

CORPORATE RISK MANAGEMENT AND RISK COMMUNICATION IN THE EUROPEAN COMMUNITY AND THE UNITED STATES

*Michael S. Baram**

I. INTRODUCTION

The responsibility of private firms to communicate hazard and risk information to government officials and persons at risk has emerged as one of the central features of corporate risk management in the European Community ("E.C.") and the United States ("U.S."). This function is commonly described as "risk communication."¹ In both the E.C. and the U.S., new legal requirements and public attitudes now promote corporate disclosure of hazard and risk information on an unprecedented scale.

Corporate risk management is a vast, complex field of activity that is largely unaddressed by commentators and unknown to the general public in both industrial societies. Further, corporate conduct of risk communication, whether legally mandated or voluntary, is a relatively new undertaking for most private firms. This Article addresses corporate risk management and communication functions and their societal implications by surveying the development of corporate risk communication to workers and the general public in the E.C. and the U.S.²

* B.S., Tufts University (1957); LL.B., Columbia Law School (1960). Michael Baram is a partner in the law firm of Bracken and Baram, Boston, MA; and is Adjunct Professor, Boston University Law School, where he directs the Center for Law and Technology. This Article is based on research supported in part by the European Community Research Centre, Ispra, Italy. Many persons provided useful insights that were helpful in preparing this Article, including: Dr. H. Otway of the European Community Research Centre; Professor B. Wynn, U. of Lancaster; Prof. J. van Eijndhoven, U. of Utrecht; Prof. H. Kunreuther, Wharton School; Dr. M. Will, Europa Institute, Saarbrücken Law School; Dr. L. Kramer, E.C. D.G. XI; Messrs. D. Allen and J. Makris, U.S. Environmental Protection Agency; Dr. L. Jourdan and Mr. J.M. Devos, Conseil Européen des Fédérations de l'Industrie Chimique; Dr. S. Swanson, American Petroleum Institute; Dr. O. Giardini, Geneva Assoc.; Dr. I. Rosenthal, Rohm and Haas Co.; Mr. J. Wheeler, Occidental Chemical, Inc.; and officials of other U.S. and European companies.

1. "Risk communication" generally denotes the disclosure of both hazard and risk information by firms to government officials and persons at risk. It should be recognized that hazard information differs from risk information. Hazard information pertains to the dangerous attributes of an activity in the abstract (e.g., the carcinogenicity or volatility of a particular chemical); whereas risk information is the estimated effects of the hazards on persons who may actually have been exposed. Therefore, risk information considers factors such as emission levels, exposure levels, and human biological response.

2. Much of this Article is based on the author's experience gained from extensive consulting and meetings with government and industry officials in the E.C. and the U.S. Statements in the text for which no citation to an authority is provided are based primarily on the author's first-hand knowledge gained through such communications.

To evaluate these developments, Section II provides an overview of the corporate risk management function, including its goals and the intrinsic and extrinsic factors that influence decision-making in the firm. Section III reviews the risk communication policies in the E.C. and the U.S. that apply to private firms dealing with hazardous substances as these policies have evolved from theory to law to practice. Section IV addresses legal requirements for the use of risk communication to protect worker health in the E.C. and the U.S., and evaluates how such requirements are shaping corporate risk management functions in large European and American firms. Section V follows the same approach in addressing the use of risk communication to protect the health and safety of community residents. The section reviews the major legal requirements in the E.C. and the U.S. for communicating risks to communities, and then evaluates the influence of such requirements on industrial risk management programs.

The major findings of this Article are summarized in Section VI. The recent enactment of laws and regulations in the E.C. and the U.S. requiring increased use of risk communication to workers and communities has been inspired by the goals of reducing industrial risks without increasing government bureaucracy, and of empowering the public to take informed action against risks from toxic substances. An underlying premise of these laws and regulations is that the mandated disclosures about risky conditions will increase corporate vulnerability to potential conflicts with local officials and persons at risk, and to consequent economic losses; firms therefore will act voluntarily to reduce risks to prevent both the conflicts and the economic losses.

Thus, corporate risk management is relied on to prevent risk and loss, but as this Article indicates, the mechanism has faltered due to a lack of uniformity and clear guidance within both the E.C. and the U.S. with respect to implementing new risk communication requirements. These and other weaknesses in the risk communication frameworks enacted in each society indicate that the promise of effective risk reduction through risk communication will not be achieved unless other policy options are chosen.

II. THE CORPORATE RISK MANAGEMENT FUNCTION

Modern industrial technologies use toxic and volatile chemicals, radioactive materials, and other hazardous substances. New chemicals and biological products that will be put to industrial use in the future will also prove to be hazardous. Firms in the E.C. and the U.S. that produce or handle these substances must use effective methods of risk manage-

ment to prevent harms to workers, community residents, and product users.³

Risk management methods used by industry vary considerably. Numerous factors are responsible for these variations in risk management, including: (i) the types of substances used and their hazard attributes; (ii) the firm's management organization and values; (iii) the legal requirements and potential for liability; (iv) the insurance availability and cost; and (v) the available risk management options and their costs. This section will discuss these and other factors that shape the industrial risk management function.

A. Hazardous Substances and Risk Implications

When private firms manage hazardous substances improperly, the consequences may be tragic for society and costly for industry. Society may be harmed by adverse impacts on human health, property interests, and natural resources. At least some of the costs for these harms will be imposed on firms and their insurers through liability awards and loss of markets and customers.

When a firm fails to prevent a spill, explosion or other sudden accidental release of a hazardous substance, the event may immediately endanger workers and community residents and establish a local legacy of chronic health and environmental harms over the long term. Major accidents at industrial and energy facilities at Bhopal, Flixborough, Beek, Seveso, Three Mile Island, and Chernobyl vividly illustrate these dangers.⁴ But not to be overlooked are thousands of smaller accidents that have occurred over the past decade and have also resulted in large numbers of deaths, illnesses, and emergency evacuations.⁵

3. See generally AIR POLLUTION CONTROL ASS'N. AVOIDING AND MANAGING ENVIRONMENTAL DAMAGE FROM MAJOR INDUSTRIAL ACCIDENTS (Conf. Proc. 1986); Baram, *Charting the Future Course for Corporate Management of Health Risks*, 74 AM. J. PUB. HEALTH 1163 (1984); INTERNATIONAL ENVIRONMENTAL BUSINESS REQUIREMENTS (B. Biles ed. 1985); CONFERENCE BOARD, INDUSTRY RESPONSE TO HEALTH RISK (Rep. No. 811 1981) (a report on medical and hygiene programs for protecting worker health in 28 large U.S. firms); INT'L LABOUR OFFICE, SAFETY AND HEALTH PRACTICES OF MULTINATIONAL ENTERPRISES (1984); REGULATING INDUSTRIAL RISKS (H. Otway & M. Peltu eds. 1985); M. WOROBEC, TOXIC SUBSTANCES CONTROL PRIMER (2d ed. 1986).

4. See Smets, *Compensation for Exceptional Environmental Damage Caused by Industrial Activities*, in INSURING AND MANAGING HAZARDOUS RISKS: FROM SEVESO TO BHOPAL AND BEYOND 79 (P. Kleindorfer & H. Kunreuther eds. 1987) (an inventory of major industrial accidents).

5. See INDUSTRIAL ECONOMICS, INC., ACUTE HAZARDOUS EVENTS DATA BASE (Report to U.S. Environmental Protection Agency, 1986). This report records 6,928 separate accidents involving industrial chemicals from 1980 to mid-1985, which caused 138 deaths and 4,717 injuries and required the evacuation of 217,000 people. Since these

Failures in risk management may also lead to slow, insidious releases of hazardous substances over long periods of time that cause unsuspected harm to workers and community residents. When pollution control or waste disposal systems are inadequate, workers and community residents may be put at significant risk from continuing exposure, as in the case of public water supplies that have been contaminated by leachate from industrial waste sites.⁶ When workers or community residents are exposed to significant risks from industrial emissions or wastes, government may also be culpable because its agencies either have failed to require sufficiently protective controls on industrial emissions and waste disposal, or have failed to monitor and enforce otherwise adequate control requirements.⁷

Finally, failures in risk management also lead to the introduction of hazardous products into commerce that unreasonably endanger users and bystanders. For example, producers that sold asbestos products to "downstream" firms⁸ or individual consumers without providing adequate warnings and safe-use instructions are now being held responsible for thousands of cases of disease and death, as well as for property damage at schools and other sites where asbestos was installed.⁹ The health effects from asbestos have occurred primarily among employees of the downstream firms, such as shipyards and construction firms. For some product risks, government may be culpable because it reviewed the hazardous product but allowed it to be sold without adequate warnings or for inappropriate uses. Government may also be culpable if it *required* the product to be used, as in the case of asbestos insulation installed in ships and public buildings.

Since a hazardous substance produced or used by industrial activities may endanger the health of workers, community residents, and product users, it requires careful management throughout its life cycle.

statistics are based on an incomplete data base, the actual number of casualties in this period likely are considerably higher.

6. For a review of hazardous waste problems in the E.C., see Wynne, *A Case Study: Hazardous Waste in the European Community*, in REGULATING INDUSTRIAL RISKS, *supra* note 3, at 149. In the U.S., the Environmental Protection Agency ("EPA") has identified some 17,000 hazardous waste sites that are in need of cleanup, and expects the total to increase to 22,000 sites. M. WOROBEK, *supra* note 3, at 182.

7. Failures in government enforcement of regulations in the U.S. and the E.C. are discussed in Baram, *Implementation and Evaluation of Regulations*, in REGULATING INDUSTRIAL RISKS, *supra* note 3, at 57.

8. A "downstream" firm is a company that purchases products from a chemical manufacturer for use in its own production processes or workplace.

9. See Brodeur, *The Asbestos Industry on Trial* (pts. 1-4), NEW YORKER, June 10, 1985, at 49; NEW YORKER, June 17, 1985, at 45; NEW YORKER, June 24, 1985, at 37; NEW YORKER, July 1, 1985, at 36; Comment, *The Manville Bankruptcy: Treating Mass Tort Claims in Chapter 11 Proceedings*, 96 HARV. L. REV. 1121, 1121-22 (1983).

Government regulation has been established for life cycle control of some hazardous substances such as radioactive materials. But for most chemical substances, government controls are incomplete or even non-existent, and responsibility for risk management rests solely with industry.

Several types of firms bear responsibility for risk management over the life cycle of any hazardous substance:

1. *Primary producers* (and importers) of the substance;
2. *Intermediate producers*, which purchase the substance to formulate mixtures and end products;
3. *End-user firms*, which use the products in their businesses, and *individual consumers* of end products;
4. *Transporters* of the substances and associated wastes; and
5. *Waste disposal firms*, which provide for ultimate disposal.¹⁰

The industrial risk management function is usually divided among these five types of firms over the life cycle of a hazardous substance. For each type of firm, the particular set of risk management tasks that require attention will be dictated by the nature of the firm's activities (e.g., production or storage), failure modes which can lead to health risks (and other adverse results), and the population sectors at risk. *Figure 1* below presents an integrated view of these considerations.

B. Determinants of Risk Management

Any firm's risk management program must achieve two objectives: regulatory compliance and loss prevention. To achieve regulatory compliance, the firm must comply with the requirements for risk prevention that are imposed by public law.¹¹ These requirements are explicit in their

10. This typology is derived from various sources of information on chemical industry activities and associated risks, such as the sources cited *supra* note 3.

11. In the U.S., public law consists of federal and state statutes and agency regulations and municipal ordinances. Public law requirements in the E.C. are set forth in E.C. Directives, and legislative and regulatory enactments by the twelve Member States (i.e., member countries) and their political subdivisions such as the "laender" in West Germany. An E.C. Directive is a document that sets out objectives that must be complied with by the Member States. A Directive is usually proposed by the Commission of the European Communities ("the Commission"), which is a body of seventeen individuals appointed by the Member States. The Commission establishes several specialized Directorate-Generals that work on specific policy areas. The Directorate responsible for environmental and safety matters is the Directorate-General for the Environment, Consumer Protection and Nuclear Safety (D.G. XI). After the Commission and the appropriate Directorate draw up a proposal for a new or amended Directive, it is sent to the European Parliament and to the E.C.'s Economic and Social Committee for comment and advice. The European Parliament is composed of representatives directly elected by the people in each Member State, while the Economic

FIGURE 1: INDUSTRIAL RISK MANAGEMENT OVER LIFE CYCLE OF HAZARDOUS SUBSTANCE

<u>Type of Firm Activities</u>	<u>Management Failure Modes</u>	<u>Health Risk Sectors</u>
<p>1. <u>Primary Producer</u></p> <p>Manufactures and stores substances, stores and disposes wastes, sells substances</p> <p>↓ 4. <u>Transporter</u></p>	<ul style="list-style-type: none"> - Accidental Release - Routine but Harmful Emissions - Sale of Products in Dangerous State 	<ul style="list-style-type: none"> - Workers, Community - Workers, Community - Workers in Downstream Firms
<p>2. <u>Intermediate Producer</u></p> <p>Purchases and stores substances, uses substances in manufacturing process, stores and disposes wastes, sells products containing substances</p> <p>↓ 4. <u>Transporter</u></p>	<ul style="list-style-type: none"> - Accidental Release - Routine but Harmful Emissions - Sale of Products in Dangerous State 	<ul style="list-style-type: none"> - Workers, Community - Workers, Community - Workers in Downstream Firms
<p>3. <u>End User Firm</u></p> <p>Purchases and stores products, uses products in various process and service activities, stores and disposes wastes, sells products, provides services</p> <p>↓ 4. <u>Transporter</u></p>	<ul style="list-style-type: none"> - Accidental Release - Routine but Harmful Emissions - Sale of Products in Dangerous State, or Use of Products in Commercial Services 	<ul style="list-style-type: none"> - Workers, Community - Workers, Community - Consumers and Users of Commercial Product or Services and Bystanders
<p>5. <u>Waste Disposal Firm</u></p>	<ul style="list-style-type: none"> - Accidental Release - Routine but Harmful Emissions 	<ul style="list-style-type: none"> - Workers, Community - Workers, Community

and Social Committee is composed of representatives of various economic and social groups, such as workers, professionals, and farmers. Based on the advice from these two bodies, the Council of Ministers then decides whether to enact the Directive. The Council of Ministers is composed of the appropriate government minister from each Member State. For example, for environmental regulations, the Council of Ministers consists of each Member State's Minister for the Environment. Once a Directive is enacted, its requirements must be transposed into national legislation by each Member State. The Commission is responsible for managing and controlling the implementation of a Directive. See COMMISSION OF THE EUROPEAN COMMUNITIES, THE EUROPEAN COMMUNITY AND MAJOR-ACCIDENT HAZARDS (1988).

mandate, are legally enforceable, often require strict conformity with certain procedures (e.g., design standards), and may permit the use of limited discretion by the firm to achieve other regulatory goals (e.g., performance standards).¹² The requirements are usually expressed in quantitative and prescriptive terms, and they may include substance testing requirements, risk analysis procedures, maximum permissible levels of emissions and human exposure, safe handling procedures, approved monitoring methods and devices, and data collection and reporting duties.¹³ Failure to comply with these requirements can lead to public enforcement actions and sanctions including fines and loss of operating permits.¹⁴

Regulatory requirements are relatively uniform for all firms within a particular industrial category in the E.C. or the U.S., since the regulations deal with common problems and therefore prescribe preventive measures that are generally applicable. Indeed, the regulations are often based to a considerable extent on practices voluntarily developed and used within the particular industrial sector. In the U.S., federal agencies often issue uniform emission or exposure standards for firms in a particular industry, subject in certain cases to minor variations due to state authority to prescribe more stringent requirements.¹⁵ Similarly, in the E.C., firms must comply with both the requirements set forth in E.C. Directives and any variations enacted by national authorities which have been permitted by the governing Directive. These generic requirements in both the E.C. and the U.S. tend to promote uniform risk management practices by all firms within a particular industrial sector.

Regulatory compliance is considered to be the first and foremost goal of a firm's risk management program. This is an achievable goal for most firms, since regulatory requirements are usually based on good industrial practices or are set de novo by an agency in part on the basis of industrial feasibility considerations. Firms therefore integrate regulatory compliance and its costs into their strategic planning, management system, and product pricing.¹⁶

12. See generally INTERNATIONAL ENVIRONMENTAL BUSINESS REQUIREMENTS, *supra* note 3; R. BRICKMAN, S. JASANOFF & T. ILGEN, *CONTROLLING CHEMICALS: THE POLITICS OF REGULATION IN EUROPE AND THE UNITED STATES* (1985); EUROPEAN ENVIRONMENTAL LAWS AND REGULATIONS (Gov't Institutes, Inc., 2d ed. 1983).

13. See, e.g., sources cited *supra* note 12.

14. *Id.*

15. See, e.g., 42 U.S.C. § 7411 (1982) (section 111 of the Clean Air Act, establishing uniform standards of performance for particular categories of new stationary sources); 33 U.S.C. § 1316 (1982) (section 306 of the Clean Water Act, establishing federal source performance standards for categories of new sources).

16. See, e.g., Cutler, *Environmental Auditing: The Keystone to a Management Compliance, Control, and Risk Assessment Program*, in AIR POLLUTION CONTROL ASS'N, *supra* note 3, at 289 (discusses regulatory compliance goals in risk management at the Olin

But industry and the public increasingly are realizing that regulatory compliance alone is an inadequate goal for risk management for several reasons. First, regulations do not cover all hazardous substances or all uses of the substances. Second, new uses of potentially hazardous substances often are not regulated until after relatively conclusive evidence of risk has been developed and extensive regulatory procedures have been concluded, a glacial process during which many harms may accrue. Third, those substances and activities that are regulated may still create health risks, even though firms achieve and maintain perfect regulatory compliance. With few exceptions, regulations are not designed to achieve the elimination of all risk. Instead, regulatory standards and licenses are designed by agencies to reduce risk to some reasonable level, a level often determined by agency balancing of health and economic considerations.¹⁷ Since most regulations permit continuation of a residual or de minimis risk level, compliance with regulations does not provide full protection, particularly for the few persons who are particularly vulnerable to certain risks because of their biological condition or life style.¹⁸ Because of these shortcomings, workers, community residents, and product users may still be harmed by many industrial activities and practices that meet regulatory requirements.

The inadequacies of industrial programs of regulatory compliance for protecting human health have set two forces in motion. First, the public is demanding risk prevention by industry beyond what is required by current regulation.¹⁹ Second, industry is realizing that, in many instances, it has an incentive to go beyond regulatory compliance in order to reduce foreseeable economic and other losses that are likely to follow if it ignores the residual risks.²⁰

Loss prevention is therefore the second goal of industrial risk management. Industry seeks to avoid economic costs that are likely to result from the risks not eliminated by regulatory compliance. These costs include: (i) tort liability and workers' compensation awards to injured persons that would be imposed by courts and agencies under private law doctrines and statutes (or, alternatively, the costs of settling such claims); (ii) transaction costs such as attorneys' fees and payments to expert witnesses that would arise in dealing with the claims of injured

Corporation); Allied-Signal, Inc., *Allied-Signal's Environmental System of Excellence*, in EUROPEAN ENVIRONMENTAL YEARBOOK 1987 (DocTer International 1987).

17. Baram, *Cost Benefit Analysis: An Inadequate Basis for Health, Safety and Environmental Regulatory Decision-Making*, 8 ECOLOGY L. Q. 473 (1980).

18. See generally J. FIKSEL, M. BARAM, L. COX & J. MIYARES, PRINCIPLES FOR USE OF DE MINIMIS CONCEPTS IN RISK REGULATION (Arthur D. Little, Inc. 1984).

19. See, e.g., Glaberson, *Coping in the Age of 'Nimby'*, N.Y. Times, June 19, 1988, at F1, col. 2.

20. See *supra* note 16.

persons; and (iii) higher premiums for future insurance coverage (or its unavailability).²¹ Residual risks can also harm a firm's public image and reputation, and can diminish the confidence of individual consumers and industrial users of the firm's products. These effects can lead to loss of markets and competitive position, a drop in the value of the firm's shares, and adverse psychological impacts on the firm's managers and employees.

Achieving the loss prevention goal is a more complex task than achieving regulatory compliance. It requires careful identification of highly uncertain residual risks and estimation of their likely incidence and magnitude of harm. Loss prevention also requires legal analysis of the ambiguous principles of private law that will be relied on by persons harmed, estimation of court decisions and amounts of awards or settlements, and judgment about potential consequential costs and other losses.²² Also, in contrast to regulatory compliance, loss prevention has no obvious stopping point. There is no consensus or generally accepted guidelines on how much loss to prevent or how much to spend for more stringent risk management systems.²³ Some firms have used cost-benefit analysis to resolve these issues, while others have simply set a dollar limit on the maximum permissible economic loss to be left unaddressed by additional risk management practices. Use of such economic criteria to determine the levels of risk that will be left unaddressed raises the fundamental issue of corporate social responsibility; disclosure of such practices may bring about public outrage and punitive damages.²⁴

21. Many large firms address these economic vulnerabilities by conducting risk assessments for their activities and product lines, and then applying legal and economic analyses to the findings in order to arrive at a forecast of potential loss. The forecast can then be used by management to justify improvements in risk management and safety as a prudent business decision. The author of this Article has participated in this form of preventive counseling.

22. Attorneys serving industrial firms are developing new methods of legal analysis to predict more accurately potential liability and consequent losses. These methods include the use of decision analysis and other systematic methods that yield quantitative estimates. See McGuire, *The Safety Profile of a Company*, TRIAL, March 1986, at 69; Raker, *Calculating Litigation Prospects*, NAT'L L. J., April 14, 1986, at 1; Richard & Silvers, *Risk Management Theory: Reducing Liability in Corporate and Medical Environments*, 19 HOUS. L. REV. 251 (1982).

23. See sources cited *supra* note 22.

24. For a well-publicized example, see *Ex-Ford Aide's Testimony Called Key to Pinto Trial*, N.Y. Times, Feb. 9, 1980, at A6, col. 5. Evidence that Ford had relied on its cost-benefit analysis findings to justify not recalling Pinto autos from consumers to add a \$6 safety device (a plastic shield) to Pinto gas tanks, which exploded in rear-end collisions and caused severe burns and deaths, outraged the jury in *Grimshaw v. Ford, Inc.*, 119 Cal. App.3d 757 (1981), and led to a jury award of \$125 million in punitive damages against Ford. This amount was equivalent to the "benefits" of non-recall which Ford calculated and used to make its non-recall decision. Although subsequently reduced on appeal to \$5 million, Ford's public image was severely impaired by the publicity.

Although loss prevention is of paramount importance to firms engaged in risky activities, its conduct is a discretionary matter. The private law doctrines that drive loss prevention, such as tort and workers' compensation law, provide compensation after actual injury has been suffered, and do not explicitly enjoin or otherwise force risk prevention on the firm as a matter of law. But these doctrines, with their potential for imposing post-injury costs and other foreseeable losses, will have a deterrent or risk-prevention forcing effect on rational managers who have the responsibility to foresee and prevent adverse economic consequences to their firm and its shareholders. *Figure 2* below presents an integrated view of these considerations.

All firms are aware of the need for loss prevention. But, because of its complexity and the resource commitments that must be made, only the largest firms systematically address loss prevention and implement the management practices necessary to achieve it. Smaller firms tend to address loss prevention only sporadically or after a costly accident or public health problem results in public notoriety.²⁵

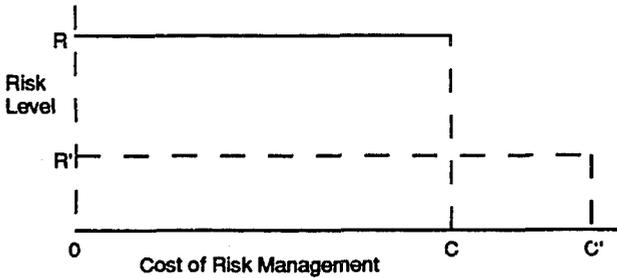
Accessible information on corporate deliberations about loss prevention is sparse. Available information indicates that various intrinsic and extrinsic factors influence management approaches and decisions, and that these factors vary in importance from firm to firm.²⁶ Consequently, risk management for loss prevention varies from firm to firm, and in some firms from case to case, in contrast to the relative uniformity of the methods used to achieve regulatory compliance.

The intrinsic factors influencing a firm's loss prevention policies generally include: (i) the firm's size and economic resources available for risk management; (ii) the extent to which the firm's management structure is centralized and coherently addresses risks; (iii) the firm's dominant "culture," such as whether it is primarily managed by engineers, lawyers, accountants or other professionals (all tend to have different outlooks on how to deal with risk, cost, and responsibility); (iv) the firm's prior experience with risk controversy, including public opposition; (v) the strength of the employees' trade union, if any, and the priority the union gives to job safety; (vi) the firm's view of its competitive position vis-a-vis other firms in the same category and markets; (vii) the firm's vulnerability to economic losses that may follow from inadequate risk management practices, such as whether it relies on

25. A major reason cited by company officials in the U.S. for not assessing risk and loss potential is that such documentation may be discovered in pre-trial proceedings, and used against the firm at trial as evidence of its willful or negligent failure to correct a known defect. See generally, J. GERGACZ, ATTORNEY-CORPORATE CLIENT PRIVILEGE (1987). See also *supra* note 24.

26. See *infra* note 27.

**FIGURE 2: INDUSTRIAL RISK MANAGEMENT:
GOALS AND COST CONSIDERATIONS**



Explanation:

R is the risk level to be achieved as required by public law (regulatory compliance).

C is the cost of the firm's risk management program necessary to achieve and maintain regulatory compliance, over a fixed time period.

R' is the more stringent risk level to be achieved in order to prevent losses unacceptable to the firm.

C' is the greater cost of the firm's risk management program necessary to achieve regulatory compliance and also to prevent losses unacceptable to the firm, over a fixed time period.

Comments:

Risk management to achieve regulatory compliance starts with R as the goal defined by regulation. C is then derived on the basis of the firm's determination of the most cost-effective program it can use to achieve and maintain R.

Risk management to achieve loss prevention may start with R' as the goal because of the predicted loss consequences; or may start with C', in which case the firm's willingness or ability to pay a fixed amount for loss prevention becomes the governing parameter for achieving a more stringent level of risk reduction (R'). For most firms, the additional costs of risk management for loss prevention (the difference between C' and C) will be justified on cost-benefit grounds, in order to demonstrate that such additional expenditure is a rational business decision to protect corporate assets and shareholder interests. However, humanitarian and social responsibility justifications may also be important.

purchased insurance coverage or self-insurance; and (viii) the special risk attributes of the firm's activity that distinguish it from competitors, such as having a production facility for toxic chemicals operating in a densely populated area.²⁷

Factors extrinsic to the firm will also influence its risk management policy and lead to different practices among firms in the same industrial sector. These extrinsic factors usually include: (i) the firm's public image and reputation; (ii) the vigor with which the courts with jurisdiction over the firm impose liability using private law doctrines; (iii) the typical levels of compensation awards and transaction costs in the same jurisdiction; (iv) the availability and cost of insurance; and (v) the consequential economic losses likely to follow from liability awards, such as the effects on the firm's competitive position and market.²⁸

From the foregoing, it is clear that industrial risk management is driven by the explicit regulatory requirements of public law, by economic loss considerations, and sometimes by humanitarian and ethical considerations. In the litigious U.S., the economic loss consequences of personal injuries to workers, community residents, or product users have, in several instances, been so severe as to drive firms into bankruptcy proceedings. For example, the Johns-Mansville Corporation and several other asbestos firms have sought shelter from litigation by filing for reorganization under U.S. bankruptcy law.²⁹ In the less litigious E.C., Sandoz and Hoffman-La Roche have incurred substantial losses and social ill will as a result of their facility accidents at Basel and Seveso.³⁰ Given the potential for severe losses in both the E.C. and the U.S., industrial risk management to achieve loss prevention, in addition to regulatory compliance, has become a necessity for firms producing or using hazardous substances.

27. Factors identified by the author of this Article are derived in part from personal communications with numerous corporate officials in the U.S. and the E.C. (e.g., at Rohm and Haas Co. and Shell, N.V.). Many of these factors are now evaluated by firms interested in mergers with, or acquisitions of, industrial firms using hazardous materials, and by banks and insurance companies financing or insuring such firms. For discussion of these and other factors, see Giannotti & Volz, *Using Environmental Assessment Programs for Compliance, Mergers, Sales and Acquisitions*, 2 *Toxics Law Rep. (BNA)* 217 (1987); F. FRIEDMAN, *PRACTICAL GUIDE TO ENVIRONMENTAL MANAGEMENT* (1988); R. KASPERSON, *CORPORATE MANAGEMENT OF HEALTH AND SAFETY HAZARDS* (1988); J. SIGLER & J. MURPHY, *INTERACTIVE CORPORATE COMPLIANCE: AN ALTERNATIVE TO REGULATORY COMPLIANCE* (1988); and journals such as the *PREVENTIVE HEALTH REP.* (Butterworth Legal Pub.) and the *JOHN LINER REV.* (Shelby Pub. Co.).

28. See *supra* note 27.

29. See *supra* note 9.

30. Some \$60 million in damage claims have been filed against Sandoz. See Smets, *supra* note 4, for an inventory of losses consequent to industrial accidents in the E.C. and elsewhere.

In recent years, new policies have been enacted in the E.C. and the U.S. that are having a major impact on corporate risk management. These policies require new modes of risk communication between private firms, government agencies, and persons at risk. The increased reliance on risk communication constitutes the latest response of industrial societies to persistent problems of technological risk. This emphasis on risk communication is based, in part, on the realization that regulation is a costly device of limited utility for dealing with the ubiquitous problem of industrial risk. Liability rules, market mechanisms, and other means of resolving risk problems may be supplemental or even superior to regulation if stimulated and enhanced by better communication about risk.³¹

Growing societal reliance on these other, non-regulatory mechanisms, as enhanced by risk communication, increases the potential for economic loss to the industrial firm. The net result is that the second goal of industrial risk management, loss prevention, is now even more important.

III. RISK COMMUNICATION

Risk communication has become an essential element of public policy in the E.C. and the U.S. for controlling hazardous technologies and their risks to workers, community residents, and product users. New laws in both industrial societies have recently established an extensive set of duties requiring industry and government to communicate risk information. The new laws also provide the public with various rights of access to risk information held by public agencies and private firms.

These recent developments are based on a diverse set of policy considerations and have raised complex issues of implementation for government and company officials. How these issues will be dealt with will determine the efficacy of risk communication for preventing harms to human health. This section reviews the policy rationales and genesis of the new risk communication requirements. In so doing, this section also assesses the issues that now must be faced by industrial officials in implementing risk communication policies as part of their risk management function.

A. Rationales

The term "risk communication" covers a broad range of activities involving the provision of information about risk. Risk communication

31. M. BARAM & K. McALLISTER, *ALTERNATIVES TO REGULATION: MANAGING RISKS TO HEALTH, SAFETY AND THE ENVIRONMENT* (1982).

may be voluntary or required by law. It may be conducted under conditions that guarantee confidentiality or that provide for public access and even promote widespread dissemination. Its content may include general information about the hazardous properties of a particular substance; it may also include personalized information about a particular person's health status, such as the blood-lead level of an individual worker in an industrial facility using lead. The disclosed information may consist only of qualitative and judgmental information, or it may also include empirical data and quantitative estimates of predicted health effects.³²

Laws in the E.C. and the U.S. establishing risk communication rights and duties differ in many of these respects, but are based on similar policy rationales. For example, risk communication can be supported as a moral imperative. Fairness and justice require that entities conducting a hazardous activity take reasonable measures to prevent harm to others. At a minimum, this responsibility means that risk generators must identify the latent risks and convey warnings and safety recommendations to persons put at a reasonably foreseeable risk of being injured.

In the E.C. and the U.S., legislative bodies and courts have recognized such moral considerations and have made them legally enforceable in many instances.³³ For example, in the nineteenth century, it became established in U.S. tort law that the operator of a railroad has a duty to signal before crossing a public road in order to warn persons at the intersection.³⁴ An operator who failed to signal would be liable for damages to any persons who were injured by the train.³⁵ Similarly, professional codes of ethics long have required doctors to warn patients of possible adverse effects from drugs or other recommended medical procedures and have allowed doctors to proceed with such therapeutic measures only if the patient willingly gives informed consent.³⁶ This informed consent protocol is enforceable in the legal systems of many nations.³⁷

Risk communication is also viewed as a political imperative in industrial democracies, since the democratic system is premised on the exercise of choice by an informed citizenry in elections and other public

32. See generally CEFIC, *infra* note 94; Baram, Risk Communication: Moving From Theory to Law to Practice (Nov. 11, 1986) (paper presented at annual meeting of Society for Risk Analysis, to be published in Conference Proceedings).

33. See discussion of legislative enactments for communication of risk information to workers and communities, and common law decisions establishing a firm's duty to warn product users, *infra* Sections IV and V of this Article.

34. H. BUSWELL, THE CIVIL LIABILITY FOR PERSONAL INJURIES ARISING OUT OF NEGLIGENCE 303 (2d ed. 1899).

35. *Id.*

36. See, e.g., Thompson, *The Drug Manufacturer's Duty to Warn—To Whom Does It Extend*, FLA. ST. U. L. REV. 135 (1985) (one of many articles on required risk communication between drug firm and doctor, and between doctor and patient).

37. *Id.*

decision processes.³⁸ In the U.S., "freedom of information" laws have been enacted by federal and state governments to assure that any person has a right of access to information held by federal and state agencies. Upon request for access, agencies have the duty to provide the information sought, subject to specific limitations such as national security and industrial trade secret exemptions.³⁹ Other U.S. laws, notably the National Environmental Policy Act, impose on agencies the affirmative duty to disclose to the public the risk attributes of certain federal actions under consideration.⁴⁰ Such disclosure is intended to promote informed participation by the public in proposed agency decisions that are likely to have a significant environmental impact.

Although E.C. member nations adhere to the political theory of informed public participation, in practice they provide only limited types of risk information to the public, subject to restrictions imposed by their different national laws. There is no counterpart to the expansive U.S. right-to-know laws in the E.C. at this time.⁴¹ In the United Kingdom, freedom of information proponents thus far have failed to achieve passage of proposed legislation, and existing law "often operates in precisely the opposite direction" by, for example, preventing disclosure of information about air pollutant emissions from regulated industrial plants.⁴² In West Germany, the public's right to information in the government's possession has been narrowly construed so that one seeking environmental information from the government must secure the approval of the appropriate government official.⁴³

Following the recent multi-national investigation of the Sandoz accident, which polluted the Rhine River, the Swiss government and other E.C. member states harmed by the accident agreed to publish reports of their investigations of the accident's costs and consequences. However, the E.C. members decided to withhold from the public their findings as to the "principal installations along the Rhine which would

38. See Otway, *Experts, Risk Communication and Democracy*, 7 RISK ANALYSIS 125 (1987). See also Bazelon, *Risk and Responsibility*, 205 SCIENCE 277 (1979) (citing views from Thomas Jefferson's to contemporary jurists' on the importance of informed public choice on risk decisions).

39. See, e.g., U.S. Freedom of Information Act, 5 U.S.C. § 552 (1982).

40. 42 U.S.C. § 4332(2)(C) (1982).

41. See *Environmental Information*, in EUROPEAN ENVIRONMENTAL YEARBOOK, *supra* note 16, at 196-204. One of the goals of the European Environmental Bureau is approval of a European Directive on freedom of information. See *The Citizen and the Environment*, EUR. ENV'T REV., June 1987, at 31. A "right-to-know" law confers a legal right on workers or citizens to be informed of the risks to which they are exposed.

42. *Environmental Information*, *supra* note 41, at 202-03.

43. *Id.* at 196-98.

become subject to more stringent accident prevention and response requirements."⁴⁴

To remedy the restrictive information disclosure practices within the E.C., and to promote uniformity of public communication policy throughout the twelve member nations, the European Commission has announced its intention to draft a proposal "that would expand the rights of citizens to obtain information from government about environmental policies and problems."⁴⁵ This proposal will be part of the E.C.'s Fourth Action Programme for the Environment being undertaken from 1987 to 1992.⁴⁶

In addition to moral and political imperatives, risk communication as an element of public policy is supported by various rationales derived from social sciences, such as psychology and anthropology. From these viewpoints, risk communication is a necessary societal response to fears of technology and to the confusion, distress, and controversy over technology's uncertain impacts on people's interests. Since people fear most what they cannot see, understand or control, risk communication is supported as a measure that will enable individuals and groups to better cope with technology.⁴⁷

Risk communication also has been promoted on grounds of political expediency and ideology. Political leaders elected on promises of restricting government growth and reducing taxes and regulatory "burdens," but faced with growing public pressure against technological risks, have turned to risk communication as the solution. By requiring increased communication in lieu of more costly national regulation, responsibility and costs can be shifted to state and local governments and the private sector. In this way, federal politicians and administrators can respond to the public pressure for political action while maintaining prior budgetary and ideological commitments.⁴⁸

In the U.S., the Reagan administration's "new federalism" program, designed to reduce the federal role in solving social problems, led to

44. See Searles, *The "Sandoz Incident": Implications for the EC*, EUR. ENV'T REV., June 1987, at 19; Sandoz *Accident Seen as New Impetus for Regulatory Actions Already in Works*, 9 Int'l Env't Rep. (BNA) 81 (1986).

45. *European Commission—Draft Fourth Action Programme*, EUR. ENV'T REV., Feb. 1987, at 19.

46. *Id.*

47. See, e.g., Baram, *supra* note 32; Otway, *supra* note 38; Kasperson, *Six Propositions on Public Participation and Their Relevance for Risk Communication*, 6 RISK ANALYSIS 275 (1986); Slovic, *Informing and Educating the Public About Risk*, 6 RISK ANALYSIS 403 (1986); Keeney & Winterfeldt, *Improving Risk Communication*, 6 RISK ANALYSIS 417 (1986); Adler & Pittle, *Cajolery or Command: Are Education Campaigns an Adequate Substitute for Regulation?*, 1 YALE J. REG. 159 (1984).

48. See discussion of the U.S. "Worker Right-to-Know Rule" and "Community Right-to-Know Act," *infra* Sections IV-B and V-B.

administration support of worker right-to-know regulation and community right-to-know legislation. These new legal requirements provide for a limited federal role and delegate most implementation functions to industry and others.⁴⁹

Risk communication also has been supported by political liberals and those organizations concerned primarily with risk reduction and public health. From these perspectives, risk communication has the potential to be an effective supplement or alternative to regulating risk by traditional measures such as licensing and standard-setting. Enhancing the flow of risk information between industry, governments, and persons at risk should stimulate the use of various economic and social forces that can be brought to bear more effectively on the industrial managers of risky activities. For example, risk information communicated to workers might stimulate labor-management negotiations and agreements to improve worker safety. Information disclosed to community residents might stimulate private legal actions and the use of local police power by health and land-use authorities to reduce risks. Finally, availability of new information about product risks should lead to safer use of products by consumers or ultimately to substitution of safer products by manufacturers.

On the other hand, some industry officials in the E.C. and the U.S. have argued against enactment of risk communication requirements. Many of these arguments were presented at industrial meetings and other forums prior to enactment of recent risk communication requirements, and, since enactment, have continued to be advanced to limit the implementation of the new laws and Directives. This opposition is based on concerns that risk communication will lead to disclosure of valuable proprietary or trade secret information to competitors, will undermine the competitive position of particular firms, and will frustrate societal goals of technological growth and international competitiveness. The requirements are also criticized as excessively costly and burdensome, and as leading to undue public anxieties and controversies.⁵⁰

Finally, industry has argued that risk communication invites involvement by government agencies and the public in corporate management of production processes and other in-plant activities. In contrast, traditional regulation has generally focused on the external effects of corporate activity, such as pollutant discharge and emission levels. More intrusive interventions into corporate decision-making, it is argued, will infringe on the autonomy of corporate managers and lead to a diffusion

49. *Id.*

50. See IMPLEMENTING THE SEVESO DIRECTIVE (Conference Proceedings, Oyez Scientific and Technical Services 1983) (unpaginated) (copy on file with author).

of responsibility for safety. This, in turn, will cause a dilution of legal accountability to the extent that injury claims against the firm for wrongdoing may be blunted because of shared responsibility.⁵¹

In both the E.C. and the U.S., however, industry positions have not been monolithic. In the U.S., small and medium-sized firms vigorously opposed enactment of the worker right-to-know rule, whereas large firms supported it.⁵² The larger firms with facilities throughout the nation hoped that federal right-to-know regulations would preempt the patchwork of differing state laws on the same subject.⁵³ Large U.S. firms also have supported federal efforts to bring uniformity to community right-to-know regulations, as over twenty states and hundreds of municipalities have laws with very different risk communication duties.⁵⁴

Large E.C. chemical firms, highly dependent on exports in international trade and in trade with other E.C. member nations, also have supported the development of uniform rules by the E.C. Indeed, European industry favorably views E.C. environmental and product safety Directives as opportunities to promote uniformity of regulation and thereby to diminish use of national law as a trade barrier.⁵⁵

The enactment and implementation of risk communication laws in the E.C. and the U.S. have been shaped by the economic, political, and philosophical rationales described above. Tragic events such as Bhopal and Seveso, as well as new research findings on the risks associated with many technological activities, have also spurred the enactment of new risk communication requirements. The genesis and overall pattern of these risk communication laws is discussed in the following section.

B. Genesis

Numerous laws and regulations in the E.C. and the U.S. now require various modes of risk communication for dealing with industrial hazards. Usually, these requirements are expressed in terms of duties imposed on industry and government agencies to provide certain information, and rights vested in agencies, the public, and particular groups of persons at risk to obtain information.

Over time, the aggregation of these duties and rights has led to the operation of three formal systems of communication or information flow: (1) from industry to government; (2) from government to the public; and (3) from industry to the general public or persons at risk. These three

51. *Id.*

52. See 48 Fed. Reg. 53,283 (1983).

53. *Id.*

54. See *infra* note 135.

55. See *infra* Sections IV-A and V-A.

systems are the components of a larger network of information flow on any particular risk,⁵⁶ as depicted in *Figure 3* below.

Today's three-part risk communication network is the result of numerous requirements that have been enacted over several decades. The first component to be formally established was the provision of risk information by industry to government regulatory agencies (depicted by arrow 1 in *Figure 3*). This system is as old as regulatory authority itself, since it is an inherent part of the regulatory systems created over the last century in the E.C. and the U.S.⁵⁷

In this first component, industry is typically required to present information on the risks of certain types of new products such as pesticides or drugs; on certain proposed facilities, such as nuclear power plants or waste disposal facilities; or on routine or operational discharges of pollutants through air emissions or water effluents. This information is necessary to inform the regulatory agencies and to secure required permits. Following approval, these firms usually are required to submit regular reports to the agencies as well as special reports on unexpected problems such as accidents and spills. Companies also must allow government inspection and monitoring of their production facilities in order to maintain their approved status. The information that industry communicates to government may be useful to inform agencies about the need for new risk research initiatives or standards, and to enable agencies to prepare contingency plans for accidents.⁵⁸

The second component of the risk communication network is government disclosure of information to the public (depicted by arrow 2 in *Figure 3*). This component has been firmly established in the U.S. since enactment of the federal Freedom of Information Act⁵⁹ two decades ago and enactment of the National Environmental Policy Act of 1969.⁶⁰ Both of these laws have been applied broadly in the U.S. to require government disclosure of information to the public.⁶¹

The second component of risk communication is much less fully developed in the E.C. at this time. Government provision of risk

56. For a more extensive discussion of this model, see Baram, *Risk Communication and the Law*, 8 ENVTL. PROF. J. 165 (1986).

57. *Id.*

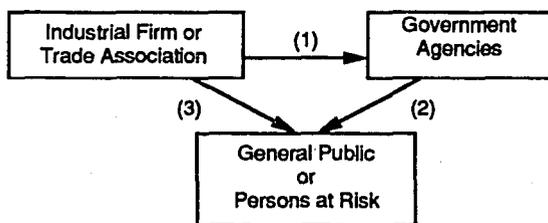
58. *Id.* See also Arup, *Chemical Notification Laws in the OECD Member Countries*, 21 J. WORLD TRADE L. 47 (1987) (a survey of the chemical information requirements of major regulatory authorities in the U.S. and E.C. member nations). For additional background, see generally EUROPEAN ENVIRONMENTAL LAW AND REGULATIONS, *supra* note 12; M. WOROBEC, *supra* note 3; INTERNATIONAL ENVIRONMENTAL BUSINESS REQUIREMENTS, *supra* note 3.

59. 5 U.S.C. § 552 (1982).

60. 42 U.S.C. § 4321-47 (1982).

61. See Baram, *supra* note 56, at 168-69.

FIGURE 3: NETWORK OF FORMAL COMMUNICATION SYSTEMS



Arrows depict information flow from entity with duty to communicate to persons with right to information. Numbers for each arrow are used for reference in the discussion in the text.

information to the public depends on an incomplete mosaic of laws and restrictive conditions in each nation.⁶² Neither the E.C. nor its member states have yet enacted any counterpart to the U.S. Freedom of Information Act, despite growing public pressure for such right-to-know laws.⁶³ However, a newly enacted E.C. Directive for Environmental Impact Assessment permits public access to information provided by the potential developer of certain types of facilities.⁶⁴

The conjunction of the requirements of the first two components of the risk communication network has significant implications for corporate risk management. In both the E.C. and the U.S., government officials receiving industrial information must prevent public disclosure of trade secrets or national security information, as well as other legally restricted information such as personal privacy information.⁶⁵ Public access to other industrial information held by the government is guaranteed by the Freedom of Information Act in the U.S., but is subject to numerous, differing restrictions in E.C. member nations.⁶⁶

As a result, industrial risk managers in the U.S. who provide risk

62. See *supra* notes 41-44 and accompanying text.

63. See, e.g., CAMPAIGN FOR FREEDOM OF INFORMATION (U.K.), SECRETS FILE NO. 2, PROTECTING THE POLLUTER (1984).

64. See Davis, *Community Environment Policy*, EUR. ENV'T REV., Oct. 1986, at 21.

65. See Baram, *supra* note 56. See also Biles & Stewart, *European Treatment of Confidential Business Information*, in EUROPEAN ENVIRONMENTAL LAWS AND REGULATIONS, *supra* note 12, ch. VI; ORGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, CONFIDENTIALITY OF DATA AND CHEMICALS CONTROL (1982); McGarity & Shapiro, *The Trade Secret Status of Health and Safety Testing Information: Reforming Agency Disclosure Policies*, 93 HARV. L. REV. 837 (1980).

66. See *supra* notes 41 and 65.

information to agencies (in the first component of the communication network) face a greater prospect that the information subsequently will be disclosed to the public and competitors (in the second component) than do their European counterparts. European firms operate with greater confidence that agencies will disclose little, if any, of the information provided to government by industry. U.S. industry fears that government disclosure to the public of risk information provided by industry will stimulate public anxiety and controversy, and will reveal trade secrets that may benefit competitors. These concerns probably are responsible, at least in part, for the greater unwillingness of American firms to cooperate with agency officials. It is therefore ironic that "freedom of information," unique to the U.S., probably leads to diminished communication and more antagonistic relationships between industry and government.⁶⁷

The third component of the risk communication network requires industrial provision of risk information directly to the public or to particular persons at risk (depicted by arrow 3 in *Figure 3*). This component of risk communication is the most recent to be created by public laws. It is articulated in several E.C. Directives, and in national, state, and local laws and regulations enacted by E.C. member nations and the U.S. within this decade.⁶⁸

These communication requirements appear in different forms, including: (i) duties to label certain products with warnings and instructions on safe use, so that consumers, workers, and other users can take informed action to reduce risk; and (ii) requirements to furnish workers and community residents with risk information so that they can respond safely to accidents and other contingencies. Worker and community right-to-know laws in the U.S., and recent E.C. Directives and laws in E.C. member states, exemplify this new type of communication requirement.⁶⁹

Direct industrial communication with persons at risk is also the most controversial component of the risk communication network because it makes industry highly vulnerable to critics and adversaries. Perhaps more importantly, it creates the highest potential for legal actions, resulting in economic losses and further public disfavor for firms. For these and other reasons, firms in the E.C. and the U.S. are carefully developing new strategies for communicating with persons at risk. Firms are trying to preempt potential controversy and loss that would otherwise likely

67. See Baram, *supra* note 7.

68. See *infra* Sections IV and V.

69. *Id.*

ensue from disclosure of the required information.⁷⁰

The effects of new risk communication requirements on corporate risk management in the E.C. and the U.S. for the protection of workers and community residents is discussed in the following sections. Emphasis is placed on the third component of the risk communication network—the provision of risk information by industry directly to workers and community residents at risk.⁷¹

IV. WORKPLACE RISKS

Industrial management of workplace risk in E.C. nations and the U.S. must comply with numerous public laws and regulations, and with negotiated agreements with unions to protect worker health and safety. Risk managers must also consider other legal doctrines that could impose liability on the firm when workers are injured, such as workers' compensation laws, which apply throughout the E.C. and the U.S.⁷² These

70. *Id.*

71. Analysis of risk communication requirements under private law for protecting product users is beyond the scope of this Article, except as these requirements affect risk management strategies for protecting the health of workers and community residents.

72. Liability imposed on a firm for injury to its workers varies from nation to nation in the E.C., according to the laws of individual nations. According to a 1982 analysis by the Claims Manager for the Swiss Reinsurance Company, awards to workers may be based on loss of earnings, medical and funeral expenses, transport and extra domestic help, rehabilitation and retraining, attorney and expert fees, and other court costs. Of the total amount of compensation, "some 80% . . . represent[s] losses and expenses which would increase at least in line with the wage index, or even more sharply as in the case of medical, hospital and rehabilitation expenses." P. Szollosy, *The Standard of Compensation for Injury and Death in European Countries* (unpublished paper 1982). The Swiss analysis evaluated six "model cases" of injuries to determine compensation awards in France, Italy, Spain, Britain, Germany, and Switzerland. One of the model cases dealt with a serious workplace injury to a 34-year-old worker, causing paralysis from the waist down, 80% disability, extensive hospitalization, and subsequent inability to secure employment. The results follow, with all awards designated in Swiss francs ("S.F."):

NATION	TYPES OF COMPENSATION	EMPLOYER LIABILITY
France	Eight	885,000 S.F.
Italy	Six	495,000 + wage loss for 1 yr
Spain	Two	400,000
Britain	Three	460,000
Germany	Four	680,000
Switzerland	Five	735,000

This data supports efforts by the Council of Europe and other organizations to harmonize liability rules and methods for calculating compensation, since the differences found "can lead to major injustices." *Id.*

In the U.S., awards to injured workers also vary from state to state according to different doctrines and compensation levels set forth in workers' compensation statutes and other state laws, as well as varying company policies.

doctrines furnish incentives for firms to act voluntarily to prevent unacceptable losses.

Responsibility for management of workplace risks is usually assigned to a special unit within the firm that possesses the requisite skills and authority for preventing harm to workers. In a large firm, this unit will usually include medical and industrial hygiene personnel, safety engineers, and specialists in workers' compensation insurance. Worker and union involvement in this unit's activities will vary according to legal requirements and the firm's receptivity.⁷³ Some of the measures a risk management unit typically will employ to manage risks include: (i) engineering methods to control toxic emissions and other hazards to health and safety; (ii) personal protective equipment; (iii) ambient monitoring systems; (iv) biological monitoring and medical surveillance programs; (v) extensive record keeping; and (vi) risk communication programs.⁷⁴

As discussed previously, three types of risk communication are applicable for workplace risks. These involve the provision of information by management to government agencies, by government agencies to workers, and by management directly to workers.⁷⁵ Of the three types of communication, direct disclosure from management to workers is emerging clearly as the most important. According to a recent report by the International Labour Office ("ILO"), "[o]f all the various forms of communication and co-operation in the area of occupational safety and health, perhaps the most important and direct communication is that which occurs between . . . employers and the workers . . ."⁷⁶

Risk communication between managers and workers has been mandated by various public laws in the E.C. and the U.S., by collective bargaining agreements between unions and management, and by adopted employment policies of firms seeking to prevent worker injuries and consequent losses. These developments in the E.C. and the U.S. and their implications for industrial management of workplace risk are discussed next.

73. See generally R. ELLING, *THE STRUGGLE FOR WORKERS' HEALTH: A STUDY OF SIX INDUSTRIALIZED COUNTRIES* (1986); INT'L LABOUR OFFICE, *supra* note 3, at 28-42; CONFERENCE BOARD, *supra* note 3, at 31-44.

74. *Id.*

75. See *supra* note 56 and accompanying text.

76. INT'L LABOUR OFFICE, *supra* note 3, at 60. This view is confirmed by R. ELLING in his six nation study, *supra* note 73, at 8 ("The main lesson to be drawn is that workers . . . must gain and make full use of 'the right to know' what chemicals they are working with . . .").

A. European Community

The control of workplace risks in E.C. nations takes place within a well-developed relationship between workers and management that includes consultation and co-determination. New methods of risk communication between management and workers are now being implemented within this cooperative relationship. The control of workplace risks in the E.C. varies from nation to nation, despite the enactment of Directives aimed at standardization.⁷⁷

At industrial facilities in West Germany, risk communication is accomplished primarily by management use of a "works council" that discusses worker-management issues including safety and health measures being used at the facility.⁷⁸ In large firms, an occupational safety and health committee often is formed to communicate further with workers. In addition, major unions run training programs in occupational health for workers and safety instructors, and maintain inter-union networks to promote worker health and more informed participation on health issues. According to various participants, the sharing of information in large firms is largely satisfactory, although some workers believe "that more advance information should be voluntarily shared."⁷⁹ While West German national law grants workers the right to co-determine occupational health policies, a recent evaluation found that information on these issues is "partial, fractionated, largely management controlled and inadequate."⁸⁰

In the United Kingdom, employers are required to set forth their occupational health program in a document open to inspection by employees and certain government officials.⁸¹ Subsequent regulations require the establishment at some facilities of health and safety committees with worker representation in order to exchange information with management on occupational health problems.⁸² In addition, workers are supplied with "care sheets" that describe the hazards of substances being used in the workplace and recommend precautionary measures workers can take to reduce risks.⁸³ According to the ILO report, "[w]orker interest in obtaining such information from their employers has been heightened by educational activities designed to provide information about substances present in the workplace which can produce serious

77. See, e.g., *infra* notes 86-87.

78. INT'L LABOUR OFFICE, *supra* note 3, at 59-60.

79. *Id.* at 60.

80. R. ELLING, *supra* note 73, at 313.

81. See INT'L LABOUR OFFICE, *supra* note 3, at 60-61.

82. *Id.*

83. *Id.* at 61.

illnesses, especially those which can produce cancer"⁸⁴ However, workers interviewed felt that they were not adequately educated on health and safety matters.⁸⁵

As the examples of West Germany and the United Kingdom illustrate, national variations in structuring risk communication to workers endure despite the E.C.'s adoption of uniform policy formulations covering certain aspects of risk communication. For example, the E.C. has enacted a Directive on labelling hazardous materials,⁸⁶ as well as a Directive on "Protection of Workers from Harmful Exposure to Chemical, Physical and Biologic Agents at Work."⁸⁷ These Directives provide for several limited methods of communicating risks to workers.⁸⁸ However, they neither impose a general duty for company disclosure of health risks to workers nor grant workers an enforceable right to know such information. The Directives also do not require companies to provide workers with data sheets on the health and safety hazards of the chemicals in use in their workplaces, considered by many to be the most basic and achievable communication mechanism.

The most significant progress toward the adoption of effective risk communication procedures has resulted from initiatives by private industry. Prototype risk communication materials and methods have been developed by trade associations and private companies. For example, various companies and trade associations have begun voluntarily to provide workers with health and safety data sheets. In 1983, CONCAWE, the "oil companies' European organization for environmental and health protection," reported on these developments in sixteen European nations.⁸⁹ At that time, provision of data sheets to workers in particular industries for certain categories of chemicals was imminent in Denmark

84. *Id.*

85. *Id.*

86. *E.g.*, COUNCIL OF THE EUROPEAN COMMUNITIES, DIRECTIVE ON CLASSIFICATION, PACKAGING, AND LABELLING OF DANGEROUS SUBSTANCES, 79/831/EEC (Oct. 15, 1979) (amending for the sixth time Directive 67/548/EEC on the approximation of the laws, regulations, and administrative provisions relating to the classification, packaging, and labelling of dangerous substances) (often referred to as the "Sixth Amendment").

87. COUNCIL OF THE EUROPEAN COMMUNITIES, DIRECTIVE 80/1107/EEC (Nov. 27, 1980). Article 4 provides that measures to protect workers include information on the potential risk to which they are exposed, the technical preventive measures to be taken, and the precautions to be used by both employer and employee.

88. The public information provisions of the "SEVESO DIRECTIVE," which require many industrial facilities to disclose information on chemical accident risks, may also provide information that can be used by unions and workers to promote occupational safety and health. *See infra* notes 177-178 and accompanying text.

89. *See* CONCAWE, HEALTH AND SAFETY DATA SHEETS FOR PETROLEUM PRODUCTS (Report No. 3/83 1983). CONCAWE has also published companion reports on product labelling. *E.g.*, CONCAWE, PRECAUTIONARY LABELLING OF PACKAGED PETROLEUM PRODUCTS (Report No. 2/80 1980).

and the Netherlands, and in actual but variable practice in France, Italy, Britain, and West Germany.⁹⁰ In these latter countries, several "standard" data sheets for voluntary use were provided by chemical and oil firms.⁹¹ The result is a patchwork of data sheets differing in format and content.

Due to economic and political complexities, government officials from the E.C. member nations have been ineffective in promoting uniformity of workplace risk communication in the E.C.⁹² As a result, uniformity among E.C. member nations in risk communication requirements and practices is lacking except for some recent initiatives by major industries and trade associations. These transnational organizations have various reasons for promoting uniformity, including economic efficiency, protection of trade secrets, and recognition of corporate responsibilities to protect workers involved in multinational commerce.

A major step to promote uniformity has been taken by the Conseil Européen des Fédérations de l'Industrie Chimique ("CEFIC"), the major trade association for the European chemical industry. CEFIC recently issued a guidance⁹³ for chemical firms, unions, and government agencies on conducting meaningful risk communication while protecting corporate trade secrets.⁹⁴ The CEFIC guidance is based on two express premises:

Management has a fundamental obligation to provide their employees with information about the hazards of substances liable to be present at their place of work.

In providing that information, it is important to recognize that it must be appropriate not only to specific job conditions, but also the individual level of education, training and experience. . . . [The] standardization of presentation of such knowledge into a single industry-wide model format for

90. CONCAWE, HEALTH AND SAFETY DATA SHEETS FOR PETROLEUM PRODUCTS, *supra* note 89.

91. *Id.*

92. For the economic and political considerations which have led to this E.C. impasse, see Lagerlöf, *Worker Protection in the EEC*, in INTERNATIONAL ENVIRONMENTAL BUSINESS REQUIREMENTS, *supra* note 3, at 157.

93. A "guidance" is a document produced by a government agency or private organization that suggests but does not require methods for complying with a regulation or achieving a particular goal.

94. CEFIC, Information on Hazards of Substances at the Individual Workplace (April 1987).

providing information at the individual workplace is unlikely to be beneficial even if it were possible.⁹⁵

From these premises, it is obvious that CEFIC seeks uniformity of the deliberative process that management should use, but does not seek uniformity of results, which it believes should be job-specific.

The CEFIC guidance classifies management's tasks into six functions. The first function involves collecting data from several sources. In all cases, labels, safety data sheets, and similar documents are to be collected from the manufacturer or supplier of hazardous chemicals used by a firm. Frequently, this data must be supplemented using external sources such as trade journals or scientific reports. Further experimentation or research may be necessary in "exceptional cases."⁹⁶

Management's second function is the selection of hazards for communication to workers. The selection process consists of many steps designed to ensure that the information to be used is truly relevant. The steps recommended are: (1) identification of general hazard attributes; (2) estimation of the relevance of the attributes to the actual use under foreseeable conditions; (3) identification of foreseeable exposure scenarios; (4) determination of additional information needed because of particular hazard and risk circumstances; (5) identification of the basic principles and equipment needed for protection against specific risks; (6) determination of safe work methods and monitoring systems; (7) analysis of legal requirements; and finally, (8) identification of emergency situations and appropriate responses.⁹⁷

The third function in CEFIC's risk communication guidance involves the translation of findings from the first two steps into useful information materials for the particular workforce being addressed. The presentation of risk information must take into account the education, knowledge, and training of the workers.⁹⁸ The guidance concludes with three final management functions: transmission of the information by selecting the most appropriate medium, training of workers, and on-going monitoring of performance in terms of worker understanding and acceptance.⁹⁹

CEFIC's guidance is designed to serve the interests of both management and workers by using data sheets and other forms of risk communication to achieve effective risk reduction. Its approach is designed to avoid overwhelming workers with confusing information and inducing unnecessary anxieties among the workforce. It establishes

95. *Id.* at 1.

96. *Id.* at 4.

97. *Id.* at 5.

98. *Id.* at 6.

99. *Id.* at 7-9.

management's moral responsibility to identify risks and communicate useful information to workers, and provides procedures for translating technical and abstract hazard data into meaningful and personal risk information that should help stimulate appropriate responses.

Some firms will be able to develop readily the hazard information and risk evaluation elements suggested by the CEFIC guidance by using the technical information they are already producing to satisfy the E.C.'s "Sixth Amendment" requirements.¹⁰⁰ The Sixth Amendment requires the manufacturer of a new toxic substance to develop a dossier of technical information on "foreseeable risks, whether immediate or delayed, which the substance may entail for man and the environment."¹⁰¹ This dossier, along with recommendations for labelling, packaging, and other precautions, must be submitted to designated officials for review prior to placing the substance on the market.¹⁰²

The information labels and precautions mandated by the Sixth Amendment constitute an abbreviated form of risk communication for a limited range of substances. Such information flows from primary producers to downstream firms and their workers. Therefore, the same data base may be used to support several systems for transmitting risk information to workers.

To summarize, firms belonging to certain trade organizations or using specific toxic chemicals in the E.C. must integrate into their risk management programs various chemical testing and risk analysis procedures. They also must adopt several methods for communicating risk information directly to their workers, including:

1. safety symbols, signs, labels, packaging, and other precautions, which provide warnings and simplified safety information as required by several E.C. Directives (e.g., the Sixth Amendment);
2. information disclosures and educational programs for unions and safety committees to enable their consultation about, and consent to, certain safety procedures, in accordance with national laws and collective bargaining agreements;
3. additional risk and safety information disclosures to workers about specific chemicals (often in the form of data sheets) as

100. See *supra* note 86.

101. *Id.*

102. See Recent Development, *The Sixth Amendment: Toxic Substance Control in the EEC*, 12 L. & POL'Y INT'L BUS. 461 (1980). If a substance has been marketed by another manufacturer under the Sixth Amendment, new manufacturers are not required to repeat elements of the process if they obtain permission to use the original manufacturer's dossier. *Id.*

- suggested by trade organizations such as CEFIC, as mandated by national law, or in order to avoid liability; and
4. miscellaneous medical and hygiene information compiled from medical surveillance and biological monitoring systems, as required by national standards, E.C. Directives on specific toxic substances, or agreements with unions.

The major methods of communicating risk information between management and workers in the E.C. now can be depicted in a modified version of the basic risk communication model (presented earlier in *Figure 3*). The modified model is presented below as *Figure 4*.

Although risk communication has become a key element of corporate risk management in the E.C., the risk communication approaches that have been adopted so far are quite minimal. There is growing public support in the E.C. for worker right-to-know requirements that will give workers the right to be fully informed of all risks to which they are exposed. There is also an increasing trend in E.C. nations toward substantial corporate liability when workers are injured as a result of management's failure to warn. These developments suggest that further reliance on data sheets and other new forms of communication, as well as legal enactment of right-to-know doctrines, can be anticipated.

B. United States

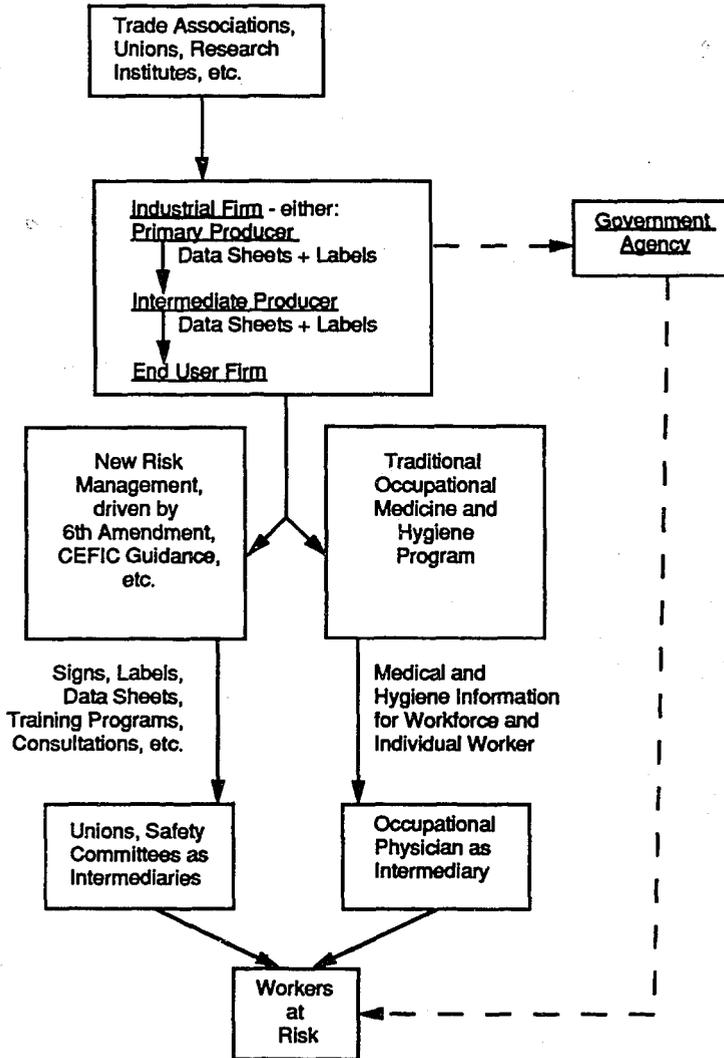
In the U.S., various modes of communication between corporate management and workers also have been integrated into risk management programs. Public laws and regulations at the federal and state levels have imposed some risk communication requirements on firms. The most important of these are regulations issued by the federal Occupational Safety and Health Administration ("OSHA"). In some instances, collective bargaining also has led to new risk communication measures that are legally enforceable. Finally, a wide variety of voluntary communication systems have been developed by employers to prevent the economic losses and public notoriety that would follow from worker injuries caused by failures to warn.¹⁰³

Since 1970, OSHA has used its authority to regulate various health and safety hazards in private workplaces.¹⁰⁴ Two types of OSHA regulations establish rights to know and duties to disclose: rules dealing with specific substances and rules for generic access to information about all

103. See generally Baram, *The Right to Know and the Duty to Disclose Hazard Information*, 74 AM. J. PUB. HEALTH 385 (1984).

104. Authority provided by the Occupational Safety & Health Act of 1970, 29 U.S.C. §§ 651-78 (1982).

FIGURE 4: RISK COMMUNICATION BETWEEN MANAGEMENT AND WORKERS IN THE E.C.



workplace risks. OSHA rules for specific hazards (such as coke oven emissions, asbestos, arsenic, acrylonitrile, cotton dust, noise, and lead) contain separate requirements for record compilation, reporting, and worker access.¹⁰⁵ Generic rights of access and duties to disclose are afforded by three OSHA rules: (i) the rule on inspections under the "general duty" clause of OSHA's enabling statute;¹⁰⁶ (ii) the access to medical and exposure records rule;¹⁰⁷ and (iii) the new hazard communication rule.¹⁰⁸

Under the "general duty" clause, workers have the right to request an OSHA inspection of their workplace, and to be notified of any imminent dangers of death or serious physical harm discovered by the inspector.¹⁰⁹ The effectiveness of this rule is dependent upon worker initiative, OSHA's diligence in inspection, and the extent to which proprietary claims limit disclosures. The right to an inspection is usually invoked after some exposure or injuries have occurred, and thus has a somewhat limited role in risk prevention.

OSHA's rule on employee access to medical and exposure records establishes generic access rights to such records kept by employers whose workers are exposed to toxic substances or harmful physical agents.¹¹⁰ But the rule does not require the compilation of such records in the first place.¹¹¹ The rule's usefulness therefore depends on voluntary record-keeping by employers, or record-keeping required by OSHA rules for specific hazards.

If records are maintained by an employer, current and former employees are permitted by the rule to examine their complete medical files except for contents pertaining to health insurance, psychiatric information, and a few other matters.¹¹² Exposure records kept by employers are also available to current and former workers and to those newly assigned to work with toxic substances.¹¹³ These exposure records may include data from environmental and biological monitoring programs conducted by the employer, as well as other information evaluating risks in the

105. See 29 C.F.R. § 1910 (1988).

106. The "general duty" clause of the Occupational Safety & Health Act requires that each employer "shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees." 29 U.S.C. § 654(a)(1) (1982). OSHA has promulgated regulations under this clause that give employees the right to request an OSHA workplace inspection. 29 C.F.R. § 1903 (1988). See also *infra* text accompanying note 109.

107. 29 C.F.R. § 1910.20 (1988).

108. *Id.* § 1910.1200.

109. *Id.* § 1903.

110. *Id.* § 1910.20.

111. *Id.* § 1910.20(d)(2).

112. *Id.* § 1910.20(e).

113. *Id.* § 1910.20(e),(g).

workplace. Unions and OSHA are afforded access to medical and exposure records under conditions designed to protect the privacy interest of workers.¹¹⁴ Employers may withhold certain types of trade secret information, and they are permitted to use written agreements with employees to restrict personal economic use of any trade secrets or any disclosures to competing firms.¹¹⁵ Finally, medical and exposure records that are compiled by employers must be retained for specified periods of time.¹¹⁶

The risk information obtained under the medical records access rule has proven useful to worker and union efforts to negotiate health and safety protection in collective bargaining with employers. The rule also has bolstered worker claims for compensation and has aided OSHA assessment of health hazards, and thereby has promoted risk prevention in industry. However, the rule's effectiveness depends on worker initiative, trade secret restrictions, and the extent to which records are kept by employers. Thus far, the rule has survived various political and legal challenges.¹¹⁷

Finally, there is OSHA's new hazard communication rule.¹¹⁸ This rule establishes that employees of American industry have a right to information about the chemical hazards they are exposed to in their workplace. The hazard communication rule imposes various disclosure duties on chemical manufacturers and importers, as well as on businesses that use hazardous chemicals in the workplace. Prior versions of this rule were opposed by the Office of Management and Budget,¹¹⁹ but support for the rule from unions and sectors of industry overcame this opposition.¹²⁰

The hazard communication rule requires manufacturers and importers of chemicals to provide downstream industrial customers with labelled containers and a Material Safety Data Sheet ("MSDS") for each

114. *Id.* § 1910.20(e).

115. *Id.* § 1910.20(f).

116. *Id.* § 1910.20(d).

117. For a history of the legal and administrative challenges to the medical records access rule, see 53 Fed. Reg. 38,140-43 (1988). The validity of the rule was upheld after a long series of legal proceedings in *Louisiana Chem. Ass'n v. Bingham*, 731 F.2d 280 (5th Cir. 1984). In 1982, OSHA responded to political pressure from various sources and proposed that the scope of the medical records access rule be reduced to a limited list of toxic substances. 47 Fed. Reg. 30,420 (1982). However, after hearings on the proposal and a prolonged rulemaking period, OSHA finally decided not to reduce the rule's applicability. 53 Fed. Reg. 38,153 (1988). OSHA did modify the rule slightly to exempt short-term employees from record retention requirements and to provide additional protection for trade secrets. *Id.* at 38,140.

118. 29 C.F.R. § 1910.1200 (1988), promulgated with a 60-page explanatory and justificatory preamble, at 48 Fed. Reg. 53,280 (1983).

119. *See, e.g.*, HOUSE COMM. ON GOV'T OPERATIONS, OMB INTERFERENCE WITH OSHA RULEMAKING, H.R. REP. NO. 583, 98th Cong., 1st Sess. (1983).

120. *See* 48 Fed. Reg. 53,282-83 (1983).

hazardous chemical they purchase.¹²¹ The rule also requires all businesses (upstream producers as well as downstream users) which use, produce or store hazardous chemicals to provide information to their exposed workers. An employer's risk communication obligations include establishing a written hazard communication program, ensuring that all containers of hazardous chemicals are properly labelled, making a MSDS for each hazardous chemical present in the workplace available to workers, and establishing a worker training program.¹²² The burden of developing basic information (e.g., MSDS's) about each hazardous chemical is imposed on chemical manufacturers and importers.¹²³ All downstream employers can choose to rely on this information and use it as the basis for communicating with their employees.¹²⁴

Originally, the hazard communication rule did not extend to workers and firms outside the manufacturing sector (e.g., construction, commercial services, and transportation). However, in 1988, OSHA expanded the hazard communication standard to include all non-manufacturing employers.¹²⁵ The duties and rights established by the rule pertain only to chemicals determined to be hazardous. The rule defines a hazardous chemical as one that is on lists of over 2000 substances adopted by the rule,¹²⁶ or which meets the criteria set forth in the rule and its appendices.¹²⁷ The disclosure duty also only applies to hazardous chemicals known "to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable

121. 29 C.F.R. § 1910.1200(f)(1), (g)(1) (1988).

122. *Id.* § 1910.1200(e)-(g).

123. *Id.* § 1910.1200(d)(1).

124. *Id.*

125. The expansion of the hazard communication standard to all industries using hazardous chemicals was announced in 52 Fed. Reg. 31,852 (1987), to take effect May 23, 1988. Opposition to the expanded rule by affected industries resulted in numerous delays and temporary stays of the rule's expansion. However, challenges to the expansion of the rule by the construction and other industries were eventually denied in *Associated Builders & Contractors, Inc. v. Brock*, 862 F.2d 63 (3d Cir. 1988). OMB opposition to the information collection requirements of the expanded rule also led to delays and uncertainty. See 53 Fed. Reg. 29,824 (1988).

126. Substances designated are those subject to OSHA regulations in 29 C.F.R. § 1910 (1988), and those listed by the American Conference of Governmental Industrial Hygienists. *Id.* § 1910.1200(d)(3). Furthermore, any substance found to be a carcinogen by the National Toxicology Program, the International Agency for Research on Cancer or OSHA under section 1910 are also automatically considered hazardous under the hazard communication standard. *Id.* § 1910.1200(d)(4).

127. See 29 C.F.R. § 1910.1200(d)(2) (1988) and Appendix A of section 1910.1200, which set forth criteria that pertain to hazardous properties such as carcinogenicity, corrosivity, toxicity, combustibility, reactivity, and explosiveness.

emergency."¹²⁸ Another limitation of the rule is that certain items regulated by other agencies such as hazardous wastes, foods, drugs, and pesticides are excluded from the rule's provisions.¹²⁹ Finally, various exemptions and limitations are provided for laboratory employers, chemical "mixtures," portable containers and piping systems, and trade secret information.¹³⁰

Various criticisms have been made about the rule's effectiveness. For example, the rule has been criticized for not requiring standardized information statements for labels and MSDS's.¹³¹ Some of the compromises in the rule, such as the provisions for protecting trade secrets, are seen as too liberal by industry and too restrictive by unions. The rule also may have some potentially undesirable consequences, including the possibility of providing a new basis for chemical producers to argue "assumption of risk" in product liability actions by downstream employees.¹³² Despite these potential shortcomings, the hazard communication rule is of considerable importance for improving health risk management in the private sector.

First, the rule directly addresses the prevention aspect of corporate risk management, since it applies at the earliest stages of the risk generation process, before exposure occurs. In contrast, other OSHA rules such as the medical records access rule are most useful only after exposure to hazards already has occurred. Second, the nature of the rule's obligations sets several forces in motion to improve management decisions. The information required to be disclosed by the rule enables workers and unions to take self-help measures, such as the personal adoption of new work practices and collective bargaining on a more

128. *Id.* § 1910.1200(b)(2).

129. *Id.* § 1910.1200(b)(4).

130. Trade secrets are defined broadly as any "confidential . . . information . . . that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it." *Id.* § 1910.1200(c). The rule provides that "the specific chemical identity, including the chemical name and other specific identification of a hazardous chemical" can be withheld from the MSDS if the trade secret claim is supportable, other information concerning the properties and effects of the substance is provided, and other criteria for such withholding are met. *Id.* § 1910.1200(i)(1). Treating physicians and other health professionals are provided the opportunity for access to such trade secrets under specified conditions, but are closely restricted in their use of the information and are subject to penalties for violation of the restrictions. *Id.* § 1910.1200(i)(3),(4).

131. *E.g.*, Note, *A Critical Look at OSHA's Hazard Communication Standard*, 11 OHIO N. U. L. REV. 365, 373 (1984) ("an employee seeking information will likely be confronted with a baffling array of forms, all purporting to provide the same information. Such a situation would prove at least discouraging and time consuming, perhaps to the point of total disuse of the data sheets.").

132. See O'Reilly, *Risks of Assumptions: Impacts of Regulatory Label Warnings Upon Industrial Products Liability*, 37 CATH. U. L. REV. 85, 92 (1987).

informed basis. Also, market forces may be engendered by better informed downstream industrial customers who may seek safer chemicals to contain their own potential losses and reduce their costs of regulatory compliance. Other economic forces may be strengthened, such as the improved incentives from new insurance rates that can now be based more soundly on differential risks between companies. The rule also will promote the development of more coherent information and record systems by employers, which will be of considerable benefit to workers, community residents, and management itself in working to reduce risks.

Third, the rule reaffirms basic principles, such as those developed by the common law to require those who undertake risky activities to disclose hidden hazards to those who are thereby put at risk.¹³³ Such affirmation of a fundamental common law principle is of important symbolic value, because regulation too often tends to erode such notions. For example, agencies often establish quantitative standards for industrial activity based on cost-benefit analyses that ignore the principle of responsibility. But the reinforcement of basic principles by the hazard communication rule is likely to be more than symbolic. The disclosures required by the rule will be useful as evidence in tort litigation for establishing judicial standards of reasonableness and responsibility in disputes involving industrial risks of various types—many of which lie beyond the scope of the rule.¹³⁴

Finally, the hazard communication rule reduces some of the confusion over risk communication duties that existed prior to its enactment. Over twenty states have enacted right-to-know laws to provide a generic right of access to hazard information in the possession of private firms.¹³⁵ Most of these laws confer the right to know to workers, and some also extend the right to citizens and to state and community officials. The laws vary considerably from state to state, and the lack of uniformity is increased by the web of other laws and regulations in each

133. See Baram, *supra* note 56, at 172-73.

134. See Baram, *supra* note 3, at 1164. See also Field & Baram, *Screening and Monitoring Data as Evidence in Legal Proceedings*, 28 J. OCCUPATIONAL MED. 946 (1986) (discussion of the use of new scientific evidence to establish disease causation in the courts and in workers' compensation proceedings).

135. See Tyson, *The Preemptive Effect of the OSHA Hazard Communication Standard on State and Community Right to Know Laws*, 62 NOTRE DAME L. REV. 1010, 1016 (1987); Feitshans, *Hazardous Substances in the Workplace: How Much Does the Employee Have the "Right to Know"?*, 1985 DET. C. L. REV. 697, 702-15 (1985); Note, *The Right To Know: Does OSHA's Toxic Hazard Communication Rule Preempt State Statutes Requiring Public Disclosure of Workplace Toxics*, 62 U. DET. L. REV. 463, 476-480 (1985).

state that provide additional access rights or disclosure duties.¹³⁶

Since the state laws represent a patchwork of requirements that often cannot be implemented consistently with the OSHA rule, industrial groups have challenged several state laws in the courts on the issue of preemption. Thus far, the courts have determined that the OSHA rule preempts those sections of the challenged state laws that directly apply to occupational health and safety and that conflict with OSHA rule provisions.¹³⁷ However, other sections of the state laws that impose significant additional risk communication requirements on firms without obstructing the OSHA rule have been upheld by the courts.¹³⁸ The Third Circuit also has responded to an early challenge by unions and other

136. Generally, each state law of the generic right-to-know variety provides for the following:

1. Identification of hazardous substances in the form of a state list or a reference to other official listings of hazardous substances, and/or performance criteria for determining other hazardous substances. A critical variable is the allocation of the burden of identifying hazardous substances. In some states, it is the duty of state officials, while in others it is the responsibility of industry.
2. Record compilation and retention requirements for employers which identify hazardous substances and their dangerous attributes, safe handling procedures, and other information. The usual requirement is that the records contain the information needed to complete an OSHA MSDS.
3. Disclosure duties for employers to guarantee that various parties can secure the information systematically (e.g., by routine filings with state officials) or on request.
4. Other hazard communication requirements for employers, including labelling requirements, posting, and worker education and training requirements.
5. Enforcement procedures, including time frames for compliance, penalties for violations, administrative hearing rights for those alleging corporate non-compliance, and provisions for judicial review in some cases.
6. Trade secret protections which permit corporate non-disclosure or limited disclosure for defined trade secrets under specific circumstances. These protections restrict subsequent disclosures of the secrets by state officials, personal physicians, workers, and other recipients of hazard information.

See supra note 135.

In many states, other laws and regulations establish additional rights to information. These include state freedom of information and open record acts granting access to agency-held information, and state medical record and licensure laws that impose duties on licensed professionals in occupational medicine.

Workers' compensation laws and pre-trial discovery rules also afford claimants access to certain records in the possession of private firms. These provisions generally provide Compensation Boards and courts with the power to issue subpoenas for the disclosure of the records needed by claimants. Because these opportunities usually become available after exposure and injury, they serve primarily as aids in securing compensation. However, they often have a deterrent effect for corporate risk management that leads to the adoption of risk prevention measures by firms.

137. *Manufacturers Ass'n of Tri-County v. Knepper*, 801 F.2d 130 (3d Cir. 1986), *cert. denied*, 108 S.Ct. 66 (1987); *New Jersey State Chamber of Commerce v. Hughey*, 774 F.2d 587 (3d Cir. 1985).

138. *See supra* note 137.

entities that the original OSHA rule was too narrow and too protective of industrial interests.¹³⁹ Although the court upheld most of the hazard communication rule against consolidated challenges, it did order OSHA to expand the rule to cover all industrial sectors, and to reduce the scope of protection afforded industrial trade secrets.¹⁴⁰

Although the OSHA rule is now being implemented, corporate compliance and agency enforcement have been problematic. From October 1985 to February 1988, the agency issued over 32,000 citations for alleged violations of the rule.¹⁴¹ Recently, OSHA has made efforts to enlighten its own inspectors as well as regulated firms as to what chemicals are subject to the rule and as to what constitutes appropriate methods of implementation.¹⁴² It also has sought assistance from Customs officials to enforce the rule against foreign firms whose chemicals are imported into the U.S.,¹⁴³ and has initiated several special inspection and safety programs to prevent catastrophic accident hazards.¹⁴⁴ However, OSHA's effort to implement and enforce the hazard communication standard has been hampered by a reduced budget and by persistent opposition from both the Office of Management and Budget and the small business sector.¹⁴⁵

Finally, as is the American way, implementation of the rule will be shaped to a great extent by numerous adversarial proceedings and decisions of administrative tribunals and courts. The Occupational Safety & Health Review Commission ("OSHRC") is the administrative tribunal

139. *United Steelworkers of America v. Aucther*, 763 F.2d 728 (3d Cir. 1985).

140. *Id.* The OSHA rule was expanded to include all industries in 1988. See *supra* note 125.

141. *OSHA Frequently Cites for Hazard Rule: Violations of Basic Provisions Common*, 17 O.S.H. Rep. (BNA) 1662 (1988). Most of these citations were for violations of the basic provisions of the rule, such as failures to have written hazard communication programs, training programs, MSDS's, or container labels. *Id.*

142. A "floor list" of carcinogens derived from findings of the U.S. National Toxicology Program and the International Agency for Research on Cancer has been issued. 'Floor' List of IARC. *NTP Carcinogens Issued to Inspectors as Reference Guide*, 16 O.S.H. Rep. (BNA) 1131 (1987). For OSHA's detailed enforcement criteria, see OSHA Instruction CPL 2-2.38B (Inspection Procedures for the Hazard Communication Standard), reprinted in 18 O.S.H. Rep. (BNA) 82 (1988).

143. *Certification Method Suggested by OSHA to Ensure Compliance by Non-U.S. Companies*, 15 O.S.H. Rep. (BNA) 1046 (1986).

144. This program is focused on 120 chemicals and involves inspections for accident hazards, safety measures, worker education and in-plant emergency response information systems. OSHA, CHEMICAL SPECIAL EMPHASIS PROGRAM FINAL REPORT (1987).

145. Hearings held by the Office of Management and Budget offered an industrial forum for complaints and opposition over costs and paperwork burdens. Non-compliance by small businesses and the need for OSHA assistance to this industrial sector emerged as a major problem. See *Hazard Communication Compliance Problems, Paperwork Burdens Subject of OMB Hearing*, 16 O.S.H. Rep. (BNA) 1181 (1987).

that hears appeals from firms cited for violating OSHA rules.¹⁴⁶ It has already been called on to deal with several implementation issues of the hazard communication rule, such as the criteria for an adequate chemical container label.¹⁴⁷ One can expect that OSHRC will face a multitude of such appeals in the future, and that many of its decisions will be appealed to the courts.¹⁴⁸

Despite these problems, the managers of many large firms have developed the training programs, MSDS's, and labels required by the rule, and are using them to achieve regulatory compliance. These large firms are the primary producers of toxic chemicals, have the knowledge and resources to comply, and are highly motivated to avoid further regulatory interference. In addition, compliance bears on their potential liability for personal injuries to downstream workers. This liability can arise when toxic products they produce or distribute are used in downstream workplaces without adequate warnings or safe-use instructions, resulting in injury to downstream workers who can then initiate product liability actions for failure to warn against the primary producers.¹⁴⁹

With few exceptions, downstream workers cannot sue their own employers for such harms. Workers' compensation law in each state provides that the exclusive remedy from the employer is that provided by the workers' compensation benefits designated by the state law. The "benefits" are usually modest and consist of reimbursement for medical costs, funeral expenses, limited compensation for loss of limbs or organs, and disability payments based on a percentage of salary for a limited time.¹⁵⁰

But this "exclusive remedy" principle does not preclude injured workers from seeking much larger awards of compensatory and punitive damages through tort actions against other parties who may have acted wrongfully, most frequently the original producer of the toxic product who failed to provide warnings and safe-use instructions to foreseeable

146. 29 U.S.C. § 661 (1982).

147. Hilton-Davis Chemical Co., OSHRC Docket No. 86-494, 13 OSHC 1185 (March 3, 1987). In this case, OSHRC found that Hilton-Davis's failure to include on container labels information regarding dangers to specific target organs violated the OSHA rule, even though other hazard information was included on the label.

148. Appeals from OSHRC decisions to the courts are provided by the Occupational Safety and Health Act. 29 U.S.C. § 660(a) (1982).

149. See Baram, *supra* note 103, at 386. The vast majority of tort actions against chemical manufacturers are product liability suits brought by downstream workers, most of which are based on the defendant's failure to warn. Personal Communication with Dr. Irving Rosenthal, Director of Health and Safety, Rohm and Haas Co., 1988.

150. See A. LARSON, WORKMEN'S COMPENSATION § 2.00 (Desk Edition 1988) (contrasting workers' compensation with compensation from tort).

users of the product.¹⁵¹ As a result, numerous lawsuits now are being brought by injured workers against primary producers based on the alleged failure of the producers to provide adequate risk information. For example, asbestos manufacturers face tens of thousands of tort actions brought by workers of downstream firms who have incurred lung cancer and other diseases from using asbestos products in their jobs.¹⁵²

Judicial adaptation of tort law to fit toxic chemical cases has led to a toxic tort system that tends to be "pro-plaintiff." Suits by injured workers against chemical producers often result in large compensatory damage awards (\$100,000 to more than \$1,000,000), and even larger punitive damage awards when willful or reckless corporate behavior is involved (such as willful non-disclosure of conclusive information on asbestos hazards).¹⁵³ These suits also impose heavy legal transaction costs on the parties, such as fees for attorneys and medical experts. Further, in many states, punitive damage awards are not insurable on public policy grounds and must be fully absorbed by the defendant manufacturer. Consequently, several asbestos firms have sought shelter under bankruptcy laws,¹⁵⁴ and manufacturers of other harmful products are now also suffering large losses.

The basis of many such tort awards has been proof that the manufacturer sold a dangerous or defective product unaccompanied by adequate warning and safe-use instructions. A chemical producer is likely to be found liable for damages if the court finds that the omission of a warning led to the worker's disease or injury. Significant awards for damages and the transaction costs involved therefore have prompted chemical manufacturers to comply with the OSHA rule and to provide the required warnings with its products.

Compliance with the OSHA hazard communication rule may prevent some health risks. For those accidents that do occur, compliance may constitute an adequate defense against failure-to-warn causes of action. However, compliance with government regulation usually does not

151. See Baram, *supra* note 103, at 386; Baron, *Piercing the Compensation Veil: Third Party Remedies for Job-Related Injuries*, in OCCUPATIONAL DISEASE LITIGATION 73 (Practicing Law Institute 1983).

152. See Brodeur, *supra* note 9, pt. 3. In one of the leading decisions in this area, the court established a "manufacturer's status as expert" with duties to "keep abreast of scientific knowledge . . . [and] to test and inspect his product" in order to assure adequate risk communication. *Borel v. Fibreboard Paper Products, Inc.*, 493 F.2d 1076, 1089 (5th Cir. 1973).

153. See W. PROSSER & R. KEETON, *THE LAW OF TORTS* § 2 (5th ed. 1984); G. NOTHSTEIN, *TOXIC TORTS* §§ 17.17, 17.19 (1984); Brodeur, *supra* note 9, pt. 3, at 65-66. See also Schwartz & Driver, *Warnings in the Workplace: The Need for a Synthesis of Law and Communication Theory*, 52 U. CIN. L. REV. 38 (1983) (arguing that worker injuries are better prevented by employer training programs than by imposing liability on product manufacturers).

154. See *supra* note 9.

constitute a conclusive defense to a tort action. Thus, firms that seek to use risk communication as part of their risk management program to avoid tort losses do more than merely comply with the OSHA rule. These firms also try to develop more elaborate risk communication programs that would be found adequate and reasonable under relatively ambiguous tort law doctrines.¹⁵⁵

Finally, American firms, like their European counterparts, voluntarily have developed various medical surveillance and biological monitoring programs, staffed by occupational physicians and industrial hygienists. Firms have adapted these programs to meet various OSHA standards for specific toxic substances such as lead and arsenic. Monitoring and surveillance programs can inform workers of medical diagnostic information and advice, data on levels of pollutants in their bodily fluids, and other information gained from personal testing and examination. This form of risk communication, while vital for promoting medical interventions and improved hygiene, only reveals problems after exposure has occurred and some adverse symptoms have appeared.¹⁵⁶ Therefore, these programs usually do not provide information early enough to prevent the onset of diseases, some of which may be irreversible. Nevertheless, monitoring and surveillance programs do produce a substantial data base for developing a risk management program that will better protect future workers.¹⁵⁷

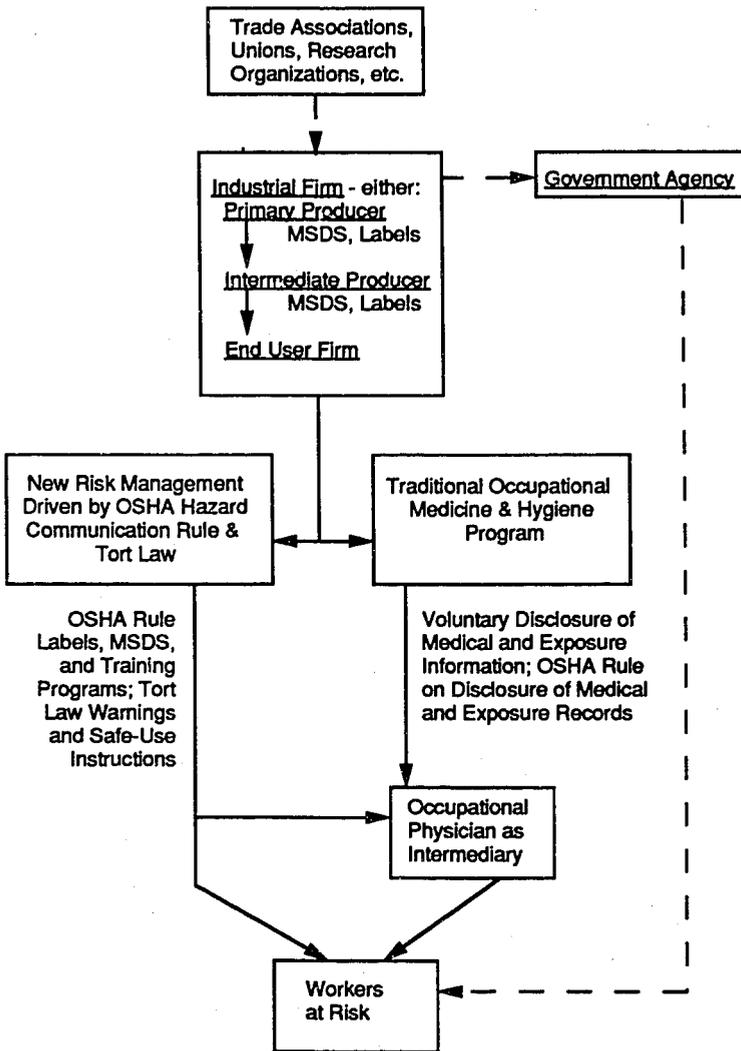
The major methods of communicating risk information between management and workers in the U.S. can now be depicted in a modified version of the basic risk communication model (presented earlier in *Figure 3*). The U.S. model is presented below as *Figure 5*.

155. The author is conducting a study for EPA on "Corporate Management of Chemical Accident Risks," which is focused on nine firms. One firm, a major producer of toxic chemicals, provides its downstream customers of certain chemicals with OSHA-mandated labels and MSDS's; in addition, the firm offers the use of its own experts to conduct safety and hygiene evaluations of the customer's workplace, provides safety seminars for customers, and takes other measures to increase warnings and reduce risks. The cost of these measures is added to the price of the products involved as a "value-added" service. Customers have responded favorably. Thus, right-to-know is now used by the producer as a marketing tool. See also *infra* text accompanying note 256.

156. See CONFERENCE BOARD, *supra* note 3.

157. For example, the Digital Corporation's recently released study of reproductive harms to workers, based on extensive analysis of current and previous workers, marks the first stage of a process which will better protect future workers. See *DEC's Hazard Report*, BOSTON BUS. J., Jan. 19, 1987, at 1, col. 4.

FIGURE 5: RISK COMMUNICATION BETWEEN MANAGEMENT AND WORKERS IN THE U.S.



C. Summary

As the foregoing discussion indicates, risk communication from industrial managers to workers is an essential part of corporate risk management in both the E.C. and the U.S. However, the legal frameworks and values that shape actual risk communication practices differ in several respects. For example, the E.C. requires the use of standardized labels but leaves the use of data sheets up to its member states and trade associations. The U.S. requires the use of both labels and data sheets, but does not specify standardized information content. Although the E.C. and the U.S. both impose enforceable duties on firms to communicate hazard information, only the U.S. has vested in workers a legally enforceable right to know such information. Both systems call for worker training and education, but some E.C. members have enacted national laws establishing roles for worker participation in safety committees and management decision-making, whereas the U.S. has not enacted such laws.

Thus, the U.S. requires more by its statutes and regulations, but implementation is left to workers and firms to use adversarial methods to resolve problems. In contrast, although E.C. public law requires less, it structures and emphasizes implementation by means of consultative and co-determination processes. Another difference between the E.C. and the U.S. is that certain firms in the U.S. (e.g., primary producers) are driven by fears of tort liability to downstream workers and, therefore, often enhance communication beyond the OSHA rule requirements in order to prevent such liability. Although firms in the E.C. face the same problem, the threat of liability is much lower.

These and other contextual factors contribute to the different approaches to occupational risk communication and management that E.C. and U.S. firms have taken. But some of these differences are decreasing. U.S. firms that export to the E.C. and E.C. firms that export to the U.S. both must adapt their risk management programs to assure compliance with both legal regimes. This leads to corporate use of common test methods and similar methods of risk analysis and communication.¹⁵⁸ In addition, E.C. firms that export to the U.S. subject themselves to American tort law and its liability rules, and therefore must adapt their risk management programs accordingly or risk severe losses.

158. Harmonization of chemical testing requirements and other aspects of industrial risk management and regulatory compliance has been pursued by the Organization for Economic Cooperation and Development ("OECD"). See Arup, *supra* note 58.

V. COMMUNITY RISKS FROM FACILITY ACCIDENTS

This section focuses on the approaches taken by firms in the E.C. and the U.S. to prevent facility accidents that endanger the adjacent region (the "community") and to develop appropriate emergency response systems in partnership with government officials. These approaches are being taken under the authority of new laws enacted in the E.C. and the U.S. that place great reliance on the communication of accident risk information by facility managers to various units of government and, in many instances, to community residents.

Industrial accidents are commonplace in the E.C. and the U.S.¹⁵⁹ Most of these accidents are confined to the premises of the facility, and have been viewed as a problem endangering workers, productivity, and corporate assets. But, in recent years, a cluster of major accidents at facilities producing or using toxic materials has released these dangerous substances into host communities and over larger regions, with damaging and tragic consequences. Examples include the accidental releases of methyl isocyanate from Union Carbide's facility in Bhopal, India; dioxin from the Hoffman-La Roche facility in Seveso, Italy; and radioactive isotopes from the Soviet nuclear power plant in Chernobyl. These accidental releases have demonstrated dramatically the far-reaching effects of modern industrial accidents and have alarmed the public.

Public anxieties have led to the promulgation of new rules and regulatory programs by many industrial nations and international organizations. Moreover, the chemical industry and its insurers, shocked by the enormity of the Bhopal tragedy (2000 deaths and 200,000 alleged injuries) and its economic consequences, have undertaken major internal efforts to improve safety. These companies also have lent their support to the development of certain new laws and regulations. Despite these developments, industrial accidents continue to occur at an alarming rate. Recent accidental releases of toxic chemicals from a Carbide plant in Institute, West Virginia and from a Sandoz facility in Basel, Switzerland have sustained public anxieties.

As a result, government officials, unions, and the general public continue to pressure chemical producers and other sectors of industry using chemicals to improve safety measures and to disclose more information to make possible independent evaluations of safety and emergency response plans. What follows is a review and analysis of the major legal developments requiring risk communication between industry, local communities, and community residents in the E.C. and the U.S. This

159. See *supra* notes 4-5 and accompanying text.

section also will discuss corporate responses in the form of improved risk management methods and increased use of risk communication.

A. *European Community*

The centerpiece of E.C. regulatory efforts at reducing chemical accident hazards is the "Seveso Directive."¹⁶⁰ This Directive was developed and enacted following a serious incident in the northern Italian city of Seveso in 1978. An accident at a Hoffman-La Roche plant led to a large release of dioxin that contaminated surrounding areas and caused substantial alarm over future health consequences to exposed persons.

The E.C.'s twelve member states are required by the Seveso Directive to implement its provisions for reducing accident risks at facilities producing, storing or using certain chemicals. National governments also are charged with ensuring that adequate emergency response programs are formulated for each facility with the assistance of company officials. The Directive does not abrogate previously enacted industrial safety and environmental laws, but does set minimum compliance levels for the member states. The minimum requirements are intended to promote uniformity between member states, an important goal of all E.C. actions. Uniformity in this case is desired to prevent use of minimal safety criteria in national competition for chemical industry facilities, to reduce administrative costs of developing national risk reduction programs, and to improve the efficacy of national programs promoting industrial safety and public planning for emergencies.

E.C. member states are required to ensure that all manufacturers engaged in "industrial activity" comply with the Directive's provisions.¹⁶¹ The Directive defines "industrial activity" as any operation or storage involving "one or more dangerous substances" that are "capable of presenting major accident hazards."¹⁶² "Dangerous substances" are those listed in the Annexes to the Directive.¹⁶³ Member states must require all applicable facilities in their countries to take two risk reduction approaches: (1) undertake on-site safety evaluations and (2) formulate off-site emergency response programs.

First, the Directive requires company officials to conduct an on-site

160. COUNCIL OF THE EUROPEAN COMMUNITIES, DIRECTIVE ON MAJOR ACCIDENT HAZARDS OF CERTAIN INDUSTRIAL ACTIVITIES (82/501/EEC, 24 June 1982; as amended by 87/216/EEC, 19 March 1987, and 88/8610/EEC, 24 November 1988) [hereinafter SEVESO DIRECTIVE].

161. *Id.* Art. 3.

162. *Id.* Art. 1, § 2(a).

163. *Id.* Annexes II, III.

evaluation of safety programs and accident risks at each plant, and to submit the findings for review by government officials.¹⁶⁴ New facilities must be evaluated before operation can begin, while the safety of existing plants must be assessed by a specified date and re-evaluated after any significant modification.¹⁶⁵ On-site evaluations involve applying safety and risk analysis methods to the industrial system at each facility.¹⁶⁶ Plant managers and engineers must identify the quantities and properties of hazardous materials used or produced at the site.¹⁶⁷ They also must describe the technological processes used by the firm, the number of workers exposed to hazards, the possible sources of an accident, and the safety arrangements and devices that are currently in place.¹⁶⁸

An agency of the national government is designated as the "competent authority" to receive and review on-site evaluations. The designated government agency may request additional information from a company or conduct its own on-site inspections. It may then use its authority under national law to order changes to plant facilities and safety systems at the manufacturer's expense.¹⁶⁹

The second risk reduction approach mandated by the Seveso Directive is formulation of an off-site emergency response program for each facility. These programs are to be developed by national and local officials with the cooperation of the facility's management. Firms are required to submit information to the competent national authority that will assist in the preparation of an emergency response plan for protecting both the public and the environment in the event of a major release. These emergency response plans must include planning for evacuation and emergency health care as well as preparations for swift containment and reduction of the environmental threat posed by an accidental release.¹⁷⁰

The Seveso Directive also requires manufacturers to provide competent authorities with information on major accidents as soon as such information becomes available.¹⁷¹ The competent national authorities, in turn, must provide timely information about such accidents to the

164. *Id.* Art. 5. Early cost estimates for safety evaluations in the U.K. are approximately £12,000 for various "non-chemical installations"; and £25,000 and £50,000 at moderate size chemical plants and complex installations, respectively. See Harris & Slater, *Techniques and Resources Required*, in IMPLEMENTING THE SEVESO DIRECTIVE, *supra* note 50.

165. SEVESO DIRECTIVE, *supra* note 160, Art. 5, §§ 2, 3.

166. Since each site is unique, complete standardization of risk analysis procedures is not possible.

167. SEVESO DIRECTIVE, *supra* note 160, Art. 5(a).

168. *Id.* Art. 5(b).

169. *Id.* Art. 7.

170. *Id.* Art. 5(c).

171. *Id.* Art. 10.

Commission of the European Communities.¹⁷² These reports from industry and government are used to establish a "registry" of major accidents occurring in the E.C.¹⁷³ It is hoped that the information in the registry, which is available to all member states, will be useful in pointing out deficiencies in the regulations of each nation.¹⁷⁴

The Seveso Directive thus requires firms to share all relevant information with the competent national authority. However, as is the tradition in the E.C., the information conveyed to local governments and the public is limited. The governing principle has been that local governments, workers, and the general public are provided only with the information they "need to know" to perform their function within emergency response plans. For example, until recently Article Eight of the Seveso Directive only required that "persons liable to be affected by a major accident . . . [be] informed in an appropriate manner of the safety measures and of the correct behaviour to adopt in the event of an accident."¹⁷⁵ This need-to-know philosophy is very different from the right-to-know principle in U.S. private and public law.¹⁷⁶

In November 1988, the E.C. amended the Seveso Directive to expand the public information requirements. The revised Article Eight requires member states to ensure that "information on safety measures and on the correct behaviour to adopt in the case of an accident is supplied in an appropriate manner, and without their having to request it, to persons liable to be affected by a major accident. . . . It should also be made publicly available."¹⁷⁷ The information required to be publicly disclosed is listed in an Annex to the Directive.¹⁷⁸ The amended Directive

172. *Id.* Art. 11.

173. *Id.* Art. 12.

174. *Id.* One of the first issues to arise under the Seveso Directive was the failure of companies to comply with the reporting mandate. This failure has prompted discussion within the E.C. about strengthening the enforcement of the information reporting process. Personal Communication with Louis Jourdan, CEFIC, 1986.

175. SEVESO DIRECTIVE, *supra* note 160, Art. 8, § 1 (prior to its amendment in 1988). See *infra* note 177 and accompanying text.

176. See *infra* notes 215-217 and accompanying text.

177. SEVESO DIRECTIVE, *supra* note 160, Art. 8, § 1, as revised by 88/610/EEC, 24 November 1988.

178. The information required to be disclosed to persons at risk and the general public under the amended Article Eight of the Seveso Directive is the following:

- (a) Name of company and address of site.
- (b) Identification, by position held, of the person giving the information.
- (c) Confirmation that the site is subject to the regulations and/or administrative provisions implementing the Directive.
- (d) An explanation in simple terms of the activity undertaken on the site.
- (e) The common names (where possible) of the substances and preparations used on site which could give rise to a major accident, with an indication of their principal dangerous characteristics.
- (f) General information relating to the nature of the major accident hazards, including

significantly increases the amount of risk information disclosed to the public and contains some elements of a right-to-know approach. Nevertheless, revised Article Eight's dominant philosophy still seems to be "need-to-know," and the information disclosed remains minimal compared to U.S. standards. For example, the public is not informed of the quantities of hazardous substances kept on site or about the type or quantity of "routine" emissions from the facility.

The Seveso Directive further restricts risk communication to local governments, plant workers, and the public by affording protection for industrial trade secrets.¹⁷⁹ Most of the information contained in safety evaluations conducted by firms relates to in-plant processes that are usually considered confidential business information. Therefore, protection of trade secrets under the Seveso Directive could severely restrict the flow of important information to persons at risk and to those in local government who must develop appropriate emergency response plans. However, because confidential information disclosed to the competent national authority remains at the national level and is not exchanged at the Commission level, national law will largely dictate the extent to which trade secret protection will restrict risk communication in each country.¹⁸⁰ Given intense industrial concerns over loss of trade secrets and various legal restrictions in the laws of member states against disclosure of proprietary information, trade secrets are likely to be highly

their potential effects on the population and the environment.

- (g) Adequate information on how the population concerned will be warned and kept informed in the event of an accident.
- (h) Adequate information on the actions the population concerned should take and on the behavior they should adopt in the event of an accident.
- (i) Confirmation that the company is required to make adequate arrangements on site, including liaison with the emergency services, to deal with accidents and to minimize their effects.
- (j) A reference to the off-site emergency plan drawn up to cope with any off-site effects from an accident. This should include advice to cooperate with any instructions or requests from the emergency services at the time of an accident.
- (k) Details of where further relevant information can be obtained, subject to the requirements of confidentiality laid down in national legislation.

SEVESO DIRECTIVE, *supra* note 160, Annex VII, Items of Information to be Communicated to the Public in Application of Article 8(1).

179. Although the Seveso Directive does not explicitly mention or directly provide protection for trade secrets, it does so indirectly. Firms subject to the Directive must disclose all required information, including trade secrets, to the competent national authority, but "information obtained by the competent authorities . . . may not be used for any purpose other than that for which it is requested." Furthermore, "[t]he Commission . . . shall not divulge the information obtained . . ." and shall not jeopardize "industrial secrecy." SEVESO DIRECTIVE, *supra* note 160, Art. 13.

180. CEFIC, CEFIC COLLOQUIUM ON THE "SEVESO" DIRECTIVE 44 (1982) (statement of G. Del Bino, D.G. XI) [hereinafter SEVESO COLLOQUIUM].

protected in information disclosures to the public under Article Eight of the Seveso Directive. Such restrictions on risk communication are likely to impair the quality of emergency response plans and may result in some accidents that could have been prevented. A model of the major features of the Seveso Directive and the communication functions required of industry and member states is presented in *Figure 6* below. It demonstrates that the basic risk communication model presented earlier (in *Figure 3*) has been significantly modified by the Seveso Directive.

The member states of the E.C. are at varying stages in implementing the provisions of the Directive. All E.C. countries except Italy have passed laws or promulgated regulations incorporating the Seveso Directive into national law.¹⁸¹ However, some of these national laws are only frameworks at this time with no deadlines or implementing regulations. In the countries that are actively implementing the Directive, major differences in approach already have emerged.¹⁸²

Several factors are responsible for the differences between E.C. member states in implementing the Seveso Directive. First, the general language of many of the Directive's provisions invites diverse interpretations.¹⁸³ Second, the requirements of the Seveso Directive are being inserted into very different frameworks of existing laws and regulations in each member nation.¹⁸⁴ The Seveso Directive requirements are being implemented most smoothly in countries that already have relatively well-developed public rights of access to environmental information, such as West Germany and the Netherlands.¹⁸⁵

A third factor shaping implementation of the Seveso Directive in member states is the different cultural and administrative traditions of the various countries. For example, in countries such as France, industry has the attitude that information should not be disclosed to the public until there is a "fully established framework of reassurance," including a

181. See Wynne, *Risk Communication for Chemical Plant Hazards in the European Community 'Seveso' Directive*, at 8 (paper presented at the Conference on Responsibilities of Multinational Corporations to Disclose and Communicate Risk Information, Boston University Law School, Mar. 1988).

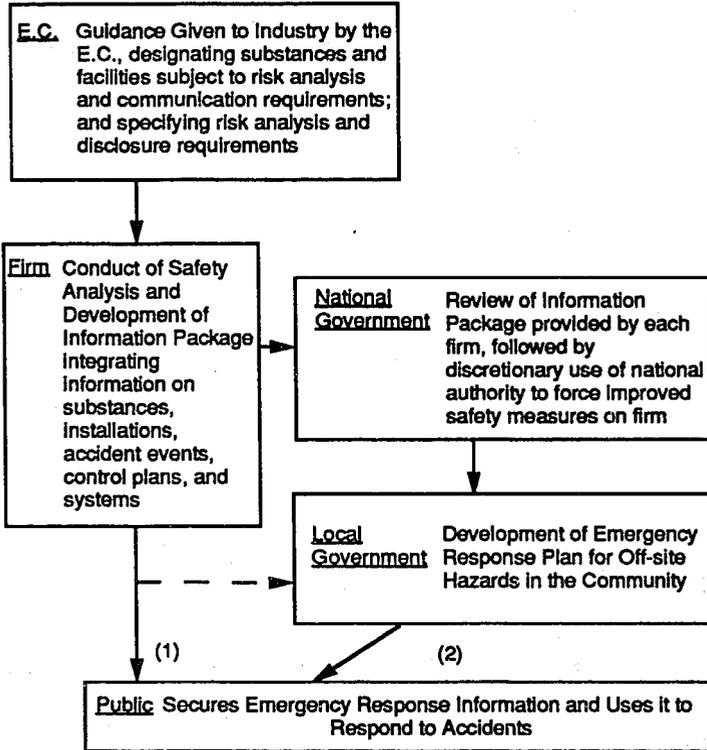
182. See generally *id.*

183. For example, according to the European chemical trade organization CEFIC, "there exist differences in the Member States' interpretation of some of [the Seveso Directive's] provisions." CEFIC, CEFIC '86: ANNUAL REPORT 17 (1986).

184. For a brief survey of relevant national laws in effect at the time of the Directive's enactment, see Kafka, *The European Chemical Industry's View of Major Hazards Legislation* (paper presented to the 1984 European Major Hazards Conference organized by the Oyez Scientific & Technical Service, London, May 1984). Numerous subsequent developments have been reported in the media. E.g., *Safety Plans in Western Europe*, CHEM. WEEK, Jan. 1, 1986, at 23.

185. Wynne, *supra* note 181, at 10.

FIGURE 6: E.C. SEVESO SYSTEM FOR CONTROLLING MAJOR ACCIDENT HAZARDS AT FACILITIES



Note: The recently amended Section Eight of the Seveso Directive requires the public to be actively informed of certain safety information but does not specify whether this information must be communicated directly from the firm to the public (1), or can be communicated through government intermediaries (2). The predominant pathway differs between Member States largely as a function of existing national law, traditions, and attitudes.

hazard analysis, a specific emergency plan, and materials and arguments for presenting the case for the facility's relative safety.¹⁸⁶ In contrast, public information is given out without this supporting framework in the United Kingdom.¹⁸⁷ Jurisdictional disputes between different agencies and levels of government within member nations is a fourth reason for differences between nations in implementing the Directive.¹⁸⁸ Since most of these reasons for variable implementation of the Seveso Directive are due to domestic considerations beyond the reach of the E.C., the lack of uniformity likely will be intractable.

Limited information is available at this time on the effects of the Seveso Directive on corporate risk management in each member nation. The results are likely to prove highly variable, given the differences in implementation between countries. But one general conclusion is apparent: the Directive, particularly Article Eight, poses great challenges for companies using or producing hazardous chemicals. On one hand, firms must carefully evaluate their activities and deal with technical uncertainties, work with employees and community officials to prevent accidents and appropriately respond to emergencies, and maintain regulatory compliance. On the other hand, such companies have the responsibility to take initiative to protect legitimate corporate interests by preventing loss of trade secrets and undue public anxiety. These firms also must engage carefully in risk communication processes that will involve national and local government units and the public.¹⁸⁹ Given these variable considerations and the Directive's authorization for member states to take measures stricter than those provided in the provisions,¹⁹⁰ each firm's risk management program will incorporate different or contextual responses to the Directive and its communication requirements.

Various propositions have been put forward by industry officials as generic considerations for risk management. These include: an increased

186. *Id.* at 13.

187. *Id.*

188. The division of responsibilities among the levels of government varies considerably between E.C. countries. In Germany, for example, administration of the Seveso Directive rests solely in the hands of the "Laender" (States). Much like the American federal system, each of the Laender has considerable power to regulate and enforce laws and regulations independent of other Laender. Italy differs from other E.C. members even more markedly in that municipal governments have almost complete responsibility for all matters relating to community health and safety. The national government provides guidance throughout the E.C. but cannot bind municipal activity in many instances. The result of all this, in the words of one CEFIC official, is a "big mess." Personal Communication with Louis Jourdan, CEFIC, 1986.

189. See generally CEFIC COLLOQUIUM, *supra* note 180.

190. SEVESO DIRECTIVE, *supra* note 160, Art. 17. See discussion of Article 17 in CEFIC COLLOQUIUM, *supra* note 180, at 42-43.

vigilance by plant engineers for purposes of identifying potential hazards and their causes (e.g., explosive vapors, substance instability, and vulnerability of parts due to aging or corrosion); use of safety factors in engineering beyond those provided in various codes (e.g., regarding capacities of systems and corrective measures); and use of safety testing and audits after the system is designed, and again, after it is in operation.¹⁹¹ In choosing sites for new facilities, firms should give greater consideration to minimizing site-specific risk factors and obstacles to emergency response. For example, densely populated areas should be avoided because they are likely to produce more exposed persons and harm in the event of an accident. Areas prone to floods and other natural hazards are also disadvantageous because these hazards can trigger accidents, obstruct emergency responses, and require more costly safety systems. Finally, areas of heavy industrial concentration have disadvantages because the proximity of other dangerous substances or activities can lead to a "domino effect," or enlargement of accident severity, and an increase in consequent losses.

Although the Seveso Directive does not explicitly require consideration of the above factors in siting decisions,¹⁹² government approval of new facilities likely will be less problematic if sites without these problems are chosen. Furthermore, safety engineering and emergency response plans in all likelihood will be less costly over time if inherently safer sites are chosen for new facilities. Once a site has been selected and the facility begins operation, firms might find it prudent to try to limit nearby population growth and industrial concentration in order to maintain the original benefits of the site. This can be accomplished by buying or leasing sufficient adjacent land to create a "buffer zone."¹⁹³

In addition to improvements in engineering safety and site selection and control, industry experts have recommended other general principles for firms in the E.C. to adopt following the enactment of the Directive. These include the need for new accident and emergency planning systems, such as containment and evacuation measures. Worker training has also been stressed, including allocation of duties among workers of different companies in areas of industrial concentration.¹⁹⁴ Overall, a program of "integrated safety" has been recommended, whereby safety

191. See van Eijnatten, *Engineering: The Safety Point of View*, in CEFIC COLLOQUIUM, *supra* note 180, at 47.

192. However, siting guidelines such as these are inherent in the SEVESO DIRECTIVE, *supra* note 160, Art. 5, § 1.

193. See *id.* Art. 5, § 4 (setting a 500 meter minimum buffer zone between certain industrial activities).

194. Jourdan, *The Viewpoint of the Chemical Industry on the General Safety Provisions*, CEFIC COLLOQUIUM, *supra* note 180, at 70, 72-75.

would be considered in all aspects of designing installations and industrial processes.¹⁹⁵

Firms have been advised to exercise particular care in meeting the risk communication requirements of the Seveso Directive. Managers have been urged to provide required information, but "only that which is genuinely required to help and advise 'those likely to be affected': the principle must be that of 'needing to know.'"¹⁹⁶ However, firms also have been cautioned against withholding information that is required to be disclosed, even if the information is "bad news" for the company.¹⁹⁷ When disclosing information to government or to the public, a firm is advised to support its safety analysis with "adequate justification for its conclusions" about risk and safety, a view that could turn analysis into advocacy.¹⁹⁸ Finally, firms have been warned to heed public perceptions of risk.¹⁹⁹ Statistical assessments of risk are likely to be quite unconvincing to most members of the public, while subjective evaluations of risk tend to be more effective in conveying information.²⁰⁰ Public relations in the form of "open days" for the public or invited visits for local officials have been recommended for addressing some of the public perception problems.²⁰¹

Early indications are that corporate risk managers are responding positively to recommendations for improving risk reduction following enactment of the Seveso Directive. According to industry and trade association views expressed at meetings, major firms are taking steps to improve their risk management programs. These steps include: (i) additions to corporate staff and increases in resources for risk management; (ii) modifications of corporate management structures; (iii) decisions to reduce volumes of Seveso Directive-designated chemicals stored on site; (iv) use of more stringent safety factors to assure

195. *Id.* at 71.

196. Merriman, *Information to the Public*, CEFIC COLLOQUIUM, *supra* note 180, at 87, 89. The rationale for this view includes the need to protect trade secrets and prevent controversies and terrorism. See also Kafka, *supra* note 184, at 20-22.

197. CEFIC COLLOQUIUM, *supra* note 180, at 96 (remarks of J.P. Jacobs, CEFIC).

198. Barrell, *Safety Cases and Emergency Plans*, in IMPLEMENTING THE SEVESO DIRECTIVE, *supra* note 50.

199. See, e.g., Kafka, *supra* note 184, at 18.

200. See generally KRIMSKY & PLOUGH, ENVIRONMENTAL HAZARDS: COMMUNICATING RISKS AS A SOCIAL PROCESS; Slovic, *Perception of Risk*, 236 SCIENCE 280 (1987); Tversky & Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, 185 SCIENCE 1124 (1974).

201. Chemical firms have traditionally been wary of communicating openly with the general public since revealing information could benefit industrial competitors. Although such fears appear to be waning somewhat, usually only a firm's general manager, public relations person or corporate secretary is allowed to communicate with the public. The same corporate attitude and practice holds for working with local governments in developing emergency plans. See Kafka, *supra* note 184, at 22.

accident prevention and containment; (v) use of less dangerous substitute products; and (vi) more technical assistance to downstream customers.

The response of industry in implementing the risk communication requirements of the Seveso Directive has been more mixed, in part due to the different legal systems and cultural backgrounds in the member states discussed earlier.²⁰² In the United Kingdom for example, firms have used several means of communicating directly with the public, which include distributing leaflets and letters, making personal visits to residents, and holding public meetings and "open days" for visiting the site. Companies also have produced videos and other materials to reach local officials, the media, and facility employees, all of whom can serve as "informed ambassadors" to the community. In contrast, "formal interactions between [the] public and industrial plant management hardly exist" in the Netherlands.²⁰³ To Dutch industry officials, the government is the responsible body for giving legally required information to the public.²⁰⁴ Therefore, risk information and emergency response plans are not actively communicated to the public by industry, but rather are provided to government officials, who then cautiously disclose the information to the public. However, the recent amendment to Article Eight of the Seveso Directive may promote greater direct risk communication from industry to the public in the Netherlands and other E.C. countries.²⁰⁵

Meaningful evaluation of the Seveso Directive's effects on risk communication must include the quality and substantive content of what is being communicated, not just the form of communication. So far, the information disseminated by industry to the public in most member countries has been very basic. Usually, companies provide generic risk and emergency response information, which does not include the site-specific hazards of a particular facility. Public relations information on the firm's products and employment contributions often are commingled with risk information. There is rarely, if ever, any indication of the uncertainty inherent in risk estimates. Finally, there are no established mechanisms for review or challenge of the accuracy of information disseminated by companies.²⁰⁶

Overall, the Seveso Directive is perceived in the E.C. as providing a sound, feasible approach for preventing industrial accidents. It has improved linkage between industry and government for providing more

202. See generally Wynne, *supra* note 181.

203. See van Eijndhoven & Worrell, *Information Practices and the Seveso Directive. Situation and Developments in the Netherlands*, at 33 (unpublished paper, 1987).

204. *Id.*

205. See *supra* note 177.

206. Wynne, *supra* note 181, at 16.

effective emergency response programs and has induced major firms to undertake some important risk reduction steps. The Directive also has structured new forms of risk communication. Nevertheless, on the basis of early evaluations, the goal of achieving a high degree of uniformity in accident prevention approaches among the twelve member nations now seems unattainable. Furthermore, the influence of the Directive for enlarging public rights to industrial information thus far has been contextual and weak. It is too early to tell what impact, if any, the November 1988 amendment of Article Eight of the Directive will have on increasing the use and quality of direct risk communication from industry to the public.

Interestingly, one of the most beneficial effects of the Seveso Directive may be the important role it is having in stimulating further accident prevention and risk communication initiatives beyond the E.C. For example, the Directive served as a model for guidelines adopted by the World Bank for its industrial projects in developing nations.²⁰⁷ The Organization for Economic Cooperation and Development ("OECD"), comprised of twenty-two member nations, likewise has recently adopted guidelines similar to the Seveso Directive.²⁰⁸ Finally, the Seveso Directive influenced legislation at federal and state levels in the U.S.²⁰⁹ The recent enactment of community right-to-know legislation in the U.S., particularly at the federal level, is considered in the next section.

B. United States

While the chemical accident in Seveso was the stimulus for an E.C. Directive on emergency response planning and the disclosure of industrial risk information in Europe, the 1984 accident at Union Carbide's Bhopal facility had a similar effect on U.S. policy. The conjunction of the tragic Bhopal accident with a series of subsequent reports of

207. WORLD BANK, GUIDELINES FOR IDENTIFYING, ANALYZING AND CONTROLLING MAJOR HAZARD INSTALLATIONS IN DEVELOPING COUNTRIES (1985). These Guidelines "are based substantially on the EEC Directive. . . ." *Id.* at 1. The Guidelines have provided the basis for WORLD BANK, MANUAL OF INDUSTRIAL HAZARD ASSESSMENT TECHNIQUES (Oct. 1985).

208. OECD, OECD COUNCIL DECISION-RECOMMENDATION CONCERNING PROVISION OF INFORMATION TO THE PUBLIC AND PUBLIC PARTICIPATION IN DECISION-MAKING PROCESSES RELATED TO THE PREVENTION OF, AND RESPONSE TO, ACCIDENTS INVOLVING HAZARDOUS SUBSTANCES (adopted 8 July 1988).

209. See Baram, *Chemical Industry Accidents, Liability, and Community Right to Know*, 76 AM. J. PUBLIC HEALTH 568, 571 (1986); Sheehan, *Chemical Plant Safety Regulation: The European Example*, 16 J. L. & POL'Y INT'L BUS. 621 (1984).

numerous other chemical accidents²¹⁰ aroused public concern and led to new regulatory initiatives at the federal, state, and local levels. For example, in 1985 the Environmental Protection Agency ("EPA") developed and disseminated a guidance for industry officials on reducing accident risks at chemical plants, even though the agency lacked clear legal authority to regulate plant safety at that time. The *Chemical Emergency Preparedness Program: Interim Guidance* ("CEPP")²¹¹ was modeled to some extent on the Seveso Directive and World Bank guidelines.

At about the same time, the chemical industry unveiled its own Community Awareness and Emergency Response ("CAER") Program, which expressed industry's willingness to provide MSDS's and other information to communities in which chemical facilities are located. CAER was developed by the Chemical Manufacturers Association ("CMA"), the major trade organization of the chemical industry.²¹² The CAER Program represented the views of Dow Chemical and other major chemical producers that saw the need for a reversal of traditional industrial policies opposing information-sharing.

Despite these reforms, numerous states and municipalities also enacted new laws and regulations for emergency response planning and risk communication.²¹³ Citizen groups also petitioned local officials to inspect and shut down industrial facilities using toxic chemicals.²¹⁴ Several bills were introduced for Congressional action and led to enactment of the federal Emergency Planning and Community Right to Know

210. E.g., OFFICE OF ATTORNEY GENERAL OF NEW YORK STATE, REPORT OF JOINT PUBLIC HEARINGS ON TOXIC CHEMICAL ACCIDENTS IN NEW YORK STATE (1986); Millar, *Braking the Slide in Chemical Safety*, N.Y. Times, May 11, 1986, at D2, col. 2; GENERAL ACCOUNTING OFFICE, CHEMICAL EMERGENCIES: PREPAREDNESS FOR AND RESPONSE TO ACCIDENTAL CHEMICAL AIR RELEASES (GAO/RCED-86-117BR 1986); American Public Health Ass'n Bhopal Working Group, *The Public Health Implications of the Bhopal Disaster*, 77 AM. J. PUB. HEALTH 230, 233-34 (1987).

211. EPA, CHEMICAL EMERGENCY PREPAREDNESS PROGRAM INTERIM GUIDANCE (Nov. 1985). This interim guidance remained in effect until it was superseded by the enactment of the Emergency Planning and Community Right-to-Know Act of 1986. See *infra* note 215.

212. The member companies of the CMA account for more than 90% of industrial chemical production in the U.S. Over 1,500 member company facilities are participating in the CMA's widely publicized CAER Program. See CMA, CAER NEWSL., Jan. 1989, at 7.

213. See *supra* notes 135-136.

214. Citizens of Cambridge, Massachusetts succeeded in shutting down a special research laboratory at the A.D. Little Co. where research on the detoxification of chemical warfare agents was being conducted under U.S. Department of Defense contracts. After commissioning a risk assessment that concluded that risk to citizens from an accidental release was very remote but nevertheless possible, the city's Health Officer issued a shut down order. This order was appealed by the firm but was upheld by state courts on the grounds that there was a reasonable basis for the order. *A.D. Little v. Commissioner of Health of City of Cambridge*, 395 Mass. 535, 481 N.E.2d 441 (Mass. 1985).

Act ("EPCRA") in October 1986.²¹⁵ EPCRA and the recently enacted state and local laws are commonly referred to as "community right-to-know" laws. These laws represent a logical extension of worker right-to-know laws,²¹⁶ since both are founded on the common principle that persons exposed to risks from industrial activities have a right to be informed of such risks.²¹⁷

EPCRA and the state right-to-know laws are based on mixed motives. On one hand, the laws are intended to improve industrial safety and establish local emergency response plans. On the other hand, the laws attempt to empower persons at risk by giving them a legally enforceable right to know the dangers to which they are exposed. Once provided with this information, citizens can make informed decisions on whether to take self-help measures to reduce the risks they face. For most of these laws, the dominant objective is empowerment of persons at risk.²¹⁸ This goal of the new laws, coupled with the adversarial methods of resolving disputes about risks in courts and government agencies, has reinforced the traditional defensive stance of corporate risk managers toward government and community groups.

The requirements and consequences of new community right-to-know laws for corporate risk management can be best understood by examining the new federal statute. EPCRA sets forth new emergency planning and risk communication functions that are allocated among industry and federal, state, and local governments. The required functions are designated as "emergency planning,"²¹⁹ "emergency notification,"²²⁰ "community right-to-know reporting,"²²¹ and "toxic chemical release and emissions inventory reporting."²²² EPCRA requires that each state establish administrative units that will carry out emergency planning. Thus, the Act mandates that each state establish a state emergency response commission ("SERC"), composed of officials from several state and

215. The Federal law is Title III of the Superfund Amendments and Reauthorization Act of 1986 ("SARA"), 42 U.S.C. §§ 11,001-050 (Supp. IV 1986). Title III of SARA is designated as the Emergency Planning and Community Right to Know Act of 1986. The genesis of this law was the proposal of Congressman James Florio of New Jersey for enactment of a federal program for licensing chemical firms. This controversial approach, contained in the proposed Chemical Manufacturing Safety Act, H.R. 965, 99th Cong., 1st Sess. (1985), was rejected.

216. See *supra* section IV-B.

217. See Baram, *supra* note 209, at 569.

218. While EPCRA includes numerous provisions requiring disclosure of risk information to the public, it does not include direct provisions for improving plant safety, such as requiring a safety evaluation of each facility. See *infra* text accompanying note 247.

219. EPCRA §§ 301-303, 42 U.S.C. §§ 11,001-003 (Supp. IV 1986).

220. EPCRA § 304, 42 U.S.C. § 11,004 (Supp. IV 1986).

221. EPCRA §§ 311, 312, 42 U.S.C. §§ 11,021, 11,023 (Supp. IV 1986).

222. EPCRA § 313, 42 U.S.C. § 11,023 (Supp. IV 1986).

local government agencies concerned with the environment and public health, and representatives from public and private sector organizations with relevant experience.²²³ Each SERC must establish local emergency planning districts and committees ("LEPC's") on a municipal or regional basis.²²⁴ LEPC's must include elected state and local representatives; police and fire officers; local or state government officials responsible for medical care and emergency planning; and representatives of affected facilities, community groups, and the media.²²⁵

Each LEPC is required to develop an emergency response plan suitable for its jurisdiction, to have the plan reviewed by the SERC, and then to revise the plan annually.²²⁶ These plans follow a civil defense model and must include: (i) identification of facilities and transport routes involving extremely hazardous substances; (ii) on-site and off-site emergency response procedures; (iii) designation of community and facility coordinators; (iv) emergency notification procedures; (v) methods for determining hazardous substance releases and probable affected sectors; (vi) description of local emergency equipment and facilities; and (vii) methods for exercising the response plans.²²⁷

LEPC activities focus on facilities that produce, use or store any of 366 extremely hazardous substances which have been officially listed by EPA.²²⁸ Any facility using or storing these listed substances in quantities exceeding their threshold levels, as established by EPA, is subject to EPCRA's emergency planning requirements.²²⁹

Several risk communication duties are imposed on industry by EPCRA. These include the obvious need for emergency notification, for which EPCRA requires that a facility immediately notify the LEPC and SERC if there is any accidental release of a listed substance that exceeds

223. EPA, TITLE III FACT SHEET, at 1 (August 1988).

224. *Id.* Most states have established an LEPC in each county while other states have designated planning districts on some other basis.

225. *Id.* at 2.

226. EPCRA § 303, 42 U.S.C. § 11,003 (Supp. IV 1986).

227. *Id.* To assist local committees, EPCRA requires preparation of a federal interagency guidance and other materials. The guidance was prepared and published in 1987 by the National Response Team, composed of fourteen federal agencies with emergency response obligations. NATIONAL RESPONSE TEAM, HAZARDOUS MATERIALS EMERGENCY PLANNING GUIDE (Mar. 1987).

228. This list, which incorporates the E.C.'s Seveso list of 178 substances, was developed by EPA and originally published at 51 Fed. Reg. 41,570 (1986), under the authority of section 302 of the Act. The current list is at 40 C.F.R. § 355 (1988). "Threshold planning quantities" for each substance on the list are provided by EPA. Screening criteria used by EPA in developing the list "are basically consistent with . . . criteria used by both the European Economic Community and the World Bank. However, the Agency has adopted a more conservative approach by modifying the selection criteria . . ." 51 Fed. Reg. 41,574 (1986).

229. EPCRA § 302(b)(1), 42 U.S.C. § 11,002(b)(1) (Supp. IV 1986).

the reportable quantity for the substance.²³⁰ To comply, the facility must consult two lists of substances, one the list of 366 extremely hazardous substances developed under EPCRA section 302,²³¹ the other a list of 721 substances designated by federal hazardous waste law.²³²

In addition, EPCRA establishes "community right-to-know" reporting requirements for manufacturers and importers. Section 311 provides that each facility required by OSHA's hazard communication rule to keep MSDS's²³³ must submit a list or copies of the MSDS's to the SERC, the local LEPC, and the local fire department.²³⁴ Moreover, section 312 requires these facilities to provide the same three governmental units with a completed "emergency and hazardous chemical inventory form," listing the maximum amounts of chemicals by categories at the facility at any time over the preceding calendar year, their average daily amounts, and their general locations.²³⁵ This inventory form has been the most controversial reporting requirement for firms, despite a Congressional attempt to compromise by setting forth two format options. The first format, "Tier 1," only requires industry to disclose the necessary inventory information in summary form. However, if a state or local official requests further information, the firm must submit a "Tier 2" inventory form that provides more detailed information.²³⁶

Finally, EPCRA section 313 requires certain facilities to prepare a "toxic chemical release form."²³⁷ This annual report is an inventory of routine emissions of toxics from a facility. Facilities that manufacture or process quantities of one or more of some 300 specially designated substances above threshold levels are required to submit a toxic chemi-

230. EPCRA § 304(a), 42 U.S.C. § 11,004(a) (Supp. IV 1986), sets forth the information to be provided. In addition, a follow-up written notice must be submitted, providing post-accident information on possible chronic health risks and necessary medical attention for exposed individuals.

231. See *supra* note 228.

232. The second list is that provided by EPA under section 102(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA"), 42 U.S.C. § 9602(a) (1982). The current list is at 40 C.F.R. § 302.4 (1988).

233. See *supra* note 122. Since section 311 of EPCRA applies to all employers required to keep MSDSs by OSHA's hazard communication standard, the recent expansion of the application of OSHA's rule from only the manufacturing industry to all employers producing, using, or storing hazardous substances also significantly expanded the coverage of section 311 of EPCRA. See *supra* note 125. Also, the legal challenges to the expansion of the OSHA rule created uncertainty and delays in the expanded application of EPCRA section 311. *Id.*

234. EPCRA § 311, 42 U.S.C. § 11,021 (Supp. IV 1986).

235. EPCRA § 312, 42 U.S.C. § 11,022 (Supp. IV 1986).

236. EPCRA § 312(d), 42 U.S.C. § 11,022(d) (Supp. IV 1986). EPA has prepared a uniform format for the inventory forms. 40 C.F.R. § 370 (1988).

237. EPCRA § 313, 42 U.S.C. § 11,023 (Supp. IV 1986).

cal release form to EPA.²³⁸ The information in the submitted forms is to be compiled into a "national toxic chemical inventory" computer data base by EPA.²³⁹ The data base is to be made available to the public.

EPCRA thereby mandates the transmission of several types of reports between industry and three levels of government. This enormous flow of paperwork is governed by complex regulations, several deadlines, four lists of toxic chemicals, and trade secret restrictions.²⁴⁰ Public access is guaranteed by the Act:

Each emergency response plan, material safety data sheet, . . . inventory form, toxic chemical release form, and followup emergency notice shall be made available to the general public consistent with section 322 [on trade secrets] . . . by the [EPA] Administrator, Governor, State emergency response commission, or local emergency planning committee, as appropriate.²⁴¹

LEPC's also are required to publish an annual notice in local newspapers of the information they have received, in order to inform the public of its access rights.²⁴²

238. EPCRA § 313(c), 42 U.S.C. § 11,023(c) (Supp. IV 1986). The designated list of slightly over 300 substances is contained in SENATE COMM. ON ENV'T AND PUBLIC WORKS, 99TH CONG., 2D SESS., TOXIC CHEMICALS SUBJECT TO SECTION 313 OF THE EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT OF 1986 (Comm. Print 1986). A chemical may be added to the list by the EPA Administrator. The threshold quantities are gradually lowered in the first few years of the law's implementation and will be 25,000 pounds per year for manufacturers and processors after July 1, 1989. EPCRA § 313(f), 42 U.S.C. § 11,023(f) (Supp. IV 1986). EPA's format for the toxic chemicals release form is published at 40 C.F.R. § 372 (1988).

239. EPCRA § 313(j), 42 U.S.C. § 11,023(j) (Supp. IV 1986). EPA is further required to use the data in conducting a Mass Balance Study as defined by section 313(l) to account for chemicals as they are used in facility processes. 42 U.S.C. § 11,023(l) (Supp. IV 1986).

240. Procedures for employing the trade secret rules have been established recently by EPA. 53 Fed. Reg. 28,772 (1988). Under section 322 of the Act, trade secret protection is afforded the specific chemical identity of a hazardous chemical if the firm presents certain information required by law to justify this restriction on information dissemination to the public. 42 U.S.C. § 11,042 (Supp. IV 1986). However, section 323 provides for disclosure of chemical identity to "health professionals" under certain circumstances (for medical diagnosis or public health assessment activities), provided the recipients sign a confidentiality agreement. 42 U.S.C. § 11,043 (Supp. IV 1986). It should also be noted that no trade secret protection may be claimed under section 304, which requires disclosure of accidental releases.

241. EPCRA § 324(a), 42 U.S.C. § 11,044(a) (Supp. IV 1986).

242. EPCRA § 324(b), 42 U.S.C. § 11,044(b) (Supp. IV 1986). According to industry officials, the Act forces disclosures which expressly are subject to confidentiality under other federal laws such as the Toxic Substance Control Act, 15 U.S.C. §§ 2601-54 (1982). See *TSCA Confidentiality Claims May Be Lost Because of New Law, Lawyer Tells ACS Session*, 16 O.S.H. Rep. (BNA) 1227 (1987).

The major risk communication features of EPCRA are depicted in Figure 7 below, which demonstrates how the basic risk communication model presented earlier (in Figure 3) has been significantly modified by EPCRA, and how U.S. and E.C. (Figure 6) approaches differ.

Since EPCRA does not supersede mandates of other federal regulatory programs for data collection or preempt numerous state and local laws for accident prevention and emergency response,²⁴³ companies and agencies are now in danger of being overwhelmed by new reporting requirements.²⁴⁴ Lawyers and consultants are responding to the industrial need for guidance as to cost-effective regulatory compliance.²⁴⁵ Lawsuits are being filed to resolve conflicts, and enforcement actions are now beginning (with penalties for non-compliance to follow) as many firms fail to carry out their several duties in accordance with statutory deadlines.²⁴⁶

243. Section 321 of EPCRA provides that it does not preempt any state or local law, but such laws which require MSDS's must assure that their MSDS content and format are identical with the MSDS requirements of section 311(a). 42 U.S.C. § 11,041 (Supp. IV 1986). One of the most recent state laws is California's Proposition 65, approved by referendum in November 1986. Proposition 65 is codified at CAL. HEALTH & SAFETY CODE §§ 25,249.5-13 (West Supp. 1987). The Proposition provides a list of 63 chemicals not to be discharged into drinking water and prohibits any business from "knowingly and intentionally" exposing the public without first providing "clear and reasonable warning." *Id.* § 25,249.6.

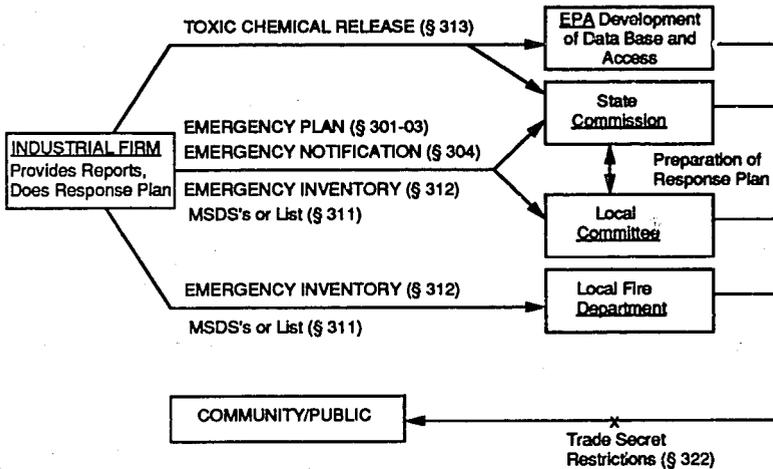
244. The flow of paperwork looms large. The 33,000 fire departments in the U.S., of which 30,000 are staffed by volunteers, expect to receive up to 20 million documents on some 50,000 hazardous chemicals due to EPCRA alone. See *Proponents For Superfund Clearinghouse Express Frustration With Industry Reluctance*, 16 O.S.H. Rep. (BNA) 1146 (1987).

245. A recent useful summary is found in Hinds & Conrad, *Reporting Requirements for Chemical Leaks and Spills*, 18 Env't Rep. (BNA) 683 (1987).

246. Under New York State's Community Right to Know Program, established by executive order in 1983, some 1600 companies and state and local authorities have been cited for failing to comply with reporting requirements. *Survey Reveals Failure of 1,600 Entities To Comply With New York State Requirements*, 16 O.S.H. Rep. (BNA) 571 (1986). In Massachusetts, a citizen's group filed suit against state agencies asserting the unconstitutionality of the community risk communication provisions of the state's right-to-know law, alleging that its protection of trade secrets violated First Amendment rights of free speech. See Gendron, *MassPIRG Seeks Stronger Right To Know Law*, BOSTON BUS. J., Sept. 8, 1986, at 8, col. 1. Under the law, community residents who obtain industrial information may not disclose what they have learned to unauthorized persons. The case was brought by two teachers who, having learned of the hazards of experimental chemicals in the classroom, were prohibited from disclosing this information to their students. The federal District Court, in granting summary judgment for the plaintiffs, held that the law's disclosure restrictions were an unconstitutional infringement of rights protected by the First Amendment. *Lawlor v. Shannon*, 1988 WL 96,609 (D.Mass. 1988).

EPCRA provides for enforcement actions against firms that do not comply with the various risk communication (reporting) requirements. These actions can be brought by EPA, and, if successful, civil penalties and other sanctions will be imposed on firms violating the requirements. EPCRA § 325, 42 U.S.C. § 11,045 (Supp. IV 1986). In December 1988, EPA issued its first fines for non-compliance with EPCRA when it penalized 25 companies for missing section 313 reporting deadlines. *EPA Issues Complaints Against Firms Over EPCRA Toxic*

**FIGURE 7: U.S. COMMUNITY RIGHT TO KNOW LAW (EPCRA)
FOR DEALING WITH MAJOR ACCIDENT HAZARDS AT FACILITIES**



EPCRA and other community right-to-know laws impose numerous reporting and other requirements on industry. But missing from the confusing array of requirements is the responsibility to conduct a rigorous, site-specific safety analysis of each facility. Thus, U.S. firms have no affirmative duty to evaluate safety or to reduce risks at their facilities. In contrast, the Seveso Directive does impose this duty on E.C. firms.²⁴⁷ In failing to impose a duty to carry out this critical function, U.S. law apparently relies on other dynamics to force risk reduction. The disclosure of risk information to agencies and to the public

Chemical Inventory Reports, 12 Chem. Reg. Rep. (BNA) 1451 (1988). EPCRA also provides for "citizen suits" to enforce the Act by actions brought in U.S. District Court against the owner or operator of a facility for failure to submit MSDS's or a list of MSDS's, a follow-up emergency notice, a toxic chemical release form or a completed generic inventory form. EPCRA § 326(a)(1), 42 U.S.C. § 11,046(a)(1) (Supp. IV 1986). Citizen suits also can be brought against EPA and the states for failure to implement various sections of the Act. *Id.* EPA recently issued proposed rules for citizen suits under EPCRA. 54 Fed. Reg. 3918 (1989). Finally, the Act authorizes states and local communities to sue firms and EPA for failing to meet various requirements. EPCRA § 326(a)(2), 42 U.S.C. § 11,046(a)(2) (Supp. IV 1986).

247. See *supra* notes 164-68 and accompanying text.

required under EPCRA are expected to stimulate public concern and to create pressures and incentives that will encourage risk reduction by corporate managers.

Firms that file reports required by EPCRA should foresee at least five conflict scenarios. Potentially, each scenario could lead to considerable losses unless the firms act preemptively and voluntarily to improve their risk management programs for facility safety. The first scenario is that disclosure of risk information may prompt local officials to use their "police power"—in the form of land use, public health, fire safety, and waste disposal regulations or ordinances—to force changes in facility operations, storage modifications or even shutdown of facilities in order to reduce accident risks.²⁴⁸ In a second scenario, community residents may use tort and property law doctrines such as nuisance, to secure injunctive relief or a restraining order forcing changes in and imposing conditions on further operation of risk-creating industrial activities.²⁴⁹

A third possibility is that concerned citizens and municipalities may use the information disclosed by industry under EPCRA to press state air quality officials for more stringent state standards to reduce the routine release of toxic air pollutants.²⁵⁰ Fourth, the information on emissions reported by industry may be used by plaintiffs in toxic tort actions as evidence that a facility's routine or accidental emissions caused plaintiffs' personal injuries or property damage.²⁵¹ Finally, public pressure may be exerted on a company directly following disclosure of toxic release

248. EPCRA does not preempt state and local authority. Citizens may seek and secure use of the "police power" to force modifications and even shutdowns under applicable state and local laws. A vivid example, provided before enactment of Title III, is the shutdown of A.D. Little's chemical warfare agent research laboratory by the Health Commissioner for the city of Cambridge, Massachusetts. See *supra* note 214. Another recent shutdown is described in *Suffolk Chemical Co. to Close Plant Under Consent Order with State Agency*, 1 *Toxics L. Rep.* (BNA) 1155 (1987).

249. Provision of injunctive relief or a restraining order by a state court is rarely available in American tort law when the defendant is a firm whose operations are of economic value to the community. See *Boomer v. Atlantic Cement Co.*, 26 N.Y.2d 219, 257 N.E.2d 870, 309 N.Y.S.2d 312 (1970) (denial of petition to shut down cement plant in N.Y. state). Nevertheless, in some situations, such relief has been provided. See *Spur Industries, Inc. v. Del E. Webb Development Co.*, 108 Arizona 178 (1972).

250. Reports required by section 313 of EPCRA, 42 U.S.C. § 11,023 (Supp. IV 1986), provide information on annual releases of toxic chemicals as an attribute of routine operations. Major companies, now reporting large quantities of released toxics previously unknown to community residents, fear that the information will be used by state agencies under political pressure to set unrealistically stringent limits. Early indications are that state environmental officials are being subjected to increased public pressure to take such actions following initial industry disclosures under EPCRA.

251. See Chadd & O'Malley, *Superfund Amendments Offer Hope for Plaintiffs in Toxic Tort Actions*, NAT'L L. J., Mar. 21, 1988, at 16.

information, causing disruption of the facility and damage to a firm's public image.²⁵²

These conflict scenarios have put industry on notice that risk management programs must be revised, despite EPCRA's failure to mandate company duties in this regard. The objective of corporate risk management not only must be compliance with EPCRA's reporting requirements but also preemption of conflicts that disclosing the information might produce. For example, firms have an incentive to use improved safety engineering and other measures to reduce risks, even though EPCRA and most of the applicable state and local laws are silent on such matters.²⁵³ In addition, since the conflict scenarios may be activated by public perceptions of risk that may substantially vary from expert appraisal of risk, many firms now are trying to "manage" community perception of facility risks and otherwise are seeking to improve their safety image in the community.²⁵⁴ Examples of company initiatives to prevent the occurrence of these conflict scenarios now are being documented by EPA and its consultants.²⁵⁵ These initiatives include the following:

1. An intermediate producer of chemical mixtures is revising its decentralized management structure and installing a computer-based information system to develop an integrated approach for better control of the purchase, storage, and use of chemicals subject to EPCRA.
2. A primary producer of radioactive chemicals built a new laboratory and immediately acted to improve its image with its host community and to allay public anxieties by holding several open meetings at the lab site.
3. An end-user of several highly toxic chemicals for producing electronic materials is reducing its on-site inventory of

252. In an effort to minimize public opposition, Monsanto's chairman announced that the company would reduce toxic emissions by 90% by 1992 at the same time as the company released its first annual toxic release inventory report. See Elkins, *Toxic Cleanups, the Right Response*, N.Y. Times, Nov. 13, 1988, at F3, col.1.

253. See generally Baram, *Right to Know Laws Asking for Flood of Disclosures*, NAT'L UNDERWRITER, Mar. 16, 1987 at 23; Baram, *Major Firms Move Beyond Compliance to Reduce Hazards*, NAT'L UNDERWRITER, Apr. 20, 1987, at 19.

254. See, e.g., McCurdy, *Strategic Communications*, CHEM. WEEK, May 22, 1985, at 3. EPA also has advised firms to "begin local public dialogue before releasing data." *EPA Advises Industry to Begin Local Public Dialogue Before Releasing Data*, 17 Env't Rep. (BNA) 1799 (1987). For discussion of public perceptions of risk, see sources cited in *supra* note 200.

255. The author is currently directing a research project that involves extensive field research at the headquarters and major facilities of firms producing, processing or using chlorine, vinyl chloride, and arsine. See *supra* note 155.

EPCRA-listed chemicals below threshold quantities to avoid reporting requirements and thereby to preempt potential controversies with its host community.

4. One of the largest primary producers of chemicals is conducting risk assessments at each of its facilities and modeling gas cloud dispersions under various accident scenarios, in order to improve its accident prevention and emergency response systems.
5. Another large primary producer ordered a detailed analysis of safety at each of its numerous facilities, modified each facility accordingly, and restructured its management to assure oversight by corporate headquarters.
6. Another chemical manufacturer with many facilities in the U.S. and abroad has sought more effective "partnerships" with local community leaders and public groups to strengthen joint efforts at emergency response and post-accident loss control. The manufacturer is also developing "expert systems" (applications of artificial intelligence in computer software) to strengthen decision-making and conduct of emergency response programs at its facilities.
7. A large petrochemical firm has hired a major technical consulting company to conduct quantitative risk analyses of its activities (which range from offshore drilling to the production of pesticides and various plastics). The firm followed this with a legal analysis of its potential liability and other losses. The results are being reviewed by top management to determine the expenditures needed to reduce the incidence and level of the accident hazards which were identified as priorities.
8. One of the largest primary producers of chemicals now offers a variety of services designed to assist customers in improving safety at their facilities, in dealing with the media, and in complying with EPCRA reporting requirements. In addition to providing information packages on each chemical and training seminars, the producer makes available its staff experts for the conduct of safety reviews at customer facilities. The producer is also requiring its distributor to inform their customers of these services. The cost of these services is included in product pricing as a "value-added" service and has been favorably received by downstream customers of the producer and its distributor. This firm is also developing computer programs on chemical risk issues that will be made available for

public use in libraries, in order to "educate the public" about risk.²⁵⁶

These examples of actual developments at several large firms illustrate that major voluntary initiatives are being taken by companies subject to EPCRA to prevent accidents, improve emergency response, and influence public perception. Such firms thereby hope to reduce liability and other losses, and retain or restore the confidence of their insurers, customers, and communities.

In addition to these steps being taken by individual firms, industry trade associations also are taking important initiatives. The Chemical Manufacturers Association ("CMA"), in many respects the U.S. counterpart to CEFIC in the E.C., recently has initiated several new accident prevention programs. Its newly-established National Chemical Response and Information Center provides public information for dealing with chemical emergencies through four programs: (1) CHEMTREC (a twenty-four hour-a-day guidance and assistance service for responding to transport accidents); (2) CHEMNET (assistance to chemical shippers at accident sites); (3) various emergency response training sessions (including library and audiovisual material) for government and industry personnel; and (4) the Chemical Referral Center, a non-emergency service which provides health and safety information to workers, users of chemicals, and the general public.²⁵⁷ In 1985, CMA also established its CAER Program to help chemical firms and local communities prepare response plans.²⁵⁸

These and numerous other developments by private firms, trade associations, professional societies, and various state and local officials indicate that EPCRA has succeeded in shifting most risk-related functions from the federal agency domain to other sectors of society. This shift manifests the "new federalism" promoted by the Reagan administration for shrinking the national government's role in public affairs (other than military matters). EPCRA also provides most of the legal framework for "community right-to-know" that was sought by environmentalists and

256. This list of company initiatives has been compiled from personal communications during 1987-88. See also GENERAL ACCOUNTING OFFICE, *supra* note 210, for discussion of several relevant matters, e.g., emergency response programs and response practice drills at eight chemical firms (Ethyl, Exxon, Nor-Am, Occidental, Realex, Rhone-Poulenc's U.S. subsidiary, Stauffer and Stybron). In addition, the author of this report has collected various publicly-available policy statements from several major chemical firms which emphasize new management initiatives on accident hazards.

257. See GENERAL ACCOUNTING OFFICE, *supra* note 210, at 36-39. The American Institute of Chemical Engineers' has established a new Center for Chemical Plant Safety, which aims to develop "acceptable industry practices." *Id.*

258. See *supra* note 212.

citizen groups. But striking the balance between those who promote risk communication as an alternative to regulation, in order to reduce government, and those who promote risk communication as a means of empowering the American public, does not assure that all firms will act in concert to address and reduce facility accident risks systematically. Nor does EPCRA assure uniform protection of public health and safety, as at least attempted by the E.C.'s Seveso Directive.

The envisioned scheme, in which risk information communicated by industry under EPCRA stimulates non-regulatory forces and incentives for risk reduction by industry, relies on fortuitous developments for its success. For example, it will not always be clear that the threat of action by community residents following their receipt of risk information will be sufficiently serious to promote appropriate industrial response, particularly in company-dominated communities. The EPCRA scheme also enables industrial use of public relations and economic coercion to reduce the potential for community action, if such options are less costly for industry than improving plant safety. Smaller firms without resources for risk management and public relations have difficulty in complying with regulatory requirements and can hardly be expected to go beyond the reporting burdens to conduct internal safety analyses. Because of such factors, EPCRA will produce highly variegated results and different levels of public protection in the thousands of communities exposed to facility accident risks. Nonetheless, EPCRA is having some beneficial effects, both by stimulating many firms to improve safety and by empowering the public to take informed action on toxic risks.

Plant managers must now grapple with important safety issues on an ad hoc basis, without the clear guidance that would have been provided if EPCRA had adopted a federal licensing approach to plant safety. The ad hoc issues faced by management include: (i) what are acceptable risk criteria and appropriate risk levels for a particular plant; (ii) what engineering and training measures should be used to achieve the acceptable risk level; (iii) what extent the community should be involved in risk management decisions; (iv) which groups or officials should be selected as partners in developing contingency plans; and (v) how firms should deal with risk factors outside the control of the facility manager, such as flood hazards and encroaching population growth.²⁵⁹

EPCRA therefore produces an unstructured situation, full of potential conflicts, that provides variable incentives and major challenges for improving risk management at industrial facilities in the U.S. It will take

259. These issues are based on remarks by Perry Hopkins, Director, International Manufacturing Division, DuPont, Inc., presented at the Symposium on Handling Hazardous Materials held at the International Institute for Applied Systems Analysis, Laxenberg, Austria (July 5, 1985).

several years to determine if the EPCRA scheme will be successful. In particular, experience is needed to determine if the potential for conflict that EPCRA's risk communication requirements will produce is sufficiently threatening to industry to induce voluntary risk reduction measures consistent with the economic goals of private enterprise and the safety agenda of community residents.

VI. CONCLUSIONS

This Article explores two subjects about which little is publicly known: corporate management of risks to health, safety, and the environment; and the influence of new risk communication functions on these management programs. Both fields are in flux, currently being shaped by many economic factors, by changing legal requirements and societal expectations, and by the development of improved new methods for evaluating risk.

These subjects are of considerable importance to European and American societies, given the increasing economic dependence on hazardous technologies and the growing reliance on risk communication policies to manage health risks. Thus, the conclusions and findings of this exploratory analysis may aid industry and government in developing corrective measures to assure that future corporate risk management and communication practices fulfill policy objectives and societal expectations, while at the same time permitting the achievement of industry's goals.

The corporate risk management function must focus on three diverse risk sectors: the workplace, the community, and downstream product users. No firm can gain complete control over all risks during the life cycle of a hazardous substance since the substance will move through several industrial and commercial firms en route to its ultimate use and disposal. To the extent that a firm has control over a substance, the firm's risk management program must be designed to achieve two goals: regulatory compliance and economic loss control.

Regulatory requirements present clear goals, promote uniform practices of risk management by firms in the same industrial category, can be accommodated by most firms in their strategic plans and product pricing, and are compulsory in that they must be complied with by firms intending to continue in operation. Loss prevention goals, however, are more difficult to identify and achieve. Risk management for preventing losses will vary from firm to firm because pursuing such a goal is a discretionary matter, and, as a result, diverse risk management practices will be employed even among firms in the same industrial category. Briefly put, regulatory requirements provide clear goals and incentives for management, but loss prevention leaves the means, ends, and incentives to

corporate discretion. Thus, the risk reduction outcome to be achieved for loss prevention will vary from firm to firm (and within many firms, from risk to risk), depending on the convergence of various extrinsic and intrinsic factors and their significance to the firm. Despite the complexity of achieving the loss prevention goal, and despite the voluntary nature of management efforts to prevent loss, loss prevention has become a necessary function of corporate risk management in order to avoid ruinous compensation payments to injured parties, associated transaction costs, and other consequent losses.

It is within this context of growing importance for loss prevention in corporate risk management that risk communication has become established as an instrument of public policy in the E.C. and the U.S. For some, risk communication is seen as a means of empowering the public; for others, it is a means of achieving risk reduction without burdensome "command and control" standards or enlargement of regulatory bureaucracies. Most firms can comply readily with the largely procedural requirements of the communication policies but face the larger challenge of how to deal with the loss implications of risk communication.

The loss implications arise from the mandated disclosures of risk information to national and local officials and to the public. These disclosures create anxieties and can lead to regulatory interventions or the use of state and local authority and lawsuits to restrict or to terminate corporate activities. In addition, losses may accrue from disclosure of trade secrets in information that becomes publicly available. Thus, industry views risk communication as a device that increases loss potential or economic vulnerability, and firms are trying to adapt their risk management programs in order to address this increased vulnerability.

This Article has reviewed the new legal requirements for risk communication to both workers and communities in the E.C. and the U.S. Significant differences exist between the two societies in the requirements and implementation of new risk communication laws. Each system has apparent limitations.

For example, with regard to accident risks in the community, the E.C. fails to empower the public with a right to know but does require firms to conduct safety analyses and to develop plans for emergency response. The U.S. system empowers the public with the right to know but fails to assure that facility safety will be addressed in any manner other than as a result of fortuitous conflicts. Neither approach will achieve uniformity. Member nations in the E.C., influenced by different attitudes and traditions, are taking variable approaches in implementing new regulations such as the Seveso Directive. The implementation of new U.S. federal laws such as EPCRA is influenced greatly by the traditions, politics, legal doctrines, and physical layout of local communities. In addition, many states and municipalities are enacting and enforcing diverse laws

that are not preempted by federal law.

It is in this diverse and complex context that corporate risk managers are embarking on the uncharted waters of risk communication. Sensitized by Seveso and Bhopal, pressured by public interest groups, beset by technical uncertainties, constrained by limited corporate resources and goals, and forced by new laws to disclose sensitive information that increases their vulnerability to economic losses, companies must discharge their duties in a manner that protects legitimate corporate interests and public well-being. Given the challenges faced by industry and the weaknesses in the new laws and regulations in the E.C. and the U.S., it is unlikely that the new risk communication requirements alone will control adequately the risks presented by the toxic substances inherent in many modern industrial processes. Nevertheless, the E.C. and the U.S. now have the opportunity to resolve many of the technological risk issues that afflict industrial society by developing a better understanding of the corporate risk management function, and then by providing improved guidance and structure for managers and persons at risk to communicate and jointly resolve risk issues in a socially-responsible manner.

