chemical manufacturers, importers, and distributors to provide to employers evaluations of all hazardous or toxic materials they sell or distribute.[84] This information is conveyed in a Material Safety Data Sheet (MSDS) for each chemical involved. (Recent amendments to the Hazard Communication Standard make the requirements applicable to non-manufacturing employers as well as those in manufacturing.[85]) Employers must, in turn, make the MSDS available to their employees.[86] The MSDS must identify the hazardous chemical, describe its physical hazards (such as potential for fire and reactivity), list health hazards of the chemical, and identify OSHA exposure limits. These data sheets, however, are necessarily brief. Further, they depend on information supplied by the chemical manufacturer, which has a strong incentive to present information which deemphasizes the risks involved.

The Superfund Amendments and Reauthorization Act of 1986 (SARA)[87] includes new "Emergency Planning and Community Right-to-Know" provisions which extend right-to-know concepts to communities in which businesses are located.[88] The provisions, which were adopted in response to the December, 1984, toxic leaks which caused mass death and injury in Bhopal, India,[89] require businesses to reveal the presence and identities of hazardous chemicals to the communities in which the businesses' facilities are located. Among its other provisions, SARA requires that the community be provided with access to Material Safety Data

84. In addition, over forty cities and over twenty states have passed workers' right-to-know laws. Wall St. J., Dec. 14, 1984, at 22, col. 5.

85. OSHA Hazard Communication Standard, 52 Fed. Reg. 31,852; 29 C.F.R. § 1910.1200 (1987).

86. OSHA Hazard Communication Standard, 48 Fed. Reg. 53,280 (1983); 29 C.F.R. § 1910.1200 (1987).

87. Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. §§ 9601-9675 (1982 & Supp IV 1986); as amended by Superfund Amendments and Reauthorization Act of 1986, Pub. L. No. 99-499, 100 Stat. 1613 (1986).

88. Emergency Planning and Community Right-to-Know Act of 1986, 42 U.S.C. § 11001-11050 (Supp. IV 1986).

89. ENVIRONMENTAL LAW REPORTER, SUPERFUND DESKBOOK 13 (1986).

Sheets which are identical to those required by OSHA under its Hazard Communication Standard.[90]

Thus, under SARA citizens will be informed of the presence and identity of large quantities of chemicals in their communities. They will also receive a brief account, *prepared by the manufacturer of the chemical*, of the hazards each chemical may present. Neither OSHA's Hazard Communication Standard nor SARA requires businesses to perform toxicological studies. SARA does not require businesses to assess the risks to which they expose the people living near their facilities. But SARA and OSHA's Hazard Communication Standard do give workers, communities, and health professionals access to information on which they may base further studies to determine exposure and compile risk assessments. One commentator notes, "This is clearly an intended and welcome consequence in a world where chemical manufacturers have not always been honest about the true dangers created by their products."[91]

When communities are made aware of the presence and identity of a chemical such as trichloroethylene, its members will want more detail about its potential effects. They will ask, "What can it cause?" "What amounts cause such effects?" "What are the chances that this will happen?" "To whom?" "Over how much time?" So, community and worker right-to-know laws are only a first step in informing the public about chemical risks in their neighborhoods and workplaces. The public needs more detail than is provided in the MSDS. In addition, citizens need access to risk assessments prepared by someone other than the chemical's manufacturer.

California's Proposition 65 and February 1988 regulations implementing it will raise similar demands for access to risk assessments. Proposition 65 will require manufacturers and retailers in California to warn consumers about any product containing a chemical known by the state to cause cancer or reproductive toxicity.[92] That warning, however, will simply be in the form of a label stating that the product contains a chemical known by the state of California to cause "cancer," or "birth defects or other

90. Emergency Planning and Community Right-To-Know Act of 1986, 42 U.S.C. § 11021 (Supp. IV 1986).

91. Tobey, *Right-to-Know and the Chicken Little Syndrome*, 7 MICH. ENVTL. L. J. 6, 7 (1987).

92. Safe Drinking Water and Toxic Enforcement Act of 1986, CAL. HEALTH & SAFETY § 25,249.5 (West 1986).

reproductive harm." As under the Delaney Clause, the conclusion that a chemical causes toxic effects will often be based on data obtained from animal tests. Also like the Delaney Clause, the law obscures the fact that risks should be viewed on a continuum: most questions of product safety are not "black and white" questions of a product being "safe" or "unsafe."[93] Proposition 65 warnings will alert consumers to the existence of risks of cancer or reproductive harm, but the warnings will not provide any information about the magnitude of those risks. Thus, Proposition 65 warnings will give the public even less information than is provided to workers and communities under federal "right-to-know" laws. Because twenty or more states may be considering similar laws,[94] the situation in California should not be viewed as unique. If similar legislation is enacted elsewhere, the public's needs and demands for access to risk assessments will continue to increase.

D. *Risk Assessments Are Difficult to Obtain and, Once Obtained, Difficult to Understand*

The next relevant question is, where and how does the public obtain risk assessments or the information in them? The answer, in short, is that risk assessments are not readily available.

As was discussed *supra*,[95] the news media are a major source of environmental information. Yet, media coverage is crisis-oriented. Further, when risk assessments are presented, they are presented in inconsistent formats. Thus, one news reporter speaks of "doubling your risk of cancer" while another tells us that we will see "five additional cases of cancer per million people." Yet, the news media is only conveying information it receives elsewhere.

93. *See supra* notes 52-57 and accompanying text.

94. "Currently 21 states are believed to have similar laws on their legislative agendas. . . ." Best & Nelson, *Is Our Food Supply Safe?*, 1987 PREPARED FOODS 154. The Sierra Club claims that Arkansas, Colorado, Louisiana, Missouri, New York, and Wisconsin have shown an interest in adopting laws similar to Proposition 65. Marshall, *California's Debate on Carcinogens*, 235 SCIENCE 1459 (1987). Carl Pope, an official of the Sierra Club, says, "[w]e're working on a generic version of Proposition 65 that other states can use, and we're getting questions from everywhere," as quoted by Lindsey, *Many States Move to Curb Disposal of Chemicals*, N.Y. Times, Dec. 21, 1986, at A26, col. 1.

95. *See* text accompanying notes 67-68 (discussing media's prominent role in communicating risk information).

The general public and news media alike can obtain risk assessments from administrative agencies. Before seeking information, however, the "researcher" must identify the agency which has conducted a risk assessment. Various agencies in federal government conduct research on and regulate the same toxic substances independent of each other. For example, OSHA, the EPA, and the Consumer Product Safety Commission (CPSC)[96] have each studied and taken action to regulate the chemical formaldehyde.[97] Each of the fifty states has administrative agencies which may conduct their own studies of various chemicals independent of the federal agencies. President Reagan's "New Federalism" approach to environmental regulation, under which more and more responsibility for environmental regulation was transferred to the individual states, intensified the dispersion of research and information.

After identifying the source of information, a researcher must obtain the risk assessment from that source. Occasionally the risk assessment or a summary is available from an agency's public information office.[98] Portions of some risk assessments have been published in the Federal Register.[99] But a Federal Register search is tedious even for lawyers; it is too much to expect of the layperson. When those means fail, a researcher's primary tool for obtaining a risk assessment from an agency is a request based on the federal Freedom of Information Act (FOIA)[100] or a state level equivalent. However, a response to an FOIA request often takes months. A news reporter wants the story today, not in several months. Similarly, a citizen concerned about arsenic or trichloroethylene in his or her water wants as much information as is avail-

96. For information on this agency, *see* Consumer Product Safety Act, 15 U.S.C. § 2053 (1982).

97. *See* M. KAMRIN, *supra* note 3, at 87-93 (gives a "case history" summarizing toxicological studies conducted on formaldehyde and regulations promulgated by various federal administrative agencies).

98. For example, the EPA has prepared a "Summary of Risk Assessment and Proposed Risk Management Actions" (fact sheet dated April 1988, available from U.S. EPA, Office of Public Affairs, Region 5, 230 S. Dearborn, Chicago, IL 60604). The fact sheet summarizes the EPA's risk assessments for Midland, Michigan, the site of numerous facilities operated by chemical manufacturers.

99. For example, *see* Cosmetics: Proposed Ban on the Use of Methylene Chloride as an Ingredient of Aerosol Cosmetics, 50 Fed. Reg. 51,551 (1985) (to be codified at 21 C.F.R. pt. 700) (summarizes toxicity studies including animal bioassays and epidemiological studies and presents risk assessments for methylene chloride in cosmetics and as a food additive for decaffeination of coffee).

100. 5 U.S.C. § 552 (1982).

able as soon as possible. A Freedom of Information Act request is a tool that is too cumbersome and time-consuming to adequately serve the needs of laypeople seeking risk assessments.

Further, once a risk assessment is obtained, it is presented in a format which is long and difficult for a non-scientist to understand.[101] Although members of the public should be given access to the "unabridged" materials, most need assistance in understanding those materials.

In summary, the public's needs and demands for risk information are not being met. Further, those needs and demands can be expected to increase significantly in the near future as community right-to-know legislation and similar programs are implemented. We need to assist citizens in understanding the nature of risk and the risk management process through affirmative risk education and communication programs.[102] In addition, we must facilitate access to risk assessments for those who actively seek them. At the present, obtaining a risk assessment is a time-consuming, cumbersome task, and the information, once obtained, is difficult for the layperson to understand. Therefore, in the next section of this article, I recommend that the federal government establish a centralized source for risk assessments and provide summary, plain-language versions of those assessments to the public.

III. Analysis—Making Risk Assessments More Readily Available to the Public.

In this section, I propose a national "Risk Assessment Clearinghouse" to be established by Congress. This section outlines the format for the Clearinghouse and explores its operative provisions. Also, discussion of specific benefits, responses to potential criticisms, and acknowledgement of the limitations of a Clearinghouse are presented.

A. *A Risk Assessment Clearinghouse*

Congress should establish a centralized office charged with collecting risk assessments from administrative agencies. The Risk Assessment Clearinghouse would be independent of the major

101. For example, the EPA's draft toxicological profile for trichlorethylene is 140 pages long. One hundred and four of those pages present toxicological data, an exposure assessment, and related data. Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, Toxicological Profile for Trichloroethylene (1988).

102. Such programs are discussed in Stenzel, *supra* note 10.

regulatory agencies involved in risk management such as the EPA, OSHA, and the FDA. This is in order to avoid the impression of "approving" the risk communication or risk management methods of one over the other and to avoid rivalry between and among such agencies.

The Clearinghouse could become a part of the Centers for Disease Control. The Centers in Atlanta, Georgia are a group of nine operating components under the U.S. Public Health Service,[103] an agency within the U.S. Department of Health and Human Services.[104] Each of the CDC's nine components has a distinct assignment related to the CDC's overall mission: prevention of unnecessary illness and death, and enhancement of the health of the American people.[105] The nine components include, for example, the National Institute for Occupational Safety and Health (NIOSH), the Center for Environmental Health, the Epidemiology Program, the National Center for Health Statistics and the Center for Health Promotion and Education.[106] The names of the divisions listed here indicate the substantial involvement of the Centers in the risk assessment process and in public health education. NIOSH and The Center for Environmental Health employ toxicologists who conduct risk assessments for OSHA and the EPA. NIOSH maintains a clearinghouse for receiving, storing, and disseminating technical information on occupational safety and health.[107]

One possible obstacle to public acceptance of the CDC as a source of this information is the fact that CDC personnel conduct toxicity and exposure assessments, both of which are processes employing value-laden assumptions. However, the public policy choices used to supplement risk assessment data in risk management decisions will continue to be made in proceedings before the EPA, OSHA, and similar agencies. To minimize potential problems of credibility, the Risk Assessment Clearinghouse should not be a part of one of the CDC's divisions which engages in risk assessment.

103. *See generally* CENTERS FOR DISEASE CONTROL, ORGANIZATION, MISSION AND FUNCTIONS (1987) (available from Centers for Disease Control, Atlanta, Georgia, 30333).

104. *Id.* at 1.

105. *Id.*

106. *Id.*

107. *Id.* at 19.

The Centers for Disease Control have earned a high level of respect in the public's eyes by responding to communities' needs and requests rather than imposing itself on them.[108] The Centers' Atlanta, Georgia location, being removed from the political atmosphere of Washington, D.C., also enables them to maintain a high reputation and credibility.[109] Such physical removal and autonomy would also be an asset for the Risk Assessment Clearinghouse, since its effectiveness will be contingent upon its ability to develop and maintain an impartial, non-political image.

1. Collecting Risk Assessments for the Clearinghouse

Congress should establish conditions under which any federal agency or any state agency compiling a risk assessment using federal funding would be required to submit that risk assessment to the Clearinghouse. Risk assessments prepared by state agencies without federal funding could be submitted voluntarily by the state or its agency. I propose that Congress require that a risk assessment be submitted to the Clearinghouse when two criteria are met. First, the acting agency conducts a risk assessment or obtains an assessment from an outside source pursuant to requirements of a state or federal statute or regulation. Second, the agency relies on that risk assessment either to justify promulgation of a rule or regulation or uses it in an enforcement proceeding (such as denial of a permit or in an enforcement proceeding against an alleged violator of an environmental law).[110]

The second criterion recognizes that agencies should reject risk assessments which are inaccurate or unreliable because of defective testing procedures, inconclusive data, or other similar reasons.[111] Therefore, to insure a standard of consistency and reliability with respect to information in the Clearinghouse, risk assessments which do not meet these two criteria, even if voluntarily submitted by a state or federal agency, should not be accepted. Inclusion of unreliable risk assessments would complicate an already difficult communication task.[112]

108. Stacey, *CDC Centers its Efforts on Controlling Disease*, 26 AM. MED. NEWS 3, 47 (1983).

109. *Id.*

110. These conditions are identical to those proposed in *The Need for a National Risk Assessment Communication Policy*, *supra* note 10, at 396-97.

111. *Id.* at 397.

112. This assumes that "an administrative agency is acting in good faith when it chooses to reject or ignore a given risk assessment. If an agency were to ignore a risk assessment for invalid reasons, such as political motivation, the consequences of such a breach of

2. Information to be conveyed to the public

The Clearinghouse would make two versions of each risk assessment available to the public: a complete, unabridged version, and a summary, plain-language version. Complete unabridged copies would be available in response to a citizen's request. Reasonable costs for copying the complete risk assessment should be charged as is done with respect to information requested under the Freedom of Information Act.[113]

The plain-language abbreviated version of each risk assessment would be supplied to the public free of charge at government expense. This version must be compiled and conveyed using a uniform format. A consistent format is essential, because without it the public cannot build an "information base" for dealing with other risks and for prioritizing among risks when risk management choices must be made.

Because risk assessments provide only estimates of risk and deal with very small risks which are difficult to put into perspective (for example, one out of hundreds of thousands or millions), the numbers have little value unless the assessment of one risk can be compared to that of another. As one researcher says, "The best way to understand the magnitude of a risk is to compare it with other risks. . . ."[114] Thus, a plain-language version of a risk assessment should compare the risk being studied to other similar risks with which laypeople are familiar in order to provide a basis for evaluation.[115] The comparison to other familiar risks should be added to the plain-language version, even if it does not appear in the original risk assessment.

Parameters for establishing a uniform format to be used in communicating risk assessments are outlined in *The Need for a National Risk Assessment Communication Policy*.[116] Those same parame-

public confidence would reach beyond the scope of RACPA [proposed Risk Assessment Communication Policy Act, a statute designed to promote risk communication]. A remedy for such a breach belongs in a comprehensive statute covering all uses of risk assessments." *Id.*

113. The Freedom of Information Act provides that an agency providing information under that act may charge reasonable costs for document search and duplication. Freedom of Information Act, 5 U.S.C. § 552(a)(4)(A) (1982). The costs for a document search using the Clearinghouse, however, would be minimal and should be not be charged to the person requesting the information.

114. Cohen, *Putting 'Risk' in Perspective*, [Mar.-Apr. 1987] FUSION 32, 38.

115. E. CROUCH & R. WILSON, RISK/BENEFIT ANALYSIS 165 (1982).

116. It is important to note that the format is not presented in a complete, usable form in the *Risk Communication* article. Moreover, it should not be finalized by any one person or

ters should be applied in the format for a plain-language version of a risk assessment. The criteria for the uniform format fall into three categories: (1) quantitative data; (2) comparison to other risks; and (3) assumptions used.

First, the quantitative description of the risk must convey the uncertain nature of the numbers presented. Descriptions should not be based on multiples of risk because such a description does not provide a frame of reference. Risk can be described in numerical terms, provided that the numbers are given as a range (for example, "a risk of one to twenty in a million"), not as a "fixed point" (for example, "two in a million").[117] Conveying risks as a range acknowledges the uncertainty inherent in the numbers and is a step toward dispelling the illusion of scientific certainty created when risk managers talk about measuring very small risks such as one in a million.

Second, a risk should only be presented with "comparators," that is, in comparison to other risks. But those comparators must be chosen from among risks with similar characteristics. By doing so risk communicators will deal with the fact that laypeople and scientists do not agree on the criteria to be used to define risks and rank risks according to their "magnitude." While scientists generally rank risks according to the number of fatalities they have caused,[118] lay people use a range of criteria.[119] Laypeople

regulatory agency. Congress should establish a non-partisan board charged with setting guidelines for describing risks. The board would include laypeople, experts in risk perception and risk communication, scientists from outside administrative agencies, and representatives of federal agencies. In order to prevent representatives of agencies from dominating the board's deliberations, they should be limited to only a small percentage of the board's members. The diverse backgrounds of panel members would promote a consideration of value-related and practical concerns from various viewpoints in addition to use of the scientific "data" available. It is crucial to avoid exclusive reliance on the risk assessment numbers, because to do so ignores their uncertain character and the value-laden choices made in compiling them. Further, without citizen involvement, the format devised by the board is likely to be viewed skeptically by members of the public. Stenzel, *supra* note 10, at 398-400.

117. This concept of presenting the numbers as a range rather than as a fixed point was not described in *The Need for a National Risk Assessment Communication Policy*, *supra* note 10.

118. Slovic, Fischhoff & Lichtenstein, *supra* note 45, at 23-24.

119. One author lists nine such criteria to illustrate this point. They include: (1) origin (natural or synthetic), (2) volition, (3) effect manifestation (immediate or delayed), (4) number of people affected per incident ("ordinary" or catastrophic), (5) controllability, (6) benefit (clear or unclear), (7) familiarity (or lack thereof), (8) exposure (continuous or occasional), and (9) necessity (as compared to luxury). M. KAMRIN, *supra* note 3, at 67. *See also*, Hohenemser, Kates & Slovic, *The Nature of Technological Hazard*, 220 SCIENCE 371, (authors classify 93 technological hazards according to twelve different hazard descriptors).

deal with risks in differing ways depending on the characteristics of the specific risk. Such characteristics include, for example, volition. Many laypeople knowingly accept risks accompanying voluntary activities such as cigarette smoking or drinking alcoholic beverages while they refuse to accept similar or even lower levels of risk if the risk is imposed on them involuntarily (for example, through occupational exposure to chemicals). Similarly, clarity of benefit, real or believed ability to control a risk, and "ordinary" nature of a risk may cause laypeople to be willing to accept certain risks while rejecting others which may be of a comparable "magnitude." For example, at least prior to the 1986 nuclear power plant accident at Chernobyl in the Soviet Union,[120] scientists viewed the use of nuclear power as relatively safe because few people had died as a result of nuclear power plant accidents. Nevertheless, laypeople viewed (and still do view) the use of nuclear power as being extremely risky because of its catastrophic potential and threat to future generations.[121] Meanwhile, they accept other risks which cause far greater numbers of fatalities, such as driving automobiles. Therefore, hazards and the risks that they pose must be compared to others hazards which share similar characteristics. For example, years of exposure to a chemical in a factory must be compared to other chronic hazards;[122] risks of exposure to a major accident at a nuclear power plant must be compared to other involuntary, catastrophic risks; and eating chemical contaminated foods should be compared to other voluntarily encountered hazards.[123]

To establish hazard categories from which comparators can be selected, it is crucial that the advisory board include people with varying backgrounds and perspectives. A cross-section of viewpoints will be necessary for decisions on two levels. First, criteria defining hazard categories must be chosen. These would include,

120. NEWSWEEK, May 12, 1986, at 20; TIME, May 12, 1986, at 38; U.S. NEWS & WORLD REPORT, May 12, 1986, at 18.

121. For discussion of risk perceptions in the aftermath of Chernobyl, see Hohenemser & Renn, *Chernobyl's Other Legacy*, 30 ENV'T 4 (1988).

122. With respect to workplace hazards, it is important to consider whether occupational risks are voluntarily or involuntarily encountered. Comparators should be selected from the same category of volition. *See* K.S. SHRADER-FRECHETTE, RISK ANALYSIS AND SCIENTIFIC METHOD: METHODOLOGICAL AND ETHICAL PROBLEMS WITH EVALUATING SOCIETAL HAZARDS 97-122 (1985) (discusses our society's mistaken assumption that most workers accept workplace risk "voluntarily").

123. *See* Stenzel, *supra* note 10, at 399-400 (discusses hazard categories).

for example, origin (natural or synthetic), volition, controllability, necessity, and other factors relevant to defining risk.[124] Second, in some cases, the board will have to decide how to classify certain types of risk according to the criteria chosen for describing risks. Laypeople, agency personnel, and scientists do not necessarily agree, for example, on what is or is not voluntary exposure (such as in the case of an asbestos worker's choice of employment),[125] the existence and magnitude of benefits, and other similar value-laden distinctions.[126] Thus, a panel that did not include laypeople, risk perception experts, and people concerned with the ethical ramifications of risk management decisions would not be qualified to establish the hazard categories.

Third, the plain-language version of the risk assessment must clearly and concisely convey the assumptions used in compiling the risk assessment. This includes assumptions made in the toxicity assessment *and* the exposure assessment. For example, when a carcinogenesis risk assessment compiled by the EPA is conveyed, the public must be told that its calculations are based on an "upper bound" of risk, not on an "average."[127] Similarly, assumptions made in assessing exposure must be conveyed. Thus, to interpret an assessment of risks to those living near a trash-to-electricity incinerator, the public needs to know what assumptions were made for the hypothetically exposed individual, such as distance of his or her residence from the incinerator, number of hours of daily outdoor (separate from indoor) exposure, number of years of exposure, and similar factors. Thus, an individual whose exposure is less than or greater than that used in the risk

124. *See supra* note 10, (lists criteria used by laypeople to define risk).

125. Our society maintains a "double standard" under which we tolerate greater risks to workers as compared to risks to which we are willing to expose the general population. For discussion of that double standard and of our society's mistaken assumption that workplace risks are "voluntarily" accepted by workers, see SHRADER-FRECHETTE, *supra* note 122, at 97-122.

126. These concerns of laypeople were expressed repeatedly at a workshop which I conducted on risk communication and risk assessment. The workshop was attended by environmentally concerned citizens from a variety of backgrounds. 1988 Backyard ECO Conference, Lake Michigan, May 21, 1988.

127. "Upper bound" describes the EPA's practice of using responses of the most sensitive species as a basis for carcinogenesis risk assessment rather than, for example, a species whose reaction is predicted to be most like that of a human being. Guidelines for Carcinogen Risk Assessment, 51 Fed. Reg. 33,994-98 (1986).

assessment can begin to put the information into an individualized perspective.[128]

3. Requests for Information

The plain-language version and the complete risk assessment would be available upon written or telephoned request. A written request could be in any reasonable form, without formal requirements, as is permitted with Freedom of Information Act requests.[129] In addition, a telephone "hot-line" should be established to receive requests. Either an "800" number, with no charge to the caller, or a "900" number, which would reduce costs to the federal government by imposing a minimal charge to the caller, could be used.

Responses to written requests would be by mail. Responses to telephone requests could be immediate, by phone, and by mail. Operators receiving calls would offer to read information contained in the plain-language risk assessment to callers who want an immediate response, but a copy of the plain-language assessment would be mailed to confirm and complete that information. Due to their length, the unabridged risk assessments would be conveyed only in writing.

B. *Precedent*

1. Precedent for Plain-Language Document

Providing a plain-language version of the risk assessment is consistent with a growing trend in our legal system. For example, lawyers are increasingly conscious of the desirability of the use of plain-language in legal documents such as wills and contracts. Use of plain-language in leases has been emphasized and has

128. Ideally, standard sets of assumptions should be used for describing types of risks. Thus, the public could more easily compare the assessment of one risk to that of another. For example, a standard set of assumptions should be developed and used consistently for each of the following categories: "(1) occupational exposure to a chemical through either inhalation or skin contact; (2) exposure due to living near a site emitting chemical air pollutants; or (3) exposure through ingestion of chemicals found in a drinking water source." Stenzel, *supra* note 10, at 401. However, in the absence of a uniform "Risk Communication Policy," at a minimum, the assumptions used should be conveyed as a part of each risk assessment.

129. The Freedom of Information Act requires that an agency "upon any request for records which (A) reasonably describes such records and (B) is made in accordance with published rules stating the time, place, fees (if any), and procedures to be followed, shall make the records promptly available to any person." 5 U.S.C. § 552(a)(3) (1982).

played an important role in landlord tenant relations in recent years. Under federal law, employers who provide pension plans (such as defined benefit, defined contribution, or profit-sharing) to their employees must provide each employee with a "Plan Summary" which summarizes the employee's rights and obligations under the plan in plain-language.[130]

In environmental law, the EPA has taken steps consistent with the proposal in this article. Beginning in 1983, the EPA conducted a series of environmental studies in the Midland, Michigan area for dioxins and other pollutants. In April, 1988, the EPA released a fact sheet summarizing the results of their risk assessment and proposed risk management actions.[131] The EPA's efforts are evidence that the agency recognizes the need to convey risk assessments to the public in a plain-language form. However, the proposal in this article goes much further by including all risk assessments used by federal agencies and many of those used by state agencies, setting a standardized format, and establishing a central location through which the assessments could be easily and quickly obtained.

2. Precedent for Clearinghouse

There is also precedent for use of a clearinghouse. The Birth Defects Program within the Center for Environmental Health, one of the nine components of the Centers for Disease Control, has conducted risk assessments to study the effects of drugs taken by pregnant and nursing mothers.[132] In various texts used by health professionals, summaries of effects of individual drugs are published. One such text, for example, includes a "Fetal Risk Summary" and a "Breast Feeding Summary," each of which describes the format (number of participants, exposure, length of study, etc.) and results of studies which have been conducted on the chemical.[133] A list citing the studies summarized is also in-

130. Employee Retirement Income Security Act of 1974, 29 U.S.C. §§ 1001-1461 (1982); Reporting and Disclosure Under the Employee Retirement Income Security Act of 1974, 29 C.F.R. §§ 2520.102-1 to 2520.102-5 (1987).

131. Summary of Risk Assessment and Proposed Risk Management Actions—Midland, Michigan (fact sheet dated April, 1988, available from U.S. EPA, Office of Public Affairs, Region 5, 230 S. Dearborn, Chicago, IL. 60604).

132. CENTERS FOR DISEASE CONTROL, ORGANIZATION, MISSION, AND FUNCTIONS (1987) (available from Centers for Disease Control, Atlanta, Georgia, 30333).

133. G. BRIGGS, DRUGS IN PREGNANCY AND LACTATION (1986). For a similar resource, *see also* T. H. SHEPARD, CATALOG OF TETRATOGENIC AGENTS (1986).

cluded.[134] To supplement such publications, personnel at the CDC respond to telephone calls from health professionals (but not laypeople) who inquire about recent studies and data which have not yet been incorporated in the published summaries.[135] Thus, the CDC may be a particularly appropriate location for a Risk Assessment Clearinghouse, since health professionals are already acquainted with their role as an information source. It is logical to assume that health professionals (including private physicians and state and local public health officials) may serve as "intermediaries." Such intermediaries may direct members of the public to the Risk Assessment Clearinghouse, or they may actually contact the Clearinghouse to obtain information on behalf of laypeople.

Congress is considering legislation which would establish a clearinghouse for information about one specific area of risk: indoor air pollution. In August, 1987, Senator Mitchell introduced the "Indoor Air Quality Act of 1987."[136] Among its other provisions, that bill would establish "a national indoor air quality clearinghouse to be used to disseminate indoor air quality information to other federal agencies, state and local governments, and private organizations and individuals." The indoor air quality clearinghouse would be a repository for information collected from government agencies, private organizations, and individuals. The proposed legislation, however, does not provide details for the design, development and implementation of the clearinghouse.[137] If that bill is passed, the format and detail outlined in this article should be implemented with respect to risk assessments included in the indoor air quality clearinghouse. Further, if a Risk Assessment Clearinghouse is established after an indoor air quality clearinghouse has been set up, it would be appropriate to transfer risk assessments for indoor air pollution to the Risk Assessment Clearinghouse. Indoor air quality information not meeting the criteria for inclusion in the Risk Assessment

134. G. BRIGGS, *supra* note 133.

135. For general information, contact the Centers for Disease Control.

136. S. 1629, 100th Cong., 1st. Sess., 133 CONG. REC. 11,655-61 (1987).

137. The design, development, and implementation of the indoor air quality clearinghouse are assigned to the General Services Administrator who is authorized, in turn, to provide for them through a contractual agreement with a nonprofit organization. Indoor Air Quality Act of 1987, S. 1629, 100th Cong., 1st. Sess., 133 CONG. REC. 11,655, § 12(a)(3) at 11,660.

Clearinghouse would continue to be provided through separate channels.

To deal with risk assessments, in 1982 the EPA established a computer data base to assist its personnel in implementing the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).[138] (CERCLA is also known as the "Superfund" legislation.) The data base, called the STARA Toxicity Base, includes data from animal toxicity tests for about two hundred chemicals and epidemiological data for about thirty chemicals.[139] STARA includes quantitative data as well as descriptive information regarding exposure and types of effects.[140] An EPA publication explains why the STARA data base was developed:

> Requests for situation-specific assessments or other technical assistance occur irregularly and often involve repetitive retrieval of toxicity information on a variety of chemicals. The traditional procedure has been to manually extract and compile the desired data from various "hard copy" sources (research articles, review documents) on a case-by-case basis as the need arose. This approach was deemed outdated and inappropriate on the basis of economy, efficiency and even accuracy. The logical solution was to compile this bulk of information into some form of computer accessible data base.[141]

The reasons given by the EPA for its own data base apply with equal force to illustrate the need for a Risk Assessment Clearinghouse to serve the general public.

C. *The Benefits of a Risk Assessment Clearinghouse*

Regulatory agencies have a duty to share risk assessments with the public. To withhold the information overtly or by maintaining barriers to its acquisition is elitist and undemocratic.[142] As Thomas Jefferson said, "[I]f we think [the people are] not enlightened enough to exercise their control with a wholesome discre-

138. 42 U.S.C. §§ 9601-9675 (1982 & Supp. IV 1986).

139. Farren & Hertzberg, THE SARA TOXICITY DATA BASE 1 (1986) (EPA Research Brief EPA/600/M-86/016, available from the EPA Center for Environmental Research Information, Cincinnati, OH 45268).

140. *Id.*

141. *Id.* at 1.

142. *See generally* Bazelon, *supra* note 13 (argues that in the interests of human dignity as well as to preserve democracy, full disclosure about risks, value choices, and risk management decisions is essential in our society).

tion, the remedy is not to take it from them, but to inform their discretion."[143]

Establishment of a Risk Assessment Clearinghouse is a logical, necessary "next step" following implementation of federal worker and community right-to-know legislation and state legislation such as California's Proposition 65.[144] Citizens and intermediaries who serve the public will gain easier, faster access to existing risk assessments.

Access will be faster and easier for a variety of reasons. Unlike the present situation, citizens will not need to do research as to the jurisdiction of various agencies before requesting information. Response will be almost immediate, with preliminary information given by telephone followed within a few days with more detailed information by mail. Thus, a citizen will not have to deal with individual agencies' public information offices, the Federal Register, or Freedom of Information Act requests.

Faster access to risk assessments will enable citizens to more quickly identify potential toxic effects of exposure to a chemical and to begin to evaluate the potential severity of those toxic effects. Suspicion that an agency is being evasive or general frustration with lack of response by an agency can be avoided or at least reduced.

Similarly, keeping in mind that the news media are the public's primary sources of environmental information, news reporters will be able to gather greater amounts of information more quickly. With nearly immediate access to risk assessments, news reporters can obtain some background before interviewing scientists, regulators, and citizens, and they can include the risk information in their stories.[145]

Further, the plain-language version of risk assessments will provide news reporters with a uniform format for presenting risk

143. Letter from Thomas Jefferson to William Charles Jarvis (Sept. 28, 1820), *reprinted in* 7 WRITINGS OF THOMAS JEFFERSON 177, 179 (H. Washington ed. 1855), quoted in NRDC v. NRC, 547 F.2d 633 (D.C. Cir. 1976).

144. *See supra* text accompanying notes 84-94 (discusses worker and community right-to-know legislation and California's Proposition 65).

145. There are sources designed to assist reporters in identifying and contacting scientists. For example, the Scientists' Institute for Public Information operates a "Media Resource Service." It is a referral service for journalists who are working on stories involving science and technology. A journalist working on a specific story can call the service. He or she will be given the names and phone numbers of appropriate experts along with information about the experts' backgrounds and credentials. McGowan, *Panel on Future Challenges for Risk Communicators*, in RISK COMMUNICATION 88 (1987).

assessments in their stories. That will minimize instances in which reporters appear to be comparing "apples and oranges" by describing risks using differing measures.

These same arguments for providing greater access to information and providing it in a uniform format also apply with respect to other parties seeking such information. For example, various environmental groups and concerned citizens seek risk assessments for their own efforts in lobbying agencies and the legislatures. They also act as "watch-dogs" of public health and may, in turn, convey this information to the news media or through their own publications.

The Clearinghouse will reveal areas where there is little or no information available, at least within regulatory agencies. (Admittedly, other risk assessments may exist for many chemicals.) Currently, a citizen who is unable to locate any information about a given chemical may fear that he or she has looked in the wrong place or that an agency is withholding information. Conveying uncertainty and insufficient data are integral parts of risk communication.

Similarly, use of the Clearinghouse will enable citizens to begin to evaluate the strength of evidence available with respect to a specific chemical. It is likely that the Risk Assessment Clearinghouse will include several risk assessments for a specific chemical. If the Clearinghouse reports that three agencies have assessed the same chemical in the past three years, each with similar results, those results would be more trustworthy than two tests run by one agency fifteen years ago. Further, if several risk assessments are available but they reach divergent "conclusions," the uncertain nature of the data on that particular chemical will be exposed.

The primary purpose of the Clearinghouse is to assist the general public. Federal administrative agencies have the expertise and personnel available to search for and find the information they need with respect to risk assessments. However, under the "New Federalism," the EPA and other regulatory agencies are turning over many risk management tasks, including responsibility for conducting risk assessments, to the individual fifty states. The Clearinghouse might provide preliminary information to assist a state in deciding how to spend its limited resources. If federal regulatory agencies have extensively assessed the risks of a chemical and the results of those assessments are consistent with

each other, a state may opt to spend its resources to assess the risks of chemical substances which have not been studied as extensively.

A similar rationale applies to the utility of information in the Clearinghouse with respect to business organizations. Large corporations possess the personnel and resources to gain access to the risk assessments prepared by agencies even if the process is time-consuming and cumbersome. Further, they regularly participate in regulatory rulemaking proceedings in which risk assessments are employed. The Clearinghouse information could be of assistance to small businesses which are concerned about complying with worker and community right-to-know laws but do not have the resources of larger companies. As the small business responds to inquiries from its workers and the community, it can use information from the Clearinghouse to supplement the information supplied by chemical manufacturers in Material Safety Data Sheets (MSDS's).

Beyond providing information needed to make specific risk management decisions, the Risk Assessment Clearinghouse will educate the public about risks in general. In turn, citizens will be able to participate in the risk management process in a more meaningful way.

By providing ready access to risk assessments and by presenting the assessments according to a consistent format, agencies will improve their public image. A free flow of information is necessary if agencies are to avoid the appearance of being evasive. Studies by risk perception experts confirm that people must trust the disseminator of information before they will accept that information.[146] As the public begins to trust administrative agencies, citizens will be more willing to participate in regulatory processes. An educated public, in turn, can make more substantial and more meaningful contributions to the formulation of public policy and to risk management decisions.

As the public feels able to and does participate in risk management decisions, the public's antagonism toward administrative agencies will be lessened. Public respect for and acceptance of regulatory decisions can be expected to increase.

146. "Successful communication demands credibility." Fischhoff, *supra* note 20, at 96. *See also*, Slovic, *Informing and Educating the Public about Risks*, 6 RISK ANALYSIS 403, 414 (1986).

D. *Anticipated Criticisms of the Risk Assessment Clearinghouse*

This proposal for a Risk Assessment Clearinghouse may encounter opposition from various groups including agencies, chemical producers and users, employers, and taxpayers in general. Critics may argue that we can't afford it and that it's an unneeded additional level of bureaucracy. It may also be argued that information which is inexact and subject to further review should not be distributed. Those arguments are not well-founded.

The Risk Assessment Clearinghouse would be a relatively inexpensive program to set up and administer. Costs for services of an advisory board which would establish the format for plain-language versions of the risk assessment would be minimal. Even though the board might be needed to periodically revise guidelines based on new knowledge, its members need not become full-time permanent employees of the federal government. The Clearinghouse would not require that new risk assessments be compiled. Clearinghouse personnel would simply gather existing information from regulatory agencies and put that information into a computer data base.[147] The work of Clearinghouse personnel would be assisted by the fact that administrative agencies would have an affirmative duty to convey certain [148] risk assessments to the Clearinghouse. Beyond the day-to-day administration, the remaining major task to be accomplished would be preparation of the plain-language documents drawing from information in the risk assessments. Costs of running the Clearinghouse would be minimized through use of computers to store and retrieve copies and by charging the public reasonable copying fees, except for the short, plain-language documents.

The costs incurred would be easily justified. The public has a right to information generated through public tax dollars. The information should not simply sit on the shelves of our regulatory agencies. The fact that our country has traditionally spent only a small percentage of its risk management dollars on public education and information programs does not mean that to do so has been a wise course of action. The National Environmental Protec-

147. It is useful to note that the EPA estimates that the cost of compiling a "toxicity" table for each of the chemicals in its STARA data base is about $500 to $1,000. Farren & Hertzberg, *supra* note 139, at 3.

148. *See supra*, text accompanying notes 110-112 (describes criteria identifying risk assessments which agencies would be required to convey to the Clearinghouse).

tion Board of Sweden, for example, spends a significant portion of its budget disseminating information about its work.[149] Risk communication may be the most important task before us in risk management today as we attempt to set priorities in dealing with a multitude of risks with limited financial resources. Therefore, it is time for the United States also to begin to devote substantial efforts and financial resources to risk education and information-sharing.

Further, the costs of the Risk Assessment Clearinghouse may be recovered elsewhere. Individuals and intermediaries acting on behalf of the public will spend less effort and fewer resources in efforts to obtain the information in risk assessments. Further, it is less likely that they will duplicate the research efforts of other individuals and groups who seek the same information.

Other objections may come from critics who say that we should not distribute information which is inexact and will be revised repeatedly as a result of future studies. These objections are not compelling. Regulators and courts reviewing their actions are making decisions based on risk assessments now, not postponing decisions for decades waiting for more information. If risk assessments are being used to make decisions affecting citizens' health and lives, then it is elitist and intolerable to suggest that the information is not reliable enough to be conveyed to the public. Lack of knowledge and scientific uncertainty are important messages to be conveyed. Further, a computer data bank can easily accommodate additional or revised risk assessments.

The messages of uncertainty which will be conveyed through the Clearinghouse also provide a response to a third potential criticism: those who are critical of agencies' reliance on risk assessments may argue that the Clearinghouse will serve to legitimatize risk assessments and further entrench our reliance on them.[150] This is not necessarily true. As discussed *supra*,[151] risk assessments are already thoroughly entrenched in our risk management process. Through the Clearinghouse, regulatory agen-

149. J. DIMENTO, ENVIRONMENTAL LAW AND AMERICAN BUSINESS: DILEMMAS OF COMPLIANCE 176 (1976).

150. This argument was raised at a workshop which I conducted on risk communication and risk assessment. 1988 Backyard ECO Conference, Lake Michigan, May 21, 1988.

151. *See generally* text accompanying notes 1-3 (discussing administrative agencies' extensive reliance on quantitative risk assessment data as they make risk management decisions).

cies will take a step toward acknowledging openly that they don't have all the answers the public wants and that the risk assessment process, although useful, is a limited tool.[152]

As the public becomes more familiar with risk assessments and the assumptions and value-laden decisions involved, there may be several consequences. Perhaps public exposure of the nature of the quantitative risk assessment process will result in more attention to the procedures used in the process and, ultimately, risk assessors will be provided with resources and compelled to reverse these procedures. More certainly, the public's awareness of other important factors which are or should be involved in risk management decisions will increase.

Value-related choices are only implicit in the risk management decisionmaking process and are rarely, if ever, expressly discussed and analyzed. We must examine and consider who receives the benefits of risk management decisions (corporate managers? shareholders? workers? customers?) and consider whether they or other parties should receive those benefits. We must analyze our assumptions about volition in the workplace. (Are workers truly choosing to expose themselves to occupational risk in exchange for higher wages? Or, are the workers in mines, asbestos factories, and other hazardous sites choosing to remain employed in these areas out of necessity because they, have no viable options?)[153] Further, regulatory agencies making risk management decisions generally do not consider available alternatives. For example, the EPA requires a chemical manufacturer to perform a toxicity assessment to support its application for licensing a new pesticide under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).[154] The EPA does not, however, require the manufacturer to consider options such as use of a less hazardous chemical or use of organic farming methods through

152. Professor Frank P. Grad of the Columbia Law School argues that although we will not (and should not) abandon the use of risk assessment in public decisionmaking, we should not let ourselves be overwhelmed by the false impression of certainty conveyed by numbers. He argues that it is a technique which is subject to challenge and varies in usefulness, depending on the context in which it is used. Grad, *Risk Assessment and the Tyranny of Numbers: A Brief Comment*, 1 ENVTL. L. & LEGIS. 1 (1986).

153. *See* K. SHRADER-FRECHETTE, *supra* note 122, at 107 (argues that many people engage in a certain work only because they have no other alternatives).

154. 7 U.S.C. §§ 135-136y (1982 & Supp. IV 1986).

which the use of risk-laden chemicals might be avoided.[155] The EPA considers such alternatives as it determines whether or not to grant the license allowing the use of pesticides. I am not suggesting that the Risk Assessment Clearinghouse alone will cause regulatory agencies or our society to reexamine and reformulate the risk management process. But, increased citizen awareness and knowledge can be the first steps toward serious efforts to institute reform.

E. *Limitations of this Proposal*

It is important to acknowledge the limitations of the Risk Assessment Clearinghouse. It would be only one of many steps toward the preliminary goal of better, two-way risk communication between administrative agencies and the public, and the ultimate objective of fair and effective risk management.

First, it must be acknowledged that risk assessments have been conducted on only a few hundred of the approximately 50,000 chemicals in common use in our society.[156] However the public needs and is entitled to be informed about our lack of information concerning the safety of these chemical substances.

It must also be acknowledged that, like the Freedom of Information Act, the Risk Assessment Clearinghouse would be passive in nature.[157] It would make information more readily available to those who seek it, but it would not actively disseminate information. Nevertheless, the Clearinghouse would be a substantial improvement over the use of the FOIA or less formal requests to agencies, by providing a centralized source and faster access to risk assessments, and by making plain-language versions available.

155. I am not recommending that chemical manufacturers be required to investigate such alternatives. In most cases there would be no economic incentive, the primary motivator of most corporations, to do so. Presentation of alternatives would most appropriately come from the regulatory agency or from concerned citizens. However, it is important to note that systematic, serious consideration of viable alternatives involving less risk is conspicuously absent from most of our risk management practices.

156. M. KAMRIN, *supra* note 3, at 6.

157. Professor James S. Coleman observed, "The Freedom of Information Act in the U.S. established the right of interested parties to gain access to information to social policy research, but it does not include procedures to aid that dissemination." J.S. Coleman, Social Policy Research in a Theory of Society (April 17, 1986) (unpublished manuscript available from the author at the Department of Sociology, The University of Chicago).

Our society's general need for risk education should be addressed through a variety of mechanisms in addition to the Clearinghouse. Additional measures would include affirmative risk education and outreach by administrative agencies.[158] They would also include public education in our primary and secondary schools and universities, and adult education through special programs such as conferences and seminars.

A further limitation of the Clearinghouse is that it would only provide one-way communication. Ultimately, risk communication between regulatory agencies and the public must be two-way. The public must participate actively in the risk management process, and regulatory agencies must listen to citizens and incorporate their needs and values into the risk management process. The Risk Assessment Clearinghouse will facilitate public input in the risk management process by enabling citizens to make more informed contributions more quickly, but other means are needed to ensure that agencies listen and respond to citizens' needs and values. For example, it may be necessary for Congress to redefine the concept of "risk management" to ensure that agencies view "risk assessment" as only one limited tool among a variety of tools to be used by agencies in making risk management decisions. For example, additional "tools" could include consideration of the values of persons to be affected by the risk management decision.[159] Also, Congress might require agencies to consider practical alternatives to use of the chemical, such as use of another chemical or no chemicals. Thus, when considering an application for a license for a new pesticide, the EPA would evaluate alternatives such as other chemicals or use of organic farming methods and deny the license if it concludes that alternative means for eliminating the "pests" will create fewer risks to human health and life.[160]

Laws and regulatory programs alone cannot create a well-informed public, but they can be used to facilitate the process.

158. *See* Stenzel, *supra* note 10.

159. *See generally* M. SAGOFF, THE ECONOMY OF THE EARTH: PHILOSOPHY, LAW AND THE ENVIRONMENT (1988) (examines and criticizes the economic methodologies, such as cost-benefit analysis, on which our environmental laws are based, and argues that ethical considerations should be included in such social regulation).

160. Further discussion of means for requiring administrative agencies to consider and incorporate the public's values into risk management decisions is beyond the scope of this article. However, I intend to continue such discussion in a future article.

Through the Risk Assessment Clearinghouse the federal government can and should facilitate risk education and communication.

IV. CONCLUSION

In the United States, the public relies extensively on administrative agencies to manage the risks created by the use of chemicals. Toxicologists conduct the risk assessments upon which agencies base their risk management decisions. Yet, the risk assessment process is riddled with uncertainties. Further, risk assessments have been conducted on only a small percentage of the chemicals in common use in our society. But, acting through our legislatures and courts, citizens in the United States have realized that we cannot wait for more definite answers before we deal with the hazards of toxic chemicals.

To deal with gaps in knowledge and uncertainties in the risk assessment process, risk assessors make value-laden assumptions. In turn, regulators making risk management decisions rely on public policy to supplement the "data" produced in the risk assessment process. Yet, whenever public policy is involved in regulatory decisions, it is crucial that the public participate in those decisions in a meaningful way. Meaningful participation depends on a well-informed public.

This article has illustrated that although risk assessments are the primary tools used by administrative agencies in risk management decisions, those assessments are not readily available to the public. Those who actively seek risk assessments find the search to be a time-consuming, confusing, and cumbersome process.

Therefore, I have proposed that Congress establish a Risk Assessment Clearinghouse. At a minimal cost to government, risk assessments compiled and used by administrative agencies would be made available to the public in a summary, plain-language form and in their entirety. By making risk assessments (or acknowledgment that they do not exist for certain chemicals) readily available to the public, the federal government will provide a logical and necessary extension to existing right-to-know laws and to legislation designed to reveal the presence of chemical risks in consumer products to the public (for example, California's Proposition 65). The Risk Assessment Clearinghouse will facilitate risk education in general and will enable the public to provide more informed input to administrative agencies. The Clearinghouse is one of a variety of tools we need to promote effective

two-way risk communication between administrative agencies and the public. Effective means of risk communication, including the Risk Assessment Clearinghouse, will be indispensable as we strive toward our overall goal of making well-informed, fair and effective risk management decisions.