A TECHNICAL PUBLICATION OF ASSE'S INDUSTRIAL HYGIENE PRACTICE SPECIALTY

THE Monitor

VOLUME 13 • NUMBER 1

Regulatory Basis for Emergency Preparedness & Response

BY MORGAN BLISS, CIH, CIE

Most employers are subject to various regulations that require businesses to prepare for (and sometimes respond to) emergencies. Most employers want to know where in the regulations it says they are legally required to do this. Following is a summary of pertinent regulations for emergency preparedness and response.

Employers must be in compliance with these requirements or their specific state plan requirements unless they fall under an exemption.

REGULATIONS

OSHA

OSHA has set standards for emergency preparedness and response that apply to most workplaces in the U.S. as described in 29 Code of Federal Regulations (CFR) 1910 (OSHA, 2013). These standards are generally required of all workplaces

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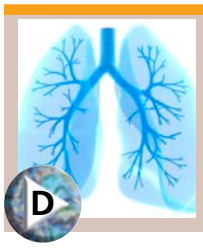

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MEMBER MESSAGE

Welcome New Members

Thanks to all Industrial Hygiene Practice Specialty (IHPS) members and welcome to these new members. IHPS now has almost 1,400 members. If you have any colleagues who might be interested in joining IHPS, please direct them to **www.asse.org/JoinGroups** for more information.

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within general industry. Employers must be in compliance with these requirements or their specific state plan requirements unless they fall under an exemption. 29 CFR 1910 includes regulations about design, construction, maintenance and safeguards of exit routes (29 CFR 1910.36 and 1910.37); provision of medical services and first aid (29 CFR 1910.151); use of portable fire extinguishers (29 CFR 1910.157); and employee alarm systems for emergency action or safe evacuation (29 CFR 1910.165).

Regulations about emergency action plans (EAP) are included in 29 CFR 1910.138—these regulations apply to employers covered by process safety management standards (29 CFR 1910.119) and hazardous waste operations and emergency response (29 CFR 1910.120). EAP regulations also apply to employers that have portable fire extinguishers (29 CFR 1910.157), employers with fixed extinguishing systems (29 CFR 1910.160) and automatic fire detection systems (29 CFR 1910.164) installed to meet a particular OSHA standard, except for employers with only automatic sprinkler systems.

Specific industries required to have an EAP include grain handling facilities (29 CFR 1910.272), industries using ethylene oxide (29 CFR 1910.1047), industries using methylenedianiline (29 CFR 1910.1050) and industries using 1,3-buatdiene (29 CFR 1910.1051).

When required, employers must prepare a written EAP. The EAP may be communicated orally if there are less than 10 employees. The minimum requirements of an EAP include:

- procedures for reporting a fire or emergency;
- procedures for emergency evacuation, including the type of evacuation (total or partial to maintain critical plant operations) and location of marked exit routes;
- procedures for employees who remain to operate critical operations prior to evacuation;
- procedures to account for employees when evacuation is complete;
- procedures and policies for employees who perform rescue and first-aid duties; and
- contact information for further information or explanation about the EAP.

Additional requirements exist for specific workplaces and handling operations. If an employer has powered platform installations permanently dedicated to interior or exterior building maintenance of a specific structure or group of structures, the employer must have an EAP.

Process Safety Management: 29 CFR 1910.119

PSM involves employers using highly hazardous chemicals in quantities equal to or greater than those listed in 1910.119 Appendix A, as well as quantities of flammable liquid or gas greater than 10,000 pounds, or if they are involved in the manufacture of explosives or pyrotechnics. PSM requires an EAP and requires an updated process hazard analysis (PHA) for each covered process every 5 years. As part of PSM, the written operating procedures for each process must incorporate emergency shutdown procedures, including identification of the person or job type responsible for the emergency action procedures.

Hazardous Waste Operations & Emergency Response: 29 CFR 1910.120

The hazardous waste operations and emergency response (HAZWOPER) standard requires employers who participate in hazardous substance cleanup activities and Resource Conservation and Recovery Act corrective actions to have a written EAP. The EAP should be an integrated part of the site-specific safety and health plan and may need to be developed with the cooperation of local, state and federal agencies. The EAP should identify the roles and responsibilities of each organization on site, as well as training requirements and required PPE.

Where to Go for Help

OSHA's Safety and Health Topics webpage for **emergency preparedness and response** has a two-page fact sheet on planning and responding to workplace emergencies (**OSHA, 2004, 2013**). OSHA has also developed an **e-tool** on emergency action plans and procedures, which helps employers determine if they need an EAP, how to write an EAP and how to evaluate the workplace for compliance with the regulations (OSHA, 2013).

OSHA has also provided an emergency action plan expert system as part of the e-tool, where employers can use a web form to create an EAP that is theoretically in compliance with OSHA regulations (OSHA, 2013). Each state may have more stringent requirements so be sure to contact local and state authorities for more information.

EPA

EPA's emergency management program was defined through a variety of existing environmental laws, including the Clean Air Act; Clean Water Act; Oil Pollution Act; Comprehensive Environmental Response, Compensation and Liability Act; Superfund Amendments and Reauthorization Act; Emergency Planning and Community Right-to-Know Act; Chemical Safety Information, Site Security and Fuels Regulatory Relief Act; and Hazardous Materials Transportation Act (EPA, 2013).

Chemical Accident Prevention Provisions: 40 CFR 68

This regulation focuses on chemical accident prevention for facilities using extremely hazardous substances as defined in Subpart F—Regulated Substances for Accidental Release Prevention or as listed in 40 CFR 68.130. It requires all employers using flammable and toxic substances defined in Subpart F of the regulation to develop a risk management program (EPA, 2013).

Subpart G: Risk Management Plan

Subpart G: Risk Management Plan (RMP) This regulation requires employers that produce, handle, process, distribute or store regulated toxic and flammable

substances (as listed in 40 CFR 68.130) above the listed threshold quantities to develop an RMP and submit it to EPA for approval. Effective 2009, EPA allows online submittal of RMPs via its RMP*eSubmit system.

An RMP must include a 5-year accident history of each site covered by the regulation and an analysis of the possible consequences of an offsite release. Another part of the RMP is the release prevention program, emergency response program and risk management plan. An RMP must also discuss methods of implementation and methods of communicating with the public (EPA, 2013).

Emergency Planning & Community Right-to-Know Act

The Emergency Planning and Community Right-to-Know Act (EPCRA) established local and state emergency planning requirements so that every community in the U.S. is part of a comprehensive emergency response plan. The act states that facilities are required to participate in the planning process if they possess and use extremely hazardous substances above the threshold requirements, as well as Tier I and II hazardous and toxic chemicals above the threshold requirements. EPCRA requires facilities to provide local, state and federal agencies a report on hazardous chemicals they store or handle, and both provide for public access to these reports.

The focus of the act is on "community right-to-know." Community right-to-know provisions allow the general public access to information on chemicals at facilities in their community, including substantial releases into the environment. The act is intended to protect both public health and environmental health. EPCRA includes sections on emergency planning, emergency release notifications and when they are required, hazardous chemical storage reporting (Tier I and II reports) and maintenance of a toxic chemical release inventory (EPA, 2013).

Where to Go for Help

EPA maintains a list of frequently asked questions (EPA, 2013). EPA has also developed a series of fact sheets and a "Basic Awareness Factsheet for Small Business" for smaller employers to determine if their operations are covered by the regulations (EPA, 1998).

U.S. Department of Homeland Security

Under Section 550 of the U.S. Department of Homeland Security (DHS) Appropriations Act of 2007, DHS promulgated an interim final rule about antiterrorism and security regulations for high-risk chemical facilities. These high-risk chemical facilities were defined as facilities in the following industries that possess, or plan to possess, chemicals of interest (COIs) above the screening threshold quantities (STQs) listed in Appendix A of 6 CFR Part 27 (DHS, 2007):

- chemical manufacturing, storage and distribution;
- energy and utilities;
- agriculture and food;
- paints and coatings;
- explosives;
- mining;
- electronics;
- plastics; and
- healthcare.

Chemical Facility Antiterrorism Standards (CFATS)

If a facility is considered to be a high-risk facility with COIs above the STQs, DHS requires the facility to complete a chemical security assessment tool (CSAT) top-screen online assessment for review by DHS. If DHS determines the facility is subject to the CFATS regulations, DHS has developed risk-based performance standards. The subject facility will need to prepare a security vulnerability assessment to identify both physical and nonphysical vulnerabilities at each site. The facility will then develop and implement a site security plan to comply with DHS risk-based performance standards (DHS, 2013).

Where to Go for Help

DHS maintains a list of frequently asked questions. After completing the CSAT top-screen, facilities will receive the risk-based performance standards matching the level of risk to which DHS believes they belong (DHS, 2013).

U.S. Nuclear Regulatory Commission

The U.S. Nuclear Regulatory Commission's (NRC) focus on emergency preparedness is designed to evaluate whether a nuclear power plant operator can effectively implement adequate safety precautions and measures. The focus on preparedness is for normal operating conditions and a radiological emergency. NRC issues licens-

es to operators of nuclear power plants on the condition that they develop and maintain emergency preparedness plans that comply with strict NRC requirements. NRC conducts inspections of these facilities regularly to ensure that the plants are operating safely (NRC, 2013).

Guidelines & Standards

While a multitude of guidelines and standards exist for emergency preparedness and response, an employer's focus should be on the following.

National Fire Protection Association

NFPA 1600: Standard on Disaster/Emergency Management & Business Continuity Programs

NFPA 1600 is designed to help businesses "develop, implement, assess and maintain" a disaster and emergency management program using an "all-hazards" approach. The standard covers prevention of hazards, mitigation of hazards, preparedness activities, response actions, business continuity planning and recovery efforts. NFPA 1600 discusses program management, including records management, and recommends a business impact analysis.

A business impact analysis helps determine which functions or processes conducted as part of normal business operations are critical. The business impact analysis also identifies dependencies within the organization and between processes. A short list of some of the hazards that should be assessed as part of the planning prior to the business impact analysis include, but are not limited to:

- health and safety of persons in the affected area;
- continuity of operations;
- property, facilities and critical infrastructure elements; and
- regulatory and contractual obligations.

Where to Go for Help

NFPA 1600 includes Annex A, Explanatory Material, which explains what an incident management system is and includes an expanded list of hazards to be considered. Annex B, Program Development Resources, provides a list of websites and documents of interest that may be useful in developing a program. Annex C, Self-Assessment for Conformity with NFPA 1600 (2013 ed.), provides a comprehensive self-assessment guide to help employers learn the strengths and weaknesses of their emergency preparedness and business continuity programs (NFPA, 2013).

NFPA 1600 is designed to help businesses "develop, implement, assess and maintain" a disaster and emergency management program using an "all-hazards" approach.

Federal Emergency Management Administration

Incident Command System

Learn how to manage an emergency using the Federal Emergency Management Agency(FEMA) incident command system (ICS). ICS is standardized and designed for on-scene, scalable and flexible response to emergencies of all sizes. ICS sets common terminology so all facets of a response team can work together seamlessly. ICS establishes a chain-of-command and five core functional areas for response: command, operations, planning, logistics and finance/administration (FEMA, 2013).

Ready.gov

FEMA has developed Ready.gov as a one-stop-shop for business and individuals to learn more about emergency preparedness.

On the Ready.gov website, FEMA explains that it follows the "all hazards approach" and provides five steps in developing a preparedness program:

1) Program Management

a) Identify regulations with which your business must comply.

2) Planning

a) Determine the possible hazards to your business.

b) Assess the risks of those hazards.

c) Conduct a business impact analysis.

d) Evaluate how you can prevent or mitigate the hazards and therefore reduce the associated risk.

3) Implementation

a) Write a preparedness plan, making sure to cover emergency response, communications, information technology, incident management and training.

4) Testing and Exercises

a) Test your plan and evaluate how the business (including individual employees) responds.

5) Program Improvement

a) Review your plan periodically and make changes as necessary.

FEMA notes on its website that it followed recommendations from NFPA 1600 when developing guidelines for business preparedness (FEMA, 2013).

FEMA references a "Professional Practices for Business Continuity Planners" published by DRI International (2012) as a comprehensive explanation for developing a business continuity plan. FEMA also provides PDF examples of an emergency response plan and business continuity plan that can be downloaded and modified by employers (FEMA, 2013). ✪

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Industrial Hygiene Safety Professional of the Year

Pam Perrich, CIH, received the Industrial Hygiene Practice Specialty's (IHPS) 2013 Safety Professional of the Year Award at **Safety 2013** in Las Vegas, NV in June. Perrich is a past administrator and assistant administrator of IHPS. She has previously served on the Leadership Conference Task Force, Admissions Committee and Student Section/Chapter Relationship Task Force. Under her leadership as chapter president from 2004-06, the Pensacola Chapter received its first Chapter Stars recognition in 2006 and was also named the Region IV Small Chapter of the Year. She frequently writes for *The Monitor*, presents at ASSE's Professional Development and Leadership conferences and assisted in the launch of the Ergonomics Practice Specialty. Her continuous contributions to ASSE are cherished. She has also made profound contributions to the field of safety and IH through her work at the Naval Hospital Pensacola. We are honored to acknowledge her as one of our best and brightest.

BEST PRACTICE

By Bo Mitchell, CEM, CPP, CBCP, CHCM, CHSP

17 Mistakes Made in Emergency Plans

How to Avoid & Correct Them

Most organizational leaders believe their company emergency plans are state-of-the-art when, in fact, their plans are dangerously flawed. Their emergency plans do not comply with federal and state regulations, ignore many classes of personnel and rarely consider visitors. Additionally, coordination with local emergency services is nonexistent, and personnel training is haphazard and illegal. The risks to the organization are many and the exposures titanic. This article provides information for creating an emergency plan that complies with regulations and protects your people, your organization and your posterior.

Why Plan?

Risk never sleeps. Emergencies can strike any organization with a direct hit or can clobber anything within a wide path. In the past year, organizations were vulnerable to these reported emergencies:

•4.1 million workplace injuries;

•2 million incidents of workplace violence; two people are murdered every day in the workplace;

•$2.6 billion of property loss from nonresidential structure fires;

•349,500 fire department responses to hazardous material spills;

•45,000 natural and manmade disasters;

•111,500 structural fires in commercial buildings;

•3.8 million concussions per year reported to emergency rooms;

•10,000 incidents of sudden cardiac arrest at work; and

•4,690 accidental workplace deaths.

Sources: OSHA, U.S. Department of Justice, NFPA, American Red Cross, EPA

Risk always multiplies.

What is the fallout for an unprepared organization?

•78% of organizations that suffer a catastrophe without a contingency plan go out of operation within 2 years;

•90% of organizations unable to resume operations within 5 days of a disaster go out of business within 1 year.

Sources: Agility Recovery Solutions, Continuity Insights Management Conference, London Chamber of Commerce Study

Most organizational leaders believe their company emergency plans are state-of-the-art when, in fact, their plans are dangerously flawed.

Compliance Issues: The Law

OSHA regulations apply to every employer in the U.S., without exception:

•All Employers Covered: 29 CFR 1910.34(a);

•Emergency Action Plan: 29 CFR 1910.38;

•Fire Prevention Plan: 29 CFR 1910.39;

•Exit Routes: Design 29 CFR 1910.36;

•Exit Routes: Maintenance 29 CFR 1910.37;

•First Aid: 29 CFR 1910.151.

The following federal regulations may also apply to many organizations:

•Hazard Communication/MSDS: 29 CFR 1910.1200;

•Bloodborne Pathogens: 29 CFR 1910.1030;

•Spill Prevention Countermeasures and Containment (EPA): 40 CFR 112

State fire codes also apply to organizations.

Compliance Issues: The National Standard That Will Torpedo Any Defense

NFPA 1600 spells out requirements for emergency preparedness, disaster recovery and business continuity, along with drills, exercises and training.

NFPA 1600 is recognized in law as the standard by the U.S. Congress [PL 108-458,§7305(a),(b)]. This standard is law (shall) in California and Florida where 56 million residents experience and plan for earthquakes, sinkholes, wildfires, hurricanes, flooding and mudslides—and have formally done so since World War II. Their authority on planning is held high by courts everywhere.

The Fire Department of the City of New York enforces the most robust emergency planning law in the world—inspired by NFPA 1600. Standard & Poor's (S&P) uses this standard when auditing emergency, disaster recovery and business continuity to ensure resiliency. Even in states where NFPA 1600 is a "should" and not "shall," any litigator will convince jurors that those "shoulds" are expected to be "shalls." Jurors will assume that you a) knew the regulations and standards, b) gambled with life safety of your personnel, c) have deep pockets and d) need to learn a lesson that sends a message to all organizations.

Consider that when you are sued for failure to plan and failure to train, you will be asked during your deposition and at the trial, "Is it your testimony that NFPA 1600 is good enough for the U.S. Congress, California, Florida, New York City and S&P, but not good enough for you?" Organization leaders must plan accordingly.

All-Hazards Planning

One critical feature of NFPA 1600 is the need for all-hazards planning. No longer can an organization's emergency plan simply address fire. All-hazards planning means that at least these requirements and foreseeable circumstances are addressed:

- active shooter;
- all-employee training;
- assembly area;
- bomb threat;
- chemical spills;
- contractors;
- disabled (any persons with special needs, including pregnancy, a temporary disability, etc.);
- drills;
- earthquake;
- emergency response team;
- emergency shutdown;
- evacuation procedure;
- explosion;
- fire prevention strategies;
- fire risk assessment;
- flood;
- headcount procedure;
- hostage;
- mandatory evacuation;
- pipe burst;
- power failure;
- severe weather/tornado/hurricane;
- shelter in place;
- spill cleanup;
- structural failure;
- suspicious package;
- team training;
- terrorism;
- visitors;
- workplace violence.

Search for any one of these emergency situations and you will find that such an incident has occurred in an organization like yours somewhere in the U.S. in the last 12 months. None of these issues is aberrant or uncommon.

In summary, planning, training and drills must address OSHA, the state fire code and NFPA 1600.

Does Your Plan Include Any of These 17 Mistakes?

911 Consulting reviewed more than 500 emergency plans nationwide created for corporations, campuses and medical facilities, all of which had 200+ employees. Of those 500 organizations, only one was found to be OSHA-compliant.

Review of organization emergency plans reveals 17 common mistakes.

1) Plans ignore critical audiences. It is illegal to ignore emergency planning, training and drills for visitors, contractors, second and third shifts and weekend employees.

Visitors are the least likely to know your facility and the most likely to freeze, panic or incur injury during an emergency. Even worse, visitors are most likely to sue and win. Nearly all emergency plans ignore visitors regarding escort policy, evacuation, shelter in place, assembly areas, headcounts and so on.

Plans also ignore employees who work late. What procedures do they follow during an after-hours emergency? Typically, the chain of command is not around, leaving undertrained employees to supervise an undrilled evacuation, conduct a never-used headcount and report to emergency service responders.

You are responsible for the safety of multiple contractors who regularly visit your worksite to care for computers, plants, coffeemakers and so on. OSHA designates you as the "host employer." You are required to include contract personnel regarding emergency planning, training and drills.

You cannot outsource risk. You can share it by creating a contract that divides the labor of planning and training with each contractor's employer. But, in the end, you are always responsible for everyone on your premises in an emergency.

2) Headcounts are not planned or conducted. Federal law requires that all personnel must be accounted for [1910.39(c)(4)]. Therefore, you must conduct headcounts in any emergency for visitors, contractors, second and third shifts and weekend employees.

Most employers report to us that 50% to 90% of employees do not show up at assembly areas for the headcount. In urban high rises, the no-show rate may reach 100%. Nevertheless, your responsibility is ironclad. You must be able to answer the fire chief's question, "Is everyone out of your space? Can you account for everyone?"

Implied in the requirement for a headcount is the need for an assembly area. Yet, many companies have no designated assembly area. It will be difficult, if not impossible, to conduct a headcount without an agreed-upon location for everyone to assemble.

3) Organization of the emergency response team is flawed in two ways. First, many organizations appoint only one or only several people to be in charge during an emergency. Yet few employers organize an emergency response team and train team members annually, as required by law.

Per OSHA 29 CFR 1910.38(c): "…employer must designate and train employees to assist in a safe and orderly evacuation of other employees." Emergency response team training must be specific to the team and its duties. Thus, team training needs to differ from that for the balance of employees.

Second, organization plans fail to assign anyone to command visitors, contractors, second and third shifts and weekend employees.

4) Command and control during emergencies is weak or nonexistent. It is not clear-cut in most organizations who is in charge when the top people are offsite. When senior emergency managers are absent, are you confident in who is left in charge of your people and assets?

Also, there are not enough commanders for a real crisis. Half of the three or five people on your call list will be unavailable in any emergency because of offsite appointments, travel, illness or vacation. Moreover, the government's standard is one supervisor in an emergency for every five people to be supervised (DHS National Response Framework). When you count visitors and contractors, you do not have enough people to search and clear floors, organize assembly areas, conduct headcounts and move panicked,often untrained, people around in dynamic circumstances.

5) Failure of cellphones, power and information technology (IT) is not addressed. Cell towers become overwhelmed and unusable almost immediately in any emergency. Traditionally, power and IT are the first two systems to fail or to become unavailable during an emergency. If you cannot communicate, you cannot respond.

The answer is inexpensive two-way radios. However, users must be trained and must carry the radios at all times so they can use them during an unexpected crisis. Otherwise, radios become useless paperweights in evacuated offices.

6) Training fails to comply with federal law. Training is mandatory for all personnel. Moreover, training must be conducted in a classroom setting where trainees can ask questions and get answers. Onscreen training alone is illegal. However, onscreen training can supplement classroom training.

Training shall be:

- annual;
- at hire;
- in a classroom where questions can be asked and answered;
- when the plan changes;
- when people in the plan change;

All personnel in these programs must be trained annually and at hire, including contractors, weekend employees and second and third shifts.

Training must be conducted by a "qualified" trainer—qualified by experience or by training in the discipline. The business manager or human resources director who shoehorns training for emergency response into the orientation or the annual sexual harassment seminar has not fulfilled the law.

People respond the way they have been trained, and untrained people freeze or panic.

7) Fire extinguisher training is illegal. No federal or state agency requires the use or training of portable fire extinguishers posted in your facility. OSHA requires that you have a use policy. "Use" or "Do Not Use" are both legal policies. Declare your preference as the employer, then train your employees in that policy.

If you decide to ask employees to use fire extinguishers in an emergency, you must train employees in their use. Conference room training with a video alone is illegal. OSHA requires that classroom training must be augmented with a live burn outside. Training must be annual.

8) Illegal evacuation maps. Many landlords post a single map at elevators or at a main entrance. However, what your landlord provides in no way fulfills your requirements as the employer. OSHA requires that every employer show every employee how to evacuate from every part of your space [1910.38(c)(2)] via two routes [1910.36(b)(1)]. A single map in the lobby or lunch/break room does not suffice under any circumstance. There must be maps in every part of your space.

9) No hazard communication plan. Many organizations have chemicals on site. Even the chemicals used by the cleaning crew could qualify your organization for a hazard communication plan (OSHA 29 CFR 1910.1200). If you (or your landlord) has an MSDS binder, then you probably need a hazard communication plan.

If you have an MSDS binder but lack a hazard communication plan, you are in violation of the most cited OSHA regulation in the U.S. Hazard communication is an "Employee Right to Know" law. The law requires that all employees be trained on a written hazard communication plan least once and whenever new chemicals are introduced to the facility. For most organizations, this means annual training.

10) Medical emergency planning lacks a standard of care. Medical emergencies are far more likely to occur in the workplace than a fire or workplace violence. Have you established a formal, written standard of care? Does it include employees, visitors and contractors?

OSHA requires (1910.151) that if the employer cannot "guarantee" (their word) emergency response for medical treatment in less than 4 minutes, the employer shall train employees in first aid and cardiopulmonary resuscitation (CPR). No fire chief or emergency medical services director in the U.S. will guarantee response in less than 4 minutes from the time of the 911 call to the moment when the emergency medical technician reaches the side of your injured.

Are your people annually trained in CPR, automated external defibrillators and first aid? How many are trained? Are their certificates of training current and on file?

Your standard of care must specify when to call 9-1-1. Also, employees must be prohibited from transporting anyone to an outside medical facility on their own or under your direction. What happens when the injured party loses consciousness or experiences a seizure (or worse) during transport? The liabilities to the management, the individual and the injured are titanic.

11) No first-aid and bloodborne pathogens training. OSHA states that any employer that cannot guarantee trained medical personnel can reach an injured person on site in less than 4 minutes shall train employees in first aid. Since no fire chief or emergency medical services director anywhere in the U.S. will make that guarantee, you must train employees in first aid. OSHA also states that any employer who trains personnel in first aid shall have a bloodborne pathogens plan (29 CFR 1910.1030) and train it to those trained in first aid. Many employers will train all employees to at least the awareness level in bloodborne pathogens.

12) Disabled and special needs personnel are ignored. U.S. Department of Homeland Security, Americans With Disabilities Act and state fire codes require that every employer have an emergency plan for special needs personnel. This plan must be integrated into both your emergency response plan and your emergency response team's training. Special needs personnel include all who are visibly disabled, and those who move slowly, are hard of hearing, pregnant, on crutches, etc. Your planning must include visitors, contractors, second and third shifts and weekend employees.

13) Procedures are copied and pasted from other organizations.

Transplanting emergency planning policy and procedures from one organization to another is epidemic. Borrowing another organization's or headquarters' procedures may seem economical, efficient and innocent. In reality, it is dangerous and illegal, thereby exposing the organization and its leaders to even more liabilities.

All plans must, by law, be site-specific. Assuming that one organization is identical to another is a classic mistake. Trying to convince regulators and jurors of this will be a naive hope and a certain failure.

In one extreme instance, a brand-name preparatory school transplanted much of its emergency plan from another equally well-known prep school—even including the latter school's copyright. The emergency response procedures and titles of response personnel were not even changed. While this is an extreme example, those who borrow and modify will not be spared from the wrath of a regulator or a competent litigator. Exposures to the borrower and the lender are many.

Moreover, given the fact that nearly all organizations' emergency plans fail to comply with federal and state standards, bad plans are copied. As the saying warns, "When you copy from an 'F' student, you get an 'F.'"

14) "That is the landlord's (building manager's) responsibility." No federal or state regulation permits landlords or building managers to supplant a tenant organization's legal requirement to have an emergency response plan. Landlords/building managers may need an emergency plan of their own for employees and to manage the tenant population. Since building managers are one key to success in any emergency, landlords/building managers should have a robust emergency plan.

However, most landlords/building managers have no plans or have bad ones. Their main deficiency is lack of command, control and communications. Often the three to five building personnel who will command or coordinate an emergency have two-way radios. However, they do not have radio communication with tenant organizations that are on the move during an emergency.

Moreover, with a few exceptions (New York City), building managers are not well trained to command anything beyond their facility duties, thereby leaving tenant populations on their own in an emergency.

If you depend solely on your landlord/building manager to successfully command your employees and their life safety during an emer-

Risk never sleeps. Risk always multiplies. The statistics on risks to organizations are overwhelming.

gency, you are not only in violation of law, you have abdicated your moral responsibility to your employees' emergency response.

15) Plans are out of date. For those few organizations that have emergency plans, many are not up to date regarding:

- best practices;
- national standards;
- laws and regulations;
- training;
- drills;
- command/control/communications.

Regulators and jurors do not like out-of-date plans, with out-of-date training, and no recent drills.

16) "No one enforces this stuff, and no organization has plans. I am willing to chance it without a real plan." Please note how this position plays out. You will have an incident. Then the many agencies and litigators will drop on you like a ton of broken glass. Or, an upset employee, an angry ex-employee or a competitor will call OSHA. The agency receives 200,000 phone calls to its 800 number every year (up from 160,000 in 2006). The agency has the statutory obligation to investigate every complaint. OSHA keeps the complainant anonymous by law.

Also note that noncompliance of law is almost always considered negligence by any state or federal court. Violation of standards often creates the presumption of negligence.

Courts love NFPA standards. The U.S. Supreme Court ruled that, "Courts must in the end say what is required; there are precautions so imperative that even their universal disregard will not excuse their omission" on part of a defendant [The T.J. Hooper, 60 F 2d 737 (2d Cir. 1932)].

17) "We have never had troubles or incidents, so, I do not think we need a real plan. We have been lucky so far." Yes, but luck is not a strategy. It will not be a standout on your resume to explain that luck is your strategy when it comes to your employees' life safety.

Conclusion

Risk never sleeps. Risk always multiplies. The statistics on risks to organizations are overwhelming. You want to believe that your organization is different, that these risks do not apply to you. However, the numbers are so great and pervasive that you cannot outlast or hide from them.

Compliance standards include OSHA, your state's fire code and NFPA 1600. The last is recognized by Congress, California, Florida, New York City and S&P. These authorities will be used by any litigator. Often, you can add EPA and many other federal, state and local regulations not touched on here.

Planning must be all-hazards to meet the standard. No longer can you just plan and train for fire. The modern organization's emergency response plan has a robust table of contents.

Recommendations

All organization owners and managers should objectively examine their emergency plans. In the case of 99% of organizations, expert help should be sought to assess the current situation. Determine what it will take to be prepared and compliant. You need a site-specific compliant plan that you train, drill and exercise to respond to foreseeable risks that threaten your people every day. You need a plan that you can share with emergency services, customers/clients and regulators, your board and jurors. Only then will you be able to sleep at night knowing that you have protected your people and your posterior. ✪

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By Robyn Steiner, CSP, CIH

Your Emergency Action Plan & Active Shooter Scenarios

Workplace violence is a common threat to all work environments. This violence can include threats, stalking, bullying, intimate partner violence, physical attacks and homicide. Violence can occur in a public, retail, private or manufacturing setting—anywhere there is a concentration of people. Violence in the workplace generally does not occur without warning; preattack indicators are usually discussed thoroughly in the media. However, your organization can take steps to be better prepared if violence strikes.

The most important step includes an emergency action plan. This plan must be communicated to employees with training on what to do, how to report in, whom to report to and what to be aware of in their daily work environment. The plan needs to be specific to each work area or location with identification of evacuation areas, routes, employee needs, etc. A general plan will likely just create confusion in an emergency. It is important for employees to understand that if they see something, they should say something and let a supervisor know their concerns. Employers need to work on encouraging an environment where employees are comfortable reporting situations that seem out of place or out of the ordinary routine.

The active shooter scenario is unique in that the shooter may be an unknown person or a coworker. Either way, active shooters usually have one thing in mind: kill as many people as they can until they are stopped. They will not negotiate as they do not usually have any agenda other than killing people. Most active shooters will commit suicide when confronted by someone who can stop them. The typical active shooter scenario is over in 10 to 15 minutes and occurs at learning institutions or other areas of high occupancy.

The most important thing that employers can do to strike back at workplace violence is to take proactive measures.

If you are interested in learning more on this topic, please visit **www.asse.org/ps/public** for more information on our Public Sector Practice Specialty, which covers this and related topics extensively.

What may surprise people is that most active shooters are not former employees, coworkers or even strangers. Historically, almost half of the active shooters in a work environment were customers and/or clients. These people usually have knowledge of the building, including areas where people tend to congregate, such as break rooms and conference rooms, and they know the planned escape routes.

With this in mind, employers need to be able to notify their employees that a situation is developing without alerting the shooter. One way to do this is to develop a code, similar to "Code Adam" used in retail stores for a missing child. This code should be communicated to all employees, be simple to use and sound like routine communications in the work environment. The code may be as simple as asking "Alice, please call Reception" or "Alice, please report to Conference Room B" when there is no employee named Alice or a Conference Room B. Higher-education employers have set up text mail systems where they can send out a mass text or e-mail to alert students and faculty to potential situations.

Once employees recognize the alert code, they need to make the decision to run, hide or fight depending on their situation:

Run: Leave all personal items behind and watch for danger along the evacuation route (the shooter may be familiar with the routes and may be waiting for employees at the exit point). Leave your cell phone in your pocket. Keep your hands visible at all times so law enforcement can see that you are not hiding anything.

Hide: Turn off your cell phone, including vibration mode, and stay quiet. If you attempt to text family or friends to tell them to alert authorities, have a code word previously set up to let them know it is a legitimate emergency and not a hoax. This will also let them know that they should not call you back.

Fight: Barricade yourself into a secure room if possible. Remember that everything and anything can become a weapon in this type of situation. Do not worry about the possible harm to the shooter. There is safety in numbers; attack en masse whenever possible.

Law enforcement agents responding to an active shooter call have only one thing on their mind: to stop the violence. If they see someone clutching a large bag or a cell phone (potential triggering device), they will treat that person as suspicious or as a potential threat since they have no idea what the shooter looks like or if the shooter is acting alone. One mistake in evacuations that law enforcement often addresses is people running

toward them, seeing them as the "saviors" during violent situations. As mentioned, these law enforcement agents are focused on stopping the violence. When they see people running toward them, they must make a split-second decision to determine whether or not those people are trying to harm them, and they may guess wrong, leading to unnecessary casualties. After the shooter is stopped, law enforcement will then begin to help the victims and to provide aid.

The most important thing that employers can do to strike back at workplace violence is to take proactive measures; have a plan in place, communicate that plan and train employees on what to do if the unimaginable happens. Employers need to foster an environment where employees feel comfortable reporting unusual behavior or circumstances. This may not stop violence from intruding on your work environment; however, it will give your employees a better chance of surviving.

The Department of Homeland Security has posted **information** on responding to active shooter situations, including proactive measures that may be taken and online training. ✪

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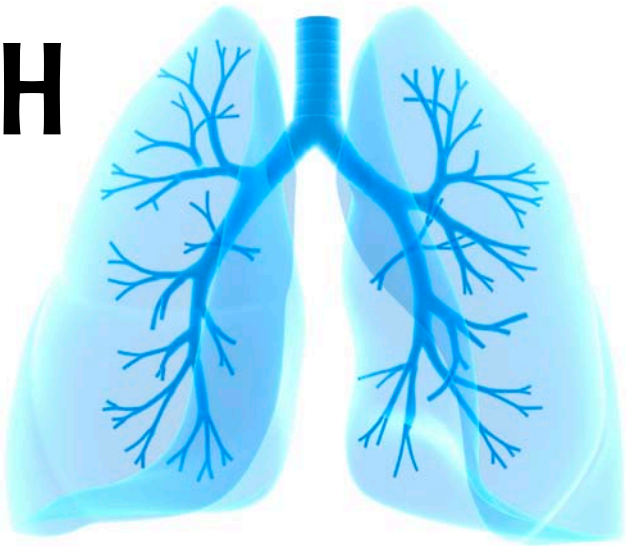
Best of the Best

Congratulations to John Baker for his article, "Exposure Assessment for Carbon Nanotubes: A Case Study." The article was one of 17 selected for inclusion in the 2012-13 Best of the Best publication. **Click here** to view this compilation of top technical material. Visit **www.asse.org/ps** for more information on the groups represented in this publication.

By Geoff Betsinger, CIH, & Don Garvey, CSP, CIH

Overview of NIOSH CBRN Respirator Standards



In 2000, NIOSH began development of certification criteria for counterterrorism respiratory protection equipment. The driving force behind development of these standards came from first responder communities' concern that industrial respiratory protection did not meet their specific needs. In response, NIOSH developed voluntary chemical biological radiological and nuclear (CBRN) respirator certification criteria for air-purifying respirators (APRs), air-purifying escape respirators (APERs), powered air-purifying respirators (PAPRs) and self-contained breathing apparatus (SCBA). These criteria are in addition to the standard NIOSH criteria for industrial certification of respirators.

CBRN has since developed into a broad term that first responders use to refer to chemical, biological or radiological hazards that are released with the intent to cause harm to the general public and infrastructure. In the last several years, the term "CBRNE" has been introduced, the "E" recognizing the rise of explosive weapons. If workers are required to respond to an event that could expose them to a CBRN situation, then the PPE selected should provide adequate protection for the anticipated hazards. While OSHA has not promulgated regulations to require NIOSH CBRN certified respirators for these exposures, it has stated the use of such respirators is highly desirable. A list of NIOSH-certified CBRN respirator systems is **available here**.

Respirator Cartridge/Canister Certification

One challenge NIOSH faced in developing CBRN respiratory protection criteria was selecting test chemicals to challenge the cartridge/canister. NIOSH approached this challenge by deriving a list of toxic industrial chemicals (TICs), toxic industrial materials (TIMs) and chemical warfare agents after a comprehensive review of available technical data. This review established 151 TICs and TIMs that included chemical warfare agents. The initial list was reduced from 151 to 139 substances. Then to reduce the number of certification tests necessary for the CBRN standard, the 139 chemicals were categorized into families. Test representative agent(s) (TRA) were then determined for each family of compounds. Biological and radiological agents were addressed as part of the particulate agent family and require P-100 (or PAPR high-efficiency filter) media.

A list of all 139 chemicals is in Appendix A of the NIOSH document, Interim Guidance on the Use of CBRN Full Facepiece, APRs/Gas Masks Certified Under 42 CFR Part 84 CBRN APR User Guide.

NIOSH then set test criteria for CBRN approvals for both APR and PAPR cartridges and canisters. Cartridge approval (23C) is for loose-fitting PAPRs and may be used for escape from contaminant concentrations up to the immediately dangerous to life and health (IDLH) level (assuming sufficient oxygen—greater than 19.5% oxygen). Canister (14G) approval is for tight-fitting CBRN APRs and PAPRs and may be used for escape from concentrations greater than the IDLH level, again assuming sufficient oxygen.

NIOSH has designated four levels of testing for CBRN cartridges and canisters—Cap (capacity) 1, 2, 3 and 4. The Cap rating means that under NIOSH-defined laboratory test conditions, the cartridge/canister will not exhibit breakthrough of the TRA to a specified level for the designated time duration. For Cap 1, this means that under the test conditions, none of the NIOSH TRAs will break through to the predetermined level in less than 15 minutes. Cap 2 means that breakthrough will not occur for at least 30 minutes, Cap 3 at least 45 minutes and Cap 4 at least 60 minutes. It is important to understand that laboratory test conditions and gas challenges do not correlate to real-world use conditions. Laboratory test parameters are often selected so that tests can be conducted in a reasonable amount of time yet provide information relevant to much longer use periods. As such, concentrations of test gases are often several orders of magnitude above what may be allowed under actual use conditions.

The NIOSH test agents are used at concentrations typically two to three times the IDLH concentrations. Table 2 gives examples of the PAPR canister test and breakthrough concentrations.

Therefore, a cartridge or canister that provides 15 minutes of capacity at an extremely high test concentration may provide ample protection for real-world exposures, which, to comply with NIOSH certification requirements and OSHA respirator program require-

ments, must be below the IDLH level. In actual use, breakthrough may not occur for several hours depending on the specific chemical, concentration, environmental and use conditions. In general, service life is inversely proportional to concentration. Extrapolation can give a rough approximation but may underestimate or overestimate actual performance, especially at concentrations that are much less than the test concentrations. It is important to note that NIOSH requirements specify that respirators exposed to chemical warfare agents must be taken out of service within 8 hours of exposure—within 2 hours if direct liquid contact occurs, even if predictions indicate that the cartridge/canister has a much longer service life.

Table 1 TIC/TIM Breakdown by Family & Test Agents

Number of Chemicals	Family	Test Representative Agent (TRA)
61	Organic vapor (vapor pressure less than cyclohexane)	Cyclohexane
32	Acid Gas	SO_2; H_2S; CNCl; $COCl_2$; HCN
4	Base Gas	Ammonia
4	Hydride	Phosphine
5	Nitrogen Oxide	Nitrogen Dioxide
1	Formaldehyde	Formaldehyde
32	Particulate	DOP

Table 2 PAPR Canister Test & Breakthrough Concentrations

TRA	Test Concentration (ppm)	Breakthrough Concentration	IDLH*
Ammonia	2,500	12.5	500
Sulfur Dioxide	1,500	5	100
Formaldehyde	500	1	30

IDLH = Immediately Dangerous to Life or Health limit. **NIOSH Pocket Guide to Chemical Hazards*****, NIOSH Publication No. 90-177, 1990. Although newer IDLH values have been published, OSHA stated in a May 21, 1996, memorandum that it will use the older IDLH valves while NIOSH conducts further study.***

The Cap rating is not a factor in determining when a CBRN APR, either a PAPR or a negative pressure device, may be safely used. CBRN APRs and PAPRs may only be used under conditions defined in OSHA's respirator program requirements (29 CFR 1910.134). As a result, APRs, including CBRN APRs and PAPRs with either Cap 1, 2, 3 or 4 cartridge/canisters, cannot be used for:

- oxygen-deficient atmospheres;
- unknown concentrations;
- unknown contaminant identity;
- entry into areas where the concentration is greater than the IDLH level.

Additionally, Cap ratings have no relationship to assigned protection factors (APFs). OSHA assigns APFs based on the respirator system type and not the cartridges, canisters or filters used. Therefore, a CBRN respirator is assigned the same level of protection when used with a Cap 1 cartridge as it is with a Cap 4 cartridge.

As with all NIOSH-approved respirators, CBRN respirators must be used in accordance with NIOSH cautions and limitations specified on the NIOSH approval label and must comply with OSHA's respiratory protection regulations (29 CFR 1910.134). The respirator manufacturer or a health and safety professional should be consulted if there is any question regarding respirator selection and use. Users must understand the respirator capabilities, as well as limitations, and must follow the respirator manufacturer's user instructions to receive the assigned level of protection. Misuse of any respiratory protection device may result in sickness, injury or death. ✪

References

NIOSH. (2005, July 8). Interim guidance on the use of chemical, biological, radiological and nuclear (CBRN) full facepiece, air-purifying respirators (APRs)/gas masks certified under 42 CFR Part 84 CBRN APR user guide. Retrieved from http://www.cdc.gov/niosh/npptl/guidancedocs/pdfs/interapr070805.pdf

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INTERVIEW

Semiotics in the Workplace

Q&A With Geoffrey Peckham, CEO of Clarion Safety Systems

Geoffrey Peckham is CEO and director of research and development at Clarion Safety Systems, a company that designs and manufactures safety signs and labels. In this interview, Peckham explains how safety signs and symbols will change in light of OSHA's final rule to revise its hazard communication standard and discusses the importance of semiotics in the workplace.

IHPS: ***Please provide a brief description of your professional background and of your position as CEO of Clarion Safety Systems LLC.***

GP: I started Clarion 22 years ago to provide companies with warnings, primarily on-product warnings for capital equipment, so that people who transport, install, use, service and decommission equipment could be better protected from harm.

Prior to forming Clarion, it was my time spent studying art and philosophy at Cambridge and Oxford Universities that gave me an intense interest in visual communication. I put myself through college by working in the printing/graphic reproduction industry, in both the production and management sides of the business. So it is with all of these things combined that brought Clarion, and me personally, to where we are today.

IHPS: ***OSHA has issued a final rule to revise its hazard communication standard (HCS) (29 CFR 1910.1200) to align with the United Nations' (UN) Globally Harmonized System of Classification and Labeling of Chemicals (GHS). Why is this global consistency so important when it comes to safety signs, symbols and markings?***

GP: Global consistency is important to safety communications for the simple reason that we live in an increasingly interconnected world. Our economies are inextricably linked. Many companies are global in scale; the markets for their products and/or their workforces and facilities extend beyond the borders of one country. Safety communication is only effective if it can convey the intended message to the intended audience. So whether your intended audience is the general public, your local employees or an international workforce, the methods you use to convey safety information should now be designed in a manner that is consistent with global standards, not provincial national standards.

The UN certainly understood this principle when it began the development of GHS. Although it has taken years to complete, OSHA's recent adoption of GHS is, in my opinion, a brilliant move. Not only does it signal to the world that the U.S. is on board with the idea that safety matters, but it also begins the process of accepting internationally standardized graphical symbols as the means to improve the communication of critically important safety information.

IHPS: ***In light of OSHA's final rule, how is Clarion advising its clients when it comes to indicating chemical hazards on product safety labels or facility safety signs?***

GP: GHS was meant to provide chemical manufacturers with a fixed set of pictograms and word messages to be used on safety labels that would appear on their chemical products' packaging. But our recommendation to our clients is this: Anytime you need to sign or label to warn about a chemical hazard, whether it is on a facility safety sign or on an equipment safety label, use one of the nine pictograms that are part of GHS if it applies to what you are trying to communicate.

A good example of the usefulness of GHS pictograms is the new construction-oriented safety sign we created for a company that does demolition and renovation. The sign warns about asbestos (Figure 1, p. 20). First, notice that our sign's message is not a simple, generic "DANGER—Asbestos," as shown in Figure 2 (p. 20).

Instead, the content of the new sign is more detailed. This is becoming the norm, not the exception. In almost every situation we encounter when we are designing safety signs that are compliant with the latest standards, the messaging is much more specific so the viewer can better understand and avoid the potential hazard. The new sign, then, goes one step further. To reinforce the word message, symbols were added. And not just any symbols. Since the inhalation of asbestos fibers was the problem, the GHS symbol for "Health Hazard" was perfect for the job of pictorializing the hazard. The "No Access for Unauthorized Persons" symbol was then added to pictorialize the primary avoidance message.

Using the GHS symbols on your facility signs and equipment safety labeling will help reinforce the understanding of the pictograms

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wherever they are used. When it comes to establishing a symbol-based system for globally recognizing hazards, part of the equation is training people on the symbols' meaning. Using these GHS pictograms when you need to communicate chemical hazards will help achieve the goal of global comprehension for these symbols.

IHPS: ***You mentioned that GHS is just the beginning of a new way to better communicate safety. What did you mean by this?***

GP: OSHA's acceptance of GHS was the start of a process that recognizes the fact that the latest standards having to do with safety signs and labels give safety professionals a valuable tool to better communicate risk and reduce it. You need only compare one of the old-style signs you typically find in U.S. workplaces today with one of the new ANSI/ISO standards-based signs to see and understand the difference.

Seeing, that is the first objective of every safety sign, that it be seen! The old 1941-era ASA Z35.1 signs you might still be purchasing for your facility today are not only outdated in terms of their formats and oversimplified content, but they lack symbols. All three of these components not only better convey a sign's message across language barriers, but help the sign achieve its first goal, that of being noticed.

Truly, a picture is worth a thousand words here. Although in the case of safety signs, the picture is worth more than words, it can be worth a person's life. The graphics used on safety signs play an integral role in getting your message across. The fact is the old word-message-only signs are rapidly going by the wayside and in their place are new signs that use the new symbol-based communication technology. We see this here in the U.S. and in nearly every country in the world where safety communication is valued.

IHPS: ***What is semiotics and how does it relate to safety signs and symbols?***

GP: Semiotics is the science behind how signs and symbols communicate messages. The field of semiotics was invented by Charles Pierce in the early 1900s. Although he died in relative obscurity, Pierce is now recognized as having been one of America's greatest thinkers. Ironically, Pierce lived and worked out of his home located half a mile down the road from Clarion's world headquarters in Milford, PA.

If I were to condense semiotics down to a few words, it works like this. In the material world, everything we perceive as communication is made

Figure 1 New ANSI-Style Asbestos Safety Sign

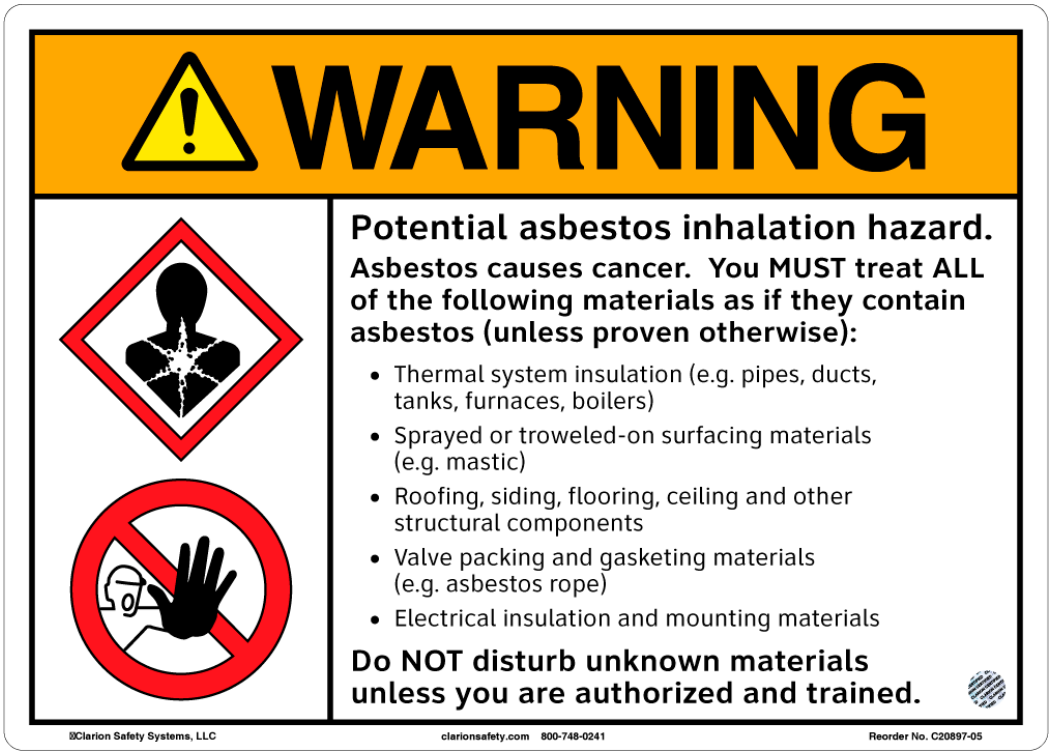

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Figure 2 Old OSHA-Style Safety Sign

known to us through our senses—sight, touch, hearing, etc. In the visual realm, we see colors and shapes and these things have meaning to them. The words you are reading right now are made up of letters, each of which has a shape that, when put in context with other letters, make up words that have meanings. But the vehicle of transmitting these meanings starts with seeing them and associating what you see with a meaning, a meaning that has been learned.

At Clarion, we apply this theory of knowledge communication to the field of safety signs and labels. Colors, shapes, symbols and words become signal colors, safety symbols and coherent text messages all aimed at reducing risk and protecting people. It is fascinating work.

IHPS: ***Can you provide some examples of where semiotics proved successful in the workplace?***

GP: First, many people doubt the effectiveness of warnings and say that you can never prove whether or not a safety sign has done its job of preventing accidents. I challenge this assumption with this fact: At this point in time, Clarion has more than 46 million safety signs and labels installed in over 180 industries, and we have yet to hear of a single instance where one of our clients was sued for "inadequate warnings" or "failure to warn." Since these are the two leading allegations in product liability lawsuits today in the U.S., and these allegations are increasingly found in premises liability litigation, the fact that we are using semiotics to successfully communicate safety speaks for itself.

To illustrate this point, compare the signs shown in Figure 3 (pp. 24). The signs on the left served as the starting point for deviation to create new signs on the right that are, first and foremost, compliant with the latest ANSI Z535 standards (the standards that set the benchmark for safety signs, colors, labels, tags, symbols and safety information in manuals in the U.S.). Second, the new signs not only describe the hazard, but they include information on the possible consequences of interaction with the hazard and how to avoid the hazard. This increased degree of content is in line with the expectations our society has today for knowledge and information, especially when it comes to safety.

Over the years, U.S. court cases have defined and redefined what constitutes an "adequate warning," and it is on this understanding, combined with human factors research, that the ANSI Z535 standards were built. At Clarion, we infuse our safety sign design experience and knowledge into each sign we design. The standards and the experience in having applied the standards to address so many needs make the signs on the right more effective than those on the left. The communication that is possible with the new sign systems is light years beyond where it used to be.

IHPS: ***Is semiotics often used in settings where workers speak multiple languages?***

GP: Yes. The new sign systems we are designing for multilingual workplaces incorporate standards-based color-coding and symbols, as well as text messages that are often translated into the various languages spoken in the specific facility. By using the latest digital print production technology, we are able to cost-effectively produce these sign systems, tailoring them to the specific needs of every client. Old generic signage was practical back in its day because customized signs were prohibitively difficult and costly to make. That has all changed thanks to digital imaging and today's high-tech materials that do not compromise quality and longevity. Safety professionals need to know these tools exist and that they can be used effectively to reinforce their safety training programs. It is possible, now, to achieve the goal of improved safety communication precisely because all of the tools and motivators have come together—the standards, graphical symbols, global consistency, safety training reinforcement and digital print production technology.

Whether your intended audience is the general public, your local employees or an international workforce, the methods you use to convey safety information should now be designed in a manner that is consistent with global standards, not provincial national standards.

IHPS: ***You are the new chair of the ANSI Z535 standards committee, which writes standards that govern the characteristics of visual safety markings used to warn about hazards and prevent accidents. How do you think the ANSI Z535 standards will be further developed or revised from this point forward, and how do these standards mesh with OSHA's current regulations?***

GP: As with all ANSI standards, the Z535 series is on a 5-year revision cycle, which means the 2011 standards will be revised and published again in 2016. It is a great committee. I have been on it now for 20 years, and unlike many standards committees where everyone comes from the same industry, the Z535 members come from a diverse range of industries, backgrounds and expertise.

For instance, just the manufacturers on the committee make the following products: heavy off-road equipment, hand power tools, consumer products, batteries, firearms, home appliances, furniture and industrial machinery, to name a few. Add to that people from the insurance industry, the legal profession, the Consumer Product Safety Commission and human factors experts and you have a wide range of perspectives on how warnings are designed and used in real life.

What works and what does not work in the ANSI Z535 standards has been sorted out over the years. Now new issues present themselves that will cause these standards to be further refined. It is clear that graphical symbols are

playing an increasingly important role on safety signs, labels and tags. The ANSI Z535.3 standard, Criteria for Safety Symbols, will probably change considerably in its next version. Right now, the standard gives some general guidance on symbol design and describes how to test symbols for comprehension. I can see the Z535.3 standard giving more practical advice on how and where to use symbols, with many examples of illustrative techniques. This would be done in an informative annex so the examples would not be misinterpreted as the only way to do things. They would just be examples of how to apply some of the design concepts described in the standard. Such changes would make the standard more useful to those who design warnings and would help keep it relevant in a world becoming increasingly dependent on symbols.

As for the relationship between the ANSI Z535 standards and OSHA regulations, I will paraphrase David Michaels, assistant secretary of labor, as he spoke at ASSE's Safety 2012: "If you are looking to implement best practices, do not turn to OSHA's regulations, they are out of date… look to ANSI standards, they represent the current state of the art."

In so many areas, OSHA regulations have not been revised since their initial creation, and the references to safety sign, color and tag standards that OSHA makes are to the 1967 versions of what are now the ANSI Z535 series of standards. OSHA accepts compliance with the Z535 standards through the "de minimus" rule that allows one to use the latest version of the basis document that OSHA used to make its regulations. It is not a pretty way of doing things, but short of OSHA overcoming its own politically charged process of rulemaking, it is the best way to justify doing the right thing.

Figure 3 Comparing Old to New

Best practice signs ©Clarion Safety Systems

IHPS: ***How does your experience as CEO of Clarion help you in your position as ANSI Z535 chair?***

GP: My role at Clarion involves working directly with clients to develop safety sign systems for their products, factories and environments. It is the experience of having practically implemented the concepts found in the ANSI Z535 standards that I bring to the standards-making table. Over the past several revision cycles, many of my change proposals have been accepted by the committee and written into the standards, and every one of these changes began as a means to better meet a client's need to communicate safety. As chair of the committee, I hope to continue to see that future revisions to the standards are valuable to those who need to implement them, all in the effort to keep people from harm. This goal of protecting people is a worthwhile endeavor and one that every safety professional recognizes as vitally important. I take great satisfaction in working with these people to create better and safer work environments for their companies to thrive in. ✪

Geoffrey Peckham *is a longtime member of ASSE and CEO and director of research and development at Clarion Safety Systems. He is chair of both the ANSI Z535 Committee and the U.S. Technical Advisory Group to ISO Technical Committee 145—Graphical Symbols. Over the past two decades, he has played a role in the harmonization of U.S. and international standards pertaining to safety signs, colors, formats and symbols.*

Interview conducted by **Jolinda Cappello**, *ASSE communications specialist.*

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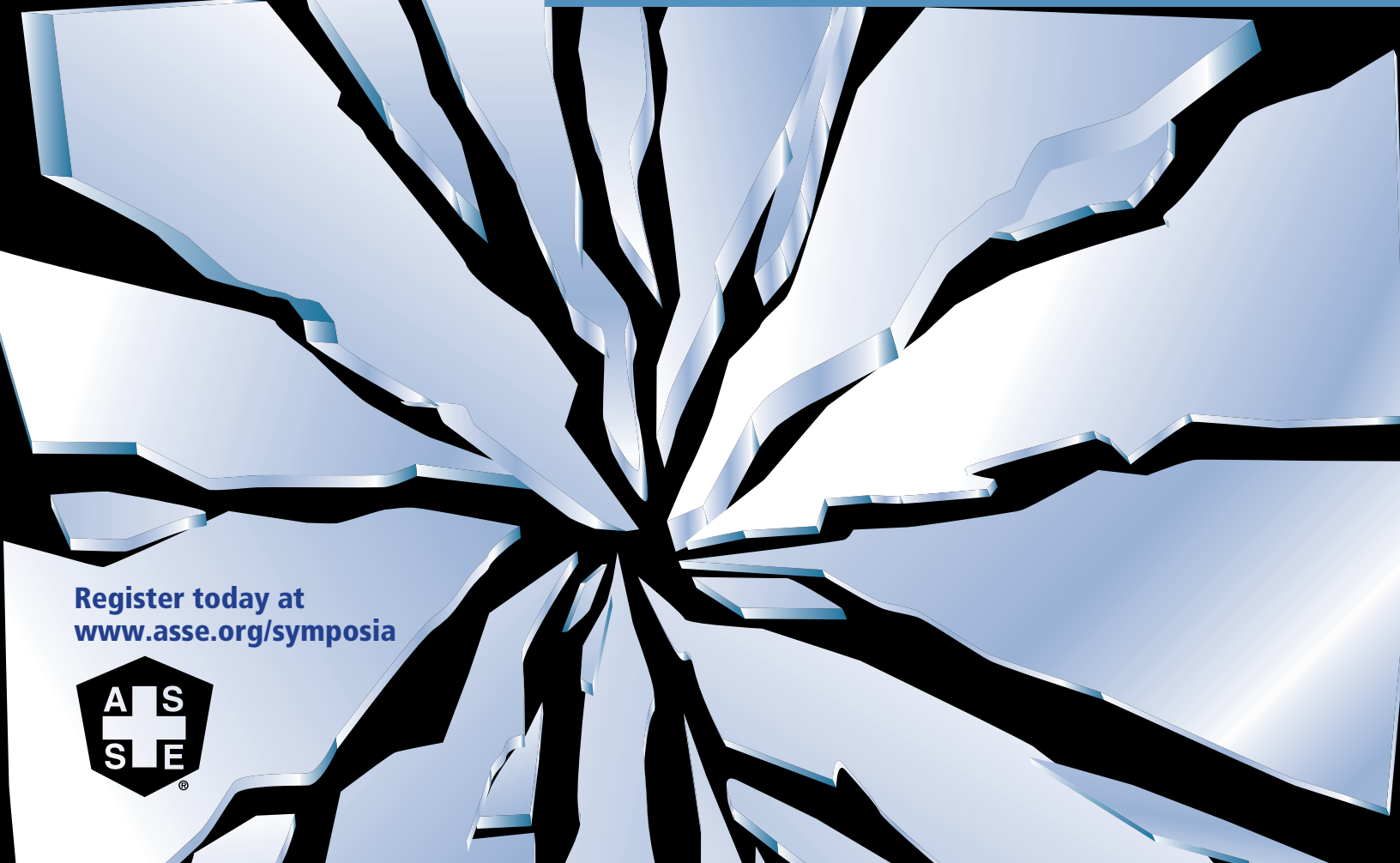

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Hazard Communication

OSHA's hazard communication standard is now aligned with the United Nations' Globally Harmonized System of Classification and Labeling of Chemicals. This update to the HazCom standard provides a common and coherent approach to classifying chemicals and to communicating hazard information on labels and safety data sheets. The first deadline in the implementation phase is Dec. 1, 2013, the date by which employers must train workers on the new label elements and safety data sheet.

OSHA has prepared many additional materials that explain the new changes to the requirements of the hazard communication standard, including QuickCards, a training **fact sheet**, a list of frequently asked questions and a **brief** on labels and pictograms. These and other materials are available on OSHA's **hazard communications** page.

New Recommended Exposure Limit for Carbon Nanotubes & Nanofibers

To minimize the health risks related to workers' exposure to carbon nanotubes and carbon nanofibers, NIOSH has proposed a new recommended exposure limit. NIOSH's recommendation appears in the agency's **Current Intelligence Bulletin**, along with a review of 54 related laboratory animal studies and other toxicological data. Nanomaterials are found in hundreds of products, including cosmetics, clothing and industrial and biomedical applications.

National Emphasis Program for Occupational Exposure to Isocyanates

OSHA has announced a new national emphasis program (**NEP**) to protect workers from the serious health effects of occupational exposure to isocyanates. OSHA develops NEPs to focus outreach efforts and inspections on specific hazards in an industry for a 3-year period. Through this NEP, OSHA will focus on workplaces in general, construction and maritime industries that use isocyanate compounds in an effort to reduce occupational illnesses and deaths.

Assistant Secretary of Labor David Michaels announced the new NEP and shared some of OSHA's priorities and recent initiatives with ASSE during his June 25 address at ASSE's Safety 2013 conference.

"Workers exposed to isocyanates can suffer debilitating health problems for months or even years after exposure," says assistant secretary of labor David Michaels. "Through this program, OSHA will strengthen protections for workers exposed to isocyanates."

Isocyanates are chemicals that can cause occupational asthma, irritation of the skin, eyes, nose and throat and cancer. Deaths have occurred due to both asthma and hypersensitivity pneumonitis from isocyanate exposure. Respiratory illnesses also can be caused by isocyanates exposure to the skin. Isocyanates are used in materials, including paints, varnishes, auto body repair and building insulation. Jobs that involve exposure to isocyanates include spray-on polyurethane manufacturing, products, such as mattresses and car seats, and protective coatings for truck beds, boats and decks.

OSHA's isocyanates **webpage** provides additional information on recognizing potential hazards, as well as OSHA standards that address isocyanates in the general, construction and maritime industries.

Indoor Air Quality Design Guide Available for Free

The American Society of Heating, Refrigerating and Air Conditioning Engineers has an indoor air quality (IAQ) design guide and reference materials available for free online.

The **Indoor Air Quality Guide: Best Practices for Design, Construction and Commissioning** is designed for architects, design engineers, contractors, commissioning agents and all other professionals concerned with IAQ. Detailed guidance provides:

•internal and external links to resources for the design, construction and commissioning of buildings with excellent indoor air quality;

•access to an incredible variety of in-depth information by topic to help users design, construct and operate buildings using best practices for IAQ;

•best practices for all aspects of IAQ building design, commissioning and construction, including designing for maintainability;

•tools and material for demonstrating the value of IAQ to clients;

•40 strategies for achieving eight critical IAQ objectives.

The guide was developed in cooperation with the American Institute of Architects, the U.S. Green Building Council, the Builders and Owners Management Association International, the Sheet Metal and Air Conditioning Contractors of North America and EPA.

Fire Protection Practice Specialty

The Fire Protection Practice Specialty (FPPS) was founded in 2004. FPPS was formed to concentrate on fire protection, prevention, preparedness and mitigation issues. FPPS diligently addresses hot topics related to fire safety and is an invaluable resource for technical content related to this field. FPPS is led by a volunteer advisory committee with extensive experience and expertise in the field of fire safety. FPPS works hard to contribute technical content to ASSE and the safety profession through **regular publications**, special publications and research, virtual events and conference sessions. FPPS is open to all ASSE members.

To join this popular practice specialty, visit **www.asse.org/JoinGroups**. Connect with FPPS at **www.asse.org/ps/fire** and on **LinkedIn**.

OSHA Citation for IH Issues

OSHA has cited A.W.T. World Trade Inc. for 28 safety and health violations, including multiple violations of OSHA's flammable liquids and spray finishing standards. The complaint inspection was initiated at the Chicago printing machinery manufacturer on Nov. 14, 2012. Proposed penalties total $119,700.

"A.W.T. World Trade failed to implement effective measures during the handling of flammable liquids and associated spray finishing operations," said Diane Turek, OSHA's area director for the Chicago North Office in Des Plaines, IL. "Employers have a responsibility to provide a safe and healthful work environment. They must provide PPE and train workers to take precautions to protect themselves from known hazards in their industry."

A total of 27 serious safety and health violations were cited, including lack of a written hazard communication program; not providing employees information and training on hazardous chemicals present in the work environment; lack of machine guarding; failure to ensure use of eye protection during welding operations; failure to properly secure and store welding gas cylinders; and hazards associated with the use and storage of flammables used in spray finishing operations. Additionally, the company was cited for interior surfaces of the spray paint booth being coated with excessive residues of flammable paints.

Several violations involve respirator protection standards, such as the lack of a written respiratory protection program, failure to select the proper respirator for the hazards present, improper storage and fit, lack of medical evaluations for employees required to wear respirators and failure to train workers in the proper use.

Violations of electrical standards were also cited, including the use of flexible cords instead of fixed wiring, lack of strain relief and obstructing the space around electrical panels. A serious violation occurs when there is substantial probability that death or serious physical harm could result from a hazard about which the employer knew or should have known.

Additionally, one other-than-serious health violation was cited for failure to verify that a required PPE assessment had been performed through a written certification. An other-than-serious violation is one that has a direct relationship to job safety and health but probably would not cause death or serious physical harm.

OSHA Settlement to Protect Workers from Anhydrous Ammonia

ConAgra Foods, Inc. (dba, Lamb Weston, Inc.) has signed a settlement agreement with OSHA to protect workers at five of its facilities from the release of anhydrous ammonia from refrigeration systems.

The agreement protects workers at Idaho, Arkansas, Missouri and Ohio facilities of the Nebraska-based company. It requires ConAgra to implement controls to reduce hazards associated with release of ammonia from low-pressure receivers (LPRs).

"This agreement ensures that ConAgra will protect workers from releases of ammonia by enclosing older LPRs that were not already enclosed and by providing other controls, such as normal and emergency ventilation to prevent exposure," says Assistant Secretary of Labor David Michaels. "OSHA's corporate-wide settlement agreements are highly effective tools for ensuring that companies take a systemic approach to addressing hazards that can injure or kill their workers."

OSHA's process safety management standard requires employers to document that equipment that was designed to meet codes and standards and is no longer in general use is still safe to operate under OSHA standards. OSHA originally cited ConAgra for failing to determine whether these older LPRs were operated safely.

Under the agreement, ConAgra will implement administrative and engineering controls at covered LPRs to control hazards associated with the release of ammonia. This includes building enclosures around equipment not already enclosed. Each enclosure must include normal and emergency ventilation that meets specified requirements, automatic switches for both normal and emergency ventilation and ammonia detection alarms. Egress doors for the enclosures will be required to include panic hardware and to swing in the direction of egress.

The agreement is the result of an inspection conducted at the company's American Falls, ID, facility, initiated under OSHA's process safety management covered chemical facilities national emphasis program.

New Version of Z359 Fall Protection Code Released

One of the biggest issues SH&E professionals continue to face is preventing the hazards of falls from heights. In fact, the latest **BLS data** show that almost two U.S. workers die each day in falls from heights and the rate is even higher globally.

To address these challenges, ASSE recommends that practitioners use the newest version of the **ANSI/ASSE Z359 Fall Protection Code**. "It contains the most definitive fall protection/restraint standards in the world," explains ASSE's Tim Fisher. "It establishes the requirements for an effective and comprehensive fall protection management system, then addresses technical issues and concepts with a series of coordinated standards and reference documents." Its use is also expanding globally, Fisher adds, noting that the standard is being used extensively in places such as Central America, South America, Canada and throughout the Middle East.

View a Tech Brief on the code **here**. Learn more about ordering it **here**.

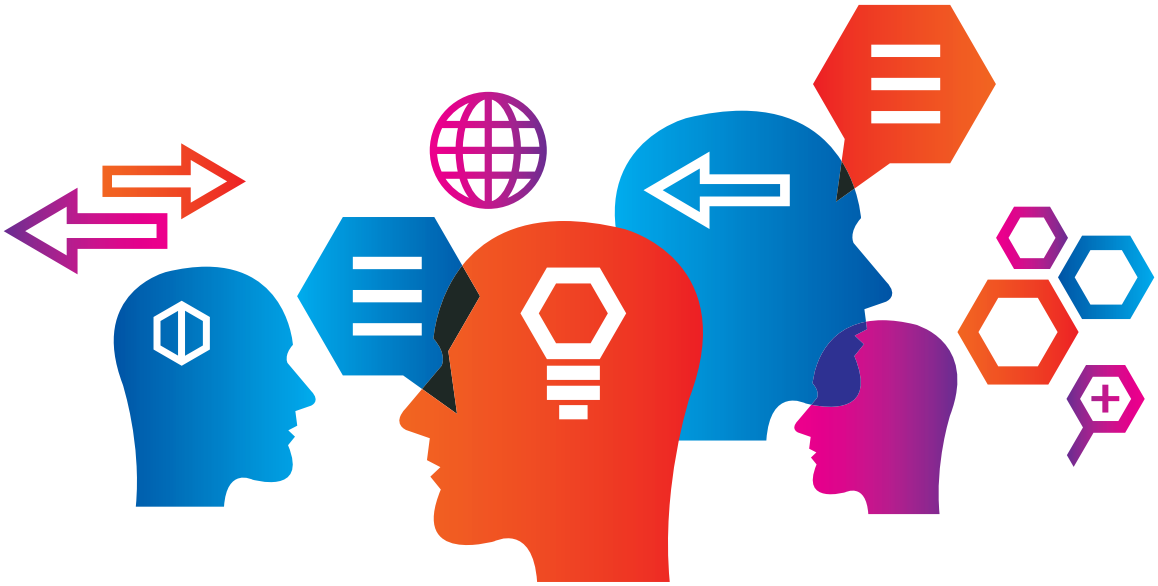
OSHA Heat Illness Prevention Materials

Each year, thousands of outdoor workers experience serious illnesses, such as heat exhaustion. In 2011, the Bureau of Labor Statistics reported that 4,420 workers experienced heat-related illness and 61 workers died. Although outdoor workers in a variety of industries are susceptible to heat illness, those in construction and agriculture are the most vulnerable.

OSHA has developed heat illness educational materials in English and Spanish, a curriculum for workplace training and a free **smart phone app** that allows users to calculate the heat index for their location and provides reminders about what to do to prevent heat illness.

Wallet-sized cards are now available in **Portuguese**, offering handy reminders about working safely in heat. The double-sided cards include OSHA contact information and feature smart phone-ready QR code links to worker safety and health resources on **OSHA's website**.

For information and resources on heat illness, visit OSHA's **Heat Illness Prevention webpage** . To order quantities of OSHA's heat illness **educational materials** in English or Spanish, call OSHA's Office of Communications at (202) 693-1999 or send an e-mail to **meilinger.francis2@dol.gov**.



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