HAZARD COMMUNICATION

Issues and Implementation

James E. Brower
editor

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Foreword

This publication, *Hazard Communication: Issues and Implementation,* contains papers presented at the symposium on Hazard Communication, which was held in Houston, Texas, 11-12 March 1985. The symposium was sponsored by ASTM Committee E-34 on Occupational Health and Safety. James E. Brower, Brookhaven National Laboratory, presided as symposium chairman and is editor of this publication. During peer review and revision, the papers presented in this book were updated in almost all cases to April 1, 1986.

Related ASTM Publications

Inhalation Toxicology of Air Pollution, STP 872 (1985), 04-872000-17

Definitions for Asbestos and Other Health-Related Silicates, STP 834 (1984), 04-834000-17

A Note of Appreciation to Reviewers

The quality of the papers that appear in this publication reflects not only the obvious efforts of the authors but also the unheralded, though essential, work of the reviewers. On behalf of ASTM we acknowledge with appreciation their dedication to high professional standards and their sacrifice of time and effort.

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Hazard Communication in the Past

Prior to the passage of the federal Occupational Safety Health Act of 1970 *[1]*, the communication of information to workers about the hazards of materials they were using was primarily a voluntary responsibility of industry. Amendments to the Longshoremen's Act of 1969 required the use of Material Safety Data Sheets (MSDSs) to convey hazard information to workers *[2]*. However, this regulation applied only to specific maritime industries. In many industries, general worker ignorance of the specific chemicals they used and their hazards was prevalent *[3]*. When transfer of hazard information occurred, it was influenced by several factors, including:

1. Market forces.
2. Trade secrets.
3. Available toxicity data.
4. Emergency situations.
5. Potential for high hazards.
6. Warnings from health and safety professionals.
7. Worker demands.
8. Liabilities.

Industries that were relatively safety conscious requested health and safety information for materials they purchased, and therefore a market demand was placed on manufacturers to provide such data. This demand, however, was often countered by the manufacturer's need to protect trade secrets of products. Coupled with the paucity of toxicity data on most products, valid health hazard assessment was often limited, particularly for chronic or long-term diseases.

Hazard communication in some industries was often reactive; that is, once an accident or serious threat of an accident occurred, information flowed quickly. Hazard information was heavily concerned with the prevention of accidents that could cause fires, explosions, acute poisonings, or personal injury and disfigurement. Safety training of chemical workers concentrated on these risks. Communication between health and safety professionals and workers using dangerous materials was largely indirect, with information filtering through supervisors or management.

The reasons for the communication of chemical hazard information were

varied, including reducing personnel absences, loss of equipment, and lost time, or just a common concern for the safety of people. Many companies may have been motivated by the risk of corporate liability [*4*]. There was an incentive to inform and train workers in order to avoid costly legal suits. However, the increased flow of information seems to have had an opposite effect, resulting in increased tort liability cases by workers who believe their illnesses or injuries were caused by real or imagined exposures to chemicals.

Whether to protect trade secrets or to withhold information that they felt could be used against them, industries were resistant to communicating detailed information to the worker unless the need could be justified. As long as the employee was trained and equipped to work safely with the material, the need to know its identification, physical properties, or detailed toxic effects was not considered necessary. The explosion of information and new products in the 1960s and 1970s created an awareness and demand on industry to provide workers with such information.

The 1970s were characterized by a rapid growth of public consciousness about chemical hazards. The Occupational Safety and Health Act [*1*] put forth legal requirements for protecting workers against unsafe work environments. Hazard communication became part of the Occupation Safety and Health Administration's (OSHA) regulations. MSDSs were generated using the 1972 OSHA Form 20. This form was essentially unchanged from the 1969 MSDS required by the Longshoremen's Act, which was used by the shipbuilding industries [*5*]. The National Institutes for Occupational Safety and Health (NIOSH) [*6*] published in 1974 a criteria document called "An Identification System for Occupationally Hazardous Materials." This document provided not only an explanation of items on the OSHA Form 20 but also gave useful criteria and guidelines for hazard determination. However, use of these guidelines was voluntary. OSHA also had requirements for workplace signs to warn workers of potential occupational hazards. Exposure limits were adopted for about 400 materials. Twenty-three specific materials have been designated as specially regulated materials and have specific hazard warning placards and labels required for their use [*7*].

Other federal and state agencies have incorporated their own hazard communication regulations. The U.S. Department of Transportation (DOT) has its label, placard, and manifest requirements for the shipping and transport of hazardous materials. The U.S. Environmental Protection Agency (EPA) enforces several regulations requiring some level of hazard communication. These include FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act), TSCA (Toxic Substances Control Act), and RCRA (Resource Conservation Recovery Act) for disposal of hazardous wastes. The Food and Drug Administration (FDA) has its regulations governing the labeling of food and pharmaceuticals. Some 31 state governments have passed or pending worker right-to-know laws [*23*]. These laws, coupled with a greater public and worker consciousness of chemical hazards, have had a dramatic effect on market forces which have promoted

hazard communication in the past. These forces, along with tort liability suits, cause many industries to assume responsibility for assessment and communication of chemical hazards [*4*].

Thus, in the 1970s, some responsibility for communication of hazards to workers was assumed by the federal government, some by state governments, and by many industries. Each of these sectors had its own definition of hazards, criteria for assessment of hazards, formats for MSDSs, labeling requirements, and requirements for training workers.

On 25 Nov. 1983 OSHA published its regulation on Hazard Communication [8]. It was heralded by Thorne Auchter, then the Director of OSHA, as "the most significant regulatory action ever taken by OSHA" [*9*]. As papers in this book will show, its impact is viewed negatively as well as positively. Some have viewed it as having a gross lack of protection for the worker [*10*]. This regulation specifies responsibilities for the federal government, the states, and certain industries. Some organizations and state governments have challenged the legal and ethical basis of these assigned responsibilities. The basis for OSHA's arguments for most of the concerns has been detailed in the preamble to the regulation [*11*]. This preamble expands and explains most of the items in the regulation and should be studied by anyone who is responsible for implementing its requirements. A brief history of the regulation has been summarized in a Bureau of National Affairs (BNA) special report [*19*].

Purposes of the Hazard Communication Standard

OSHA listed three principle purposes of its Hazard Communication standard [*9*]:

1. To ensure the evaluation of chemicals to determine their hazards.
2. To apprise workers in manufacturing industries of the hazards with which they work.
3. To preempt state laws covering hazard communication.

There are five concerns implicit in these objectives, and it is instructive to examine the OSHA Hazard Communication standard in relation to these concerns, which include:

1. Who is to inform?
2. Who is to be informed?
3. What is the information?
4. How is the information transmitted?
5. How can the information be standardized?

Who informs whom is specified by OSHA. Manufacturers and importers have specific responsibilities to evaluate, produce, and transmit information on hazardous materials. Employers have specific responsibilities to transmit this

information to the workers. However, as we shall see, not all businesses, services, or industries have the responsibility to produce and transmit information.

The target persons to be informed are the workers who handle or are potentially exposed to the material and are in the industrial manufacturing sectors. Who is to be informed is a concern spelled out in the standard and will be discussed in several of the papers. There are also others who need this information, including doctors, nurses, health and safety professionals, and supervisors.

What kind of information is needed is specified in the standard. Six basic types of required information will be discussed.

1. Material identification.
2. Company identification.
3. Material properties.
4. Hazard information.
5. Protective information.
6. Emergency information.

Criteria for each type is specified in the standard to various degrees [29CFR 1910.1200, Section (*g*) (2) (i to xii)] [*8*].

How information is to be transmitted is specified for three modes of communication:

1. Labeling.
2. Material Safety Data Sheets.
3. Training.

Containers of hazardous materials must be labeled by manufacturers and importers. MSDSs which are crossed-referenced to the label are intended to detail the information on the material's properties, hazards, and safe practices. Training will provide verbal instructions to workers and will give them information necessary to understand the labels and the MSDS. Requirements for each of these items will be discussed in the papers.

Two aspects of this law are meant to promote standardization of information.

1. Generic performance criteria for six requirements which include:

(*a*) Hazard determination.
(*b*) Written hazard communication plans.
(*c*) Labeling.
(*d*) Material Safety Data Sheets.
(*e*) Employee information and training.
(*f*) Release of trade secret information.

2. Preemption of state laws which are not consistent with the OSHA standard.

Performance guidelines will be presented in the first section entitled, "Regulatory and Compliance Issues." The third section, entitled "Other Jurisdictions and Legal Issues," will be concerned largely with state right-to-know problems.

Hazard Communication Issues

Several issues have been raised by this federal Hazard Communication standard. While many of these issues were addressed in the preamble to the standard [*11*], some have not been resolved and are in litigation, and others have been resolved with a few requirements amended [*19, 20*]. These controversial issues include:

1. Worker right to know versus worker need to know.
2. Who should be responsible for defining hazards?
3. Is this federal standard a real standard?
4. Does the standard protect the worker sufficiently?
5. The manufacturer's right to protect trade secrets.
6. The community right to know.
7. States' rights to formulate stricter standards.

There is a distinction, which is often blurred, between the concept of right-to-know and need-to-know information. Industry generally accepts the idea that workers need to have certain information about hazardous materials in order to work safely with them. Labor and government, however, believe that workers have the right to know information about the materials they work with. The right to know implies freedom of information, that is, free access to all information that is related to safe use of that material. For example, if a chemical worker has no education or training in toxicology, he or she would not likely have the expertise to interpret oral LD-50 data from rats exposed to a chemical with a complex technical name. The workers may need only to know that this chemical is highly toxic if ingested or inhaled and know how they can best protect themselves. However, do workers need to know the oral LD-50 value or the Threshold Limit Value? They have an explicit legal right to the latter value but not to the former. Other kinds of quantitative data are required on an MSDS even though most workers are not fully trained to interpret them. Although training is prescribed in the OSHA standard, the worker cannot be expected to become technically proficient about the information they have a right to access.

The OSHA standard gives the worker the right to know this information, but some may question whether anyone other than an industrial hygienist or a physician needs to know or will in practice use this information. Still, there is a valid reason to include these kinds of technical data on an MSDS even though the average worker may not have the proficiency to evaluate it. The right to know gives workers an avenue to obtain independent opinions from other occupational health professionals who can interpret the MSDS. Basically OSHA is saying that employees have a right to make informed decisions about risks to their health and life from materials to which they may be exposed. If workers are told what adverse effects to expect from exposure to a hazardous material, they can recognize the symptoms and evaluate the need for corrective action.

Assignment of responsibility to manufacturers and importers for defining hazards is stated in the standard. Many groups are concerned that more

responsibility was not assigned to the government and less to manufacturers and importers [14, 15]. Some concerns include:

1. Lack of a specific list of known hazardous substances.
2. Arbitrary and limited criteria for hazard assessment.
3. Variable interpretations of hazardous properties of the same material by different manufacturers and importers.
4. Bias on the side of industry in evaluating hazards.
5. Lack of technical expertise among smaller industries to assess hazard information and to produce detailed MSDS.
6. No clear accountability or authority assigned to those who define and assess the chemical hazards.

Some have argued and will continue to argue that the OSHA standard is not a true standard. The controversy centers around OSHA writing a performance standard instead of a specification standard. The differences between these two approaches are discussed in the papers. This OSHA standard, unlike others, is performance oriented. Its intention is to promote consistency in the kinds of information to transmit rather than specifying contents of labels and MSDSs, which line for line look alike and adhere to fixed specifications. The standard provides the rules for the game, not the score cards.

There is concern that the standard does not sufficiently protect the worker [*10,14,15*]. Labor and several states feel that only a select group of workers are protected by the standard and that full disclosure to the worker is limited. OSHA argues that the primary coverage of manufacturing industries protects most of the workers facing potential chemical exposures and that those in other industries will still be able to get information they need. The extent that this is true is discussed. This issue was under litigation [*16*], and OSHA will broaden its scope [*21,22*]

Trade secret issues will continue to be a concern. Industry spokesmen have stated that emphasis on identification of materials shifts the emphasis away from identification of hazards [*17*]. Labor maintains that specific identification of hazardous materials is needed so the worker can adequately assess hazards [*14,15*]. OSHA provides the means for disclosing trade secret information, and the details and limitations of this provision will be discussed in the papers. An amendment to the trade secret provision has been made [*20*].

Community rights to hazard information is an issue, particularly as required by some states. This issue is a key element in the New Jersey Right-to-Know law. The community right to know and need to know what hazardous materials are used in a neighboring plant and their health risks to the public was strongly brought to the forefront with the tragic accident with methyl isocyanate in Bhopal, India. A comprehensive review of this accident and its scientific, toxicological, engineering, social, political, and economic implications was given in the 11 Feb. 1985 issue of *Chemical & Engineering News*. [*13*]. Since OSHA's jurisdiction is the protection of workers, the standard is not concerned

with the community aspect of hazard communication. However, several states and local communities have or are considering such laws [*4*]. Separate state and local community right-to-know laws, which are separate from worker right-to-know laws, do not conflict with the OSHA standard [*12*].

One of the more heated issues of the standard is the preemption of state right-to-know laws. As with other OSHA and environmental standards, states have the right to formulate stricter standards. New Jersey has been in the forefront of this litigation with one court decision ruled on OSHA's favor on preemption in manufacturing industries [*12,18*]. Some of the recent and pending court decisions of this issue are presented in the papers.

Objectives of the Symposium

This symposium was intended to achieve eight objectives:

1. Provide an overview of the OSHA standard.
2. Discuss implementation requirements of the standard.
3. Critique the standard from the views of labor, industry, and the states.
4. Provide examples and problems of industry compliance.
5. Examine state and local right-to-know issues.
6. Examine legal issues.
7. Compare the proposed Canadian systems with the United States standard and examine international implications.
8. Evaluate available information resources.

The papers may overlap and cover several of these objectives. Although an overview of the standard is covered in the first paper by Dean McDaniel, most of the other papers will expand on the specific requirements of the law. Overlap of information was difficult to reduce in a symposium such as this where there are several points of view on each of the OSHA requirements.

This publication is organized into four sections, as was the symposium:

1. Regulatory and Compliance Issues.
2. Industry Programs.
3. Other Jurisdictions and Legal Issues.
4. Information Resources.

Many of the issues and objectives are discussed in the panel discussions following each of the sections; these discussions are edited transcriptions of the actual discussions taped at the ASTM symposium.

The incorporation of some papers in a particular section may seem arbitrary due to the overlap of information between them. For example, much of the information on legal issues could have fit in the first section, but due to the recent court cases centering on state preemptive issues, this paper is included in the third section. Similarly, labor issues could easily have been presented with legal issues, but were included in the first section in response to OSHA's

overview. The paper by J. Bransford stresses a theme of legal liability, but was included in the fourth section because of its emphasis on information needs for labels and MSDSs. Requirements of the regulation have been modified since this symposium was held [*19,20*]. Where feasible, these court rulings have been updated in the papers.

References

[*1*] "Occupational Safety and Health Act," PL 91–596, U.S. Department of Labor, Washington, DC, 1970.

[*2*] "Longshoremens and Harbor Workers Compensation Act," (33 U.S.C. 941) 29CFR 1501, 1502, and 1503, U.S. Department of Labor, Washington, DC, 1969.

[*3*] Bureau of National Affairs, "State Industry Officials Dispute Effects of State Regulation on Interstate Commerce," *Occupational Safety and Health Reporter*, 18 Oct. 1984, pp. 395–396.

[*4*] Baram, M. S., "The Right to Know and the Duty to Disclose Hazard Information," *American Journal of Public Health*, No. 74, 1984, pp. 385–390.

[*5*] "Material Safety Data Sheet. Requirements for Reporting Hazardous Materials. Safety and Health Regulations for Shiprepairing, Shipbuilding, Shipbreaking," Bureau of Labor Standards, U.S. Department of Labor, Wage and Labor Standards Administration, 0-367-264, U.S. Government Printing Office, Washington, DC, 1969.

[*6*] "A Recommended Standard. . . . An Identification System for Occupationally Hazardous Materials," NIOSH, U.S. Department of Health, Education and Welfare, Public Health Service, Center for Disease Control, Washington, DC, HEW Pub. No. (NIOSH) 75–126, 1974.

[*7*] OSHA, 29CFR 1910.1000-1047.

[*8*] "Hazard Communication," 29CFR 1910.1200, U.S. Department of Labor, OSHA, *Federal Register*, 48:53280–53348, 25 Nov. 1983.

[*9*] "OSHA Issues Final Hazard Communication Standard," U.S. Department of Labor news release, USDL 83-498, Office of Information, 22 Nov. 1983.

[*10*] "Hazard Communication Rule Should Cover All Employees, Public Citizen Maintains," Bureau of National Affairs, *Chemical Regulation Reporter*, 21 Sept. 1984, pp. 625–626.

[*11*] "Preamble to Final OSHA Standard on Workplace Hazard Communication," U.S. Department of Labor, OSHA, *Federal Register*, 48:53280–53340. 25 Nov. 1983.

[*12*] *New Jersey State Chamber of Commerce v. Robert E. Hughey*, No. 84–3255), U.S. District Court District of New Jersey, 3 Jan. 1985.

[*13*] "Bhopal Report," Heylin, M., Ed., *Chemical and Engineering News*, Vol. 63, No. 6, 1985, pp. 14–75.

[*14*] "Hazard Communication Rule Should Extend Beyond Manufacturing Sector, Proposal Says," Bureau of National Affairs, *Occupational Safety and Health Reporter*, 13 Sept. 1984, pp. 319–320.

[*15*] "OSHA Issues Final Labeling Standard; AFL-CIO Files Suit for Review of Rule," Bureau of National Affairs, *Occupational Safety and Health Reporter*, 1 Dec. 1983, pp. 691–692.

[*16*] *United Steelworkers of America v. Auchter*, U.S. Court of Appeals, Third circuit, Philadelphia, 24 May 1985.

[*17*] Wilkenson, P. R., "Right-to-Know: OSHA Standard Serves as Guide," *Journal of Commerce*, 7 June 1985.

[*18*] "New Jersey Worker Statute Preempted by OSHA Communication Standard, Court Rules," Bureau of National Affairs, *Chemical Regulation Reporter*, 11 Jan. 1985, pp. 1229–1230.

[*19*] Right-to-Know; A Regulatory Update on Providing Chemical Hazard Information," BNA special report, Bureau of National Affairs, Washington DC, 1985.

[*20*] "Hazard Communication, Disclosure of Trade Secrets to Nurses," U.S. Department of Labor, *Federal Register*, 50:49410, 2 Dec. 1985.

[*21*] "Appeals Court Narrows OSHA Preemption of State Laws on Hazardous Substances Data," Bureau of National Affairs, *Chemical Regulations Reporter*, 18 Oct. 1985, pp. 784–785.

[22.] "OSHA Drafting Rule on Trade Secrets, Advanced Notice on Expanding Scope of Standard," Bureau of National Affairs, *Occupational Safety and Health Reporter*, 24 Oct. 1985, p. 419.
[23] "State Right-to-Know Status Chart," Bureau of National Affairs, *Chemical Substance Control*, 1986, pp. 221:1191.

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Regulatory and Compliance Issues

Dean W. McDaniel[1]

The OSHA Hazard Communication Standard

REFERENCE: McDaniel, D. W., **"The OSHA Hazard Communication Standard,"** *Hazard Communication: Issues and Implementation, ASTM STP 932*, J. E. Brower, Ed., American Society for Testing and Materials, Philadelphia, 1986, pp. 13–19.

ABSTRACT: On 25 Nov. 1983, The Occupational Safety and Health Administration (OSHA) issued a final rule on hazard communication. This final rule represents over ten years of rule-making activity. The purpose of the Hazard Communication Standard is to ensure that hazards of all chemicals produced or imported by chemical manufacturers are evaluated and that the information on these chemical hazards is transmitted to employers and employees within the manufacturing sector.

Employers in the manufacturing sector [Standard Industrial Classification (SIC) Codes 20–39] are to provide information to their employees about hazardous chemicals by means of a hazard communication program, labels and other forms of warning, Material Safety Data Sheets, and information and training. The purpose of the Hazard Communication Standard is threefold:

1. To ensure that the chemicals produced or imported or both by chemical manufacturers and importers are evaluated to determine their hazards.
2. To provide information about hazardous chemicals to all employers and employees in the manufacturing sector.
3. To establish uniform requirements nationwide by preempting state right-to-know laws applicable to the manufacturing sector. A state may assume responsibility in this area only through the provisions of Section 18 of the Occupational Safety and Health Act.

The standard applies to chemical manufacturers, importers, distributors, and employers in the manufacturing sector in SIC Codes 20 through 39. In addition, the standard applies to any chemical 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 emergency. There is limited coverage for laboratories as well as exclusions for certain products.

There are six major elements of the Hazard Communication Standard:

1. Hazard assessment—the hazards of chemicals must be evaluated by chemical manufacturers and importers. The information must be passed on to employers in the manufacturing sector who purchase the hazardous chemicals.
2. Hazard communication program—employers covered by the regulation must develop a hazard communication program to transmit information on hazardous chemicals to their employees.
3. Labels and other forms of warning must be placed on containers of hazardous chemicals.

[1] Regional Industrial Hygienist—Dallas, Occupational Safety and Health Administration, U.S. Department of Labor, Dallas, TX 75202.

4. Materials Safety Data Sheets must be developed to transmit hazard information to the manufacturing employees and employers.
5. Employee information and training must be provided. This includes identifying work operations where hazardous chemicals are present as well as means that employees can take to protect themselves.
6. Trade secret provisions—there are provisions for the release and protection of trade secret information.

KEYWORDS: hazard determination, labels, Material Safety Data Sheets, MSDS, hazard communication, chemical manufacturer, distributor, manufacturing employer

Initial considerations of the issue of hazard communication or right to know occurred when Congress passed the Occupational Safety and Health Act of 1970 [*1*]. Section 6(*b*) (7) of the act indicates that "any standard promulgated under this section shall prescribe the use of labels or other forms of warning as are necessary to ensure that employees are apprised of all hazards to which they are exposed. . . ."

The Occupational Safety and Health Administration's (OSHA) involvement in the issue of identification and communication of hazards began in 1971. At that time a standards advisory committee was formed to provide recommendations for regulatory action. The committee expressed agreement in the final report, dated 6 June 1975, on the need for a comprehensive standard [*2*].

In the early 1970s the National Institute for Occupational Safety and Health (NIOSH) collected special occupational health and safety survey data [*3,4*]. This data indicated that 25 million employees were exposed to at least one of over 8000 hazardous chemicals. In 1974 the NIOSH published a criteria document with a recommended standard for "An Identification System for Occupationally Hazardous Materials" [*5*].

During the period of 1977–1978, the Bureau of Labor Statistics (BLS) also collected survey data [*9*]. The BLS data indicated that during the period of evaluation there were 174000 illnesses due to chemical exposures [*6*]. Also during this same period, the OSHA was presented with evidence from both the private and academic sectors that indicated a need for an effective federal standard.

Finally, during the late 1970s and early 1980s approximately twelve states and six local governments passed various right-to-know laws. These laws were not uniform and created a burden on interstate commerce. Chemical manufacturers who sold their products throughout the country would have to comply with the local right-to-know laws in each of these local jurisdictions, OSHA's position was that a strong federal law would preempt the state and local laws, resulting in one uniform regulation nationwide. In addition to providing increased worker protection, a federal law would ease the burden on interstate commerce.

On 28 Jan. 1977, OSHA published an advanced notice of proposed rulemaking on chemical labeling. The notice requested comments from the public regarding the need for a standard that would require employers to label hazardous

materials. A total of 81 comments were received from a variety of federal, state, and local government agencies, trade associations, businesses, and labor organizations. In general, there was support for the concept of a hazard communication standard [6].

In January 1981 the OSHA proposed a hazard identification standard. This proposal was withdrawn in February 1981 for reconsideration of regulatory alternatives, such as a performance-oriented standard as opposed to a detailed standard.

In 1982 the agency, after further consideration, proposed the Hazard Communication Standard. Public hearings were held throughout the country during the summer and fall of 1982. The final standard was issued on 25 Nov. 1983 [6]. The standard became effective on 25 Nov. 1985, for chemical manufacturers and importers in that containers of hazardous chemicals leaving their workplaces must be properly labeled and material safety data sheets must be provided with initial shipments. Distributors had to be in compliance with all applicable provisions by 25 Nov. 1985. The effective date for employers to be in compliance with all provisions of the standard, including training, was 25 May 1986.

The purpose of the Hazard Communication Standard is threefold. First, the standard is to ensure that the hazards of all chemicals produced and imported in this country are evaluated. Second, the information regarding the hazard is transmitted to employers and employees in the manufacturing sector. A third purpose of the federal standard is to establish uniform requirements nationwide by preempting state laws in states without OSHA-approved state plans.

The standard applies to three groups of employers: chemical manufacturers and importers; distributors; and manufacturing employers. The regulation covers approximately 14 million employees in over 300,000 establishments. It applies in situations where hazardous chemicals are known to be present in the workplace in such a way that employees may be exposed under normal conditions or in foreseeable emergencies.

The regulation applies to chemical manufacturers and importers in that it requires them to assess the hazards of the chemicals they import or produce and to provide information to employers in the manufacturing sector who purchase their products.

The standard applies to employers in the manufacturing industries in Standard Industrial Classification (SIC) Codes 20 through 39, in that they must provide the hazard information to their employees by means of a hazard communication program, labels or warning signs or both, material safety data sheets, and information and training. Although hazardous chemicals are used in other industries, OSHA determined that the employees in the manufacturing sector are at greatest risk of experiencing health effects from exposure to hazardous chemicals [6]. The agency thus decided to exercise its authority to set priorities for standards promulgation and limited the standard's scope to the manufacturing sector.

The regulation provides limited coverage for laboratories in manufacturing establishments in that: labels on incoming containers are not to be removed; Material Safety Data Sheets that are received with incoming shipments of hazardous chemicals are to be maintained readily accessible to laboratory employees; laboratory employees are to be apprised of the hazards of the chemicals in their workplace. In addition, there are exclusions for certain types of products that is, wood or wood products, articles, and food, drugs, or cosmetics intended for consumption by employees while in the workplace. Although the application of agricultural chemicals would not be covered by the regulation, the manufacturing of agricultural chemicals such as pesticides would be covered by the regulation.

The Hazard Communication Standard is a performance-oriented standard with six major elements:

1. Hazard determination.
2. Hazard communication program.
3. Labels or other forms of warning.
4. Material safety data sheets (MSDS).
5. Employee information and training.
6. Trade secret provisions.

Each of these elements will now be discussed in more detail.

Hazard Determination

The first major element of the regulation is hazard determination. Under this aspect of the standard, chemical manufacturers and importers must evaluate the chemicals that they produce or import to determine if they are hazardous. A hazardous chemical is defined as any chemical that is a physical or health hazard. Physical hazards are clearly defined in the regulation, that is, flammable, combustible liquid, explosive, etc. However, the definition of a health hazard is very broad, that is, a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. Therefore, there are two appendices to the regulation that provide guidance on the evaluation of the health hazards and the criteria to be followed on the completeness of the health hazard evaluation.

It is important to note that there is a "floor" of over 600 substances that are automatically considered to be hazardous for the purposes of this standard. The "floor" consists of any chemicals contained in:

1. OSHA-regulated substances in Subpart Z of the 1910 regulations.
2. The Threshold Limit Values for Chemical Substances and Physical Agents, published annually by the American Conference of Governmental Industrial Hygienists.

3. The National Toxicology Program's (NTP) Annual Report on Carcinogens [7].

4. Monographs published by the International Agency for Research on Cancer (IARC) [8].

The carcinogenicity of a substance must be considered in the hazard assessment. If the substance is listed in either of the last two references as a carcinogen, then it is to be considered a carcinogen for the purposes of this standard.

The regulation allows the hazard determination of mixtures to be treated differently than the hazard assessment for pure substances. In general, if a mixture of chemicals has been tested as a whole to determine its health hazards or physical hazards, then the evaluator may use the results of the tests to determine if the mixture presents a health hazard or physical hazard. If the mixture has not been tested as a whole to determine its health hazards, then the mixture shall be assumed to present the same health hazards as do each of its components that are present in the mixture in a concentration of 1% or more (0.1% for carcinogens). If the evaluator has evidence that any component may present a health hazard at less than these percentages, then the mixture will be considered a health hazard. If a mixture has not been tested as a whole to determine its physical hazards, then the evaluator may rely on any scientifically valid data to evaluate the physical hazard potential of the mixture.

The chemical manufacturer/importer must describe in writing the procedures they use to determine the hazards of the chemicals. The written procedures must be made available to employees or their designated representatives or both upon request.

Hazard Communication Program

The next major aspect of the regulation is the Hazard Communication Program. Employers must develop and implement a written hazard communication program for their workplace. The program must contain a list of hazardous chemicals known to be present in the workplace. In addition, the program also must indicate the methods that will be used to inform employees of the hazards of nonroutine tasks and of hazards associated with chemicals contained in unlabeled pipes. Finally, the program also must indicate the methods the employer will use to inform contract employers of the hazardous chemicals their employees may be exposed to.

Labels and Other Forms of Warning

The chemical manufacturer, importer, or distributor must ensure that each container of hazardous chemicals leaving the workplace is labeled or marked with the identity of the chemical, appropriate hazard warnings, and the name and address of the manufacturer, importer, or responsible party.

Employers in the manufacturing industries must ensure that each container of hazardous chemicals in the workplace is labeled, tagged, or marked with the identity of the hazardous chemical and appropriate hazard warnings. There are some exceptions. Process sheets, placards, and batch tickets that contain the hazard warning and identity information may be used for individual stationary process containers. Portable containers need not be labeled where any employee transfers the hazardous chemical from a labeled container to the portable container and it is intended for the immediate use of the employee.

Material Safety Data Sheets

Chemical manufacturers and importers must develop and maintain Material Safety Data Sheets for each hazardous chemical. The MSDS must contain the following information:

1. The identity used on the label.
2. The chemical and common names of all ingredients determined to be health hazards.

For mixtures, the MSDS must list the chemical and common names of ingredients present in 1% or more. It also must list any carcinogenic ingredients present in 0.1% or more.

The chemical and common names of all ingredients determined to be a physical hazard should be identified as follows:

1. Physical and chemical characteristics.
2. Physical hazards.
3. Health hazards.
4. Primary routes of entry.
5. The OSHA permissible exposure limit (PEL), American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit value (TLV), or other applicable exposure limits.
6. Whether the chemical is listed by the NTP Annual Report on Carcinogens or by the IARC.
7. Precautions for safe handling.
8. Appropriate control measures.
9. Emergency first aid.
10. Date prepared.
11. Name, address, and telephone number of the chemical manufacturer.

If there is no information available for any of these items, the MSDS must state that no information was available. The MSDS can take any form as long as it contains all essential information.

Employee Information and Training

Employers must provide information and training to employees upon their initial assignment and whenever a new hazard is introduced into a work area.

The information to be provided must include the requirements of this standard, the location of the written Hazard Communication Program, lists of hazardous chemicals and MSDS, and any operations in their work area where hazardous chemicals are present.

The employees must receive training on the methods and observations that may be used to detect the presence of a hazardous chemical, the physical and health hazards of the chemicals, the measures employees can take to protect themselves from the hazards, and the details of the hazard communication program developed by the employer.

Trade Secrets

There are provisions for the protection of trade secret information. Under the standard, only the specific chemical identity may be withheld from the MSDS if it is a bonafide trade secret. The hazard information must be disclosed in every case.

There are provisions for the release of trade secret information in medical emergency situations. When a medical emergency exists as determined by a physician or nurse and the specific chemical identity is necessary for treatment, the chemical manufacturer, importer, or employer must immediately disclose the information. If deemed appropriate, a confidentiality agreement may be obtained at a later point in time from the physician or nurse.

Finally, there are also provisions in the standard for the release of trade secret information to a health professional who is providing medical or occupational health services to exposed employees. The health professional must demonstrate a legitimate need for the trade secret information and provide adequate means to protect the confidentiality of the trade secret information.

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OSHA's Hazard Communication Standard Falls Short

REFERENCE: Mabry, F, M., Seminario, M. M., and Barkman, M., **"OSHA's Hazard Communication Standard Falls Short,"** *Hazard Communication: Issues and Implementation, ASTM STP 932,* J. E. Brower, Ed., American Society for Testing and Materials, Philadelphia, 1986, pp. 20–31.

ABSTRACT: The focus of the "New Federalism" is supposed to be the return of regulation to state and local government. The Occupational Safety and Health Administration's (OSHA's) Hazard Communication Standard is a radical departure from the just-stated policy. The standard calls for preemption of state and local regulation in occupational settings. Also, regulation is limited to Standard Industrial Classification (SIC) Codes 20 through 39: the majority of workers therefore are *not* covered.

The standard is being challenged on legal grounds by the United Steelworkers of America and by state and other government entities who filed as intervenors. The trade secret claim provision is too broad and is without adjudicatory remedy for workers and representatives. The addendum outlines the court's decision in favor of the unions.

KEYWORDS: OSHA standards, hazard communication workplaces, workplace safety and health, workplace right-to-know, hazardous and toxic substances

On 25 Nov. 1983 the Occupational Safety and Health Administration (OSHA) issued its final Hazard Communication Standard. OSHA claims that the standard is the most far-reaching and protective health standard ever issued by the agency and will provide workers with necessary chemical hazard information. The AFL-CIO does not believe that the standard provides the protections claimed by OSHA and also believes that the standard was issued as an attempt to preempt state and local right-to-know laws, not to protect workers.

The standard limits coverage to the manufacturing section (SIC Codes 20–39). No protections are provided for construction, service, transportation, or

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other industries outside SIC Codes 20–39. Manufacturers and employers can claim any chemical they choose a trade secret and withhold the chemical identity from the exposed workers. Despite the standard's limitations in coverage and protection, OSHA has announced its intent to preempt state right-to-know laws, even those laws which go beyond the federal standard in providing protection.

The labor movement has gone to court to challenge the standard in order to force OSHA to issue a standard that really will provide workers with the "right-to-know" the identities and hazards of workplace chemicals and to prevent OSHA from preempting state laws which provide greater protection and that are consistent with the Occupational Safety and Health Act.

Background and History

The labor movement has been fighting for a strong federal OSHA right-to-know standard for more than a decade. The unions want protections that will provide workers and union representatives with the right to know the specific chemical names of workplace chemicals and the hazards of these chemicals.

In 1980, under the Carter Administration, OSHA issued a regulation which was part of the "right-to-know" package. OSHA's Access to Employee Medical and Exposure Records rule required that employers maintain medical and exposure records of workers exposed to toxic chemicals and make the records available to exposed workers and their representatives for examination and copying. This rule required only the maintenance of existing records on chemicals, not the generation of new records.

In January 1981, the Carter Administration published its proposed right-to-know/hazards identification proposal in the Federal Register. The proposal required all containers of chemicals to be labeled with the real chemical names of all toxic chemical ingredients and the hazards posed by those chemicals. Within days of taking office, the Reagan Administration withdrew the OSHA proposal at the request of the chemical industry, intending that this action would kill the right-to-know movement.

On the contrary, the Reagan Administration's action of pulling the right-to-know proposal intensified the right-to-know movement. Unable to secure protections at the federal level, the labor movement, joining with its allies in the environmental and consumer movements, turned to the states and local governments for right-to-know protections. As a result of this concerted activity, in the last 4 years right-to-know statutes have been introduced in at least 30 states and in over three dozen communities.

Fourteen states now have right-to-know laws on the books. The laws differ in their scope, coverage, and requirements. Some laws cover only the workplace, while others extend protections to the community as well. Some laws cover limited numbers of chemicals; for other laws, the coverage is very broad.

Faced with the prospect of 50 different state laws, the chemical industry turned to the Reagan Administration for a federal OSHA standard that the

industry hoped would legally or politically preempt state and local right-to-know laws. The Reagan Administration proposed a very weak federal OSHA Hazard Communication Standard in March 1982. After months of public hearings around the country and 1½ years of deliberation, OSHA issued its final Hazard Communication Standard in November 1983. Some parts of the standard, such as health hazard definitions, are better than in the 1982 proposal, but other parts, such as the trade secret provisions, are worse. A summary and analysis of the 25 Nov. 1983 OSHA final standard on hazard communication follows.

General

The OSHA Hazard Communication Standard covers employers in the manufacturing section (SIC Codes 20–39). Chemical manufacturers (and importers) have the primary obligation to evaluate chemicals for their hazards and to develop and transmit material safety data sheets (MSDSs) and labels. User employers have an obligation to develop a hazard communication program that includes MSDSs, labels, lists, and training.

The MSDS is the primary vehicle for transmitting information; there is no requirement to label containers with the chemical names of hazardous components. The trade secret provisions of the standard are very broad. Chemical manufacturers/employers can claim any chemical they choose a trade secret and withhold the identity from the exposed workers. Access to trade secret identities is only provided to health professionals and even then only under very limited circumstances and conditions.

Scope

Industries Covered

The standard's coverage is limited only to the manufacturing sector, SIC Codes 20–39. Included in these SIC codes are the basic manufacturing industries such as chemical, electrical, rubber, steel, auto, textile, etc.

All industries which fall outside SIC Codes 20–39, such as agriculture, maritime, construction, transportation, communications, utilities, services, etc., are excluded from the standard's coverage even though millions of workers in these industries are exposed to toxic chemicals. The only requirement that will provide some indirect coverage to these excluded industries is the standard's requirement that all chemical manufacturers must label chemical containers before shipment from the manufacturing facility. The only information that must appear on these labels is any form of chemical identity (including trade names), appropriate hazard warning as determined by the manufacturer, and the name and the address of the chemical manufacturer. There is *no* requirement that MSDSs be shipped to users outside SIC Codes 20–39, nor is there even a requirement that excluded industry employers leave labels intact.

Laboratories in the manufacturing sector (SIC Codes 20–39) are not subject to the standard's full requirements. For laboratories in covered industries, employers are required to leave labels intact, maintain and make available copies of MSDSs, and apprise laboratory workers of chemical hazards.

It is the AFL-CIO's position that all workers exposed to toxic chemicals in all industries should be covered by the standard. Exposure to toxic chemicals, not an arbitrary SIC code determination, should be the basis for coverage under the standard.

Chemicals Covered

Chemical manufactures and importers of chemicals are required to evaluate all chemicals they produce or import (including mixtures) to determine if the chemicals are hazardous as defined by the standard. Only those chemicals the manufacturer or importer determines to be hazardous are subject to the standards labeling, safety data sheet, listing, and training provisions.

Chemicals listed in 29 CFR1910.1000 Subpart Z and the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) list are defined as hazardous by the standard and are subject to the standard's provisions.

Chemicals that are regulated OSHA carcinogens or listed as potential carcinogens in the latest National Toxicology Program (NTP) *Annual Report on Carcinogens* or in the International Agency for Research on Cancer (IARC) Monographs are defined as carcinogens for the purpose of the standard and are subject to the standard's provisions.

Other chemicals which pose physical hazards or health hazards as defined in the standard also are covered. For health hazards, chemicals for which animal or human evidence demonstrates an adverse health effect are covered. But there is some ambiguity as to which effects reported in animal studies trigger coverage of a chemical. OSHA's interpretation of this provision of the standard will determine whether the standard's coverage is very broad, covering most chemicals for which well-conducted animal tests show positive results, or limited primarily to OSHA- and ACGIH-listed chemicals (about 600 chemicals).

Pure chemicals and chemical mixtures are covered by the standard. For mixtures which have been tested as a whole, the results of the testing may be used to make a hazard determination. For mixtures which have not been tested as a whole, the mixture is presumed to present the same health hazard as do hazardous components which comprise 1.0% or greater of the mixture, or 0.1% or greater concentrations for carcinogens.

Chemicals, foods, drugs, cosmetics, consumer products, and hazardous wastes subject to the labeling provisions of other federal statutes (such as the pesticide law or Consumer Product Safety Act) are exempted from the labeling provisions of the OSHA standard when labeled according to these other statutes.

Hazard Determination Procedures

Chemical manufacturers and importers are required to evaluate the chemicals which they produce or import to determine if they are hazardous. Other employers covered by the standard may rely upon the hazard determinations performed by the manufacturer or importer. Chemical manufacturers, importers, or employers who evaluate chemicals are required to identify and consider the scientific evidence concerning the physical hazards and health hazards of such chemicals.

Specific definitions of physical hazards covered by the standard are set forth in the definition section of the standard (that is, definition of combustible liquid, compressed gas, explosive, etc.).

For health hazards, evidence which is statistically significant and which is based on at least one positive study conducted in accordance with established scientific principles is considered to be sufficient to establish a hazardous effect if the results meet the definitions of health hazards set forth in Appendix A of the standard.

Appendix A, which is mandatory, sets forth the health effects covered by the standard. Appendix A includes definitions of what constitutes a carcinogen, corrosive agent, highly toxic and toxic substance, irritant, and sensitizer and lists target organ effects to illustrate the kinds of additional effects that are covered by the standard. This section is an improvement over the March 1982 OSHA proposal, which contained no mandatory definitions for coverage of health hazards under the standard.

Appendix B, which is also mandatory, sets forth the hazard determination procedures which must be utilized in evaluating chemicals. The hazard determination requirement is performance oriented; no mandatory sources of information are listed for consultation. Certain criteria which must be followed in all hazard determinations are included:

1. Determinations made by NTP, IARC, or OSHA that a chemical is a carcinogen or potential carcinogen are considered conclusive evidence to establish carcinogenicity.
2. Epidemiological studies and case reports of adverse health effect must be considered in the evaluation.
3. The results of animal testing must be used to predict the health effects that may be experienced by exposed workers.
4. The results of any studies which are designed and conducted according to established scientific principles and which report statistically significant conclusions regarding the health effects of a chemical are considered sufficient basis for a hazard determination and must be reported on the safety data sheet. For acute health hazards, the definitions of what constitutes an adverse health effect in animal studies are set forth in Appendix A. For chronic health effects, the manufacturer appears to have considerable flexibility in determining which results of animal tests constitute an adverse health effect and trigger coverage

under the standard. Manufacturers and importers also are permitted to report the results of other scientifically valid studies which tend to refute the findings of the hazard.

Appendix C, which is nonmandatory, sets forth a list of information sources which may be consulted in making a hazard determination.

Chemical manufacturers, importers, or employers evaluating chemicals are required to describe in writing their hazard determination procedures and must make these written procedures available upon request to employees, employee representatives, OSHA, and the National Institute for Occupational Safety and Health (NIOSH).

Hazard Communication Program

Employers covered by SIC Codes 20–39 are required to develop and implement a written hazard communication program for their workplaces which sets forth how requirements for labeling, warnings, MSDSs, and training will be met. The written programs shall be available to employees, employee representatives, OSHA, and NIOSH upon request.

A list of hazardous chemicals known to be present in the workplace must be compiled. Chemicals may be listed by any identity, including trade names or code names, that is referenced on the MSDS, and lists may be compiled by workplace or work area. The list is for chemicals currently present; there is no requirement to maintain lists of chemicals for any period of time.

The hazard communication program must set forth the methods the employer will use to inform employees of nonroutine tasks and the hazards associated with chemicals contained in unlabeled pipes in their work area. The AFL-CIO recommended the labeling or placarding of pipes and valves with appropriate identity and hazard information.

Employers are required to develop methods to inform any contractor working in the facility of the hazardous chemicals present and of appropriate protective measures. Employers may rely on existing hazard communication programs which meet the criteria set forth in the standard.

Labels and Placards

The standard places minimal importance on labels and relies primarily on MSDSs to convey most identity, hazard, and control information.

Chemical manufacturers, importers, and distributors must ensure that each container of hazardous chemicals leaving the workplace is labeled with: (1) the identity of the hazard chemical(s) (this may be either a chemical name, common name, trade name, or code name); (2) appropriate hazard warnings (determined by the manufacturer); and (3) the name and address of the chemical manufacturer or importer. For chemicals regulated by specific OSHA health standards, labels must meet the requirements of the health standard.

Employers in SIC Codes 20–39 must ensure that each container of hazardous chemicals in the workplace is labeled with the: (1) identity of the hazardous chemical (chemical, common, trade, or code name); and (2) appropriate hazard warnings.

Placards, signs, process sheets, operating procedures, etc. may be used in place of labels for stationary process containers. Portable containers into which chemicals are transferred from labeled containers and which are intended for the immediate use of the employee who performs the transfer need not be labeled.

Employers in SIC Codes 20–39 are prohibited from removing or defacing labels unless the container is immediately marked with the required information.

Material Safety Data Sheets

Under the OSHA standard, MSDSs are the primary vehicle for transmitting chemical identity and hazard information.

Chemical manufacturers and importers are required to develop or obtain a MSDS for each hazardous chemical they produce or import. Manufacturing employers are required to have an MSDS for each hazardous chemical they use and may rely on MSDS supplied by the chemical manufacturer.

MSDSs must contain the following information: (1) the identity used on the label; (2) the chemical and common name of the substance; (3) for mixtures which have been tested, the chemical and common names which contribute to the known hazards and the common name of the mixture itself; (4) for untested mixtures, the chemical and common names of all ingredients which have been determined to be health hazards which comprise 1.0% or greater of the composition, or 0.1% or greater for carcinogens; (5) the chemical and common names of all ingredients which present a physical hazard when present in the mixture; (6) physical and chemical characteristics; (7) physical hazards; (8) health hazards of the hazardous chemical, including signs and symptoms of exposure; (9) primary routes of entry; (10) the OSHA permissible exposure limit, ACGIH TLV or any other exposure limit recommended by the chemical manufacturer; (11) carcinogenicity determinations made by NTP, IARC, or by OSHA; (12) precautions for safe use and handling; (13) generally acceptable control measures known to the chemical manufacturer; (14) emergency and first aid procedures; (15) the date of preparation of the MSDS; and (16) the name, address, and telephone number of the chemical manufacturer or other party responsible for the preparation of the MSDS.

Where a hazard determination reveals no relevant information for any given category, the MSDS must indicate that no applicable information was found.

For complex mixtures which have similar hazards and contents (that is, the chemical ingredients are essentially the same, but the specific composition varies from mixture to mixture), the chemical manufacturer may prepare one MSDS for all similar mixtures.

Chemical manufacturers must ensure that the information on the MSDS accurately reflects the scientific evidence used in making the hazard determination. Chemical manufacturers must add new significant information on chemical hazards or protection against hazards to the MSDS within three months.

Chemical manufacturers or importers must provide distributors and manufacturing employers with an MSDS with the first shipment of the chemical and with the first shipment after the MSDS is updated. If the MSDS if not provided with the initial shipment, manufacturing employers are required to obtain one from the chemical manufacturer, importer, or distributor as soon as possible.

Copies of MSDSs must be maintained in the workplace and must be readily accessible to employees during each work shift.

MSDSs must be made available upon request to designated representatives, OSHA, and NIOSH in accordance with provisions of OSHA's Access to Medical Records Standard.

Worker Training and Information

Employers must provide workers with information and training on hazardous chemicals in their work area upon initial assignment and whenever new hazards are introduced into the work area. Annual or other routine training is not required.

Workers must be informed of the requirements of the standard, operations where hazardous chemicals are present, and the location and availability of the written hazard communication program, lists of chemicals, and MSDSs.

Worker training programs must include: (1) methods and observations that may be used to detect hazardous chemicals; (2) the hazards of chemicals in the workplace; (3) measures employees can take to protect themselves, including control procedures the employer has implemented; and (4) details of the hazard communication program developed by the employer.

Trade Secrets

The trade secret provisions of the standard are a study in contrast: they provide very broad protections for trade secrets but only limited protections for worker health. Manufacturers and employers can claim any chemical they choose a trade secret, regardless of the chemical's hazards, and withhold the specific chemical identity from the data sheet and workers if certain other requirements set forth in the standard are met. The trade secret protections for manufacturers and employers are so broad that they create a loophole that threatens to swallow the rest of the standard.

Chemical manufacturers and employers must be able to "support" all trade secret claims. The standard does not define what constitutes adequate support, nor does it require written substantiation. The preamble indicates the "support" would only be required after the fact if the trade secret claim were challenged.

Thus, there is no barrier to prevent overly broad trade secret claims in the first place.

For chemicals alleged to be trade secrets, general information on the properties and effects of the chemicals must be disclosed, and the MSDS must indicate that specific chemical identity is being withheld on trade secret grounds.

Workers and union representatives have no right of access to specific chemical identities claimed as trade secrets. Limited access is provided only to health care professionals. The Hazard Communication Standard appears to be in direct conflict with the OSHA Access to Medical and Exposure Record rule which provides for workers and union access to specific chemical identities claimed trade secret by the employer if the worker or union signs a confidentiality agreement.

Under standard health care, professionals have limited access to trade secret chemical identities in emergency and nonemergency situations. In emergency situations, treating physicians or nurses may request and obtain trade secret identities needed for diagnosis or treatment. The manufacturer must provide the information but may require a written statement of need and confidentiality agreement after the fact.

The procedures of nonemergency access to trade secret identities are complicated, burdensome, and unworkable. Access is limited to health professionals, including physicians, industrial hygienists, toxicologists, and epidemiologists. Health professionals must request the trade secret information in writing and state in reasonable detail why the information is needed for one of the occupational health purposes set forth in the standard (that is, to conduct monitoring, medical surveillance, epidemiological studies, etc.). The request must detail why the specific chemical identity is needed and why other specific types of information are inadequate.

The health professional (and his/her employer or contractor) must sign a written confidentiality agreement stating that the information won't be used for other purposes and agree not to release the information to anyone, including the exposed or affected worker, unless such release is authorized in the agreement.

For these confidentiality agreements, manufacturers/employers may restrict the use of the information to the specified health purposes and may require specific legal remedies if the information is disclosed, including the manufacturer's/employer's estimate of the damages.

Health care professionals who decide that the trade secret information should be disclosed to OSHA must inform the chemical manufacturer/employer of this action.

Chemical manufacturers and employers many deny requests for trade secret identities. The manufacturer/employer must respond in writing to the health professional within 30 days of the request. The denial must state why the request is being denied and why other alternative information may satisfy the occupational health needs.

The standard establishes OSHA as the initial arbitrator for cases where specific chemical identity is denied. OSHA is required to determine whether the manufacturer has supported the trade secret claim ("support" is not defined) and whether the health professional has supported the need for the trade secret information and demonstrated that the information will be protected.

OSHA is supposed to determine whether there is a legitimate health reason for withholding the information. Citations against the manufacturer/employer are to be issued for noncompliance. However, the manufacturer/employer may still contest the citation and withhold the information until the case is decided by the Occupational Safety and Health Review Commission. This procedure invites denials of trade secret requests, contestation of OSHA findings, and will result in years of delay.

There are no provisions in the standard for workers or union representatives to challenge overly broad trade secret claims or to request chemical identities claimed trade secret. All workers and union representatives must work through a health professional. Few local unions have access to a health professional they trust. How many health professionals would be likely or willing to subject themselves to the hassles and constraints involved with gaining trade secret information? The practical effect of the standard's trade secret provisions will be that manufacturers/employers can claim anything they choose a trade secret and withhold chemical identity from workers and their representatives.

Effective Dates

None of the standard's provisions go into effect for at least two years. By November 25, 1985 all chemical manufacturers and importers are required to label containers and provide MSDSs with first shipment. By May 25, 1986 all covered employers are required to comply with all the standards provisions, including training and education.

Preemption

The OSHA standard states that the "standard is intended to address comprehensively the issue of evaluating and communicating chemical hazards to employees in the manufacturing sector, and to preempt any state law pertaining to this subject." According to the standard, "any state which desires to assume responsibility in this area may only do so under the provisions of Subsection 18 of the Occupational Safety and Health Act which deals with state jurisdiction and state plans."

Reading this regulatory language together with the accompanying preamble, there is uncertainty about the extent to which OSHA intends the standard to preempt state laws. To further complicate matters, since the standard was issued

Assistant Secretary Auchter has made public statements about preemption which go beyond the rationale and statements contained in the standard.

The upshot on the preemption issue is that there are serious disagreements between the AFL-CIO and OSHA concerning a variety of issues resulting from OSHA "preemption" strategy. The key issues are as follows:

1. To begin with, the federal rule does not become effective for two years after promulgation, that is, November 1985. Yet OSHA appears to be ready to support any employer who argues that even during this interim period—when no federally enforceable obligations are in place—states are prohibited from enforcing their right-to-know laws.

2. Commencing in November 1985, OSHA apparently intends that in all states without approved state OSHA plans existing right-to-know laws will be preempted "in all occupational settings," not just the manufacturing sector. It is OSHA's position that these states will no longer be entitled to enforce their own right-to-know laws even in sectors not covered by the federal regulation (for example, construction, transportation, utilities, services).

3. According to OSHA, only states with approved state OSHA plans may adopt right-to-know standards or statues. However, this does not automatically mean that these states will be permitted to enforce standards or laws that are more effective from a worker protection standpoint than the federal regulation. Instead, the states will be required to submit these provisions to OSHA for approval. OSHA has stated that it will approve a state standard different from the federal regulation only if it is "required by compelling local conditions and does not unduly burden interstate commerce."

As you know, the AFL-CIO has launched a major court challenge to various aspects of the federal standard either because they are "arbitrary" or because they are not justified by customary preemption concepts. These matters will be addressed in detail in the AFL-CIO's brief to the United States Court of Appeals for the Third Circuit and ultimately will be decided in court.

In the meantime, while we are pursuing our legal remedies in court, the AFL-CIO urges our affiliates to continue their efforts to seek strong state and local right-to-know protections. It is clear that the federal OSHA standard does not provide adequate protection and that state and local right-to-know laws are still needed. We urge states to seek the broadest protections possible, including provisions for community right to know and special provisions for firefighters and public safety. Where there is pressure from the industry or state to adopt the federal OSHA standard as a law or regulation, every effort should be made to improve it, especially in areas of coverage and trade secrets, so that meaningful chemical and hazard information will be provided to all exposed workers.

In enacting right-to-know laws, states should include appropriate "severability" language to ensure that the state laws remain in full force and effect except to the limited extent that any final court decision determines that a portion of that law is preempted by the federal standard.

ADDENDUM

OSHA'S Hazard Communication Standard Falls Short

This addendum updates Labor's comments on the Standard to May, 1986. On 24 May 1985, the United States Court of Appeals for the Third Circuit ruled on the suit that the United Steelworkers of America (USWA) had brought against OSHA on its Hazard Communication standard. While the USWA was the lead union in the case, it was brought on behalf of the AFL-CIO and was argued by AFL-CIO counsel.

The Court, in its opinion, held with the view of labor in all major areas that had been challenged:

1. The Secretary of Labor was directed to expand the coverage beyond the manufacturing sector (SIC Codes 20 through 39) to all sectors where feasible.
2. The Court freed state and local governments to regulate workplaces outside the manufacturing sector until OSHA extends its coverage to them.
3. The Court held that the definition of trade secrets was too broad, that is, that it offered broader protection than state law and was therefore invalid. The Court ordered OSHA to redefine its trade secret provision and limit it to chemical identities that are not readily discoverable through reverse engineering.
4. The Court ordered the Secretary to adopt a rule permitting access by employees and their collective bargaining agents to trade secret health information.

OSHA has not appealed the decision and is currently studying comments on a proposal to expand coverage to other nonmanufacturing sectors. The unions are now satisfied that the Secretary will promulgate an adequate standard that will meet the mandate contained in Section 6(*b*)(5) of the Occupational Safety and Health Act. The section states, in part . . . "The Secretary . . . shall set the standard which most adequately assures . . . that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life. . . ."

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Training Programs: The Key Link to OSHA's Hazard Communication Standard

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ABSTRACT: The Occupational Safety and Health Administration (OSHA) Hazard Communication standard was developed to ensure that workers understand the hazards of substances in their workplace. The key to accomplishing this objective is through effective industrial training programs. Industry, while desiring performance language in OSHA standards, appears confused with the performance language of the Hazard Communication standard. Effective compliance can only be achieved through an understanding of the standard and the personality of one's company. Although many of the standard's requirements are unique, many other requirements have been performed for years by industry. The confusion performance language is creating has become a roadblock to effective compliance. A thorough analysis of the standard and company needs, coupled with a logical approach to compliance in a timely manner, is essential.

KEYWORDS: hazard communication, hazardous substances, performance language, industrial training, training requirements, nonroutine tasks, emergency procedures, material safety data sheets, record keeping, training evaluation, contractor training

The Hazard Communication standard was developed to ensure that employers evaluate hazards of chemicals and to ascertain that employees understand these hazards. Although the basis for the program has been described as being the Material Safety Data Sheet (MSDS), transmittal of the hazard information through training has become known as the key link, the reinforcer of the standard.

The Employee Information and Training Section of the standard requires several modes of training, many of which most employers in SIC Codes 20–39

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have been effectively conducting for several years. Although industry's appeal for performance-oriented language has been realized, performance language has become a double-edged sword.

Organizations such as the Chemical Manufacturers Association (CMA) and the Organization Resource Counselors (ORC), as well as most chemical and manufacturing companies, desired to get away from the specification language used by OSHA during the Carter Administration.

A combination of this pressure, the Reagan Administration, and the subsequent new direction of the Occupational Safety and Health Administration (OSHA) gave industry just what it wanted—a new OSHA attitude and a performance-oriented standard in the Hazard Communication standard.

Herein lies the double-edged sword. On the one hand, language is used that permits several avenues of compliance; while, on the other hand, many questions emerge such as, "Is it okay to do it this way?," "Can I really just post it on the wall?," or "How do you, OSHA, want me to do this?."

After being told, to the inch, what to do for years, industry management was wondering what to do. The emergence of so many hazard communication seminars was evidence of this dilemma. It is the author's personal observation that the situation was serious. Instead of rolling up its sleeves and getting to work on reasonable programs, management looked for packaged programs, loopholes, and easy ways to accomplish the requirements. All the confusion interfered with progress and many companies did not complete requirements by the 25 Nov. 1985 and 25 May 1986 dates.

Discussion

With performance language in mind, let us examine the standard's training requirements and discuss possible methods of satisfying those requirements. Whatever training methods a company selects depends on several factors. The answers to the following questions will supply one with basic information necessary to choose the most effective training program for a particular operation.

First, the type of operation. For example, if the plant is a chemical company, what processes are used? Are plant facilities indoor or outdoor, batch or process, modern or older? If it is a multisite company, the chances are that all these conditions exist.

Second, and a factor that is often overlooked: Are plant sites divided into specific departments or work areas? Are workers fairly static in movement from work area to work area, or is there excessive job bumping or movement of employees from area to area?

Third, are employees well-educated, highly technical types or of average educational background? Are they young or old? How much job experience do they have? Most importantly, how effectively has management trained employees up to now? Are employees knowledgeable about hazardous substances they work with?

Fourth, what kind of training personnel, facilities, and equipment is available? Is the site set up to train on shift, or is training scheduled on overtime?

Lastly, how many hazardous substances exist on the plant site? Do hazardous substances exist throughout the site, or are they confined to specific work areas? What specific hazardous substances are present? Can these substances be grouped (for example, acids, chlorinated substances, cutting oils)?

The preceding questions are an important series of questions management must answer, based on their company's personality, because all companies are different. The bottom line is that management needs to logically examine company procedures and come up with the most efficient way to teach employees how to: (*a*) know what hazardous substances are present in their work areas; (*b*) know the hazards they present; (*c*) know what precautions to take; (*d*) know what to do if the precautions don't work.

To better understand how to apply what has to be done, the following hypothetical example will be used.

Plant XYZ is a plant which manufactures batteries. The hazardous substances number 60, with lead and acids at the top of the list. There are 120 employees: 12 office employees, 16 in maintenance, and the remaining 92 employees work in the various departments of the plant. Plant XYZ works two shifts. Employees are divided into five separate and distinct departments—A, B, C, D, and E. Basically, employees stay in departments and very rarely move from department to department, with the exception of maintenance personnel. All hazardous substances are known, and MSDS's exist on 42 of the 60.

In a routine listing, hazardous substances were tabulated by department and number of employees, as noted in Table 1.

Using the information from Table 1, consider the possible avenues that XYZ management can take to install a hazard communication program. First, consider training activities XYZ Co. and most other companies have been using for years. For the purpose of this discussion, the training requirements of the standard have been divided into two categories. The first consists of activities which most companies have been using for years. The second consists of activities which are new or unique to the standard. Remember that these activities are requirements of the Hazard Communication standard.

TABLE 1—*Plant XYZ: number of hazardous substances and number of employees by department.*

Department	Substances	No. of Employees
A	27	46
B	2	11
C	9	21
D	22	5
E	0	9
Office	0	12
Maintenance	60	16

In the first category, the standard states, "Employees must be trained in methods used to detect the presence of hazardous materials they may encounter." A common reaction of many people, once they have read the standard, is to list all hazardous substances that exist on site and proceed to train all their employees on the hazards of each specific substance. This time-consuming process is not required. All employees may not be potentially exposed to all hazardous substances.

To demonstrate this point, consider XYZ Co. once again. Most XYZ office personnel are never potentially exposed to the 60 hazardous substances. Looking back at the department setup, we see that various department personnel are potentially exposed to less than the total 60 hazardous substances. Department E has no hazardous substances, D only two, and so forth. Actually, the only XYZ employees potentially exposed to all 60 hazardous substances work in the maintenance group.

Since XYZ's employees rarely move from department to department, management would be wasting time training employees on all hazardous substances. Of course, whenever employees move to another department or a new employee is hired, training on the new potential exposures is required.

A classic example of this is an aerospace company with 200 employees and 120 hazardous substances. A quick look at departments and employee distribution revealed that only two employees were potentially exposed to 100 of the 120 hazardous substances. The remaining 198 employees were potentially exposed to only 20 hazardous substances.

XYZ Co. has an established training program on the hazards of lead and acids. The point is that many companies have such programs presently in effect. Why be concerned about training requirements which are being met by programs already in effect?

The second point of the standard's training requirements in Category 1 that should be discussed is, "Employees should be trained on the proper use of protective equipment they may be required to use." XYZ Co. and most other companies have been doing this for years.

Further, "Employees must be trained on non-routine tasks" such as vessel entry, line breaking and lockout. Again, XYZ Co. has been doing this for years. For most other companies, this is also true.

Lastly, "Employees must be trained on emergency procedures" such as first aid, hazardous spills, and fire emergency procedures. Once again, many companies have been doing this for quite some time.

In the second category, many new or unique requirements are listed. Many of these requirements concern procedures most companies do not have in place.

The first requirement states that "the requirements of the standard be transmitted to employees." The standard's performance language permits anything from posting requirements on the wall to covering each specific requirement with individual employees. Whatever method you choose should be based on your site's personality.

The second new requirement states "that a written program exists and where employees can find it." Companies are required to write a program and make it available to employees, which can be achieved by placing a copy in the personnel office, copies in lunchrooms, or copies in individual departments. The important thing to remember is that the program must be available at all times while employees are present.

The third concerns "a list of workplace hazardous chemicals and where it can be found." Again, one of the first steps is to develop such a list. It could be posted at a central location or in individual departments. It must also be part of the written program.

The fourth requirement states that "employees must be made knowledgeable about procedures your company uses to evaluate chemicals." A simple explanation of how your company determines which substances are hazardous should suffice. This information must also be in your written program. Hygiene procedures and other evaluative procedures, many of which have probably been in existence for some time, must be transmitted to employees.

The fifth requirement concerns "where MSDSs are located and how to read them." Many companies have already collected many MSDSs. Completing that collection, training employees how to read MSDSs, and their availability should not be a monumental task. Many vendor programs on MSDS training are currently available. The basis of your hazard communication program's training procedure may well center on the MSDSs. If this is the case, more intense MSDS training may be required.

The final requirement states that "employees must be trained on specific hazards of chemicals in the work area." If a company has a unique communication system, such as a symbol program, employees must understand how it works. Performance language permits several avenues of compliance on this requirement. Some examples are classification of hazardous substances, the use of symbols or written warnings on batch and process sheets, and job checkoff systems where employees are required to review hazards of substances prior to starting their job tasks. Again, your company's personality will dictate which methods are most appropriate.

The last item regarding training concerns outside contractors. Although not responsible for training contractors, employers are responsible for conveying their hazard communication program requirements to a contractor's representative. The contractors are required to train their employees with the information given them. Once your hazard communication system is in effect, it should be relatively simple to alert contractors to what hazardous substances are present, the hazards they present, the company procedures on personal protection, emergency procedures, and any other pertinent precautions. In the case of permanent contractors, many companies have decided to train them as they do their own employees.

Two items not required by the standard, but key to the effectiveness of any program, are evaluation and record keeping. Many industrial safety and health

training programs do not include evaluation. In the case of hazard communication, how can one be sure your training methods are effective? How does one eliminate redundancy and unrequired procedures? Feedback from employees, both written and verbal, are important to any training effort. For example, observation of employee behavior and morale are evaluative techniques that can tell one much more than a reduction in accident or illness rates.

By establishing an effective record keeping system, information for planning and evaluation of training is readily available. A simple hand filing system or electronic maintenance on personal or mainframe computers can be used depending on the size of the operation.

Conclusions

It's time to slow down and smell the roses. First, find out exactly what the standard requires. Second, take a logical look at one's operations and select the most efficient program for company needs. The Appendix lists some early steps to compliance. This checklist, developed by Thomas Evans of Monsanto Corp., should help reduce confusion and serve as a guideline for timely compliance.

Above all, don't let performance language confuse you to the point of inactivity. If your company has not already done so, now is the time to start developing a hazard communication training program that best suits your company's personality and needs. The Hazard Communication standard is not a labeling standard or an MSDS standard. Its key ingredient is training, and training is the key link to accomplishing your company's responsibilities.

APPENDIX

Some Early Steps to Compliance: OSHA Federal Hazard Communication Standard

1. Read the standard; a reading of the preamble also will provide helpful information.
2. Start to collect MSDSs from suppliers (completion date was 5/25/86).
3. Begin MSDS preparation of your products—review what you do now and determine what you need to add (completion date was 11/25/85).
4. Prepare write-up of your hazard evaluation procedure (generic by operating companies).
5. Prepare documentation to support your hazard classification and warnings that are selected and assigned.
6. Reduce your hazard communication program to writing—they will likely have to be different for each of your work areas.
7. Prepare a workplace list of substances for posting in the workplace or work area.

8. Reduce your procedures to writing for nonroutine tasks such as routine maintenance of linebreaks, hazardous tank entry, emergency procedures, etc.

9. Recommend development of policy and procedure to govern your understanding with a contractor and their employees.

10. Prepare a write-up covering your industrial hygiene survey and monitoring practices, hearing conversation program, and respirator protection program.

11. Review content of your product labels for reprint.

12. Reassess your trade secret classifications; if firm, develop justification for a position.

13. Prepare typical trade secret confidentiality agreement language.

14. Establish a system within your order/billing departments to distribute MSDSs to customers upon receipt of order.

15. Establish a system within your purchasing department to obtain MSDSs from suppliers for every raw material used.

16. In general, implement portions of the new requirements as soon as they are completed and available to you within your company organizations.

Milton Freifeld[1]

Labels and Material Safety Data Sheets in Hazard Communication

REFERENCE: Freifeld, M., **"Labels and Material Safety Data Sheets in Hazard Communication,"** *Hazard Communication: Issues and Implementation, ASTM STP 932,* J. E. Brower, Ed., American Society for Testing and Materials, Philadelphia, 1986, pp. 39–54.

ABSTRACT: In the Hazard Communication Standard (HCS), the Occupational Safety and Health Administration (OSHA) chose labels, Material Safety Data Sheets (MSDSs), and training as the vehicles for conveying to workers information about hazards on the job. Labels have always been aimed at the worker. MSDSs, on the other hand, have been written largely for health professionals. Training should, therefore, include the meaning of technical terms in labels and MSDSs so that workers can understand them.

A label is intended to provide an immediate warning about hazardous materials in the workplace. It may be in written or graphic form and must be tied in with training and MSDSs. The label must include the identity of the hazardous chemicals and appropriate warnings about the hazards. The label format is optional, and existing systems may be used. Some alternatives to labeling are allowed, such as large posters describing contents and hazards of a series of similar reactors. Chemical manufacturers, importers, and distributors must also include the name and address of the manufacturer of materials being shipped out of a plant. Substances covered by other federal laws are exempt from HCS's shipped container labeling requirements.

MSDSs complement the label and are more complex. They include: (1) the identity used on the label (except trade secrets) and the specific chemical identity of the hazardous ingredients; (2) physical and chemical characteristics of hazardous materials; (3) fire, explosion, and reactivity hazards; (4) health hazards—both short- and long-term; (5) safe handling and use procedures; (6) emergency and first aid procedures; and (7) date and name of the responsible party preparing the MSDS.

The Hazard Communication standard requires chemical manufacturers to make MSDSs available to their employees. It also requires them to supply MSDSs to downstream manufacturing employers, who in turn must make them available to employees. Clearly then, the chemical manufacturers face the challenge of preparing complete MSDSs. Manufacturing employers must be sure that their workers do indeed get the message.

KEYWORDS: Occupational Safety and Health Administration (OSHA) Hazard Communication standard, labels, Material Safety Data Sheets (MSDS), training

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Can you imagine an industry promoting a federal regulation that will greatly affect it? Well, the chemical industry is strongly in favor of the Occupational Safety and Health Administration (OSHA) Hazard Communication rule. The Chemical Manufacturers Association (CMA) and its members endorse it because they believe this approach will protect workers in manufacturing industries. Material-specific standards are still needed but take a long time to produce.

Furthermore, a uniform standard for the whole country makes much more sense than myriad requirements created by individual communities and states. State and local right-to-know laws which have a variety of requirements for labels and material safety data sheets (MSDSs) can create confusion without improving worker safety and health.

Let's look more closely at the OSHA Hazard Communication standard to see what it includes and why we think it will be effective. I look at the Hazard Communication standard as a three-legged stool based on labels, MSDSs, and education and training. Each of these elements must be strong in support of the written hazard communication program in which the employer has included the hazards he has determined to be present in his workplace.

Labels

The purpose of the label is to provide an immediate warning, and, through training, link it to the more detailed information in the MSDS. The label itself may contain written material or use symbols in a graphic approach on containers of hazardous chemicals.

Since the standard is performance oriented, the format is optional rather than rigid. Different companies use different systems. The new rule permits employers to continue to use effective systems so long as they contain the necessary information and effectively warn workers about hazardous chemicals. There is, however, an advantage in following the ANSI Z129.1 standard to promote uniformity throughout industry.

Chemical manufacturers, importers, and distributors are responsible for labeling containers of hazardous chemicals shipped to employers in the manufacturing sector, Standard Industry Codes (SIC) 20–39. Materials covered by other federal labeling laws are exempt from the shipped container labeling requirements.

In the workplace, manufacturers may use alternatives to actually putting labels on containers. For example, the hazards for a given material in an identified container may be posted in the workplace where it is readily accessible to employees. These alternatives and exemptions are discussed in further detail in paragraphs that follow.

The label itself must include the identity of the hazardous chemicals, which means their chemical or common names as keyed to the MSDS. The label must also contain appropriate warning about hazards, as determined by the employer. This does not mean the employer must test each substance in his workplace

but may obtain the necessary information from the chemical manufacturer, importer, or distributor. In addition, the label for materials being shipped out of a plant must also contain the name and address of the manufacturer. In all cases, even where the label is in the form of a placard or other material not affixed to a moveable container, the information must be readily accessible to employees. For example, the information may be part of a standard operating procedure.

When identifying a hazardous material on a label, an employer may use the chemical or common name of the material, but he must then use the same name on the required list of hazardous chemicals, the label, and the MSDS. In any case, the MSDS must also include the specific chemical identity of the hazardous ingredients. The chemical name must be in accord with the Chemical Abstract Service (CAS) system of the American Chemical Society or that of the International Union of Pure and Applied Chemistry (IUPAC).

Bonafide trade secrets are protected in the Hazard Communication standard (HCS) while providing for the protection of exposed employees. This is done by providing for limited trade secret disclosure to health professionals under prescribed conditions of need and confidentiality.

A hazard warning may be in the form of pictures or symbols, or words alone or in combination. The need for training to be sure workers understand the hazard warning is apparent. This need exists regardless of the method of written communication one chooses.

Figure 1 is an example of a complete label. Note that the common name is used and that the label includes the signal word "Danger," what the hazards are, precautionary measures, first aid, and the manufacturer's name and address.

There are several exemptions to the labeling requirements [Section (*b*)(4) and (5)]. In general, these exemptions apply to substances covered by other federal laws and regulations. Substances containing any chemical(s) that come under the labeling requirements of any of the following acts are not subject to this standard's shipped container labeling requirements:

1. Federal Insecticide, Fungicide and Rodenticide Act (7 USC 136 et seq.).
2. Federal Food, Drug and Cosmetic Act (21 USC 3091 et seq.).
3. Federal Alcohol Administration Act (27 USC 201 et seq.).
4. Consumer Product Safety Act (15 USC 2051 et seq.).
5. Federal Hazardous Substances Act (15 USC 1261 et seq.).

These acts are administered by the Environmental Protection Agency, the Food and Drug Administration, the Bureau of Alcohol, Tobacco and Firearms, and the last two by the Consumer Product Safety Commission.

The standard has limited application to laboratories as follows:

1. Labels on incoming containers of hazardous chemicals must be left intact.
2. The MSDSs that accompany the hazardous chemicals must be kept and made readily accessible to laboratory employees.

ACETONE CYANOHYDRIN

Material will slowly dissociate to a flammable liquid (acetone) and a flammable poisonous gas (hydrogen cyanide, HCN) in ambient storage Rate of dissociation will increase with increased pH and temperature Since lethal amounts of hydrogen cyanide can be present material should be handled as HCN

POISON
Call a Physican

COMBUSTIBLE
Flash point 165 F

Hazards

DANGER!

CAN CAUSE DEATH IF INHALED, SWALLOWED, OR ABSORBED THROUGH SKIN If exposed, take first aid action immediately Symptoms of exposure may be delayed

COMBUSTIBLE

AMYL NITRITE IS AN ANTIDOTE Always have on hand a cyanide antidote kit.

Precautionary Measures

Keep away from heat and flame

Do not breathe vapor or mist.

Do not get in eyes, on skin, on clothing.

Keep container closed

Use only with adequate ventilation

Wash thoroughly after handling

WEAR PROTECTIVE EQUIPMENT such as rubber gloves rubber boots rubber apron and self contained breathing apparatus with eye protection Wash equipment with water after each use Do not use leather or fabric gloves

In Case of Contact or Exposure

FIRST AID IN CASE OF CONTACT, immediately flush skin and eyes with plenty of water for at least 15 minutes while removing contaminated clothing and shoes Call a physician Wash clothing before reuse Destroy contaminated shoes Residual acetone cyanohydrin on clothing and shoes can be absorbed through the skin

IF INHALED, remove to fresh air If not breathing give artificial respiration, preferably mouth to mouth If breathing is difficult give oxygen Call a physician

IF SWALLOWED, induce vomiting immediately by giving two glasses of water and sticking finger down throat Call a physician NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON

Symptoms of Exposure

Signs of poisoning will be dizziness, confusion, marked weakness severe headache, sweating nausea and vomiting If exposure continues, loss of consciousness results

ANTIDOTE Always have on hand a cyanide antidote kit Break an amyl nitrite pearl in a cloth and hold lightly under nose for 15 seconds Repeat 5 times at about 15 second intervals

NOTE TO PHYSICIAN If patient has not responded to amyl nitrite, inject intravenously 10 millimeters of a 3 percent solution of sodium nitrite at a rate not greater than 2 5 to 5 0 milliliters per minute Follow directly with 50 milliliters of a 25 percent solution of sodium thiosulfate at the same rate by the same route Keep patient under observation If signs of poisoning persist or reappear repeat nitrite and thiosulfate injections one hour later in one half the original doses

In Case of Accident

In case of:

FIRE, use water, dry chemical, or CO_2 Wear self contained breathing apparatus and full protective clothing including boots Keep run off out of sewers, watersheds, and water systems

SPILL or LEAK, evacuate personnel Remove ignition sources Wear protective clothing and equipment, including self contained breathing apparatus Contain spill Keep out of sewers watersheds and water systems

Acetone cyanohydrin
UN 1541, RQ

Container Handling and Storage

Keep cool, away from heat Use material promptly

Emptied container retains vapor and product residue Observe all labeled safeguards until container is cleaned, reconditioned or destroyed DO NOT CUT OR WELD ON OR NEAR THIS CONTAINER

In case of emergency involving this product call collect, day or night,
(713) 945 4431

Monsanto.

LOT NO _____ PACKER _____ NET/LEGAL _____ LB _____ KG

MONSANTO COMPANY, ST LOUIS, MISSOURI 63166, U S A

840 29 000 06/BT

FIG. 1—*Example of a complete label.*

3. Employees must be apprised of the hazards of the chemical in their workplace in accord with the employee information and training requirements of this standard.

Figure 2 shows a summary of an acceptable graphic system for hazard identification. This is but one example, developed by the National Paint and Coatings Association, of a system for informing workers about the seriousness of a hazard and how to protect themselves from it. The system is called Hazardous Materials Identification System (HMIS). The severity index varies from zero, meaning minimal hazard, to four, meaning severe hazard. Readily identifiable are the symbols for safety glasses, gloves, aprons, respirators, boots, and so on.

Alternatives to labeling each vessel or container with hazardous chemicals deal with representative posting, process container information, piping systems, and "immediate use" portable containers. For example, the warning for a row of identical reactors using the same process may consist of a large poster describing the materials contained, their hazards and protective measures. The contents of pipes will often vary with time; hence, the pipes themselves need not be labeled. The hazards of the materials in these unlabeled pipes must nevertheless be addressed as part of the employer's hazard communication program. For example, the flow of materials from one vessel to another may be described in the standard operating procedure available to employees. Also, portable containers into which hazardous chemicals are transferred from the labeled container and which are intended only for the immediate use of the employee who performs the transfer need not be labeled.

It is the responsibility of employers to be sure that:

1. Containers of hazardous chemicals are labeled. That is, for example, he must leave the chemical manufacturer's incoming label in place if it is adequate. If the hazardous material was generated internally or for any other reason is unlabeled, the employer must provide one with appropriate information.

2. Labels are legible. This means format, type size, position, and other factors, although not specified, should be such that the label can be read easily by employees.

Chemical manufacturers, importers, and distributors shipping materials must label containers of hazardous chemicals and ensure that the labels do not conflict with the Hazardous Materials Transportation Act. They must also be sure that the labels comply with material-specific OSHA standards as well as the Hazard Communication standard. If the label on a container received by a shipper is satisfactory he need not add a new label.

So far, I have dealt with the OSHA Hazard Communication standard requirements about who should prepare labels, what should be in them, and where and when they should be used. Those who must actually prepare a label need more detailed guidance. For those cases, I recommend two outstanding references:

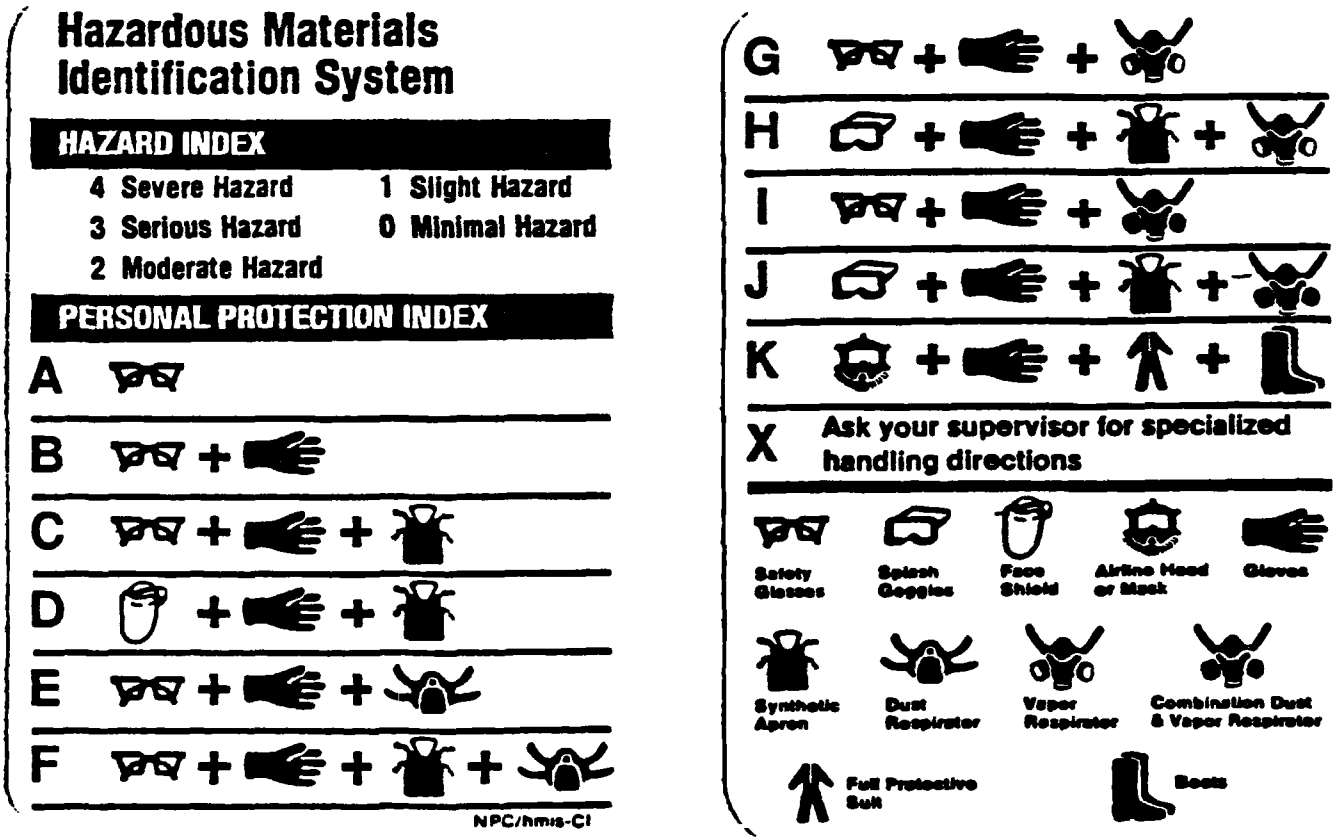

FIG. 2—*National Paint and Coatings Association system for identifying hazardous materials.*

1. ANSI Z129.1–1982, published by the American National Standards Institute, Inc. 1430 Broadway, New York, NY 10018. This voluntary standard is an outgrowth of a labeling activity started 40 years ago by the Manufacturing Chemists Association, the predecessor of the CMA.

2. *Handbook of Chemical Industry Labeling,* Charles J. O'Connor and Sidney I. Lirtzman, Eds., Noyes Publications, Park Ridge, NJ, 1984.

Material Safety Data Sheets (MSDSs)

Like the entire standard, the section on MSDSs is performance oriented. This means, for example, that each company may chose its own format as long as the necessary information, which we will discuss later, is included. If a company is already using a system that includes all the required information, it may continue to do so.

The purpose of the MSDS is to serve as the primary vehicle for transmitting detailed hazard information to employees and manufacturing employers. Since the MSDS is such a key element in the hazard communication program, it should be prepared before labels are created.

The MSDS for a given hazardous chemical must be written or printed in English. That is, it must be a given identifiable document.

The reason the MSDS is such a key part of the hazard communication program is that it contains all of the information on which the other elements are based. Specifically, the labels and training program will be derived from the information generated for the MSDSs.

Chemical manufacturers and importers are responsible for providing MSDSs and must obtain or develop an MSDS for each hazardous chemical. The information in it must accurately reflect current scientific evidence. This requires judgment.

Chemical manufacturers and importers who normally generate the MSDS must ensure that distributors and downstream customers are provided with an MSDS for each hazardous material. That is, MSDSs must be provided with the initial purchase, either attached to the container or sent to the purchaser. When an MSDS has been updated it must be sent to the purchaser prior to, or at the time of, the next shipment. Distributors have the responsibility of ensuring that MSDSs are provided to other distributors and manufacturing purchasers.

A manufacturing employer must be sure that an MSDS for each hazardous chemical in the workplace is accessible to his employees. He may, of course, use the documents provided by his suppliers. In some cases, he may have to generate his own MSDSs.

The content of MSDSs is specified by OSHA. To begin with, the MSDSs must identify the hazardous substance or mixture in question. The way in which a material is identified depends on whether it is a single substance, a mixture which has been tested as to hazard, or an untested mixture.

When identifying a single substance, both the chemical and common names must be given. If it is a mixture which has been tested, its common name must

be given. In that case, the identification must include the chemical and common names of each ingredient that is known to contribute to the hazards demonstrated by the testing. It should be noted that very few mixtures have been subjected to a full range of toxicological testing and thus considered to be "tested" under the rule. For untested mixtures, hazardous ingredients present in greater than 1% must be identified and health hazards connected with them noted. If the hazardous ingredient is a carcinogen, however, it must be identified and the hazards noted if it is present in 0.1% or more of the total untested mixture. All physical hazards connected with the untested mixture must, of course, be listed in the MSDS.

What specific information must an MSDS include in addition to the hazardous ingredients as just discussed? To begin with, the physical and chemical characteristics, such as vapor pressure and flashpoint must be given. Also, physical hazards like fire, explosion, and reactivity must be included.

In addition to the health hazards of chemicals, the MSDS must also list signs and symptoms of overexposure as well as medical conditions that could be aggravated by such exposure. Primary routes of entry, such as ingestion, skin contact, or inhalation must also be listed.

The evaluation of a hazard depends on the scientific data available about it and the professional judgment applied to the available information. The OSHA standard, however, mandates certain criteria for hazard determination. For example, if OSHA has promulgated a permissible exposure limit for a given chemical or the American Conference of Governmental Industrial Hygienists (ACGIH) has published a threshold limit value (TLV) for a substance, it must be listed as hazardous in the MSDS when present at 1% or greater. Similarly, if a material has been identified as a suspect or confirmed animal or human carcinogen by OSHA or in the most recent annual report of the National Toxicology Program (NTP) or by the International Agency for Research on Cancer (IARC) and present at 0.1% or greater, then this information must be indicated on the MSDS.

Other sections of the MSDS deal with precautions for safe handling, hygienic practices, and cleanup procedures for spills. Maintenance operations are generally not routine, and protective measures while they are conducted must be given in the MSDS. The MSDS must also include any generally applicable control measures which are known to the chemical manufacturer, importer, or employer such as appropriate engineering controls, worker practices, or personal protective equipment.

In addition, the MSDS must contain emergency and first aid procedures, the date of preparation, and changes in the information given in the MSDS. For example, if the chemical manufacturer, importer, or employer becomes newly aware of any significant information regarding hazards of a chemical or ways to protect against a hazard, this new information must be added to the MSDS within three months. Finally, to make additional information available, the MSDS must include the name, address, and telephone number of the party responsible for the document.

Miscellaneous requirements are that MSDSs must be in English and contain no blanks. That is, if the preparer can find no information for a given category on the MSDS, he must mark it to indicate that no applicable information was found. Where a series of mixtures have similar hazards and contents, a single MSDS may be prepared which applies to all of these similar mixtures.

No format for the MSDS has been specified. They will be evaluated based on the adequacy and accuracy of the information, not format. The OSHA MSDS Form, shown in Appendix I, is nonmandatory. When properly completed, however, it is acceptable.

An example of a Material Safety Data Sheet is shown in Appendix II. In this case the MSDS contains all the necessary information, but the arrangement of sections is different than in the OSHA 20 form. For example, the health information is presented on the first page rather than later on. Also, though not required, symbols and the hazard rating system are given. All of these would have to be coordinated with labels and the training efforts. Toxicity data is also given though OSHA doesn't require this data to be printed, but only requires it to be used in the assessment of hazard.

Note also that the CHEMTREC number is given in the upper left-hand corner of the Shell MSDS. CHEMTREC, a CMA operation, runs a 24-hour, toll-free information hotline for chemical transportation emergencies.

While this summary of the label and MSDS portions of the Hazard Communication standard may be helpful to those who must comply with it, they still need to read the standard, including the preamble, carefully and understand it thoroughly in preparation for implementing it.

Since the Hazard Communication is a performance standard, it leaves room for flexibility. On the other hand, it raises questions as to how best to proceed. To help find some of the answers, people and companies responsible for labels and MSDSs should consider becoming active in:

The American Conference on Chemical Labeling
Suite 310
1220 L Street, N.W.
Washington, D.C. 20005
202/842–4100

When the labels and MSDSs have been prepared, key things to remember are that they must be accessible to employees at their work, and that they must be tied in with the training program.

In conclusion, CMA strongly supports the Hazard Communication standard since we believe it is an excellent way to help prevent injuries and prevent confusion that differing state laws can bring. This position is a reflection of the chemical industry's safety commitment. Evidence of this commitment is that the chemical industry has been first among 42 principal industries for three of the last four years and second for one year in the National Safety Council ranking of incidence rates of occupational illness and injury involving days away from work and deaths.

APPENDIX I

Material Safety Data Sheet
May be used to comply with
OSHA's Hazard Communication Standard,
29 CFR 1910.1200. Standard must be
consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY *(As Used on Label and List)*	*Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that*

Section I

Manufacturer's Name	Emergency Telephone Number
Address *(Number, Street, City, State, and ZIP Code)*	Telephone Number for Information
	Date Prepared
	Signature of Preparer *(optional)*

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity, Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% *(optional)*

Section III — Physical/Chemical Characteristics

Boiling Point		Specific Gravity (H_2O = 1)	
Vapor Pressure (mm Hg)		Melting Point	
Vapor Density (AIR = 1)		Evaporation Rate (Butyl Acetate = 1)	

Solubility in Water

Appearance and Odor

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL

Extinguishing Media

Special Fire Fighting Procedures

Unusual Fire and Explosion Hazards

(Reproduce locally) OSHA 174, Sept 1985

Section V — Reactivity Data

Stability	Unstable		Conditions to Avoid
	Stable		

Incompatibility (*Materials to Avoid*)

Hazardous Decomposition or Byproducts

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur		

Section VI — Health Hazard Data

Route(s) of Entry. Inhalation? Skin? Ingestion?

Health Hazards (*Acute and Chronic*)

Carcinogenicity NTP? IARC Monographs? OSHA Regulated?

Signs and Symptoms of Exposure

Medical Conditions
Generally Aggravated by Exposure

Emergency and First Aid Procedures

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled

Waste Disposal Method

Precautions to Be Taken in Handling and Storing

Other Precautions

Section VIII — Control Measures

Respiratory Protection (*Specify Type*)

Ventilation	Local Exhaust	Special
	Mechanical (*General*)	Other

Protective Gloves	Eye Protection

Other Protective Clothing or Equipment

Work/Hygienic Practices

* USGPO 1986-491-529/45775

APPENDIX II

Shell

MATERIAL SAFETY DATA SHEET

97367 (4-85)

MSDS NUMBER ▶ 10-5 PAGE 1

24 HOUR EMERGENCY ASSISTANCE	GENERAL MSDS ASSISTANCE
SHELL: 713-473-9461 CHEMTREC: 800-424-9300	SHELL: 713-241-4819

BE SAFE
READ OUR PRODUCT SAFETY INFORMATION ... AND PASS IT ON
(PRODUCT LIABILITY LAW REQUIRES IT)

ACUTE HEALTH	FIRE	REACTIVITY	HAZARD RATING ▶ LEAST - 0 SLIGHT - 1 MODERATE - 2 HIGH - 3 EXTREME - 4
2	3	0	

*For acute and chronic health effects refer to the discussion in Section III

SECTION I	NAME
PRODUCT ▶	EPON(R) RESIN 872-X-75
CHEMICAL NAME ▶	REACTION PRODUCT OF BISPHENOL A/EPICHLORHYDRIN RESIN AND DIMER
CHEMICAL FAMILY ▶	FATTY ACID; EPOXY-RESIN
SHELL CODE ▶	43322

SECTION II-A **PRODUCT/INGREDIENT**

NO.	COMPOSITION	CAS NUMBER	PERCENT
P	EPON RESIN 872-X-75	MIXTURE	100
1	EPON RESIN 872	67989-50-0	75
2	XYLENE	1330-20-7	25

SECTION II-B **ACUTE TOXICITY DATA**

NO.	ACUTE ORAL LD50	ACUTE DERMAL LD50	ACUTE INHALATION LC50
P	NOT AVAILABLE	NOT AVAILABLE	NOT AVAILABLE
1	NOT AVAILABLE	NOT AVAILABLE	NOT AVAILABLE
2	4.3 G/KG (RAT)		6700 PPM/4H (RAT)

SECTION III **HEALTH INFORMATION**

THE HEALTH EFFECTS NOTED BELOW ARE CONSISTENT WITH REQUIREMENTS UNDER THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200).

EYE CONTACT
BASED ON PRESENCE OF COMPONENT 1, PRODUCT IS PRESUMED TO BE IRRITATING TO THE EYES.

SKIN CONTACT
BASED ON PRESENCE OF COMPONENT 1 AND 2, PRODUCT IS PRESUMED TO BE MILDLY IRRITATING TO THE SKIN. PROLONGED OR REPEATED LIQUID CONTACT CAN RESULT IN DEFATTING AND DRYING OF THE SKIN WHICH MAY RESULT IN SKIN IRRITATION AND DERMATITIS.

INHALATION
BASED ON PRESENCE OF COMPONENT 2, PRODUCT IS PRESUMED TO BE MILDLY TOXIC AND MAY PRODUCE CNS DEPRESSION.

INGESTION
BASED ON PRESENCE OF COMPONENT 2, PRODUCT IS PRESUMED TO BE MODERATELY TOXIC AND MAY BE HARMFUL IF SWALLOWED; MAY PRODUCE CNS DEPRESSION.

PRODUCT NAME: EPON(R) RESIN 872-X-75 **MSDS 10-5**
PAGE 2

SIGNS AND SYMPTOMS
IRRITATION AS NOTED ABOVE EARLY TO MODERATE CNS (CENTRAL NERVOUS SYSTEM) DEPRESSION MAY BE EVIDENCED BY GIDDINESS, HEADACHE, DIZZINESS AND NAUSEA; IN EXTREME CASES, UNCONSCIOUSNESS AND DEATH MAY OCCUR.

AGGRAVATED MEDICAL CONDITIONS
PREEXISTING EYE AND SKIN DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT.

OTHER HEALTH EFFECTS
NONE IDENTIFIED.

SECTION IV **OCCUPATIONAL EXPOSURE LIMITS**

	OSHA		ACGIH		OTHER
NO.	PEL/TWA	PEL/CEILING	TLV/TWA	TLV/STEL	
P	NONE ESTABLISHED				
1	NONE ESTABLISHED				
2	100 PPM (SKIN)		100 PPM (SKIN)	150 PPM (SKIN)	

SECTION V **EMERGENCY AND FIRST AID PROCEDURES**

EYE CONTACT
FLUSH EYES WITH PLENTY OF WATER FOR 15 MINUTES WHILE HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION.

SKIN CONTACT
REMOVE CONTAMINATED CLOTHING/SHOES AND WIPE EXCESS FROM SKIN. FLUSH SKIN WITH WATER. FOLLOW BY WASHING WITH SOAP AND WATER. IF IRRITATION OCCURS, GET MEDICAL ATTENTION. DO NOT REUSE CLOTHING UNTIL CLEANED. CONTAMINATED LEATHER ARTICLES, INCLUDING SHOES, CANNOT BE DECONTAMINATED AND SHOULD BE DESTROYED.

INHALATION
REMOVE VICTIM TO FRESH AIR AND PROVIDE OXYGEN IF BREATHING IS DIFFICULT. GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING. GET MEDICAL ATTENTION.

INGESTION
DO NOT INDUCE VOMITING. IF VOMITING OCCURS SPONTANEOUSLY, KEEP HEAD BELOW HIPS TO PREVENT ASPIRATION OF LIQUID INTO THE LUNGS. GET MEDICAL ATTENTION.*

NOTE TO PHYSICIAN
*IF MORE THAN 2.0 ML PER KG HAS BEEN INGESTED AND VOMITING HAS NOT OCCURRED, EMESIS SHOULD BE INDUCED WITH SUPERVISION. KEEP VICTIM'S HEAD BELOW HIPS TO PREVENT ASPIRATION. IF SYMPTOMS SUCH AS LOSS OF GAG REFLEX, CONVULSIONS OR UNCONSCIOUSNESS OCCUR BEFORE EMESIS, GASTRIC LAVAGE USING A CUFFED ENDOTRACHEAL TUBE SHOULD BE CONSIDERED.

SECTION VI **SUPPLEMENTAL HEALTH INFORMATION**

COMPONENT #2: LABORATORY ANIMALS EXPOSED BY VARIOUS ROUTES TO HIGH DOSES OF XYLENE SHOWED EVIDENCE OF EFFECTS IN THE LIVER, KIDNEYS, LUNGS, SPLEEN, HEART AND ADRENALS. RATS EXPOSED TO XYLENE VAPOR DURING PREGNANCY SHOWED EMBRYO/FETOTOXIC EFFECTS. MICE EXPOSED ORALLY TO DOSES PRODUCING MATERNAL TOXICITY ALSO SHOWED EMBRYO/FETOTOXIC EFFECTS.

PRODUCT NAME: EPON(R) RESIN 872-X-75 MSDS 10-5 PAGE 3

SECTION VII PHYSICAL DATA

BOILING POINT: NOT AVAILABLE (DEG F) | SPECIFIC GRAVITY: 1.02 (H2O=1) | VAPOR PRESSURE: 6 (MM HG)

MELTING POINT: NOT AVAILABLE (DEG F) | SOLUBILITY: NEGLIGIBLE (IN WATER) | VAPOR DENSITY: 3.7 (AIR=1)

EVAPORATION RATE (N-BUTYL ACETATE = 1): NOT AVAILABLE

APPEARANCE AND ODOR: LIGHT YELLOW LIQUID.

SECTION VIII FIRE AND EXPLOSION HAZARDS

FLASH POINT AND METHOD:
<100 DEG. F (SETAGLASH)

FLAMMABLE LIMITS /% VOLUME IN AIR
LOWER: 1.1 UPPER: 7.0

EXTINGUISHING MEDIA
USE WATER FOG, FOAM, DRY CHEMICAL OR CO2.

SPECIAL FIRE FIGHTING PROCEDURES AND PRECAUTIONS
WARNING. FLAMMABLE. CLEAR FIRE AREA OF UNPROTECTED PERSONNEL. DO NOT ENTER CONFINED FIRE SPACE WITHOUT FULL BUNKER GEAR (HELMET WITH FACE SHIELD, BUNKER COATS, GLOVES AND RUBBER BOOTS), INCLUDING A POSITIVE PRESSURE NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER.

UNUSUAL FIRE AND EXPLOSION HAZARDS
HANDLE AS FLAMMABLE LIQUID. CONTAINERS EXPOSED TO INTENSE HEAT FROM FIRES SHOULD BE COOLED WITH WATER TO PREVENT VAPOR PRESSURE BUILDUP WHICH COULD RESULT IN CONTAINER RUPTURE. CONTAINER AREAS EXPOSED TO DIRECT FLAME CONTACT SHOULD BE COOLED WITH LARGE QUANTITIES OF WATER AS NEEDED TO PREVENT WEAKENING OF CONTAINER STRUCTURE.

SECTION IX REACTIVITY

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS AND MATERIALS TO AVOID:
AVOID HEAT, SPARKS, FLAME AND CONTACT WITH STRONG OXIDIZING AGENTS AND STRONG LEWIS OR MINERAL ACIDS.

HAZARDOUS DECOMPOSITION PRODUCTS
CARBON MONOXIDE, ALDEHYDES AND ACIDS MAY BE FORMED DURING COMBUSTION. REACTION WITH SOME CURING AGENTS MAY PRODUCE CONSIDERABLE HEAT.

SECTION X EMPLOYEE PROTECTION

RESPIRATORY PROTECTION
AVOID BREATHING VAPOR OR MISTS. IF EXPOSURE MAY OR DOES EXCEED OCCUPATIONAL EXPOSURE LIMITS (SEC. IV) USE A NIOSH-APPROVED RESPIRATOR TO PREVENT OVEREXPOSURE. IN ACCORD WITH 29 CFR 1910.134 USE AN ATMOSPHERE-SUPPLYING RESPIRATOR OR AIR-PURIFYING RESPIRATOR FOR ORGANIC VAPORS.

PROTECTIVE CLOTHING
AVOID CONTACT WITH EYES. WEAR CHEMICAL GOGGLES IF THERE IS LIKELIHOOD OF CONTACT WITH EYES. AVOID CONTACT WITH SKIN AND CLOTHING. WEAR CHEMICAL-RESISTANT GLOVES AND PROTECTIVE CLOTHING.

ADDITIONAL PROTECTIVE MEASURES
USE EXPLOSION-PROOF VENTILATION AS REQUIRED TO CONTROL VAPOR CONCENTRATIONS. EYE WASH FOUNTAINS AND SAFETY SHOWERS SHOULD BE AVAILABLE FOR EMERGENCY USE.

PRODUCT NAME: EPON(R) RESIN 872-X-75 MSDS 10-5 PAGE 4

SECTION XI ENVIRONMENTAL PROTECTION

SPILL OR LEAK PROCEDURES
WARNING. FLAMMABLE. ELIMINATE ALL IGNITION SOURCES. HANDLING EQUIPMENT MUST BE GROUNDED TO PREVENT SPARKING. *** LARGE SPILLS *** EVACUATE THE HAZARD AREA OF UNPROTECTED PERSONNEL. WEAR APPROPRIATE RESPIRATOR AND PROTECTIVE CLOTHING. SHUT OFF SOURCE OF LEAK ONLY IF SAFE TO DO SO. DIKE AND CONTAIN. IF VAPOR CLOUD FORMS, WATER FOG MAY BE USED TO SUPPRESS; CONTAIN RUN-OFF. REMOVE WITH VACUUM TRUCKS OR PUMP TO STORAGE/SALVAGE VESSELS. SOAK UP RESIDUE WITH AN ABSORBENT SUCH AS CLAY, SAND OR OTHER SUITABLE MATERIAL; PLACE IN NON-LEAKING CONTAINERS FOR PROPER DISPOSAL. FLUSH AREA WITH WATER TO REMOVE TRACE RESIDUE; DISPOSE OF FLUSH SOLUTIONS AS ABOVE. *** SMALL SPILLS *** TAKE UP WITH AN ABSORBENT MATERIAL AND PLACE IN NON-LEAKING CONTAINERS; SEAL TIGHTLY FOR PROPER DISPOSAL.

WASTE DISPOSAL
UNDER EPA - RCRA (40 CFR 261.21), IF THIS PRODUCT BECOMES A WASTE MATERIAL, IT WOULD BE IGNITABLE HAZARDOUS WASTE, HAZARDOUS WASTE NUMBER D001. REFER TO LATEST EPA OR STATE REGULATIONS REGARDING PROPER DISPOSAL.

ENVIRONMENTAL HAZARDS
EPA - COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT. UNDER EPA-CERCLA ("SUPERFUND") RELEASES TO AIR, LAND OR WATER WHICH EXCEED THE REPORTABLE QUANTITY MUST BE REPORTED TO THE NATIONAL RESPONSE CENTER, 800-424-8802.

THE REPORTABLE QUANTITY (RQ) FOR THIS PRODUCT IS 4000 LB (471 GAL) BASED ON COMPONENT #2 CONTENT.

SECTION XII SPECIAL PRECAUTIONS

WARNING. FLAMMABLE LIQUID. KEEP LIQUID AND VAPOR AWAY FROM HEAT, SPARKS AND FLAME. SURFACES THAT ARE SUFFICIENTLY HOT MAY IGNITE EVEN LIQUID PRODUCT IN THE ABSENCE OF SPARKS OR FLAME. EXTINGUISH PILOT LIGHTS, CIGARETTES AND TURN OFF OTHER SOURCES OF IGNITION PRIOR TO USE AND UNTIL ALL VAPORS ARE GONE. VAPORS MAY ACCUMULATE AND TRAVEL TO IGNITION SOURCES DISTANT FROM THE HANDLING SITE; FLASH-FIRE CAN RESULT. KEEP CONTAINERS CLOSED WHEN NOT IN USE. USE (ONLY) WITH ADEQUATE VENTILATION. CONTAINERS, EVEN THOSE THAT HAVE BEEN EMPTIED, CAN CONTAIN HAZARDOUS PRODUCT RESIDUES.

CONTAINERS, EVEN THOSE THAT HAVE BEEN EMPTIED, CAN CONTAIN EXPLOSIVE VAPORS. DO NOT CUT, DRILL, GRIND, WELD OR PERFORM SIMILAR OPERATIONS ON OR NEAR CONTAINERS. STATIC ELECTRICITY MAY ACCUMULATE AND CREATE A FIRE HAZARD. GROUND FIXED EQUIPMENT. BOND AND GROUND TRANSFER CONTAINERS AND EQUIPMENT.

AVOID BODILY CONTACT WITH MATERIAL. WASH WITH SOAP AND WATER BEFORE EATING, DRINKING, SMOKING OR USING TOILET FACILITIES. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.

CONTAMINATED LEATHER ARTICLES, INCLUDING SHOES CANNOT BE DECONTAMINATED AND SHOULD BE DESTROYED.

SECTION XIII TRANSPORTATION REQUIREMENTS

DEPARTMENT OF TRANSPORTATION CLASSIFICATION: FLAMMABLE LIQUID
D.O.T. PROPER SHIPPING NAME: RESIN SOLUTION

OTHER REQUIREMENTS:
DOT ID NO. UN1866; GUIDE NO. 27. TRANSPORTATION SPILLS WHICH CAN ENTER SURFACE WATERS ARE REPORTABLE IF THE "REPORTABLE QUANTITY" (RQ) IS RELEASED FROM ONE INDIVIDUAL PACKAGE OR INDIVIDUAL BULK TRANSPORT VEHICLE. SEE SECTION XI.

SECTION XIV OTHER REGULATORY CONTROLS

THE COMPONENTS OF THIS PRODUCT ARE LISTED ON THE EPA/TSCA INVENTORY OF CHEMICAL SUBSTANCES.

PRODUCT NAME: EPON(R) RESIN 872-X-75 MSDS 10-5
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THE INFORMATION CONTAINED HEREIN IS BASED ON THE DATA AVAILABLE TO US AND IS BELIEVED TO BE CORRECT. HOWEVER, SHELL MAKES NO WARRANTY, EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF. SHELL ASSUMES NO RESPONSIBILITY FOR INJURY FROM THE USE OF THE PRODUCT DESCRIBED HEREIN

DATE PREPARED: NOVEMBER 20, 1985

JOHN P. SEPESI

SHELL OIL COMPANY
PRODUCT SAFETY AND COMPLIANCE
P. O. BOX 4320
HOUSTON, TX 77210

BE SAFE

READ OUR PRODUCT
SAFETY INFORMATION ...AND PASS IT ON
(PRODUCT LIABILITY LAW
REQUIRES IT)

Bibliography

The American National Standard for Hazardous Industrial Chemicals—Precautionary Labeling, ANSI Z129.1–1982.

"Chemical Hazard Communication Pamphlet," U.S. Department of Labor, 1983, OSHA 3084.

Handbook of Chemical Industry Labeling, Charles J. O'Connor and Sidney I. Lirtzman, Eds., Noyes Publications, Park Ridge, NJ, 1984.

"OSHA Hazard Communication Standard," 48 *Federal Register* 53280–53348, 25 Nov. 1983.

Panel Discussion: Regulatory and Compliance Issues

This panel discussion was held as a continuation of Section I of the symposium on Regulatory and Compliance Issues. The discussion is presented in its original form; it was not peer reviewed. The names of those individuals asking questions are not given; the questions and responses of these persons are listed as *Question* and *Response*.

The moderator was Don Webb, Environmental Protection Agency. The panel members were: Alfred A. Capuano, ICI Americas, Inc., Wilmington, Delaware; Dean W. McDaniel, Occupational Health and Safety Administration, Dallas, Texas; Milton Freifeld, Chemical Manufacturers Association, Washington, D.C.; John Stewart, Chairman of ASTM Committee E-34, who is manager of Environmental Affairs, Courtaulds of North America, Inc., Mobile, Alabama; Fred M. Mabry, United Steel Workers of America, Houston, Texas; and Gerald Batey, Occupational Safety and Health Administration, Houston, Texas.

Specific Questions and Responses

Question: Has OSHA published enforcement guidelines in the OSHA Field Operations Manual?

D. McDaniel: No, the Agency has not done that. At the present time there is a task force. The task force is putting together the compliance directive and hopefully by the end of May or the first part of June [1985] it will be incorporated into the Field Operations Manual.[1]

Question: Is that manual going to give us more guidelines as far as the Standard Industrial Classification (SIC) codes and who is under these codes?

D. McDaniel: Yes, it will. You had a specific question about captive operations, and the current draft of the enforcement directive does have some guidance on how the Agency is going to handle operations that are captive within a larger industry. There was a question raised earlier about the primary business not being in SIC Codes 20–39, but there was a captive operation in this business such as a maintenance of a small manufacturing process. The directive will give some information and guidance on how the Agency is going to handle that as far as enforcement is concerned.

M. Freifeld: We're waiting for this OSHA compliance manual too, particularly with regard to labels, because the ANSI [American National Standards Institute]

[1] Final enforcement guidelines for inspection procedures for the Hazard Communication standard, 29 CFR 1910.1200, were published by OSHA in May 1986.

standard, as I indicated, is a general outline. We understand that OSHA will be filling in some of that outline. To be more specific, the ANSI standard does discuss organs that are affected during chronic exposure. Now OSHA could say that the proper label must indicate the affected organs even with acute exposure. So it is going to be an important guide for all of us as to just what OSHA expects everyone to have on the label, and there might be a lot of scrambling when that compliance document gets public.

Question: In the absence of the compliance document, do you have a central file of questions that have been sent to you and answers that you have supplied?

D. McDaniel: At the present time I think Jennifer Silk of the National OSHA office has been the focal point. She has been collecting interpretations from the various regions. We have relayed to her questions that we have received in the field and common answers. One thing that will be in the directive, and we worked on this last week, will be a number of questions and answers on the standard that will explain what applies in certain situations. There will be a series of questions and answers at the end of the directive itself, and if you want specifics on those, you may contact Jennifer Silk at 202-523-7166. She may have a copy of those responses.

Question: Realizing that the enforcement manual is not yet available, I was wondering if you could just give us some insight in terms of how OSHA foresees handling daily information problems, such as checking to see if labeling requirements are being enforced.

D. McDaniel: Well, at this time it is difficult to say because we have not yet formulated the posture. We've got several options available to us, and we have not made a decision on which option to go with so it would be very difficult for me to answer that question.

Question: I wonder if Mr. Mabry may be able to give us some insights from his experience in terms of the effectiveness of previous OSHA enforcement activities.

F. Mabry: Where there have been specific standards, it has been great. Where there are no standards, it has not been as good. It is very hard to get a Section 5 in a general duty clause citation even if you've got a problem. That has been our experience in the past. We do have a standard now. I personally think that the performance standard is great because it's now a generic standard and is going to apply wherever it applies, and that will give us some leverage to get enforcement if we need it.

Question: It is our understanding that if an establishment is not in the SIC Code 20–39 and doesn't have to disseminate this knowledge, would it be possible for a contractor to come into such an establishment, the contractor supposedly meeting the requirements, but the establishment he comes into is not in the SIC codes.

F. Mabry: As I pointed out in my talk earlier, contractors are not covered. They're not in SIC Codes 20–39. Contractors, regardless of what they're doing, are not covered.

Question: What if a manufacturer's representative or somebody like that is going to work on a vessel or a line that goes into a plant which is not in the SIC Code 20–39, isn't the plant management supposed to tell the guy what he is going to be exposed to or possibly exposed to?

F. Mabry: Not under this standard, as I understand it, because construction is not covered.

G. Batey: They're not covered in those SIC Codes. A contractor you're talking about would be a manufacturer's representative that could be out of a retail or maintenance office. I don't think they'd be covered while working in those nonregulated SIC codes. I think you're looking at a contractor being a maintenance contractor or something to that effect.

Question: Dean McDaniel mentioned the base list of items having OSHA PEL (permissible exposure limit) and ACGIH (American Conference of Governmental Industrial Hygienists) TLVs (threshold limit values). How would you consider nuisance dust? Would that be considered hazardous under your regulation if there are no other hazards identified with the nuisance dust?

D. McDaniel: That is a well thought-out question. We've had a number of questions on that. Basically what you would need to do as far as nuisance dust would be to go back to the ACGIH TLV booklet. It does have a TLV for nuisance dust. It does have in Appendix D a list of nuisance dusts. What we're looking at in the directive is that if employees may be exposed to one of those, that would fall in the purview of the standard. If it were going to be outside those that are in the appendix, then it may not.

D. Webb: Let me add one part of the question on that. I will let OSHA do this first. How does the standard affect dust, mists, solids, etc. In essence we are getting down to welding rods, gases, batteries, paint fumes, etc. Isn't that part of what we're discussing?

D. McDaniel: Yes. In the manufacturing industries the welding rods and the fumes from them would be included. Paint fumes certainly would be. If in a foreseeable emergency, people might be exposed to the acid or any of the contents of the battery, then yes, it would fall within the purview of the standard.

Question: If there is a specific item such as quartz dust, it would be triggered under the standard, but if it is not specifically mentioned would it be triggered?

D. McDaniel: If you're talking about nuisance dust, yes, that is correct. Assuming the chemical does not present a health and/or physical hazard.

Question: My question is classification of mixtures. Suppose a company produces a wide range of mixtures with a relatively fixed set of ingredients but

in varying proportions and chooses to test only three or four points on their mixture curve of possible proportions. Is it then permissible to interpolate and to use that curve as a means of classifying the hazard of the mixture as opposed to a specific test on each specific ratio used in the mixture preparation?

D. McDaniel: You're talking about the full range of physical hazard and health hazard tests?

Response: Yes. Assume that a complete set of physical and health hazard tests have been run on several combinations but not on every conceivable combination of a series of mixtures used. For example, in the coatings industry.

D. McDaniel: I'll have to give some thought to that. I haven't been asked that question.

Response: Has it not been addressed by OSHA? Is that a fair response?

D. McDaniel: Yes, that's correct.

Question: The hazard communication standard on labels talks about including "appropriate hazard warnings." I'd like to specifically ask Mr. McDaniel and Mr. Mabry, What in your opinion are appropriate hazard warnings?

D. McDaniel: As I recall on the definition of labels, it actually said either printed or graphic material that would actually relate to the hazard. As a bare minimum, since it is a performance-oriented standard, we would be looking for exactly that.

M. Freifeld: As I just indicated, most labels, for instance, where it is appropriate, will say harmful if inhaled. Well, that has been considered an adequate warning for a long time. One could argue that you ought to say whether the kidneys are affected when you inhale it. And we agree. Certainly in a chronic situation you should do that. I would question whether it is necessary for acute hazards. Usually most of the time the point is to warn the worker, and one of the big problems with labels, as we see it, is that they get too busy, too noisy, and the message gets lost. It's easy to do. You don't want your label to look like an insert for an over-the-counter drug. It loses the point. So the less you put on but still get the message across by words or symbols, I think that has to be the message on the label.

F. Mabry: I will agree with that. You don't want the label to be too busy where you miss the point, and I think it should have adequate warning if there is, indeed, a danger and that you should refer to the MSDS for the total picture.

Question: On labeling in mixtures, many of the compounds that we work with have a number of different hazardous substances or hazardous materials in them, so the example that you showed was on a specific compound. How would you approach the labeling on one of these without, as you say, covering the whole drum or the whole container? Could you put the specifics on that and then tie it back to a reference on the material safety data sheet?

M. Freifeld: We're talking about shipping labels primarily, and I think the second option you mentioned is the one to go with. You rely on the MSDS, as you pointed out, for the details. Am I answering your question?

Response: Well, we have a lot of mixtures. The formulations have a number of ingredients in them and to try labeling those on 400 or 500 different formulations, the sorting out and the labeling would be monstrous. So many of the hazards that you deal with are very, very similar. I am asking if this generic information could be put on the label and then key it back to the material safety data sheet. Would that be an adequate answer?

M. Freifeld: You mean not mention the specific hazardous ingredients?

Response: For instance, it may be xylene, or acetone, or formaldehyde or something different; it varies.

Mr. Freifeld: Well, as I read it, you have to list the hazardous ingredients.

Response: But, they would be on the material safety data sheets. They are there with the TLV and other details.

Mr. Freifeld: You still have to list the hazardous chemicals on the labels. That is my interpretation. Does someone differ?

F. Mabry: I agree.

Question: I'd just like to make a comment on that. We've gone around and around about this at our company and have decided that what chemical identity or identities means in the standard is that it has to tie that label back to a material safety data sheet, and in the MSDS then you can list those hazardous materials, the specific chemicals, so it could be compound XYZ if you have an MSDS that says compound XYZ and lists the compound with 20 chemicals in them. The 20 chemicals then are specifically listed. Is that okay with OSHA?

D. Webb: I used to be with Consumer Product Safety Commission. We were working a case and went out to the plant to see what was there. It turns out that they were using some of your XYZ-type compounds. They didn't know what was in them, but they had master suppliers and here was the list of supplies, and that is how they brought them into the plant. The plant manager never knew what was there, even though the information was held back in company headquarters, and part of which was under your Proprietary Act at the time. That was 10 years ago, but these are the kind of problems we ran into and so it has existed.

Question: I would like to address this to Dean McDaniel. There are some chemicals on the PEL list that are low in toxicity. I have in mind certain freons, and, I believe, carbon dioxide is also included. Would you address labeling those?

D. McDaniel: Yes, it's pretty straightforward. First, if there is an OSHA

PEL or TLV listing or they present a health or physical hazard, they will be covered by the standard regardless of what that exposure limit would be. So basically the answer to your question is that they would come under the purview of the standard.

Response: Are you saying we would label dry ice?

D. McDaniel: Yes, and containers of dry ice.

Question: I have another question with regard to labeling. I work for an insurance company, and we're getting concerned with the synergistic reactions between workplace and nonworkplace environments. Where exactly does the synergistic effects go—on the label, or on an MSDS, or how far should you go in identifying synergisms?

D. Webb: Synergy, the way I understood it, was an MBA word and didn't have a real definition. That's the way it was taught to me.

M. Freifeld: I don't know if I can paraphrase the question. You're asking how far does one go in listing the properties, and the testing that has been done?

Response: Try, for example, trichloroethylene and ethyl alcohol consumption. That is only the tip of the iceberg. Should you change an MSDS every time a new synergism is discovered?

M. Freifeld: I don't know. I hadn't thought much about that one. I would think when a serious problem is first surfaced, yes, you should certainly look at it and at least consider changing your data sheet. It depends on how strong the evidence is, how serious it can be.

F. Marbry: If I could add a comment. That's been a large part of our problem. It's what is synergistic with which. You mentioned alcohol and some of the chlorinated hydrocarbon solvents. There are other things out there that, for instance, react with aspirin and that compound the fever that aspirin is supposed to relieve. I would agree. If you find some new hazard, it ought to be put on the MSDS.

D. Webb: In spite of the items listed, that is, failure to include all workers, CAS (chemical abstract service) numbers, preemption pipe labeling and routine training, do you feel the OSHA standard effectively addresses the employees' concerns of working with hazardous substances?

F. Mabry: No. If you leave out 60% of the workers or more, you've not addressed their concerns. That is a big part of the problem. The scope is not broad enough. The other part is the trade secret restrictions. We're very wary of the trade secret exemption, and we think that it's probably a big loophole that's going to give us a lot of problems. Aside from those two issues, yes, it goes a long way toward protecting workers. I'm not saying that it's all bad. In fact, I'm saying it's good, except for some specific things in it. It's something we never had before, and generic standards by and large are hard to come by. Look at all the OSHA standards and you'll find that there are very, very few

generic standards. So I think the standard is great except that the workers are not going to be totally satisfied because some are left out and there are some loopholes in it that are going to allow for some latitude that ought not to be there.

Question: I will just throw this out to the panel. When you're preparing MSDSs for products or chemicals that, say, are a two or three component system where you have Part A, Part B, Part C, as in say, epoxy coatings, something like that, and you take Part A and mix it with Part B, you could have one set of hazards for Part A and another set for Part B, and then when you mix the two together, you have a totally different situation. Now, how do you address sending MSDSs out to a customer if you're manufacturing this product and then selling it or bringing it to someone else's plant? I assume that while you're making the product yourself and not mixing the two components together, in your plant it would be okay to just have a Part A MSDS and a Part B MSDS since you really shouldn't be mixing the two. But when you then go ahead and have to send out MSDSs to customers, do you send out a Part A and Part B, or do you have to then prepare a Part A, a Part B, and a mixed component MSDS, too, because conceivably you form other compounds? And, also, how should the labeling be covered?

D. McDaniel: Well, basically, as far as Part A and Part B, I am assuming that they are packaged separately. Well, yes, you would have to have separate MSDSs for those. As to the other part of the question, I am not certain that I can answer it entirely. As far as the products that are going to be generated when you mix the two together, say in a manufacturing situation, if the employer or the manufacturing employer is aware of what the chemicals are, then he does have the requirement to inform his employees about those particular chemicals, and also tell them about the hazards regarding the mixture itself. Now where that's addressed in the standard, at this point I'm not real certain. It might be addressed easily on the MSDS per se, Component A as well as B under the precautions for recommended safe handling. Additional statements can be added down there to really cover all of that.

Response: So you say we really wouldn't need a third safety data sheet?

D. McDaniel: I'm not saying a third data sheet wouldn't be necessary. I am saying that under the precautions and reactivity portion of the MSDS, you might be able to address it there. If the manufacturer or the chemical manufacturer feels a third one is appropriate, since he is aware of the specific chemicals that are generated and that they are hazardous, then that might be the other avenue. There may be several ways to address the problem. A third MSDS may be one way.

Question: The way I understand a standard, we only have to put hazardous materials on the label or on the MSDS. We don't have to divulge total formulations in the case of mixtures. Is that true?

D. McDaniel: The chemical and the common name of all ingredients determined to be physical hazards or health hazards must be on the MSDS.

Question: When we do put on physical and chemical hazards, do we have to give exact percentages or can it be a range?

D. McDaniel: You don't have to give percentages at all.

Response: So, according to the standard, all we have to do is just give the name of the chemical hazard. No percentage is required.

Question: Can we talk about training for a minute? I'm with the Hazard Communication Training Center in Washington, DC, which as been recently formed to help people develop training programs in this area to meet the need. But I have a question about performance-oriented training that Al Capuano was talking about. It's a little confusing to me because for many years training people have been trying to develop the concept of performance-based training. The military was largely responsible for insisting that training be evaluated in terms of the product in the sense of measuring what the trainee can perform. Because in the military, if you can't fix a tank, then the training wasn't any good. It doesn't make any difference how big the course was, how long it was, or the quality of the instructor if the tank still doesn't run. So the military insisted on performance-based training on a go, no-go basis. You either do it or you don't do it, according to certain standards. Now we have this performance-oriented training. When I saw that in the regulation, I said, oh boy, OSHA's really going to take the bull by the horns and develop a standard that's going to be based on the actual ability of the training to produce performance in terms of what the employee can do. But, now I understand that that's not really what they're saying. To my way of thinking, it's more of a product standard, that is, if you have MSDSs and you have labeling, and if you have a written program that describes how you're going to carry out your training and several other items, then you've seemed to have met the standard. And so it's really not performance in the sense of the employee performance. There is no requirement to actually demonstrate that he knows what to do other than his ability to pass a test, or to evaluate his knowledge. But it's a little bit different than performance in the way it's been described in other areas of training. I wanted to make a distinction between those two kinds of performances. So to me it's almost a product standard in that sense.

But OSHA, I think, recognized that it was leaving out the quality of training in its standard and developed a document that I don't think has been mentioned yet, which is a training guideline. I don't know the exact title of it, or the date. But would someone like to comment on the training guidelines and how they might be made available to people? Because it does specify in a guideline sense, not in a standard sense, what some of the characteristics of good training are so people who develop their training can incorporate good training principles. Does anyone have a comment on its availability or its quality?

G. Batey: I am probably the one that should have a comment, but I'm not exactly sure what you're talking about. We have a lot of manuals in the office, and I'm not aware of a training guideline manual.

Response: It's about a 30–40 page publication. I think it's called Training Guidelines. I didn't bring a copy with me, but I have one back in the office.

A. Capuano: I know what it is. I have seen it, and I'm sure other people have seen it. It's a very generic approach to ways in which you can go about setting up and doing training. It's very general.

Response: That's true. But it is useful, I think, in the sense of setting up some of the characteristics of an effective training program.

A. Capuano: If you've never done any training before or anything like that, it would be useful to read it. It would give you a base to go by.

Question: Another question for OSHA. In a multifaceted company where you have a large company overall that's rated outside or identified outside the 20–39 SIC code, but there are 300 to 350 different locations, are the locations going to be individually identified, or is the company overall going to be identified as a complier within the SIC code or without it?

D. McDaniel: The way it looks right now is that assuming we go to the various establishments, we will look at the individual work site to see what their primary operation is and classify that under the SIC codes.

Question: I am a volunteer for an organization that deals with this problem of training. I notice that an awful lot of the training and information is to be read, and there are millions of perfectly intelligent Americans who have problems and cannot read. Do you anywhere in your training or standards address this problem?

A. Capuano: I think the standard is pretty plain. It says you can do it any way you want to. There are a lot, as you see, of symbol type systems being used. The one we developed and tested was because we had several illiterate employees at some of our sites. Other people have language barriers, such as Spanish-speaking people who do not understand English. This is where a symbol system comes in if that's answering your question. There are many avenues to get there. So you can use symbols or you can write the words down or whatever you want to use.

D. Webb: Your companies may have standards on the way they hire employees. You were talking about the ones who can't read or understand English at a certain level. That is another problem you have to deal with. If a company has a standard, when a new employee walks in they must be able to read or be able to respond to information given them.

A. Capuano: The system that we developed took the MSDS and put it into a symbolized form. In other words, it took the information from the MSDS and symbolized it. What we did was we put the symbolized chemical hazard summary

sheet, as we called it, in the work areas with the MSDSs. When we trained our people, we usually trained them in the symbols and what they meant. We told them what all the various aspects were and related the labels with everything else. We told them that the summary sheets were going to be available in the work areas as well as an MSDS. You can go to either one you desire to get the information you want. We put these sheets in the work areas and observed the workers on their breaks, at lunchtime, and before and after work to see if they used these books. We found that, by and large, the majority would go to the symbolized sheet rather than read the MSDS. When you first look at an MSDS, you're overwhelmed with all those words. I'm not a scientist, but there are still a lot of things on there the MSDS I'm not sure of. You take an average worker—he's just blown away when he looks at an MSDS. So he'll look over there and see a little symbol which shows a carcinogen on it or shows flammability with a real big fire or whatever your symbol may be. It may be a symbol showing a face shield or some other protective device. He can pick that information up just like that. Workers prefer that, I think, over the MSDS. For those who want more detail, the MSDS is there.

Question: This is to Mr. McDaniel. I want to clarify a point that I think you made when you were talking about categories of information for the MSDS, and about carcinogenicity you mentioned that people were having problems saying "insufficient data" or "no data available." First of all, is that correct, what you were saying?

D. McDaniel: I used the carcinogen category as an example, but the thrust of my statement was that each of the categories that is mentioned in the standard for MSDS must be addressed. The reason the standard says that is because the MSDS can take any form. It can be on a computer printout form or it can be on just a regular typed page, so each of those categories must be addressed. If there is insufficient information in one area, say, for instance, under physical hazards for flashpoint, or for some reason there is no data available, then you just must indicate that no data was available on that item.

Response: I understand that point. When it came to carcinogenicity, though, I did not see a separate line item in the standard that would have to be on every MSDS.

M. Freifeld: Carcinogencity is not a line item. You're right about that. So if the material is not carcinogenic, there is no evidence to indicate that; I don't think you have to fill in the blank and say there is no evidence about carcinogenicity.

Response: That was my interpretation. I just wanted to clarify that based upon what you had said.

M. Freifeld: Just the large blocks of categories have to be filled in to avoid a blank. You don't have to list every health effect you didn't find.

D. McDaniel: Carcinogenecity may have been a good example.

A few minutes ago I mentioned that in response to a question whether there is a focal point in the National Office that is collecting information, questions and answers. I gave you Jennifer Silk's number. It might be premature if you are planning to talk to her this week or next week, since they are still in the process of collecting the information.

Question: I'll address this to Dean McDaniel. I think I misunderstood an answer to one of the earlier questions. If you've got a substance and the label has a chemical identifier with cross references back to the MSDS, and you've listed specific chemicals on the MSDS that correspond to health and physical hazards, my understanding then is that I do not have to put the specific chemicals on the label if I have them on the data sheet.

D. McDaniel: That is correct.

Question: What are the best sources of information about the symbols that have been generally adopted, or is there a great deal of flux in the area of symbolism at this point?

A. Capuano: That's the big problem because everybody has their own little system, and they vary quite a bit. There are many: the National Paint and Coating Association, and the one we have at ICI. There is one in Canada. J. T. Baker's got one. They're just all different, though some have similar symbols. What you have to do, if you're looking for one to adopt or to use, is to try to figure out just exactly what you need to have on the label, what most appropriately does the job of getting that information to the worker, and then take an existing system or come up with one of your own. It's a problem; there is no standardized label. We tried to get ours to be accepted by OSHA, but they didn't accept it.

M. Freifeld: I've got something I could add to that. There is an ANSI standard being developed, Z–535, that deals with symbols and colors. Now, it is not designed specifically for MSDSs or for labels, but nevertheless the symbols that they're talking about have been tested, and, you will note, that Al keeps talking about testing, which is very important. It's easy to design a symbol for something that means something to you. The question is does it mean something to the worker or the general public who looks at that? And I think that would be a good source as a start if you are going to use symbols.

A. Capuano: Belinda Collins has done a lot of work on this, and we get a lot of our information from her. Her study has been going on for quite some time. It concerns shapes, colors, and symbols people prefer to see and prefer to look at. The study shows that you actually prefer certain shapes over other shapes. I think that would be something good for anyone to look at when it finally comes out.

M. Freifeld: If you're really interested you can contact Belinda Collins at the National Bureau of Standards. Actually it has about four or five parts to it. Some are more ready than other, but she will be glad to send you a draft.

Question: I have a two-part question. One deals with the uniformity of the safety data sheets, and the second part is in the legal arm of which branch of government that would enforce it. Suppose you found a deletion of information on a current data sheet that was probably intentionally deleted or not included for the benefit of being able to sell the product. The first question I would like to ask is: Why is there not a uniform safety data sheet program? For example, the major chemical companies do not have uniform MSDSs. Whenever an end user like the company that I represent orders mineral spirits, and it's a Shell product, for example, it has an MSDS with about four pages. If it's a small distributor, he'll have his own MSDS, and he won't have anywhere near the information that the larger chemical companies are able to put on the document. I was wondering, Is anyone working toward standardization of safety data sheets? Because I've got several in my files that are on the same thing from different companies, and they're never the same.

D. McDaniel: No one is working on the standardization of the MSDS, and the reason why is that in the rule-making process, one of the things that was brought out by a number of companies, was that it would be an additional cost to them to come up and meet a specific form. Many companies had already programmed in their computers the format that they were going to use. If the Agency was going to come out and require a specific type, then a lot of people would have to go back and just overhaul existing systems. That was costed out, as I understand, in the cost estimates of the standard itself. It was finally determined that if the standard were performance oriented, it would allow existing programs, as long as they met the intent of the standard, to stand without employers having to go back and make major changes in their programs. That's the reason the standard allows the MSDS to be any type of form, and that is the same reason why there will not be a standard form come out as far as the regulation is concerned.

D. Webb: We represent the E-34 Occupational Health and Safety Committee of ASTM. We were developing a standard MSDS. When Jim Brower took over that task group there were several years worth of prior effort put into it. When OSHA drafted its standard, our MSDS lost support, and a vote was taken by the membership of E-34, and the MSDS effort was defeated. Companies really didn't want the MSDS standard. We've tried it, and the efforts to develop one weren't supported.

Mr. Freifeld: I think the question is when you have a given product, and you get two or more data sheets from different suppliers and they don't agree. Isn't that the question.

Response: That is right, that is part of it. Well, especially when you have a bargaining unit to deal with. You have to explain to these employees that, well, your purchasing department over here is buying different ones, one is cheaper, so they get it from them, but their safety data sheets are different and the employees are trying to explain to them that this is the same stuff. Well, it's

certainly not the same, it doesn't look the same, some of the percentages are even different, some of the descriptions are different. It can be just straight mineral spirits, and if you get it from Shell, you get a real nice printout with four pages. If you get it from some smaller company, it's a little thing, and that's it, with NA's all over it, no chemical family name, no components, and you have trouble selling that to an employee. So for the second part of my question, what is the legal arm of the government that may enforce intentional fraud?

G. Batey: Well, OSHA's going to be looking at the MSDS once the new standard becomes effective to make sure they're proper. How this is going to be done is another question. Are we going to go in and look at all your chemicals and then look at all of your MSDSs or just pick a few out and try and see if they're correct. But I'm sure that obvious things, such as where we get MSDSs that don't agree, we will be taking a look at those.

Question: One of the things I want to avoid is running into this with the DOT (Department of Transportation) and everybody else fighting over who is to prosecute. Sometimes it is unclear who the actual person is that bought the product and who is having the problem with it; we don't really know who to call for enforcement. It's not always OSHA; it can be DOT, if it is something that is transported or shipped, before it goes in the plant. Excuse me if I'm wrong. Is that not true?

G. Batey: In transit, it's DOT's responsibility.

Response: Well, it's got to be shipped and sent.

G. Batey: Once the containers are in the plant, then it is OSHA's responsibility.

J. Brower: I would just like to add a comment to what he mentioned about the MSDS variability. You don't have to get the complex mixtures to see these problems. Just take phenol, and go look at Kodak's MSDS for phenol, or J.T. Baker's, or Fisher Scientific's, or any of the other companies that are reputable companies, and you will see a wide disparity of information that's on these sheets. And if you take the chemical name off it, you'll be wondering if they're talking about the same compound. It doesn't matter that you're dealing with two-page versus four-page sheets. These MSDSs are two-page sheets or three-page sheets of comparable length and complexity, and there's a wide difference between something simple like phenol.

Response: Well, what I really was referring to was your larger companies; of course they address them, and they do have variable formulations, but what I'm talking about is "not applicable," "does not apply," all those deletions you see on the MSDS. I think that one of the things that behooves the manufacturers' representatives who actually use these MSDSs in their plants are to stop these things in your purchasing department. You're going to have to have them send those things over, and if they don't state on there what they are, if they're not acceptable to you, I think that the proper place to do it is to

turn it around in purchasing. And that's probably what we're moving toward doing.

A. Capuano: I was going to say that. That same question came up with our people at plants that are having the same problems you're having, and somebody said once, and I agree with them totally, that this standard is going to give toxicologists and hygienists a job for a long time to come. And the reason you had to pay more for your Shell product is because they had to pay those toxicologists to make that MSDS up. The standard requires a manufacturer to put that information on the MSDS and make sure that it's correct. And what we're telling our people now, if you've got hygienists and knowledgeable people like that who are knowledgeable on your site, set up some kind of a review group to review all the MSDSs coming in. If you don't have knowledgeable people, what we're telling them is if you have two MSDSs that come in and they really differ, send them back and challenge that person you got them from. It's up to them to make sure that it's right.

J. Brower: Dean, I have a question for you that has been brought up by toxicologists in evaluating materials for the MSDS. In the standard, they seem to have gone from a performance standard to a specification standard on defining hazards such as high hazards and low hazards, and they have very rigid criteria based upon inhalation, oral exposure in the white rat, and specify the white rabbit for skin exposure criteria. I wonder if you might be able to address the issue of how does one standardize these hazards when you're talking about animals other than white rats and rabbits, especially if there's no data on white rats or there is conflicting data.

Mr. Freifeld: Can't find anyone wants to answer that one. You're asking a toxicologist that question, I take it.

J. Brower: I think I can ask the panel because the OSHA standard is fairly specific on what it's asking for. How would OSHA recommend someone dealing with that situation in defining the characteristics of a hazard? For example, dioxin. It is said that it is the most highly hazardous material known. Well, it is to guinea pigs, but it's not to rats.

D. McDaniel: I'm not sure I really understand what you're asking.

J. Brower: How does one apply the specific criterion in the standard to defining hazardous categories when it's only based upon the white rat. What if we have disparate data between species or no data on white rats.

D. McDaniel: As far as the standard is concerned, it says you need to consider all studies that are conducted in accordance with established scientific principles. If there's one valid study that supports, say, that a certain chemical is a carcinogen, or a certain health effect will result, then you need to include that in your determination. But on the other hand, if there are other studies that contradict that, you can include that in your hazard determination also. The

standard does allow you the flexibility to recognize that there are some limitations and that there are conflicts in scientific literature.

Question: This is in reference to various suppliers of the same compound. Let's say you use five different suppliers for carbon monoxide, for example. Do you have to maintain each supplier's MSDS on file in the workplace for the employee, even though it's the same material?

G. Batey: No, I don't think so. I think as long as we have an MSDS on file you're in compliance.

D. McDaniel: Our original response is no, as long as you have the MSDS. However, I'll have to qualify that. A lot of times certain products have various inhibitors and that type of thing in them. Assuming that it's not jaded by the fact that there are different types of inhibitors, as long as you have an MSDS, then that would be fine.

G. Batey: I think one of the problems you're going to find out there is that you're going to have, as was brought up, ten different kinds of MSDSs, and if you can get one that tells your people exactly where to look and how to do it, it's going to help you enormously.

Question: Can you use your own discretion to choose what you feel from a hygienic standpoint is the best MSDS and provide that to your employees?

D. McDaniel: As long as it has the proper material on it. Another aspect to your question is, first of all, if, say they have bottled CO out at the plant, and it's got a certain label on it, and it's sent in by one manufacturer, and then you have a second bottle that goes under a different name. The other problem you may run into is that the employee is supposed to be able to look at the label and track that back to an MSDS. If you've got one for both products, you're going to have to have some kind of cross reference, so from a simplicity standpoint it might be easier to go ahead and maintain two, although maintaining one would probably meet the intent of the standard.

D. Webb: I've got two quick questions for Dean McDaniel. Question 1: Concerning the 1% criteria for hazards or, in the case of carcinogens, content of mixtures. How was this level determined?

D. McDaniel: I was looking over the preamble to the standard during the last part of the discussion. I believe I know where the 1/10th of 1% came from on carcinogens, and that's the existing cutoff under the vertical OSHA carcinogen standards. Under the current OSHA regulations that cover carcinogens, and I think 1910–1003 through 1014, the minimum cutoff is 1/10 of 1%. As far as the 1%, I can't answer the question. Looking at the docket, there was some concern as to whether that 1% was really overprotection or really went too far, and I don't know who suggested the 1%. There is another angle to the standard that you might want to be aware of. The standard does include a statement that if

the evaluator becomes aware of chemicals that are present in a mixture of less than 1%, if those chemicals in that mixture might pose a serious health problem, then they're obligated to go ahead and put that in their hazard assessment and include that in their MSDS.

D. Webb: The second question. In the case of a medical emergency in which an emergency medical technician or other emergency worker such as a firefighter needs to know the identity of a trade secret substance, how would such information be obtained? Would a physician or nurse need to be consulted to get this information?

D. McDaniel: The answer to the question is, the standard is very specific, it does say that a doctor or nurse has to determine that a medical emergency exists, so that basically is the bottom line, that a physician or a nurse has to make the determination. Past that point is when the chemical manufacturer is obligated to release the trade secret information.

Response: So you're saying in the case of an emergency like Bhopal where there wouldn't necessarily be a nurse or doctor on the scene that it's not going to be possible to get that information if it is a trade secret.

D. McDaniel: Yes. You've got two separate situations. This standard only applies to an occupational setting where people are employees in an establishment. This is not intended in any way to be a community protection standard at all. Community protection is beyond the purview of OSHA. We do not have the Congressional mandate to regulate chemicals as far as community exposure, so the Bhopal exposure would not be applicable here.

Response: Bhopal was a problem within the plant as well as in the community. So it's not the best example. In a case where the exposure was limited to a plant site then, you would have to go get a doctor or nurse.

D. McDaniel: Right.

Response: The fire fighters could stand there.

D. McDaniel: Right. I have thought about this. Many times your medics on the scene are reporting to a physician either by radio or by telephone about the condition of the patient, and at that point the medical emergency can be determined by the doctor or the nurse once they have data from the on-site person. The standard doesn't prohibit that.

Question: We have been talking about the possibility of having several MSDSs which may have differing information on them. If you, as an employer, accept the information on the MSDS, you may do that. If you don't, you may do testing on your own and use that information, if I'm not mistaken. If you decide to accept the information on the MSDS, who would be liable if it's wrong?

G. Batey: The employer would be, the employer that we inspect. We will

issue the citation against that particular employer, not the one who issued the MSDS. That's the way the law is written.

D. McDaniel: The way you pose the question, there are only two alternatives. One, you know, if you get bad information or get insufficient information, is either you do your own testing or you go back to the manufacturer. Assuming that you go back to the originator and you don't get a sufficient answer or what you consider to be an adequate answer, there is an alternative, and that is to refer the matter to OSHA to indicate that you don't have sufficient information and let the Agency make a determination, and if legal action is appropriate, they can take that.

Industry Programs

Thomas F. Evans[2]

Federal Versus State Hazard Communication: A Chemical Industry Perspective[1]

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By now, most employer manufacturers have either read the federal Occupational Safety and Health Administration's (OSHA) Hazard Communication standard published in the Federal Register on Friday, 25 Nov. 1983 or possibly have obtained a summary overview of this Department of Labor regulatory action. The previous assistant secretary of Labor for OSHA, Thorne G. Auchter, said that he thought the standard represented the most comprehensive, significant, far-reaching regulation published by the agency since the passage of the act by Congress in 1970. In this paper, I would like to provide some of the background that led up to this regulatory action, consider some of the effects of the standard, and discuss the responsibilities of the industrial community.

The rules and regulations of the federal OSHA Hazard Communication standard are basically designed to require manufacturers and employers in the manufacturing section to inform their employees about the hazards of the chemical substances to which they are or may be exposed and how to protect themselves accordingly on their job. Information about hazardous chemicals is to be conveyed by hazard warnings on labels, Material Safety Data Sheets (MSDS), and education and training programs in the workplace.

[1]Due to the nature of the subject matter, this paper has not been updated. It appears as written for the March 1985 symposium.

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A somewhat similar information flow concerning hazardous chemicals is already mandated by other laws for certain sectors of our society. The lion's share of the public today really has no appreciation of the number and scope of the laws passed by the federal government that deal with information about chemicals. The Occupational Safety and Health Act (OSH Act) of 1970 gives the Department of Labor the mechanism to deal with our nation's workplaces. The Toxic Substances Control Act of 1976 gives the Environmental Protection Agency regulatory powers over all chemicals in the environment and provides public access to information by request. Under Clean Air and Water Laws, the public has access to information about chemical releases and environmental project details. The Resource Conservation and Recovery Act gives the public information on hazardous wastes. The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) exists for agricultural chemicals, the Food and Drug Administration (FDA) for drugs and cosmetics, The Department of Transportation (DOT) for transportation of hazardous substances, and the list goes on. Many of these laws preempt state rules and preserve uniformity in definitions and classification of hazardous air pollutants, or whatever, from one state to another. Experience indicates that a few of our citizens have sought information provided and made available by these laws.

Back during the middle-to-late 1970s, the Environmental Protection Agency (EPA) and OSHA independently began to work on what then was called a chemical labeling rule. In late 1980, the EPA decided that there were too many cooks in the kitchen, and they dropped out and left the matter in OSHA's hands. On the final day of the Carter/Bingham Administration, OSHA issued its proposed Hazard Identification standard requiring classification, identification, and labeling of hazardous chemicals in the workplace. Industry opposed this proposed rule because it was costly and unworkable, not because of the concept of practice of hazard communication. Under the new administration, Secretary Donovan withdrew this proposal in March of 1981. One year later, OSHA reissued a revised federal proposed standard, now entitled "Hazard Communication." This proposed rule included similar requirements of evaluation, classification, identification, and labeling of chemicals but added an important feature that required that employers train and educate their employees who work with these substances. Following a regulatory hearing and the submission and review of public comments, OSHA responded by publishing its final federal standard on 25 Nov. 1983. The standard requires chemical manufacturers and distributors to label shipping containers and send MSDSs to manufacturer's purchasers beginining in November 1985. The rest of the standard's requirements go into effect in May 1986.

During this rather long and drawn out period of time, labor and various public interest groups became disenchanted with the federal government and further became convinced that they were going to do nothing. Labor used the issue to rally their members, and, together with state legislative sponsors, moved into the void created by federal inaction and initiated what we know today as the Right-to-Know movement.

At this stage of its evolution, the right-to-know issue had moved into the public arena as strongly as it started in the workplace. The right-to-know issue itself does not regulate or limit the manufacturer of chemicals; it does not protect workers or limit exposure levels; nor does it regulate the transportation of chemicals. The issue deals simply with the information about chemicals, their hazards, their health effects, and protective measures.

Why is it such an issue? Perhaps an oversimplified answer is "chemophobia," the fear of chemicals spawned by Love Canal, Kepones and asbestos, polychlorinated biphenyl (PCBs), and more recently, of course, dioxins. People naturally fear hazards, and the less they understand, the greater their fear. For some, the right to know is only a chemical identity disclosure. Sheldon Samuels of the AFL-CIO has said, "Nothing is more important than the name of the chemical."

General Effects

The effects of this new standard go beyond the chemical industry. Contrary to critics of the new rule, this is the most comprehensive, far-reaching rule ever generated by OSHA over its 13-year history. This federal standard will have a salutory effect upon all industry, not just the chemical or manufacturing workplaces. If its effect can be measured by fewer occupational injuries and illnesses over years to come, the standard will prove to have a most beneficial effect. Over the last three years, the chemical industry has been rated either the first or second safest manufacturing industry in our society, second only to the airline industry [*1*].

The good performers will improve even more, and those poor performers will improve significantly as employers learn to understand and implement the new Hazard Communication standard. Employees who are trained and educated will not only be safer and healthier, they will be more productive and happier employees as well.

How does the chemical industry feel about this regulatory action? Speaking at least for Monsanto and the Chemical Manufacturers Association, we believe very strongly that all employees have the right to know, and indeed must know, about the hazards of the substances with which they work or to which they may be exposed in the workplace. And, they must know how to protect themselves on their jobs. We are very much in favor of a uniform, cost-effective federal regulation, and we believe that its overall effect throughout industry will be positive.

Criticisms of the Federal Standard

There is what has been characterized as a misguided concern that the federal standard does not cover a broad enough range of hazardous substances because it includes only the OSHA Z and the American Conference of Governmental Industrial Hygienists (ACIGH) lists plus the International Agency for Research

TABLE I—State law hazardous substance lists.

List	PA	NJ	MA	IL	NY	Federal OSHA
EPA Toxic Pollutants and Hazardous Substances (Clean Water Act of 1977)	X	...	...	...	...	...
EPA Hazardous Air Pollutants, Sec. 118 Clean Air Act	X	...	...	...	...	...
EPA 1st of Restricted Use Pesticides 40 CFR 162.30	X	X	X	...	...	...
EPA CAG List	X	...	X	...	...	...
OSHA Z List	X	X	X	X	...	X
IARC List	X	X	X	...	...	X
NTP List	X	X	X	X	...	X
NFPA 49	X	...	X	...	...	...
NFPA 325 M	X	...	X	...	...	...
ACGIH	X	X	X	...	...	X
NCI	X	...	X	...	...	...
DOT	...	...	...	...	...	...
NIOSH Recommendations for Occupational Health Standards	...	X	...	...	...	...
New Jersey Environmental Hazardous Substance List	...	X	...	...	...	...
Nonhazardous Chemicals	...	X	...	...	...	...
Occupational Health Guidelines for Chemical Hazards—NIOSH	...	...	X	...	...	...
RTECS	...	...	...	...	X	...
MSDS List	...	...	...	X	...	...
Evaluation of Chemicals	...	...	...	...	...	X

on Cancer (IARC) and National Toxicology Program (NTP) lists for potential carcinogens, while several state laws include lists of a few hundred more substances. Table 1 compares the hazardous substance list in New Jersey, Pennsylvania, Illinois, Massachusetts, and New York with that defined by the federal OSHA standard. Examination of this table clearly indicates that a substance classified as hazardous in one state may not be so classified in another. Critics of the federal standard tend to ignore the feature that requires manufacturers of chemical substances to evaluate all other products and process intermediates produced in their workplaces and classify them hazardous if they meet the strict guidelines of the standard. In this way, the OSHA rule covers all toxic chemicals, not just the few listed in the somewhat expanded lists in some of the states. By this comparison, the federal standard covers more substances than are listed by the Registry of Toxic Effects of Chemical Substances (RTECS), which includes over 60 000 chemicals. Many custom-made trade name chemicals do not appear on any of these lists. Blends of lubricating oils and miscellaneous polymers provide examples of many of these trade name chemicals.

There is concern that the OSHA standard covers only SIC Codes 20–39 and leaves many employees of downstream users of chemicals unprotected by the standard. There is no denying that OSHA limited coverage to the manufacturers

in an attempt to minimize the enormous cost to the economy that training would impose on employers. To calculate the cost of training in industry, the regulatory agency must take into account all employees working in the manufacturing community, multiply a given number of hours per year that an employer would have to spend with each employee to train and educate him, and multiply that by a given wage rate to provide a final cost. These costs, when calculated, will exceed several billions of dollrs. Worker coverage is, however, far more complete than it appears. OSHA realized that by including all producers and distributors of chemicals under the standard, the force of the market will cause copies of the MSDSs to be readily available and distributed to all sectors of the employer community. Employees in businesses not covered by the Hazard Communication standard also have access to health and safety information about chemicals to which they are exposed under the authority of the Access to Exposure and Medical Records standard [*2*], a feature little understood by the employer/employee community.

Another feature of the OSHA rule that has probably received most criticism concerns trade secrets. You hear frequently how more stringent controls exist in some of the states that limit employer claims for protection of proprietary business information. This is nonsense. I know of no state right-to-know law that does not allow a manufacturer to make a claim for trade secret protection. The federal standard gives an OSHA compliance officer the authority to pass judgment on such a claim, while the states give this authority to one of their departments of health, labor, or environment. In any case, under any system or law, if disagreement exists on disclosure, the courts will make the final decision.

The effect here upon industry is obviously one of frustration, confusion, indecision, and inability to comply with the federal and the many state right-to-know laws at the same time. The new OSHA federal Hazard Communication standard becomes effective in two years. Some state rules are already in effect.[3] The challenge of complying with all the rules that have been legislated so far, as well as the federal rule, is destined to be a nightmare. To complicate this confusion and frustration, manufacturers find that they need a judgment from the lawyers and the courts on the preemption issue.

Section 18 (*a*) and (*b*) of the Occupational Safety and Health Act says:

(*a*) "Nothing in the act shall prevent any state agency or court from asserting jurisdiction under state law over any occupational safety or health issue with respect to which no standard is in effect under section 6."

(*b*) "Any state which, at any time, desires to assume responsibility for development and enforcement therein of occupational safety and health standards relating to any occupational safety and health issue with respect to which a federal standard has been promulgated under section 6 shall submit a state plan for the development of such standards and their enforcement."

[3]Effective dates of right-to-know laws: California, 21 Feb. 1983; Illinois, 1 Jan. 1984; Massachusetts, 28 Sept. 1984; New Jersey, 29 Aug. 1984; New York, 26 June 1980.

The new OSHA standard has been promulgated under Section 6 of the act. This is also the same issue that the states are addressing in their right-to-know laws. The legal community says that since OSHA has effectively addressed this issue with a Section 6 standard, Section 18(*a*) does not grant any state the

TABLE II a—Government hazard communication or right-to-know requirements through 1984.

Federal Regulation

Occupational Safety and Health Administration Rule, 29 CFR 1910.1200

State Right-to-know Laws

Alaska[1]	Chapter 93 (1983)
California[1]	Chapter 2.5 (1980)
Connecticut[2]	Acts 80–130, 80–257, 82–251, 83–511 (1980, 1982, 1983)
Delaware[3]	Chapter 344 (1984)
Florida[3]	HB 426 (1983)
Illinois[3]	Public Act 83–240 (1983, 1984)
Iowa[1]	S.F. 2248 (1984)
Maine[3]	Chapter 568 (amended 1983)
Maryland[1]	S. 754, H. 1095 (1984)
Massachusetts[3]	Chapter 149, House Bill 6710 (1955, 1983)
Michigan[1]	Act 51 (1980)[4]
Minnesota[1]	Chapter 316 (1983)
Nevada[1]	NRS 618 (1983)
New Hampshire[3]	Chapter 466 (1983)
New Jersey[3]	NJSA Chapter 34, Section 5A-1 et seq. (1983)
New York[3]	A-71030-D (1980)
Oregon[1]	Chapter 22-015 (1979)[4]
Rhode Island[3]	Chapter 18, Title 28 (1983)
Virginia[1]	Chapter 6, Article 9, Section 32 (1977)[4]
Washington[1]	49.17.220 (1962)[4]
West Virginia[3]	Chapter 21, Article 3 (1981)
Wisconsin[3]	Chapter 364 (1982)

Community Right-to-Know Ordinances

Campbell, CA	Sacramento, CA	Ventura City, CA
Carlsbad, CA	Sacramento City, CA	Vista, CA
Chula Vista, CA	San Diego, CA	Watsonville, CA
Del Mar, CA	San Jose, CA	Danbury, CT
El Cajon, CA	Santa Clara, CA	Monroe, CT
La Mesa, CA	Santa Fe Springs, CA	Chelsea, MA
Milpitas, CA	Santa Monica, CA	Edison Twp., NJ
Palo Alto, CA	Santee, CA	Pennsauken, NJ
Poway, CA	Sunnyvale, CA	Cincinnati, OH
Rocklin, CA	Union City, CA	Philadelphia, PA
Roseville, CA	Vallejo, CA	

[1] OSHA-approved state plan.

[2] OSHA-approved state plan (state and local employees only).

[3] No approved state plan.

[4] Michigan, Nevada, Oregon, Virginia, and Washington do not have comprehensive right-to-know statutes,but they do have regultations implementing health and safety statutes which address labeling, posting, and/or worker exposure notification.

authority to assert jurisdiction over the issue, unless the state has submitted a plan for the development of such standards and their enforcement under Section 18(*b*). To obtain federal OSHA approval, states must follow the steps outlined in Section 18(*c*) of the OSH Act. To date, some twenty states have passed right-to-know laws—seven operate state OSHA programs, but thirteen do not (see Table 2 for complete list). Traditionally, those state-plan states just adopt federal OSHA standards without change.

In those states that do not have an approved plan, industry believes state regulations will be preempted by the federal standard in all occupational settings. This will occur at least when the federal standard becomes effective on 25 Nov. 1985, the compliance deadline for chemical manufacturers and importers, and, arguably, it could happen even sooner. Now some believe that a state regulation may not be enforced before the effective date of the federal standard, since

TABLE II b—Hazard communication state plan modification.

Region	State	Status
X	Alaska	Proposed standard submitted, final not yet received by Region X
IX	Arizona	adopted identical to federal rule
IX	California	draft submitted to OSHA and will adopt standard which is more stringent than federal rule (applies to all employers, and MSDS must be submitted to state); anticipated effective date 1/86; existing law will sunset
		region plans to accept as equivalent
I	Connecticut[1]	. . .
IX	Hawaii	Region IX has accepted modification which is slightly different from federal rule as equivalent
V	Indiana	planning to adopt identical to federal rule
VII	Iowa	. . .
IV	Kentucky	adopted identical to federal rule (effective 8/84)
III	Maryland	modification submitted; Region III has found inadequate and sent to HQ for guidance
V	Michigan	. . .
V	Minnesota	. . .
IX	Nevada	adopted identical to federal rule
VI	New Mexico	adopted identical to federal rule (effective 6/19/84)
II	New York[1]	. . .
IV	North Carolina	adopted identical to federal rule (effective 2/1/84)
X	Oregon	modification submitted; Region X reviewing for equivalency
II	Puerto Rico	adopted identical to federal rule
IV	South Carolina	adopted identical to federal rule (effective 2/14/84)
IV	Tennessee	adopted identical to federal rule (effective 6/12/84)
VIII	Utah	adopted identical to federal rule
I	Vermont	planning to adopt identical to federal rule

[1] OSHA State Plan says for state and local employees only.

compliance with one regulation, only to have it preempted later by another, could present an unreasonable burden to those subject to regulation.

In OSHA-approved, state-plan states, the OSH Act spells out the procedure to be followed. These states have 6 months to develop a hazard communication rule and submit it for approval. To be approved, the rule must be deemed at least as effective as the federal standard. If different, it must be justified on the basis of compelling local conditions and must not pose an undue burden on interstate commerce. Federal OSHA will make the decision to accept or reject the state rule, and their decision can, of course, be challenged in the courts.

So, does the federal rule preempt the state rule? Does this preemption go beyond the scope of coverage of the federal rule? Does this preemption also extend into the community as well? If this is so, when does it take effect? Is it effective on the date of promulgation of the federal standard or is it effective upon the effective date of the federal rule? All of these are possibilities. Some say that Congress addressed the issue years ago when it passed the Occupational Safety and Health Act of 1970. Experience shows that we are right now subject to several different effective state rules [*3*], so the issue cries for settlement by the courts.

One state court has reacted. The U.S. District Court of New Jersey ruled on 3 Jan. 1985 that the New Jersey Worker and Community Right-to-Know Act is preempted by the federal Occupational Safety and Health Hazard Communication standard in manufacturing workplaces (SIC 20–39). The decision also preempted Community Right-to-Know laws where it was intertwined with the federal standard. All preemption dates were effective upon promulgation of the federal standard on 25 Nov. 1983. Employers outside of SIC 20–39 are not preempted, and all provisions of the state law will apply. We will now just have to wait and see if future decisions concerning the federal suit follow a similar theme.

Legal Effect

What is the effect of all of this? Mass confusion and uncertainty, and in some cases probably the lack of initiation of programs worthwhile to employees and community residents because of all the legal questions that remain unanswered. The obvious effect here is that many lawyers will spend many hours, and many dollars will be spent in court trying to get a judgement so that the employers will know what to do and which master to serve—the federal government or 50 separate governments around the country.

To complicate the legal effect that the promulgation of the federal standard has upon the industry, several unions and public interest groups have sued federal OSHA, contending that the OSHA standard is not strong enough, does not have great enough coverage, and should not preempt the state laws. Several states have also sued OSHA, contending that the standard should not preempt their specific state law [*3*]. When will the issue be decided? Soon, we hope. In

the meantime, what is the effect? Are the manufacturers around the country to comply with the most stringent and detailed provisions of each state law to guarantee that all concerns are in compliance with all laws, or should we just gear our compliance efforts to the federal rule, or should we gear our compliance efforts to a blend of both state and federal rules? For example, the federal standard requires only the trade name of chemical identity on labels, while most states require the chemical name and chemical abstract (CAS) numbers. Inclusion of chemical names on labels as well would ensure compliance to all state laws as well as federal OSHA at the same time. A lot of manufacturing concerns are discussing the issue and trying to decide just what to do. For certain, the effect here is increased legal action. More lawyers and more legal costs.

Cost Effect

OSHA has calculated another effect of the new standard. They have estimated that the new standard will cost the manufacturing community some $600 million to implement. Much of this cost of a performance-oriented-type standard requires that training and education be maintained in each workplace in the manufacturing community. Most of the chemical industry already educates and trains their employees, so this cost will be less for them than for most of the other industries.

Miscellaneous Effects on Industry

Some state rules have more specifications [*4*]. They do not necessarily provide more information for the employees, but they do cost more to provide the same information to the employee. This certainly will affect the chemical industry. It may well affect whether or not employers expand and locate in one state or another. The *Wall Street Journal* on 28 Dec. 1983 [*5*] ran an article that dealt with the concern that states have today about industry leaving their states to seek states where business operating costs are less. Some states, such as Illinois, are attracting new business by offering tax incentives, training bonuses, and the like, so that industry will find a favorable climate. If some of the state rules are costly and still do not provide the employee any more information, this certainly will be a factor industry must look at when it makes decisions where to place new manufacturing facilities for expansion.

Now, let us consider specific provisions of the standard and try to evaluate the effects upon industry. The hazard evaluation feature of the federal standard specifies four lists of chemicals known to all as the base lists of hazardous substances, plus what the manufacturer manufactures that he evaluates to be hazardous. This is fine, but mass confusion exists because each of more than 20 states has different lists of hazardous substances as pointed out in Table 1. If workers do not become confused, employers certainly will.

Consider MSDSs. The chemical industry has had them for years, but now they are mandated, and we must keep them up to date. This is good. The effect

of uniformity will be an improvement. The only downside is that most manufacturers who have good MSDSs will have to revise and reissue them to pick up some of the special features required by the federal standard, including the mixture ingredient level of 1% for hazardous ingredients and 0.1% for hazardous substances classified as carcinogens.

Manufacturers will be forced to reassess all trade secret claims because, if total chemical identity is not revealed, the trade secret notation must be made on the MSDS. If such a claim is made, it will have to be supported. The obvious effect of all of this should produce fewer trade secret claims in the future. Again, however, the varying state requirements, if upheld in the courts, will create a real security problem as individual trade secrets are "registered" separately in the many different states. One state may agree to protect one substance, while another may not agree on the same substance. In the federal standard, the OSHA compliance officer is the first one to pass judgment on the validity of the trade secret claim. In the states, either personnel from the Department of Health, Labor, or Environment will make the decision—all over the country. The nightmare lives on!

Downstream distribution of MSDSs is encouraged by the force of the standard and the marketplace. More information is therefore available to more people, and this is a good result.

On the other hand, with greater access to health effect information on the MSDSs, there obviously will be more health-related complaints—the hypochondria effect may well be realized, and this is a bad effect. More and more claims of health-related problems through exposure will occur. Certainly, some of these claims may be legitimate. However, attempts to get a handle on the real causation for various health problems is going to be a problem. Scientists all over the world, for example, are still trying to sort out the real long-term chronic effects, if any, of exposure to dioxin.

Container labeling provisions in the standard will positively affect one's safety by allowing one to know immediately what he is dealing with. The information on labels and MSDSs, the special, the emergency, and the industrial hygiene procedures reduced to writing, and the requirements of employee training may produce an administrative burden on employers, particularly the unsophisticated smaller ones; but, certainly the resulting effects will be good, as already mentioned. We will have wiser, safer, and more productive workers.

The federal standard, mercifully, does not require that each and every pipe and vessel in the manufacturing areas be labeled like the shipping container. At the national level, the cost effect here would have exceeded $2 to 3 billion. If an employee is asked to clean out or remove a pipeline, the employer is expected to warn and train the employee about how to accomplish the task safely. The employer must reduce to writing procedures for performing these nonroutine jobs in the workplaces safely. Here is simply another example of a good effect of the standard—its performance nature is such that billions of dollars of cost are saved, and yet safety of the employee is assured if the employers do what

the standard says without necessarily being told how to do it. Manufacturing employers will learn more about their own operations right along with their employees and this certainly is a good effect!

An overall effect of the standard will be to bring employers closer to both their trade associations and their regulatory agencies of government, as all parties seek to understand the business they run and are trying to regulate, respectively. Trade associations and government alike will be called upon to consult, advise, and help, while management will become closer to their employees. The industrial hygiene community will become enhanced, and new positions for chemists, engineers, and supervisors will open up to carry out these hazard communication programs. All of these effects are good, and, on balance, the good effects of the new standard far outweigh any costs or administrative concerns.

Employer Responsibility

Now, employers throughout the country have the primary responsibility to maximize the good effects of the new Hazard Communication standard. Employers must read and understand it. We should all read the preamble, as well, to get essential background information. The standard is comprehensive and far-reaching, and, contrary to much of what we hear, is not weak and full of loopholes, as pointed out earlier. It is, however, both cost-effective and performance-oriented in that it tells the employer what is required, but does not tell him how to do it in every case. Another example here concerns in-plant labeling. The OSHA standard does not require that all plant processing equipment and pipes be labeled as long as operating instructions, batch tickets, placards, or signs are available that cross-reference an MSDS in the workplace that provides all of the identity and health and safety information that an employee might want or need about a substance. Labeling of pipes would cost billions of dollars. Here, the information is available but of virtually no added cost to the employer. (The New Jersey law requires that all pipes be labeled.)

We, the employers, have the responsibility to implement this standard in a complete and professional manner. To judge our compliance, if we are in doubt, we should only have to ask one question in our workplaces: "Is all information available to employees in some way and by some mechanism so they know all they need or want to know about the substances with which they work and to which they are exposed on the job concerning health hazards and personal protective measures?" If the answer is "yes," you certainly are meeting the performance intent of the standard and are, therefore, likely in compliance.

The employers with the greatest responsibility, of course, are those manufacturers in the chemical industry who make most of the chemical substances and those who process and use them. All of these employers have a responsibility to make effective and widespread the communication of information about the hazards of chemical substances.

These manufacturers are given the key responsibility of evaluating their chemical products and assessing their hazards according to accepted scientific practices and procedures. The standard does not simply rely on a list of chemicals as do most of the state rules, as we have already discussed. The federal government has placed the responsibility for this determination where it belongs—on the manufacturer who knows his materials better than anyone else and not on a government weighted and impeded by its own inefficiency and bureaucracy. As indicated in Table 1, the states have lists while the OSHA standard has lists plus a requirement to evaluate all substances produced in the workplace. Monsanto products, such as Skydrol and Phos-chek, do not appear on any state list and must be evaluated to determine their specific properties. The employers are given the responsibility to communicate the hazard warnings for these materials to their employees and customer/end users.

Here, the industry has unique responsibility. We must be thorough in our evaluations and complete in our recording of data and findings. We must reveal more of the contents and structure of our products than ever before. All of these responsibilities are designed to improve the safety and health of employees throughout the country.

Employers, I think, have three special responsibilities as a result of the new OSHA standard. These responsibilities give the chemical industry and their related manufacturing associates the opportunity to improve their reputations and image in the public. We can create a better understanding of our industry and our products. We have the opportunity to take the fear out of chemophobia and put the risk of exposure to chemicals in its proper perspective.

Our first responsibility is to open up. We have the responsibility to reevaluate our claim of proprietary business information where exact chemical identity is involved. Reevaluation and reclassification should reduce the number of our trade secret claims significantly. We should only have to ask for the understanding of our reluctance in a minority of cases to reveal proprietary business information when business interest and employee job security would be adversely affected. Employers now have the responsibility mandated by the standard to support and justify their positions on confidentiality.

As we open up, we must extend our communications to the community. The Bhopal disaster certainly focused attention to the issue of community right-to-know, and we must all encourage our plant locations to communicate the same information to the public that we communicate to our employees. Some plant locations have been doing this for years, but others have not. Plant representatives must go into the community and conduct seminars to speak to local civic groups about their plant operations, the kinds of chemicals used and produced, and about any special dangers that might exist. Plant management must participate in emergency planning for the public and provide the technical information on our products to the local emergency response groups and local government officials as necessary. We should not permit the lack of information to be a cause for injuring anyone!

Our second special responsibility is to pass on the MSDSs for our products to nonmanufacturers as well as the SIC Codes 20–39 as needed. Even though the OSHA standard only covers these manufacturers, the force of the marketplace should be sufficient to place this health and safety information about chemicals in the hands of all employees in the workplace who need it. We have the responsibility to make this happen.

Finally, we have what I would call a civic responsibility—we need to save ourselves from ourselves. We have an OSHA federal standard that can be and should be uniformly applied across the nation in all workplaces. Unfortunately, we find ourselves in some 30 different states working hard to create and pass into law state and local right-to-know rules that differ widely enough to create a nightmarish situation for interstate commerce.

Twenty of these state laws have already been passed. It makes little sense to organize state governments to tax their citizens to implement and enforce varying and different state laws when the federal government is already ordained and funded by Congress to handle the job more thoroughly and efficiently at no cost of money or human resources at the state level. Our state governments today have more to do than they can handle, so why get involved in business that Congress clearly assigned by statute to the federal government some 13 years ago.

Industry personnel have the responsibility to inform and educate their state legislators about the preemptive effect of the federal standard and the lack of need for the effort at the state level. We have the responsibility to not be misunderstood: We are not opposed to the right-to-know laws in the states, we only oppose their lack of uniformity; and we endorse adoption of the federal initiative across the nation.

Summary and Conclusions

In summary, the Congress has established the Occupational Safety and Health Administration within the Department of Labor to deal with issues of occupational safety and health. In Section 18 of the Act, Congress has clearly defined the role of the states and demonstrated their concern that varying state laws on the same issue would cause interstate commerce problems for business. Contrary to popular opinion, the federal standard is comprehensive, not weak, and provides more coverage in the manufacturing workplaces in our country than any single state law. The courts will eventually decide the legal issue of preemption in favor of federal OSHA. In the meantime, chemical manufacturers have the responsibility to open up and reassess their claims for trade secret protection and proceed to implement the federal standard in an efficient and professional manner. Injury and illness statistics in the future should show that industry performance has improved and that employees are safer and healthier as a result of this important federal rule, the Hazard Communication standard.

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The Hazard Communication Program at 3M: "You Need to Know"

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ABSTRACT: The organizational structure and diversity of 3M has led to the development of a unique system of hazard communication to meet both internal and external needs. 3M is a diversified manufacturer operating in 53 countries with some 6600 kinds of products with annual sales over $8 billion. The large number of raw materials and intermediates used to make these products dictate that 3M has a large responsibility in regard to the Occupational Safety and Health Administration (OSHA) Hazard Communication standard.

A corporate hazard communication committee representing various staff groups has developed a compliance plan. The Medical Department is taking the lead in this effort. The hazard communication programs can be divided into internal programs and external programs. These encompass and provide direction for the major elements of hazard communication. 3M has adopted the phrase "you need to know" as a catchword of the hazard communication program. This paper describes the various aspects of the 3M compliance program.

KEYWORDS: hazard communication, labeling, material safety data sheets, right to know, employee training, hazard evaluation

This paper describes one company's compliance to the federal Hazard Communication standard. Minnesota Mining and Manufacturing (now 3M) was founded in 1902 by five men who thought they had purchased a high quality corundum deposit in Two Harbors, Minnesota, on the north shore of Lake Superior at the mouth of the Baptism River. The deposit was discovered not to be the high-quality corundum anticipated but a relatively worthless deposit of anorthosite. From these dubious beginnings, 3M went on to make a quality sandpaper that became the standard of the abrasives industry. 3M has grown to

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be a diversified manufacturer operating in 53 countries with some 6600 kinds of industrial and consumer products which include 50 000 individual products with annual sales of over $8 billion. In manufacturing these products, about 60 divisions use over 7000 chemical raw materials and 10 000 intermediates to make the 50 000 products.

This large number of raw materials, intermediates, and products means that 3M has a huge compliance responsibility in regard to the federal Hazard Communication standard. Because 3M has a corporate staff responsible for safety, industrial hygiene, and toxicology, the coordination of compliance efforts falls upon the shoulders of a relative few.

In 1983, when the standard was promulgated, a hazard communication committee was formed of members from Toxicology, Industrial Hygiene, Package Engineering, Safety, Legal, Public Relations, and Industrial Relations. The committee outlined a plan of action for compliance and circulated it for comment to the affected groups and individuals within the company. These comments were used as the basis of a revised document which was then submitted for approval to the general managers of the divisions. After their approval was gained, the plan was signed by the company's presidents.

During the development of the corporate plan, groundwork was already being laid in the staff groups to be affected. The Medical Department was to be the lead group for hazard communication regardless of the specifics of the plan. In anticipation of this, requests were made for additional staff and resources in order to comply by November 1985. A health hazard evaluation form and procedure was being developed for documentation purposes, and the Material Safety Data Sheet (MSDS) form was being revised to more accurately reflect the requirements of the standard. Several of 3M's larger divisions were proceeding with computerized MSDS and labeling programs, as well as compiling or updating lists of hazardous substances in the workplace.

The 3M program that was developed by the Hazard Communications Committee (HC) encompasses and provides direction for the four major elements of hazard communication. These elements are: performing and documenting hazard evaluation; creating and distributing MSDSs; labeling products; and training employees. 3M has a philosophy that 3M employees and users of 3M products not only have a right to be informed about the hazards of the materials they work with, but above all have an obligation to themselves, their families, and their fellow workers to use materials safely. As a result, 3M has adopted the phrase "you need to know" as a catchword of the Hazard Communication Program.

The Hazard Evaluation Process

In order to communicate potential hazards of a material through labels, MSDSs, and training programs, 3M, as an employer, manufacturer, importer, and distributor, needs to determine the hazards associated with the product.

Certain types of products are exempt from this provision of the standard, such as hazardous waste, tobacco or tobacco products, wood or wood products, food, drugs and cosmetics, articles and consumer products, and pesticides.

While articles and consumer products are exempt from certain aspects of the standard, 3M's approach to the hazard evaluation process is uniform for all intermediates and products, including products outside affected Standard Industrial Codes (SIC) 20–39. It involves a stepwise evaluation performed by the corporate Toxicology Department. The first step is to obtain the composition and other information on the product from the manufacturing division. The second step in the evaluation process is to determine the known health effects and physical hazards of the pure substance or, in the case of mixtures, each component of a mixture. Each substance is checked to determine if it is included on the Occupational Safety and Health Administration's (OSHA) Z list, American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values® (TLV) list, the National Toxicology Program's (NTP) carcinogen list, and the positive carcinogens list from the International Agency for Research on Cancer's (IARC) monographs. If a substance appears on any of these lists, it is considered "to be hazardous by definition."

Once the just-cited lists have been consulted to identify the designated "hazardous" chemicals, a search of several common databases is initiated to obtain specific other information on health effects. Included among these sources are:

1. Existing MSDSs (vendor and 3M).
2. ACGIH TLV® documentation.
3. National Library of Medicine on-line databases.
4. Toxicology Services files (these include chemical information profiles, product files, and 3M-sponsored toxicology studies).
5. NIOSH (National Institute of Occupational Safety and Health) and OSHA occupational health guides.

Other sources may be consulted as deemed appropriate or necessary by the reviewing toxicologist.

From the initial literature search, the toxicologist then can assess and determine the adequacy of information available regarding specific health effects. Once this determination has been made, the toxicologist may decide to recommend certain toxicity tests. This is an individual decision involving the professional judgment of the toxicologist. This becomes important in the case of evaluating mixtures. If test data exist for specific effects of mixture, this will take precedence over the data on individual components of the mixture. A general toxicity evaluation involves testing the product for its acute hazard potential. Tests include evaluation of a material's skin and eye irritation potential, sensitization potential, acute oral toxicity, dermal toxicity, inhalation toxicity, and in vitro mutagenic potential. If the toxicologist decides not to test a mixture for a specific effect, he/she must rely on the data for components.

Hazard Communication Program

Basically, the hazard communication program at 3M can be divided into internal and external components. The differences between these two components and how each operates will now be described.

Internal Program

The internal program is designed to ensure that 3M employees are provided with the training and information necessary to prevent adverse exposure to hazards and to allow ready access to information regarding the hazards of chemicals in the workplace. The internal aspects of the program may be broken into three elements; essentially, these are providing MSDSs, labeling containers, and employee training. These three aspects cover the hazards associated with raw materials purchased under specification from vendors and used in 3M facilities, intermediate materials created from the raw materials, and laboratory and factory stock items.

MSDSs

As stated earlier, 3M currently uses over 7000 chemical raw materials. These raw materials are processed into about 10 000 intermediates and 50 000 finished products. From these numbers it is obvious that simply providing MSDSs to manufacturing sites is not a minimal effort. We have found the most expedient system for providing MSDSs on raw materials is to supply sets of microfiched MSDSs to 3M labs and manufacturing sites.

Information on the hazards of these raw materials comes from several sources, the vendor MSDS being the most easily obtained. The vendor MSDS is routinely requested prior to purchase by the Purchasing Department or by the operating unit planning to use the material. Whoever receives the original MSDS makes a copy and sends the original to Toxicology Services, where it is incorporated into the microfiche system. The MSDSs are indexed and cross-referenced by raw material (RM) number, chemical name, trade name, and company name.

A location on microfiche cards is assigned and also indexed. The original MSDS is then microfiched. These microfiche MSDSs and indexes are provided to plants and laboratories. Updates, including new and revised MSDSs and indexes, are sent out on a quarterly basis. When a particular MSDS is superseded by a more current one, the old entry is omitted from the published index to avoid confusion. Many manufacturing facilities will use these MSDSs as a reference for creating hazard information for process standards. The microfiche currently number about 800 and contain about 40 MSDSs on each fiche. Sets of fiche are available to employees in the plant, and copies of individual MSDSs may be made on the microfiche reader printers. The original MSDS forms are filed by Toxicology Services for historic reference.

Currently, personnel limitations do not allow the review of each MSDS

received from a vendor for adequacy of information. This necessitates reliance on the information as it is received, unless inadequacies are discovered by a user of an MSDS. In such cases, 3M will supplement the vendor information. This happens occasionally but is by no means a routine procedure.

In the manufacture of most 3M products, intermediate materials are generally prepared and quite often transported to another plant site and used by another division. A suitable system for preparing MSDSs for these materials has evolved. This requires that the manufacturing division complete a draft of what is termed an Internal Material Safety Data Sheet (IMSDS). In doing this, an individual who understands the material, such as the process engineer, completes a draft worksheet. It includes the composition (the actual contents) of the material as well as 3M identification numbers for all raw materials or other intermediates which are present. Existing information on chemical and physical properties, fire and explosion hazard data, reactivity, stability, and potential hazardous degradation products also are included when known or can be estimated.

Once completed by the process engineer, the draft is forwarded to Toxicology Services where a unique identification number is assigned. The responsible toxicologist then takes the form and determines the hazards of the material as previously discussed in the health hazard documentation process. For all hazardous components of mixtures at 1% or greater by weight or volume (except in the case of carcinogens and other especially hazardous components for which a cutoff of 0.1% or less may be used), the associated effects are incorporated into the IMSDS along with any editorial remarks. The form then goes to the industrial hygienist who incorporates precautionary information and personal protective equipment recommendations. After this input, the form passes through Environmental Engineering and Pollution Control where environmental effects and spill and disposal recommendations are added. The completed IMSDS is prepared in final form by the manufacturing division and distributed to users where necessary.

The IMSDS format is quite similar to that used for 3M products and includes all those provisions required by the standard. Some divisions, particularly those which transfer intermediates to other divisions, have created on-line data bases for the IMSDSs on 3M's time-sharing computer system. This allows access at any 3M site as well as timely updating of information. A similar program has been developed for products and will be discussed in due course.

Labeling

Container labeling is another major area of concern with regard to the Hazard Communication Program. There are four categories of hazardous materials which require labeling: purchased raw materials, intermediates, factory and laboratory items, and finished products. Labels must include the manufacturer's name and address, identity of the hazardous chemicals, and appropriate hazard warnings.

3M relies on the supplier of raw materials to provide adequate hazard warning labels which comply with the OSHA standard on the purchased materials received in the workplace. The program, with respect to labels on incoming materials, involves ensuring that the labels are not defaced or removed. Plant personnel inspect incoming materials to make sure that they are labeled.

Intermediate materials are labeled in compliance with the OSHA Hazard Communication standard by various systems. One of the more sophisticated includes a computer-generated label. This system is used by the chemical resource division within the company. This division produces many of the chemicals that are incorporated into finished products by other divisions. Label statements are written by the toxicologist and entered into the corporate time-sharing computer. The plant then transfers those statements to a personal computer label database. The label contains the container or pallet ID number, lot number, a product code number identical to the one on the IMSDS, appropriate health hazard warnings, the contents which contribute to the listed hazards, and a reference to the IMSDS.

Label statements are generated from a personal computer and printed on label stock. A peel-off portion of the label allows for placing the identity of the material both on the top and side of the container.

Hazards associated with stationary process containers are covered in detailed process operating standards prepared by the process engineer and reviewed by the industrial hygienist. The standard is located at the work station during the process run.

Laboratory stock items may or may not be adequately labeled. Those items which are considered adequately labeled are those which are received from the vendor with a hazard warning label. Laboratories are responsible for determining the extent of their efforts to label unlabeled lab shelf items. One laboratory utilizes various brightly colored stickers to indicate potentially toxic materials, cancer causing chemicals, the availability of an MSDS, and, when no MSDS is available, a name to contact for more information.

Training

Hazard evaluation, MSDSs, and labels are of little value to the employee if he or she is not properly trained in the identification of hazards in the workplace, how to prevent exposure, and how to obtain additional information. Therefore, the training programs at 3M are quite important and are not taken lightly.

The OSHA Hazard Communication standard requires that employees be trained in:

1. The methods and observations that may be used to detect the presence or release of a hazardous chemical.
2. Physical and health hazards in the workplace.
3. Protective measures.

4. The details of hazard communication systems such as labeling systems, MSDSs, and how to obtain and use hazard information.

Within 3M, the training of employees is conducted by the manufacturing facility or laboratory with consultation of the Industrial Hygiene staff at a corporate level. The industrial hygienist assists and provides guidance in the development of a program specific to each facility. The facility-specific program is ultimately designed and written by the plant and approved by the industrial hygienist.

These training programs are part of the overall 3M program entitled "You Need to Know." As part of this overall program, several video or sound/slide programs have been developed or purchased covering such topics as how to read MSDSs and labels, basic toxicology principles and terminology, the handling of chemicals, among others. Video presentations for specific agents such as lead, asbestos, isocyanates, solvents, and dust have been developed. Pamphlets are available to the employees to augment and supplement these programs. Because 3M has been conducting training of all employees for many years, the training provisions of the standard have proved the least burdensome aspect of the standard.

External Program

In contrast to the internal portion of the 3M Hazard Communication Program, the external aspect is designed to communicate product hazards to the 3M customer and the public. The main components of the external program are the product MSDSs and product labeling.

MSDSs

The product MSDS contains all those provisions required by the OSHA Hazard Communication standard. Compliance with the MSDS provisions of the Hazard Communication standard is having the greatest impact on the manner in which the 3M program is conducted. In the past, the MSDS was a one-sheet, two-sided form that was coordinated, printed, and distributed by Toxicology Services. Printing was limited to 75 sheets a run, and the sheets were sent to the customer only upon request. The standard requires a more detailed MSDS with a wider, proactive distribution. It also requires updating within 90 days of the receipt of any significant new data on health or physical effects. To meet this need, 3M has revised the MSDS form, switching to a variable length, free text, computer-generated sheet. This allows the MSDS to be as short or as long as needed and to be remotely printed at a variety of locations such as sales branches, distribution centers, as well as corporate headquarters.

Computerization allows timely and efficient updating of information. Not all divisions require the use of a computer system; therefore, the form also is compatible with word processor units.

Labeling

3M has a committee responsible for generating a set of guidelines for acute and chronic labeling and for determining what hazard data from the product MSDS should be placed on the product label. The guidelines are based on the federal Hazardous Substance Act and the Z.129.1, 1982 American National Standards Institute (ANSI) Labeling Guideline and comply with the OSHA HC Standard. The guidelines cover format as well as content.

With respect to format, there are five integral parts to the precautionary label. These include:

1. The signal word followed by hazard statements.
2. The identity of contents contributing to the listed hazards.
3. General and specific precautions for safe use and handling.
4. Suggested first aid measures and any necessary notes to physicians.
5. A reference to the product MSDS.

Placement of the label text on the container is generally dictated by the conformation of the container. In any case, the text appears prominently and before any other general instructions or statements. On larger containers, the signal word and a statement of the major hazards may appear on the front panel, under the product name, with a reference to the complete text which appears on the side or back panel. On smaller containers, the limited space available may not allow for this.

Typesetting guidelines dictate that the hazard statements be prominently displayed. Signal words are capitalized in bold type, and the hazard statements which follow also are presented in bold type, but not bolder or larger than the signal word. Other sections of the precautionary label text are presented in lower case and less bold than the hazard statements.

The words, phrases, and sentences which are incorporated into the precautionary label are composed by the toxicologist using established guidelines and the necessary application of professional judgment. The signal word, either DANGER, WARNING, or CAUTION, is selected to represent the greatest degree of hazard, be it a physical or health hazard. The signal word is the keynote of the label. Acute hazards may require one of the three signal words depending on their severity; however, where chronic hazards exist, either DANGER or WARNING is used.

The most difficult aspect of labeling is the determination of which hazards to list. The MSDS lists all health effects determined to be significant. Incorporating all of these in the form of warnings in the limited space on a container is not always possible. Furthermore, it may not be appropriate since the toxicologist may be able to argue that the hazard listed on the MSDS will not present itself under ordinary use or foreseeable misuse of the product. Indeed, the OSHA HC standard states that "appropriate" hazard warnings should be included in the label text. We have obtained an interpretation from OSHA that this means the

actual hazards of the material which are likely to be present during use or exposure. At 3M, it is the toxicologist's responsibility to determine the significant hazards from those listed on the MSDS and place these on the label. This requires that the toxicologist take into consideration the form, use, and potential misuse of the product, relative prevalence of various components, and other information on the product in identifying "appropriate" hazards for labeling purposes.

Where space limitations exist, the major hazards are identified and the reader is referred to the MSDS.

Acute hazards can be readily identified and do not require as much judgment as is often needed in identifying appropriate chronic hazards. Test data on mixtures prevail over information on individual components.

Labeling for chronic hazards requires a greater level of judgment. A decision must be made as to the potential hazard from exposure to the product. In some instances, a fair amount of information may exist on the amount and type of exposure producing or not producing a given effect. This information, in combination with information on exposure to the hazardous substance during product use, may allow for a scientifically sound judgment concerning the presence of an actual hazard. However, for certain chronic hazards, notably carcinogens, reproductive toxins, and teratogens, it is usually advisable to identify the chronic hazard regardless of actual exposure considerations.

Trade Secrets

In order to protect the bona fide trade secret to be disclosed to the health professional, the trade secret holder (3M) may require that the health professional provide 3M with a confidentiality agreement signed by the health professional (and the employer or contractor of the health professional's services, that is, downstream employer, labor organization, or individual employer). In the case of a medical emergency, where the trade secret identity must be given immediately to the treating physician or nurse as soon as circumstances permit, that is, after the emergency is abated, the employer (3M) may require the physician or nurse to provide a written statement of need and require him/her to sign a confidentiality agreement.

Summary

The foregoing has given you an overview of 3M's compliance effort in hazard communication. Although almost as complicated as a jigsaw puzzle, the integral parts of these programs fit together to fulfill the worker's "need to know."

Panel Discussion: Industry Programs

This panel discussion was held as a continuation of Section II of the symposium on Industry Programs. The discussion is presented in its original form; it was not peer reviewed. The names of those individuals asking questions are not given; the questions and responses of these persons are listed as *Question* and *Response*.

The moderator was Jules Van Schelt, United Technologies Corp., Windsor Locks, Connecticut. The panel members were: William E. Effron, Atlantic Richfield Co., Los Angeles, California; William C. McCormick III, 3M Co., St. Paul, Minnesota; and Thomas F. Evans, Monsanto Co., St. Louis, Missouri.

Specific Questions and Responses

Question: What is the policy of your company regarding requests for MSDSs from other than purchasers, for example, outside health professionals or consultants?

T. Evans: Some of you may have even seen it in the newspapers; our CEO, Richard Mahoney, has said that Monsanto will make available to the community, individually or whomever, copies of every MSDS of every product we have. To date we've not been overwhelmed with requests, but we did get a request from a hospital in southern California that wants to set up a program where they can be kind of a repository for this type of information. So we're packaging some 1200 MSDSs for them right now. So if you want them, call us up and we'll send you one.

W. Effron: ARCO treats the MSDS as a public document. For anybody who has a legitimate reason for needing one, we will get it to you. We distribute them by individual operating company.

W. McCormick: We also consider our MSDS a public document. However, when I first started at 3M, my first request for an MSDS was for a tape dispenser which we did not comply with.

J. Brower: The topic came up this morning about copyrighting MSDSs. I wonder if any of you know of any industries that copyright them or have any problems of other people using this information freely.

T. Evans: I'm personally not aware of any. I know there are some companies

that maybe have them copyrighted because they're in the business to generate them. I may be doing Genium Publishing Co. a disservice, but I know they have an MSDS service, as others do. I would assume that they're copyrighted, but there's also probably nothing wrong with xeroxing any MSDS you find. I think once it's available it's open season.

W. McCormick: I would tend to agree with that.

J. Van Schelt: A question for Bill McCormick. Minnesota has its own right-to-know law. How has 3M chosen to deal with it versus the federal standard? Are there any significant differences?

W. McCormick: The Minnesota State Right-to-Know Law came into effect before the federal law was promulgated, so we have had to be in compliance with it. The main provision that is different is that for laboratories we have to have MSDSs for all materials in those areas. And the second thing is that the training provision provides that there is a documentation process of who is trained when, which the federal law does not have. Al Capuano said that it is a good idea to document who is trained and who is not. That is part of the Minnesota law, and we feel that's a good part.

Question: I have a question for the three of you. Suppose your company is dealing with the regulations for the labeling of drums, etc. and data sheets pursuant to the OSHA standard, and then at the same time you have to deal with probably similar products that you're marketing overseas in European Economic Community (EEC) countries. What are you doing in terms of trying to maintain consistency of labels for EEC countries and labels for domestic operations?

T. Evans: The European Common Market Community is still in the process of developing an understanding of what they will allow between Europe and here, and it will be another year, as I understand it, before all that agreement is hammered out. So the day of judgment has not come yet. Our position right now is simply that we're going to adhere to the OSHA regulations, we're going to adhere to FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) regulations, we're going to adhere to DOT regulations and force our importers overseas to do what our importers in this country have to do for products received from overseas, and that is apply what's necessary before it leaves the port of embark or debark, whatever it happens to be. An importer is covered under the Hazard Communication standard. Therefore, if he gets something mislabeled or has no MSDS, he is responsible in this country for getting it, or he can't move his product. I assume the same thing could happen in Europe, so until something is hammered out differently, we're just providing what the law in this country requires.

W. McCormick: 3M has a fairly extensive European involvement. We relabel in our Antwerp facility, we relabel for EEC with our five-language label. Where we have a little bit of a problem right now is that there is some disagreement

between our international people and our domestic people about the content of the MSDS. In some ways it is in conflict with what their desires are versus the extensive amount of detail that the new MSDS is going to require. They would rather truncate it or try to keep our old sheets. We're going to be coming out with a new MSDS sheet, and we really haven't ironed out how we're going to treat MSDS for EEC, but all the products are relabeled for Europe.

W. Effron: We're currently doing a fair amount of relabeling for those things that are going into the European community. I do know that there are other major companies who are using two labels, one for Europe and one for the states. They are doing book labels at the site of manufacture. And in those countries in Europe where they are sending most of these products, primarily France and Germany, they have done full text translations of their MSDS. They kind of look the other way when you say what happens because they're in conflict. They have added some phrases, and they are in the process of trying to sort out that difference in making a European version using the data generated in the states.

Question: The courts have said OSHA overstepped their bounds in the noise standard in that they asked the employers to do something that the Act didn't give OSHA the authority to do. On what basis did OSHA say they could require the importers to do some of these things?

T. Evans: If you go back to the regulatory hearing and read the record that was provided when the federal standard was developed, you will find testimony and background that said effectively this. The chemical industry does not believe that OSHA has the authority to regulate in commerce labeling, and that would apply to what you said plus just the mere shipping of materials in this country out of the workplace. But at the same time the position of the chemical industry was to say, even though we agree that you (OSHA) do not have that authority, we do not choose to question it because we think it's the right thing to do. Going back a little further, back prior to the close of the Bingham-Carter administration, EPA was also involved in writing regulations for labeling. One of the last acts of the Carter Administration was to allow EPA to drop out of the regulatory activity and will it all to OSHA. So, whether we liked it or not, letting OSHA go outside of the workplace, we chose not to oppose it because it was the right thing to do, it was best to have only one federal agency involved, and we just thought it was a real good deal. So there has been no legal challenge to that, and I think you'll find that's why.

Question: I am with the health department of a state that has recently considered right-to-know legislation, and one of the things that our health department will be called on to do with the legislature is to provide them with evidence that it is a helpful sort of thing. I wondered if any of your companies, or any other companies that you know of, will be keeping track of effects, doing some sort of evaluation, and are you going to in the long run save money,

make your workers happier, prevent some dire catastrophes? Is anyone planning anything like that?

T. Evans: I'm still not sure I understand the question. Evaluation of what?

Response: Of the implementation and the utilization of the OSHA Hazard Communication standard.

J. Van Schelt: He was questioning whether there's a benefit to the companies for the cost of doing this.

Response: There are a number of things that could be done. You could keep track of the training and how well people learn. You could look at the bottom line, how many accidents you might prevent, if you could somehow determine that; and I think I could think of a few more possibilities.

T. Evans: You may get tired of hearing those of us in the chemical industry say it. But we think we are number one in safety performance because we've been training our people and educating our people because we do have hazardous operations, and therefore you're inclined to tell somebody about it. I don't think there is any question that the Hazard Communication standard is going to improve safety performance throughout the country. I frankly have no doubt that it's going to help improve productivity. You're going to make employees happier. They're going to be better informed, and they're going to feel more part of the operation. Sure, there are some administrative downsides. You've got to keep a few more records and keep track of training, and maybe that's a burden on some people, but in the long run I think you're going to find it both cost effective in terms of the uniform regulation, and it's also going to improve your company's performance.

Question: Tom, could you elaborate a little bit on what Monsanto is doing in the area of community right to know?

T. Evans: Monsanto has announced that it will, as I said a little while ago, make our MSDS available to anyone who wants them. Our plant managers at every site location throughout the country have been urged to go out into the community, talk to the leaders, if you will, talk to the emergency response people, be it fire department, be it public health, be it police, whatever, and express, if they haven't already, their willingness to work with them, to educate the community on what we make in our facilities, and help develop emergency response programs and the like. Sure, Monsanto is a big company, and we can probably afford to do more than most.

We're trying to be as active as we can, and, as I said in my talk earlier, we don't like to be viewed or perceived as opposed to the right to know. We're anything but. But we are opposed to a lot of the varying nonuniform laws and a lot of the onerous provisions required, such as having to inventory, give it a map of where you store every pound of every substance you have in your plant, how often you ship it, what your usage quantities are, what your emissions are for everyone of those substances, etc.

You start to confuse the Bhopal issue with the right-to-know issue, and this is the thing that we're trying to educate the public on and show that there are two needs for right-to-know out there. One is the Bhopal and the other is the workplace that we've been talking about here today. And there is a difference. There's no way you can provide the emission out of a stack for every one of the 50,000 chemicals we have in the country, but there probably are anywhere from 50 to 150 of them that people should know what's coming out the stack. So it's that kind of community right-to-know education program we're trying to do.

J. Van Schelt: I have another written question. If you manufacture chemicals and have a construction division which applies chemicals, are both of these covered by hazards communications training or regulations?

W. Effron: The way that we understand the standard, you have a choice to make. Those that are in the manufacturing SIC codes of 20 through 39, you don't have a choice. They must follow the standard. For the rest of our corporation, we have made the decision that they will also comply, and that was based upon looking at product liability, defending law suits, i.e., having an attorney stand up in front of the jury and say you warned one set of employees against the hazards of this substance, but in the other half of your corporation you did not. I think if you're going to prudently do business in a community, though, you ought to give strong consideration to applying it across the board in your companies.

T. Evans: The standard is very clear about one thing, though. It says that an employer must educate a contractor employer about the hazards of the substances in the workplace. You are not required to train the contractor's employees, but you are required to provide the information to the contractor himself so that he may do that. However, if it is not a manufacturing site, you're not covered.

J. Van Schelt: How do you ensure that each new substance that comes into your complex operations is known? Do you have some kind of control over purchasing? If you have a very diverse operation, people are buying things and the industrial safety department doesn't always have this knowledge.

W. Effron: We have control through purchasing. In our refining division, they have a list of suppliers which we have bought from before. We have requirements that an MSDS and product labels must accompany the incoming shipment. You don't buy anything that is (1) not on the list, and (2) bought through purchasing. If you need something in an emergency, you can get the refinery manager to let you have it for 48 hours. During that time you can try and get the information. If at the end of 48 hours you don't have it, either by telephone to the industrial hygiene or safety people, you cease to use that chemical. We haven't had anybody told that they can't use it any longer. So, yes, we have the control.

W. McCormick: At 3M you can't order the material without a number. It has to have an 11-digit product raw material number that's assigned through

purchasing, and purchasing won't order it unless they can get an MSDS, so that's our check point.

T. Evans: We all must be the same, just have different procedures. There's no way you can use a raw material in a chemical process that you have not used before or evaluated to know how it will react.

Question: I'll address this question to all three of you. What do you do with toxicological data that is not easily interpreted by the lay folks? Do you include it on the MSDS? If you do, how do you interpret it for them? How do you deal with that kind of information?

W. McCormick: Do you have an example?

Response: Well, the two-generation reproductive study on a particular chemical indicating the potential for reproductive hazard in a male or a mutagenesis assay, which one of you mentioned earlier, that you do and include on the sheet. How do you interpret that?

W. McCormick: Ames assay data or mutagenetic assay data that we list on the sheet—we say there's an Ames assay using the following strains with these kind of positive results or the number of increases or something like that.

Response: What does it mean?

W. McCormick: We will say it's a positive mutagen in bacteria. If we don't have any carcinogenicity data, we'll say there may be a potential for a carcinogenic risk. That's the way we translate it in terms of human hazard. We like to try and get as much chronic data as possible to support or discount a mutagenicity assay. However, for reproductive effects, if there is a two-generation study in rats and it shows effects on males, we'll say that the material causes a particular effect limited to that animal, but that it may have an importance to humans.

T. Evans: Again, I guess we all do things the same way, with the same intent, but the important thing on MSDS is to at least identify the hazard or the physiological effect that you've noted. There's no way you can put all of the studies down or you'd effectively have a MSDS as thick as RTECS (Registry of the Effects of Chemical Substances), but I know that if you took Monsanto's formaldehyde MSDS, you'd think you had a pamphlet in your hand. On the other hand, if you take a normal one, it has only two foldover or four sides to the page; I think a lot of it depends on the complexity of the studies that have been done and just how much the public or the workers have to know. With formaldehyde being so controversial, you tend to put more information down than maybe you need to, whereas, on hydrogen cyanide, everybody knows what that is, so you don't need as much.

W. Effron: It is our practice not to give numbers which can't be easily interpreted. We on the outside have watched the toxicologists fight over the numbers for hours and hours, and we don't expect the lay people to try and understand the subtleties of the numbers. So it is our attempt to clarify in terms

that they will understand or warning them of something to do to avoid it. In those instances where supplements to MSDS information are needed and are specifically requested, we will provide numbers to those people capable of interpreting those data.

Question: What do you do with the mutagenicity data? You just don't include it?

W. Effron: No, it is included, but a discussion follows in terms that a lay person can understand.

Response: What do you say if the test is positive?

W. Effron: If the report says that the test has been positive, then in terms that the employee can understand we report that in certain situations this agent causes cancer or may cause cancer.

Response: How about a genetic risk?

W. Effron: I'm going to defer. I'm not a toxicologist.

W. McCormick: We don't address them as actual mutagens. Frankly, if you want to get into the question of whether there really are, in fact, any mutagens or not for humans, it hasn't been established; we don't have a policy on how we consider mutagenicity data in terms of any mutagenetic impact for humans.

Question: What does one do about nonindustrial chemicals? For example, something one goes to the supply store to purchase. Does that come under the consumer product exemption in the OSHA standard?

T. Evans: Believe it or not, the answer to that is yes and no. The consumer products are exempt from the OSHA standard based on labeling. You cannot force an OSHA-type label to be put on a product that's consumed by the public. However, if you're running a shop for a plant in SIC Codes 20 through 39 and you send your lead mechanic down to the ACE hardware store and tell him to bring in a case of WD-40, and he brings it in, and OSHA comes in and finds a can of WD-40 in the workplace without an MSDS to explain the hazards of WD-40 to your employees; technically, you're in violation of the standard. I personally argued with OSHA on that, but technically you read the standard and that's an interpretation that is both accurate and true. So, look at the label and write the company and ask them to send you an MSDS.

Question: Do any of your companies utilize a numerical rating system for assigning health hazards and fire hazards?

T. Evans: We don't. I think you're referring to a program such as duPont has where, depending upon the hazardous condition or environment, they put a number on a tank, and it tells you that if you've got a certain number, you've got to wear gloves, glasses, and everything else. We do not. We simply put up signs and say don't come past here without hearing protection, eye glasses, whatever.

W. Effron: Internally we do not either.

W. McCormick: Neither do we.

J. Van Schelt: Milt, wasn't there a numbering system on one of the MSDSs that you showed this morning?

M. Freifeld: The HMIS (Hazardous Materials Information System) of the National Paint Coating Association, for which I had one slide, did cover coding hazards, and it went from 4 to 0. Also, ICI has a rating system and, as was pointed out, duPont does—a number of companies do. I don't know that it's any better than not having it. As long as you train people to recognize the hazards, I think either way it can work.

T. Evans: That's the beauty of a performance standard.

W. Effron: I wish to comment on Milt's statement. A drawback to doing this is that you're setting up something that is unique to warn your company to your individual facility, and if you do like we do, big jobs between refineries, and one refinery has it and the other one doesn't, that limitation has got to be recognized in dealing with new people that come into the facility. You also have to realize that if you use contractors that information has to be provided to them, because if they're hurt and they haven't had it, OSHA's not going to look kindly, let alone the courts, that you didn't train them or make that information available. It's not an adequate hazard warning, or may not be. Any other kind of numeric code that's introduced may be confusing to the reader.

Question: Would any of the panelists comment on their procedures or systems for classifying materials, especially acute hazards and physical chemical properties. We've heard about reviews and the process of preparing MSDSs, but I didn't hear about systems for classifying hazards so that when materials of similar toxicity or flammability are reviewed they get similar statements and similar treatment. Would you care to comment on that?

W. Effron: We have two different systems that we employ. One takes a look at a number of chemicals coming in the front door and attempts to do some prioritization for the preparation of hazard warnings. It does not assign anything but a category that says No. 1 priority or No. 2 priority to be done after No. 1 is done. And it basically groups them, and we found that to be very helpful. It puts the benzenes and the gasoline up where they belong, and the table salts down where they also belong. The other thing that we do use in the preparation of MSDSs, and this has been under study for about three years in our chemical company (they have about 3000 to 4000 products to do, while the rest of the corporation has about 2000 in total), is to the very specific component information classifications. If you have an LD-50 for a chemical between this number and that number, that fixes you with a signal word of danger. When you use danger on the signal section or summary section of our MSDS related to an eye irritant, it means that you will use the following statement on the MSDS, the following statement on the label. So we have that kind of a system.

W. McCormick: 3M's setting up of priorities in regard to these things has been to go through our high volume material and also look at their toxicity and their volatility and set some priorities on our very large volume things. Those are things we're going to look at first, and we make no assessment as to other hazards for low volume as to whether or not they get any higher consideration.

Question: When you are reviewing an MSDS or drafting one, do you apply a classification system?

W. McCormick: No.

T. Evans: Effectively, we don't either. We evaluate the hazard and then define it just as we see it. It doesn't have a category of either A, B, or C. It's whatever we see it to be.

Other Jurisdictions and Legal Issues

Robert R. Stone[1]

Right-To-Know Legislation in New York State: Provisions and Implementation

REFERENCE: Stone, R. R., **"Right-To-Know Legislation in New York State: Provisions and Implementation,"** *Hazard Communication: Issues and Implementation, ASTM STP 932*, J. E. Brower, Ed., American Society for Testing and Materials, Philadelphia, 1986, pp. 109–117.

ABSTRACT: Many states and localities have passed "right-to-know" legislation in the absence of federal activity in this area. In doing so, they face the dilemma of establishing mandatory informational programs to improve job safety, yet not burdening employers to the extent of losing jobs within their jurisdictions. The Right-To-Know Law in New York State has successfully implemented a program which guarantees employees information on all chemicals for which data exist [as listed in the Registry of Toxic Effects of Chemical Substances (RTECS)], yet has a minimal employer impact. The law is comprehensive in terms of the number of employees and the number of chemicals covered. The smooth implementation of this law is due to reliance on easily available information sources [Material Safety Data Sheets (MSDSs)] and the establishment of a technical resource within the state to assist employers with the gathering of information. This has been particularly important for the smaller businesses that do not retain staff physicians or industrial hygienists. This paper describes the essential features of New York's law and the outreach program that was developed for its implementation.

KEYWORDS: right-to-know, New York State, chemicals, legislation, provisions, coverage, toxic substance, employee, implementation, enforcement, Material Safety Data Sheet, MSDS, Registry of Toxic Effects of Chemical Substances, RTECS, training, record keeping, trade secrets

Paleontologists have characterized ancient man as the "tool-user" not only because he used tools, but because his way of life had become dependent upon them [*1*]. Today, we would have to refer to man as the "chemist." We deal with chemicals every day, both in the workplace and in the home. Chemicals purify our water, clean and insulate our homes, preserve our food, and are required for the manufacture of our clothing, televisions, and automobiles. We live in a chemical society. The question of chemical safety no longer centers

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on avoiding the use of chemicals. Rather, the question has become one of having the information necessary to deal with chemicals intelligently.

Table 1 demonstrates the magnitude of the problem with regard to information on chemicals. We have been producing chemicals faster than the information necessary to deal with them safely. The Chemical Abstracts Service (CAS) announced the assignment of the 6 000 000th identification number in July of 1983 [*2*]. The National Institute for Occupational Safety and Health (NIOSH) Registry of Toxic Effects of Chemical Substances (RTECS), which represents data extracted from over 2000 technical journals, lists only 85000 chemicals at the present time [*3*]. The Occupational Safety and Health Act (OSHA) only regulates workplace exposure to about 400 chemicals [*4*]. There are many chemicals which are not regulated and for which no occupational standards exist; there are also many chemicals which, for safety purposes, must be regarded as hazardous because of insufficient information. However, there is no chemical that is so hazardous that it cannot be used safely if the proper precautions are taken. This information must be available before contact with the chemical occurs. Prior knowledge is required for all activities surrounding the use of chemicals, from the selection of protective equipment to the administration of first aid.

The employer is rightly responsible for maintaining a safe workplace, but this should not exclude the employee from also taking responsibility for himself. The OSHA standards are not intended to shield the employee from knowledge. After all, there are situations which the OSHA standards were not intended to encompass, such as chemical antagonism with preexisting medical conditions, allergies, and chemical sensitivities; they also fall short of addressing the special concerns of women, especially pregnant women, as they have come to represent a larger proportion of the work force. The employee is often in the best position to assess his own capabilities and conditions in regard to the chemical exposures anticipated in the workplace. There are some decisions which the employee must be allowed to make for himself.

Many states, and some cities, have enacted "right-to-know" legislation in the absence of federal activity in this area. These laws require employers to provide their employees with health and safety information on hazardous chemicals. In some cases, it is required that this information be supplied to community organizations, such as local fire companies. The source of the information also varies. The employer may be required to obtain the information from the manufacturer, or he may submit a list of substances to the state, with the state then preparing the information for subsequent distribution to all users.

TABLE 1—*The numbers problem of chemicals.*

Known to science (CAS numbers)	6 000 000 (100%)
Toxicological data available (RTECS)	85 000 (1%)
OSHA regulated (Subpart-Z)	400 (0.01%)

In all cases, the employer or manufacturer must deal with the administrative costs of implementation. Training requirements and the registration of trade secrets also may add to these costs.

Each state then faces a dilemma. How does it protect the worker without imposing such a regulatory burden as to lose jobs to other states with more favorable business climates? All regional programs must compromise between costs and benefits. This compromise is most often reflected in a limitation of the number of chemicals or people covered. In theory, federal legislation would not face this dilemma and could impose as stringent a set of requirements as deemed necessary. The added costs would be independent of locality or state. Yet even the proposed OSHA Hazard Communication Standard [5] limits coverage in both areas. The number of chemicals is limited to a few hundred, and only employees in certain industry codes are covered.

It is worthwhile reviewing the chemical coverage of the Hazard Communication Standard, both for the comparison with New York's Right-To-Know Law, which is the topic of this paper, and because of the confusion surrounding this subject. Both programs cover substances explicitly through lists and implicitly through determinations. Explicitly, OSHA states that a "floor" of substances will be regarded as hazardous under all conditions of use. This floor is composed of substances appearing in OSHA Subpart-Z or in the American Conference of Governmental Industrial Hygienist's (ACGIH) "Threshold Limits for Chemical Substances and Physical Agents in the Work Environment" (latest edition). Subpart-Z, which contains 411 substances, adds only 7 to the 626 listed by the ACGIH, for a total of 633. Those familiar with the origin of Subpart-Z will not find this surprising.

Appendix A of the standard states that carcinogens are to be automatically considered hazardous and refers to lists of substances prepared by the National Toxicology Program (NTP) and the International Agency for Research on Cancer (IARC). The NTP list represents only positive findings of carcinogenicity and currently contains 118 substances. Only 65 new chemicals are added to the "floor." IARC has evaluated 288 substances but finds sufficient or limited probability of carcinogenicity on 233 substances. Only 113 are not represented on other lists. It also should be remembered that many of the substances evaluated by IARC and NTP are food or drug related [aflatoxin, diethylstilbestrol (DES)] for which occupational exposures are unlikely to be of concern. If industrial processes are included, only 822 unique items appear on the four lists. This should be compared to the explicit coverage of the right-to-know law of 85000 items.

Implicit coverage of chemicals under the two programs is likewise different. OSHA calls for manufacturers to evaluate products under a set of guidelines supplied in two mandatory appendices. The Right-To-Know Law adds any chemical that "has yielded positive evidence of acute or chronic health hazards in human, animal, or other biological testing." Neither approach allows a simple quantitative comparison.

The crucial distinction between these programs is that OSHA relegates the coverage of a majority of chemicals to an evaluation process (the uniformity of which is uncertain), while the Right-To-Know Law covers vastly more chemicals explicitly. It is the contention of this author that the latter approach is to be preferred.

It is a curious aspect of this standard that employers outside the specified industry codes will not be required to obtain or pass along to employees the Material Safety Data Sheets (MSDSs) and container labels that the chemical manufacturers are preparing. The standard does not prohibit this from occurring; it merely does not require it. (It is unlikely that chemical manufacturers will prepare different labels for different customers, with an OSHA label destined only for customers in the manufacturing sector.) While some employees will undoubtedly benefit, this restriction seems forced and arbitrary and appears to be a "trickle-down" approach to safety. The Right-To-Know Law in New York has avoided the cost/benefit dilemma by relying on easily available information sources and backing those sources with technical assistance at the state level. In this way, no restriction on coverage has been necessary.

Right-To-Know Law in New York State

Coverage

The Right-To-Know Law [*6*] was signed by Governor Carey on 26 June 1980 and took effect 180 days later. The legislative intent states, in part, that "at a minimum, employees have an inherent right to know about the known and suspected health hazards which may result from working with toxic substances." This inherent right is well supported by the coverages provided. Table 2 lists the criteria for coverage of people and chemicals. The exclusion of federal employees is not specifically stated in the law but results from standard jurisdictional considerations. The "list" used in New York is the latest printed edition of RTECS, which currently is composed of five volumes (three volumes released in 1983, and two supplements released in 1985) and 85000 chemicals, and represents citations extracted from over 2000 technical publications worldwide. It should be emphasized that the results reported in RTECS are those

TABLE 2—*Coverages of the New York State Right-To-Know Law.*

Employee Coverage: All employees in New York State except:
1. The casual worker at the residence of the employer.
2. Federal employees.
Chemical Coverage:
1. All substances listed in the latest printed edition of the National Institute for Occupational Safety and Health's *Registry of Toxic Effects of Chemical Substances* (RTECS).
2. Those substances having yielded positive evidence of acute or chronic health hazards in human, animal, or other biological testing.

claimed by the authors of the paper, and the cited journal may not be peer reviewed. The editors of the Registry do not verify the accuracy of the conclusions. Indeed, the Registry does not contain the type of information that the law requires be provided to employees. The essential result of this definition of toxic substance is that, if a chemical has been studied or adverse effects reported, the employee is entitled to that information.

The second part of the definition brings into consideration those substances which have had adverse effects that have not been reported in the technical literature. For example, pharmaceuticals require extensive animal and clinical testing of the final product before marketing. However, the chemical intermediates in the manufacturing process may never be submitted to animal tests and may not occur outside a specific facility. New employees must be informed if adverse effects have been encountered in that facility due to the handling or use of the intermediates.

Information

The Right-To-Know Law specifies the categories of information that must be provided to employees, and these categories are listed in Table 3. These categories are similar to those found on the OSHA Form 20 MSDS. As a matter of practicality, this form has become the main vehicle of information transfer for the Right-To-Know Law. The form has been in existence for over 14 years and is easily available from manufacturers.

Alternative strategies to the wholesale collection of MSDSs are possible. Certain employers will have the personnel and facilities to research individual requests. Hospitals and universities often have libraries that will meet this need. However, for most employers, the MSDS will be the source of the necessary information.

Employer's Responsibilities

Table 4 lists the employer's responsibilities. Employers are encouraged to obtain MSDSs for all products that meet the definition of toxic. This means conducting a workplace survey of all substances currently in use in the facility.

TABLE 3—*Information to be provided to employees.*

1. The name or names of the toxic substance, including the generic or chemical name.
2. The trade name of the chemical and any other commonly used names.
3. The level at which exposure to the chemical is determined to be hazardous, if known.
4. The acute and chronic effects of exposure at hazardous levels.
5. The symptoms of such effects.
6. The potential for flammability, explosion, and reactivity of such substance.
7. Appropriate emergency treatment.
8. Proper conditions for safe use and exposure to such toxic substances.
9. Procedures for clean up of leaks and spills of such toxic substance.

TABLE 4—*Employer's responsibilities.*

1. Post a notice to employees informing them of their rights.
2. Provide information upon request.
3. Maintain records of employees using OSHA Subpart-Z substances.
4. Provide training
   (a) before hiring new employees.
   (b) annually, for substances used routinely.
   (c) when new chemicals are introduced.
   (e) if exposures change due to new work assignments.

In addition, many employers also make payment of new purchase orders contingent on receipt of a current MSDS. This takes care of all future chemical acquisitions. The employee is entitled to ask about any substance that may be encountered in the course and scope of employment, not just the chemicals which he is required to use. Substances that are not occupationally related are not covered. For example, the table salt in the cafeteria and automobile exhaust fumes from the parking garage, two examples cited by the early opposition to the law, are not covered. On the other hand, if the employer produces table salt or has employees engaged in automobile repair, table salt and engine exhaust are occupationally related and would be covered.

The law does not specify the format of the required training, which may be conducted in the way which is most efficient for the employer. The content of the training is specified to be the same as the information requirement, with the addition of the location(s) in the facility where the substance is most likely to be used or stored. There is no requirement for the employer to maintain records of having performed the training; however, this is recommended.

The record-keeping requirement of the law is intended to provide the Health Department of New York State with a data base for epidemiological investigation of occupational disease. The employer is required to keep the name, address, and Social Security number of all employees who use OSHA Subpart-Z substances. These records are to be maintained for 40 years. For epidemiological research, more information than name and address would be desirable. Exposure levels, frequency of use, process type, Social Security number, and age are examples of additional information concerning the employee which would greatly aid such a study. This limited requirement reflects a concern for maintaining a minimal burden on the employer. Records kept for the Right-To-Know Law have been of considerable value in practice. Recently, medical follow-up for employees exposed to cobalt fume (hard metal disease) has been facilitated through these records.

Employee's Rights

Table 5 lists the employee's rights under New York's law. The information necessary to answer requests and fulfill training requirements is substantially

TABLE 5—*Employee's rights under New York State's Right-To-Know Law.*

1. To request and receive information on chemicals encountered during the course and scope of employment.
2. To refuse to work with a substance if the requested information is not received within three working days.
3. Not to be required to waive rights.
4. Not to be discriminated against for exercising rights.
5. To file a complaint with the Commissioner of Labor.

met by the MSDS or equivalent form. Most employers find that the training sessions are a useful way of dealing with the specific use of chemicals and how the hazardous properties of a chemical are related to the actual risks encountered in their facility.

The employee may refuse to work with a substance if he has not received the requested information within three working days. If the employer has the MSDSs on hand, this deadline is more than sufficient. It does not allow enough time for the employer to receive the MSDS through the mail, however. The importance of the workplace survey and receipt of MSDSs is emphasized.

The right of the employee to file a complaint with the Commissioner of Labor is the basis for enforcement activity. Investigations are initiated upon receipt of a complaint, with the employee's anonymity being maintained. If a violation is found, corrective action is recommended, or the case may be referred to the Attorney General's office for litigation. There is no separate inspection program for this law, with the exception that investigators who may be on-site for other complaints also may assess the degree of compliance with the Right-To-Know Law. Both the right to information and the responsibility to maintain that right through enforcement are vested with the employee.

Trade Secrets

A trade secret registration procedure is in effect which will allow a manufacturer to protect the composition of a product which may form the foundation of his business and role as an employer. This procedure requires the manufacturer to register the composition of his product, along with MSDS-type information, with the Department of Health. This allows the department to verify that the hazardous properties of that product as reported on the MSDS are an accurate reflection of product composition. Changes and improvements are recommended by the department, if necessary. Once registered, the manufacturer is no longer required to report product composition on the information sheet. All other information requirements must be met, however. There is no requirement for the submitting company to provide information supporting the validity of the trade secret claim, as required by the federal proposal and by several states. Registration forms submitted to New York also are exempt from Freedom of Information Law requests.

Many unions support proposals eliminating the ability of a company to protect product composition through trade secret provisions. The law, as framed in New York, will allow the Health Department to verify that the information provided to the worker is accurate in all other respects and makes that information easy to register without time-consuming review and legal procedure. This is a reasonable compromise between the respective needs of employers and employees.

Implementation

Because of the sophisticated nature of the information required by this law, the Health Department has established an outreach program for information on the law and technical information on hazardous substances. The department will consult with both employees and employers and is not part of the enforcement activity. Experience has shown that large companies, such as Kodak and Olin Chemical, have had similar programs in effect for many years and have often produced data sheets on products that they purchase from other companies. Small businesses, without physicians or industrial hygienists on staff, have the greatest difficulty in interpreting toxicological data for their employees. The department feels a special duty to help such businesses as much as possible. Toward this end the department has assembled an implementation package containing much information on the law, compliance, and technical and informational resources on hazardous substances. It also produces its own chemical fact sheets on common substances, including cleaning agents, industrial solvents, and pesticides. These chemical fact sheets are kept current through annual review of the medical and technical journals. New versions are sent automatically to those who have ordered specific fact sheets through the use of computer-based mailing lists.

The department provides several services to support this legislation. MSDSs are reviewed for accuracy and completeness. In addition to the fact sheets, which cover a remarkable number of products, information can be obtained on most other chemicals through the department's technical library. The department also will conduct searches of the toxicological data bases maintained by the National Library of Medicine. Interpretation of toxicological data is also provided. Staff members have traveled extensively throughout the state to conduct seminars on the law.

Summary

The Right-To-Know Law in New York State guarantees an employee access to information necessary to make reasoned decisions about the chemicals he encounters on the job. The use of easily available information sources and the establishment of a technical resource within the state have resulted in the smooth implementation of this law. More importantly, there is no limitation on the

number of chemicals or employees covered, as seen in other states and in the proposed OSHA Hazard Communication Standard.

The employee is in the best position to recognize the effects of chemical overexposure and may provide the first warning of occupational and environmental hazard. Knowledge of chemicals is required for the selection of protective equipment and for the proper diagnosis and treatment of adverse health effects. When properly informed, the individual is in the best position to assess his own capabilities and conditions in regard to the chemical exposures anticipated in the workplace.

The rapid proliferation of right-to-know programs is an indicator of society's increasing awareness of chemicals at home and at work. Events such as Love Canal and the chemical release at Bhopal, India, have served to heighten concern for how the handling of chemicals by others can affect our day-to-day lives. It has become impossible to avoid involvement with chemicals. The only rational alternative is the acquisition of the knowledge needed to deal with chemicals in an intelligent way. For "man the chemist," the information age has arrived.

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Henry L. Garie,[1] *Caron Chess,*[2] *and Edward Stevenson*[3]

Overview of the Implementation of a Statewide Worker and Community Right-to-Know Act

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ABSTRACT: New Jersey's Worker and Community Right-to-Know Act requires employers to report information about toxic substances used, stored, or released from facilities in the state. This information is made available to the public and is directly transmitted to the Department of Environmental Protection (DEP), local emergency response personnel, and county health departments. The collection of this information enables the DEP to develop a comprehensive database of toxic substance use in the state.

The DEP has developed two surveys to gather information from employers covered by the act. The Emergency Services Information Survey, which gathers information about materials that pose potential safety hazards, requires the reporting of materials on the United States Department of Transportation's Hazardous Materials Table. The Environmental Survey, Part I requires employers to report information about a DEP-compiled list of 154 substances that have the potential to cause chronic health effects or to cause damage to the environment. After a scientific review of data provided on the Environmental Survey, Part I, the DEP will require selected employers to report additional, detailed information about emissions and discharges of hazardous substances.

The centralized database that is developed from information reported in these surveys will enable the DEP to improve public health protection and to guide new efforts in environmental monitoring and regulation.

KEYWORDS: right to know, emergency response, hazard communication

New Jersey's Worker and Community Right-to-Know Act, which became effective on 29 Aug. 1984, offers a unique and comprehensive approach to

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public health protection. The Right-to-Know law provides New Jersey citizens with ready access to information about toxics used, stored, or released from facilities in the state, thus allowing citizens to make more informed decisions about where to live and work. Emergency response personnel, aided by similar toxics information sent directly to them by businesses in their jurisdiction, can plan for and respond more effectively to chemical emergencies such as spills and fires.

Just as important, the Right-to-Know law provides the Department of Environmental Protection (DEP) with an extensive inventory of toxics used in the state, a major step towards protecting public health. Although research has allowed scientists to identify some substances that pose risks to human health, the extent of many of these risks is not completely understood. A toxic substances inventory is the first step towards understanding the extent of toxic substance use and towards determining ways to prevent unnecessary exposure both to substances with the potential to cause chronic health hazards and those with the potential to cause acute hazards.

Prior to enactment of the 1983 Worker and Community Right-to-Know law, New Jersey, which is one of the country's leading manufacturing states, had taken steps to inventory toxic substances handled by industries. From 1979 to 1982, the New Jersey DEP required more than 15000 manufacturers to supply detailed information about emissions, discharges, and disposal practices, as well as throughput and storage quantities, of 155 substances the DEP had identified as having the potential to cause chronic health or environmental problems. More than 20% of those manufacturers that completed the surveys reported handling one or more substances on the DEP list. This inventory aided DEP in locating hazardous waste sites for listing under CERCLA Superfund and in targeting areas for site investigations, including assessment of potential dioxin contamination. The process of conducting these industrial surveys gave the DEP experience that would prove valuable when shaping and implementing the environmental provisions of the state's Right-to-Know law.

DEP has taken a practical approach to implementation of the Right-to-Know law which: (1) maximizes the department's capability to develop an effective database to understand the use of toxic substances in New Jersey and to track toxic problems to their sources; (2) disseminates relevant information to various audiences; and (3) minimizes the burden to employers.

The DEP has developed two surveys which employers are required to complete:

1. The Emergency Services Information (ESI) Survey, which gathers information about potential safety hazards, was designed specifically for emergency response personnel. On the ESI, employers report materials they handle that are included on the United States Department of Transportation's Hazardous Material Table, a list commonly used by emergency response teams. Employers send completed surveys that include approximate amounts, major storage methods, and hazard information to their local fire and police departments as well as to the DEP (Fig. 1).

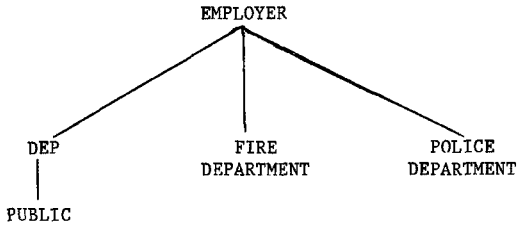

FIG. 1—*Distribution of emergency services information survey.*

2. The Environmental Survey requires employers to report similar information about 154 substances that have the potential to cause chronic health effects or damage to the environment. In order to determine which substances from the 1979–1982 Industrial Survey should be included on this survey and what others should be added, the DEP conducted a search of the scientific literature and also considered structural analogues of known carcinogens. To be included on the Environmental Survey, substances were required to meet two criteria:

(*a*) Evidence of a significant rate of use, production, or importation in the United States and, in particular, in New Jersey. The DEP considered 10000 lb or more a year to be significant.

(*b*) Evidence of at least one of the following health or environmental effects: carcinogenicity, teratogenicity, mutagenicity, acute toxicity, persistence, or ability to bioaccumulate.

The Environmental Survey is comprised of two parts. Part I is a screening mechanism which collects information that DEP scientists evaluate to determine which employers should complete Part II of the Environmental Survey. Part II requires detailed information on environmental emissions, discharges, throughputs, and disposal information, such as that requested by the previous Industrial Survey. Employers send completed Environmental Surveys to the DEP and their local county health departments (or other designated agencies) for distribution to the public (Fig. 2).

The Department of Health, which has a vital role in implementation of the Right-to-Know Act, administers—among others—labeling requirements, provisions regarding worker education and training, and development of a list of hazardous substances for which employers cannot claim trade secrets. In addition, the Department of Health is developing fact sheets for distribution to the public regarding the physical properties and health effects of more than 2000 substances.

Several factors have been critical to effective implementation of the Right-to-Know law in New Jersey:

1. Continued strong commitment to the law by the governor and the legislature.
2. Development of a sophisticated, computerized data base to allow the DEP to monitor compliance and easily summarize data about the location and quantities of specific toxics.

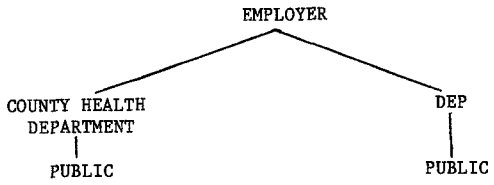

FIG. 2—*Distribution of environmental surveys.*

3. Sufficient funding, including an appropriation for initial planning and development of regulations, to enable state agencies to fulfill the mandate of the law.

4. Enforcement provisions which enable penalties to be assessed for noncompliance.

As originally enacted by the legislature, the Right-to-Know law covers more than 35000 employers designated according to Standard Industrial Classification (SIC) Code, a federal system of classifying businesses (Table 1). In response to a legal challenge filed against the state by several business trade associations and individual industries, a federal district court judge ruled on 3 Jan. 1985 that regulations promulgated by the federal Occupational Safety and Health Administration (OSHA) preempted New Jersey's law in the manufacturing sector. As a result, manufacturers were not covered by any provisions of the New Jersey law until the United States Court of Appeals for the Third Circuit ruled on 10 Oct. 1985 that the law "is not preempted insofar as it regulates employers outside the manufacturing sector, or insofar as it requires identification and reporting of environmental hazards."

In practical terms, this most recent court decision gives the DEP authority to survey employers in the manufacturing sector. However, the court ruled that certain provisions of the law, such as requirements for labeling, training of employees, and completion of a Workplace Survey (which in the court's opinion are workplace related), are subject to preemption in the manufacturing sector.

The court's ruling of October 10 is consistent with its ruling of May 24 concerning a petition for review of the OSHA standard filed by the United Steelworkers of America. In that opinion the court did not discuss the question of preemption of community right-to-know provisions but ruled that the standard preempts "state hazard communication rules as they apply to employees in the manufacturing sector."

As is readily apparent from the New Jersey DEP's implementation of the law, the state statute differs from the federal rule in a number of respects:

1. Employers must furnish toxics information to the state, including, in some cases, detailed data on releases.

2. The public and emergency response personnel are given access to toxics information.

TABLE 1—*S-3435, signed into law in January 1986, specifies that employers in the following SIC groups are covered under the Right-to-Know law.*

SIC Number	Description	Status
0782	lawn and garden services	A
20	food and kindred products (entire group)	R
21	tobacco manufacturers (entire group)	R
22	textile mill products (entire group)	R
23	apparel and other textile products (entire group)	R
24	lumber and wood products (entire group)	R
25	furniture and fixtures (entire group)	R
26	paper and allied products (entire group)	R
27	printing and publishing (entire group)	R
28	chemicals and allied products (entire group)	R
29	petroleum and coal products (entire group)	R
30	rubber and miscellaneous plastics products (entire group)	R
31	leather and leather products (entire group)	R
32	stone, clay and glass products (entire group)	R
33	primary metal industries (entire group)	R
34	fabricated metal products (entire group)	R
35	machinery, except electrical (entire group)	R
36	electrical and electronic equipment (entire group)	R
37	transportation equipment (entire group)	R
38	instruments and related products (entire group)	R
39	miscellaneous manufacturing industries (entire group)	R
4511	certificated air transportation	A
4582	airports and flying fields	A
4583	airport terminal services	A
46	piplines except natural gas (entire group)	R
4712(*)	freight forwarding	R
4742(*)	rental of railroad cars—with care of lading	R
4743(*)	rental of railroad cars—without care of lading	R
4782(*)	inspection and weighing services—connected with transportation	R
4783(*)	packing and crating	R
4784(*)	fixed facilities for handling motor vehicle transportation, not elsewhere classified	R
4789(*)	services incidental to transportation not elsewhere classified	R
4811(*)	telephone communication (wire or radio)	R
4821(*)	telegraph communication (wire or radio)	R
49	electric, gas and sanitary services (entire group)	R
5085	machinery, equipment and supplies—industrial supplies	A
5087	machinery, equipment and supplies—service establishment equipment and supplies	A
5093	miscellaneous durable goods—scrap and waste materials	A
5122(*)	drugs, drug proprietaries and druggists' sundries	R
5161(*)	chemicals and allied products	R
5171(*)	petroleum bulk stations and terminals	R
5172(*)	petroleum and petroleum products wholesalers except bulk stations and terminals	R
5181(*)	beer and ale	R
5182(*)	wines and distilled alcoholic beverages	R
5198(*)	paints, varnishes and supplies	R
5199(*)	nondurable goods, not elsewhere classified	R
5511	motor vehicle dealers (new and used)	A
5521	motor vehicle dealers (used only)	A
5541	gasoline service stations—retail	A
7216	drycleaning plants—except rug cleaning	A

TABLE 1—Continued

SIC Number	Description	Status
7217	carpet and upholstery cleaning	A
7218	industrial launderers	A
7397	commercial testing labs	A
7531(*)	top and body repair shops	R
7534(*)	tire retreading and repair shops	R
7535(*)	paint shops	R
7538(*)	general automotive repair shops	R
7539(*)	automotive repair shops, not elsewhere classified	R
7692(*)	welding repair	R
8062(*)	general medical and surgical hospitals	R
8063(*)	psychiatric hospitals	R
8069(*)	specialty hospitals, except psychiatric	R
8211(*)	elementary and secondary schools	R
8221(*)	colleges, universities, and professional schools	A
8222(*)	junior colleges and techinical institutes	R
8249(*)	vocational schools, except vocational schools not elsewhere classified	R
91–94	state, county, local government	R
95	administration of environmental quality and program (entire group)	R
96	administration of economic programs (entire group)	R
97	national security and international affairs (entire group)	R

NOTE: (*) = The other SIC numbers in these major groups have been deleted; A = Employers that were not covered under the 1983 Act, but are *added* by S-3435; R = Employers that were included in the 1983 Act and are *retained* by S-3435.

3. The state determines which substances are hazardous and should therefore be covered by provisions of the law.

4. Stringent trade secret provisions require employers to send comprehensive data to the state and place the burden of proof on the employers for providing documentation of requests for withholding information from the public.

5. Many employers outside of the manufacturing sector are required to comply.

As mentioned previously, developing a comprehensive, centralized database is particularly critical in the implementation of the New Jersey Worker and Community Right-to-Know Act. However, the OSHA standard, which only regulates the transfer of toxics information from employer to employee, is not conducive to development of a similar database. For example, a centralized database will enable the DEP to better trace contamination of drinking water to its source by comparing the contamination with substances reported at local facilities. In addition, the DEP will be able to compile inventories of acutely hazardous substances to aid in emergency prevention and planning. These inventories will provide immediate access to information and an overall view of the status of toxics in the state which will guide new efforts in environmental monitoring and regulations.

Geoffrey C. Granville[1]

Hazard Communication in Other Jurisdictions: A Proposed Canadian System

REFERENCE: Granville, G. C., **"Hazard Communication in Other Jurisdictions: A Proposed Canadian System,"** *Hazard Communication: Issues and Implementation, ASTM STP 932,* J. E. Brower, Ed., American Society for Testing and Materials, Philadelphia, 1986, pp. 124–130.

ABSTRACT: The Workplace Hazardous Materials Information System (WHMIS) was initiated as a tripartite project in 1982, and a final report was submitted to government during 1985. The report recommends an approach to the communication of hazardous properties of materials used in the Canadian workplace that is broadly similar to the OSHA Hazard Communication standard, although there are some notable differences.

At the time of publication, the report had not resulted in any new regulatory initiative.

KEYWORDS: MSDS, labels, hazardous materials, hazard communication, Canada

For some time it was recognized by a number of interested parties in Canada that there was a need to identify workplace hazardous materials and provide workers with detailed hazard information about them. In July 1981, federal and provincial occupational safety and health (OSH) regulatory agencies suggested to the Canadian Association of Administrators of Labour Legislation (CAALL) that a nationally consistent information system for hazardous workplace materials be established. To implement the system, provincial OSH legislation was necessary to provide needed information, particularly for imported materials. (It is important to note that occupational health and safety is a provincial responsibility within Canada, but coordination on a national level is necessary in order to ensure that interprovincial barriers to trade do not develop.)

This suggestion led to the formation of a federal/provincial task force to study the feasibility of labeling hazardous materials in the workplace. The task force

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reported to CAALL in April 1982 and recommended an information delivery system consisting of warning labels, material safety data sheets (MSDS), and worker education programs.

The task force also identified classes of hazardous materials and concluded that further development of the system would require scientific experts to define specific hazard criteria for workplace materials. In this work, the task force saw the need for harmony with the classification and labeling requirements of the Transportation of Dangerous Goods Act.

These recommendations were accepted in principle by CAALL. The deputy ministers extended the feasibility study in order to develop fully the concept of a national information delivery system for hazardous materials. To ensure successful completion of the system concept and its effective implementation, they envisaged a tripartite consultative process involving the direct participation of government, industry, and organized labor.

The workplace Hazardous Materials Information System Project was started by Labour Canada in mid-1982, and the resulting report was submitted to the federal Deputy Minister of Labour in April 1985. The Executive Summary [*1*] is reprinted here.

Executive Summary

This report, to the federal Deputy Minister of Labour and his provincial counterparts, recommends a national standard for a Workplace Hazardous Materials Information System (WHMIS).

In 1982 the Canadian Association of Administrators of Labour Legislation accepted the report of a federal/provincial task force which studied the feasibility of labelling hazardous substances in the workplace. The WHMIS project was then started by Labour Canada using a tripartite Steering Committee with representatives from organized labour, industry and the federal government. Representatives of provincial governments and other industry groups also participated as ex officio members.

The project involved unprecedented tripartite consultation on complex technical and social issues. Though requiring time and patience, it proved rewarding both for the subject at hand and for establishment of the process. The Steering Committee's main task was to recommend a national system to provide information on hazardous materials used in the workplace, recognizing the interests of workers, employers, suppliers, and regulators. Its most difficult problem was to balance the worker's right and need to know with industry's right and need to protect trade secrets.

Under WHMIS, suppliers would be responsible for evaluating and classifying their material, labelling it and supplying additional information by a Material Safety Data Sheet (MSDS) on or before initial shipment. The MSDS could protect trade secrets, subject to validation by an

independent third party and subject to conditions set by a tripartite arbitration board. Employers would be responsible for seeing that education programs were implemented. Workers would be responsible for participating in the education programs and for using information gained on the job to protect themselves and their fellow workers. The recommendations proposed required a delicate consensus which must be considered as an entity.

Hazardous materials already covered by federal legislations such as the Pest Control Products Act were not included within the WHMIS proposal, but the appropriate legal authorities would be approached to implement WHMIS in the relevant product areas to meet WHMIS standards if necessary. WHMIS would use existing toxicological data, without mandatory testing. Agreement was reached on classification of hazardous materials[2], including the Toxic and Very Toxic subclasses, but there was no consensus on mutagenicity. The Steering Committee therefore recommended a further independent review of this aspect.

The only area of incompatibility with the Transportation of Dangerous Goods (TDG) Regulations is in the method for classifying untested mixtures for acute lethality. No consensus was reached on this aspect. Work is in progress internationally on this subject, and it is recommended that any future internationally accepted evaluation be considered for application to WHMIS.

Since the technical requirements of classification may create problems for small manufacturers, government should consider appropriate means to assist them.

The information delivery system has three components: Label, MSDS and Worker Education Program, all interdependent and complementary. Suppliers must label each container. In addition, an MSDS would be provided by the supplier or, in the case of in-plant process, by the manufacturer. Nine categories of required information on the MSDS are specified, but flexibility would be available in the format. An employer MSDS would be permissible, but not mandatory. Ingredient disclosure would be subject to trade secret and cut-off provisions, but would include ingredients that fall within WHMIS hazard criteria and the WHMIS Ingredient Disclosure List, ingredients about whose toxicological properties nothing is known, ingredients that the supplier thinks may be dangerous, proven carcinogens, respiratory sensitizers and reproductive toxins. Normal concentration cut-offs would be 1%; for carcinogens, reproductive toxins and lung sensitizers they would be 0.1%. The existence of ingredients considered trade secrets would be noted, and they would be described generically as closely as possible. Piping systems would be a mandatory part of the WHMIS worker education program.

[2] See Appendix for details.

The Steering Committee decided on a performance approach to worker education, which is the responsibility of the employer. In addition, it recommended that a training and communication plan be organized by Labour Canada to be used as a guideline subject to tripartite review; it could be used by all parties during implementation.

Trade secrets would be protected by a single national three-tier mechanism: (1) a Third-Party Screening Agency, (2) a Tripartite Arbitration Panel and (3) A Process for Judicial Review. The Agency responsible for trade secrets would confirm or deny the validity of confidentiality, ensure that information given is appropriate, or request further information, all subject to appeal to the Arbitration Panel. The Panel's proceedings, which would be confidential, would involve lawyers and technical experts. The Panel would direct the supplier to conclude confidentiality agreements with interested parties. The Judicial Review may consider form, process, errors in law, adherence to agreed principles, but not the content of decisions.

The Steering Committee developed criteria for trade secrets which it believes should be mandatory through legislation and not advisory. The law would not only recognize the right and need to protect trade secrets, but would ensure that there would be no legal exemption from prosecution of negligent government employees and that trade secrets would be exempt from disclosure under Access to Information laws. The agency would be exempt from any liability except improper release of information.

For implementation, provincial and federal legislation would be necessary, including use of the federal Hazardous Products Act and Regulations, provincial OSH legislation and Part IV of the Canada Labour Code. Legislation respecting labels and MSDS for imported products would be enforced by Consumer and Corporate Affairs and Revenue Canada Customs. Provincial OSH regulators and Labour Canada would ensure workplace compliance within Canada. Some new legislation would probably be needed, such as amendments to the Hazardous Products Act; some new provincial legislation might also be required. There would be a tripartite approach to legislation/regulation and implementation of WHMIS.

The Steering Committee recommends that, as far as possible, WHMIS should be implemented as a total package at one time. The Steering Committee wants to ensure that the momentum created during the development of the proposal is maintained by governments while considering the implementation of the WHMIS system. The Steering Committee strongly recommends that governments promulgate the necessary legislation and regulations within *one year* from the date of submission of this report to Deputy Ministers of Labour or Deputy Ministers responsible for occupational safety and health. Implementation of the actual system should occur within 18 months of promulgation.

A cost/benefit study was undertaken to estimate the socioeconomic impact of the proposed system. In addition to special tabulations from Worker's

Compensation Boards (WCB) and the Dominion Fire Commissioner, a survey was launched to obtain information on the potential public and private sector costs as well as on benefits from WHMIS. During the fall of 1984, 1,964 companies representing a wide range of industries and company sizes, were contacted to seek the point of view of management and workers. Since the Workers Education Program was viewed as the most important element, two scenarios were identified. The first one assumed that all elements of the standards would apply to all economic sectors. The second assumed the same application of WHMIS except that the complete Worker Education Program, as defined by the Steering Committee, would apply only to those sectors that use a significant amount of hazardous materials. Under the first scenario, total discounted costs over a forty-year period would exceed benefits by $932 million ($2,259 vs. $1,337 million). However, if the second scenario were to be implemented, the benefits derived by the system would, over the long term, offset its private and public sector discounted costs by $591 million.

Consensus could not be reached on the scope of WHMIS. The WHMIS project was set up on the explicit advice of the government administrators that any WHMIS developed or recommended would apply to *all* workplaces; it was on this understanding that the consensus over WHMIS was accepted by the labor caucus on the project. Industry, on grounds of cost/effectiveness wished it to apply to the manufacturing sector and other areas with a significant potential of benefits, but not to establishments where benefits would be marginal. The regulators stated that all workplaces would be included.

Concluding Comments

Whether these WHMIS recommendations will be accepted by government still remains to be seen. No significant regulatory progress has been made as of April 1986, and therefore WHMIS—or a derivative thereof—is unlikely to be a regulated requirement before the end of 1987. There are also major unresolved issues, such as the mutagenicity criteria, confidential business information, and the scope of the project; these still need to be worked out.

Of interest to the United States is the fact that the WHMIS recommendations are generally compatible with OSHA requirements, although there does appear to be a potentially greater use of and need for professional technical evaluation under WHMIS.

The use of a tripartite consultative process on such a complex technical and social issue has no known precedent. In terms of the outcome, it seems to be an unqualified success in that the resulting consensus is acceptable to all stakeholders. This should result in greater commitment once regulatory status is achieved than could otherwise have been expected. It is hoped that this process will be repeated for future regulatory initiatives.

APPENDIX

Classification to be made against the following criteria:

- Explosive material
- Compressed gas
- Flammable and combustible material
  - Flammable gas
  - Flammable liquid
  - Combustible liquid
  - Flammable solid
  - Flammable aerosol
  - Reactive flammable material
- Oxidizing material
- Dangerously reactive material
- Material at extreme temperatures
- Poisonous and infectious material
  - Very toxic material (see information that follows)
  - Toxic material (see information that follows)
  - Biohazardous infectious material
- Corrosive material (see information that follows)

Materials being classified within the "Very Toxic," "Toxic," or "Corrosive" classes have to meet specified criteria within a wide range of toxic effects; the effects covered are as follows:

A. Very Toxic Class

Acute lethality Chronic toxicity Teratogenicity, etc. Carcinogenicity Respiratory sensitivity	"pure" material or tested mixture

Untested mixture: above effects applied to components, with a specific concentration cutoff (1% or 0.1%, depending on the effect)

B. Toxic Class

Acute lethality Chronic toxicity Skin sensitivity irritancy	"pure" material or tested mixture

Untested Mixture: above effects applied to components with specified concentration cutoffs (1% for all effects).

C. Corrosive Class

Corrosive in a physical or biological test, or, for an untested mixture, applied to components at a specified cutoff (1%).

References

[*1*] "Workplace Hazardous Materials Information System," report of the Project Steering Committee, Labour Canada, April 1985, copies available from OSH Branch, Labour Canada, Ottawa, Canada K1A OJ2.

Claire M. Boccella[1]

Legal Issues Related to the Hazard Communication Standard

REFERENCE: Boccella, C. M., **"Legal Issues Related to the Hazard Communication Standard,"** *Hazard Communication: Issues and Implementation, ASTM STP 932*, J. E. Brower, Ed., American Society for Testing and Materials, Philadelphia, 1986, pp. 131–149.

ABSTRACT: This paper will discuss several legal issues surrounding the promulgation of the OSHA hazard communication standard. The specific areas that are discussed are the litigation challenging the validity of the standard; the litigation on the preemptive effect of the standard on state right-to-know laws; the product liability concerns that are raised by the standard; and, the effect the standard will have on employee relations.

KEYWORDS: hazard communication, preemption, product liability, occupational disease

The promulgation of the Hazard Communication standard (29 C.F.R. 1910.1200) (''the standard'') by the Occupational Safety and Health Administration (OSHA) has resulted in several court cases and has raised a number of legal issues. This paper discusses:

1. The litigation challenging the validity of the federal Hazard Communication Standard.
2. The litigation in New Jersey challenging enforcement of the New Jersey right-to-know law on preemption grounds.
3. Product liability issues raised by the standard.
4. The effect the standard will have on employee relations.

Hazard Communication Litigation

When OSHA published the Hazard Communication standard on 25 Nov. 1983 (48 Fed. Reg. 53280), the United Steelworkers of America and Ralph Nader's Public Citizen immediately filed a petition for review of the standard

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in the Third Circuit Court of Appeals. The issues, in a petition for review action, are whether the agency action satisfies the substantive mandates of its enabling statute and whether the rule-making proceeding is procedurally sound. If the court decides that the agency action is outside the agency's scope of authority or that the agency failed to follow the proper notice and comment and due process requirements, the court can remand the rule, or parts of the rule, to the agency for further action.

There were other petitions for review filed in other circuit courts of appeals by various states and by one industry trade group. The petitions filed by New York, Illinois, Massachusetts, New Jersey, and Connecticut were consolidated into one case in the Third Circuit Court of Appeals. Several trade associations—the American Petroleum Institute (API), the National Paint and Coatings Association (NPCA), and the Chemical Manufacturers Association (CMA)—were permitted by the court to intervene as respondents in the case (that is, to support OSHA's defense of the standard). The case was decided on 24 May 1985 [*United Steelworkers of America et al. v. Auchter,* 763 F.2d 728 (3d Cir. 1985)]. The Hazard Communication standard went into effect on 25 Nov. 1985.

The petitioners' raised the following challenges to the standard:

1. OSHA acted improperly by limiting the scope of coverage of the standard to employers in Standard Industrial Classification (SIC) Codes 20–39.
2. OSHA improperly delegated the responsibility for hazard determination to manufacturers.
3. The trade secret provision of the standard is overly protective of business interests and underprotective of the rights of workers to chemical identity.
4. The standard is not a "standard" but a "regulation" and, therefore, does not have any preemptive effect.

Scope of Coverage

The Steelworkers and Public Citizen contended that OSHA failed to fulfill the mandate of the Occupational Safety and Health Act (the OSH ACT) (29 U.S.C. §651 et seq.) when it limited the scope of coverage of the standard to manufacturing employers (SIC Codes 20–39).

Congress declared that the purpose and policy of the OSH Act is "to assure so far as possible every working man and woman in the nation safe and healthful working conditions. . . . " (29 U.S.C. §651). The petitioners argued that the standard does not regulate all similarly situated employees using hazardous chemicals. There is evidence in the record, the petitioners contended, that shows that employees in other SIC codes using hazardous chemicals face precisely the same problem as employees in the industries covered by the standard, that is, a lack of basic information about the identities, hazards, and means to avoid the hazards of chemical substances.

OSHA argued that the standard's limited scope is justified because the SIC

Codes 20–39 have the greatest demonstrated need for the standard. The rulemaking record shows that SIC Codes 20–39 have a higher rate of chemical source injury and illness than other major sectors in the SIC code system.

OSHA also asserted that it merely exercised its discretion to establish rulemaking priorities. Section 6(*g*) of the OSH Act [29 U.S.C. §655(*g*)] provides:

> In determining the priority for establishing standards under this section, the Secretary shall give due regard to the urgency of the need for mandatory safety and health standards for particular industries, trades, crafts, occupations, businesses, workplaces or work environments.

The petitioners disagreed with OSHA's interpretation of Section 6(*g*). They argued that the priority-setting authority refers to OSHA's discretion in determining when and what hazards to regulate. Petitioners contended that once OSHA has decided to regulate a hazard, all employees exposed to that hazard must be protected equally. The petitioners asked the court to set aside the provision defining the scope of coverage of the standard.

The court directed OSHA to reconsider its decision to exclude the nonmanufacturing sector from coverage and ordered that employers in other sectors be included unless OSHA can demonstrate why that would not be feasible. On 27 Nov. 1985, OSHA published an Advanced Notice of Proposed Rulemaking asking for public comment on the feasibility of expanding coverage of the standard (50 Fed. Reg. 48794). OSHA expects to expand coverage; however, it will probably take at least a year for the agency to complete the rule.

Hazard Determination

Under the standard, the primary duty for hazard evaluation lies with chemical manufacturers and importers of hazardous chemicals. Each chemical must be evaluated for its potential to cause adverse health effects, as well as its potential to pose physical hazards. The standard also establishes that certain substances are hazardous in any occupational setting. These substances are those currently regulated by OSHA under 29 C.F.R. Part 1910 and those listed by the American Conference of Governmental Industrial Hygienists (ACGIH) in the latest edition of the "Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment."[2]

The petitioner, Public Citizen, argued that OSHA acted improperly by leaving the evaluation process to chemical manufacturers, and that OSHA should have made itself responsible for chemical evaluations.

[2] The preamble to the standard states that this provision sets a floor of over 600 substances that are covered by the standard. In its brief to the Third Circuit Court of Appeals, OSHA told the court that the standard actually sets a floor of about 2300 chemicals because, in addition to the substances in 29 C.F.R. Part 1910 and in ACGIH's "Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment," any chemical listed by the National Toxicology Program's (NTP) "Annual Report on Carcinogens" or evaluated positively in an International Agency for Research on Cancer's (IARC) "Monograph" must be considered a carcinogen or potential carcinogen for hazard communication purposes.

Public Citizen alleged that the hazard determination procedures mean that the standard will cover only the 600 substances established as the floor since employers have strong economic incentives for finding that chemicals do not pose hazards. "A finding that a substance is hazardous not only triggers the disclosure requirements of the standard, but also opens the twin Pandora's boxes of potential exposure under the workers' compensation laws and liability under that law" (p. 26 of Public Citizen's brief). Public Citizen contended that assigning the hazard determination responsibility to employers is "little different from allowing the fox to guard the hen house" (p. 26 of Public Citizen's brief).

Public Citizen believes that there is an additional flaw in OSHA's hazard determination approach which, standing alone, warranted setting it aside; that is, the hazard determination provision is unenforceable. Employers are not required to follow any particular procedures, and the standards for making a hazard determination are very subjective. For example, the standard for health hazards is, "evidence which is statistically significant and which is based on at least one positive study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees." Public Citizen alleged that these standards are highly subjective and allow employers to decide whether the scientific evidence is "satistically significant" and whether the studies were "conducted in accordance with established scientific principles." Scientists seldom agree on these issues, Public Citizen stated, and so there is no reason for OSHA to expect employers to make these determinations with any uniformity.

Finally, Public Citizen contended that OSHA should have required that the substances on the National Institute for Occupational Safety and Health's (NIOSH) "Registry of Toxic Effects of Chemical Substances" (RTECS) to be the "hazardous substances" that are covered by the standard.

OSHA defended its adoption of a mixed approach of hazard determination (that is, the automatic inclusion of more than 2300 chemicals included in the specified lists of hazardous substances, combined with general criteria for evaluating all other chemicals). OSHA told the court that only the lists included in the standard specify those chemicals considered hazardous by scientific consensus, and, beyond these lists, there is no specific method of hazard evaluation agreed upon by the scientific community (p. 41 of OSHA's brief). OSHA said it saw no advantage in attempting to establish "cookbook" rules for hazard evaluation because that process is necessarily fluid and judgmental, and therefore, such "cookbook" rules would be of questionable scientific merit (p. 47 of OSHA's brief).

OSHA told the court that the only realistic way to assure that all chemicals will be evaluated is to place the duty for hazard evaluation on the employers responsible for producing or importing those chemicals. OSHA estimates there may be as many as 575000 chemical products with hundreds of new chemicals introduced annually (p. 49 of OSHA's brief). In addition, the amount of

information available on chemical hazards is increasing tremendously (p. 50 OSHA's brief). OSHA concluded that no list could keep up with this volume.

In response to Public Citizen's argument that OSHA should have adopted the RTECS list, OSHA said lists such as RTECS are essentially no more than a bibliography of scientific reports and perhaps a brief abstract of their findings; they are no substitute for careful evaluation of the studies themselves (p. 51 of OSHA's Brief).

OSHA also rejected the RTECS list because it is both over- and underinclusive. RTECS is overinclusive because: (1) there are many substances listed in RTECS not currently used in workplaces; and (2) the criteria for data selection of RTECS are lax in that toxic effects are reported for substances based on either human or animal data without regard to the question of exposure or the quantity of concentration of the substances. RTECS is also underinclusive—it contains only 60000 of an estimated 100000 unique substances (that is, it does not cover mixtures) for which toxicity data may be available. For example, substances whose principal toxic effect occurs as a result of exposure over a long period of time may be excluded from RTECS because of present selection criteria (p. 51 of OSHA's brief).

Finally, OSHA told the court that the agency does not have the resources necessary to carry out the work that would otherwise be done simultaneously by more than 11000 chemical manufacturers.

The court upheld the hazard determination provisions. It rejected the argument that OSHA should have used the RTECS list to identify hazardous chemicals, finding OSHA's rejection of the list to be supported by substantial evidence and consistent with the purposes of the OSH Act.

Trade Secrets

The protection of trade secrets was one of the most controversial issues connected with the hazard communication rule making, as it was in the litigation. OSHA was faced with balancing employee interest in chemical identity disclosure and the employer interest in trade secret protection. It is important to note that the controversy over trade secrets does not involve disclosure of hazard information. In fact, the standard's trade secret provision states that specific chemical identity may be withheld provided that " . . . information contained in the material safety data sheet concerning the properties and effects of the hazardous chemical is disclosed . . . " [29 C.F.R. 1910.1200(*i*)].

The standard provides that specific chemical identity information can constitute a bona fide trade secret, and thus provisions are made to protect such an identity while providing for the proper protection of exposed employees [29 C.F.R. 1910.1200(*i*)]. This is accomplished by providing for limited trade secret disclosure to health professionals under prescribed conditions of need and confidentiality. The term "specific chemical identity" is used to describe the

trade secret information being discussed. This term refers to the chemical name, the Chemical Abstracts Services (CAS) registry number, or any other specific information which reveals the precise chemical designation. It does not include common names.

Trade secret processes or percentage of mixture information is specifically excluded from disclosure. The chemical manufacturer, importer, or employer is permitted to withhold the specific chemical identity from the material safety data sheet (MSDS) if certain conditions can be met: (1) the chemical manufacturer, importer, or employer can support the claim that the information withheld is a trade secret; (2) information concerning the properties and effects of the hazardous chemical is disclosed as required on the appropriate MSDS; (3) the chemical manufacturer, importer, or employer indicates on the MSDS that the specific chemical identity is being withheld as a trade secret; and (4) the specific chemical identity is made available to health professionals under certain specified situations. Health professionals are considered to be physicians, industrial hygienists, toxicologists, or any other person providing medical or other occupational health services to exposed employees.

The standard's provisions make a distinction between the trade secret disclosure requirements in the event of a medical emergency and in nonemergency situations.

In the case of a medical emergency, the chemical manufacturer, importer, or employer must immediately disclose the specific chemical identity of a hazardous chemical to a treating physician or nurse when the information is needed for proper emergency or first aid treatment. As soon as circumstances permit, however, the chemical manufacturer, importer, or employer may obtain a written statement of need and a confidentiality agreement.

In nonemergency situations, chemical manufacturers, importers, or employers are required to disclose the withheld specific chemical identity to health professionals providing medical or other occupational health services to exposed employees if certain conditions are met. The request for information must be in writing and must describe in reasonable detail the medical or occupational health need for the information.

To be considered a medical or occupational health need for purposes of this standard, the health professional must be planning to use the specific chemical identity information for one or more of the following activities:

1. To assess the hazards of the chemicals to which employees will be exposed.
2. To conduct or assess sampling of the workplace atmosphere to determine employee exposure levels.
3. To conduct preassignment or periodic medical surveillance of exposed employees.
4. To provide medical treatment to exposed employees.
5. To select or assess appropriate personal protective equipment for exposed employees.

6. To design or assess engineering controls or other protective measures for exposed employees.
7. To conduct studies to determine the health effects of exposure.

In addition, the written request must also explain in detail why the disclosure of the specific chemical identity is essential to providing the occupational health services, and why disclosure of the following types of information would not satisfy the health professional's need:

1. Properties and effects of the chemical.
2. Measures for controlling workers' exposure to the chemical.
3. Methods of monitoring and analyzing worker exposure to the chemical.
4. Methods of diagnosing and treating harmful exposures to the chemical.

The request for the information must further provide a description of the procedures to be used to protect the confidentiality of the information. An agreement not to use the information for any purpose other than the health need asserted or to release it under any circumstances other than to OSHA must also be included, and signed by the health professional as well as the employer or contractor of the health professional's services.

The confidentiality agreement may restrict use of the information to the purposes indicated in the statement of need, prohibit disclosure to anyone other than OSHA who has not signed an agreement, and provide for appropriate legal remedies, including stipulation of a reasonable preestimate of likely damages. Nothing in the standard is meant to preclude the parties from pursuing noncontractual remedies to the extent permitted by law.

If a request for trade secret information is denied, the denial must be in writing and must state why the request is being denied. The requestor may refer the matter to OSHA for consideration.

The petitioners in the hazard communication litigation disputed the definition of trade secret used in the standard and the requirements for gaining access to trade secret chemical identities. The Steelworkers argued that the standard should have given employees without ready access to health professionals the same right of access as was provided health professionals (pp. 37–43 of Steelworkers' brief). The Steelworkers argued that an employee with a "need to know" chemical identity who is unable to secure the services of a health professional is left by the standard with no means to obtain this information (p. 38 of Steelworkers' brief).

Public Citizen argued that the standard's limitation on access to trade secret information by employees is in direct conflict with the employees access to trade secrets provision under the Access to Medical and Exposure Records regulation (the "Access to Records regulation") (29 C.F.R. 1910.20). The Access to Records regulation requires employers to disclose exposure data and medical records to employees. Workers have a right under the Access to Records

regulation to be informed of the chemical identities of the hazards they face on the job, although employers may withhold trade secret information which reveals processes or the percentage composition of a chemical mixture [29 C.F.R. 1910.20(*f*) (1) and (*f*) (3)]. The only condition employers may impose on the release of chemical identity data is that the employee enter into a confidentiality agreement under which the requesting party agrees not to release the information to a competitor or to use the information for commercial gain [29 C.F.R. 1910.20(*f*) (3)].

In addition, Public Citizen alleged that the procedures governing the disclosure of trade secrets will thwart requesters:

1. A request for a trade secret must come from a health professional, who must sign a confidentiality agreement not to disclose the trade secret to anyone, including their patients.
2. The confidentiality agreement may provide for liquidated damages which, Public Citizen contends, compels employees to waive their right to have the employer prove damages in order to recover.

OSHA contended that the standard reaches a reasonable accommodation between the two interests. Regarding the definition of trade secrets, OSHA chose the most commonly accepted definition of the term from the *Restatement of Torts,* §757(*b*) (1939). The *Restatement* definition has repeatedly been used by courts interpreting federal statutes affording protection to trade secrets in public law settings. For example, the Supreme Court approved the use of the *Restatement* definition in the 1984 case *Ruckelshaus v. Monsanto,* 52 L. W. 4886 (June 1984). Moreover, OSHA argued, all trade secret identities, which otherwise could generally be legally withheld, are subject to disclosure (p. 61 of OSHA's brief).

OSHA defended the procedures for obtaining disclosure by arguing that they are designed to assure that disclosure is necessary to meet an occupational health need and that the secrecy of the information will be preserved outside the scope of that need (p. 68 of OSHA's brief). The agency stated that the liquidated damages provision of a confidentiality agreement does not free the employer from the threshold burden of proving that the health professional has committed a breach by an unauthorized disclosure.

In response to the petitioners' allegation that employees, as well as health professionals, should have access to trade secrets, OSHA stated that employees already have access to trade secrets under the Access to Records regulation. It is only the trade secrets of employers other than their own (and the odd "hazardous substance" not covered by the Access to Records rule) for which an employee would have to rely exclusively on a health professional (p. 75 of OSHA's brief). Secondly, the limitation on employee access relates only to chemical identities—all health data, such as health effects and methods of control, must be available to employees.

The court set aside the definition of *trade secret* insofar as it affords protection

to chemical identity information that is readily ascertainable through reverse engineering and insofar as it denies employees access to trade secret chemical identity. The court discussed what information OSHA is authorized to protect as a "trade secret." It held that OSHA is not authorized to protect trade secrets except to the extent that the OSH Act, state law, or the Constitution creates substantive trade secret protection. It concluded that neither Section 15 nor any other provision of the OSH Act authorizes trade secret protection in the context of a Section 6(*b*) (5) standard, thus leaving state law and the Constitution as the only bases for protection of trade secrets. While suggesting that even state law might not justify trade secret protection under a federal regulatory statute like the OSH Act, the court was prepared to accept state law as a basis for protection, since none of the petitioners had asked the court to limit protection to constitutional requirements. The court then went on to consider the particular issues raised under the standard.

Definition of Trade Secret—The court held that the definition of *trade secret* in the standard is too broad. The standard defines a trade secret as:

> confidential formula, pattern, process, device, information or compilation of information (including chemical name or other unique chemical identifier) 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.

The court read this definition to reach even chemical identity information that is determinable without great difficulty through reverse engineering. It found that state law generally does not protect such information. The court therefore remanded the standard to OSHA for reconsideration of the definition of trade secret, ordering that any new definition shall not include "chemical identity information that is readily discoverable through reverse engineering."

Written Request Requirement—The court, with little discussion, upheld OSHA's requirement that any request for trade secret information must be in writing with supporting documentation.

Employee Access—The court rejected OSHA's decision to exclude employees and their representatives from obtaining access to trade secret information and to limit access to health professionals. It found that employees and their representatives could make use of such information and concluded that there was no record evidence supporting OSHA's determination that employees who are not health professionals would be more likely to breach a confidentiality agreement than would health professionals.

Confidentiality Agreements—The court upheld the standard's provision that, except in a medical emergency, a manufacturer receiving a request for trade secret information may require that the requesting party sign a confidentiality agreement containing a liquidated damages clause.

In response to the court's finding, OSHA published revised trade secret provisions on 27 Nov. 1985 (50 Fed. Reg. 48750). OSHA adopted the *Restatement* definition of *trade secret* and the *Restatement's* criteria for determining whether a valid trade secret exists (for example, the extent to which the information is known outside the business; the extent of measures taken to guard the secrecy of the information). The ability to reverse engineer the chemical identity of a substance is one of the six criteria to be evaluated.

In addition, OSHA complied with the court's directive to provide for access to trade secrets for employees. It did so by providing for access by employees under the same conditions and procedures by which health professionals have access (that is, demonstration of need, confidentiality agreements, etc.).

Preemption

The extensive delay in the promulgation of the federal Hazard Communication standard[3] had one very significant impact—the passage of worker right-to-know legislation by some 21 states. Frustrated by the delays at the federal level, organized labor shifted the focus of the issue from federal OSHA to state legislatures. As a result, the issue of the preemptive effect of the federal standard has taken on considerable importance, both to the states that have right-to-know laws and to employers who are covered by the federal standard and the state laws. The significance of the preemption issue is demonstrated by the fact that five states which have right-to-know laws (Massachusetts, New York, New Jersey, Illinois, and Connecticut) intervened in the hazard communication litigation to challenge OSHA's contention that the standard preempts their state laws.

Petitioners, Steelworkers, and Public Citizen did not address the preemption issue at all in their briefs; the five state petitioners did. The foundation of the states' argument that the standard does not preempt their state laws is that the standard is not a "standard" but a "regulation." The OSH Act creates two kinds of rules—standards and regulations. The distinction between the two is significant and in two respects: judicial review of a standard lies in the federal courts of appeals, while judicial review of regulations lies in district courts[4]; and, standards, but not regulations, statutorily preempt state laws that address the same issue as a federal standard. The controversy over whether the rule is a standard or regulation arose in this case because of the significance of the preemption issue and also because this rule is a generic standard, not substance specific, as most OSHA standards are.

[3] The effort to issue a hazard communication standard began in 1974 and involved the issuance of two notices of proposed rule makings (the first proposed rule was withdrawn in the early days of the Reagan Administration; the final rule is based largely on the Reagan Administration's notice of proposed rule making) and numerous delays.

[4] It is paradoxical that the state petitioners filed their petitions for review in a court of appeals, and yet they contended that the Hazard Communication rule is a regulation and not a standard.

OSHA supported its characterization of the Hazard Communication rule as a standard by demonstrating to the court that it has the two essential attributes of a standard. First, standards must be based on a finding of significant risk of material health impairment. The record in the rule making supports OSHA's conclusion that inadequate communication about serious chemical hazards endangers workers and that the practices required by the standard are necessary or appropriate to the elimination or mitigation of these hazards (p. 24 of OSHA's brief). Second, standards are designed to correct identified hazards rather than "mere inquiry into possible hazards" (as regulations do). The Hazard Communication rule is designed to decrease the incidence of illness or injury caused by harmful chemical exposure by providing employees with both the information regarding the chemicals and the training needed to help protect themselves.

OSHA distinguished the Hazard Communication rule from Access to Records rule, which was determined by a court to be a regulation and not a standard.[5] The Access to Records rule was held to be merely a device to detect hazards via recordkeeping; the Access to Records rule did not require employers to make records, only to make those records which employers already keep, available to employees. In contrast, the Hazard Communication rule imposes affirmative requirements to develop MSDSs, labels, education, and training programs as well as to evaluate chemical hazards. Finally, the Hazard Communication rule is not limited to mere inquiry into possible hazards but mandates certain practices that are aimed toward the correction of hazards identified by the rule.

If the court determined that the rule was a "standard," then there would be express preemption of state laws in accordance with the terms of OSH Act. If the Hazard Communication rule was determined to be a regulation, there would have been another possibility for preemption—the doctrine of implied preemption. Implied preemption means that, even if there is no applicable express statutory preemption provision, there may still be preemption if there is conflict between a federal scheme of regulation and a state scheme or if Congress intended to occupy an entire field of regulation.

In their briefs to the court, the state petitioners contended further that if the hazard communication rule is a regulation, there is no implied preemption of their state right-to-know laws.

The states contended that their right-to-know laws were enacted to ensure public health and safety—a subject matter that is appropriate to state regulation. They also alleged that their laws, because they are broader in scope (that is, they protect more employees than the federal standard and include worker and community right-to-know provisions), cannot be preempted by a narrower federal standard. They alleged that Congress did not intend OSHA to occupy an entire field in such a manner.

[5] The decision in *Louisiana Chemical Association v. Bingham,* 657 F. 2d 777 (5th Cir. 1981), which held that the Access to Medical and Exposure Records rule was a regulation, not a standard, is the leading case precedent for this issue.

The standard states:

> This occupational safety and health standard is intended to address comprehensively the issue of evaluating and communicating chemical hazards to employees in the manufacturing sector, and to preempt any state law pertaining to this subject. Any state which desires to assume responsibility in this area may only do so under the provisions of §18 of the Occupational Safety and Health Act (29 U.S.C. 651 et seq.) which deals with state jurisdiction and state plans [29 C.F.R. 1910.1200(*a*)(2)].

The issue of the standard's preemptive effect was thus squarely presented on the face of the standard.[6]

It was OSHA's position that state activity is limited in light of the Hazard Communication standard under well-established constitutional doctrine. The Supreme Court only recently, in *Capital Cities Cable, Inc. v. Crisp,* 52 U.S.L.W. 4803 (U.S., 18 June 1984), reviewed the law:

> Under the Supremacy Clause, U.S. Const., Art. VI, cl. 2, the enforcement of a state regulation may be pre-empted by federal law in several circumstances: first, when Congress, in enacting a federal statute, has expressed a clear intent to pre-empt state law. . . .

The limitations on state regulatory activity due to OSHA's promulgation of the Hazard Communication rule come within this "clear congressional intent" category.

The preemption provision of the OSH Act (Section 18) works in the following manner. Until OSHA promulgates a standard, state activity is not restricted. Once OSHA has promulgated a standard, states may regulate that issue only if they obtain OSHA approval of the regulation as part of a state plan:

> Any State which, at any time, desires to assume responsibility for development and enforcement therein of occupational safety and health standards relating to any occupational safety or health issue with respect to which a Federal standard has been promulgated under section 655 of this title shall submit a State plan for the development of such standards and their enforcement. [Section 18(*b*), 29 U.S.C. §667(*b*)].

State plans must be approved by OSHA where the criteria of Section 18(*c*), 29 U.S.C. §667(*c*), are met. Among these criteria are that the state standards must be "at least as effective in providing safe and healthful employment" as the OSHA standard, and that state standards, when applicable to products distributed or used in interstate commerce, must be required by compelling local conditions and must not unduly burden interstate commerce [Section 18(*c*)

[6] The Court of Appeals was not asked to rule on the validity of any particular state statute. This case involves only a preenforcement challenge to the federal OSHA standard and requires only that the court make rulings as to the OSH Act and the federal standard. The case discussed later in this paper, *State Chamber of Commerce et al v. Hughey,* No. 84–3255 (D.N.J. 1985), involved a direct challenge of the validity of the New Jersey Worker and Community Right-to-Know Act on the ground of preemption.

(2) of the OSH Act, 29 U.S.C. §667(*c*) (2)]. Therefore, any state that wishes to regulate on the subject of hazard evaluation and communication in the manufacturing sector must submit to OSHA a state plan meeting the criteria set out in the act (that is, "at least as effective," etc.). It was OSHA's position in this litigation that, without an approved state plan, states are preempted from regulating hazard communication within the manufacturing sector.

Regarding the issue of whether the standard preempts state laws regulating hazard communication in the nonmanufacturing sector, OSHA told the court that this issue is not ripe for review (p. 84 of OSHA's brief). Neither the standard nor its preamble expresses on its face what the preemptive effect of the standard might be in the nonmanufacturing sector. There has been no formal action by OSHA that would have a concrete effect on the state petitioners that would make this question fit for judicial decision at this time. OSHA suggested that the state plan approval process and challenges to state statutes provide better avenues for review of this question (p. 86 of OSHA's brief). What OSHA suggested is that if a state wishes to regulate hazard communication outside the manufacturing sector, the state should submit its regulation to the agency for approval as a state plan (since it already has to submit its regulation of hazard communication in the manufacturing sector for state plan approval).

OSHA told the court that there is no controversy concerning the standard's preemptive effect on community right-to-know laws (p. 88 of OSHA's brief). Public health and safety are beyond the purview of OSHA. The preemptive effect of an OSHA standard can be no broader than the Secretary's mandate. OSHA pointed out, however, that to the extent that there are several portions of a community right-to-know law that are workplace or employee specific, "they are not immune from preemption by OSHA simply because they are enveloped in a law that at the same time manifests a broader purpose" (pp. 88–89 of OSHA's brief).

The court held that the rule is a "standard" that has preemptive effect under the OSH Act with respect to disclosure to employees in the manufacturing sector. The court agreed with the Fifth Circuit in *Louisiana Chemical Ass'n v. Bingham* that the test of whether an OSHA rule is a "standard" or a "regulation" turns on whether the rule purports to correct a particular significant risk or instead is merely an enforcement or detection procedure designed to further the goals of the OSH Act generally. Applying this test, it held that the Hazard Communication rule is a "standard" under Section 6 of the OSH Act.

In addition, the Court held that, under Section 18 of the OSH Act, the Hazard Communication standard preempts state hazard disclosure laws with respect to disclosure to employees in the manufacturing sector. (The Court added gratuitous language indicating that there would be no preemption absent the express provisions of the OSH Act.) The Court declined to consider the question, urged by several states, of whether state laws requiring disclosure outside the manufacturing sector are preempted. Rather, it stated that such a declaration would be premature and noted that this question could turn on issues such as

the severability of manufacturing sector provisions from nonmanufacturing sector provisions of the state law.

New Jersey Right-To-Know Litigation

The preemptive effect of the Hazard Communication standard was the central issue in a lawsuit challenging the New Jersey right-to-know law.[7]

On 3 Jan. 1985, federal district court judge Dickinson Debevoise ruled that the federal Hazard Communication standard preempts the entire New Jersey right-to-know act ("the Act") as it applies to employers in SIC Codes 20–39. The decision was issued in a lawsuit brought by a coalition of business interests challenging enforcement of the Act on the ground that it is preempted by the standard [*New Jersey State Chamber of Commerce v. Hughey,* 600 F. Supp. 606 (D.N.J. 1985)]

The decision means that manufacturing employers (SIC Codes 20–39) are not subject to the provisions of the Act (including the worker *and* community right-to-know provisions), and that nonmanfacturing employers (outside SIC Codes 20–39) are unaffected by the court's decision and, therefore, must implement the Act's requirements.

The court said that congress addressed the preemption question in the OSH Act (Section 18); therefore, this is a case of express preemption. The court found that Section 18 has been consistently interpreted by OSHA and the courts to ban exercise of state jurisdiction over issues addressed by an OSHA standard. Since the New Jersey law covers the same "issue" as the federal standard (that is, hazard communication in the manufacturing sector), that part of the law is preempted. The fact that the Act is broader than the federal standard (that is, public health and safety versus worker health and safety) does not insulate the worker provisions from the preemption provisions of the OSH Act.

The court commented that if the state wants manufacturers to be covered by the Act, the state must submit the Act to OSHA for approval as a state plan. New Jersey had argued that the Act was not inconsistent with the federal standard and, in fact, furthers the objectives of the OSH Act. The judge said that a determination in that regard must be made by OSHA in the first instance as the state plan approval process requires.

Standard Versus Regulation

The judge rejected the state's argument that the federal Hazard Communication standard is a "regulation" and not a "standard." As explained in the hazard communication litigation section, OSHA standards preempt state laws covering

[7] Similiar cases were filed in Pennsylvania. *Pennsylvania Foundrymen's Assoc. v. Knepper* (M.D.C. Pa. 1985) and *Manufacturers Assoc. of Tri-Country v. Knepper* (M.D.C. Pa. 1985). A decision in the Pennsylvania case was rendered on 12 Dec. 1985. The decision, which was similar to the decision in the New Jersey case, has been appealed.

the same issue; OSHA regulations do not have any preemptive effect. The judge held that the OSH Act and the legislative history of the Act support the status of the standard as a "standard." In addition, the judge said the agency's interpretation of the standard as a "standard" should be "accorded the significant weight which courts give to interpretations of an implementing agency."

The court agreed with OSHA's distinction between this standard and the Access to Records rule, which was held to be a "regulation" [*Louisiana Chem. Association v. Bingham,* 657 F. 2d 777 (5th Cir. 1981)]. In contrast to the Access to Records rule (which is aimed at detection of risk, not corrective action; which has a voluntary record creation provision; and, which includes substances that are not hazardous), the standard: requires evaluation of hazards, development of MSDSs and education; pertains only to hazardous chemicals; and includes label and warning requirements that come under OSHA's standard-setting authority.

Extent of Preemption

The judge found that, because there is no federal standard that covers employers outside SIC Codes 20–39, there is no preemption of the act as it applies to those employers. The court rejected an argument by industry that OSHA's decision not to regulate employers outside SIC Codes 20–39 was in fact a decision with preemptive effect (that is, if the Act applies to nonmanufacturing employers, OSHA's decision not to regulate them would be defeated). The judge also rejected industry's argument that OSHA may regulate employers outside SIC Codes 20–39 in the future, and, therefore, that state regulation should not be allowed to intrude.

The court also found that since there is no federal rule covering nonmanufacturing employers, the state is under no obligation to submit its Act, as it applies to nonmanufacturing employers, to OSHA for approval as a state plan. Industry had argued that if the state wanted hazard communication regulations that went beyond the scope of the standard, those regulations would have to be approved by OSHA as a state plan in order to ensure consistency from workplace to workplace.

Community Right-to-Know

The judge acknowledged New Jersey's right to enact community right-to-know legislation. However, in this case, the nonworkplace provisions of the Act are superimposed upon workplace requirements that have been preempted. The judge said that the workplace and community regulatory schemes are inextricably intertwined. The judge found that the community provisions are preempted as they apply to manufacturers because of the inability to sever those requirements from workplace requirements.

The court commented on the state's ability to have community right-to-know legislation that applies to manufacturing employers. The court said if a state were to adopt a statute directed as a bona fide effort solely to achieve nonworkplace objectives such as community right-to-know, the OSH Act's preemption provisions would not be applicable. The court added, "If in fact the nonworkplace regulatory scheme infringed on an OSHA standard, the often difficult question of implied preemption would have to be addressed."

Appeal of the Decision

On 10 Oct. 1985, the Third Circuit Court of Appeals affirmed in part and reversed in part Judge Debevoise's decision. The Third Circuit Court held that the New Jersey statute is preempted by the OSHA standard to the extent that the New Jersey statute pertains to protection of employees in the manufacturing sector. There is no preemption of the New Jersey statute insofar as it regulates hazard communication outside the manufacturing sector (at least until OSHA extends the coverage of the Hazard Communication standard to employers outside SIC Codes 20–39). Nor is there any preemption of the New Jersey statute's community right-to-know (or environmental hazard) requirements except to the extent that they can be shown to make it impossible to comply with the OSHA standard or stand "as an obstacle to the accomplishment of the purposes of the OSHA standard."

Specifically, the court of appeals upheld the provisions in the New Jersey statute for the development of environmental and workplace hazard surveys and hazardous substance lists by the New Jersey Departments of Environmental Protection and Health. The requirements for completion and distribution by employers of *workplace* hazard surveys may be applied only *outside* the manufacturing sector; however, the court upheld the requirements as to completion and distribution of *environmental* hazard surveys as to *all* employers.

With respect to in-plant labeling, the court of appeals held that the New Jersey requirements are preempted to the extent that they require labeling of *workplace* hazards in the manufacturing sector. But it held that the requirement of in-plant labeling as to *environmental* hazardous substances is not expressly preempted, and it sent that issue back to Judge Debevoise for a determination of whether compliance with the New Jersey requirements would create an obstacle to the accomplishment of the purposes of the federal standard. That decision is still pending in the district court. The court reversed Judge Debevoise on the "severability" question, holding that the environmental hazard provisions of the statute were not inextricably intertwined with the worker protection provisions and that they can continue in effect, even in the manufacturing sector.

Finally, the court of appeals affirmed Judge Debevoise's holding that the trade secret provisions of the New Jersey statute—to the extent that they are not preempted—do not constitute an unconstitutional taking of private property.

This decision and the *Steelworkers* decision establish substantial case precedent that the federal Hazard Communication rule is a standard, and it preempts state laws covering the same issue. While employers in SIC Codes 20–39 are not covered by the state law, the decision means employers outside SIC Codes 20–39 are. When OSHA expands the scope of coverage of the standard, as ordered by the court in the *Steelworkers* decision, preemption will likewise expand.

While manufacturers have won the legal argument of preemption and now have the protection afforded trade secrets by the federal standard, employers outside SIC Codes 20–39 will have to have trade secret information on labels and MSDSs, etc. in accordance with the New Jersey law. Manufacturers may claim certain information as a trade secret, under the protection given by the standard, that the manufacturers' customers may have to disclose under the Act. This kind of conflict will make implementation of the Act very difficult, if not impossible. The fact that the decision severs one segment of employers from the Act, and results in two different worker right-to-know laws applying in the state will certainly cause the confusion that the industry told the court would result.

The court suggested that the state submit its Act to OSHA for approval as a state plan, if it wishes manufacturing employers to be covered by the Act. The state asked OSHA to evaluate whether the New Jersey law meets the "at least as effective" requirement for state plans. OSHA responded in the negative, listing numerous reasons why the state law is not "at least as effective" as the federal standard. For example, the state's definition of "hazardous substance" is more limited than the federal definition. OSHA determined that the state statute would cover approximately 2000 substances, compared to as many as 60000 substances covered by the federal standard. Another example is the fact that MSDSs are to be provided to employees within 5 days of a request for one; the federal standard requires that MSDSs be "readily accessible" to employees during each work shift.

Liability Issues

The standard establishes a legal standard of care in regard to warning employers and employees of the hazards associated with potentially dangerous chemicals.

A plaintiff can now allege specific violations of the standard and request the court to find that such a violation is conclusive as far as the employer's failure to meet the standard of care. Some courts may hold that a violation of an OSHA rule constitutes negligence per se; other courts may consider such a violation as evidence of negligence.

The standard will make information more readily available to plaintiffs and will help them in establishing their cases. At the same time as it aids plaintiffs in building a case, it will improve record keeping and documentation, which

will aid employers in establishing defenses. Very often, employers are found liable, not because the employer did not consider the dangers and provide adequate warning, but because the employer cannot document the fact that he engaged in either activity.

The standard will, in addition, provide employers with a defined standard to which a jury can compare their conduct. Employers who comply with the Hazard Communication standard can use it as a tool which will assist the jury in evaluating the reasonableness of the employer's conduct. Prior to the standard's adoption, juries often assessed the adequacy of warnings in a vacuum, with the jury usually demanding greater specificity of warning. Compliance with the new standard, however, is evidence of reasonable conduct in accordance with recognized standards. Compliance with the Hazard Communication standard, however, is not an absolute defense. The jury can decide that a reasonable employer would have taken additional precautions or given additional warnings other than those required by the Hazard Communication standard. For instance, the standard's requirement that labels be written in English may not meet the reasonableness standard in all cases. Where the employer has non-English speaking employees in the workplace, a jury could easily decide that the labels should have contained warnings in a second language.

Effect on Employee Relations

The recent United Automobile Workers (UAW) Union labor agreement with Ford and General Motors is perhaps an illustration of where the right-to-know issue is headed. That agreement provides:

1. The companies will set aside millions of dollars for health and safety training.
2. The companies will conduct outside research projects on hazardous chemicals that are of concern to union members.
3. The union will have greater say in deciding how hazardous materials are used in plants.[8]

The last two points are significant—how will workers use the information that must now be made available to them? It is likely that there will be demands that certain chemicals not be used, or that additional data on a particular chemical is needed? Employers are faced with the challenge to make hazard information meaningful and accurate. These issues will inevitably be a part of collective bargaining.

Another effect on employee relations may be increased litigation for compensation of occupational diseases. In fact, the AFL-CIO has formed a Legal Rights foundation to help workers gain compensation for illnesses due to exposure to workplace health hazards. The foundation will coordinate and

[8] "UAW's Right-to-Know Breakthrough," *Chemical Week*, 23 Jan. 1985, p. 19.

support lawsuits brought on behalf of these workers. As just mentioned, the standard and state right-to-know laws facilitate the bringing of these types of cases.

Conclusion

The issuance by OSHA of this generic standard and judicial approval of the standard is a significant accomplishment for the agency. The standard is the most far-reaching action ever taken by the agency.

There is now clear case precedent that the federal standard preempts state worker right-to-know laws in the manufacturing sector. This decision will impact the states' ability to enforce right-to-know laws against manufacturers.

In regard to the product liability issue, the standard may precipitate increased litigation. However, employers should derive some benefit from the guidance the standard provides in regard to the legal standard of care by which employers will be judged.

Panel Discussion: Other Jurisdictions and Legal Issues

Two panel discussions were held as part of Section III of the symposium on Other Jurisdictions and Legal Issues. The first panel discussion, labeled Part A, was entitled, "State and Local Right-to-Know Issues—Industry Views." The second panel discussion, labeled Part B, was entitled, "Other Jurisdictions and Legal Issues."

The discussions are presented in their original form; neither was peer reviewed. The names of those individuals asking questions are not given; the questions and responses of these persons are listed as *Question* and *Response*.

Part A: State and Local Right-to-Know Issues—Industry Views

The moderator was Art Boehm, United Technologies, Hartford, Connecticut. The panel members were: Thomas F. Evans, Monsanto Co., St. Louis, Missouri; Hank Garie, New Jersey Department of Environmental Protection, Trenton, New Jersey; and Robert R. Stone, New York State Department of Health, Albany, New York.

Specific Questions and Responses

A. Boehm: Yesterday Fred Mabry of the U.S. Steelworkers Union listed as a shortcoming of the federal law the fact that there was no community hazard information requirement. Dean McDaniel later responded to a question from the floor about Bhopal, saying that environmental type of concerns are really outside of the purview of OSHA. Now we had a presentation on New Jersey's right-to-know system which is in effect. I have a question from a couple of different viewpoints. Is New York State planning anything along these lines? And, secondly, Congressman Waxman of California has a staff that has been working for a few years trying to put together a federal activity in regard to regulation for community hazard information. Will New Jersey continue to go ahead with their plans or see how things develop through Congressman Waxman's efforts? I open that up to Bob Stone.

R. Stone: New York does have a community right-to-know program, although it's run by our Department of Environmental Conservation, and, as far as I

know, it is still in the formulation stage. This was not implemented by legislative action but by proclamation of the governor. As I said at the beginning of my presentation, we have a number of activities in the state related to toxic substances and cleanup of toxic substances including the two right-to-know programs and our Superfund program, but they're not lumped together as a single program. I don't know if that was intentional, but we have certainly avoided the jeopardizing of one program because it's part of another program, such as happened in New Jersey.

H. Garie: The state of New Jersey will continue with our efforts on the community aspects of right to know. With the recent legal challenges, however, it's going to be important that the manufacturing sector be included if our data is to be a comprehensive picture of toxic use in New Jersey. I don't think there's any question as to the importance of that. If federal legislation addresses the area of community right to know, New Jersey would certainly be supportive of the intent of those efforts. As I mentioned earlier, right now New Jersey's approach, both to the industrial survey and the community right to know, is being considered as a model for a nationwide toxics inventory to be included under Superfund. If there is, in fact, future national legislation, we would certainly be supportive of a consistent approach.

Question: First of all, from a federal viewpoint and a state viewpoint, what are the regulations regarding labeling buildings in which hazardous waste is stored? What are the criteria involved? And, isn't this a critical aspect of communications to the community, particularly for local firefighters? Shouldn't there be some labeling on a building when there are toxic substances stored in there? Picture a storage building filled with various chemicals. Shouldn't there be requirements noting that it contains hazardous materials, so that if the building should catch fire and the local fire department comes out to put it out, they would know what's in there? At least they would know that there are hazardous chemicals in there and that they should treat it with respect.

H. Garie: Currently, under the New Jersey law, there is no labeling requirement for buildings. The way the process is designed to work is through the survey process; the fire and police departments would know what's stored within a particular facility in advance. They can review their survey form for that plant.

Response: Is this effective? If you get an emergency call, I can't feature some guy on the fire truck reviewing the plans for the area. Is this an effective program?

H. Garie: Well, right now I think it's a little too early to tell how effective it will be in New Jersey.

Response: Why isn't there a program in New Jersey or any place else? It seemed to me that it would be pertinent to this area of hazard communication.

H. Garie: I think it's an interesting concern, but it's not included in our current legislation under community right to know.

Response: It's not included in any federal legislation either, is it?

H. Garie: Not that I'm aware of.

T. Evans: There are two states that have right-to-know laws that include a building labeling feature. One is in Iowa and the other is in Tennessee, which is in process. The community right-to-know aspects of most of the other laws are not that detailed. They are designed to promote communication from the manufacturer to the community so that they know what's there. You will soon hear about an initiative, an initiative the members of the Chemical Manufacturers Association will be undertaking to voluntarily make this information available to the community. They will work with the local community officials to try to develop this kind of an understanding without necessarily going through all of the mechanics of the specifications of inventory, but will provide any information they want. We're going to try to do it on a voluntary basis, tailoring it to each local community. As Hank Garie indicated, some of the local communities just aren't that concerned. But if we go into the fire department and make them aware of what is stored in the buildings they're concerned about, they'll know the hazards.

Response: They'll know, but will they have that information when they're on the fire truck?

T. Evans: There's no way you can put a sign on a building and let somebody know everything that's in there.

Response: No, but there ought to be some criteria set up.

T. Evans: You can put the Department of Transportation type of label: "Flammable," "Danger," "Explosive," or something like that. But you might just as well say "Chemicals Here," since it could be anything from A to Z.

Response: Well, even that would be an improvement over no label.

T. Evans: I am sure that if there are legislators in the audience that they're taking notes.

Question: Just as a matter of information, practically every fire department in the United States has rules, at least local municipal rules. Take, for instance, nitrocellulose. The NFPA (National Fire Protection Association) symbol is posted on buildings where nitrocellulose is stored. In the past, it's been the responsibility of the local fire department to demand these various designations. I don't see how you can legislate it from a federal point of view because the local fire department has to fight the fire. That is one of the functions of the NFPA.

T. Evans: That's one of the reasons why I'm not too unhappy with an Illinois provision in the state right-to-know law that they have. They require that the manufacturer contact the local fire department. It's the manufacturer's initiative. He must make the contact and say, "We're here, we have these things, let's sit down and talk and we'll go over it with you and explain and develop

emergency response programs.'' If the fire department doesn't respond, it's not the manufacturer's responsibility, but at least the initiative is required there, and I think that's a good provision.

H. Garie: Yes, I think that's an important point. Our intent from a survey is to provide the fire departments with basic information, and then, under the law, they have the authority to go back to the employer and gather more specific information. So the underlying intent is to get the fire departments interacting with the employer.

Response: In Connecticut we have a statute along those lines where the manufacturers have to get ahold of the local fire department and give him an idea of what kinds of chemicals are there. It goes by the DOT listing, though.

H. Garie: Have you found that to be effective?

Response: We have not had the fire department respond. We have our own internal fire department, which is probably larger than the East Hartford fire department, in our particular case.

Question: Is it unworkable to set up a criteria in which a building could be labeled as containing hazardous substances? Something as simple as a certain number of pounds of chemicals per square foot of floor space, something to that effect. Is that unworkable? Does it make sense? Realistically, with all the communications that you have with the fire department and the fire district, the fireman that's on site may not have that information and may be injured as a result of entering a building in which chemicals are burning.

T. Evans: To me, this is a key point of why you don't want to legislate specification detail in this area. If you give the fire department a list of 50 million chemicals, and you tell them that we've got 4.3 pounds per square foot stored on two different levels, the guy's going to say, ''So what.'' What you should tell him is, look, here is a plant, we have *X* chemicals in there. Here is the contact point for any emergency we have. If you can't get him, it's this person or that person. Before your engines come into that location, these people will be looking for you to tell you what the problem is, where it is, and what you should be aware of. That's the only way they can absorb it. If you try to go down and tell them you've got 50 different things and these are 50 different hazards and they've got to watch out for all of them, the poor guy driving the hook and ladder would probably turn and go the other way instead of coming into the plant. Perhaps somebody at that plant will show them and tell them what to look for. That's the intent, at least from an industry point of view. This is what we're trying to do voluntarily with the communities rather than load them down with paper that they don't need. We'll give it to them if they want it.

Response: Whether this is voluntary or legislative doesn't matter to me in terms of the effectiveness of it. But wouldn't it be effective if that engine arrived

at a particular building, and there was a sign there saying, "This building contains toxic substances"?

T. Evans: What I'm telling you is, if you rely on pipe labeling or sign labeling on buildings, people are going to stop and think they've done their job, and as soon as something leaks on that pipe or leaks on the sign or burns the sign up, there "ain't" going to be anybody there to tell them what it is. You need something other than a sign to do it.

H. Garie: If I could add one other thing. I think Tom's point is valid from an industry perspective where in many large industries you do have a contact person that the fire department goes through to find out just where things are located and stored. However, that's not the case in many small businesses, and what I'm hoping will happen through our survey process is that the fire department, by reviewing several survey forms, will have a general idea of what to expect when it approaches a small facility such as a dry cleaning establishment that may be on fire. It would be impossible for him to have a contact at that dry cleaning place to check in with. So there is a distinction here between a large manufacturing industry versus small employers that still have hazardous materials in their buildings.

J. Brower: I have two questions here, one for Bob Stone, and another for Tom Evans. Bob, you mentioned that you had some concerns about the OSHA standard, but are there any specific areas in the New York State Right-to-Know Law that will be preempted by the OSHA standards?

R. Stone: Well, the OSHA standard and the New York Right-to-Know Law dovetail very well. People who have been complying with Right to Know for the last five years are well on their way to OSHA compliance. People who are gearing up for OSHA compliance meet the requirements of right to know. There really isn't very much conflict between the two pieces of legislation. Our major area of concern is that people who are working in industries outside the SIC codes specified in the Hazards Communication standard don't lose their right to obtain the information that they've been able to get for the last five years.

J. Brower: Tom, I wonder if you could briefly summarize. There are very many state right-to-know laws on the books, and I know industry has become very concerned about these state laws, but are there any particular states for which you could summarize their particular concern to industry?

T. Evans: I commented yesterday about trying to develop a compliance program aimed at the federal standard but at the same time considering as many of the state laws that are there. Whether they're going to be preempted or not, you've got to take them into your compliance plan. Attorneys at our companies say, we don't know what the preemptive effect will be. Sure, we have the New Jersey decision now, but these decisions that I'm referring to were made before the New Jersey court decision was handed down. Our decision was that we simply do not want to be out of compliance with any state law regardless of

how onerous it may be. So we set up a program of compliance to the federal standard but made adjustments to it to take into account these various state laws.

I'll give you a couple of examples. Number one, the federal standard says that on a label you merely need to put the common name and the appropriate hazard warning of the chemical. The federal standard says that on an MSDS you must record the exact chemical identity, the chemical name. Now the reason that OSHA didn't force that on the label was that they were under pressure from OMB Office of Management and Budget to minimize the effect of cost on the industrial community, and they realized that every label would have to be remade, so they didn't require it. They did require that there be some link between the label and the MSDS so that anybody could find out whatever they needed to know. Several states didn't do that. New Jersey, Illinois, Massachusetts, and you can keep on going, require the chemical name on the label. So we made a conscious decision—let's put the chemical name on all our labels. We talked the federal government out of it, but now we roll over and do it for all the states.

Number two, some states require CAS (Chemical Abstract Service) numbers. The federal government didn't even require CAS numbers on MSDSs or labels because they recognized that CAS numbers don't exist for all chemicals, and that this would be confusing to compliance officers who came in and said why don't you have a CAS number. So we made a conscious decision because of those states to put the CAS number on our labels as well as on our MSDS.

Now you go to Massachusetts. Massachusetts has a requirement that says if you have a proprietary trade secret for a carcinogen, mutagen, or teratogen, you put a C, an M, or a T on your label. This becomes a problem. Do we do that in Massachusetts, or do we do that everywhere to try to comply? We made a conscious decision there not to change our policy as we did on CAS numbers and chemical names. We decided not to put M, C, and T on all of our labels. We decided merely to sticker a label that was going from a Massachusetts-producing facility of ours into the community and take our chances on outside products coming in, and if we have to sticker them going in, then we'll sticker them going in.

New Jersey required on the label, in addition to chemical identity, the five most predominant ingredients of a mixture. We made a conscious decision to put on the labels for all states, again, mixture ingredients only if hazardous. We made the conscious decision not to put the five most predominant, including nonhazardous chemicals. We just think that will burden down the label, and some labels get so big you can't even wrap them around the product. So we decided if New Jersey's law did stand up under the test in the court, we would sticker labels in New Jersey accordingly. However, we would avoid that particular effort around the country in all of our plants.

The only other feature of New Jersey that made it different from most others was the feature that Hank Garie was talking about, the environmental surveys.

Even that was no problem. The problem came down to emission data. The surveys required that all point source, stack source, water runoff, and hazardous waste emissions from your plant on all of these substances must be provided. Senator Lautenburg and Congressman Florio have bills in the Congress right now requiring that from a federal point of view. We would have had to take every product we make in every plant and somehow determine what those emissions were. Even though we know most of them based on Clean Air and the Clean Water Act and RCRA, we don't know every chemical that's in the workplace. We conservatively estimated that that would cost $2 million a plant, and we've got 50 plants. If it has to be done, we're going to have to find out some way to do it, but to me that information is just redundant.

Let's run back to Massachusetts again. Massachusetts has a requirement for hazardous substances if they contain teratogens, mutagens, or carcinogens. Massachusetts wrote a law requiring 0.1% to require identification as a hazardous substance for those three types. The regulators then got together, and they wrote regulations that took that down to one part per million. In Massachusetts, if you have a mixture that includes one part per million of one of those substances, it is a hazardous substance by definition.

I started my manufacturing life in Massachusetts working in our Springfield plant producing polystyrene. Polystyrene is safe; you can chew it and pick your teeth with it or whatever you want to do with it. But if you have residual monomer on one part per million in those pieces of plastic, it is a hazardous mixture in Massachusetts. We had to go in to our warehouses and sticker millions of pounds of bags of polystyrene to point out that this was a potential carcinogen because it contained a chemical that was on the National Cancer Institute's and NTP's list as a carcinogen. There is a federal law regarding acrylonitrile. The ABS polymer is exempted from being identified as a carcinogen because they recognized that that was unnecessary and silly, and yet we all know acrylonitrile by itself is a carcinogen. Polystyrene isn't a carcinogen.

I think most of the other laws around the country pretty much follow the federal standard, but every now and then they throw in a provision such as notifying the fire department or this person or that person, but those are not the problems. The problems are the emission data that just don't exist. I think it's probably redundant to most communities.

H. Garie: Let me just interject here while we're talking about emissions and give some of our reasons for requiring that information. If we look at the information we collected during 1978 and 1979 on the industrial survey, we see things like benzene and commonly used solvents such as xylene and toluene being emitted throughout New Jersey at several million pounds a year. Vinyl chloride emissions may be several million pounds a year. It's important that we understand these emissions so that we can then institute appropriate control strategies. In the state of New Jersey, which is probably one of the more progressive states in terms of environmental regulations, there are only 16 toxic

air pollutants that are regulated. Sixteen out of how many thousands? I guess I disagree that the information being provided under the right to know would be redundant. If it's redundant, it would be no problem for the industries to give us those estimations.

T. Evans: When I say redundant, I don't mean that the information on some chemicals is redundant. What I'm saying is, I think it is redundant to information in RTECS. Take New York's, for example. For every substance in RTECS that you have in your plant, you're required to provide emission data. For benzene, for acrylonitrile, for vinyl chloride, and for styrene, we know what they are. They're required by the other laws, and we've had to develop the technology over the years to do it. But if somebody came and said, you produce dimethyl chicken wire, you must determine how much goes out every particular stack exit point from your plant; we can do it, but it's going to take us several years to develop the technology and millions of dollars. That's the only point I meant about redundancy. But now take benzene, for example. We can tell you how much benzene goes up the stack. We can tell you usually how much goes out in water, too. But what does it mean? There's more benzene going out every day; all of you inhale more benzene driving home in your car probably than I do, having worked in a plant where we produce benzene. It's in gasoline, it's everywhere. And there are a lot of other chemicals that are that way. I just sometimes wonder just what all this information will do for us. We can provide it if we have the time and the resources, we can develop the technology. But it can't be done overnight.

Part B: Other Jurisdictions and Legal Issues

The moderator was Art Boehm, United Technologies, Hartford, Connecticut. The panel members were Milton Freifeld, Chemical Manufacturers Association, Washington, D.C.; Henry Garie, New Jersey Department of Environmental Protection, Trenton, New Jersey; Geoffrey (Jeff) Granville, Shell Canada, Ltd., Calgary, Alberta, Canada; and Robert R. Stone, New York State Department of Health, Albany, New York.

Specific Questions and Responses

Question: Jeff, under Canadian law, under what circumstances would the downstream employer be permitted to rely completely on the MSDS as provided by the supplier? Would there be circumstances under which he could not rely on it or when he would be forced to evaluate it himself?

G. Granville: As the regulation or rather the draft report has been given to the regulators, that MSDS from the supplier is law to that person. If he doesn't like it, he has to respond somehow or send it back and say he disagrees. But if

he accepts it as being correct, then it is. It brings up a very difficult problem, of course, which is what do you do if you're a reasonably responsible employer who knows there's something inadequate in that the supplier's MSDS is lacking data because it has not yet been found by the report drafters. This has me very worried because a number of times the MSDS production is not really as good as one would like it to be, and this situation is unlikely to change drastically in the next two or three years. So, it hasn't been addressed, and there's a lot of concern being expressed about those legal responsibilities.

Question: Jeff, you mentioned that the labels are required to be bilingual. Will that be true of the MSDSs as well?

G. Granville: Yes, both MSDSs and the labels will be bilingual. You have an option with respect to the MSDSs. You can request it in one or other language, but they should be produced bilingually. Most companies right now in Canada automatically produce a bilingual MSDS.

A. Boehm: Perhaps I could interject a question now. Milt, in regard to the international setting, CMA has been active in a number of areas. Do you have any other views of what other countries are doing that might be of interest to any of the multinational employers who might be in the audience today? Like in the United Kingdom, they have their new regulation on community information. As I understand, it became effective this year where employers or manufacturers are to provide to the community information on the material stored. In that particular instance it's to go to the local buyer and the mayor, whoever.

M. Freifeld: Well, I guess there are a number of ways to answer that. One is we like to do things voluntarily, and we're taking that approach essentially. As Tom Evans alluded to this morning, we have in development essentially a program for outreach to communities. There are many companies who do this right now and do a very good job of it. There are others who do need some help, and we're planning a program to help our members do exactly that, to get information to neighbors around the plant, to get the information needed to emergency response people, and indeed to help organize emergency response capabilities where they're not present right now. And one of the things we plan to stress is that the whole focus doesn't have to be just on chemical emergencies, that other emergencies should be considered as well, and that surely we'll provide information where it's necessary and desirable. Again, trying not to overload the system but to give people what they need to respond and to set up mechanisms. As Tom Evans pointed out this morning, being practical about it, our objective is not to fill truckloads with MSDSs and deliver them to the fire department, but rather to provide a way to assist the local emergency people if and when something happens. So that's one level. There's one other level I want to talk about and that is that we are thinking of some kind of approach to lesser developed countries, and we haven't really formulated that program yet,

but we're working; in fact, we're not even working on it yet. The meeting for initiating them will be later next week.

A. Boehm: Part of my question was do you have the names of the countries which are starting such programs as Canada is doing? I know that England has their regulation. Do you have any of the others in the European community?

M. Freifeld: No, I really don't know right now.

G. Granville: There is something called the Seveso Directive that's part of the European community. There is one you mentioned in the United Kingdom. The EEC has passed the Seveso Directive as far as I know, and there will be two years for each member state to develop its own emergency response for this type of package. I don't know what other countries within the EEC area have promulgated their specific regulations.

Question: Most MSDSs received from our suppliers have some sort of disclaimer stating that the information contained in them is accurate to their knowledge, but they make no warranty as to their accuracy. Is a statement like this valid, and does it legally let companies off the hook in liability cases?

M. Freifeld: Well, in a nonlegal sense, just using common sense, an employer that fills out an MSDS has to make a pretty good faith effort to get all the information he can. It's not enough for him to go to his library and say, well, if it's not in my library I can't put it on the MSDS. And there are more and more data banks becoming available. In fact, we had one demonstrated here yesterday afternoon. Using the CSIN (Chemical Substances Information Network) approach, even relatively small companies would be able to access that kind of information.

A. Boehm: I believe that counsel would advise that you cannot absolve yourself of your responsibilities. You can't write a note to say you can't hold me responsible for robbing this bank because the gun wasn't loaded. It's there, it's in the law. You can write anything you want down but you can't change the law just by putting your opinion on a piece of paper. I'm pretty certain that is the advice you will get.

J. Brower: I think the OSHA standards are fairly clear that the employer is really the one responsible for the accuracy of the information. I think the question will probably arise, and that may take some courts to resolve it. The employer may then turn around and sue the manufacturer or the importer for misinforming him. The employer has the primary legal responsibility. He is the one who could be sued by the worker.

G. Granville: This brings up a whole new issue which I'd like to indulge us all with. The mere fact that you produce information on an MSDS or a label is only half of the story. You know, this is what the material is capable of doing. As we all know, any material can do just about anything given certain circumstances. And it can hardly be the responsibility of the supplier to know

all the possibilities of use that a product is put to. However, you must obviously know the major ones. Canada isn't thinking quite the same way as the United States. In the United States, you look at your enormous fishbowl and see that so many decisions are taken by the court of law, not based on practicalities so often, but on legal requirements and necessity. Whereas in Europe, they're very much the other way, and in Canada we sit midway between the two. But the question is, where is responsibility stopping and where does legal authority start? When is an MSDS wrong? I'd like to develop that one idea. Providing information is just part of it. It's how it is used and what happens. So people develop a perception that all you need is to provide information. Would we have avoided Bhopal if there were MSDSs on methylisocyanate? That's the sort of impression I get. And, well, we all know that impression is obviously not accurate. I feel that we've got to try and develop some way of saying that giving information is just a little teeny bit of a larger situation. People believe that information is all there ever is and all they'll ever need, whereas the important thing is what is done with such information. This is like possibly sticking a label up outside a building in case of a fire. You've got to get awareness and understanding. How are the right-to-know issues tied up with respect to public awareness and public education? We're now producing labels and MSDSs, but this does not mean the material is safe? This doesn't mean it's unsafe either. An MSDS is just part of an awareness situation. You, the people, now have to understand what it means. You have to become educated to do your own risk management. I don't know how we do that. I'd like to ask how you are attempting to address that.

H. Garie: Yes, I think Jeff has brought up a real interesting point here, and it is very valuable for us to be able to provide citizens in our state or throughout the nation with information on hazards. The next logical question, though, is just what does that mean to me on a daily basis? The way we're trying to approach that in New Jersey is through the science of risk assessment; although risk assessment is just an emerging area, we're trying to place various risks into some sort of an overall perspective. And that is important when one considers developing environmental management and control strategies. I think we'd better take a look at the overall area of chemical exposure and then develop a way to orderly assess the various risks that are associated with different exposure routes. We're trying to do this in New Jersey now by working cooperatively with the Department of Health and several universities. I think it's going to be a process that will take a while and will continue to develop, but that's what has to be done with information generated by right to know. You've got to be able to take that next step and explain to people just what it all means from a human health perspective.

G. Granville: I just hope that we spend more time on education and less time on data, as such. Because we have a horrible inequality going on right now with focus on one aspect, and complete ignorance with respect to exposure and

that sort of area. And the only way we can start is right now by hearing people like you say that and get on with programs to do it. So, it does help.

R. Stone: I think the training provisions of most of the right-to-know programs in the Hazards Communications Act is a perfect place to put this kind of education because, as Jeff said, it's not so much what you use but how you use it that is important. And each facility has their own precautions for dealing with toxic and hazardous chemicals so as to reduce the risk to the employees. In the Health Department in New York, we provided, as part of the outreach program, some kinds of training materials on hazardous and toxic substances that will at least familiarize the employee with some of the routes of exposures, what kind of symptoms to look for, what those symptoms may or may not indicate, give them a handle on judging the relative impact of that chemical on their health as opposed to diseases in other kinds of adverse health effects.

G. Granville: Are you also tying it up with the broader environmental health issues? Again the focus is on toxic chemicals. How are you relating that to issues of smoking, of our habits in feeding, drinking of general environmental things? Are we relating the toxic chemical issues to the environment in a much broader sense, rather than to focus hazards on toxic chemicals out of context?

R. Stone: We have within the department several programs that are really addressed to life style considerations rather than toxic chemicals. In that sense it's much more of a public relations effort than it is an informational effort. Programs for alcohol abuse, pregnant women, things of that nature that indicate life style as well as chemical exposure can be a major factor in your health.

A. Boehm: What is the significance of OSHA approval of state Hazard Communication Rule (HCR) plans, and does that ensure that compliance with the OSHA federal HCR will mean compliance with state HCR?

R. Stone: Well, at least in New York, I don't believe there is really any strict mechanism for compliance with one ensuring compliance with the other. In fact, they are conceived and implemented independently. I think in New York there's probably the greatest degree of overlapping between the two regulations, but the overlap isn't 100%. We're waiting for the outcome of the petition for review that was filed to see exactly what the degree of preemption is going to be.

A. Boehm: Perhaps you could give details on that petition for review; are there certain points where you are saying that your efforts are as good as what the federal government wants to do?

R. Stone: Well, the two major problems that we have with the OSHA standard were the number of chemicals and the number of employees. We do not want to see Right To Know preempted in all SIC codes if OSHA is only going to regulate in 20 to 39. We feel that would be giving up some of the rights that employees currently enjoy under Right To Know. If the chemicals really do

receive the degree of evaluation that they predict, then perhaps the overlap between the number of chemicals covered by the two laws will be minimized also. We have some problems with some of the specifics of the OSHA communication standard, like the exemption of some chemicals that have labeling requirements under other federal agencies. For example, pesticides labels really don't meet the requirements of most of the right-to-know types of legislation and probably should be included. Other consumer-type products are probably justifiably exempted. Mostly we want to see all the employees in New York State enjoy some sort of Right-To-Know protection.

M. Freifeld: As Claire Boccello pointed out in her paper, it's possible to write an extension essentially as they did in Iowa so that workers outside the SIC Codes 20–39 are included. So, at least theoretically, it doesn't have to be a problem.

Question: My question is to Mr. Granville. If an American supplier to a Quebec Province customer provides an English only MSDS, under the presumed acceptance of reciprocity, number one, is that acceptable legally, and number two, is it acceptable practically to the supplier with French-speaking workers?

G. Granville: I'm pretty sure practically it will not be acceptable. As long as it's worked out carefully with respect to a warehouse, you can provide any information on the outside container which would then be split up at the warehouse, and then the inner containers, the packages, whatever, will have to be relabeled at that site and the MSDS redone at that site. And so, yes, you could probably provide an English one with the understanding that at that worksite it would be translated, et cetera. I'm just unsure as to whether you are legally not in compliance by providing only an English-speaking MSDS. I think you probably would be in noncompliance, but I would not like to be held responsible for that statement one way or the other.

Question: Hank, I know you've touched on this, but frankly I am a little confused by what New Jersey plans on doing with all this information that it is going to be compiling outside of the area of firemen and police responses to emergencies. You brought up the example of a family who wants to move into New Jersey and find a safe place to live, and they could come to your office and get all this relevant information. What sort of relevant information would that be? Would that be 1400 MSDSs, or fact sheets? Would this material be massaged in some sort of useful fashion for these people to use? What do you envision along these lines?

H. Garie: Let me expound upon that. Currently under New Jersey law, as I tried to show in the slides, we are trying to utilize the county health departments as the major local depository of information. So that people can go to their county health departments as the first step along the way. At the health department will be copies of all of the workplace surveys and the environmental

surveys, and a citizen can get a copy of that information. In addition, we're planning on providing computer summaries of the information to put that county into perspective with other counties throughout the state and give summary information on the number of surveys we sent out, the number we got back, the types of compounds commonly reported. So that a local citizen can then get detailed information if he wants it by looking at copies of the individual survey forms. Also available through that county health department will be copies of hazardous substance fact sheets, if he wants that information, as well as summary information on the computer diskettes. If a citizen does not get the information that he wants from his county agency, then the next step is to contact the state, and we will try to provide them with more information. That's the way it's planned to work.

Response: I understand. I just see that citizens will not find this information very useful to them unless it's massaged very carefully by people who can translate it into relatively simple terms.

H. Garie: In what respect? In terms of its impact on their health? Or in terms of their understanding of what is included in the survey? The survey forms are designed to be fairly simple in nature.

Response: Well, let me give you an example. I don't think knowing that one plant uses 1000 hazardous chemicals is going to tell you much as to whether or not it's safe to live around that plant. Really more relevant information is what kind of work practices control how many substances get outside the plant. There's a lot that goes into how safe it is to work in a plant or live around a plant other than how many chemicals are used in that plant. If this information is oriented toward how many chemicals or where they are without regard to other relevant information, it will not be useful.

H. Garie: Well, that's not really true in terms of the environmental survey. The environmental survey is designed to provide detailed information in terms of environmental emissions for a relatively small number of chemicals. But you're right, and that's where we come into the state's responsibility of trying to explain to the citizens what this all means and how particular risks fit into an overall risk.

Response: I used to live in New Jersey and now have been living in Texas for some years. But the daughter of a friend of mine who is one of the people who is allergic and cannot live in the Deer Park Pasadena area here in Texas just got a promotion in the phone company and is going to move to New Jersey and actually has been asking me this question, where can she live safely in New Jersey. It sounds like a silly thing, but actually people are concerned about that. She hemorrhages under her skin when she lives along our ship channel area.

M. Freifeld: I used to live in New Jersey in a place called Boonton Township,

and I can testify that it's a very nice place. My children are all healthy, my wife is doing fine—even I'm here.

H. Garie: People get kind of a strange perception when you hear of New Jersey. Most people who are traveling from other states only see a very narrow portion of the state. It is really a very nice state. There's a lot of diversity. I'm not a real estate agent, so I'm not going to guide your friend's daughter on where to live. But I think one of the things we have been able to do, because we're a small state which is heavily industrialized and very densely populated, we've been forced to deal with many different environmental issues. And so when you look at New Jersey and you see that there are 95 sites on the Superfund list, part of that is because we're very aware of the environmental issues we're dealing with, and so we've done a lot of our homework. I think as we move forward in the 1980s, many other states are going to realize that; they have very similar types of problems. But I think that we have been forced through public awareness and through the various problems that we have faced to move ahead; and so at least we've identified where the problem areas are and are moving forward to deal with them.

M. Freifeld: I guess there's another approach to answering that question. And that is just to describe to you what one of our members at a particular plant site recently did, which was to send out letters to all their neighbors within some radius—I'm not sure what it was. But they had three shifts and invited everybody in the neighborhood to come into the cafeteria one evening, a weekday evening that was fairly convenient to a lot of people, and explained to them what goes on in the plant. And I think if your friend picks a place to live and asks some questions about what chemical plants are nearby, she could probably find out very quickly whether she would have a problem or not. She doesn't have to wait for a meeting of that type. But I just bring it up as an example of the types of things we are doing and plan to do a lot more of.

A. Boehm: We've been looking into the laws and their different aspects, both state and federal. I've been out of the domestic safety and health function for a couple of years and just coming back to the United States and seeing this as the most recent law, I seem to sense that there is a change. If I go back to the health standards of the past, which were written with the concept that under a given circumstance there was a hazard and the worker needed to be protected from that hazard. Normally we're talking about airborne concentrations, such as micrograms of lead in air. Now, if you were below that level, you did not have to have all these control conditions within the factory. There was no exposure. But now we have a different type of standard. Other than the fact that it's performance versus specification, we have one that says you will have this control. This control will be in place at all times regardless of whether there is an exposure at any point.

Now let's examine this situation. Let's take a thermoplastic resin, PVC. We know that since the advent of the vinyl chloride standard that manufacturers of

PVC have been processing their finished product in a given manner to remove residual vinyl chloride. Now, whether they get the residual down to less than 1 ppm, I don't know. But generally it gets the PVC pellets down low enough where you don't have to worry about somebody.

G. Granville: It has me deeply concerned because we're going to get out of focus. What we are trying to do is in other groups like Environmental Protection Service of Canada, they've been taking the advocacy approach to environmental health recently. I am going to help to try and put them into risk assessment and risk management in a much more positive way, including public health awareness. Because unless you do everything you're going to waste money on trivia and miss the real problem.

Question: As I understand the OSHA regulation, cigarette smoke, for instance, would be excluded for two reasons. One, that tobacco and tobacco products are excluded, and, number two, that it's a consumer product.

G. Granville: You're right, it would be excluded on both counts.

Question: Does the Canadian legislation follow the same exclusions?

G. Granville: Very same thing.

J. Brower: I just want to make an observation. There are several people who have come to various committee members and staff members and myself during the symposium. And what has struck them was that there was a lot of room left for consensus standard development in the area of hazard communication and what can ASTM do about it, and I would like to reiterate that there are probably a lot of areas that ASTM can be of service in helping to develop some additional, supplementary consensus standards that would be voluntary for industry to follow. And if any of you have any ideas on that, I would like to pursue them further. Please see me, or Art, or Don Viall, or any of the other panel moderators, and we'll explore these ideas and see if we can get the ball rolling on some of them. We'd be willing to serve in that capacity.

Information Resources

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Hazards of Toxicity Information

REFERENCE: Wiseman, L. M., **"Hazards of Toxicity Information,"** *Hazard Communication: Issues and Implementation, ASTM STP 932,* J. E. Brower, Ed., American Society for Testing and Materials, Philadelphia, 1986, pp. 169–175.

ABSTRACT: The Occupational Safety and Health Administration's (OSHA) Hazard Communication standard, state and local right-to-know laws, and a heightened public awareness of environmental issues have created new demands for information on the toxicological properties of chemicals and products. Several computer-searchable database producers have attempted to respond to these new demands by collecting and managing the growing amount of data and generally making it more easily and widely available.

Transforming this data into usable information presents some problems, especially since some of it may be of questionable quality or value. How do we increase our management's, our employees', and our customers' understanding of the true hazards associated with chemicals and products? What and how do we communicate to our various audiences—plant workers, health and safety professionals, management, marketing personnel, customers, and legislators? How do we ensure that we are providing information that is not only accurate and complete, but also usable and understandable? This paper presents one industrial organization's approach to the problems of handling toxicity information.

Celanese Corp. believes that information of the toxic properties of any chemical used in the company's processes or the toxicity of the company's final products is a basic component in the chemical's risk assessment. A Material Safety Data Sheet (MSDS) will effectively communicate accurate environmental, health, and safety information. Significant toxicological data will be communicated to employees, affected customers, regulatory authorities, and the public. The Toxicology Department has developed two documents, a Toxicity Summary and a Toxicity Evaluation, that can be used at the beginning of the communication process.

All those at Celanese involved in hazards communication share two ongoing responsibilities. One is for continuous analysis and verification of data on the toxic effects of chemicals. The second is to impart quality information to others—be it as an MSDS, a "Dear Customer" letter, or a briefing to employees—that will heighten their awareness and increase their understanding. It has been and will continue to be a learning process.

KEYWORDS: toxicity data, communication of; information sources—toxicology; bibliographic data bases; source data bases; risk assessment

Over the past decade, the amount of testing performed to determine the toxicity of chemicals increased dramatically. This testing was spurred by

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regulatory requirements, the technological advances in the science of toxicology, and industry's own sense of moral commitment to learn about the chemical hazards to its workers, customers, and neighbors.

In today's information-driven world, it follows that the significant increase in the toxicity data and the growing number of concerned persons have led to new computer systems to store, retrieve, and manage this data. This paper presents one industrial organization's program.

Celanese Corp., like many other organizations, believes that data on the toxic properties of any product or any chemical used in the company's processes is fundamental to the chemical's risk assessment. As information scientists, we make a distinction between data, which are facts or descriptors, and information, which is data presented in an appropriate format for effective decision making.

There are three categories of data sources. The primary sources of data for Celanese are its own toxicity testing program, its suppliers, universities, or government agencies. In the ideal situation, we would have a complete report available for review and assessment by the toxicologist.

In most cases at Celanese, we must rely on published journal literature as our secondary source of data. The journal literature is searchable today through commercially available computer-searchable bibliographic data bases, such as TOXLINE, MEDLINE, CAS ONLINE, EMBASE (Excerpta Medica's online database), etc.

Standard references or handbooks provide a third category of data sources. They are useful for common chemicals that have been in commercial production for a long time and whose characteristics and effects have been adequately tested and assessed.

Within the past 5 years or so, several vendors have introduced what are commonly known in the information field as "source" or "nonbibliographic" databases (Table 1). This new type of database is blurring the distinction between primary and secondary sources of data. A bibliographic database provides a citation and usually an abstract, enabling the researcher to locate the original article or report and evaluate the data himself. A source database, on the other hand, presents raw data or summarized information, sometimes without the citation to the original report, in which case it would be like the librarian providing a student with the answer to a homework question rather than giving the student several relevant articles that would lead to his or her own conclusions.

TABLE 1—*Bibliographic and source data bases.*

Type of Data Base	Characteristics
Bibiographic data bases	citations to journal articles, reports, books, etc. may provide abstract
Non bibliographic (source) data bases	data facts descriptors information?

Some of the main nonbibliographic data bases in operation today are the Registry of Toxic Effects of Chemical Substances (RTECS); the National Library of Medicine's Toxicology Databank (TDB); certain files in the Chemical Information System (CIS), which was originally developed by the Environmental Protection Agency and the National Institutes of Health and now is available through Fein-Marquart Associates and Information Consultants; and Occupational Health Services' Hazardline. These databases provide toxicology and environmental health data to the information intermediary, the health professional, the employee, and the community resident.

The growing popularity and use of nonbibliographic databases present new concerns regarding toxicity information (Table 2). It is extremely important for the user of such nonbibliographic databases to know the source of the data or summarized information. Are they standard handbooks in toxicology and environmental sciences? The latest editions of such books? If more current data are available in the journal literature, which journals are reviewed for inclusion in the database?

Who is reviewing or abstracting or both? Are the data peer-reviewed by toxicologists before entry into the database? What are the biases or editorial slant? What is not included may be as critical as what is included. For example, the RTECS does not cite no-effect levels (NoEL) from acute studies, but only cites the lowest dose which reportedly caused death. The data are unevaluated, while other scientifically valid studies may have established a higher lethal dose.

How thorough is the final proofreading of the data. A misplaced decimal point or inaccurate unit of measure makes a big difference. How responsive are the database producers to correcting errors in the files or to providing additional information? If a source is provided, is it clearly identified? If not, will the database producer provide the researcher with the documentation or original source of the data?

Within Celanese, we have both information and health professionals searching databases for toxicological characteristics of chemicals of interest. The results of these searches, usually the full printouts and abstracts, are reviewed by product safety coordinators in each of our operating companies. We do not have

TABLE 2—*What you need to know and have a right to know.*

1. Source of the data
2. Quality of the source
3. Timeliness of the source
4. Qualifications of reviewer/abstractor
5. Qualifications of the peer review group
6. Biases or editorial slant of the data base producer
7. Criteria for inclusion/exclusion of data
8. Quality of proofreading
9. Ability of data base producer to quickly correct errors
10. Ability of data base producer to supply original source

professional toxicologists in our operating companies, so the review of the data at that level usually is performed by an industrial hygienist, environmental professional, occupational physician, safety professional, or a team which includes several disciplines. In most cases, the search results then are forwarded to the corporate toxicology staff for formal evaluation or summary or both. The complete articles or original reports are usually requested at this time.

The corporate Toxicology Department prepares two types of documentation of toxicity information. The first is the Toxicity Summary, which cites journal articles, Celanese-sponsored testing, and any other publicly available data. Data reported in the literature are not evaluated on the basis of standard protocols, Good Laboratory Practices, quality assurance, etc. Often the details needed to make such a judgement are not provided within the article or report. Toxicity Summaries are available to anyone within the corporation and may be distributed outside the corporation with the appropriate disclaimer.

An outline of a Toxicity Summary is shown in Fig. 1. Figure 1*A* involves the chemical's identity, including CAS number, chemical name, trade names or synonyms, and physical properties. The data on the chemical's toxicity then are grouped by acute effects, subacute or subchronic effects, long-term effects other than cancer, information on carcinogenicity testing, mutagenicity testing, possible reproductive effects, behavioral effects, and any information on the chemical's effect on air quality or the aquatic environment (Fig. 1*B*).

The second type of documentation is a Toxicity Evaluation (Fig. 2). This is a one-page summary that includes an evaluation of significant data on the toxic effect of the chemical, comments from the toxicologist on specific hazards, and his/her suggestions for further testing to complete the toxicological profile, further risk assessment, or other actions. Celanese originally developed this form to support documentation in our formal procedures for product safety approval. But it also can provide information to an industrial hygienist who may be implementing engineering controls, or to research personnel planning further development of a product or process.

We have worked with operating company and plant staffs over the past several years to make the Toxicity Evaluation a more useful source of information for them. The Toxicity Evaluation usually becomes the basis for an ongoing dialogue to communicate accurate and adequate information on the toxicity of the chemical to health professionals, plant employees, management, marketing personnel, regulatory authorities, customers, and the general public. The operating company staffs charged with the preparation of MSDS must be able to take the data and information provided on the Toxicity Evaluation and make it meaningful to the affected audience.

The dilemma we in the chemical industry face with regard to hazard communication is how to interpret and convey the significance of toxicity testing results not only to health and safety personnel, but to marketing, plant workers, and to customers without sensationalizing the risks and, equally as important, without trivializing the test results. The information professional must be aware

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TOXICITY SUMMARY:

CHEMICAL NAME:

CAS REGISTRY NO.:

SYNONYMS:

CHEMICAL STRUCTURE:

MOLECULAR STRUCTURE:

A

CHEMICAL & PHYSICAL PROPERTIES:

MOLECULAR WEIGHT:

MELTING POINT:

PHYSICAL STATE:

COLOR:

STABILITY:

FLAMMABILITY:

SOLUBILITY:

CRITERIA STANDARDS & REGULATIONS:

A. HUMAN EFFECTS

B. ANIMAL TOXICOLOGY

B

1. **Acute Effects**
2. **Subacute Effects**
3. **Metabolic Effects**
4. **Chronic (non-carcinogenic) Effects**
5. **Carcinogenic Effects**
6. **Mutagenic Effects**
7. **Reproductive Effects**
8. **Behavioral Effects**

C. ENVIRONMENTAL EFFECTS

1. **Air**
2. **Water**
3. **Other**

FIGS. 1*A* and 1*B*—*Outline of a Toxicity Summary.*

TOXICITY EVALUATION OF_____

REQUEST FROM_____DEHSA FILE_____

cc:

TOXICOLOGY INFORMATION

Acute Exposure TOXICITY HAZARD CATEGORY (40 CFR Part 162.10)

Dermal _____ Inhalation _____ Oral _____ Eye _____ Skin _____

Repeated Exposure Toxicity

Mutagenicity

Carcinogenicity

Reproductive Toxicity

Other

COMMENTS

SIGNED _____ DATE _____

FIG. 2—*A Toxicity Evaluation form.*

of the new sources of toxicity data and be cognizant of the quality of those sources and their limitations.

It is significant that the Occupational Safety and Health Administration (OSHA) Hazard Communication standard highlights the need for training and education. The chemical industry has put much effort into these areas, and yet the need for greater knowledge and understanding still exists. John Naisbitt, in his best-seller *Megatrends,* wrote, "We are drowning in information but starved for knowledge." We are all aware of the "information revolution" and the theory that society has moved from the industrial age into the information age. How well are we dealing with all this new data on the toxicity of chemicals?

Are we translating this data into information and applying the knowledge in our plants?

At Celanese, the Toxicology Department has tried to ensure that its Toxicity Summaries and Toxicity Evaluations contain accurate and adequate data for future decision making concerning the health of our employees, customers, and the community.

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Using the Micro-CSIN Workstation to Provide Chemical Hazard Information

REFERENCE: Hushon, J. M. and Conry, T. J., **"Using the Micro-CSIN Workstation to Provide Chemical Hazard Information,"** *Hazard Communication: Issues and Implementation, ASTM STP 932*, J. E. Brower, Ed., American Society for Testing and Materials, Philadelphia, 1986, pp. 176–198.

ABSTRACT: Chemical hazards are of two basic types: emergency situations presenting imminent danger to humans or the environment and existing hazards such as dump sites or chemical storage areas. The information requirements and tools available for responding to these two types of hazards are different, and the Micro-CSIN Workstation developed by Bolt Beranek and Newman (BBN) under the sponsorship of the Council on Environmental Quality (CEQ), the Environmental Protection Agency (EPA), the National Library of Medicine (NLM), and the Centers for Disease Control (CDC), can respond to both.

Emergencies require rapid access to factual data. The Micro-CSIN Workstation permits rapid retrieval of factual data stored in three databases: Hazardous Substances Data Bank (NLM/TOXNET), Hazardline (OHS), and Ohmtads (CIS) according to a prestored, user-specified, retrieval profile. The data are then organized by subject area into a report. The Workstation also has the ability to rapidly retrieve chemical identification information.

In a nonemergency situation, it is possible to carry out a more thorough search of the literature. The Micro-CSIN Workstation makes use of a general bibliographic script to access and retrieve any of several hundred bibliographic databases available through Bibliographic Retrieval Systems (BRS), Chemical Abstracts Service (CAS), Dialog, NLM, and Systems Development Corp. (SDC). These more current and in-depth data can be used to supplement the chemical summary information.

For a company responding to the right-to-know laws, the chemical summaries are ideal, especially if supplemented by additional, more recently published results. One way of organizing right-to-know information is to organize all data into two computerized files using a database management software package. BBN uses RS/1, one of its software products. The two files cover (1) product-related information and (2) chemical-related information, and the files are cross-indexed. The structures of these files are presented along with a possible data management scheme for storing and manipulating local site data, material safety data sheets (MSDSs), chemical content information, and chemical-specific data needed to respond to the laws. It is in identifying and retrieving chemical-specific data that the Micro-CSIN Workstation technology is particularly valuable.

KEYWORDS: workstation, emergency, right to know, network, microcomputer, CSIN, bibliographic, factual, numeric, hazard, chemical, MSDS

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Types of Chemical Hazards

In connection with a recent project, Bolt Beranek and Newman, Inc. was asked to try to determine the types of information required to respond to situations involving chemical hazards. The first logical step involved trying to define the situations in which chemical hazard information might be required. Based on this, a list of possible situations ranging from spills to developing of and complying with chemical regulations was constructed; Table 1 lists some of the possible information-requiring activities that were envisioned [*1*].

Upon closer examination, it was evident that the types of information required for these different types of activities varied as did the sources where information was usually sought. Most of the activities seemed to fall into one of the two extremes: (1) those requiring rapid response and (2) those where the response could be more thorough and carefully prepared.

The rapid response situations tended to result from chemical emergencies such as accidents or spills, and often there were accompanying concerns about fire or explosion. In addition, there was often concern about human lives or health for both the rescue/cleanup workers and for the nearby populations. The information required in these types of situations was generally of the factual/numeric type. Table 2 lists some of the categories of information often identified by emergency response personnel as being desirable.

The traditional sources of these data are generally handbooks such as:

1. The Department of Transportation's (DOT) *Emergency Response Guidebook.*
2. U.S. Coast Guard's (USCG) *Chemical Hazard Response Information System Reference Manual.*
3. The National Fire Protection Association's (NFPA) *Fire Protection Guide on Hazardous Materials.*
4. Sittig's *Handbook of Toxic and Hazardous Chemicals.*
5. NIOSH/OSHA's *Pocket Guide to Chemicals.*

or telephone referral services such as Chemical Manufacturers Association's CHEMTREC. These data resources must be easy to use, must be located in the emergency vehicle (ambulance, firetruck, hazmat truck, etc), or be rapidly available by telephone. If multiple chemicals are involved, there is no way to easily integrate the data to identify the most potentially dangerous chemicals

TABLE 1—*Information requiring activities.*

Hazard identification
Risk assessment
Research and development
Monitoring and analysis
Regulations and guidelines preparation
Enforcement/compliance
Emergency response/remedial action

TABLE 2—*Information requested by emergency response personnel.*

Melting point
Vapor pressure (volatility)
Physical state/appearance
Odor/taste thresholds
Flash point
Autoignition temperature
Combustion potential
Combustion products
Reactivities
Sampling method
Handling procedures
TLV (threshold limit value)
IDLH (immediately dangerous to life and health)
LD50—rat oral and inhalation
Antidote and emergency treatment
Acute toxicity summary
Carcinogenicity, mutagenicity, teratogenicity indicators
Population at special risk
Level of protection required
Evacuation distances
Permissible levels in air, water, soil

from a health standpoint, or to rapidly determine whether chemical incompatibilities exist which may hinder remedial action measures. Microcomputer systems for use in chemical emergencies are just starting to be developed, and Micro-CSIN's script designed for emergency response will be discussed later as a novel answer to the problems of emergency chemical hazard assessment.

In nonemergency situations, the time available for information gathering about chemical hazards is greatly extended. A more complete literature search is possible, and it is generally feasible to go to the primary scientific literature as well as to the secondary reference guides and handbooks. For these types of searches, the computerized data resources are often used to obtain both factual/numeric and bibliographic data [2]. Tables 3 and 4 list the major factual/numeric and bibliographic databases searched to evaluate chemical hazards[3]. In a nonemergency situation, the review of the hazard can be done at a more leisurely pace and fewer rapid decisions are required. Micro-CSIN provides extremely powerful tools for searchers in both emergency and nonemergency situations.

Micro-CSIN is the newest version of the Chemical Substances Information Network (CSIN) technology. Mandated by the broad information requirements of the Toxic Substances Control Act of 1976, CSIN is designed to facilitate the searching for, the retrieval of, and the formatting of information from bibliographic dictionary, and factual/numeric databases. CSIN was made publicly available in 1981 as a multiuser program on DEC-VAX 11/780 minicomputer.

[3] The following are the toll-free phone numbers for the information vendors mentioned in this article: BRS (Latham, NY): 800-345-4277; CAS ONLINE (Columbus, OH): 800-848-6533; DIALOG (Palo Alto, CA): 800-227-1960; Fein-Marquart (Baltimore, MD): 800-247-8737; National Library of Medicine (Bethesda, MD): 800-638-8480; Occupational Health Services (Secaucus, NJ); 800-223-8978; SDC (Santa Monica, CA): 800-421-7229.

Over 500 individuals representing 120 private and public sector organizations have been trained on CSIN since then.

One current microcomputer implementation is a single-user version that runs on an advanced microcomputer (IBM-PC/XT or AT under the DOS operating system). At a minimum, the microcomputer must have 512K of random access memory, 10 MB of hard disk storage, one floppy disk drive, 2 modems, and an independent input/output port in addition to the monitor.

Once data are retrieved by Micro-CSIN, users must take into consideration the data's quality and limitations. This is an important issue since, in many cases, chemical information is not specific for a given situation and must be interpreted. Moreover, even peer-reviewed databases have been known to contain erroneous data. There is growing awareness of these problems, and efforts are being made by industry and government to address the issues [*3,4*].

The remainder of this paper is devoted to showing how microcomputers can be used in both emergency and nonemergency chemical hazard evaluations, and some time is spent describing BBN's system to comply with the Massachusetts (and other state) right-to-know laws and the federal OSHA Hazard Communications standard (29 CFR 1910.1200).

Response to Chemical Emergencies

Emergency response situations have several key characteristics that must be included in the design and selection of appropriate information resources. Typically, time is limited. Remedial action must be inaugurated as quickly as possible. Effective action depends on accurate identification of the chemicals and the availability of necessary and sufficient response information. In addition, the information should be succinct and clear. Excessive data at this point will serve only to slow response. Searching primary scientific literature is, therefore, unrealistic. Rather, the secondary literature that is in factual/numeric databases and handbooks is more appropriate to emergency situations.

Emergency response personnel will be under intense pressure with demands being placed on them from a variety of sources (for example, fire personnel, health personnel, residents). Data locating and accessing activities that are highly labor intensive will have a limited chance of being used correctly or at all. Thus, any online information retrieval should prompt the searcher, be capable of operating with few inputs from the searcher, be capable of operating unattended once a search is initiated, and produce a formatted, easy-to-use report for the on site personnel.

Given the constraints of a specific situation, it is possible to design effective information retrieval programs for online databases. In the case of Micro-CSIN, these programs are called scripts. Scripts are step-by-step programs designed to lead a searcher, to help him/her set up and define a search, and to identify and retrieve appropriate information. Scripts eliminate the need for searchers to learn specific information system commands by providing a user-friendly software

TABLE 3—*Overview of factual databases of use in chemical emergencies.*

Database Name	Subject Areas									
	Vendor System	Physical/ Chemical Properties	Handling	Toxicity	Environmental Fate	Lab/ Monitor	Regulations	Chemid	No. of Compounds	Developer
Aquire	CIS	. . .	. . .	X	X	. . .	. . .	. . .	2500	EOA
Chemical Carcinogenesis Research System (CCRIS)	CIS	. . .	. . .	X	. . .	. . .	. . .	. . .	882	NIH
Chemicals in Human Tissues and Fluids (CHT)	DIA	. . .	. . .	. . .	. . .	. . .	X	. . .	1000	ORNL
Chemical Index (CHEMDEX)	SDC	. . .	. . .	. . .	. . .	. . .	. . .	X	3855143	CAS
Chemical Regulations and Guidelines System (CRGS)	DIA	. . .	. . .	. . .	. . .	. . .	X	. . .	NA	CRC Systems
Chemlaw	DIA	. . .	. . .	. . .	. . .	. . .	X	. . .	NA	BNA
Chemline	NLM	. . .	. . .	. . .	. . .	. . .	. . .	X	607203	NLM
Chemname	DIA	. . .	. . .	. . .	. . .	. . .	. . .	X	1304061	DIA/CAS
Chemsis	DIA	. . .	. . .	. . .	. . .	. . .	. . .	X	3979619	DIA/CAS
Chemzero	DIA	. . .	. . .	. . .	. . .	. . .	. . .	X	1439928	DIA/CAS

Clinical Evaluation Search and Retrieval System (CESARS)	CIS	. . .	. . .	X	. . .	. . .	. . .	. . .	180	MDNR
Clinical Toxicology of Commercial Products (CTCP)	CIS	. . .	. . .	X	. .	. . .	. . .	. . .	3000	CPSC
DARC	Questel	. . .	. . .	. . .	. . .	. . .	. . .	X	6700000	Questel
Dermal	CIS	. . .	. . .	X	X	. . .	. . .	. . .	655	EPA
Envirofate	CIS	. . .	. . .	. . .	X	. . .	. . .	. . .	452	SRC/EPA
EPA Chemical Status Report (EPACASR)	CIS	. . .	. . .	. . .	. . .	. . .	X	. . .	5000	EPA
Genetox	CIS	. . .	. . .	X	. . .	. . .	. . .	. . .	3170	EPA
Hazardline	OHS	X	X	X	X	. . .	X	. . .	3200	OHS
ISHOW	CIS	X	. . .	. . .	. . .	. . .	. . .	. . .	5460	EPA
Oil and Hazardous Materials Data System (OHMTADS)	CIS	X	X	X	X	X	X	. . .	1100	EPA
Registry of Toxic Effects of Chemical Substances (RTECS)	NLM,CIS	X	. . .	X	. . .	. . .	X	. . .	50000	NIOSH
Structure and Nomenclature Search System (SANSS)	CIS	. . .	. . .	. . .	. . .	. . .	. . .	X	227000	EPA
Hazardous Substances Data Bank (HSDB)	NLM	X	X	X	X	X	X	X	4112	NLM
TSCA Inventory	DIA,SDC,CIS	. . .	. . .	. . .	. . .	. . .	X	X	56427	EPA

TABLE 4—*Overview of bibliographic databases of use in chemical emergencies.*

Database Name	Subject Areas										
	Vendor System	Physical/ Chemical Properties	Handling	Toxicity	Environmental Fate	Lab/ Monitors	Regulations	Chemid	Update Frequency	Coverage	Developer
Agricultural Online Access (Agricola)	BRS,DIA,SDC	. . .	. . .	X	X	X	. .	. . .	monthly	1970–	USDA
Air Pollution Technical Information Center (APTIC)	DIA	X	. . .	X	X	X	X	. . .	closed	1966–1976	EPA
APIlit	SDC	X	X	X	X	. . .	. . .	X	monthly	1964–	API
Aqualine	DIA	. . .	. . .	. . .	X	X	. . .	. . .	monthly	1974–	WRC/UK
Aquatic Science and Fisheries Abstracts (ASFA)	DIA	. . .	. . .	X	X	. . .	. . .	. .	monthly	1978–	FAO
Biological Sciences Abstracts (Biosis)	BRS,DIA	. . .	. . .	X	X	. . .	. . .	. . .	bimonthly	1969–	Biological Abstracts
CA Search	BRS,CAS, DIA,SDC	X	. . .	. . .	. . .	. .	. . .	X	two weekly	1967–	Chemical Abstracts Service
Cancerlit	NLM	. . .	. . .	X	. .	. . .	. . .	. . .	monthly	1968–	NLM
Comprehensive Dissertation Index	DIA	. . .	. . .	X	X	X	. . .	. . .	monthly	1861–	University Microfilms Intl.
Conference Papers Index	DIA	. . .	. .	X	X	. . .	. . .	. .	monthly	1973–	Cambridge Scientific Abstracts
DOE Energy	DIA	X	X	X	X	. . .	. . .	. . .	two weekly	1974–	DOE
Energyline	DIA,SDC	. . .	. . .	. . .	X	. . .	. . .	. .	monthly	1971–	EIC Intelligence
Enviroline	BRS,DIA, SDC	. . .	. . .	. . .	X	X	. . .	. . .	monthly	1971–	EIC Intelligence

Environmental Bibliography	DIA	. . .	. . .	X	X	. . .	. . .	. . .	bimonthly	1973–	ESI
Excerpta Medica	DIA	. . .	. . .	X	. . .	. . .	. . .	. . .	weekly	1974–	Excerpta Medica
FEDEX	SDC	. . .	. . .	. .	. . .	. . .	X	. . .	weekly	1976–	Capitol Services
Federal Register (Fedreg)	DIA,SDC	. . .	. . .	. . .	. . .	. . .	X	. . .	weekly	1977–	Capitol Services
GEOREF	DIA,SDC	X	. . .	. . .	X	. . .	. . .	. . .	monthly	1961–	American Geologic Institute
Life Sciences Collection	DIA	. . .	. . .	X	X	. . .	. .	. . .	monthly	1978–	Cambridge Scientific Abstracts
National Technical Information Services (NTIS)	BRS,DIA, SDC	. . .	X	X	X	X	. . .	. . .	biweekly	1964–	NTIS
Oceanic Abstracts	DIA	X	. . .	. . .	X	. . .	. . .	. . .	bimonthly	1964–	Cambridge Scientific Abstracts
PESTDOC	SDC	. . .	. . .	X	X	X	. . .	. . .	quarter	1968–	Derwent
Medback	BRS,DIA, NLM	. . .	. . .	X	. . .	. . .	. . .	. . .	monthly	1966–1979	NLM
Medline	BRS,DIA, NLM	. . .	. . .	X	. . .	. . .	. . .	. . .	monthly	1980–	NLM
Pollution Abstracts	BRS,DIA	. .	. . .	X	X	. . .	. . .	. . .	bimonthly	1970–	Cambridge Scientific Abstracts
Scisearch	DIA	X	. . .	X	X	. . .	. .	. . .	biweekly	1974–	ISI
Toxback	NLM	. . .	. . .	X	X	. . .	. . .	. . .	monthly	1965–1980	NLM
Toxline	NLM	. . .	. .	X	X	. . .	. . .	. . .	monthly	1981–	NLM
Waternet	DIA	X	. . .	X	X	. . .	. . .	. . .	quarter	1971–	AWWA
Water Resources Abstracts (WRSIC)	DIA	. . .	. . .	. . .	X	X	X	. . .	monthly	1968–	USGS
Zoological Record	DIA	. . .	. .	X	X	. . .	. . .	. . .	bimonthly	1978–	Biosis

interface. This avoids the need to retrain personnel when a new system is added (whether it is an internal, organizational database or a public one). The script still looks the same to the user. This is an important factor since training emergency response personnel usually removes them from their response work.

Micro-CSIN has three scripts, each designed for specific types of information needs in specific situations:

1. CHEMID (Chemical Identification Script).
2. TOXCHEM (Chemical Data Script).
3. BIBLIO (General Bibliographic Script).

With these scripts, Micro-CSIN can search both factual and bibliographic databases, thus making the massive amount of online data easily available to all Micro-CSIN users [5].

In carrying out information searches, all Micro-CSIN scripts have a common set of functions:

1. Connect to selected systems.
2. Enter stored log on and password.
3. Reformat search items.
4. Conduct search using appropriate commands.
5. Locate records that meet search criteria.
6. Capture records (if requested).
7. Disconnect from systems.
8. Format results into report.

The CHEMID Script is designed to quickly locate and retrieve chemical identifying information given a variety of different inputs:

1. Trade name.
2. Common chemical name.
3. Preferred chemical name.
4. CAS registry number.

CHEMID can search the main, online, chemical dictionary databases:

1. CAS Registry.
2. Chemical Information System (CIS) SANSS (Fein-Marquart).
3. Dialog Chemname, Chemsis, chemzero, and Chemsearch.
4. NLM Chemline.
5. SDC Chemdex 1, 2, and 3.

and retrieve the contents of the relevant records, storing them in CSIN standard format (Fig. 1). The first four lines are comments added by Micro-CSIN for the searcher. They are not used by any of the scripts. Individual terms are placed one to a line and labelled. CAS registry numbers are marked with RN; preferred chemical names with N1; synonyms with SY; molecular formulas with

```
/* Component: SDC */
/* Database: CHEMDEX */
/* Generated by: CHEMID */
/* Input was: edb */


RN - 106-93-4
RN - 8003-007-4
N1 - Ethane, 1,2-dibromo-
SY - Bromofume
SY - sym-Dibromoethane
SY - .alpha.,.beta.-Dibromoethane
SY - Glycol dibromide
SY - Iscobrome D
SY - Soilfume
SY - Aadibroom
SY - Nefis
SY - Sanhyuum
SY - Ethylene dibromide
SY - Ethylene bromide
SY - EDB
SY - Soilbrom
MF - C2H4Br2
```

FIG. 1—*Sample CHEMID output file.*

MF; and material that is not used in subsequent searches is labelled with NU. Typically, a CHEMID search takes under 2 min to set up and run.

The results of a CHEMID search can be used as inputs to the other Micro-CSIN scripts. While it is not necessary to use the CHEMID results as inputs to later searches, searchers are encouraged to do so because the presence of a complete set of identifiers helps ensure successful searches for factual/numeric data such as chemical/physical properties and emergency response data, as well as for bibliographic entries. The indexing policies of various databases are stored in Micro-CSIN, enabling it to search in the most efficient way.

The Chemical Data Script (TOXCHEM) is designed to quickly search factual/numeric databases for emergency response information on a given chemical and to assemble the information into a report, organized by topic (not database). TOXCHEM is unique in that it enables users to do the critical, time-consuming work of identifying appropriate types of data and data elements ahead of time. This feature enables a searcher to have the script searching for information in only three steps.

TOXCHEM can search with any of the following chemical inputs:

1. Trade name.
2. Common chemical name.
3. Preferred chemical name.
4. CAS registry number.
5. CHEMID output file.

Given one of these starting points, TOXCHEM can search the major factual/numeric databases that contain information pertinent to emergency response:

1. CIS OHMTADS (Oil and Hazardous Material Technical Assistance Data System).

2. NLM/TOXNET HSDB (Hazardous Substances Data Bank).
3. OHS Hazardline.
4. NLM RTECS (Registry of Toxic Effects of Chemical Substances).
5. CIS DERMAL.
6. CIS AQUIRE
7. CIS Envirofate.
8. CIS CCRIS (Chemical Carcinogen Research Information System.)

Each of these databases is indexed by CAS registry number. Thus, if a searcher has a CAS registry number available (from the CHEMID script or another source), Micro-CSIN will search much more quickly than if it has to enter the parts of a chemical name.

Running TOXCHEM requires only one additional piece of information: the name of a stored information profile. The "search" mode of TOXCHEM is relatively quick. The three pieces of information the script requires are usually short and easy to enter. Once the information is entered, the script requires no additional user involvement. TOXCHEM searches for the chemical information identified in the profile, retrieves the data, and formats them into a report. The script's speed depends on the amount of data being located and retrieved. Figure 2 illustrates the general TOXCHEM search process.

The "profile building" mode takes more time. It should be done ahead of time, although this is not necessary. A profile is just the set of databases and specific fields in those databases that are to be retrieved. Building a profile involves selecting from the approximately 200 fields of information on the

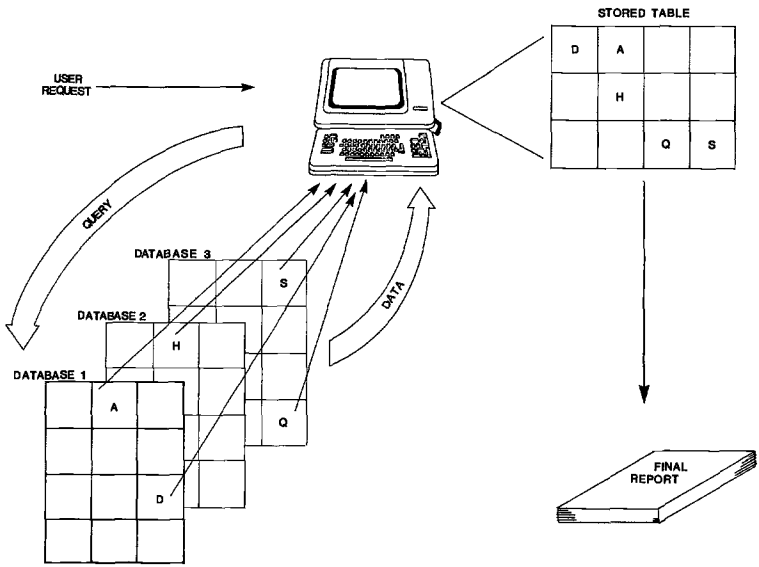

FIG. 2—*Micro-CSIN with factual numeric databases.*

databases. Since significant redundancy and overlap exist on the databases, selection of the best field is important. Normally, identifying the best field requires a thorough knowledge of the databases, or extensive documentation on each of the databases in addition to knowledge about the types and quality of data that are necessary in specific situations. The "profile building" mode is designed to streamline and simplify the entire selection process. It also eliminates the need to remember field mnemonics for print specifications and field contents since all of that information is online in Micro-CSIN.

Because the different fields of information fall into general categories, TOXCHEM first divides them into nine major categories of information:

1. Identification information.
2. Chemical/physical properties.
3. Critical exposure levels.
4. Emergency response/handling data.
5. Toxicity information.
6. Production and use information.
7. Environmental fate/concentrations.
8. Laboratory and monitoring methods.
9. Regulations.

In each category, default options are indicated that, if chosen, can speed up the selection process.

Once a searcher picks a category of information, TOXCHEM presents the specific topics of information. Figure 3 presents a sample menu for chemical physical properties. This menu provides the searcher with several important pieces of information.

1. Whether each of the three databases contains a field of information on the specific menu category of information (empty brackets indicate that the vendor does not offer a field on that specific topic).
2. Whether the specific field is a "default field" ([D_]).
3. Whether a specific field has been chosen ([YES] or [NO]).
4. The sequence of sections in the final report (this mimics the order of the choices on this menu).

The concept of default fields enables experts in the different subject areas covered by TOXCHEM (for example, toxicologists, medical personnel, engi-

Choice	Description	HAZ	CHM	HSDB
1 BP	Boiling Point	[NO]	[NO]	[D_NO]
2 MP	Melting Point	[NO]	[NO]	[D_NO]
3 SOL	Solubility	[NO]	[NO]	[D_NO]
4 SPGR	Specific Gravity/Density	[NO]	[NO]	[D_NO]
5 VP	Vapor Pressure	[NO]	[NO]	[D_NO]
6 DENSITY	Vapor Density	[NO]	[NO]	[D_NO]
7 COFO	Color/Form	[NO]	[ ]	[D_NO]
8 PHYSCHEM	Physical/Chemical Properties	[NO]	[ ]	[D_NO]

FIG. 3—*Chemical and physical properties.*

neers) to evaluate the fields ahead of time and to select those most appropriate for specific situations. A searcher can override the defaults by simply selecting the specific topic (for example, vapor pressure). TOXCHEM will present him/her with a table of databases and fields on that topic; any field can be selected.

Once a profile is built, it can be stored for future use. Thus, it is possible to have profiles on topics such as fire, protective clothing, environmental problems, regulatory information, etc. A profile can include from one field up to every topic in every category. This, however, will produce a very long search and final report as it will have redundant and unnecessary information that will divert the on-site personnel from other activities.

Figure 4 illustrates the process Micro-CSIN uses in carrying out a TOXCHEM search with a user profile. Figure 5 contains a sample TOXCHEM report from a search on the default chemical/physical properties fields.

Response to Nonemergency Hazards

The major difference between emergency and nonemergency situations is time. Nonemergency searching (for example, assembling MSDSs, researching worker education programs, or building extensive chemical reference files) can be planned more carefully. As a result, different types of information can be worked with, and search programs can be more highly structured. More complex and comprehensive searches can be conducted, and results can be less specific and more open to interpretation. In these situations, searchers can choose from all available information sources and tools.

In nonemergency situations, searches of chemical dictionary files as well as factual/numeric databases are still important. Just as in emergencies, proper

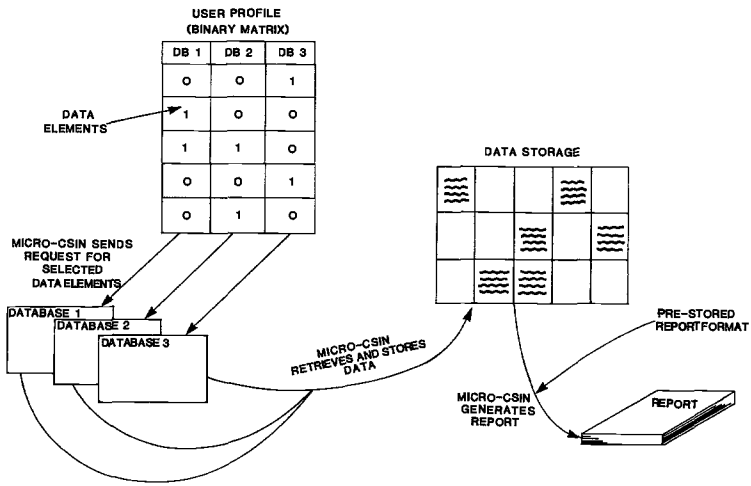

FIG. 4—*Micro-CSIN process using a stored user profile.*

```
1.  Identification Information
  1.1.  Chemical Name (HSD, OHM, HAZ)
    NAME - ETHYLENE DIBROMIDE
    (MAT)  Material Name: $$$ ETHYLENE DIBROMIDE $$$
    CHEMICAL NAME
      ETHYLENE DIBROMIDE

2.  Chemical/Physical Properties/Reactivities
  2.1.  Boiling Point (HSD)
    BP   - 131-132 DEG C [MERCK INDEX 9TH ED 1976]

  2.2.  Melting Point (HSD)
    MP   - 9.79 DEG C [WEAST. HDBK CHEM & PHYS 60TH ED 1979]

  2.3.  Solubility (OHM)
    (SOL)  Solubility (ppm @ 25C): 4310

  2.4.  Specific Gravity/Density (HSD)
    DEN  - (Liquid) 2.172 g/ml [KIRK-OTHMER. ENCYC CHEM TECH 3RD ED
           1978-PRESENT]

  2.5.  Vapor Pressure (HSD)
    VAP  - 1.0 kPa [KIRK-OTHMER. ENCYC CHEM TECH 3RD ED 1978-PRESENT]

  2.6.  Vapor Density (HSD)
    VAPD - 6.5 (AIR= 1) [NRC. HNDLING HAZARD CHEM 1981]

  2.7.  Color/Form (HSD)
    COFO - COLORLESS, HEAVY LIQUID [SAX. DANGER PROPS INDUS MATER 4TH ED
           1975]

  2.8.  Physical/Chemical Properties (HSD)
    CTP  - 309.8 deg C; 7154 kPa (70.6 atm). [KIRK-OTHMER. ENCYC CHEM TECH
           3RD ED 1978-PRESENT]
    DSC  - NO DATA
    HTC  - Heat of combustion in an oxygen bomb is 6647 J/g (1289 cal/g).
           [KIRK-OTHMER. ENCYC CHEM TECH 3RD ED 1978-PRESENT]
    HTV  - 82.1 BTU/LB= 45.6 CAL/G= 1.91X10+5 JOULES/KG [CHRIS. HAZARD CHEM
           DATA MANUAL 2 1978]
    OWPC - NO DATA
    PH   - NO DATA
    SPEC - INDEX OF REFRACTION: 1.5379 @ 20 DEG C/D [MERCK INDEX 9TH ED
           1976]
    SPEC - SADTLER REF NUMBER: 996 (IR, PRISM) [WEAST. HDBK CHEM & PHYS 60TH
           ED 1979]
    SURF - 38.75 DYNES/CM= 0.03875 NEWTONS/M AT 20 DEG C [CHRIS. HAZARD CHEM
           DATA MANUAL 2 1978]
    EVAP - NO DATA
    VISC - Viscosity at 20 deg C, 1.727 mPa s (=cP). [KIRK-OTHMER. ENCYC
           CHEM TECH 3RD ED 1978-PRESENT]
    OCPP - REACTS AS ALKYLATING AGENT; LIBERATES BROMIDE [IARC MONOGRAPHS
           1972-PRESENT]
    OCPP - PER CENT IN SATURATED AIR: 1.5 AT 25 DEG C [PATTY. INDUS HYG &
           TOX 3RD ED VOL2A,2B,2C 1981-82]
    OCPP - Vapor Pressure: 1.13 kPa (8.5 mmHg) at 20 deg C; 15.98 kPa (119.8
           mmHg) at 75 deg C; 285.2 mmHg at 100 deg C. [KIRK-OTHMER. ENCYC
           CHEM TECH 3RD ED 1978-PRESENT]
    OCPP - Heat capacity, J/(Kg K): solid at 15.3 deg C, 519 (124 cal/kg K);
           liquid at 21.3 deg C, 724 (173 cal/kg K). [KIRK-OTHMER. ENCYC
           CHEM TECH 3RD ED 1978-PRESENT]
    OCPP - Heat of fusion at 9.9 deg C, 53.4 kJ/kg (12.76 kcal/kg).
           [KIRK-OTHMER. ENCYC CHEM TECH 3RD ED 1978-PRESENT]
    OCPP - Heat of transition at -23.6 deg C, 10.34 k J/kg (2.47 kcal/kg).
           [KIRK-OTHMER. ENCYC CHEM TECH 3RD ED 1978-PRESENT]
    OCPP - Expansion coefficient at 15-30 deg C, 0.000958/K. [KIRK-OTHMER.
           ENCYC CHEM TECH 3RD ED 1978-PRESENT]
    OCPP - Dielectric constant at 20.5 deg C (0.1 MHz), 4.77. [KIRK-OTHMER.
           ENCYC CHEM TECH 3RD ED 1978-PRESENT]
    OCPP - Ratio of specific heats of vapor (gas) 1.109. [CHRIS. HAZARD CHEM
           DATA MANUAL 2 1978]
    OCPP - Liquid-water interfacial tension 36.54 dynes at 20 deg C. [CHRIS.
           HAZARD CHEM DATA MANUAL 2 1978]
    OCPP - Ethylene dibromide weighs 18.1 pounds/gallon. [Bureau of
           Explosives; Emergency Handling of Haz Matl in Surface Trans p.235
           (1981)]
    OCPP - 2.172 @ 25 DEG C/25 DEG C [MERCK INDEX 9TH ED 1976]
```

FIG. 5—*Sample TOXCHEM report.*

chemical identifying information is essential. Likewise, searchers will probably want to run more extensive searches of the factual/numeric databases to assemble reports for MSDSs, or right-to-know reporting requirements. Both the CHEMID and TOXCHEM scripts are appropriate for nonemergency situations.

Searches of bibliographic databases, however, are usually appropriate only in nonemergency situations. Typically, bibliographic searches require extensive knowledge of the databases and can take significant amounts of searcher interaction and time to obtain and interpret results. Micro-CSIN has a script designed to simplify and systematize bibliographic searches called BIBLIO.

BIBLIO requires user input to set up, and user intervention at various points to retrieve data or to continue the script. In addition, the type of information BIBLIO retrieves (bibliographic citations) usually requires comparison and analysis to interpret the results.

BIBLIO greatly simplifies searches of bibliographic databases. It eliminates the need to recall various search and print commands for the vendor systems it interfaces. It is also not necessary to know the indexing policies of the bibliographic databases available online. BIBLIO can search any of 240 online bibliographic databases offered by the vendors it interfaces (BRS, CAS, SDC, NLM, DIALOG). Database selection is streamlined. Databases are organized by category as well as by vendor. Descriptions for each database are provided to facilitate selection. Finally, search strategies and database lists can be saved.

BIBLIO can search on authors, chemicals, keywords or keyword lists, year range, or language of the article. BIBLIO, like the other Micro-CSIN scripts, is menu driven. Figure 6 contains a sample BIBLIO search strategy menu. BIBLIO can include in the search strategy all of the Boolean logic operators (AND, OR, and NOT).

BIBLIO was designed to preserve most of the flexibility available to searchers directly accessing the databases without the script. Micro-CSIN searches the appropriate fields for each search strategy category. The default search fields

```
Choices       Description

1 AUTHOR      cockerham, l. AND young, a.

2 CHEMICAL    todd OR 2,4,5-t

3 KEYWORDS    hepatic(w)tissue# AND mice AND NOT charles(w)river

4 YEAR LIMIT  1982-1984

5 LANGUAGE    ENGLISH

6 File        containing search strategy
```

FIG. 6—*Search strategy menu.*

can be overridden by including conditional commands for specific databases in the keyword lists.

BIBLIO includes standard keyword lists on a number of topics. To date, keyword lists have been developed for chemical and environmental toxicity concepts, as well as a special set on hydrologic topics for hydrologists and geologists. These keyword lists are developed in conjunction with experts on the various topics and information specialists familiar with the indexing policies of the databases to be searched. This provides Micro-CSIN users with a researched and tested list of search terms that they can use immediately. However, it is also simple to either derive a specialized keyword list from one of the standard lists or to build an entirely new one.

The availability of standard keyword lists greatly helps the search process, since, as with TOXCHEM, time-consuming design and selection work can be done ahead of time. Keyword lists can save large amounts of time on searches that tend to be repeated across a number of databases or at various time intervals (for example, human toxicity information on various chemicals). The Micro-CSIN user can build and store customized keyword lists. When information is needed on a different chemical, the searcher needs only to reference the stored keyword list, the chemical, and the list of database(s) to search. Micro-CSIN will then search the specified database(s) for information on the chemical on the topics defined in the prestored keyword list.

Once BIBLIO locates records on the search topic, it provides the searcher with a variety of printing options:

1. Sample titles.
2. Retrieve into Micro-CSIN all or part of records.
3. Print offline at the vendor system.

BIBLIO also allows the searcher to specify the format of the records to be retrieved. The formats available are those that are used most frequently:

1. Full record.
2. Bibliographic fields only.
3. Bibliographic fields and descriptors.
4. Abstract and bibliographic fields.

BIBLIO places comment fields in the output file, indicating the search logic and databases searched.

Once the retrieval process is complete and records are retrieved from one or more databases, these records can be post-processed. Records can be converted to a standard bibliographic citation format and then files merged and references sorted (by author, title, year as requested by the searcher). Duplicates are also eliminated. This facilitates the preparation of bibliographies.

Micro-CSIN also has a built-in accounting facility that permits a searcher to keep track of system access times and approximate charges.

One Way to Obtain and Organize Corporate Right-to-Know Information

The proposed federal Hazard Communication (right-to-know) standard was published in the *Federal Register* on 25 Nov. 1983, although compliance was not required with the federal law until 25 Nov. 1985 [*6*]. A number of states also prepared and passed right-to-know laws (for example, Massachusetts, California, Rhode Island) which are presently functioning. Since the federal law is not yet in place, these state laws are the only ones requiring reporting at the present time. However, any compliance system set up should consider both the federal draft law and the relevant state statutes.

The following discussion will focus on the system that BBN developed for its own corporate use to facilitate compliance. First, just a few words describing BBN to place their information needs in better perspective. BBN is a research and development and computer hardware and software manufacturing company headquartered in Cambridge, Massachusetts, with offices in four other states. Since most of its facilities are located in Massachusetts, BBN was most concerned, at least initially, with complying with the state of Massachusetts' Right-to-Know Law that went into effect in September of 1984 [*7*].

The first task was to obtain information on the legal requirements of the federal and various state laws likely to affect BBN's operations. This information was then analyzed to identify those categories of information on a chemical that are required for compliance with all the laws. It should be pointed out that though the state laws are basically similar to the federal law and to each other, there are differences in the chemicals covered and in the information required, so the requirements integration step is required. Table 5 lists the information requirements for the laws impacting on BBN.

At this time, it was still not clear that this project was going to result in the development of a computerized as opposed to a manual system. The types of questions to be asked of the right-to-know system in order to comply with the laws were then identified. Table 6 lists some of the questions that are felt to be fairly typical.

TABLE 5—*Information requirements of right-to-know laws.*

Chemical name
Synonyms
Physical chemical properties
Physical hazards (fire, explosion, corrosivity)
Health Hazards (acute and Chronic toxic effects, medical conditions that may be aggravated, symptoms of overexposure)
Exposure (primary routes, exposure standards)
Presence on NTP, IARC, OSHA carcinogen lists
Handling/Cleanup (precautions, first aid, emergency procedures for spills, fire, disposal)
Health risk statement in lay terms
Date material compiled
Name of contact

TABLE 6—*Right-to-know questions answered.*

1. Which products have chemicals that must be reported under the various laws?
2. In which facilities are the chemicals that must be reported located?
3. Which products contain carcinogenic or neurotoxic ingredients?
4. For which products are there supplier MSDSs on file?
5. If there is no product MSDS on file, are ingredient MSDSs on file?
6. Which products are obtained from a particular supplier?
7. What are the ingredients of a particular product?

To answer these and other related questions on a regular basis, it was obvious that a computerized approach was going to be required and that a database management system (DBMS) would be required to facilitate response to impromptu queries. There are a large number of DBMSs commercially available for mini- and microcomputers that could meet the requirements to operate a right-to-know system. BBN's decision, however, was driven by the networked structure of BBN's computer resources and the fact that they market a data evaluation and management system called RS/1(tm) that could meet their needs [*8*].

The file structure of BBN's system was affected by regulations in the following way. Companies order, store, and use chemical-containing products, but the laws are structured on a chemical-by-chemical basis. This means that data must be stored so that chemical and product data can be accessed separately, but the logical connection of chemicals in products must be maintained. This required two files, one for chemicals and one for products, with common data linking the two files. The layouts of data in these files are shown in Figs. 7 and 8. These figures actually correspond to the layouts used for data entry developed using RS/1's data entry package called RDE(tm) [*9*].

Assembling the data from the files required several steps. At each facility and building within that facility, someone was designated to conduct an inventory of products present, the chemicals they contain (if shown), the manufacturer or distributor, and the quantity present. These products were then assigned numbers and entered into the product file. Where chemical data were not available, the purchasing department was requested to identify the supplier and a request for a MSDS was sent.

The initially identified chemicals, plus those from the MSDSs, as they came in, were entered into the chemicals file. CAS numbers were looked up in the Toxic Substances Control Act (TSCA) *Inventory of Chemicals in U.S. Commerce* to reduce the problem of synonyms. To supplement the MSDS data, Gosselin, Smith, and Hodge's *Clinical Toxicology of Commercial Products* was used to obtain generic chemical composition information on a number of common industrial substances [*10*].

The State of Massachusetts requires companies to submit copies of MSDSs for all products containing substances listed on the *Massachusetts Register of Chemical Substances*. BBN is submitting these MSDSs from manufacturers as

Chemical Name: _____

CAS Number: _____ Entry Date:

Synonyms:

Syn 1: _____

Syn 2: _____

Syn 3: _____

Syn 4: _____

Syn 5: _____

Product File records containing the chemical:

Product ID - 1: ___ Product ID - 2: ___

Product ID - 3: ___ Product ID - 4: ___

Product ID - 5: ___ Product ID - 6: ___

Product ID - 7: ___ Product ID - 8: ___

Product ID - 9: ___ Product ID -10: ___

Have Chemical MSDS? _

Mass List? _ RI List? _ CA List? _

Source List:

Source 1: _ Source 2: _ Source 3: _ Source 4: _

Source 5: _ Source 6: _ Source 7: _ Source 8: _

Source 9: _ Source 10: _

Carcinogenic? _

Neurotoxic? _

FIG. 7—*Contents of chemical file.*

they receive them and is supplementing them with MSDSs purchased from General Electric (GE).

For substances not covered from the manufacturers or from the GE MSDSs, BBN is using the Micro-CSIN TOXCHEM Script with a special MSDS profile (Table 7). This profile is used to search OHMTADS, Hazardline, and HSDB, capture the selected fields, and format the results into a report. These reports can be regenerated at appropriate time intervals to comply with the laws.

Product Name: _____

Product ID: ___ Entry Date:

Product Contents:
Number of Ingredients: _

Name 1: _____ CAS 1: _____

Name 2: _____ CAS 2: _____

Name 3: _____ CAS 3: _____

Name 4: _____ CAS 4: _____

Name 5: _____ CAS 5: _____

Name 6: _____ CAS 6: _____

Name 7: _____ CAS 7: _____

Manufacturer:

Name _____

Address _____
_____
_____
_____
_____

Product MSDS on file? _

Contains carcinogenic ingredient? _

Contains neurotoxic ingredient? _

BBN Locations:

Site 1: __	Building 1: __	Room 1: ___
Site 2: __	Building 2: __	Room 2: ___
Site 3: __	Building 3: __	Room 3: ___
Site 4: __	Building 4: __	Room 4: ___
Site 5: __	Building 5: __	Room 5: ___
Site 6: __	Building 6: __	Room 6: ___
Site 7: __	Building 7: __	Room 7: ___
Site 8: __	Building 8: __	Room 8: ___
Site 9: __	Building 9: __	Room 9: ___
Site 10: __	Building 10: __	Room 10: ___

FIG. 8—*Contents of product file.*

One of the most useful products of BBN's right-to-know system has been the generation of a report organized by building and room of products containing chemicals on the Massachusetts list (a list of chemicals published by the state of Massachusetts in connection with their right to know law requiring special

TABLE 7—*Micro-CSIN TOXCHEM Script MSDS Profile.*

Field Content Identifier	Hazardline	Ohmtads	Hazardous Substance Data Bank
Chemical name	CHEM	MAT	NAME
Synonyms	SYNM	SYN	SY
Physical chemical properties	PROP	. . .	CTP, DSC, HTC, HTV, OWPC, PH, SPEC, SURF, EVAP, VISC, OPP
Boiling point	. . .	BLP, BOC	BP
Melting point	. . .	MLT, MTC	MP
Solubility	. . .	SOL, SLC	SOL
Specific gravity	. . .	SPG	DEN
Vapor pressure	. . .	VPN, VPT	VAP
Vapor density	. . .	VDN, VDT	VAPD
Color form	. . .	. . .	COFO
Physical hazards	. . .	. . .	. . .
Flammability	. . .	FLM	FPOT
Standard fire codes	. . .	STD	NFPA
Flammability limits	. . .	LFL, UFL	FLMT
Toxic combustion products	. . .	TCP	TOXC
Autoignition point	. . .	AIP	AUTO
Flash point	. . .	FLP	FLPT
Intensity of heat	. . .	. . .	INTH
Explosivity limits	. . .	EXP, LEL, UEL	EXPL
Reactivities	INCO	SGM, ANT, HYD, BIN	HAZR
Corrosivity	. . .	COR	CORR
Health hazards	. . .	. . .	. . .
Toxicity summary	. . .	. . .	TOXS
Human toxicity excerpts	. . .	. . .	HTOX
Toxicity values	. . .	. . .	HTXV, NTXV
Etiological potential	. . .	EDF	. . .
Carcinogenicity	. . .	CAR	. . .
Mutagenicity	. . .	MUT	. . .
Teratogenicity	. . .	TER	. . .
Symptoms	SYMP	. . .	. . .
Target organs	ORGA	. . .	. . .
Population at risk	. . .	. . .	RISK
Immediate danger to life	IDLH	. . .	IDLH
Exposure	. . .	. . .	. . .
Routes of entry	ROUT	. . .	RTEX
Permissible exposure levels	EXPO	. . .	. . .
Max acceptable daily intake	. . .	. . .	ADA
Inhalation limit	. . .	INH, INT	. . .
Recommended drinking water	. . .	DRK, DRR	. . .
Allowable tolerances	. . .	. . .	ATOL
Human exposure	. . .	. . .	HUEX
Handling/cleanup	. . .	. . .	. . .
Personal safety precautions	. . .	SAF	OPRM
Personal protective clothing	CLOT	. . .	EQUP
Goggles	GOGG	. . .	. . .
Skin-washing instructions	WASH	. . .	. . .

TABLE 7—*Continued.*

Field Content Identifier	Hazardline	Ohmtads	Hazardous Substance Data Bank
Personal safety precautions	. . .	SAF	OPRM
Personal protective clothing	CLOT	. . .	EQUP
Goggles	GOGG	. . .	. . .
Skin-washing instructions	WASH	. . .	. . .
Changing clothing	CHAN	. . .	. . .
Specific emergency provisions	PROV	. . .	. . .
Respirator use	RESP	. . .	. . .
Medical surveillance	SURV	. . .	MEDS
First aid procedures	FIRA	. . .	ANTR
Extinguishing methods	. . .	EXT	FIRP
Acton levels	. . .	ACT	. . .
Leach/spill cleanup	LEAK	SHR, AML	CLUP
Availability countermeasures	. . .	AVL	. . .
Disposal methods	WAST	DIS, DSN	DISP
Shipment methods	. . .	. . .	SHIP
Storage conditions	. . .	. . .	STRG
General handling procedures	. . .	HND	

reporting and education activities for products containing these chemicals) and the identities of these chemicals. This report is used to guide employee hazard awareness training as required under the Massachusetts' Right-to-Know Law.

BBN's computer files are kept on a minicomputer because this facilitates communication among all company facilities which are already linked by a data network. These files could, however, be built and maintained equally well using most database management systems designed for use on a microcomputer.

Conclusion

This paper has tried to illustrate how microcomputers can be used to speed and simplify retrieval of many kinds of chemical hazard data and to organize and manipulate them so they can meet many different needs. Though the requirements for emergency response are different from those in long-term hazard assessment or right-to-know law compliance, all can benefit from the speed and organizational capabilities available through modern microcomputers.

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Hazard Communication Information: A History and Commentary on the MSDS Problems

REFERENCE: Bransford, J. S., Jr., **"Hazard Communication Information: A History and Commentary on the MSDS Problems,"** *Hazard Communication: Issues and Implementation, ASTM STP 932,* J. E. Brower, Ed., American Society for Testing and Materials, Philadelphia, 1986, pp. 199–205.

ABSTRACT: The history of "Need to Know," which became "right to know," began at the Occupational Safety and Health Administration (OSHA) in 1973. The immensity of the task of maintaining and tracking the constantly changing health effects and toxicity data required for material safety data sheets (MSDS) and labels changed the regulators' planned methodology. The emergence in recent years of the courtroom principle of strict liability changed the views of the large chemical manufacturers. The right-to-know standard became a vehicle to downshift some liability away from the suppliers to the supplied parties. The courts took a contentious stand against the restrictive policy of OSHA, which covers only those workers in manufacturing, and ordered a widening to cover all workers falling under federal authority. The courts have been breaking down the ability of a manufacturer or formulator to withhold trade secrets from the MSDS data, and in Nov. 1985 OSHA published a new revised policy.

The communities, which include police, firemen, and in some states the public at large, are claiming rights to the information. Some 35 states have already passed right-to-know legislation in one form or another with a high probability that other states will follow suit.

The technical staff requirements for in-house maintenance and the creation of MSDS information is beyond the reach of many chemical manufacturers and formulators in terms of personnel requirements and the need for an extensive chemical, biological library. Many corporate users have not digested the import of multiple suppliers with drastically different MSDSs on commodity chemicals which they purchase from many manufacturers. The liability will be assessed by the courts in terms of the weakest MSDS whether such MSDS was provided to the worker or not. Such weak MSDSs will be obtained for possible entry as evidence through the discovery process.

KEYWORDS: hazard communication, need to know, OSHA, chemical mixtures, trade secret, preempted, strict liability, communities, right to know, MSDS, omissions, maintenance and perishability, full disclosure, commodity chemical, tort, downshift liability, deepest pocket

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The objective sought in 1973, when the U.S. Department of Labor first outlined the need to know [*1*], was simple and straightforward information on chemicals in the workplace. Theoretically, the idea was difficult to oppose. Many serious scientists envisioned information pages which were to be prepared by the Occupational Safety and Health Administration (OSHA). Gradually, the enormous difficulties of such a plan made it obvious that OSHA would eventually determine that the quantity of data would prove too great to generate internally as did the Federal Drug Administration (FDA), Environmental Protection Agency (EPA), Department of Transportation (DOT), Coast Guard, Centers for Disease Control (CDC), and many other regulatory agencies in regulating such data on an ever increasing number of chemicals. Problems that soon came to light were:

1. The infinite number of chemical mixtures.
2. The lack of data.
3. The miniscule testing efforts compared to that which needed to be tested.
4. The lack of dose/response data.
5. The constantly changing information.
6. The lack of coordination of data between regulatory agencies and states.
7. The trade secret barriers.

In time, it became clear to most within the agency that collecting and processing such large amounts of data could only come about through participation from the creators and users of the chemicals. This idea received considerable support with creation of the Toxic Substances Control Act (TSCA), which required testing and disclosure of data by the manufacturers [*2*]. The pattern of the FDA was being repeated in that the maker/user and formulator would have to accept the burden of data creation.

The theory of strict liability was beginning to emerge from scattered courtrooms. Most manufacturers were understandably alarmed at the notion of revealing their most potentially harmful information to employees. The idea seemed to contradict all they have been taught. By 1980, liability per se had become a reality. Basically, the courts were holding the makers and sellers responsible for the consequences to both worker and user. Thus, the horizons were widened in "need to know" to include the workers of other employers who themselves were clients of the manufacturers or formulators. The Consumer Product Safety Commission was created but proved ineffective to industry due in part to its lack of funding [*3*]. Government enforcers, while inefficient at seeking out offenders and enforcing standards and regulations, did provide the information which permitted judges and juries to measure what they perceived as wrongdoing. Federal government rules and standards allowed juries to use perspective in deciding a particular case.

Strict Liability, a Reality

The theory of strict liability accelerated the development of "need to know." Out-of-court settlements for employee-generated claims of health impairment became numerous. The advent of hazardous waste cases and contaminated

groundwater cases became commonplace. The communities began to realize that they too had a stake in planning ways to avoid future chemical problems, but no planning could be done because they lacked information on the chemicals and storage locations. As a result of all the problems, the right-to-know phrase was adopted and states began passing their own laws ahead of the federal effort. To date some 35 states have passed such legislation in varied forms. On 25 Nov. 1983 the U.S. Department of Labor published the final form of the federal right-to-know standard in the *Federal Register* [*4*]. It purports to preempt all phases of state occupational or labor right-to-know law. Perhaps the precedental decision had already been handed down when Maryland sued the Secretary of Labor on the chemical standard of benzene [*5*]. In that case, the judgement of the courts was reviewed by the U.S. Supreme Court. Essentially, the court said that a state has a right to pass a standard or regulation into law. The court further upheld the right of a state to pass more stringent standards than the federal ones and held that, whether of federal or state origin, the more stringent requirements prevail within said state. The federal right-to-know standard is now scheduled to go into final effect on 25 May 1985, and, already, courts in Pennsylvania [*6*] and New Jersey [*7*] have decided that certain provisions in those states' laws, which are beyond the scope of the federal standard, are in force and not preempted by federal law.

While deciding that the manufacturing sector (SIC CODES 19–39) will be preempted by the federal standard, the Third Circuit Court of Appeals has required that state laws covering industries other than the manufacturing SIC CODES shall not be preempted [*8*]. The court has also essentially struck down the trades secret section of the federal standard, and, in November 1985, OSHA published a new revised policy. This revision lists six factors the agency will examine when determining whether or not a legitimate trade secret claim can be made:

1. The extent to which the information is known outside of the employer's business. If the information is widely known, the employer cannot make a credible argument for the specific chemical identity being a legitimate trade secret.
2. The extent to which the information is known by employees and others involved in the business. If the specific chemical identity is truly a trade secret, it can be expected that the employer would use some means to limit access to it within the facility.
3. The extent of measures taken by the employer to guard the secrecy of the information. If a specific chemical identity is a trade secret, it can be assumed that security measures to protect the information would be designed and implemented by the employer.
4. The trade secret must have some value to the employer or to his competitors. If holding the information as a trade secret does not result in a competitive or economic advantage to the employer, then the existence of a legitimate trade secret is questionable.

5. The amount of effort or money expended by the employer in developing the information is also a factor. Many employers spend much time and effort developing novel products, and protection of the information allows them to develop a market and recoup the costs of development.

6. The ease or difficulty with which the information could be properly acquired or duplicated by others. If the specific chemical identity of a component can be readily determined through reverse engineering, it does not qualify as a legitimate trade secret [*9*].

Further, this three-judge court of appeals has instructed Secretary of Labor Bill Brock to show cause why all employees in the United States covered by OSHA should not be covered by the federal right-to-know standard. In response, OSHA, in November 1985, published an advanced notice of proposed rule making, asking the public to submit comments on how the standard might be expanded to cover workers other than those in the manufacturing sector. The agency sought detailed information on current hazard communication activities, costs, and problems that might arise if the standard was extended to cover other industries [*10*]. In March 1986, Jennifer Silk, an official in OSHA's Health Standards office, complained that the comments received failed to supply the agency with the information it was seeking. Many of the responses were "single issue letters" from persons who appeared "to have never read the notice," Silk said. While many comments dealt with industries such as construction, wood, paper, transportation, oil and gas, and chemicals, little information was received from hospitals and other service sectors, she noted. Silk and three other OSHA officials are evaluating the comments to gather information for a proposal on expanding the standard. That proposal, however, is not expected to be published before fall of 1986 [*11*].

Dimension of Problems of Creation and Maintenance

Those who have looked hard at these tasks already know that the cost in manpower is indeed taxing. We cannot rely on existing scientific, industrial hygiene, library, and medical personnel to create and maintain our MSDS files. They neither have the time away from their regular duties or the experience to tackle this job. Many organizations have done nothing. Some organizations have assumed they would simply use the MSDSs provided by their suppliers. Some have already started trying to develop a file of up-to-date and accurate MSDSs and have encountered the following problems:

1. Supplier MSDSs in the majority are unsatisfactory. They do not protect the client or organization who will be sued by employees, clients, and possibly by local communities or the public at large. These supplier MSDSs, we find, are inaccurate and do not contain enough disclosure data to protect the employer.

2. The scientific and industrial hygiene staffs in most organizations are already overworked at their regular tasks. Most organizations, depending on the number

of substances and mixtures they have in inventory, will need from three to six new employees to complete this task of MSDS creation, and from one to three trained people to simply maintain the files once they are created. Such organizations will need computerized systems to create and maintain the MSDS files. Accomplishing this task in an up-to-date fashion for more than 100 substances or 200 mixtures or both without such a system is nearly impossible. Each change in data causes untold problems with printing, file maintenance, and MSDS dissemination to the proper employees and clients.

3. Many organizations acquire chemicals and mixtures from multiple sources for reasons of economy and availability. You will find significant differences between supplier MSDSs for the same substance or mixture. These inadequate MSDSs simply cannot protect your organization. Each MSDS from a different organization may differ considerably.

4. The decisions of the courts under current litigious climates do not tolerate omission or false data. Look at the decisions of the past few years. It was omission that hurt Manville Corp., the large asbestos concern that had to file for chapter 11 bankruptcy in 1982 after being hit with billions of dollars in health and property damage suits [*12*]. The standard (29CFR1910.1200) requires the creator of an MSDS to include in the health data any statistically significant study output even if you disagree as an organization [*13*]. This seemingly offensive requirement can protect the company.

Tobacco companies are not being sued hourly for cancer and emphysema because it would be nearly impossible to convince a judge or jury that one didn't know the hazards associated with smoking. The cause-and-effect link can be established by the Surgeon General's required warning on each package, which is in itself an "MSDS" label.[2] Clearly the reason these tobacco settlements have markedly declined since the late fifties and early sixties is that the user of cigarettes is informed and does not need a "learned intermediary" to ascertain that cigarettes will hurt him. The omission of similar data from an MSDS is negligence, and such negligence bears a heavy courtroom cost. Since the original writing of this manuscript, the Third Circuit U.S. Court of Appeals in Philadelphia has ruled that the health warning on cigarette packs protects tobacco companies from product liability suits [*14*].

5. Maintenance and perishability are inextricably related. To adequately maintain an extensive file of MSDSs requires a full-time work force of 12 to 20 trained personnel. There are currently about 14,000 journals and abstracts sources which must be reviewed regularly. The OSHA standard allows 90 days for an organization to get new MSDS data revisions into circulation. How does an organization keep up with these worldwide changes? How does an organization get MSDSs disseminated to employees? Does one wait 90 days after a new health effect comes out of a journal or a Section 8(*e*) [*3*] is published in the

[2] Surgeon general of the United States requirement for label: "WARNING: THE SURGEON GENERAL HAS DETERMINED THAT CIGARETTE SMOKING IS DANGEROUS TO YOUR HEALTH" on each cigarette package.

Federal Register? Does one have a computer file of MSDSs that our clients can access remotely to get the latest data?

I supervise a staff of 20 researchers and 4 peer reviewers who compile MSDS files. I find I am asked how often disagreements arise on the health effects on a particular MSDS after research has been completed. The answer is, "Every day." No one knows all the answers, but it is helpful to have researchers who review within their own specialized areas of expertise. We are asked how we resolve such disagreements. The answer is that we fully disclose in order to err on the side of full disclosure as opposed to the seemingly unforgivable sin of omission. We then go over each argument with our clients, and they can add to or subtract from according to their own reasoning. Regardless of client MSDS changes made, our public access files are maintained on the side of full disclosure for the purpose of avoiding litigation for our on-line clients. The two litigable unforgivables have proven in court to be, "We didn't publish this data although we knew about it," and, "We should have known but didn't." An economic and market-dictated fact requires users to buy commodity chemical substances from multiple suppliers. The MSDSs differ widely from each such supplier. If you cannot specifically prove that a particular harmful effect occurred on a particular day and that the worker was aware of the data contained in the specific manufacturer MSDS, then how do you protect yourself? Certainly the other manufacturers of said substance will not step forward to form a legal safety net for your organization as an employer client user. Regardless of the federal standard preemption, your company will be sued in the state workers' compensation court. If you do not monitor and create a generic set of MSDSs for your company use, then there will be trouble with multiple suppliers, different MSDSs, and tort feasor cases.

Conclusion

Our staff of researchers and our outside advisors all agree on one matter. It is a matter tempered by 4 years of maintaining HAZARDLINE (TM) and four other environmental health databases. It is a matter arrived at after providing data for many hundreds of cases of potential and actual litigation. In short, it is to fully research and fully disclose. One bad settlement (to say nothing of an adverse court judgment) can cost several hundred times the cost of a poorly maintained MSDS database. Being a business-defense group, we are often asked, "How did such a standard come into being in an admittedly probusiness administration?" The answer is no secret. The major chemical producers felt that every time there was an allegation or a lawsuit, all liability eventually tracked back to them. The Hazard Communication standard "downshifts" much liability to the formulators, mixers, and employers. Soon, lawsuits for failure to disclose will be directed toward the local employer first, rather than seeking out the "deepest pocket." It is nearly impossible to sue an out-of-state chemical

manufacturer in workers' compensation cases. The employer is responsible for the data as well as the chemical producer. The local company is also responsible to the community. If this local company buys feedstocks or formulations from more than one supplier, he becomes responsible to all parties for all suppliers and the inability to reconcile the differences in data from several different suppliers on the same substance or mixture.

You are responsible as an organization. There is no shortcut or alternate route. We had best tend to our own houses first.

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Panel Discussion: Information Resources

This panel discussion was held as a continuation of Session IV of the symposium on Information Resources. The discussion is presented in its original form; it was not peer reviewed. The names of those individuals asking questions are not given; the questions and responses of these persons are listed as *Question* and *Response*.

The moderator was Richard Parent, Consultox, Ltd., Baton Rouge, Louisiana. The panel members were: Lynda M. Wiseman, Celanese Corp., New York, New York; Judith M. Hushon, Bolt Baranek and Newman, Arlington, Virginia; and John S. Bransford, Occupational Health Services, Inc., Nashville, Tennessee.

Specific Questions and Responses

J. Brower: I have a general comment to make on using computerized information resources. I think Lynda probably touched upon it in her paper on the Hazards of Toxicity Information. I was reminded when I saw Judy's slide downloading from various systems, the chemical identifiers, the chemical names, Chemical Abstract Service numbers, and all the synonyms. These are hazards of using this information even though it may be accurate, to some extent. If you take some of these synonyms and try to use them on your MSDSs, you may find after you do a little further research that many of the names really aren't true synonyms. They may be a trade name product that contains 20%, 80%, or 90% of that material, but they are being put in some of these databases as synonyms. Maybe for certain hazardous properties, you could consider them as such. That is one of the "hazards of toxicity information" that you'll find on some of these databases.

Question: The same thing came up again today about changing the MSDS. I think you made a good point, John—Is there a constant fear of inviting litigation possibilities when you start changing words and altering MSDSs? Is that generally true?

J. Bransford: I'm not sure I understand what you're asking. Are you saying that do you have the right as an employer to evaluate the MSDS that you received and rewrite it in a generic form and submit them to your employees and clients?

Response: Yes, there is a constant phobia of secondary recovery in Workmen's Compensation.

J. Bransford: There is no question that you have a liability there, but there is a much more vast liability and that is to use and disseminate to workers or clients or communities—if you live in New Jersey or California or other places—data that is inadequate simply because it was submitted to you by some big company. I'll give you a case of a few weeks ago where we were evaluating some MSDSs for one of the larger hi-tech companies in defense. They had a quaternary salt of sodium hydroxide, and the company said it had no hazardous properties, and it had a pH of 13. This is a fact. So I called on the company, and, finally after some waiting for them to get back to me, I got the toxicologist who was in charge. He was, I think, embarrassed. I said, "I don't understand, I need to know which quaternary salt this is." He said, "I can't tell you that." And I said, "Well then, maybe there's an error," really expecting him to say yes, it was a misprint, on the pH 13. He said, "No, that's right." And I said, "Do you still stand with that it's not hazardous?" And he said, "Yes." I said, "Do you have a daughter?" And he said, "Yes, I've got two of them." I said, "Would you let either one of them put their hand in that nonhazardous solution?" And he said, "No way." And I said, "Well is there anything else you've got to say?" And he said, "John, I can't say anything else to you. Goodbye."

Obviously it was a decision that had been made by the sales department or some other part of the company. The MSDS was worse than worthless. They would have been better off not to have ever sent one out because now if they ever have a suit, can you imagine the field day that the plaintiff lawyers are going to have with that one. It will never go to court. It would be another one that would be settled out of court. What if someone gets that material in their eyes and has corneal damage or if someone has severe burns on their skin, or, God forbid, that somebody should swallow it by mistake? It is a highly corrosive material, and they had sent out an MSDS that is an open invitation to financial disaster.

J. Brower: That reminds me of a very similar situation. If you didn't say a pH of 13, I would say it was probably the one I read about a couple of months ago and tried to get some information on. The MSDS said it does not contain phosphates, nitrates, acids, and so on, and it listed about a dozen things it did not contain as hazardous ingredients. You scratch your head and you say, "What does it contain?" We called the company, and they said, "Well, that's proprietary information. We gave you all the information that you need to know." But I was able to conclude just by what they were saying what the product did and what it didn't have, that it was probably some chelating agent such as EDTA, just because of what the product was used for. Now that didn't sound to me like it was something that deserved proprietary disclaiming information, or that you couldn't get what it was, at least in generic terms, but they wouldn't reveal it. So getting this information is often very hard. If they

don't give you anything to go by, you can't even go into a database and search information on any of the components in the material.

J. Bransford: A lot of companies are evaluating the MSDS that they have. Many companies have thousands of them from multiple sources, and they're trying to pull them together, I think a little late because I don't think many of them are going to get them revised by November 25 of this year [1985]. Again I point out to you that OSHA is not the real problem. OSHA will be very ineffective in enforcing this law, but the plaintiff lawyers will be very effective in enforcing it, and they've always been the bad men as far as you were concerned—it's never been OSHA.

R. Parent: I have some questions relative to information retrieval, particularly the toxicological information. I wonder if it might be possible to retrieve target organ toxicity data from any of the databases? It was pointed out that in Massachusetts they flagged neurotoxicity and carcinogenicity. Let's say, in the case of the central nervous system, could you search for a hexane solvent mixture and find out something about the central nervous system effects? Could you pull out that as a subfile in doing a search? Could you also search other organ systems that are less obvious?

L. Wiseman: Yes, you can do it as part of your search strategy. If you're using a microcomputer, you can store a profile that would contain all your central nervous system, your neurotoxicity terminology, and run that against your search. So, yes, that's very possible.

J. Hushon: Also, the Hazardline database happens to have a field called ORGA for target organs. This field happens to list which target organs are affected. So you could pull out that information. In fact, the new Toxicology Data Bank (TDB) file, HSDB (Hazardous Substances Data Bank) will have it split out. It's one of the new fields in that database.

J. Brower: There's another database which is available on Dialogue, but it is also put out by Oak Ridge National Laboratory on the DOE Recon system. It gives chemicals detected in tissues, and the Dialogue name is Chemical Exposure. They include information on chemicals that accumulate in various tissues, both in animals and man.

Question: This question is directed primarily to John. I presume that you would advise, when listing target organs for which there is good scientific data, to list all of them in the MSDS. Would you recommend any kind of cutoff for including them in the label?

J. Bransford: To cut off information on the labels? We don't pretend to be expert on the labels. But I think, again, you're talking about precisely the same effect, and that is, omission of information on the labels. There's a liability if you don't have it thoroughly recorded on the MSDS and abbreviate it on the label. Is their liability, and the answer is, there is liability any time that a plaintiff lawyer perceives that he's got an angle that he can get money out of

you on for a chronic health effect. So the labels carry a liability for sure. I worry more about the labels in terms of those that we supply or that we don't sell publicly, that are printed on tractor-type printers in color, and I worry about whether or not they're color fast and whether or not the water when it strikes the barrel in the open truck is going to dissolve it, and a few things like that; so we're trying to come up with a plastic envelope that we can stick permanently to things that are going to get scarred and damaged and water damaged. But I think that the MSDS in all honesty carries a great deal more information and possible liability than the label.

Question: If we refuse to buy from anybody who won't dislose without a proprietary agreement, are we in any way violating the law? The intent is, people can have proprietary information, and I worry about violating a person's right to sell if we won't buy from them because they won't disclose.

J. Bransford: What you need to worry about are your rights as an employer. I'll give you a case in point there, again with another hi-tech firm involved in manufacturing parts for satellites. We had a great many highly reactive chemicals. We went to a number of the manufacturers and asked them for more data, and they refused to give it to us on behalf of the client. But we developed a little system, which was computer originated, in which the first letter went out when they refused to give it to us, or within three weeks if we hadn't heard from them. We contacted them with the second letter saying that the purchasing department and the legal department of whatever corporation has demanded that we get an MSDS of a disclosing nature for their employees and the employees of NASA. If we didn't hear from them or we got a negative response, then a letter went out saying, we hope you understand, but your material has been removed from the materials that can be purchased by our company for the purposes outlined. That almost always got a response because the people who were keeping it from happening in the first place vis-á-vis the sales division responded, and usually we got it. I can't say it was 100% effective. It's just a problem you're going to have to wrestle with and determine how much liability you have and how serious that particular chemical is.

Question: Now with OSHA, the standard provides for proprietary agreements. You can get that additional information, but we're not giving out any proprietary information to the worker.

J. Bransford: I understand. You still have your responsibility to your workers, and they will sue you whether it is proprietary or not.

Question: One of the examples you used in your talk a minute ago had to do with the labeling of cigarettes as hazardous to your health, and you implied that that disclosure almost really absolved the cigarette manufacturers of any liability. Are you saying that full disclosure or an MSDS is going to protect the employer from being sued?

J. Bransford: No, I'm saying that it strongly mitigates the circumstances

under which a cause-and-effect link could be created in a courtroom that would establish both the health effects and the negligence on the part of the employer. And in order to be able to obtain punitive damages in 49 states, they're going to have to prove negligence. This law makes it very easy for them to prove negligence. Again, I repeat, I suspect the OSHA will be very ineffective because they don't have the number of men to do it. But the lawyers will end up being very effective in enforcing it because they're going to come back in and create the negligence atmosphere. When you get into the courtroom, what the plaintiff's lawyer will say is, "Here's what the law says this company should do, and, your Honor, here's what they did. Now, here's what they didn't do that the law said you should do." And most of those cases are jury cases, and most of them are tried in state law first. When they have a backdrop of an OSHA standard, or an EPA-TSCA standard, you are measured, as a corporation, by your willingness or ability to comply. The punitive damages or the negligence are established by what you don't do.

Response: I get that impression, too, but the one thing I was concerned about was the fact that cigarette smoking, of course, is a voluntary action.

J. Bransford: That's what I said. If they go into court, they're going to get it thrown out in most cases. I'm not saying you couldn't find a judge who would entertain it, and I'm sure one is going it right now.

Response: However, the liability doesn't take into consideration voluntary action.

J. Bransford: Well, the courts certainly have. If you will remember, several years ago that there were cases about people, widows and widowers who were suing the tobacco companies for damages of various types, and they were getting awards, and the tobacco companies were settling out of court. But it's awfully difficult today to go in and establish negligence of the tobacco companies when every package that they put out has got that warning on it.

R. Parent: However, they can claim that they were not warned in the 1950s and claim the fact that that's then the initiation phase of the cancer began, and that, I believe, is being done. That's the way it worked.

Question: As I understand it, when a company is preparing an MSDS, they can exercise some judgment with health data as to whether it should be included, whether, in their opinion, it is valid or not to be included in the MSDS. If certain data were left out on those grounds, it would seem from what's been said that one would have to document very carefully the reasons for not including a particular piece of data in the event that later on some plaintiff attorney might get him on the stand and ask him why he didn't put that in the MSDS when other companies were, in fact, putting it in.

R. Parent: That's all discoverable, too.

J. Bransford: The law is very specific on it. It says if there is a statistically

significant study, and there is only one, and whether you agree with its findings or not, that you're obligated to list the results. You are also free to list other results on the same MSDS that refute the findings of the statistically significant study. Now I'm not going to tell you what a statistically significant study is; I don't know. Again the liability is for failure to do it. If you list it, you're better off than not listing it, and this is a real traumatic thing for people in industry to accept. We've always been told that you put your best foot forward. You don't go out and tell the worst things you possibly can. In this case, you're dealing with a performance standard. The performance is your performance. And the burden is on you, the same way it is for the FDA. When you turn in a study for a new drug, you've got to fully disclose. If an FDA panel finds you didn't fully disclose, you're going to sit there until hell freezes over, and you're not going to get a drug application approved. It's just that simple. I hope that answers that question; but it is true, you're supposed to list it.

Summary: The Hazard Communication Standard—Issues and Impacts

In the Introduction I outlined seven issues related to the Occupational Safety and Health Administration's (OSHA) Hazard Communication standard.

1. Worker right to know versus worker need to know.
2. Who should define the hazards?
3. Is the federal standard a standard?
4. Does the standard protect the worker?
5. Trade secrets and proprietary information.
6. Community right to know.
7. Preemption and state responsibility.

The papers and panel discussions gave details on requirements, implementation, and controversies related to this regulation. In summary, let us examine and evaluate these issues in more detail as they relate to the papers and panel discussions.

Worker Right to Know Versus Worker Need to Know

The OSHA regulation [*1*] is explicit regarding the workers' right to know, as was pointed out in the first paper by D. W. McDaniel, which gives an overview of the regulation. Certain workers who have a potential for exposure to hazardous materials have a legal right to information about hazardous materials in their workplace. The kinds of information that they are entitled to receive were discussed in the first section on "Regulatory and Compliance Issues." What workers are entitled to know and what they need to know to protect themselves may be different, particularly regarding rights to trade secrets, amount and complexity of information, and relevance of information.

The issue of "need to know" has generated some concerns which are not addressed in the regulation. The kinds of information that must be made available to the worker are specified, but does the worker really need this data? L. M. Wiseman suggested in her paper that there may be hazards in drowning in too much toxicity information so that useful information is lost. The need to know does not imply a need for volumes of information. However, as J. S. Bransford pointed out in the last panel discussion, we generally have a deficiency, not a surplus, of adequate health effects data for most chemicals. How can the worker

best use all the information and data that he/she needs and is entitled to? It is knowledge, not data, that is needed by the worker, and this need, as stressed by A. Capuano, is best served by training. In fact, it is not intended that the material safety data sheet, (MSDS) be widely distributed to workers. The law requires only that they be readily available to the worker.

As was stressed in the first and fourth panel discussions, the worker needs information at a level of language that he or she can understand. OSHA clearly states that the language must be English. For international trade, other languages must be used. In Canada, for example, French as well as English is required. The OSHA regulation requires that information is based on best available scientific evidence and information. This requirement will likely encourage the use of technical jargon that will not be understood by most workers in manufacturing industries. Several panel members stressed that such technical information should be translated into layman's terms. Workers may not understand medical jargon, but physicians and industrial hygienists should be able to understand health effects information in layman's terms. The extent to which the use of nontechnical language is promoted will depend on the manufacturer's and importer's perception of the need to include detailed toxicological effects and medical symptoms in an MSDS to avoid liability claims. Some lawyers will likely advise the precise quoting of scientific information to avoid misinterpretation of the literature. Should this view prevail, a MSDS would become a legal technical document and lose its usefulness as a communication device, which OSHA intended it to be. At the other extreme, some MSDSs will become so simplified that they will consist of general or vague lists of possible hazards and protective measures that are simply checked off for each different product marketed.

Labeling requirements were discussed by D. W. McDaniel and M. Freifeld and by panel members in the first panel discussion. The intent of the label is to identify the material, identify the manufacturer or distributor, provide immediate warnings, and permit easy reference to the MSDS for more detailed information. There is a strong interest among some manufacturers and importers to color-code their labels, include pictographs of hazards, and use numerical hazard codes. Several systems already exist including Department of Transportation (DOT), National Paint and Coatings Association (NPCA), National Fire Protection Association (NFPA), ASTM, J. T. Baker Chemical Co. [*2–6*]. These systems are not standardized, and industry representatives at this symposium expressed the need to use caution when applying them. Numerical rating codes in particular should be used with caution and be precisely defined since they are not standardized. The NFPA hazard rating and the Hazard Materials Information System (HMIS) ratings used by the NPCA are not necessarily the same. These systems are designed to communicate hazard information to workers quickly and effectively, but the worker should be trained to interpret them correctly. For example, an NFPA health code emphasizes health hazards of a chemical in a fire whereas an HMIS health hazard code emphasizes occupational

use. Also, reactivity codes may have quite different meanings which may or may not include chemical or thermal reactivity or stability.

Symbols and pictographs serve those who cannot or will not read labels, and certainly will not read a technical MSDS. These abbreviated approaches may warn the worker of general hazards, but they hardly provide adequate detailed information and many symbols are not standardized. Labels should reference the MSDS, but the MSDS may not likely be read. At what point can the worker say, "I didn't know" or, "Nobody told me"? Clear and meaningful labels and MSDSs with a sound training program are therefore essential to communicate necessary information on hazardous materials. The intent of OSHA is to train the worker about the hazards rather than the specific chemical and its properties.

To help enhance good hazard communication, there are others besides the worker who will have a need to know. This need will likely create a demand for health and safety professionals and cause redefinition of their responsibilities [*7*]. Thus, industry educators, occupational physicians and nurses, industrial hygienists, toxicologists, emergency response teams, and supervisors need MSDS information to assure that workers are properly informed, protected, and treated. The rights of some of these professionals to information are defined in the OSHA regulation, particularly those who have rights to trade secret information. However, occupational nurses were not included in the 1983 regulation, although they may need this information [*7,8*]. These health care professionals now have the same rights to trade secret information as do physicians or industrial hygienists [*17*].

In practice much of the information needed by supervisors, training professionals, and health and safety professionals need not be detailed by federal specifications. Except for trade secrets, information supplied to the employer should be freely available not only to those who are entitled to it but to anyone in that firm who truly needs it. Industrial hygienists and toxicologists will need it to serve as intermediaries and interpreters for the worker. Supervisors will need information since they often have line responsibility to assure worker safety during a workshift. The free flow of information, forces of the marketplace, and legal liabilities will encourage communication of information to these people.

Who Should Define the Hazards?

Although the regulation specifies that manufacturers and importers are responsible for defining the hazards of chemicals they produce or import, there are some who believe that they have been given too much responsibility and leeway and that OSHA has not assumed enough responsibility [*9,10*]. There is concern that this is another case of the "fox guarding the chicken coop." This is an example of a change in direction for OSHA in which the principle of "cooperative regulation" is being applied [*11*]. In the past, the National Institute for Occupational Safety and Health (NIOSH) has been assigned specific roles in assessing and defining hazards for consideration by OSHA in promulgating

regulations. The impracticality of an agency doing this for all hazardous chemicals, mixtures, and other materials used in the workplace should be obvious. Canada and most states in the United States have also delegated this responsibility to suppliers and manufacturers. However, New York and New Jersey are developing their own fact sheets for certain chemicals.

Shouldn't industry be given a list of hazardous chemicals? In part, they have been with a list of about 600 materials that includes any material in OSHA 1910.1000-Subpart Z through 1910.1045 [*12*], the American Conference of Governmental Industrial Hygienists (ACGIH) list of chemicals assigned Threshold Limit Values (TLVs) [*13*], the National Toxicology Program (NTP) list of carcinogens [*14*], and the International Agency for Research of Cancer (IARC) materials designated as carcinogens [*15*]. Critics in this symposium and elsewhere [*8,10*] have claimed that this list is insufficient. OSHA has now expanded this list to cover 2300 substances [*28*], although they have not formally published this expanded list. Since regulation of chemical hazards on a chemical-by-chemical basis is recognized as impractical, OSHA has defined chemical hazards in a generic performance standard. Any material meeting these requirements, regardless if it is not on a list, must be defined as hazardous, and its physical and health hazards must be reported on labels and MSDSs. These criteria have been criticized as arbitrary and overly exclusive [*8,9,10*], particularly concerning the 1% rule for hazardous ingredients and the exclusion of labeling requirements for pesticides. In principle, government has assumed the responsibility of setting the criteria for defining hazardous properties, and industry must comply by applying these criteria to their products. In Canada, developing these criteria has involved concerned parties that include federal and provincial agencies as well as industry and labor representatives.

As was pointed out several times in this symposium, there can be variable interpretations of these criteria by different manufacturers and importers. Carcinogens, for example, are defined by OSHA as any material that is regulated by OSHA as a carcinogen, listed as a carcinogen by NTP, or found to be a carcinogen by IARC. There are those who will likely follow the letter of the law and recognize only these as carcinogens. Others, following OSHA's criteria of "best available scientific evidence," will include many other materials not designated by NTP or IARC if their toxicologists evaluate the evidence to be positive. Some companies who do not have their own toxicoligists may decide to reduce risks of law suits and record tumorogenic information and nonevaluated data given in the NIOSH Registry of Toxic Effects of Chemical Substances (RTECS) [*16*]. Also, some companies which lack the resources that larger industries have for researching information and making hazard assessments may omit detailed information on hazards.

The accountability of industry in preparing an MSDS is not fully crystalized. The workers have definite rights to information, but who can they hold accountable or liable for the accuracy and completeness of the content of the MSDS or label? This issue was raised in several papers and panel discussions

in this symposium. The employer is not required by OSHA to review or verify information on an MSDS. However, many panel members agreed that since the employer has the right to accept or reject the information of the supplier, the employer may be primarily accountable. The extent to which the employee or the employer can hold the originator of the MSDS accountable for the information is not clear and will likely be tested in the courts. G. Granville stated that this concern has not been fully addressed in the proposed Canadian standard. For clear violations of the regulation by the supplier, the employer can take the case to OSHA for enforcement. Employers can also send an MSDS back to its originator and refuse to order that material until a proper MSDS is supplied.

Is the Federal Standard a Standard?

Several of the previous papers and discussions stressed the importance of having a hazard communication regulation that is performance oriented. This approach to standard setting is another change in OSHA's regulatory direction. The distinction between performance and specification standards was spelled out in A. Capuano's paper on training programs. The justification for using a performance standard and the unworkability of a specification standard has been documented [*8*] and generally accepted in principle by labor, industry, and the states.

Nevertheless, some have become concerned that labels and MSDSs will lack significant standardization [*18*]. The OSHA standard specifically states that a label or MSDS may take any form as long as it contains the kinds of information required in the regulation. The current OSHA MSDS Form 20 will be discontinued and a new voluntary form has been prepared. This new form may be useful to those who have not the resources or the desire to create their own system. Most manufacturers, however, will continue to use their own MSDS formats and labels and modify them to comply with the OSHA standard. Not only may their form and appearance vary and create confusion, but information contained in them may not be standard. The quality of information may vary considerably. Quantitative units of measurement are known to vary. Some MSDSs are highly detailed and technical, others are brief and general. Some are no more than a check list that is marked off to indicate hazards.

It remains to be seen if reputable companies with comparable resources will produce standard information on an MSDS for the same chemical. For example, if one examines eight different MSDSs on phenol, one finds lengths varying from two to six pages. Discrepancies in the physical data on some of the sheets make one wonder if they refer to the same chemical. One states percent volatile matter to be negligible and another to be 100%. Some give the melting point; others do not. Vapor pressures vary from less than 0.1 to 1.0 depending on the temperature reported. The odor for phenol could be "strong sweet," "sharp medicinal," or just "characteristic." Guidance for disposal is confusing: one suggests neutralizing and flushing to sewer if local laws permit it, another

recommends incineration or burial, and a third recommends recovery and recycling. Whether these discrepancies will be corrected following implementation of the OSHA requirements remains to be seen. However, where standard units and specifications were not given by OSHA, there will likely be a great amount of variation between MSDSs on the same chemical. This problem will be even greater for mixtures and trade name products. An employer receiving MSDSs from several vendors may find discrepancies between them. How does the employer evaluate these differences? Does the most recent MSDS signify new data as required by OSHA? Maybe one is just being overly cautious and is giving more details. The differences, however, may represent errors on the MSDS.

Some states, such as New York and New Jersey, have chosen to create their own standard chemical fact sheets. Several industries have had comprehensive MSDSs for years. Computerized MSDS systems are also available. Some of these may serve as models for standard MSDSs. The American National Standards Institute (ANSI) Standard Z129.1 [*19*] and the National Paint and Coatings Association system [*3*] may serve as voluntary labeling standards. The OSHA regulation will likely need some fine tuning, and some changes have already resulted from recent court rulings [*7,29,30,31*]. Some additional fine tuning that has not been addressed by OSHA or the courts can be done by creating supplementary consensus standards and guidelines through standard-setting societies. Such supplementary standards should be developed with caution and only where needed and should not conflict with the OSHA regulation. Many industries would likely oppose any new standards that would adversely affect systems they have in place and that may cause them to retrofit these systems. The need for clearer and more effective communication to promote worker safety, however, should be the prime consideration.

Does the Standard Protect the Worker?

In those industries in the manufacturing SIC Codes 20 through 39, the worker is covered [*1*]. The justification limiting the standard to these industries was discussed in the first Section on the overview of the regulation and in the regulation's preamble [*8*]. In the papers in the first and third sections presenting labor's view and New York's and New Jersey's positions, OSHA was strongly criticized on this issue. This has been a widely publicized issue and has been tested in court [*9,10,11,18,20*]. Labor maintains that two-thirds of the work force or as many as 60 million workers may be excluded from legal protection [*9,18*]. OSHA's defense to this criticism is threefold:

1. Those SIC codes cover the greatest number of workers at risk.
2. It is more cost-effective.
3. The free flow of information in these designated industries will flow over into the other industries not specifically designated.

The use of cost-benefit considerations to this extent is another example of OSHA's new emphasis on cost-effective regulation and performance-oriented standards [*9,11,18*]. OSHA's preempting state right-to-know laws ensures that conflicting and variable labeling requirements will not burden interstate commerce. The cost of these state laws on interstate commerce is uncertain [*25*]. The trickle-down effect of information from the manufacturing industries to nonmanufacturing industries is not satisfactory to Labor since there are no worker rights guaranteed by voluntary flow of information. As F. M. Mabry of the U.S. Steel Workers pointed out in the first section, Labor feels that the regulation has many good points but that it doesn't go far enough either in protecting all the workers or in providing full disclosure of information.

Most of the current state right-to-know laws and the proposed Canadian regulation include more groups of workers than the OSHA regulation. If a recent court ruling is upheld [*22,31*], there may come into being numerous state standards regulating the other industries not specified in the OSHA regulation. In addition, many of the issues of concern such as community right to know, trade secrets, coverage of nonmanufacturing industries, will likely be used in tort litigation to establish judicial standards in these areas [*24*]. There is pressure to amend the OSHA standard to cover the other SIC codes [*17,29,31*]. As a result of a court decision [*20*], OSHA is intending to expand this coverage [*30*].

Trade Secrets and Proprietary Information

Critics of the standard are concerned that the law is overly protective of trade secrets at the expense of worker protection [*9,18*]. Trade secrets are defined more broadly than in many state right-to-know laws [*24*]. Industry is concerned that there is a fundamental shift from information on the material's hazards to emphasis on its chemical identity [*21*]. Industry can withhold the identity of hazardous ingredients if they can support the trade secret claim. Labor maintains that without knowing the identity of the hazardous material they have been denied the right to independently assess the hazards to workers using that material. This issue is linked to the issue of right to know versus need to know and the issue of responsibility for defining the hazards just discussed. The overly protective use of trade secret rights denies some the right to know and limits checks and balances in the independent assessment of hazards that the employer may wish to make.

Industry does have a need and a legal right to protect bona fide trade secrets [*8*]. Industry and OSHA have argued that the law does provide for use of trade secret information to certain professionals where it is truly needed. Physicians can obtain this information in emergencies, and health and safety professionals have legal means to access the information where chemical identity is necessary to protect the worker. The law limits workers' access to this information.

Critics have argued that there are really very few true trade secrets regarding chemical identities of mixtures. They feel that industry can use this OSHA

provision to conceal information that may not be considered bona fide trade secrets. A large number of manufacturers give composition information freely on their MSDS; it is required on labels of food, pharmaceuticals, pesticides, and other consumer products. In addition, composition of many products can be analyzed by a good analytical chemist although such analyses may be expensive and not practical. Generally what needs to be confidential is not always the identity of components but the process used to make that product. In addition, patent laws provide the legal means to halt copying of patented products. The law, however, is protective of trade secrets, and free flow of this information by many industries is not likely.

Of greater concern is the policy of some industries to classify toxicological data as proprietary information. I have had experiences of not being able to freely get copies of toxicity studies from certain industries for independent assessment of hazards. One major chemical company would not disclose details regarding experimental protocols and the number of rats used in their experiments. As long as they used "standard toxicology procedures" and gave you the LD50 results, they claimed that was sufficient. Some industries may feel that this information may come back to haunt them. Even the federal government, particularly the Defense Department, is known to classify some toxicity data. Even obtaining unclassified data may require time to cut the red tape. With the OSHA standard requiring hazard assessments based on sound scientific data, one may have a legal basis for freeing some of this proprietary data without resorting to freedom of information procedures.

Community Right to Know

In the third section, community right to know was presented and discussed. To what extent does hazard communication extend beyond the gates of the plant? The mission of OSHA is clear on this issue. Community right to know is not under their jurisdiction. However, a recent court ruling appears to preempt state community right-to-know laws in SIC Codes 20–39, if they are included as part of the worker right-to-know law [*22,23*]. Passage of separate state community right-to-know laws would not likely be affected by federal jurisdictions. As was mentioned in the introduction, the incident in Bhopal has focused interest on community rights to know. To what extent the New Jersey law or similar laws will serve as a model for other states remains to be seen. One can see various needs for informing police, fire departments, emergency response teams, local health departments, zoning boards, and even realtors and home owners of potential hazards to the community from industries using, storing, or disposing of significant amounts of hazardous materials. Some corporations have cooperated voluntarily on this issue.

Although there is some congressional initiatives for community right to know, restraint of trade would not be a significant factor that would promote federal standardization of state and local laws. The community issues are not generally

concerned with container labels or MSDSs but rather with on-site inventories of significant amounts of hazardous materials and the potential for accidents and environmental contamination that would affect community health and property. Most of the issues are local and involve municipal, town, or county jurisdictions. In the future, national corporations will likely have to deal with proliferation of various state and local community right-to-know laws. Some aspects of community right to know, however, may be incorporated into existing federal legislation such as the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental, Response, Compensation and Liability Act (CERCLA, i.e. Superfund). These proposals could be modeled after some aspects of New Jersey's right to know law.

Preemptive Issues and State Responsibility

As was discussed in the third section, this new OSHA regulation is unlike many other OSHA and environmental protection standards in that it preempts the states' rights to formulate stricter standards. Many state laws provide greater protection to the worker by covering more industries and materials and having stricter disclosure requirements [*26*]. Each state must have a federally approved plan that will be as strict as OSHA's but will not unduly burden interstate commerce. A New Jersey court decision on 3 Jan. 1985 ruled that OSHA does have preemption rights claimed in the standard, but that this only applies to the SIC Codes 20 thru 39 [*22,23*]. States, however, have the right to regulate those industries not covered by the standard and can promulgate community right-to-know laws as long as they are not linked to the worker right to know laws preempted by the federal Hazard Communication standard [*23,31*]. As pointed out by R. Stone during this symposium, one of the major concerns of states that have existing right-to-know laws is that workers who are now protected do not lose those rights under the federal standard. Also, OSHA exempts several materials such as pesticides, now included in some state right-to-know laws.

One of the primary incentives for passing the federal Hazard Communication regulations and its preemptive clause was the burden to interstate commerce from conflicting labeling requirements [*8*]. T. F. Evans from Monsanto discussed, in the panel discussion in the third section, the problems that have arisen and will continue to proliferate if the various state laws on labeling are upheld by the courts. Each industry will have to decide for itself if it should standardize all its labels to comply with a few differing state requirements or if they should just issue supplementary stickers for containers shipped to those states.

The states may continue to have a free hand in formulating state right-to-know laws for other SIC Codes that will cover industries such as construction, exploration and mining, research and development laboratories, transportation, communications, and the wholesale/retail business. Some materials and procedures in these industries may be preempted by the OSHA standard under its exemptions for transportation regulations, pesticides, and consumer products.

Most manufacturing industries are linked through supply of materials, corporate ownerships, contractual arrangements or economic forces to service, construction, research, and wholesale businesses. Any state regulation of these businesses will undoubtedly "trickle up" to the manufacturing industries covered by OSHA. In serving those businesses, some industries may have to comply voluntarily with the demands of those sectors regulated by various and inconsistent state laws. Certainly those industries and services not currently covered by OSHA will certainly feel the need for some federal standardization, particularly if they do business in several states. The cost of not having a federal standard covering them may be far greater than having one.

The rights of the states to formulate stricter regulations as they can with other OSHA regulations and EPA regulations is a key states rights issue that will continue to be fought in the courts. However, unlike regulating workplace exposures and safety practices or emissions from a plant, MSDSs and particularly labeling requirements have a direct impact on interstate commerce according to views expressed by industry representatives in the second and third sections. It is interesting that these two concerns, which have not been of concern to OSHA administrators in the past, have been delegated to OSHA through the Office of Management and Budget (OMB). It is by these arguments that OSHA has been able to preempt stricter state right-to-know laws. Many of these pitfalls seem to be avoided in Canada by bringing together the federal and provincial agencies with industry representatives. Therefore, differences are being worked out before a federal law is passed.

Impact of the Standard

Opponents and proponents of OSHA's requirements generally agree that this regulation will have far-ranging impacts. If the OSHA regulation is upheld by the courts with regard to the issues presented in this symposium, then it will indeed make a historical mark for OSHA on several accounts.

1. Using criteria of interstate commerce and economic impacts for inclusion and exclusion of groups of workers to be protected.
2. Preemption of stricter state regulations.
3. Granting the legal right to know to only a limited group of workers.
4. Promulgation of requirements for protection of industry trade secrets.
5. Promulgation of a regulation that is performance oriented.
6. Delegating to industry the responsibility to define and describe hazards of materials they produce.

Specific requirements related to these issues are changing as a result of court decisions. The issues related to trade secrets have been modified, and the inclusion of others' rights to access this information has been expanded [*29,31*]. Expansion of the scope to cover other industries is also being amended by OSHA [*30*].

Cost-effective issues influenced the scope of the OSHA requirements. The burden of state laws on interstate commerce is and will continue to be tested in the courts. Economic effects of the standard may have been underestimated. According to Dow Chemical Co. [*26*], costs could exceed $1 billion compared to the $604 million estimated by OSHA. Neither of these figures consider added costs if strict preemption is not applied to the states. State requirements, particularly in the nonregulated SIC code industries, will add to the costs of hazard communication. Many companies will likely go beyond the specific requirements of OSHA in order to minimize the risks of tort liability, and this will certainly add to costs.

As a result of this standard more information will become available to more workers and health and safety professionals than ever before. Although it legally covers specific industries and limits disclosure of information for certain materials to certain people, labor has a strong foot in the door to obtain further worker protection. Court cases involving toxic materials are increasing [*27*]. As several panelists in this symposium stated, tort liability will likely be a significant force influencing free flow of needed information. The requirements for training and the communication of chemical hazards will likely redirect current efforts of health and safety professionals [*7*].

Finally, the general acceptance of performance criteria will likely change a practice of OSHA enforcement using specification rules and inspections to a more response-oriented and flexible enforcement. The responsibility for characterizing hazards is now industry's responsibility. Noncompliance with these performance criteria will likely be enforced by petitioning OSHA or by suing the suppliers of faulty information. There will likely be a degree of nonstandardized labeling and MSDS practices. To the extent that industries will need more specific standards, the OSHA regulation can be modified or voluntary consensus standards can be developed by standard-setting organizations.

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