Voluntary Protection Programs

The Voluntary Protection Programs (VPPs) allow OSHA to recognize employers and workers in the private and public sectors that have: (1) implemented effective safety and health management programs and (2) maintain injury and illness rates below the national average for their industry. Management, labor, and OSHA work cooperatively to prevent fatalities, injuries, and illnesses through a system that focuses on: (1) hazard prevention and control, (2) workplace analysis, (3) training, (4) management commitment, and (5) worker involvement. To participate, employers must first undergo a comprehensive on-site inspection conducted by safety and health professionals. If the workforce is represented by a collective bargaining unit, a union representative must participate. VPP participants are exempted from OSHA programmed inspections as long as they maintain their VPP status—which must be re-evaluated every three to five years. Popular VPP programs include the Star Program, Merit Program, and Demonstration Program.19

Safety Fact

Maine OSHA's Top 200 Program

The OSHA of Maine developed one of the most innovative state-level safety programs. Maine's Top 200 Program departs from the traditional OSHA approach of inspect and fine—an approach that many safety professionals believe encourages businesses to cover up problems instead of identifying and dealing with them. Instead, Maine's OSHA identifies the 200 businesses in the state that record the most injuries each year and makes them an innovative offer. Any company on the list that agrees to identify its own safety problems and work with OSHA officials to correct them is exempt from wall-to-wall inspections. As a result, Maine's business community is identifying and solving an unprecedented number of safety problems. In the eight years prior to implementing the Top 200 Program, a total of 37,000 safety problems had been reported to Maine's OSHA. After just two years of the program, this number had increased to 174,331, and 118,051 of these had been corrected. Along the way, OSHA became a partner to the business community instead of an intrusive arm of big government.

In recognition of the innovative spirit and positive results produced by this initiative, Maine's Top 200 Program received the Innovations in American Government Award from the Ford Foundation and the John F. Kennedy School of Government at Harvard University.

Susan Harwood Training Grants

OSHA awards grants to nonprofit organizations to provide training and education on hazard identification and prevention to workers and small employers. The focus of the grants is small business and hard-to-reach workers in high-hazard industries.20

Training and Education Services

Training and education services available from OSHA take several forms. OSHA operates a training institute in Des Plaines, Illinois, that offers a wide variety of services to safety and health personnel from the public and private sectors. The institute has a full range of facilities, including classrooms and laboratories in which it offers more than 60 courses.

To promote training and education in locations other than the institute, OSHA awards grants to nonprofit organizations. Colleges, universities, and other nonprofit organizations apply for funding to cover the costs of providing workshops, seminars, or short courses on safety and health topics currently high on OSHA's list of priorities. Grant funds must be used to plan, develop, and present instruction. Grants are awarded annually and require a match of at least 20 percent of the total grant amount.

OSHA Standards

OSHA establishes standards in the following areas: general industry, construction, maritime, and agriculture. These standards are intended to protect workers from a wide range of workplace hazards. For example, OSHA has established standards to:

provide fall protection;

prevent trenching cave-ins;

prevent exposure to certain infectious diseases;

ensure that confined spaces are safe to work in;

prevent exposure to dangerous chemicals;

put guards on dangerous machines;

provide personal protective gear including respirators;

provide training for selected dangerous jobs in a language and vocabulary level that workers can understand.

In carrying out its duties, OSHA is responsible for promulgating legally enforceable standards. OSHA standards may require conditions, or the adoption or use of one or more practices, means, methods, or processes reasonably necessary and appropriate to protect workers on the job. It is the responsibility of employers to become familiar with standards applicable to their establishments and to ensure that employees have and use personal protective equipment when required for safety.4

The general duty clause of the OSH Act requires that employers provide a workplace that is free from hazards that are likely to harm employees. This is important because the general duty clause applies when there is no specific OSHA standard for a given situation. Where OSHA standards do exist, employers are required to comply with them as written.

How OSHA Standards Are Developed

OSHA has the authority to develop, adopt, amend, and revoke occupational safety and health standards. The OSHA standard-setting process is comprehensive and provides many opportunities for input from all stakeholders, from individuals to private sector employers to other government agencies. OSHA is authorized to begin the standard-setting process on its own or in response to requests or recommendations from other stakeholders including:

the National Institute for Occupational Safety and Health (NIOSH is the research agency for occupational safety and health)

state and local government agencies

nationally recognized standards producing organizations

employers

labor organizations

interested parties in general

When considering the development or revision of a standard, OSHA typically publishes a request for information (RFI) or an advance notice of proposed rule making (ANPRM) in the Federal Register to ensure that all stakeholders are aware and have opportunities to provide input. Further, OSHA often

holds meetings with stakeholder organizations that have a specific interest in the area covered by the proposed new or revised standard. All responses to an RFI or ANPRM are made public.

When OSHA decides to proceed with issuing a new or revised standard, it must publish a notice of proposed rule making (NPRM) in the Federal Register and solicit input from stakeholders and the public in general. An NPRM will contain the draft standard and an explanation of why it is needed. Stakeholders may submit their feedback in writing at regulations.gov. In addition, OSHA typically holds public hearings to solicit testimony and information from stakeholders. Once input from stakeholders has been considered and any changes based on it have been made, OSHA issues a final standard that then becomes an enforceable document.

Each spring and fall, the Department of Labor publishes a list of all regulatory projects that are currently in process. The list is published in the Federal Register. OSHA provides a projected schedule for its in-process projects so that stakeholders know the timing of new and revised standards and can participate in the development process. Current and past issues of the Regulatory Agenda are available at osha.gov/law-regs.html.

Input from and Help for Small Business in Standards Development and Compliance

OSHA is sensitive to the needs of small business both in developing new and revised standards and in enforcing their compliance. Further, the Small Business Regulatory Enforcement Act (SBREFA) provides help to small businesses that struggle with understanding and complying with OSHA regulations. SBREFA also gives small businesses a voice in the development of new and revised standards by requiring that OSHA:

produces small entity compliance guides for selected agency rules;

be responsive to small business inquiries about complying with OSHA regulations;

has a penalty reduction policy for small businesses;

involves small businesses in developing proposed rules that are expected to have a significant effect on a large number of small businesses. This is accomplished through Small Business Advocacy Review Panels;

gives small businesses opportunities to undertake court challenges to OSHA rules and regulations they believe will adversely affect them.

OSHA Standards versus OSHA Regulations

OSHA issues both standards and regulations. Safety and health professionals need to know the difference between the two. OSHA standards address specific hazards such as working in confined spaces, handling hazardous waste, or working with dangerous chemicals. Regulations are more generic in some cases than standards and more specific in others. However, even when they are specific, regulations do not apply to specific hazards. Regulations do not require the rigorous review process that standards go through. This process is explained in the next section.

How Standards Are Adopted, Amended, or Revoked

OSHA can adopt, amend, or revise standards. Before any of these actions can be undertaken, OSHA must publish its intentions in the Federal Register in either a notice of proposed rule making or an advance notice of proposed rule making. The notice of proposed rule making must explain the terms of the new rule, delineate proposed changes to existing rules, or list rules that are to be revoked. The advance notice of proposed rule making may be used instead of the regular notice when it is necessary to solicit input before drafting a rule.

After publishing the notice, OSHA must conduct a public hearing if one is requested. Any interested party may ask for a public hearing on a proposed rule or rule change. When this happens, OSHA must schedule the hearing and announce the time and place in the Federal Register.

The final step, according to the U.S. Department of Labor, is as follows:

After the close of the comment period and public hearing, if one is held, OSHA must publish in the Federal Register the full, final text of any standard amended or adopted and the date it becomes effective, along with an explanation of the standard and the reasons for implementing it. OSHA may also publish a determination that no standard or amendment needs to be issued.5

How to Read an OSHA Standard

OSHA standards are typically long and complex and are written in the language of lawyers and bureaucrats, making them difficult to read. However, reading OSHA standards can be simplified somewhat if one understands the system.

OSHA standards are part of the CFR, published by the Office of the Federal Register. The regulations of all federal government agencies are published in the CFR. Title 29 contains all the standards assigned to OSHA. Title 29 is divided into several parts, each carrying a four-number designator (such as Part 1901, Part 1910). These parts are divided into sections, each carrying a numerical designation. For example, 29 CFR 1910.1 means Title 29, Part 1910, Section 1, Code of Federal Regulations.

The sections are divided into four different levels of subsections, each with a particular type of designator as follows:

First level: using lowercase letters in parentheses: (a) (b) (c) (d)

Second level: using numerals in parentheses: (1) (2) (3) (4)

Third level: using roman numerals in parentheses: (i) (ii) (iii) (iv)

Fourth level: using uppercase letters in parentheses: (A) (B) (C) (D)

Occasionally, the standards go beyond the fourth level of subsection. In these cases, the sequence just described is repeated with the designator shown in parentheses underlined. For example: (a), (1), (i), (A).

Understanding the system used for designating sections and subsections of OSHA standards can guide readers more quickly to the specific information needed. This helps reduce the amount of cumbersome reading needed to comply with the standards.

Temporary Emergency Standards

The procedures described in the previous section apply in all cases. However, OSHA is empowered to pass temporary emergency standards on an emergency basis without undergoing normal adoption procedures. Such standards remain in effect only until permanent standards can be developed.

To justify passing temporary standards on an emergency basis, OSHA must determine that workers are in imminent danger from exposure to a hazard not covered by existing standards. Once a temporary standard has been developed, it is published in the Federal Register. This step serves as the notification step in the permanent adoption process. At this point, the standard is subjected to all the other adoption steps outlined in the preceding section.

How to Appeal a Standard

After a standard has been passed, it becomes effective on the date prescribed. This is not necessarily the final step in the appeals process, however. A standard, either permanent or temporary, may be appealed by any person who is opposed to it.

An appeal must be filed with the U.S. Court of Appeals serving the geographic region in which the complainant lives or does business. Appeal paperwork must be initiated within 60 days of a standard's approval. However, the filing of one or more appeals does not delay the enforcement of a standard unless the court of appeals handling the matter mandates a delay. Typically, the new standard is enforced as passed until a ruling on the appeal is handed down.

Requesting a Variance

Occasionally, an employer may be unable to comply with a new standard by the effective date of enforcement. In such cases, the employer may petition OSHA at the state or federal level for a variance. Following are the different types of variances that can be granted.

Temporary Variance

When an employer advises that it is unable to comply with a new standard immediately but may be able to if given additional time, a temporary variance may be requested. OSHA may grant such a variance for up to a maximum of one year. To be granted a temporary variance, employers must demonstrate that they are making a concerted effort to comply and taking the steps necessary to protect employees while working toward compliance.

Application procedures are very specific. Prominent among the requirements are the following: (1) identification of the parts of the standard that cannot be complied with; (2) explanation of the reasons why compliance is not possible; (3) detailed explanations of the steps that have been taken so far to comply with the standard; and (4) explanation of the steps that will be taken to comply fully.

According to the U.S. Department of Labor, employers are required to keep their employees informed. They must "certify that workers have been informed of the variance application, that a copy has been given to the employees' authorized representative, and that a summary of the application has been posted wherever notices are normally posted. Employees also must be informed that they have the right to request a hearing on the application."6

Variances are not granted simply because an employer cannot afford to comply. For example, if a new standard requires employers to hire a particular type of specialist but there is a shortage of people with the requisite qualifications, a temporary variance might be granted. However, if the employer simply

cannot afford to hire such a specialist, the variance will probably be denied. Once a temporary variance is granted, it may be renewed twice. The maximum period of each extension is six months.

Permanent Variance

Employers who feel they already provide a workplace that exceeds the requirements of a new standard may request a permanent variance. They present their evidence, which is inspected by OSHA. Employees must be informed of the application for a variance and notified of their right to request a hearing. Having reviewed the evidence and heard testimony (if a hearing has been held), OSHA can award or deny the variance. If a permanent variance is awarded, it comes with a detailed explanation of the employer's ongoing responsibilities regarding the variance. If, at any time, the company does not meet these responsibilities, the variance can be revoked.

Other Variances

In addition to temporary and permanent variances, an experimental variance may be awarded to companies that participate in OSHA-sponsored experiments to test the effectiveness of new health and safety procedures. Variances also may be awarded in cases where the secretary of labor determines that a variance is in the best interest of the country's national defense.

When applying for a variance, employers are required to comply with the standard until a decision has been made. If this is a problem, the employer may petition OSHA for an interim order. If granted, the employer is released from the obligation to comply until a decision is made. In such cases, employees must be informed of the order.

Typical of OSHA standards are the confined space and hazardous waste standards. Brief profiles of these standards provide an instructive look at how OSHA standards are structured and the extent of their coverage.

Confined Space Standard

This standard was developed in response to the approximately 300 work-related deaths that occur in confined spaces each year.7 The standard applies to a broad cross section of industries that have employees working in spaces with the following characteristics: limited openings for entry or exit, poor natural ventilation, and a design not intended to accommodate continuous human occupancy. Such spaces as manholes, storage tanks, underground vaults, pipelines, silos, vats, exhaust ducts, boilers, and degreasers are typically considered confined spaces.

The key component in the standard is the permit requirement. Employers are required to develop an in-house program under which employees must have a permit to enter confined spaces. Through such programs, employers must do the following:

Identify spaces that can be entered only by permit.

Restrict access to identified spaces to ensure that only authorized personnel may enter.

Control hazards in the identified spaces through engineering, revised work practices, and other methods.

Continually monitor the identified spaces to ensure that any known hazards remain under control.

The standard applies to approximately 60 percent of the workers in the United States. Excluded from coverage are federal, state, and local government employees; agricultural workers; maritime and construction workers; and employees of companies with 10 or fewer workers.

Hazardous Waste Standard

This standard specifically addresses the safety of the estimated 1.75 million workers who deal with hazardous waste: hazardous waste workers in all situations, including treatment, storage, handling, and disposal; firefighters; police officers; ambulance personnel; and hazardous materials response team personnel.8

The requirements of this standard are as follows:

Each hazardous waste site employer must develop a safety and health program designed to identify, evaluate, and control safety and health hazards, and provide for emergency response.

There must be preliminary evaluation of the site's characteristics prior to entry by a trained person to identify potential site hazards and to aid in the selection of appropriate employee protection methods.

The employer must implement a site control program to prevent contamination of employees. At a minimum, the program must identify a site map, site work zones, site communications, safe work

practices, and the location of the nearest medical assistance. Also required in particularly hazardous situations is the use of the buddy system so that employees can keep watch on one another and provide quick aid if needed.

Employees must be trained before they are allowed to engage in hazardous waste operations or emergency response that could expose them to safety and health hazards.

The employer must provide medical surveillance at least annually and at the end of employment for all employees exposed to any particular hazardous substance at or above established exposure levels or those who wear approved respirators for 30 days or more on-site.

Engineering controls, work practices, and personal protective equipment (PPE), or a combination of these methods, must be implemented to reduce exposure below established exposure levels for the hazardous substances involved.

There must be periodic air monitoring to identify and quantify levels of hazardous substances and to ensure that proper protective equipment is being used.

The employer must set up an informational program with the names of key personnel and their alternates responsible for site safety and health, and the requirements of the standard.

The employer must implement a decontamination procedure before any employee or equipment leaves an area of potential hazardous exposure; establish operating procedures to minimize exposure through contact with exposed equipment, other employees, or used clothing; and provide showers and change rooms where needed.

There must be an emergency response plan to handle possible on-site emergencies prior to beginning hazardous waste operations. Such plans must address personnel roles; lines of authority, training, and communications; emergency recognition and prevention; safe places of refuge; site security; evacuation routes and procedures; emergency medical treatment; and emergency alerting.

There must be an off-site emergency response plan to better coordinate emergency action by local services and to implement appropriate control actions.9

Work Accident Costs and Rates

Workplace accidents cost employers millions every year. Consider the following examples from the recent past. ARCO Chemical Company was ordered to pay $3.48 million in fines as a result of failing to protect workers from an explosion at its petrochemical plant in Channelview, Texas. The steel-making division of USX paid a $3.25 million fine to settle numerous health and safety violation citations. BASF Corporation agreed to pay a fine of $1.06 million to settle Occupational Safety and Health Administration (OSHA) citations associated with an explosion at a Cincinnati chemical plant that caused two deaths and 17 injuries.

These examples show the costs of fines only. In addition to fines, these employers incurred costs for safety corrections, medical treatment, survivor benefits, death and burial costs, and a variety of indirect costs. Clearly, work accidents are expensive. However, the news is not all bad. The trend in the rate of accidents is downward.

Work accident rates in this century are evidence of the success of the safety movement in the United States. As the amount of attention given to workplace safety and health has increased, the accident rate has decreased.

As Figure 2–1 shows, the cost of these 10,000 work deaths and work injuries was $48.5 billion. This translates into a cost of $420 per worker in the United States, computed as the value-add required per worker to offset the cost of work injuries. It translates further into $610,000 per death and $18,000 per disabling injury.3

Although statistics are not available to document the supposition, many safety and health professionals believe that the major cost of accidents and injuries on the job results from damage to morale. Employee morale is a less tangible factor than documentable factors such as lost time and medical costs. However, it is widely accepted among management professionals that few factors affect productivity more than employee morale. Employees with low morale do not produce up to their maximum potential. This is why so much time and money are spent every year to help supervisors and managers learn different ways to help improve employee morale.

Because few things are as detrimental to employee morale as seeing a fellow worker injured, accidents can have a devastating effect on morale. Whenever an employee is injured, his or her colleagues silently think, “That could have been me,” in addition to worrying about the employee. Morale is damaged even more if the injured employee is well-liked and other employees know his or her family.

Time Lost Because of Work Injuries

An important consideration when assessing the effect of accidents on industry is the amount of lost time due to work injuries.4 According to the NSC, approximately 35 million hours are lost in a typical year as a result of accidents. This is actual time lost from disabling injuries and does not include additional time lost for medical checkups after the injured employee returns to work. Accidents that occurred in previous years often continue to cause lost time in the current year.

Estimating the Cost of Accidents

Even decision makers who support accident prevention must consider the relative costs of such efforts. Clearly, accidents are expensive. However, to be successful, safety and health professionals must be able to show that accidents are more expensive than prevention. To do this, they must be able to estimate the cost of accidents. The procedure for estimating costs set forth in this section was developed by Professor Rollin H. Simonds of Michigan State College working in conjunction with the Statistics Division of the NSC.

Cost-Estimation Method

Professor Simonds states that in order to have value, a cost estimate must relate directly to the specific company in question. Applying broad industry cost factors will not suffice. To arrive at company-specific figures, Simonds recommends that costs associated with an accident be divided into insured and uninsured costs. 9

Determining the insured costs of accidents is a simple matter of examining accounting records. The next step involves calculating the uninsured costs. Simonds recommends that accidents be divided into the following four classes:

Class 1 accidents. Lost workdays, permanent partial disabilities, and temporary total disabilities

Class 2 accidents. Treatment by a physician outside the company's facility

Class 3 accidents. Locally provided first aid, property damage of less than $100, or the loss of less than eight hours of work time

Class 4 accidents. Injuries that are so minor that they do not require the attention of a physician, result in property damage of $100 or more, or cause eight or more work hours to be lost10

Average uninsured costs for each class of accident can be determined by pulling the records of all accidents that occurred during a specified period and by sorting the records according to class. For each accident in each class, record every cost that was not covered by insurance. Compute the total of these costs by class of accident and divide by the total number of accidents in that class to determine an average uninsured cost for each class, specific to the particular company.

Figure 2–5 is an example of how the average cost of a selected sample of Class 1 accidents can be determined. In this example, there were four Class 1 accidents in the pilot test. These four accidents cost the company a total of $554.23 in uninsured costs, or an average of $138.56 per accident. Using this information, accurate cost estimates of an accident can be figured, and accurate predictions can be made.

Figure 2–5 Uninsured costs worksheet.

Figure 2–5 Full Alternative Text

Other Cost-Estimation Methods

The costs associated with workplace accidents, injuries, and incidents fall into broad categories such as the following:

Lost work hours

Medical costs

Insurance premiums and administration

Property damage

Fire losses

Indirect costs

Calculating the direct costs associated with lost work hours involves compiling the total number of lost hours for the period in question and multiplying the hours times the applicable loaded labor rate. The loaded labor rate is the employee's hourly rate plus benefits. Benefits vary from company to company but typically inflate the hourly wage by 20 to 35 percent. A sample cost-of-lost-hours computation follows:

Employee hours lost (4th quarter)×Average loaded labor rate=Cost386×13.48=$5,203.28

In this example, the company lost 386 hours due to accidents on the job in the fourth quarter of its fiscal year. The employees who actually missed time at work formed a pool of people with an average loaded labor rate of $13.48 per hour ($10.78 average hourly wage plus 20 percent for benefits). The average loaded labor rate multiplied by the 386 lost hours reveals an unproductive cost of $5,203.28 to this company.

By studying records that are readily available in the company, a safety professional can also determine medical costs, insurance premiums, property damage, and fire losses for the time period in question. All these costs taken together result in a subtotal cost. This figure is then increased by a standard percentage to cover indirect costs to determine the total cost of accidents for a specific time period. The percentage used to calculate indirect costs can vary from company to company, but 20 percent is a widely used figure.

Estimating Hidden Costs

Safety professionals often use the iceberg analogy when talking about the real costs of accidents. Accident costs are like an iceberg in that their greatest portion is hidden from view.11 In the case of icebergs, the larger part is hidden beneath the surface of the water. In the case of an accident, the larger part of the actual cost is also hidden beneath the surface.

There are many different models that can be used for estimating both the direct and indirect costs of accidents. Some of these models are so complex that their usefulness is questionable. The checklist in Figure 2–6 is a simple and straightforward tool that can be used to estimate the hidden costs of accidents.

Figure 2–6 Some accident costs that might be overlooked.

Safety and Health Manager

The most important member of the safety and health team is its manager. Companies that are committed to providing a safe and healthy workplace employ a safety and health manager at an appropriate level in the corporate hierarchy. The manager's position in the hierarchy is an indication of the company's commitment and priorities. This, more than anything else, sets the tone for a company's safety and health program.

In times past, companies with a highly placed safety and health manager were rare. However, the passage of the Occupational Safety and Health Act (OSH Act) in 1970 (see Chapter 6) began to change this. The OSH Act, more than any other single factor, put teeth in the job descriptions of safety and health professionals. Occupational Safety and Health Administration (OSHA) standards, on-site inspections, and penalties have encouraged a greater commitment to safety and health. Environmental, liability, and workers' compensation issues have also had an impact, as has the growing awareness that providing a safe and healthy workplace is the right thing to do from both an ethical and a business perspective.

Job of the Safety and Health Manager

The job of the safety and health manager is complex and diverse. Figure 4–2 is an example of a job description for such a position. The description attests to the diverse nature of the job. Duties range from hazard analysis to accident reporting, standards and compliance, record keeping, training, emergency planning, and so on.

Figure 4–2 Safety and health manager job description.

Figure 4–2 Full Alternative Text

The minimum educational requirement set by Poultry Processing Inc. (PPI) is an occupational certificate from a community college with the full associate of science or applied science degree preferred. Preference is given to applicants with a bachelor's degree in specifically identified fields.

Role in the Company Hierarchy

The safety and health manager described in Figure 4–2 reports to PPI's local plant manager and has line authority over all other members of the safety and health team. This and the duties set forth in the job description are evidence of the company's commitment to safety and health and show that PPI is large enough to have a dedicated safety and health manager.

In some companies, the safety and health manager may also have other duties such as those of a production manager or personnel manager. In these cases, the other members of the safety and health team, like those shown in Figure 4–1, are not normally company employees. Rather, they are available to the company on a part-time or consultative basis as needed. The safety and health manager's role in a company depends in part on whether his or her safety and health duties are full time or are in addition to other duties.

Another role determinant is the issue of authority. Does the safety and health manager have line or staff authority? Line authority means that the safety and health manager has authority over and supervises certain employees (i.e., other safety and health personnel). Staff authority means that the safety and health manager is the staff person responsible for a certain function, but he or she has no line authority over others involved with that function.

Those occupying staff positions operate like internal consultants—that is, they may recommend, suggest, and promote, but they do not have the authority to order or mandate. This is typically the case with safety and health managers. Even managers with line authority over other safety and health personnel typically have a staff relationship with other functional managers (e.g., personnel, production, or purchasing). For example, consider the following safety and health-related situations:

A machine operator continually creates unsafe conditions by refusing to practice good housekeeping.

A certain process is associated with an inordinately high number of accidents.

A new machine is being purchased that has been proven to be unsafe at other companies.

In the first example, the safety and health manager could recommend that the employee be disciplined but could not normally undertake or administer disciplinary measures. In the second example, the safety and health manager could recommend that the process be shut down until a thorough analysis could be conducted, hazards identified, and corrective measures taken. However, the manager would rarely have the authority to order the process to be shut down. In the final example, the safety and health manager could recommend that an alternative machine be purchased, but he or she would not normally have the authority to stop the purchase.

Maintaining a safe and healthy workplace while playing the role of internal consultant is often the greatest challenge of safety and health managers. It requires managers to be resourceful, clever, astute with regard to corporate politics, good at building relationships, persuasive, adept at trading for favors, credible, and talented in the development and use of influence.

Problems Safety and Health Managers Face

As if the diversity and complexity of the job were not enough, there are a number of predictable problems that safety and health managers are likely to face. These problems are discussed in the following paragraphs.

Lack of Commitment

Top management may go along with having a company-wide safety and health program because they see it as a necessary evil. The less enthusiastic may even see safety and health as a collection of government regulations that interfere with profits. Although this is less often true now than it has been in the past, safety and health professionals should be prepared to confront a less-than-wholehearted commitment in some companies.

Production versus Safety

Industrial firms are in business to make a profit. They do this by producing or processing products. Therefore, anything that interferes with production or processing is likely to be looked on unfavorably. At times, a health or safety measure will be viewed by some as interfering with productivity. A common example is removal of safety devices from machines as a way to speed production. Another is running machines until the last possible moment before a shift change rather than shutting down with enough time left to perform routine maintenance and housekeeping tasks.

The modern marketplace has expanded globally and, therefore, become intensely competitive. To survive and succeed, today's industrial firm must continually improve its productivity, quality, cost, image, response time, and service. This sometimes puts professionals who are responsible for safety and health at odds with others who are responsible for productivity, quality, cost, and response time.

Sometimes, this cannot be avoided. At other times, it is the fault of a management team that is less than fully committed to safety and health. However, sometimes the fault rests squarely on the shoulders of the safety and health manager. This is because one of the most important responsibilities of this person is to convince higher management, middle management, supervisors, and employees that, in the long run, the safe and healthy way of doing business is also the competitive, profitable way of doing business. The next section explains several strategies for making this point.

Company-Wide Commitment to Safety and Health

In many cases, safety and health managers have been their own worst enemy when it comes to gaining a company-wide commitment. The most successful are those who understand the goals of improved

productivity, quality, cost, image, service, and response time and are able to convey the message that a safe and healthy workplace is the best way to accomplish these goals. The least successful are those who earn a reputation for being grumpy in-house bureaucrats who quote government regulations chapter and verse but know little and care even less about profits. Unfortunately, in the past, there have been too many safety and health managers who fall into the latter category. This is not the way to gain a company-wide commitment to safety and health, but it is a sure way to engender resentment.

Lack of Resources

Safety and health managers are like other managers in an organization in that they must compete for the resources needed to do the job. Often they find that their departments rank lower in priority than the production and operations departments (at least until a disaster occurs). Safety and health managers need to become proficient in showing the financial benefits of a safe workplace.

Today's safety and health manager must understand the bottom-line concerns of management, supervisors, and employees and be able to use these concerns to gain a commitment to safety and health. Figure 4–3 illustrates the essential message that competitiveness comes from continually improving a company's productivity, quality, cost, image, service, and response time. These continual improvements can be achieved and maintained best in a safe and healthy work environment.

Figure 4–3 Factors that produce competitiveness.

Figure 4–3 Full Alternative Text

Safety and health managers should use this message to gain a commitment from management and employees. Following are some strategies that can be used to get the point across.

Productivity, Quality, Cost, and Response Time

These four factors, taken together, are the key to productivity in the age of high technology and global competitiveness. The most productive company is the one that generates the most output with the least input. Output is the company's product. Input is any resource—time, talent, money, technology, and so on—needed to produce the product. Quality is a measure of reliability and customer satisfaction. Cost is the amount of money required to purchase the item. If all other factors are equal, customers will select the product that costs less. Response time is the amount of time that elapses between an order being placed and the product being delivered.

To compete in the global marketplace, industrial companies must continually improve these four factors. At the most fundamental level, successfully competing in the global marketplace means having

the best people and the best technology and getting the most out of both by applying the best management strategies.

Safety and health managers who understand this can use their knowledge to gain a commitment to their programs. In attempting to do so, the following five points are helpful:

If it is important to attract and keep the best people, a safe and healthy workplace will help.

If it is important to get the most out of talented people, it must be important to keep them safe and healthy so that they are functioning at peak performance levels (e.g., the best technician in the world can't help when he or she is out of action as the result of an injury or illness).

Employees cannot concentrate fully on quality when they are concerned for their safety and health.

Keeping industrial technologies up-to-date requires the continual investment of funds. Profits that are siphoned off to pay the costs associated with accidents, emergencies, and health problems cannot be reinvested in the latest technologies needed to stay competitive.

With the skyrocketing costs of medical care, workers' compensation, and litigation, it costs less to prevent accidents than to pay for them.

Image and Service

Image and service are also important factors in the competitiveness equation. Of the two, image relates more directly to safety and health.

In today's intensely competitive marketplace, a company's image, internal and external, can be a deciding factor in its ability to succeed. Companies that establish a solid internal image in terms of safety and health will find it easier to attract and keep the best employees. Companies that establish a solid external image with regard to environmental and product safety issues will find it easier to attract and retain customers.

Gaining a full and real commitment to safety and health in the workplace is one of the most important roles of the safety and health manager. Traditionally, safety and health managers have argued their

cases from the perspectives of ethics or government mandates. The ethical argument is as valid now as it has always been and should continue to be used.

However, in today's competition-driven workplace, managers responsible for the bottom line may resent arguments that are based on government mandates and regulations. On the other hand, these same managers may respond positively if they can be shown that resources invested in safety and health can actually improve a company's competitiveness. Using the points made earlier about productivity, quality, cost, image, and response time can go a long way in helping to gain management commitment to safety and health.

Education and Training for Safety and Health Managers

Advances in technology, new federal legislation, the potential for costly litigation, and a proliferation of standards have combined to make the job of safety and health professionals more complex than ever before. These factors have correspondingly increased the importance of education and training for safety and health managers. The ideal formula for safety and health professionals is formal education prior to entering the profession supplemented by in-service training on a lifelong basis afterward.

Universities, colleges, and community colleges across the country have responded to the need for formal education for safety and health managers as well as for other safety and health personnel. Many community colleges offer occupational certificates and associate degrees in applied science or science degrees with such program titles as industrial safety, occupational safety, environmental technology, safety and health management, and industrial hygiene.

Universities have responded to the need for formal education by making safety and health-related courses either optional or required parts of such bachelor's (or baccalaureate) degree programs as industrial technology, manufacturing technology, engineering technology, industrial engineering technology, industrial management, and industrial engineering. Some universities offer bachelor's degrees in industrial safety and health, occupational safety management, and industrial hygiene.

Formal education provides the foundation of knowledge needed to enter the profession. Having begun a career as a safety and health manager, the next challenge is keeping up as the laws, regulations, standards, and overall body of knowledge relating to safety and health grow, change, and evolve.

In-service training, ongoing interaction with professional colleagues, and continued reading of professional literature are effective ways to stay current. New safety and health managers should move immediately to get themselves "plugged into" the profession. This means joining the appropriate professional organizations, becoming familiar with related government agencies, and establishing links

with relevant standards organizations. The next section covers agencies and organizations that can be particularly helpful to safety and health managers.

Helpful Agencies and Organizations

Numerous agencies and organizations are available to help the safety and health manager keep up-to-date. These agencies and organizations provide databases, training, and professional literature. There are professional societies, trade associations, scientific organizations, certification boards, service organizations, and emergency service organizations. Those listed here represent only a portion of those available.

Certification boards. Professional certification is an excellent way to establish one's status in the field of safety and health. To qualify to take a certification examination, safety and health managers must have the required education and experience and submit letters of recommendation as specified by the certification board. Figure 4–4 contains the names and addresses of certification boards of interest to safety and health managers. Certification is covered in greater detail later in this chapter.

Figure 4–4 Professional certification boards.

Figure 4–4 Full Alternative Text

Professional societies. Professional societies are typically formed to promote professionalism, adding to the body of knowledge, and forming networks among colleagues in a given field. Numerous professional societies focus on various safety and health issues. Figure 4–5 summarizes some of these.

Figure 4–5 Professional societies.

Figure 4–5 Full Alternative Text

Scientific standards and testing organizations. Scientific standards and testing organizations conduct research, run tests, and establish standards that identify the acceptable levels for materials, substances, conditions, and mechanisms to which people might be exposed in the modern workplace. Figure 4–6 summarizes those of critical importance to safety and health managers.

Figure 4–6 Scientific standards and testing organizations.

Figure 4–6 Full Alternative Text

Government agencies. Many government agencies are concerned with various aspects of workplace-related safety and health. Some of the most helpful agencies for the safety and health manager are listed in Figure 4–7.

Figure 4–7 Government agencies.

Figure 4–7 Full Alternative Text

Trade associations. The purpose of a trade association is to promote the trade that it represents. Consequently, material produced by trade associations can be somewhat self-serving. Even so, trade associations can be valuable sources of information and training for safety and health managers. Figure 4–8 lists some of the trade associations that can be particularly helpful.

Figure 4–8 Trade associations.

Note: Complete addresses are available in the reference section of most college and university libraries. Most have Web sites that can be found on the Internet.

Engineers and Safety

Engineers can make a significant contribution to safety. Correspondingly, they can cause, inadvertently or through incompetence, accidents that result in serious injury and property damage. The engineer has more potential to affect safety in the workplace than any other person does. The following example illustrates this:

A car-pooler transports himself and three fellow employees to work each day. He is not a particularly safe driver and does not insist that his passengers use seatbelts. After running a red light, he crashes into the side of a building while swerving to avoid another vehicle. The two passengers wearing seatbelts are not hurt, but the driver and one other passenger, neither of whom were wearing seatbelts, are critically injured.

This brief story illustrates an accident that has two things in common with many workplace accidents. The first is a careless worker—in this case, the driver. The second is other workers who do not follow prescribed safety rules—in this case, failing to use seat belts. Employees such as these can and do cause many workplace accidents, but even the most careless employee cannot cause a fraction of the problems caused by a careless engineer. The following example illustrates this point:

An engineer is charged with the responsibility for designing a new seatbelt that is comfortable, functional, inexpensive, and easy for factory workers to install. He designs a belt that meets all of these requirements, and it is installed in 10,000 new cars. As the cars are bought and accidents begin to occur, it becomes apparent that the new seatbelt fails in crashes involving speeds over 36 miles per hour. The engineer who designed the belt took all factors into consideration except one: safety.

This brief story illustrates how far-reaching an engineer's impact can be. With a poorly designed seat belt installed in 10,000 automobiles, the engineer has inadvertently endangered the lives of as many as 40,000 people (estimating a maximum of 4 passengers per automobile).

The engineer's opportunity for both good and bad comes during the design process. The process is basically the same regardless of whether the product being designed is a small toy, an industrial machine, an automobile, a nuclear power plant, a ship, a jumbo jetliner, or a space vehicle. Safety and health professionals should be familiar with the design process so that they can more fully understand the role of engineers concerning workplace safety.

Not all engineers are design engineers. However, engineers involved in design are usually in the aerospace, electrical, mechanical, and nuclear fields. The following paragraphs give an overview of these design-oriented engineering fields as seen in the course descriptions of a college catalog.

Aerospace Engineering

The bachelor of science in engineering (aerospace engineering) program incorporates a solid foundation of physical and mathematical fundamentals that provides the basis for the development of the engineering principles essential to the understanding of both atmospheric and extra-atmospheric flight. Aerodynamics, lightweight structures, flight propulsion, and related subjects typical of aeronautical engineering are included. Other courses introduce problems associated with space flight and its requirements. Integration of fundamental principles with useful applications is made in design work in the junior and senior years. Thus, the program prepares the student to contribute to future technological growth, which promises exciting and demanding careers in aerospace engineering. Examples of concentration areas are: aerodynamics; design; flight propulsion; flight structures; space technology; and stability, control, and guidance.1

Electrical Engineering

Electrical engineering is a science-oriented branch of engineering primarily concerned with all phases and development of the transmission and utilization of electric power and intelligence. The study of electrical engineering can be conveniently divided into the academic areas of circuits, electronics, electromagnetics, electric energy systems, communications, control, and computer engineering.2

Mechanical Engineering

Mechanical engineering is the professional field that is concerned with motion and the processes whereby other energy forms are converted into motion. Mechanical engineers are the people who are responsible for conceiving, designing, manufacturing, testing, and marketing devices and systems that alter, transfer, transform, and utilize the energy forms that ultimately cause motion. Thus mechanical engineers are the people who make the engines that power ships, trains, automobiles, and spacecraft; they design the power plants that convert the energy in fuels, atoms, waterfalls, and sunlight into useful mechanical forms; and they construct intelligent machines and robots as well as the gears, cams, bearings, and couplings that facilitate and control all kinds of mechanical motion.3

Industrial Engineering

Industrial engineering is concerned with the design, improvement, and installation of integrated systems that include people, material, equipment, and energy. This field of engineering draws upon specialized knowledge and skills in the mathematical, physical, and social sciences in concert with the principles and methods of engineering analysis and design to specify, predict, and evaluate the results to be obtained from such systems.

Nuclear Engineering

Nuclear engineering sciences comprise those fields of engineering and science directly concerned with the release, control, and safe utilization of nuclear energy. Applications range over such broad topics as the design, development, and operation of nuclear reactor power systems to the applications of radiation in medicine, space, industry, and other related areas. The nuclear engineer, by virtue of his/her engineering and science-based training, is in a unique position to contribute to the many diverse aspects of this major component of the energy radiation field.4

Safety Fact

The Calculus Controversy in Safety and Health Programs

Many of the programs in colleges and universities that prepare safety and health professionals require calculus. Some practicing professionals in the field think that college programs require too much math and too little management, business, and international safety. These professionals argue that calculus has no value to them on the job, but that more business and management courses would. The opposing faction in the field continues to defend calculus as necessary and important. A third faction supports calculus and business management courses, claiming that the safety and health professional needs both.

Design Process

The design process is a plan for reaching a goal that proceeds in five sequential steps:

Problem identification. Engineers draft a description of the problem. This involves gathering information, considering constraints, reviewing specifications, and combining all of these into a clear and concise description of the problem.

Synthesis. Engineers combine or synthesize systematic, scientific procedures with creative techniques to develop initial solutions to the problem identified in Step 1. At this point, several possible solutions may be considered.

Analysis and evaluation. All potential solutions developed in the previous step are subjected to scientific analysis and careful evaluation. Such questions as the following are asked: Will the proposed solution satisfy the functional requirements? Will it meet all specifications? Can it be produced quickly and economically?

Document and communicate. Engineering drawings, detailed calculations, and written specifications are prepared. These document the design and communicate its various components to interested parties. It is common to revise the design at this point based on feedback from different reviewers.

Produce and deliver. Shop or detail drawings are developed, and the design is produced, usually as a prototype. The prototype is analyzed and tested. Design changes are made if necessary. The product is then produced and delivered.

The design process gives engineers unparalleled opportunities to contribute significantly to safety in the workplace and in the marketplace by producing products with safety built into them. However, in too many cases, the design process does not serve this purpose. There are two primary reasons for this:

In analyzing and evaluating designs, engineers consider such factors as function, cost, life span, and manufacturability. All too often safety is not even considered or is only a secondary consideration.

Even when engineers do consider safety in analyzing and evaluating designs, many are insufficiently prepared to do so effectively.

Engineers who design products may complete their entire college curriculum without taking even one safety course. Safety courses, when available to engineering students in design-oriented disciplines, often tend to be electives. This limits the contributions that design engineers can make to both product and workplace safety (Figure 4–9).

Figure 4–9 Design students should be required to study workplace safety.

Source: Pressmaster/Shutterstock

Safety Engineer

The title safety engineer is often a misnomer in the modern workplace. It implies that the person filling the position is a degreed engineer with formal education and/or special training in workplace safety. Although this is sometimes the case, typically the title is given to the person who has overall responsibility for the company's safety program (the safety manager) or to a member of the company's safety team. This person is responsible for the traditional aspects of the safety program, such as preventing mechanical injuries; falls, impact, and acceleration injuries; heat and temperature injuries; electrical accidents; fire-related accidents; and so on.

In the former case, the person should be given a title that includes the term “manager.” In the latter case, the title “safety engineer” is appropriate. However, persons with academic credentials in areas other than engineering should be encouraged to seek such positions because they are likely to be at least as well prepared and possibly even better prepared than persons with engineering degrees. These other educational disciplines include industrial technology, industrial engineering technology, manufacturing technology, engineering technology, industrial management, and industrial safety technology (bachelor’s or associate degree).

There are signs that engineering schools are becoming more sensitive to safety and health issues. Graduate degrees in such areas as nuclear physics and nuclear engineering now often require safety courses. The federal government sponsors postgraduate studies in safety.

Industrial Engineers and Safety

Industrial engineers are the most likely candidates from among the various engineering disciplines to work as safety engineers. Their knowledge of industrial systems, both manual and automated, can make them valuable members of a design team, particularly one that designs industrial systems and technologies. They can also contribute after the fact as a member of a company’s safety team by helping design job and plant layouts for both efficiency and safety.

Although industrial engineers are more likely to work as safety engineers than are engineers from other disciplines, they are not much more likely to have safety courses as a required part of their program of study. However, their focus on industrial systems and the integration of people and technology does give industrial engineers a solid foundation for additional learning through either in-service training or graduate work.

Environmental Engineers and Safety

A relatively new discipline (when compared with more traditional disciplines such as mechanical engineering) is environmental engineering. Environmental engineering deals with hazardous waste, water, waste water, and systems ecology.

With the addition of health concerns to the more traditional safety concerns, environmental engineers will be sought as members of corporate safety and health teams. The course work they take is particularly relevant since all of it relates either directly or indirectly to health (Figure 4–10).

Figure 4–10 Environmental engineers may now be part of the safety and health team.

Source: Comaniciu Dan/Shutterstock

A person with the type of formal education shown in Figure 4–10 would be a valuable addition to the safety and health team of any modern industrial firm. Environmental engineers typically report to the overall safety and health manager and are responsible for those elements of the program relating to hazardous waste management, atmospheric pollution, indoor air pollution, water pollution, and wastewater management.

Chemical Engineers and Safety

Increasingly, industrial companies are seeking chemical engineers to fill the industrial hygiene role on the safety and health team. Their formal education makes people in this discipline well equipped to serve in this capacity. Chemical engineers are concerned with physical changes of matter in processing operations.