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Chemical Accident Prevention: Site Security

The Environmental Protection Agency (EPA) is issuing this *Alert* as part of its ongoing effort to protect human health and the environment by preventing chemical accidents. EPA is striving to learn the causes and contributing factors associated with chemical accidents and to prevent their recurrence. Major chemical accidents cannot be prevented solely through regulatory requirements. Rather, understanding the fundamental root causes, widely disseminating the lessons learned, and integrating these lessons learned into safe operations are also required. EPA publishes *Alerts* to increase awareness of possible hazards. It is important that facilities, SERCs, LEPCs, emergency responders, and others review this information and take appropriate steps to minimize risk. This document does not substitute for EPA's regulations, nor is it a regulation itself. It cannot and does not impose legally binding requirements on EPA, states, or the regulated community, and the measures it describes may not apply to a particular situation based upon circumstances. This guidance does not represent final agency action and may change in the future, as appropriate.

CHEMICAL SAFETY ALERT

PROBLEM

Facilities that handle chemicals are actively engaged in managing risks to ensure the safety of their workers and the community. Most of their efforts focus on ensuring that the facility is designed and operated safely on a day-to-day basis, using well-designed equipment, preventive maintenance, up-to-date operating procedures, and well-trained staff. Because of today's increased concern about terrorism and sabotage, companies are also paying increased attention to the physical security of facility sites, chemical storage areas, and chemical processes. All companies, big and small, should have some measure of site security in place to minimize crime and to protect company assets. This is especially true for facilities that handle extremely hazardous substances.

Under section 112(r) of the Clean Air Act (CAA), EPA developed Risk Management Program (RMP) regulations that require facilities to examine their chemical accident risk and develop a plan to address it. The increased concern for the physical security of facilities that handle extremely hazardous substances is also reflected in recent government actions. Highlighting site security, the Chemical Safety Information, Site Security and Fuels Regulatory Relief Act contains a major provision that requires the Department of Justice to prepare reports to be submitted to Congress describing the effectiveness of RMP regulations in reducing the risk of criminally caused releases, the vulnerability of facilities to criminal and terrorist activity, and the security of transportation of listed toxic and flammable substances.

This *Alert* is intended as a public service. It highlights security areas that companies may want to review to ensure that appropriate measures are being implemented. More importantly, it provides sources of information and help to assist facilities that routinely handle chemical substances in their efforts to have secure and accident-free operations.

EXAMPLES

The following examples illustrate the range of damage that can occur at facilities handling hazardous substances because of criminal activity:

- A manufacturer uses flammable naphthalene to produce mothballs. Received in molten form, the naphthalene solidifies when cooled and looks similar to candle wax. Trespassing teenagers found the vats of naphthalene that were left outside to cool. They ignited the naphthalene and started an uncontrollable fire. Approximately 40 acres of industrial property burned, at an estimated cost of $100 million.

- Every few weeks, EPA receives reports that thieves, looking for ammonia to use to make illegal drugs, have broken into fertilizer dealers, refrigerated warehouses, or ice manufacturing facilities, frequently leaving valves open. In some cases, the thieves have been overcome by the ammonia and needed to be rescued; in other cases, the community has been evacuated, and there have been injuries to the general public and to law enforcement personnel from exposures to the released ammonia.

- There are cases where vandals have attempted unsuccessfully to break into chlorine tank cars. Fortunately, the design of the chlorine tank car includes a heavy steel dome and additional lock out devices that discourage even well-equipped vandals.

These examples illustrate the need to examine security measures at a facility, especially those handling highly hazardous substances, to guard against criminal acts, including vandalism.

AREAS OF CONCERN

Threats may come in different forms and from different sources. Threats from outside the facility could affect people and the facility itself, and may involve trespassing, unauthorized entry, theft, burglary, vandalism, bomb threats, or terrorism.

Threats from inside the facility may arise from inadequate designs, management systems, staffing or training, or other internal problems. These may include theft, substance abuse, sabotage, disgruntled employee or contractor actions, and workplace violence, among others.

Threats are not restricted to people and property, but could also involve sensitive facility information. Both facility outsiders and employees or contractors could pose threats to data storage and data transmission of, for example, confidential information, privacy data, and contract information. They could also pose a threat to computer-controlled equipment. These threats may include breaches in data access and storage, uncontrolled dissemination of information, destruction of information or threats to automated information systems.

COMMON SECURITY MEASURES

Most security measures are intended to prevent intruders from gaining access to the site or to limit damage. The following sections present a number of design and procedural approaches that facilities have successfully implemented. The appropriateness of any one of these depends on site-specific conditions that you would need to consider in assessing any security needs for your facility.

PREVENTING INTRUSION

Most facilities have some measures that are intended to prevent intruders from entering the grounds or buildings. These measures may include fences, walls, locked doors, or alarm systems. The location of the facilities and the types of structures will determine how much and what type of protection a facility needs.

In addition to basic measures, some facilities also provide physical protection of site utilities at the

fence perimeter. Security lighting (good lighting around buildings, storage tanks, and storage areas) can also make it very difficult for someone to enter the facility undetected.

Some facilities augment these measures with intrusion detection systems — video surveillance, security guards at fixed posts, rounds/mobile patrols, alarm stations, and detectors for explosives and metal. If you have guards, it may be useful to consider their training in detection and response and the availability to them of equipment for appropriate protective force.

To protect against unauthorized people coming in through normal entrances, security clearances, badges, procedures for daily activities and abnormal conditions, as well as vehicular and pedestrian traffic control, can provide efficient access for employees while ensuring that any visitors are checked and cleared before entering.

Most facilities have procedures to recover keys from employees who leave and to immediately remove the employee's security codes from systems. At times it may be wise to consider additional measures, such as changing locks, when a disgruntled employee leaves.

LIMITING DAMAGE

In addition to protecting a facility from intruders, it is important to limit the damage that an intruder (whether physically at the site or "hacking" into the company's computers) or an employee could do. Most of the steps to limit damage are probably things you already do as part of good process safety management, because they also limit the loss of chemicals if management systems or equipment fails or an operator makes a mistake. These steps can be related to either the design of the facility and its processes or to procedures implemented.

Facility Design

A well-designed facility, by its layout, limits the possibility that equipment will be damaged and, by its process design, limits the quantity of chemical that could be released. Facility and process design (including chemicals used) determine the need for safety equipment, site security, buffer zones, and mitigation planning. Eliminating or attenuating to the extent practicable any hazardous characteristic during facility or process design is generally preferable to simply adding on safety equipment or security measures.

The option of locating processes with hazardous chemicals in the center of a facility can thwart intruders and vandals who remain outside the facility fenceline. Transportation vehicles, which are usually placarded to identify the contents, may be particularly vulnerable to attack if left near the fenceline or unprotected. However, for some facilities and processes, the option of locating the entire process at the center of the site may not be feasible. You may need to consider external versus internal threats, such as the threat to workers if an accidental release occurs, or the access to the process in case of an emergency response.

Where feasible, providing layers of security will protect equipment from damage. These layers could include, for example, blast resistant buildings or structures. Enclosing critical valves and pumps (behind fences or in buildings) can make it less likely that an intruder will be able to reach them, a vehicle will be able to collide with them, or that releases are compounded because of damage to neighboring equipment.

Chlorine tanker valves are an example of equipment design with several layers of security: (1) a heavy steel dome with lid; (2) a heavy cable sealing system that requires cable cutters to

remove; (3) a heavy duty valve that can withstand abuse without leaking; and (4) a seal plug in each valve. As many as three different tools would be needed to breach the container's integrity.

If equipment is located where cars, trucks, forklifts, or construction equipment could collide with it or drop something on it, the equipment should be constructed from materials that could stand some abuse. In general, you should give consideration to collision protection to any equipment containing hazardous chemicals with, for example, collision barriers.

The idea of layers of security may also be applied to communications/computer security. Some companies have developed alternate capabilities and systems to protect receipt and transmission of confidential information. Backup power systems and/or conditioning systems can be important, particularly if processes are computer controlled. Access to computer systems used to control processes may need to be controlled so that unauthorized users cannot break in; appropriate computer authentication and authorization mechanisms on all computer systems and remote access may prove useful; entrance into control rooms may need to be monitored and limited to authorized personnel. For emergency communications, some companies use radios and cell phones as a backup to the regular phone system.

Well-designed equipment will usually limit the loss of materials if part of a process fails. Excess flow check valves, for example, will stop flow from an opened valve if the design flow rate is exceeded. These valves are commonly installed on chlorine tankcars and some anhydrous ammonia trailers, as well as on many chemical processes. Like excess flow valves, fail-safe systems can ensure that if a release occurs, the valves in the system will close, shutting off the flow. Breakaway couplings, for example, shut off flow in transfer systems, such as loading hoses, to limit the amount released to the quantity in the hose.

If you store hazardous liquids, you may want to consider containment systems (e.g., buildings, dikes, and trenches) that can slow the rate at which the chemical evaporates and provide time to respond. Double-walled vessels can also protect against attempts to rupture a tank.

The installation of chemical monitors that automatically notify personnel of off-hour releases could be important if your facility is not staffed during certain periods (e.g., overnight). Such monitors, however, are not available for all chemicals. The appropriateness of monitors, and any other equipment design solutions, will depend on site-specific conditions.

Procedures and Policies

Your facility's policies and procedures can also limit the damage caused by a release. As with design issues, the procedural steps you routinely take to operate safely also help protect your facility from attacks. Maintaining good labor relations may protect your facility from actions by either employees or contractors. Open negotiations, workplace policies emphasizing that violence and substance abuse are not tolerated, and adequate training and resources to support these policies are important considerations. The goal is to develop a workforce and management capacity to identify and solve problems by working together. Following are several examples of specific areas where procedures and policies can prevent or limit the damage of a release.

As a matter of good practice, as well as site security, you may consider disconnecting storage tanks and delivery vehicles from connecting

piping, transfer hoses, or distribution systems when not in use. Leaving the tanks linked to the process or pipeline increases the chance of a release because the hoses or pipes are often more vulnerable than the tanks.

In addition to accurately monitoring your inventory, another practice you may want to adopt is limiting the inventory of hazardous materials to the minimum you need for your process. This policy limits the quantity of a hazardous material that could be released. You could also consider actions such as substituting less hazardous substances when possible to make processes inherently safer.

Your written procedures are also an important tool in protecting your facility. As part of your regular operating procedures, you probably have emergency shutdown procedures. These procedures, and workers trained in their use, can limit the quantity released. The procedures are particularly important if you have processes that operate under extreme conditions (high or low pressures, temperature) where rapid shutdown can create further hazards if done improperly.

As you review your contingency plan, consider, if necessary, revisions to address vandalism, bomb threats, burglary - including evaluating the desirability of your facility as a target - working with local law enforcement, and providing extra security drills and audits. Many companies find that working with local law enforcement is an effective means of evaluating security risks.

As a matter of good practice, for both process and response equipment, it is important to have a program that ensures that all equipment is subject to inspection and to corrective and preventive maintenance. In this way, you can be sure that the safety systems you install will operate as designed.

SITE-SPECIFIC DECISIONS

The steps you take to operate safely will often serve to address security concerns as well. Considering inherent safety in the design and operation of any facility will have the benefit of helping to prevent and/or minimize the consequences of any release. Before taking steps to improve site security, you may want to evaluate your current system and determine whether it is adequate. Factors you might consider include:

- The chemicals stored at your site; some chemicals may be particularly attractive targets because of the potential for greater consequences if released.

- The location of the site; sites in densely populated areas may need more security than those at a distance from populations.

- The accessibility of the site; are the existing security systems (e.g., fences, security lighting, security patrols) adequate to limit access to the site?

- The age and type of buildings; older buildings may be more vulnerable because they have more windows; some newer building are designed for easy access.

- Hours of operation; a facility that operates 24-hours day may need less security than a facility that is unoccupied at night.

Decisions about improving site security should be made after evaluating how vulnerable your site is to threats and what additional measures, if any, are appropriate to reduce your vulnerability. Each facility should make its own decision based on its circumstances.

IT IS YOUR DUTY

If you produce, process, handle, or store extremely hazardous substances you have, under the Clean Air section 112(r)(1), a general duty "to identify hazards which may result from such releases, using appropriate hazard assessment techniques, to design and maintain a safe facility taking such steps as are necessary to prevent releases, and to minimize the consequences of accidental releases which do occur."

INFORMATION SOURCES

Several organizations (e.g., ASTM, ANSI) have standards for site security or include site security issues in their codes. The National Fire Protection Association (NFPA) has a standard NFPA- 601, *Standard for Site Security Services for Fire Loss Prevention*. The American Petroleum Institute addresses security issues in RP 554, *Process Instrumentation and Control*. Likewise, the Chemical Manufacturers Association addresses this issue through the *Responsible Care Employee Health and Safety Code Site Security Management Practice*. Protocols developed under the Responsible Distribution Process**K** cover security concerns. You can contact the following websites for additional security information:

www.energysecuritycouncil.org
The Energy Security Council is a national industry association to assist law enforcement agencies and energy companies in combating all types of criminal activity.

www.nfpa.org
The National Fire Protection Association provides standards, research, training, and education to reduce the burden of fire and other hazards.

www.nsc.org
The National Safety Council provides general safety information on chemical and environmental issues.

www.asisonline.org
www.securitymanagement.com
The American Society for Industrial Security develops educational programs and materials that address security concerns. Its Security Management Magazine site provides an online version of its magazine.

www.siaonline.org
The Security Industry Association provides general security information.

www.atsdr.cdc.gov
The Agency for Toxic Substances and Disease Registry site provides a 10-step procedure to analyze, mitigate, and prevent public health hazards resulting from terrorism involving industrial chemicals.

www.aiche.org/ccps
The Center for Chemical Process Safety (CCPS) is an industry-driven, non-profit professional organization affiliated with the American Institute of Chemical Engineers (AIChE). It is committed to developing engineering and management practices to prevent or mitigate the consequences of catastrophic events involving the release of chemicals that could harm employees, neighbors and the environment.

www.cdc.gov/niosh
The National Institute for Occupational Safety and Health provides multiple resources on workplace violence prevention.

The Complete Manual of Corporate and Industrial Security, by Russell L. Bintliff (Prentice Hall, 1992) provides detailed discussions of the advantages and disadvantages

of various security systems as well as checklists for security inspections.

The *Handbook of Loss Prevention and Crime Prevention*, 3rd Edition, L.J. Fennelly, Ed., (Butterworth-Heinemann, 1996) includes information on conducting security surveys as well as chapters on a broad range of security subjects.

Guidelines for Investigating Chemical Process Incidents. (AIChE/CCPS). These Guidelines establish a basis for successful investigation of process incidents to determine causes and implement changes, which can prevent recurrence. Primary focus is on incidents with catastrophic potential but the concepts should also be used for investigating environmental incidents, minor injuries, less significant property damage events, or near misses.

Process Plants: A Handbook for Inherently Safer Design, by Trevor Kletz. (Taylor & Francis 1998) illustrates the principles of inherent safety and demonstrates the advantages of considering safety approaches in the design stages of a process.

Inherently Safer Chemical Processes: A Life Cycle Approach. (AIChE/CCPS) This book presents the principles and strategies for applying inherently safer thinking from the start of the life cycle to the very end.

STATUTES AND REGULATIONS

The following are a list of some federal statutes and regulations related to process safety management and accident prevention:

EPA

Clean Air Act (CAA)

- General Duty Clause [Section 112(r)(1) of the Act] - Facilities have a general duty to prevent and mitigate accidental releases of extremely hazardous substances.

- Risk Management Program (RMP) Rule [40 CFR part 68] - Facilities that have a listed toxic or flammable substance above a certain threshold are required to develop a hazard assessment, a prevention program, and an emergency response program.

Chemical Safety Information, Site Security and Fuels Regulatory Relief Act

- A major provision requires the Department of Justice to submit reports to Congress describing the effectiveness of the RMP regulations in reducing the risk of criminally caused releases, the vulnerability of facilities to criminal and terrorist activity, and the security of transportation of substances listed under CAA Section 112(r).

Emergency Planning and Community Right-to-Know Act (EPCRA)

- Emergency Planning [40 CFR part 355] - Facilities that have listed chemicals above a certain threshold must report to their Local Emergency Planning Committee (LEPC) and State Emergency Response Commission (SERC) and comply with certain requirements for emergency planning.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

- Under the authority of CERCLA, EPA's Chemical Safety Audit program examines site security as part of a standard audit protocol.

Clean Water Act (CWA) as Amended by the Oil Pollution Act of 1990 (OPA)

- Spill Prevention Control and Countermeasures Plan (SPCC) [40 CFR part 112] - Facilities storing oil above a certain threshold must

prepare and implement an SPCC plan. These plans need to address security elements such as locks, guards, access, lighting, and vandalism.

OSHA

- General Duty Clause [OSH Act section 654] - Employers are required to provide a safe workplace free of recognized hazards.

- Process Safety Management (PSM) Standard [29 CFR 1910.119] - Facilities that have a highly hazardous substance above a certain threshold are required to implement a number of actions to manage hazards including performing a process hazards analysis and maintaining mechanical integrity of equipment. External threats must be considered when conducting a process hazard analysis.

- Hazard Communication Standard [29 CFR 1910.1200] - Facilities handling hazardous chemicals must maintain information on the hazards and train employees in how to handle the chemicals safely and protect themselves if exposed.

Other OSHA regulations address some security issues for specific types of hazardous materials (e.g., flammables).

Department of Transportation

The US Department of Transportation has a number of regulations that address security at transportation terminals. These regulations can be found in Titles 14, 33, and 49 of the Code of Federal Regulations.

For More Information:
Contact the EPCRA Hotline at:
(800) 424-9346 or (703) 412-9810
TDD (800)553-7672
Monday -Friday, 9 AM to 6 PM, EST

For information on OSHA standards contact OSHA Public Information at (202) 219- 8151 or visit the website: www.osha.gov

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