Chemical Catastrophe

A Practical Guide To Prevention and Preparation

by Paul J. Schumacher, Jr. and Elena N. Lougovskaia

On April 25, 2002, an explosion in a downtown Manhattan commercial building injured 36 people and caused extensive damage to the building and the surrounding area. Kaltech Industries Group, a commercial sign manufacturer, used hazardous chemicals in the basement of its building to etch and clean metal signs. The spent etching solution was placed in 15-gallon plastic carboys for storage. Some of the carboys also contained residues of lacquer thinner. On the day of the accident, employees of Kaltech were consolidating various containers of liquid waste for off-site shipment. Employees had pumped several of the 15-gallon carboys into a larger, 55-gallon plastic drum. Moments after transferring the contents of an unmarked metal 15-gallon container into the drum, a vigorous chemical reaction began inside the drum. Workers described a hissing noise followed by a fiery explosion that rocked the building and caused the extensive building damage, fire and multiple injuries. *See* Kaltech Investigation Information Page, at http:/www.csb.gov.

Investigators later found the metal carboy and tested the residue. It was determined to be nitric acid, a strong oxidizer and corrosive that is incompatible with most organic solvents. Since lacquer thinner contains flammable chemicals like toluene and acetone, a spontaneous chemical reaction occurred, generating heat and gas. The owners and operators of Kaltech could find no records of having purchased any nitric acid. Since it can, however, be used in some metal etching operations, the government investigators concluded that it had likely been obtained many years prior. But because it was stored in an unmarked container, employees were unable to determine that it contained incompatible chemicals. *Id.*

Kaltech was cited for 36 OSHA violations after this incident, including the failure to properly label chemicals and hazardous wastes, failure to provide formal employee training, and improper storage of materials, resulting in thousands of dollars in fines. Kaltech had never been inspected by OSHA before the incident, and it had never been inspected by the state environmental authorities.

Many small manufacturing clients falsely assume that major catastrophic events happen to industrial giants. To the contrary, many of the catastrophic chemical accidents occur at relatively small facilities like Kaltech. Perhaps due to this misconception, or for other unknown reasons, the level of knowledge and preparation varies from client to client and is typically dependent on the size of production. A catastrophic explosion, fire or release of toxic chemicals, however, will not discriminate based on the company's size or its level of sophistication. Therefore, even small- and medium-sized operations will benefit from prospective counseling, thorough hazard assessment, and careful preparation for such events. Practitioners' advice to their clients should extend beyond traditional regulatory compliance. As this article demonstrates, the key to a successful preventive program is a thorough analytical process guided by past experiences, outside non-binding recommendations, full knowledge and understanding of the production processes and hazards at the workplace, and careful steps to eliminate or minimize those hazards. Counsel consulting with any business that handles, uses or stores chemicals in the workplace should start with the following basics.

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Comprehensive Hazard Assessment

Identifying Hazardous Chemicals at the Workplace

The natural starting point for any analysis of the potential for a chemical catastrophe is an analysis of the hazardous chemicals used or stored at the client's facility. The most important development in the OSHA standards was the passage of the Hazard Communication Standards (HAZCOM) in 1985.29 C.F.R. §1910.1200 (2004). The HAZCOM law requires that the manufacturer and supplier of a chemical must provide material safety data sheets (MSDS) and appropriate container labeling for hazardous products. As a result, this information is now readily available at most workplaces.

The first step in managing chemical hazards should be a careful analysis of the hazardous chemicals known to be present at the workplace. The OSHA mandated written hazard communication program should be available and a list of chemicals used in the workplace or at individual work stations should be reviewed. *See* 29 C.F.R. §1910.1200(e)(1) (2004). The same chemicals found on the list of hazardous chemicals should match up to appropriate MSDS for the materials used or stored at the facility. Chemicals must be evaluated under OSHA's HAZCOM law to determine if they are "hazardous." 29C.F.R. §1910.1200-(b)(1) (2004). Any chemical that is either a "physical hazard" or a "health hazard" is considered a "hazardous chemical." If the intended conditions of the use of a chemical can be expected to involve hazards of elevated temperatures or pressures that may result in the release or creation of another hazardous chemical, those hazards must also be included in the MSDS. *See* ANSI Z400.1-1988 *Hazardous Industrial Chemicals–Material Safety Data Sheets–Preparation.* In addition to the MSDS for a particular material, a review of technical bulletins, labels, instructions for use and industry publications concerning the chemical or material should be reviewed.

The analysis of the information provided by the chemical manufacturers is the beginning, not the end, of the analysis. The next step involves a careful analysis of the specific applications and processes in which chemicals are used in the particular work environment--information to which manufacturers and suppliers are not privy. Some scrutiny of the manner in which the company uses, handles and stores the chemicals is part of a formal process safety management program that will be discussed in more detail later in this article.

Assessing Hazardous Processes at the Workplace

Of course, trying to predict a hazardous situation for each chemical or mixture of chemicals used in the workplace is not a certain science. Evaluation of the risks requires an identification of the hazard, and also an assessment of the hazard in terms of its nature and its likelihood. In many instances, a walk-through of the plant is a good starting point because some potentially hazardous areas can be identified visually. Operations that create varying degrees of heat, dust or fumes should be the natural points of interest.

A clear understanding of the work processes and operations is critical to an accurate analysis and identification of potential hazards. Interviews with operators, supervisors and maintenance employees will reveal details that will assist in recognizing the typical hazards presented during normal operation as well as atypical situations. While this analytical work can and should be done by outside consultants or those familiar with the operations, an attorney who has a working knowledge of these processes can provide much better counsel when something does go wrong.

A review of historical documents is also warranted. Prior accident or near-miss reports provide a valuable tool for better understanding of the types of mishaps and dangerous situations that may arise in the future. Equipment maintenance records may reveal chronic problem areas or a potential for future failure. Government hazardous waste permits and environmental reports of emissions may provide clues to future mishaps. Finally, a check of the OSHA website (http://www.osha.gov) can assist in determining if the business has had prior inspections or citations. The website is also useful for research into similar industries. Searching by standard industrial classifications, or SIC codes, can reveal businesses in a similar industry and the violations for which they have been cited. All of these sources of historical documentation should be reviewed with an eye toward identifying the potential for a major incident.

The hazards of the particular process must be identified and the necessary safeguards set forth.

Effective Hazard Communication and Training

Lack of proper employee training is a common theme in the root causes of many chemical catastrophes. In the Kaltech explosion, for instance, the lack of chemical hazard identification, the corresponding training program, and the lack of an EPA-compliant waste management program were identified as the root causes of the explosion. Effective hazard communication and training of employees will ensure implementation and enforcement of the company's final hazard control program.

In addition to the labeling and MSDS requirements, the OSHA Hazard Communication Standard also establishes a responsibility for training workers on the dangerous chemicals used in the workplace. 29 C.F.R.§1910.1200(h) (2004). Employees must be trained before they begin working with a hazardous chemical or whenever a new hazardous chemical is introduced to the work area. This training is required to provide effective information concerning the methods for detecting the release of a hazardous chemical, the physical and health hazards of that chemical, and the measures that the employees can take to protect themselves from such hazards. Training is also required on the labeling and MSDS system and on appropriate work practices and emergency procedures. A review of the written

HAZCOM plan and an audit of its effectiveness is an essential first step in preventing chemical hazards in the workplace. Employee training should also include education about job-specific hazards, as well as the general hazards associated with the use, handling, or storage of the hazardous materials specific to their workplace. Although standardized training about universal safety concepts is cost-effective and mandatory, it only serves as a foundation for more detailed training about specific hazards and processes at the workplace. A comprehensive training program will ensure the company's effective implementation of safety policies and procedures. Without effective communication and enforcement, safety rules, no matter how adequate, are useless at the workplace.

Process Safety Regulations

There are a variety of legal requirements and regulations that apply to chemicals known as "highly hazardous" chemicals, including reactive chemicals. In the aftermath of Union Carbide's Bhopal, India tragedy in 1984, the government became concerned about the potential for a similar chemical catastrophe at a U.S. chemical plant. In 1992,OSHA promulgated its Process Safety Management (PSM) Standard. 29 C.F.R. §1910.119 (2004). Basically, the PSM Standard is designed to assist employers in minimizing the consequences of catastrophic releases of "highly hazardous" chemicals, including toxic, flammable, highly reactive and explosive substances. OSHA relied on sources like the NFPAs Hazardous Chemical Data (NFPA 49, 1975) to develop its list of "highly hazardous" chemicals. For a list of these chemicals see 29 C.F.R. §1910.119 app.A (2004). If the process, use, storage, handling or manufacturing of such chemicals is above the threshold limits set forth in the appendix, then a PSM is required.

Although the standard currently regulates 137 chemicals and substances with toxic, explosive or reactive properties, some have criticized it as too narrow since there are literally thousands of potentially dangerous chemicals used in industry. The Chemical Abstracts Service (CAS) lists more than eight million chemicals and more than 235,000 substances that are regulated around the world. *See* http://www.cas.org/. Moreover, the OSHA list has not been updated since the standard was originally issued in 1992. 57 Fed. Reg. 7847. Recently, the PSM Standard has come under additional criticism because it fails to include many highly reactive chemicals, some of which have been involved in recent fatal explosions, fires and incidents. Indeed, the U.S. Chemical Safety and Hazard Investigation Board's (CSB) report, Improving Reactive Hazard Management (Report No. 2001-01-H), asserts that over half of the 167 accidents that it reviewed involved chemicals that were not covered by OSHA's PSM standard. OSHA has responded with some initiatives, but industry pressures have prevented any updates.

The PSM Standard is a performance standard that requires the workplace to follow a 14-step safety program. One portion of that standard requires the employer to conduct a process hazard analysis, which OSHA defines as "an organized and systematic effort to identify and analyze the significance of potential hazards associated with the processing or handling of highly hazardous chemicals." The hazards of the particular process must be identified and the necessary safeguards set forth. It is the failure to conduct a process hazard assessment that has been identified by the CSB as a root cause of many of the serious incidents they have investigated. *See* CSB Completed Investigative Reports at http://www.csb.gov/. Regardless of whether the particular chemicals are listed, it is a good practice to recommend the voluntary development of PSMs or other industry-specific process hazard analyses to companies that use chemicals in any significant quantities.

In 1996, the EPA promulgated its Accidental Release Prevention Requirements: Risk Management Programs (RMP). 40 C.F.R. §68 (2004). In this standard, the EPA identified covered substances based on toxicity and flammability, but not chemical reactivity. The law requires that for each process that uses the listed chemicals, there must be a hazard assessment, a prevention program and an emergency response program. The hazard assessment must evaluate the past accidental releases of regulated substances, including a five-year history of accidents involving the process above the threshold amounts. It must include an off-site consequence analysis that includes a worst case scenario. This means that the business must consider the off-site consequences of a release of the largest quantity of the substance from a vessel, or for flammables, a vapor cloud explosion. 40 C.F.R. §68.3 (2004). As noted, a related prevention program designed to prevent accidental releases and an emergency response program if one occurs, are also to be submitted in the written RMP documents. The development of these documents can be problematic for companies, especially after an incident occurs. Nonetheless, they are required under the regulations.

In many ways, the RMP requirements include the same basic elements of OSHA's PSM Standard. The major difference is that the PSM Standard applies to the workplace and employees, while the RMP program also requires a hazard assessment that

considers the off-site consequences of an accident. The RMP reports, as noted above, are required to be submitted to the CSB and also to local and state emergency response teams. The two lists of applicable chemicals are fairly similar, but the EPA's list contains more toxic chemicals, but not as many flammables and explosives, and the EPA's list does not cover reactive chemicals.

In addition to these government-mandated programs, several industry groups have published chemical process safety guidelines, many tailored to particular industries. For example, the American Institute of Chemical Engineers (AIChE), the American Chemistry Council (ACC), and the National Association of Chemical Distributors (NACD), each have standards that should be reviewed, especially if your client is a member of the organization. Following the Bhopal incident, the AIChE established the Center for Chemical Process Safety (CCPS), which publishes various safe process guides for particular industries. A major criticism of the EPA and OSHA programs is that they are limited only to organizations that use, handle or store large quantities of highly hazardous chemicals. As can be observed from the CSB investigations, many tragic chemical incidents occur each year at facilities that use much smaller quantities of these chemicals. Conducting a workplace process hazard assessment in these facilities is clearly warranted and a good practice for an organization focused on prevention and safety. In contrast to the public nature of an EPA-required RMP report, counsel could seek a similar report, but without the need to release it to the government and public surrounding the plant facility. In the event an accident does occur, these programs will only assist in the defense of later claims and suits.

Environmental Reporting

Another source of information about chemicals hazards in the workplace is in the environmental reports required to be filed in most states and with the federal government. A manufacturing facility that uses over the threshold amounts of any of the more than 300 listed toxic chemicals has a duty to comply with the provisions of Title III of the 1986 Superfund Amendments and Reauthorization Act (SARA Title III). 42 U.S.C. §11014 (2000). Basically, the law requires that a MSDS for each chemical or a list of hazardous chemicals be provided to the Local Emergency Planning Commission (LEPC) and the local fire department. 42U.S.C.511021(a)(1) (2004). Notification provisions of the law also mandate that private industry notify the community immediately following any emergency releases of toxic chemicals. A list of the chemicals considered "hazardous" or "extremely hazardous" substances is also provided within the statutes. *See* 42 U.S.C. § 11004(a) (2000). The overall purpose of these regulations is to inform the public and emergency responders of the risks that may be present in the event of an accident. Despite the threat of huge penalties ($25,000 per day), however, many small companies fail to comply with these requirements. These regulations are important not merely for compliance purposes, but because they serve as a useful tool in prompt and effective management of an emergency situation.

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SARA reporting is compiled annually into one large report known as the "Toxic Release Inventory" (TRI). The plant should have a "Form R" for each listed chemical that is manufactured, processed, handled, or otherwise used in excess of the threshold levels. A review of the annual TRI for a particular facility should readily disclose amounts of particular chemicals used at a facility during the course of one year. The EPA's website currently provides the TRI reports collected through the year 2003. *See* http://www.epa.gov/tri/. While this information is useful, it is only aggregate information. Obviously, every hazardous chemical should be assessed, since even small releases of highly toxic substances can pose great risk to human health.

Another source of data that should be reviewed is any report filed with the EPA concerning any past spill or accident. Under the Resource Conservation and Recovery Act of 1976 (RCRA), the EPA promulgated extensive regulations dealing with the handling and disposal of toxic and hazardous waste. 42 U.S.C. §6901, et seq. (2004). RCRA reporting or permits will give counsel an idea of the types of chemicals or materials leaving the facility and whether they were designated as "toxic" under those regulations. Also, permits are required if more than small amounts of a hazardous waste are stored on-site. Waste generators are also required to conduct formal employee training for all personnel involved in waste disposal operations. As illustrated by the Kaltech accident, lack of formal training was one of the root causes of the fire and explosion.

In addition to government reporting, if any, an analysis of many other company documents will assist in preparing a company to avoid chemical incidents. Review contracts with licensed hazardous waste contractors to determine how much waste is being shipped off-site. Is the waste tested? Most contractors will provide such services for the waste they transport. Many will also provide employee

training about hazardous wastes and their management. Such training should be tailored to the particular operation so that it includes dangers of incompatible chemicals and wastes found at the facility.

OSHA HAZWOPER

Does the client conduct operations that involve employee exposure to hazardous waste or substances? OSHA also developed rules concerning any employees who may be involved in any hazardous waste cleanup or other operations. The OSHA "HAZWOPER" standard, 29 C.F.R. §1910.120, requires employers to develop and implement a written safety and health program for employees who are involved in hazardous waste operations. It requires extensive training for those designated to respond to hazardous waste spills or leaks or those who deal with hazardous waste. Keep in mind that any operation that can be considered the "treatment, storage or disposal" of hazardous waste is covered by this standard. 29 C.F.R. §1910.120(a)(1)(iv) (2004). The employer must also create an emergency response plan to handle emergencies before they occur. (Creation of similar emergency response plans under CERCLA will qualify. *See* 42 U.S.C. §11003 (2000).) Of course, the employer can choose to simply evacuate employees from the danger area when an emergency occurs, as long as that plan is written and so long as no employee is permitted to assist in handling the emergency. *See* 29 C.F.R. §1910.120(q)(1) (2004). In any case, the conduct of any of these hazardous waste operations on-site is another point to consider in assessing the likelihood of an unintentional release of hazardous chemicals and an ensuing crisis.

Non-Regulatory Recommendations and Guidelines

United States Chemical Safety and Hazard Investigation Board

One such useful, but seldom used, source is the United States Chemical Safety and Hazard Board. The CSB is a non-regulatory organization that investigates chemical accidents in the United States. Unlike traditional regulatory agencies such as OSHA or the EPA, the CSB's purpose is purely investigatory. The United States Congress designed the CSB to be independent of those organizations so that its investigations will, where appropriate, review the effectiveness of existing regulations and their enforcement. Following the models of the National Transportation Safety Board (NTSB) and the Department of Transportation (DOT), Congress directed that the CSB gear its investigations with a view towards prevention of future occurrences. As such, it is a valuable educational tool to practitioners and their clients.

Originally created as part of the 1990 Clean Air Act amendments, the CSB did not become operational until 1998. *See* 42 U.S.C. §4212 (2000). The CSB investigates a variety of chemical incidents resulting in death, serious injury, substantial property damage or evacuation. Although it typically investigates incidents involving extremely hazardous chemicals, it may also investigate less severe accidents. In addition, it is charged with the responsibility of reviewing the EPA-required risk management plans, submitted by the users and handlers of certain highly hazardous chemicals. *Infra.*

A review of the investigations completed by the CSB shows that it has issued numerous recommendations to government agencies, private companies, trade associations, labor unions and other interested groups. There is no obligation to adopt any of the CSB recommendations, yet they are the principal means for affecting positive change. The CSB staff also tracks each safety recommendation and makes note of satisfactory implementation. These can be found at the CSB website at http://www.csh.gov/. It is also significant that the findings of the CSB may not be used as evidence in a civil suit for damages so that the potential civil liability does not cause a chilling effect on safety improvements. 42 U.S.C.§7412(r)(6)(G) (2000).

The CSB is also authorized to conduct investigations of chemical hazards even where no accident has occurred. In those instances, it can issue a report concerning a particular chemical hazard. To date, the CSB has issued two comprehensive hazard reports. The first was concerning reactive chemicals (2002), and the second was pertaining to nitrogen asphyxiation (2003). The CSB is currently working on a third in-depth report dealing with the hazards of combustible dusts. Often, these investigations occur in response to a series of similar accidents and the board makes specific recommendations to avoid their recurrence. The recent CSB investigation into reactive chemicals, for instance, concluded that OSHA and the EPA should revise federal process safety regulations to better control these hazards. In response, in 2003, OSHA announced an initiative to address reactive chemicals, and the Center for Chemical Process Safety also took steps to develop comprehensive guidelines to improve chemical process safety management. Copies of these in-depth reports can be found at the CSB website.

The CSB must be commended in its efforts to prevent chemical catastrophes, but it is only through implementation of basic self-enforced hazard assessment programs that small and large chemical manufacturers and

users of chemicals can control their exposure and liability for such incidents.

Liability Insurance

A final area that counsel should consider is the adequacy of insurance liability and building insurance coverage. Although beyond the scope of this article, it is obvious that proper insurance planning is an essential for proper protection in the event of an occurrence. Annual policy reviews by a professional insurance broker or agent are recommended. As can be seen by some of the real case examples, a catastrophic chemical accident can result in unlimited potential liability.

When reviewing insurance, consider underwriting guidelines or loss control audits conducted by the carrier. Often, a liability insurance carrier will conduct underwriting or loss control audits of a facility. These audits are sometimes made in accordance with an insurance industry protocol or standard. Large liability insurance carriers publish guidelines and standards on topics such as fire protection and sprinkler equipment, material storage, ventilation systems and a host of other topics. Review and analysis of these outside source documents may reveal additional areas of concern.

Preparing for an Accident

Despite careful review of chemical use and processes in a plant, adherence to government regulations and industry standards, accidents may still occur. Resulting risks and liability to your client can still be minimized with proper emergency and disaster planning. What is the role of counsel once a chemical accident occurs? As some commentators have noted, in the moments after a serious incident has occurred, the natural reactions of legal counsel is typically risk avoidance. In an emergency, however, decisions must be made promptly and may involve a high degree of potential legal liability. In these times, the attorney is often seen as an impediment to rapid and quick decision making. *See* Roger A. Nowadsky, *Lawyering Your Municipality through a Natural Disaster or Emergency*, 27 Urb. Law. 9 (1995). If counsel is to have an effective role in dealing with the events following an accident, however, they must be involved in the preparations and planning efforts before the accident occurs. Familiarity with the plant, its planning for disasters and emergencies and the legal requirements will make you an asset to your client in times of crisis.

Conclusion

Prospective counseling of industrial clients who use, handle or store chemicals is an important step in preventing chemical accidents. Counsel should encourage clients to conduct a comprehensive hazard analysis and they should ensure compliance and familiarity with governmental regulations. Counsel should also become familiar with insurance and risk management planning and emergency response plans. In this way, if disaster does strike, the defense will be ready to meet it. FTD