The nation’s food products are susceptible to tampering or other malicious, criminal or terrorist acts. Threats to the food supply are very plausible. Many Transportation Practice Specialty members are involved in moving food from farm to processor or from processor to retail stores. Ensuring safe food within the processing plant, during transportation, in storage and at retail is vital to the protection of public health. This article examines the risks, and discusses action to be taken to prevent intentional attack on the food supply as outlined in U.S. Dept. of Agriculture’s “Food Safety and Inspection Service (FSIS) Food Safety and Security Guidelines for Transportation of Meat, Poultry, and Egg Products” and U.S. Food and Drug Administration Center for Food Safety and Applied Nutrition’s “Guidance for Industry Food Producers, Processors and Transporters: Food Security Preventative Measures.”

Food is susceptible to intentional or unintentional contamination from various physical, chemical, biological or radiological agents. Those responsible for transportation and delivery should implement security measures to ensure the safety of products throughout the farm-to-table food system. Many transportation companies have developed a security plan to address HazMat transportation. If your company handles food products or food ingredients, you should develop a plan to address food security risks as well.

**Food Security Plan**

**Assess Vulnerabilities**

- Identify a food protection management team and assign a leader to verify that required actions are effective and implemented.
- Develop a comprehensive transportation security plan and assess vulnerabilities using a recognized threat/risk/vulnerability model. A flow diagram from the point of ori-
gin to final destination, including all shipping modes/routes, is a helpful tool in this assessment.

- Identify all points of vulnerability where the potential for intentional adulteration or contamination to occur during the transportation and distribution operations exists.
- Identify potential biological, chemical and physical hazards.
- Determine whether control is possible at the point(s) of hazard and what is the most effective point to exert control. If control points are identified, determine the method, frequency and limit that must be met. This will determine where and how often monitoring and verification of limits should occur and what corrective and preventive actions should be taken.

**Develop & Implement Procedures**

- Implement identified security measures at each point to ensure protection of products from time of shipment through delivery to each destination.
- Create a system to identify and track the product at any time during transportation and distribution. Food establishment operators should develop a delivery schedule and not accept unscheduled deliveries or drivers, and must investigate missing or delayed shipments.
- Contracted transporters (maritime, air, ground or rail) and storage/warehouse facilities need to have a security program in effect.
- Include procedures for the immediate recall of adulterated products from trade or consumer channels.
- Establish a system to track salvaged, reworked and returned products.
- Include procedures for handling threats to and actual cases of product tampering.
- Establish an evacuation plan for the facility.
- Include procedures for safe handling and disposal of contaminated products. Identify where and how to separate suspect products.
- Document condition of product and packaging upon receipt at destination.
- Establish policy/procedure for rejecting packages and products that are not acceptable, cannot be verified against shipping papers or contain unacceptable changes to shipping documents. A monitoring and recordkeeping system is needed to document actions taken.
- Establish procedures/policy for allowing outside transportation employees (e.g., rail crew, truckers, etc.) to enter a facility and monitor their activities while on your property.
- Maintain the food security plan in a safe location and share on a “need to know” basis.

A food establishment operator should have emergency operation contacts in place, a notification procedure developed and have a media communication plan ready. The operator will need to train and test the plan. In addition, employees must be screened and educated about food security methods.

**Additional Guidance for Specific Modes of Transportation**

On average, 200 billion metric tons of food are shipped internationally each year; 60 percent by sea, 35 percent by land and five percent by air. Domestically, most food products are shipped by ground transportation—truck and rail. The food delivery system is intermodal in nature and each mode of transportation has unique security issues.

The guidance reviewed covers aviation, truck and maritime. However, let’s first review some general rules for all modes.

Contracted shippers and consignees should have security measures in place to ensure product integrity and traceability and should verify that they are meeting contractual security obligations. Basic security measures should include:

- Physical boundaries of facility or terminal are secure.
- Background checks are conducted for all potential employees at shipping, trucking and drayage companies.
- Positive identification system is in place for all employees.
- Security training and awareness program is conducted for all employees on how to prevent, detect and report suspicious activity.
- System is in place to track movement of products and truck, trailer and containers/vessels.
- Recordkeeping system is in place to document chain-of-custody; this aids in product tracing.
- System to detect tampering and radio-logical, biological and chemical agents in shipping containers should be in place.

- Policies and procedures are established for handling suspicious products.
- Steps are taken to ensure that all containers are properly secured at all times when held in storage yards.

**Aviation**

Although fewer food products are transported by air than other modes, it is still critical to ensure the security of these products when air is the mode of transportation used.

- Check all trucks entering a terminal facility.
- Trucks carrying meat, poultry and egg products should have seal logbooks and the seals examined and verified.
- Inspect containers arriving at the terminal for loading before admitting them to the terminal.
- Immediately report suspicious or inconsistent servicing of a container to terminal security.
- Design internal and external packaging so customers will be able to determine whether the product was tampered with and can immediately notify the food operation establishment. Contact information should be included in the packaging.
**Truck**

It is estimated that 21 million trucks transport products across the U.S. each day. Keeping containers secure is a huge endeavor since so many opportunities for tampering may exist.

- Develop and implement procedures for drivers to ensure security of the truck, trailer or container when stopping along the delivery route for meals, gas, repairs or rest.
- Transportation equipment should be designed and built to make locking and sealing easy and to permit inspection.
- Examine trailer doors to ensure that the trailer can be secured.
- Keep empty trailer doors locked at all times.
- Check product periodically during transit to ensure temperature is proper and that integrity of packaging is intact.
- Distributors and transporters should have emergency action plans that include notification of federal/state/local authorities, breakdown and reporting of suspicious activity.
- Train drivers on security precautions while enroute (e.g., no hitchhikers, do not discuss nature of cargo at stops, be aware of surroundings, lock truck, trailer or container when unattended and avoid low-lit areas).
- Train drivers to report unusual situations, such as being followed, to appropriate authorities.
- Develop procedures to follow when reefer boxes or trailers are found unlocked.
- Deter hijacking of cargo by keeping track of trucks. Ensure that hours-of-service logs are maintained and provide trucks with communication and tracking equipment.
- Hold drivers accountable for ensuring that security measures are taken to prevent contamination of food products like meat, poultry, eggs and produce while being stored at the trainyard or on a rail siding for any length of time.
- Inspect locks/seals on boxcars at pull and place operations.

- Review shipping documents upon arrival at trainyard and before the train engineer leaves.
- Inspect integrity of seals upon arrival and before departure of the load.
- Dedicate boxcars for food products only to reduce chance for contamination.

**Maritime**

Ports are vulnerable due to their size, accessibility by water and land, location in metropolitan areas and quantity of products moving through them. Approximately 80 percent of U.S. imports arrive via American seaports, yet U.S. Customs physically inspects only a fraction of all containers; the remainder are electronically screened. Therefore, additional security measures are necessary for products shipped by sea.

- Check all trucks entering a terminal facility. Trucks carrying meat, poultry and egg products should be sealed, drivers should have seal logbooks and the seals should be verified.
- Seals should be removed in the presence of terminal personnel so they can verify seal number and its integrity.
- Report suspicious or inconsistent servicing of a customer container to terminal security immediately.
- Supervise opening of ship hatches.
- When unloading product from sea-going vessels, inspect seals for evidence of tampering. A documentation system should be in place.
- Document cutting of seals (e.g., when seal is cut for inspection by government official).
- Shipping line agents should provide importers and customs brokers with a record of vessel discharge and checks at discharge and in transit.
- Establish policy and procedures to download reefer electronic information during inspection (this will allow terminal personnel to be alerted for anomalies).
- Establish a reporting system when discharging of any product looks suspicious or the product shows evidence of tampering.
- Lock the terminal facility during meal breaks and at night.
- Close facility doors immediately after the truck/trailer pulls away from the dock.

Effective Dec. 11, 2003, food importers are required to provide FDA with advance notice of human and animal food shipments imported or offered for import. This allows FDA to know, in advance, when specific food shipments will be arriving at U.S. ports of entry and what those shipments will contain. With this advance information, FDA, working with U.S. Customs and Border Protection, can more effectively target inspections and ensure the safety of imported foods.

Prior notice must be received and confirmed electronically by FDA no more than five days before arrival and, as specified by the mode of transportation below, no fewer than:

1) two hours before arrival by land by road;
2) four hours before arrival by air or by land or by rail;
3) eight hours before arrival by water;
4) time consistent with the timeframe established for the mode of transportation for an article of food carried by or otherwise accompanying an individual if it is subject to prior notice. (The food must be accompanied by the FDA confirmation.) In addition, prior notice must be received and confirmed electronically by FDA before food is mailed by international mail. (The parcel must be accompanied by confirmation of FDA receipt of prior notice.)

Protecting the nation’s food distribution network is essential to homeland security. The issue of food security within transportation is critical. Transportation entities must develop security plans to reduce the potential for product tampering, adulteration or terrorism threats.

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**Additional Resources**

- American Assn. of Railroads [www.aar.org](http://www.aar.org)
- American Trucking Assn. [www.trucking.org](http://www.trucking.org)
- Food and Drug Administration [www.cfsan.fda.gov/~dms/secguid6.html](http://www.cfsan.fda.gov/~dms/secguid6.html)
- Transportation Security Administration [www.tsa.dot.gov](http://www.tsa.dot.gov)
- U.S. Customs [www.customs.usagov.gov](http://www.customs.usagov.gov)
- U.S. Postal Service [www.usps.com/cpm/fip/pubsh/pub166/welcome.htm](http://www.usps.com/cpm/fip/pubsh/pub166/welcome.htm)
- World Health Organization [www.who.int/fsf](http://www.who.int/fsf)

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W
whether we are teachers, train-

ers or consultants (or all

three), our goals are to pro-

due to improve the delivery of safety topics.

1) Establish clear objectives and

expectations at the beginning of your

course, class period or presentation.

Course objectives should delineate pre-

cisely what students will be able to do as

a result of taking the course. Your expecta-

tions should be clear and help students

and participants anticipate what you

expect to accomplish, and how you plan

d to do it (the agenda). Refer to your objec-

tives often throughout the course and

ensure that you are doing what it takes to

achieve them.

2) Explicitly couch and frame your

material for students. Put specific con-

tent into the proper context. Consistently

relate topics to overall course objectives,

and to recent classes or discussions.

Explain how the topic is relevant in the

world today. It may be clear in your mind

how specific topics fit into the overall

materials, but students may not be so clear unless you spell it out.

Vagueness can be a problem for teachers

who have a high level of expertise and

may be teaching something they have
done for years. As a result, they often fail
to fully explain the background and forget
to put their material into relevant context;
this makes it more difficult for many stu-
dents to follow.

3) Use powerful stories and examples
to illustrate your points. Stories can bring
dry points to life and help students better
understand the meaning of materials. You
may want to work on improving your sto-

telling skills. Stories need not be lengthy,

but the richer one can detail them and

make them relevant to topics, students will
not only have a better understanding of the
materials, but the topics will also be more
memorable. I don’t know whether any research has
assessed stories as a memory

aid, but it seems logical that students are more likely
to remember those points

poignantly illustrated by the instructor. For

example, if teaching about safety regula-
tions, you might illustrate the need for the

regulation by telling a story of an injury or

fatality that occurred because the regulation
was not in place or was not followed.

If you are working with an experienced

audience, you can also solicit stories from

them and keep on their experience.

4) Consider using some form of prob-

lem-based learning to meet your objec-
tives. Many disciplines are successfully
using problem-based learning (PBL) in

their classes. The idea is to present the
class or individual groups within your class
with a specific problem they need to solve.

One form of PBL is a case study that does
not reveal the ending—students need to
solve the problem. It may be rather com-
plex and require some time (more than one
class period) and research to solve.

Consider using real cases such as actual
problems that occurred in industry
some time ago or problems currently
being experienced by an organization.

You may even be able to work in conjunc-
tion with individuals from an organization.
The class and students may not be
paid as a consultant would, but they could
help solve the problem just like a consul-
tant—all with the benefit of the learning.

Working to solve these problems and case
studies makes a greater impact (including
real or simulated experience) on student
learning than simply reading materials
and listening to lectures.

5) Make classes and presentations

light and entertaining. For educational
purposes, light and entertaining is better
than dark and overly serious. Do not take
yourself too seriously either, as students

and participants are not positively
impressed with an instructor’s inordinate
effort to impress. Certainly, safety is a
serious subject, but that should not pre-
vent learning from being entertaining.

Depending on the topic, consider using
games for learning. One of the most pop-
ular sessions I’ve ever done (based on
student feedback) is Safety Jeopardy.

Students request and ask when the game
can be played again, and it appears to
help students learn materials better before
exams. Developing the material for the
game requires extra time and preparation,
but it is enjoyable and rewarding for
everyone when done well.

6) Thoroughly cover one, two or

three topics during a session. This is pre-
ferred to just touching briefly on a large
number of topics. Even this article, for
example, would probably be more memo-
rable if there were just two or three main
points instead of 10 or 12. I learned from
one of my mentors (Dr. Charles Byers at
the University of Kentucky) while working
on my doctorate that it can be effective to
cover one topic during a class—go into
great detail, ask questions, encourage
debate and have students write about that
topic. I’ve also learned that most of my
better conference presentations are those
that cover fewer items while the less-effec-
tive presentations tried to cover too many
ideas and had too many slides.

7) Recognize that students and audi-
ences reflect or mirror the instructor’s
mood, energy level and enthusiasm.

This is a powerful principle when it
comes to teaching and presenting. If you
are a teacher and have received com-
ments on student evaluations that you are
not enthusiastic about your teaching,
these evaluations may not be accurate.

Perhaps you are highly enthusiastic
about teaching and about the subjects you
teach. However, if you are particularly
dry or slow in delivery, then students will
perceive that you are not enthusiastic
about the subject. This may be your style
or perhaps at times you have been tired or
not adequately prepared. If you smile and are positive, your students/audience will reflect smiles to you and be positive.

If you project the belief a session will be enjoyable and meaningful, and express that you are enthusiastically looking forward to it, your audience will do the same. A nervous instructor tends to make for a nervous audience. If you do not feel you have anything useful or meaningful to offer in a particular presentation, participants may simply get up and leave because they are likely to feel the same way. Certainly, there are exceptions. An individual may think the material is boring no matter how interesting the instructor tries to make it. Perhaps that student should consider another major.

8) Be a greater facilitator of learning and less a lecturer of material. Encourage discussion and questions, set up small group activities with meaningful objectives, let students and audiences know that you expect participation. In Safety Management: A Human Approach, Dan Petersen notes that studies show that lecture is the least effective method for learning. My recommendation is not that you avoid lectures, but that you intersperse brief (e.g., 15-minute) lectures with other activities. Even during miniature lectures, encourage discussion and questions. Ask your own questions and expect audience participation. Unless you are a world-class lecturer, my advice is to steer clear of 90-minute or even 45-minute lectures.

9) Encourage and allow students and audiences to give you and others answers. Do not provide all the answers yourself or, worse yet, pretend you are the source for all the answers. Do not act like you think you know all the answers. Pretending to know all the answers is a heavy load to carry. One of my mentors, Dr. Scott Geller, observes that good leaders do not know all the answers, but they know what questions to ask. A good teacher knows the questions to ask to get students to think, to stimulate analysis and answers. To get better-quality answers, let students know before the class that you will ask them questions about the topic and that you expect them to provide intelligent answers (or even to give brief reports to their classmates).

Another technique that works well is to divide the class into groups, write the questions on the board or display, and have each group discuss then share their best thoughts with the rest of the class. Instructors should be generous with praise when good answers are given and tactful with correction if the answer is not what the instructor was seeking. No one likes to be embarrassed in front of peers. It is the instructor’s responsibility to establish an open atmosphere that is conducive to learning—one that is relaxed and devoid of fear or embarrassment.

10) Use peer evaluations. Many of us to think we are better instructors than others think we are. Do not be afraid to have peers evaluate your instruction and provide feedback. Although many instructors appear reluctant to volunteer for peer evaluation, I’ve found it can be very helpful. Choose someone with experience, someone you respect, who is sensitive and will provide honest feedback. Peer evaluation can be highly beneficial to the instructor who listens and makes needed changes.

I have learned a lot from respected evaluators, including things I did not even realize before receiving the feedback. For example, I learned from Dr. Jennifer Robinson, director of The Scholarship of Teaching and Learning at Indiana University, about the PBL technique. Robinson visited my class and said while I was teaching at a high level, I could improve the effectiveness of my teaching with the addition of PBL, which I subsequently researched and began using in my courses.

11) Use self-evaluation. Another mentor, Dr. Mohammad Torabi at Indiana University, is department chair for Applied Health Science and is highly respected in his field and at the university as a chancellor’s professor. One question he asks himself after he teaches a class is, “If I were a student in my own class, would I enjoy the class and learn from it?” It is more difficult for us to see ourselves objectively than for others to see us as we are, but we can still observe our own methods and effectiveness of execution, then make systematic improvements based on self-observation.

12) Solicit ideas from others to improve your teaching techniques and delivery effectiveness. Network and learn from others in ASSE’s Academic Practice Specialty. Do not ever stop learning. Just as leading organizations are learning organizations, so are leading teachers learning individuals. If we work intelligently at it, we can continually improve our teaching and presentation effectiveness.

Speaking of continuous improvement, I would like to solicit your ideas—either additional ideas or more detailed thoughts about my recommendations. Contact me at blair@indstate.edu.

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General Liability: The “Other” Construction Safety Issue
By Tom Land, M.S., CSP, and Ted Wilburn, CSP

What’s the name of that other kind of insurance—general something?” Unfortunately for many construction companies, that sort of question arises all too often in senior management conversations. More often than not, the risk management focus is on workers compensation as management believes that it has the greatest potential for a positive impact on workers and the company’s bottom line. This is natural since the workers’ compensation premium is frequently one of a company’s largest fixed expenses. As a result, it’s what many safety people associate with construction, insurance and risk management.

That other kind of insurance—general liability—addresses risk management issues of which SH&E professionals may not be as familiar. General liability claims, however, can be significant and result in dramatic negative consequences for a company. How big? Search the Internet and you will find references to costs in the millions of dollars. Research your company’s loss history and what you find may surprise you.

A definition of commercial general liability insurance is that it provides a company financial protection for damages they may be held legally liable to pay to others. This legal requirement to pay originates from the insured’s actions or negligence. These claims may involve bodily injury, property damage, personal and advertising injury, medical payments and/or other supplemental issues addressed in the specific policy.

Specific operations that can yield general liability claims include traffic control, construction defects, exposures to the general public, trench/excavation work and falls on the construction site. This article discusses the importance of general liability risks; hazards to look for; and control measures that may help a company manage this exposure. This discussion by no means addresses all general liability risks or controls, but it does cover items of importance for construction companies of all types and sizes. It is not an insurance lesson; it is more of a profit center improvement article.

Loss of Business
Consider this scenario. Your company rents a commercial office building and lot that is next to a new project under construction to use as office space and storage of small equipment, tools, etc. You sign a lease or rental agreement for a specified period of time and amount, say for two years at $800 a month. Next door is an attorney’s office. On the third week of your lease, someone leaves the coffee pot on in your office and during the night a fire breaks out. The building and all of its contents are a total loss. The fire department needs to cut down a large tree to provide access to the fire and to keep it from spreading, and it falls across the front of the law office’s door. The tree does not damage that building, but the entire area, including the front of the law firm, is behind a police barricade for three days while the cause of the fire is investigated.

Your company’s property loss in the fire is covered by property insurance, subject to policy terms and conditions. No employees were injured so there would be no workers’ compensation claim. But how about the rented property? That’s right—general liability insurance would cover this. Property damage is designed to cover costs resulting from physical damage to tangible property and loss of use of tangible property regardless of damage. So general liability coverage, if you have it, would repair or replace the building within the limits on your policy.

What about the law office next door? This example illustrates what a general liability hazard might be—damage, destruction or loss of use to the tangible property of others. Is this something that anyone in your company has addressed? What can you do to help prevent such claims? A few suggestions would be:

• Make every effort to contain project-related activity to within the project boundaries.
• Conduct a risk assessment prior to making the decision to rent a location. Address factors such as age, condition, fire issues, fire protection availability and neighboring property.
• Remember that tangible property can include automobiles, boats, etc. Make sure your equipment is configured so that it does not protrude into traffic lanes, over waterways or in any manner have the potential to impact or be impacted by the general public.
Mold
An example of an extremely expensive type of claim currently prevalent in the construction industry involves mold/mildew—a “construction defect” type claim. For example, the general contractor has the building (you pick the type/size) almost ready for turnover, just interior and exterior finish work remain. A severe afternoon thunderstorm hits and drops four inches of rain in just over two hours. Since finish grading has not started, runoff rainwater backs up into the building. During the follow-up inspection mold is found not only in areas wet from the storm, but also from leaking water pipes located behind drywall.

So what is the problem? Mold, perhaps. Is it serious? It can be serious, especially if the owner decides not to accept the building. What can be done about it? After it is present, the cure can sometimes require removal and/or restoration of moldy material, treatment of surfaces with biocides, and testing to confirm the mold has been addressed, all of which can be expensive and time-consuming. The resulting lost time and increased expense are exactly what you do not want in construction.

Two main causative factors are associated with mold that can be addressed: moisture and stagnant air. Both can be defended against to a certain extent by preplanning and implementation of preventive actions such as the following:

• Once the building is out of the ground, slope the exterior grade so that drainage is away from the structure, something contractors often wait until the last minute to do.
• Ensure all pressurized water systems are tested, double-checked for leaks and documented before wall coverings are installed.
• After unusual events that might shake the building, such as earthquake, hurricane or nearby explosions, retest the water systems for leakage.
• Start interior finish work only in areas that are dried in.
• Protect construction materials from exposure to moisture—for example, store wallboard off the floor on wooden runners and cover the stack with plastic.
• Keep water out of the building. Install the roof covering and windows as soon as possible, and ensure that roof drains are unobstructed and functional.

• The less air movement the better. Mold grows in areas where moisture may collect and air tends to be stagnant. Install temporary air movers to provide circulation.

Work Zones
Another example of a prevalent general liability issue in construction involves work next to streets and roads and in construction work zones. This can range from an HVAC service company truck parked alongside a building to a multi-mile interstate construction/renovation project. Work zones put the general public in close proximity to the construction process—creating the potential for major general liability problems. A further complication is that the general public is driving. Accident statistics indicate driving skills are less-than-optimal to begin with. Throw in the rush hour, talking on a cell phone, etc., and you can begin to have serious problems.

Some street and road construction exposures that insurance claims handlers frequently encounter include the following:

• Construction equipment protruding into the roadway, frequently rotating equipment such as cranes or track-hoes.
• Signs or markers installed improperly or, perhaps more frequent, damaged but not repaired.
• Lane striping left in place after lane changes are made.
• Traffic cones and barricades knocked down but not replaced.
• Mud/gravel tracked onto the roadbed causing skids.
• Dust obscuring the vision of drivers.
• Concrete slurry/paint overspray dropped on passing vehicles, often below.
• Slow-moving contractor vehicles pulling into traffic without adequate clearance or the benefit of an acceleration lane.
• Employee-owned vehicle damage.

This list illustrates the complexity of safely conducting work zone operations. What can you do about it? First, make line management aware of the risks. They must understand that eliminating general liability issues means more dollars reach the bottom line. This is the point where you will get their buy-in and full support, the absolute critical foundation for success in the safety business.

Secondly, develop a plan to address specific problems you anticipate in your project. For example:

• Evaluate your work for exposures where vehicular traffic is in close proximity.
• Establish and enforce designated parking areas that are well removed from heavy equipment operations so employee-owned vehicles do not get damaged (this holds true for any project).
• Ensure that your company has persons adequately trained to recognize and correct problems in work zones.
• When traffic controls are in place designate a “competent person,” often the superintendent, to inspect and document, several times daily, the inspection results and all corrective action taken. Include provisions for weekend and holiday inspections as these are the times when traffic may be the heaviest.
• Ensure that rotating equipment operates within boundaries established as safe work zones.
• Remove or cover any potentially confusing lines, stripes, markings or signs when shifting traffic.
• If you use a vendor to handle work zone issues, make certain your contract establishes the frequency of inspections and repairs, and the corresponding documentation to meet project needs.
• Plan and conduct hazard recognition and specific safety training for all employees exposed to work zones. Ensure that safety training addresses exposure to traffic, both from the general public and from construction activities. Discuss issues to look for during the work day such as how to report observed issues. Good planning and preparation are the key.
• Plan for the driver who doesn’t see very well, is easily confused and is talking on the cell phone, because that person will perhaps be driving through your project.

Injuries to the Public
Another general liability exposure contractors have to contend with on the job is injuries to the public. This will include the general public, vendors and other nonemployees such as the person who slips into your jobsite just to see what is there. Common public injuries are those resulting from a slip, trip or fall.

Controlling the work surfaces and maintaining excellent housekeeping will continued on page 8
these are serious problems if children can get to them. The legal term for this sort of exposure is “attractive nuisance,” defined as a structure or artificial condition that is especially attractive to trespassing young children and which might pose a danger to them. The contractor has a legal duty to take great care to guard young children from such dangers.

Other potential general liability hazards presented by trenching and excavation operations include damage to existing buildings, roadways and underground utilities. When excavating adjacent to existing buildings and roadways, make sure that shoring plan is adequate (engineered, written and implemented) and that written consent is obtained from the adjacent property owners. In some cases, a pre-excavation survey of buildings adjacent to the jobsite may be warranted to prevent any potential liability claims.

Utility locator services should always be used before digging and extra precautions should be taken when working around known utilities. Hand digging may be required to locate an underground line and you may also want to use your own locator devices to double check against the locator service. If a line is struck by accident, photos should be taken showing the relationship/distance between the locator’s markings and the strike. Another best practice is to video the route that your excavation will take, before work commences. This video should document all pre-existing conditions, such as cracked driveways, dead or dying trees/shrubbery, etc. This simple precaution may ward off many potential general liability claims that arise during and after your work has been completed.

Conclusion
This article has addressed some prevalent general liability risks facing the construction industry. If a company has an exposure that could involve people or property outside itself, it may fall into the category of general liability. Training management to better manage potential issues through recognition, implementation of the proper control measures and documentation is the key to control much as it is in workers’ compensation.

Can general liability losses be controlled? Rick Caprario, corporate director of risk management and safety of Berg Electric stated that in 1996 Berg Electric had a fleet of 140 vehicles, operated in three states and had about $2.5 million in liability claim cost. “Focusing on general liability issues provides the loss prevention/control representative the opportunity to impact the bottom line of a company, as well as impact the primary reasons for employee-related injuries,” Caprario says. “I call this the back door approach. If you ‘sell’ your ideas as ways to improve production and eliminate destructive and costly GL issues, you will create an environment where selling safety becomes an improvement upon production, retention, marketability and overall expense.”

The result of his leadership? In December 2004, Berg Electric operated a fleet of 430 vehicles in 17 states and had liability-related claim costs of approximately $55,000 for the year. Over the previous six years, the company’s general liability claim loss has averaged $60,000 per year. That is quite an accomplishment for his company and an example to the industry of what can be accomplished.

For additional information about general liability issues, contact your company’s insurance agent/broker and/or its loss control representative.

The authors do not guarantee the accuracy of this information or any results and assume no liability in connection with this publication, including any information, methods or safety suggestions contained herein. This publication cannot be assumed to contain every acceptable safety and compliance procedure or that additional procedures might not be appropriate under the circumstances. The subject matter of this publication is not tied to any specific insurance product nor will adopting these procedures ensure coverage under any policy.

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People establish consulting practices for a variety of reasons. Some choose to become a consultant to work part-time from a home-based office while raising school-aged children or caring for an ailing parent. If you have been laid off from corporate positions, the title “consultant” feels better than saying you are “unemployed” or “between jobs.” Some people enjoy doing essentially the same work that is done by employees within organizations, but they prefer to work off-site and/or to work with several companies instead of just one. Some people offer consulting as an extra service to help their product-oriented business make more profit. You certainly are not alone if you established your consulting practice in response to working for an oppressive manager in a corporate position.

Then there are those who view consulting as a profession with its own set of skills that warrants specific education, training and business plans to guide the growth of the practice. A subset of these people become consultants to address a need in the marketplace—to solve a problem.

Be Honest with Yourself
The overwhelming majority of consultants really have what could be called “incorporated careers” instead of true businesses. If your primary purpose is to freelance, you might want to follow some of the steps taken by people who are looking for part-time jobs. They keep their résumé current, and they respond to want ads. They stay in contact and network with a group of people within key companies in their industry, and assignments come primarily through word-of-mouth referrals. You probably will have the chance to do projects based on your references and sometimes on a corporation’s need to control the head count and the cost of benefits.

The growth of a consulting practice is limited if it is defined by the availability, abilities and interests of a single person. How large can your practice really get if you will not travel more than one hour from your home, refuse to take on research projects, will not learn new software applications or prefer to take Fridays off? With time allotted for vacation, holidays, illness, marketing, sales and administration, a solo practitioner may realistically have only about 1,250 hours available to do any work for clients full-time. It is not surprising then that the overwhelming majority of independent (solo) consultants bring in less than $125,000 per year in gross revenue. The $125,000 per-year practice is essentially averaging $100 per hour in fees.

Set Aside Time to Be President
If you want to grow your consulting practice, it helps to address “positioning” questions. Do you want to be viewed as a provider of a range of related services for companies within a specific industry, or do you want to be known for your unique approach or method and apply it across a range of industries? Will the reputation of your consultancy be defined by your style or personality? Will a geographic area define your practice? The best growth strategies for a consulting firm that wants to “own” an industry are very different from the strategies for a local consulting firm that is defined by style.

How would you answer these questions? If your formal education was not in business, you may not know. The temptation of most solo consultants is to continue to work on client projects and to avoid this strategic question.

Instead of avoiding these questions, it is important to schedule time to address them. You may need to read some books about positioning. You may want to inter-view other business owners and professional colleagues about how they answered their positioning questions. In other words, set aside time to work as a business owner/president, even if you will always be a solo consultant.

You will also want to reflect on your reasons for having a consulting practice. Is there an underlying philosophy involved? Is there a set of problems that you wish to address? Are you trying to correct a wrong? Is your interest in advancing a technology?

You will want to review your past consulting assignments to learn which clients received the most value, wanted you to do more, were most satisfied, were the most profitable for you and referred you to others. It is easier to grow a consulting firm when its true purpose is related to market needs.

Also, you will want to look at market trends. What is your competition doing? What problems will your customers face a few years from now that they will not be able to address on their own? What questions will warrant the objectivity of an outside consultant? What issues transcend an individual client? What skills should you be developing now to be more prepared to assist customers tomorrow?

Your role as the president/business owner of your consulting practice includes market research. If your past training and experience does not include market research, you will need to set aside time to read, learn when surveys are indicated, decide when a few phone calls will suffice, obtain resources for studies and determine how much detail is necessary. This is especially important for those of you who are trying to broaden the identity of your firm.
include things that are expected in the marketplace. They may not directly attract a customer to you, but their absence could kill a deal. For example, it is expected that a consultant:

- be listed in major directories;
- be a member of an industry association;
- have appropriate certifications and licenses;
- have professional-looking business cards and stationery;
- have a website that conveys biographical information, a list of services, testimonials and case studies.

These background music elements will not change very often.

The wording in your directory listings, association lists, printed materials and website should reinforce your desired positioning. If you want to be known as a safety expert for the pharmaceutical industry, then you should provide references from within that industry and include a slogan or tagline that mentions the pharmaceutical industry.

As the Digital Age advances, the list of things that are expected from consultants has increased. Today, a consultant is expected to have authored some articles for trade publications, websites and association newsletters. Providing timely information on your website used to be viewed as unique, but it has quickly become “expected.”

**Project Your Competitive Advantage**

The melody of your marketing symphony will convey your competitive advantage. If you are a safety expert within the pharmaceutical industry, your melody elements will convey why someone should select you over other safety experts in the industry.

The melody elements come in the form of more direct communication from the consultant to the marketplace. For example, the speeches you provide at conferences are part of the melody. Direct-mail pieces that go beyond form letters sent to thousands of people would be part of your melody. The gifts you give customers and the elements of your website that go beyond “brochure-ware” can also be part of the melody. Display advertisements in trade journals, your approach to entertaining and media appearances are all part of the melody as well.

The melody elements of your marketing often require more thought and preparation than the background music. Most consultants do not have enough time and money to do 20 different melody elements, but it is often best to select only three or four key things to do in a way that is unique to you. If you want a memorable melody that will keep your marketing consistent, persistent and consistent.

My company’s marketing program has included carefully selected birthday gifts for our clients. This would not be a good marketing approach for every consultant, but in our case, we wanted to convey that our clients are our “customers for life.” Unlike accountants, we do not provide services for our clients on a constant basis. We try to stay in touch with our clients so that they will think of us and invite us to help them when they consider their next major move.

The melody elements of your marketing program can come in many different forms. You can hold special events, become a media personality, conduct research, lead philanthropic efforts, publish a magazine or sponsor a major award. Whatever you choose to do, it is important to sustain the effort. By the time you have become bored with the masthead of your newsletter or with your association projects, most people will not have even noticed them.

Remember that people are preoccupied. The first time prospective buyers receive a direct mail piece from you, they are too busy to even see it. Then they may actually notice the announcement of a speech you are giving. Then a reprint of an article you wrote does not get read but is instead set aside. Then they pass up an invitation to participate in research you are conducting, but they did notice who was doing the research. Then they hear you on a talk radio program and decide to enter your name into their database. However, you still do not receive a call. You get the idea. Most marketing experts claim that it takes six to seven marketing impressions before a prospective buyer even considers responding.

If you think that your competitive advantage is that your consulting firm is “fast,” you will want speed to be projected in your company’s name, speech titles, advertising themes, writing style and website pace.

### Return on Investment

**Hypothetical Example**

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dollar volume desired</td>
<td>$200,000</td>
</tr>
<tr>
<td>Budget available for marketing</td>
<td>$20,000</td>
</tr>
<tr>
<td>Number of consulting assignments desired</td>
<td>20</td>
</tr>
<tr>
<td>Value of a typical consulting assignment</td>
<td>$10,000</td>
</tr>
<tr>
<td>Number of prospects needed to get one assignment</td>
<td>5</td>
</tr>
<tr>
<td>Dollar value of a prospect</td>
<td>$2,000</td>
</tr>
<tr>
<td>Number of leads needed to attract one prospect</td>
<td>10</td>
</tr>
<tr>
<td>Dollar value of a lead attracted by marketing</td>
<td>$200</td>
</tr>
<tr>
<td>Number of leads needed (20 x 5 x 10)</td>
<td>1,000</td>
</tr>
</tbody>
</table>

### Protect Your Competitive Advantage

Business opportunities are lost every day by consultants who convey the promise of a competitive advantage in their marketing messages, then fail to back up that promise with consistent management practices. For example, a firm may send conflicting messages when it promises that it is “fast,” but then may have a slow voicemail system or may not return telephone calls right away.

If your competitive advantage is that you are similar to your prospective customers, your marketing should play up your background. It should include photos of you with people your prospects know. Your gifts should be a bit more personal or fun, and your messages should convey a sense of familiarity.

Another consulting firm with a competitive advantage of “thoroughness” might have marketing messages that emphasize credentials, awards, licenses and certifications.

In addition to being a skilled consultant, are you fun to work with? An adver-
tising agency client of mine had the competitive advantage of being “fun.” The agency’s brochures and advertisements were as good as or better than its competitors’, but the true edge came from the agency’s humor, employees’ ease with people and their love for their work.

If your marketing promises that you use cutting-edge technology and are a leader in your industry, are you investing in continuing education? Do you hire only well-educated people who enjoy continuous learning? Does your compensation program reward the development of new techniques?

Measure Your Return on Investment in Marketing

Too many business people, including many experienced solo consultants, view marketing as just an expense. In actuality, marketing is an investment with measurable results. If you want to grow your consulting firm, it pays to learn how to measure return on investment in marketing and how to make time to actually do it.

How many consulting assignments do you want? What is the dollar value of an average consulting assignment for your firm? How many proposals must you present to prospective clients to get one consulting assignment? How many leads does your marketing need to attract to bring you one prospect?

It helps to keep track of where your leads come from. How did a lead first learn about you? Who is making referrals to you? If your marketing did not attract 250 leads/inquiries last quarter, it could be that you are lost in marketing activities that do not generate leads.

The first place to look is your association-related networking. We all know consultants who go to association meetings, attend conferences, participate in committees, then do not have any consulting leads. If this happens to you, it may be helpful for you to obtain some guidance on how to turn association networking into real business.

If you are not generating the number of leads that you need, you may want to review your list of associations. It is wonderful to network with your consulting friends in professional associations, but from a marketing standpoint, it is even more important for a consultant to be visible at events that serve the consultant’s customers. If you are a safety expert in the pharmaceutical industry, you will want to attend and speak at conferences for pharmaceutical executives and have articles published in journals that pharmaceutical executives read.

If your marketing is not attracting the needed number of leads, you may also want to review how you communicate with your past customers. Are you keeping inactive clients informed about your new services? Do you follow up with them to see what new needs they have? Are you asking for referrals?

Also, if your marketing is not attracting enough inquiries, review what people receive from your business. How do you maintain communication with people who have attended one of your speeches? Who receives reprints of articles that you have written? Are there people in your database who have heard from you only once? How does your business interact with members of associations between conferences? Who is notified when you are scheduled to give a speech at a conference? Who do you invite to attend an event with you? Who do you nominate for awards? Who do you invite to serve as a panelist with you?

Get Help with Marketing

We all know consultants who would rather just focus on serving their customers. Maybe you are one of those people. However, being a good consultant is usually not enough to drive the growth of a consulting practice. Fortunately, there are marketing consultants available who specialize in the needs of other consultants.

Strategies That Complement Your Desired Positioning

Today, it seems more popular for consultants to do whatever they can to avoid having employees. I have seen consultants tolerate poor-quality service from subcontractors just so that they did not have to face the responsibility of being an employer. In some ways, I am convinced that the trend toward “virtual” everything has gone a little too far when it comes to consulting practices. I have found that it pays to employ people to perform the core elements of your consulting practice and to save subcontractors for the type of work that your clients occasionally need.

If you decide to grow your consulting practice by hiring other consultants, associates or assistants, it pays to learn more about “billing multipliers,” the difference between a senior consultant and a junior associate and when to use performance bonuses and commissions. Although a consulting company grows primarily through capable people who provide quality service and solid marketing, it is helpful for consultants to learn how to execute growth strategies such as acquisitions, joint ventures, roll-ups, geographic expansion, channel control, equity deals, initial public offering, licensing and franchising.

Enjoy Growing Your Business

It is important for consultants to learn how to grow their practices, but it is also

continued on page 12
Choosing a Safety Integrity Level Assignment Method

By Kimberly A. Dejmek, PE, CFSE

In Feb. of 1996, the Instrumentation, Automation and Systems Society (ISA) approved a standard, Application of Safety Instrumented Systems for the Process Industries ANSI/ISA 84.00.01-1996; in 2003, the International Electrotechnical Commission (IEC) promulgated IEC 61511, Functional Safety: Safety Instrumented Systems for the Process Industry Sector. One basic concept of these standards is the definition of the safety integrity level (SIL) for each safety instrumented function (SIF) within the safety instrumented system (SIS). The SIL defines the safety performance criteria for the function, and assigning the target requires a measure of system criticality. Although SIL is a key concept in the implementation of the standards, the development of a method for determining the target SIL has been left in the hands of the owner/operator. Both documents provide guidance on this topic and include several example methods that should be considered, including qualitative, semiquantitative and quantitative risk analysis techniques.

Table 1 (pg. 12) presents the safety integrity level in terms of the probability of failure on demand (PFD). Several factors must be considered when selecting the appropriate method for a given situation or for inclusion in a corporate standard. Setting the target SIL requires integration into existing conceptual design and process hazards analysis (PHA) procedures, as well as alignment with the company’s existing risk management philosophy.

Available Methods
Six generally accepted methods are used for SIL assignment: modified HAZOP; consequence-only; risk matrix (two- and three-dimensional); risk graph layers of protection analysis (LOPA); and quantitative assessment. Several articles and papers have been written describing the details of these methods (see references). Only a brief overview of each is provided here.

Modified HAZOP
The modified HAZOP method, which is introduced in Annex A of the ISA standard, is a purely qualitative SIL assignment technique. As a part of the normal HAZOP process, the team will identify existing SIF or the need for additional SIF protection [Dowell (b)]. In cases where an SIF is deemed necessary, the team will then consider the severity of the consequences, the probability of event occurrence, and the expected risk reduction from existing engineering and administrative controls. When all of these factors are considered collectively, the team will come to a consensus as to the appropriate safety integrity level.

Consequence-Only SIL Assignment
This method is also purely qualitative, requiring only the consideration of the potential consequences of a process event. Consequences can be defined in terms of the potential safety, environmental and economic impact associated with the event. Table 2 (pg. 12) provides an example set of definitions. Because the initiating event frequency, the availability of protection layers and the probability that a dangerous event develops are not considered, this method can produce conservative results. However, this can be offset by the ease of application and the time saved in assigning SIL targets.

Risk Matrix
The risk matrix method is based on the qualitative evaluation of the potential event consequences and likelihood. A team of process and operations specialists will evaluate each safety function, first describing the potential consequences of the event, then developing a severity ranking.
Typically, a risk matrix will have three to five severity ratings that span the range from minor impact to catastrophic event. As in the consequence only method, severity rankings can be defined for environmental and economic effects, as well as the on-site and off-site safety consequences.

Following the development of the safety severity, the team will investigate the causes of the event, the safeguards (other than the SIS under consideration), and the event sequence in order to estimate the likelihood that the consequences will occur. A set of likelihood rankings will be defined to represent the range of possible event frequencies. After listing the potential causes and protection layers, the team will select the appropriate likelihood ranking.

Using the severity and likelihood rankings together, the risk matrix will be applied to determine the target SIL. Based on their corporate risk tolerance, SIL, SIS philosophy, and ranking definitions, each corporation must determine the relationship between the rankings and the SIL. Figure 1 (pg. 13) depicts a sample risk matrix.

The risk matrix is a widely accepted tool for the qualitative evaluation of risk. Many companies use a form of the risk matrix as a part of their PHA in order to determine whether existing engineering and administrative controls provide sufficient risk reduction, or whether additional safeguards should be recommended. Although familiarity with the method could be considered a benefit, the application of the risk matrix to the selection of a target SIL is somewhat different to that used in a PHA, which may increase confusion.

Another variation of the risk matrix method is also used in the determination of target SIL. Called the Safety Layer Matrix in Annex A of the ISA standard, this method incorporates a third variable, protection layers, in addition to the severity ranking and the frequency ranking.

When applying this method, the evaluation of the frequency ranking does not include any protection layers. The frequency ranking only considers likelihood of the event causes and external events that occur for the consequences to be realized. Any risk reduction is addressed through the application of the protection layer ranking.

To be considered in this ranking, the systems must meet the definition of a protection layer (CCPS). Typically three levels of protection layer rankings are considered. These are either based on the amount of risk reduction provided by the protection layers (low, medium, or high) or on the number of protection layers that exist other than the SIS under consideration.

RRiisskk  GGraapphh

IEC standards 61511 and 61508 provide an alternative method to the risk matrix called risk graph. This method provides an SIL correlation based on four factors:

1) consequence (C);
2) occupancy (probability that the exposed area is occupied) (F);
3) possibility of avoiding the hazardous event (P);
4) frequency of the unwanted occurrence (W).

This method is a qualitative technique that requires definitions of each parameter to be developed to ensure that the four parameters are properly chosen by the assignment team. In addition to the consequence and event likelihood that are part of the basic risk matrix, the risk graph focuses attention on the evaluation of the risk to an exposed individual. The four factors are evaluated from the perspective of a theoretical person being in the incident impact zone at the time of the incident.

Once these factors are determined, the risk graph is used to determine the associated SIL. This method requires a multidisciplinary team to ensure that the four parameters listed earlier are properly chosen. Figure 2 depicts a sample risk graph.

**Layers of Protection Analysis**

Layers of protection analysis (LOPA) is a semiquantitative method of risk analysis. The consequence evaluation remains qualitative, as in the previously described methods. The evaluation of the event likelihood is quantitative, based on “order of magnitude” estimates of the initiating event frequency and the availability of the pro-

---

**TABLE 1**

<table>
<thead>
<tr>
<th>SIL</th>
<th>Target Average PFD</th>
<th>Availability (1-PFD)</th>
<th>Target Risk Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1 to 0.01</td>
<td>0.90 to 0.99</td>
<td>&gt;10 to ≤ 100</td>
</tr>
<tr>
<td>2</td>
<td>0.01 to 0.001</td>
<td>0.99 to 0.999</td>
<td>&gt;100 to ≤ 1,000</td>
</tr>
<tr>
<td>3</td>
<td>0.001 to 0.0001</td>
<td>0.9999 to 0.9999999</td>
<td>&gt;1,000 to ≤ 10,000</td>
</tr>
<tr>
<td>4</td>
<td>0.0001 to 0.00001</td>
<td>0.999999 to 0.9999999</td>
<td>&gt;10,000 to ≤ 100,000</td>
</tr>
</tbody>
</table>

**TABLE 2**

<table>
<thead>
<tr>
<th>SIL</th>
<th>Example of the Consequence-Only Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Potential for minor injuries. No environmental damage, release less than reportable quantity. Production and capital loss less than $50,000.</td>
</tr>
<tr>
<td>2</td>
<td>Potential for serious injuries requiring hospitalization. Repairable environmental damage or release of reportable quantity. Production and capital losses between $50,000 and $1 million.</td>
</tr>
<tr>
<td>3</td>
<td>Potential for on-site fatality or multiple serious injuries. Environmental damage requiring long-term clean-up effort. Production and capital losses between $1 million and $10 million.</td>
</tr>
<tr>
<td>4</td>
<td>Potential for multiple on-site fatalities or one or more off-site fatalities. Significant environmental impact that may threaten right to operate. Production and capital losses greater than $10 million.</td>
</tr>
</tbody>
</table>

continued on page 14
tection layers. The basic concept of LOPA is summarized in the following steps:

1) Identify impact events, determine the types of impact and classify event severity.
2) List causes for each impact event.
3) Estimate the frequency of each initiating cause.
4) List the protection layers (PLs) for each cause-consequence pair.
5) Determine the PFD for each PL.
6) Calculate the mitigated frequency for each cause-consequence pair.
7) Sum the frequencies for each cause-consequence pair that will place a demand on the SIS.
8) Compare the total mitigated event frequency to the acceptability criteria for the associated event severity classification.
9) Determine SIL based on required risk reduction or identify other risk reduction measures, if required to meet the risk acceptability criteria [Dowell(b)].

Quantitative Risk Assessment (QRA)

The quantitative approach to SIL assignment is the most rigorous technique. Quantitative evaluation of both the consequences and the event likelihood are possible, however, typically the consequence evaluation remains qualitative. The event likelihood is calculated by modeling the combined influence of the potential causes, protective system and any external events that are required for the consequence to be realized. This information can be used to construct and quantify a fault tree or event tree.

This method is quite similar to that described for LOPA, except that specific failure rate data are used in place of the “order of magnitude” estimates and any necessary external events are considered, in addition to the risk reduction provided by the various protection layers.

These external events allow all of the steps in the event sequence to be quantified. This includes probabilities of events such as immediate or delayed ignition, individuals present in the hazard zone, atmospheric conditions that will support the development of an explosive mixture, and release size sufficient to lead to undesired consequences. Quantitative analysis is sometimes the only method that will allow complex events with multiple causes and protection layers to be evaluated. The method does require a thorough understanding of the event sequences and data for each basic event.

Method Selection

The development of a corporate approach to the assignment of target SIL requires the consideration of several factors related to the corporate culture, risk management philosophy and staffing. Some of these factors include:

- the existing corporate risk management philosophy;
- the level of process complexity and understanding;
- consistency and experience of the assignment team.

Each method has unique strengths and limitations that will influence the selection decision.

One of the first decisions is the choice

![Figure 1: Sample Risk Matrix](image1)

<table>
<thead>
<tr>
<th>Consequence Severity Ranking</th>
<th>Catastrophic</th>
<th>Major</th>
<th>Moderate</th>
<th>Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>N/A</td>
</tr>
<tr>
<td>Infrequent</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>N/A</td>
</tr>
<tr>
<td>Occasional</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Often</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

![Figure 2: Sample Risk Graph](image2)

- **C** = Consequence parameter
- **F** = Exposure time parameter
- **P** = Probability of avoiding the hazardous event
- **W** = Demand rate assuming no protection

---

The arrangement is specific to the applications to be covered by the risk graph.

Legend:
- **a** = No special safety requirements
- **b** = A single SIL is not sufficient

1, 2, 3, 4 = Safety integrity level

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between qualitative and quantitative risk assessment. One of the most important steps in the development of a quantitative method is establishing risk acceptability criteria. Once these criteria are established for each consequence severity ranking, it is plausible that they would be applicable to far more than the evaluation of SIS. Therefore, this decision should be consistent with the corporate risk management philosophy. If both safety and economic consequences are being considered, the risk acceptability criteria will make possible the comparison of the corporation’s valuation of life and health and monetary considerations. This decision can have far-reaching affects and should be made with careful deliberation.

The type of process under consideration is another factor that can influence the effectiveness of the various techniques. Processes that are very complex or novel may warrant the use of the quantitative methods, since the qualitative evaluation of risk may be too difficult. The use of the quantitative tools reduces the reliance on the team’s ability to simultaneously consider all potential event sequences, allowing each sequence to be taken independently.

Another appropriate yet quite different approach to complex or novel processes, is the use of the consequence-only method. Teams that have a limited understanding of the process under study can successfully apply this simple method. The application of risk matrix and risk graph methodologies requires a thorough understanding of the potential event sequences and sufficient operating experience to estimate both the consequences and likelihood of these events. Therefore, these methods may not be appropriate for all situations.

The final item that may influence the selection of an SIL assignment method is the expected composition of the team. If it is expected that the method will be consistently applied throughout the company by teams with varied facilitators, experiences and operating philosophies, then a more rule-based method is indicated. Methods such as consequence-only, LOPA and QRA will provide a more consistent result. Modified HAZOP risk matrix and risk graph can be applied successfully using teams with varied membership; however, some consistency is needed either through the meeting facilitators or core team members. The instructions that are typically prepared to aid in the use of these methods are usually insufficient to produce consistent results without some overlap in participants from study to study.

Conclusion

Given the numerous approaches in use for the assignment of SIL for safety instrumented systems, corporations are able to select a method that is consistent with their risk management philosophy and corporate culture. In this time of mergers and joint ventures, there may be many different philosophies and cultures within a single operating entity. Hence, an approach that includes numerous methods, allowing the most appropriate to be selected for each application, should be considered.

References


C

Civil and criminal environmental cases raise significant issues for environmental consultants regarding the protection of attorney/client privileged communications and work-product (“privileges”). While the work-product doctrine is not technically a privilege, courts and commentators have loosely referred to it as both a privilege and a doctrine. See B. Berman, Florida Civil Procedure, §280.3 (2003 Edition). It is, therefore, important for environmental consultants to have a basic understanding of the applicability and scope of these privileges. For instance, clients can rarely successfully assert that oral or written communications are privileged when an environmental consultant has been retained as a testifying expert. Consulting experts, on the other hand, are afforded much broader protection from disclosure of oral and written communications, particularly if certain protocols are implemented. This article is intended to provide an overview of these privileges and illustrate protocols that can be established in order to preserve these privileges in litigation, enforcement or other legal proceedings. (Consultation with the law of the jurisdiction in which the matter arises is also critical in establishing appropriate protocols as the laws vary between states, and state law can also deviate from federal law.)

Attorney/Client Privilege

The attorney/client privilege protects “confidential disclosures by a client to an attorney made in order to obtain legal assistance.” [Fisher v. U.S., 425 U.S. 391, 403 (1976).] A lawyer is a person authorized, or reasonably believed by the client to be authorized, to practice law in any state or nation. [Fla. R. EVID 90.502(1)(a).] A client includes any person, public officer, corporation, association, or other organization or entity, either public or private, who consults a lawyer for the purpose of obtaining legal services, or who is rendered legal services by a lawyer. [FLA. R. EVID 90.502(1)(b).] The privilege belongs to the client, not the attorney, and can be waived voluntarily by or for the client or involuntarily by any participant in the communication.

Importantly, if the communications include or are disclosed to third parties, the communications are usually not privileged because there is no reasonable expectation of privacy. [Olson v. Accessory Controls & Equip. Corp., 757 A.2d 14, 22 (Conn. 2000).] However, the presence of certain third parties, who are agents or employees of an attorney or client, and who are necessary to the consultation, may not destroy the confidential nature of the communication. [Olson v. Accessory Controls & Equip. Corp., 757 A.2d 14, 22 (Conn. 2000).]

Nevertheless, “courts that have considered the application of the attorney/client privilege to independent outside consultants have been cautious in extending its application.” [U.S. Postal Serv. v. Phelps Dodge Refining Corp., 852 F. Supp. 156, 161 (E.D. N.Y. 1994).] (Attorney/client privilege did not apply to documents prepared by environmental consultant who was hired by corporation to formulate a remediation plan acceptable to the regulatory agency and to oversee remedial work at the property.)

Accordingly, when an environmental consultant’s report is made in the course of the consultant providing environmental services to the company, and not for the purpose of assisting the law firm in providing legal advice to the corporation, the attorney/client privilege generally will not apply. [In re Grand Jury Matter, 147 F.R.D. 82, 85 (E.D. Pa. 1992).] In fact, according to one court, “there are few, if any, conceivable circumstances where a scientist or engineer employed to gather data should be considered an agent within the scope of the privilege since the information collected will generally be factual, obtained from sources other than the client.” (Phelps Dodge Refining Corp., 852 F. Supp. at 162.) The privilege has, however, been applied to protect environmental reports from disclosure where the corporation’s attorney clearly retained the consultant to perform confidential services in anticipation of possible litigation. (Olson, 757 A.2d at 28.) In Olson, the consultant was retained by the corporation’s counsel after the corporation had received an order from the state department of environmental protection requesting information and a remedial plan concerning the storage, disposal and removal of hazardous waste at the plant, and the engagement letter clearly stated that the services being provided were confidential.

Work-Product Doctrine

While the attorney/client privilege applies to communications between an attorney and client, the work-product doctrine applies to certain documents and papers of an attorney or party prepared in anticipation of litigation regardless of whether they pertain to confidential communications with a client. [The leading case on the work-product doctrine is the U.S. Supreme Court decision in Hickman v. Taylor, 329 U.S. 495 (1947). Subsequent to Hickman, most states have amended their rules of civil procedure to include the work-product doctrine.]

There are two types of work-product materials: fact work-product and opinion work-product. Fact work-product refers to facts, documents, statements or other information compiled by the attorney in preparation for or in anticipation of litigation. [In re Travelstead, 212 B.R. 505, 508 (Bankr. D. Md. 1997).] Opinion work-product...
consultant that he was being hired for the
counsel specifically told the environmental
under criminal investigation and outside
corporation was notified by EPA that it was
been retained by outside counsel after the
ficantly, the environmental consultant had

87 (E.D. Pa. 1992)

protected from disclosure as work-product.
alleged violator and the authorities are not
posed methods of remediation, summaries
plans to regulatory authorities, tables com-
activities by experts and consultants carried
mental claims, factual reports and compila-
not consider such material protected by the

The work-product doctrine protects only
the documents themselves from being dis-
and not the underlying facts, [See Maloney, 165 F.R.D. at 30 (W.D. N.Y. 1995).] If an attorney intends to introduce the
information at trial, courts usually will
not consider such material protected by the
work-product doctrine.

Generally, in the context of environ-
mental claims, factual reports and compila-
tions, such as the documentation of
activities by experts and consultants carried
out for the purpose of preparing remedial
plans to regulatory authorities, tables com-
piled from testing done at the site, pro-
posed methods of remediation, summaries
of meetings, communications or telephone
conversations between regulatory authori-
ties and expert consultants or between the
alleged violator and the authorities are not
protected from disclosure as work-product.
[In re Grand Jury Matter, 147 F.R.D. 82, 87 (E.D. Pa. 1992).]

Recently, however, the Ninth Circuit
Court of Appeals held that the district court
erred in holding an environmental consul-
tant in contempt for refusing to provide
documents in response to a grand jury sub-
poena requesting production of “any and
all records relating in any way to any work
completed by you or your company con-
cerning the disposal of waste material or
any material whatsoever from Ponderosa
Paint . . . from Jan. 1, 2000, through the
present.” [In re Grand Jury Subpoena, 357 F.3d 900, 906 (9th Cir. 2004).] Signi-
ificantly, the environmental consultant had
been retained by outside counsel after the
corporation was notified by EPA that it was
under criminal investigation and outside
counsel specifically told the environmental
consultant that he was being hired for the

“purpose of assisting him in preparing a
legal defense on behalf of Ponderosa.” (In
re Grand Jury Subpoena, 357 F.3d at 905.)
The Ninth Circuit held that the documents
prepared by the consultant constituted
work-product stating, in pertinent part:
The documents are entitled to work-
product protection because, taking into
account the facts surrounding their cre-
at, their litigation purpose so perme-
ates any nonlitigation purpose that the
two purposes cannot be discreetly sepa-
rated from the factual nexus as a whole.
(In re Grand Jury Subpoena, 357 F.3d at 909-910.)

According to the court, the mere fact
that the consultant prepared documents
while serving a dual purpose—he assisted
with preparation of a defense and acted as
the environmental consultant on the cleanup—did not preclude the application
of the privilege. A contrary result was
reached, however, where the evidence
demonstrated that the consultant—who
was also a testifying expert—was hired
directly by the corporation to conduct
environmental studies and testing, and to
oversee remedial work on the property.
[Coastline Terminals of Connecticut Inc.
v. U.S. Steel Corp., 221 F.R.D. 14, 16 (D.
Conn. 2003).] Under these circumstances,
the documents were not privileged.
[Coastline Terminals of Connecticut Inc.
v. U.S. Steel Corp., 221 F.R.D. 14, 16 (D.
Conn. 2003). See also, FED. R. CIV. P.
26(b)(4) which provides that a party may
obtain full discovery of testifying experts.
However, a party may obtain discovery
pertaining to experts not expected to testi-
fy only upon a showing of exceptional
circumstances rendering it impracticable
to obtain facts or opinions on the same
subject by other means.]

The Self-Critical
Analysis Privilege
The self-critical analysis privilege provides
protection for internal reports assessing
individual or entity compliance with laws
and regulations that were intended, at
the time of initiation, to be confidential
The rationale underlying the privilege is to
encourage monitoring and compliance with
the law. While the privilege has frequently
been claimed in securities cases, it is now
being asserted in environmental litigation.

The purpose of the report is critical in
determining applicability of the privilege.
Accordingly, the report will not be privi-
leged if it is prepared for the purpose of
obtaining technical environmental data
rather than for the purpose of seeking legal
advice. Typically, the privilege extends
only to subjective opinions and conclu-
sions contained in a written report, not the
objective facts that may have been com-
piled as part of the report. [In re Air Crash
Near Cali, Columbia on Dec. 20, 1995,
959 F. Supp. 1529, 1532 (S.D. Fla. 1997.)]
While some courts have recognized a privi-
lege for internal reports that evaluate a
company’s historical compliance with
environmental regulations, others have
rejected it. [Reichhold Chems., Inc. v.
Teextron Inc., 157 F.R.D. 522, 527-528
(N.D. Fla. 1994) granting privilege and
containing a discussion of courts that have
not recognized the privilege]. Extensive
consultation with counsel experienced in
environmental litigation should be under-
taken before relying on the protections of
the self-critical analysis privilege.

Additionally, some states have enacted
legislation establishing privileges and/or
immunities relating to internal environ-
mental audits. While EPA is opposed to
state legislation granting privileges and
immunities with respect to environmental
audits, it has adopted policies that are
intended to act as compliance incentives to
encourage self-auditing and voluntary
reporting. These polices set forth eligibility
criteria for mitigation of penalties. [EPA
Audit Policy, “Incentives for Self-Policing:
Discovery, Disclosure, Correction and
Prevention of Violations,” 65 FR 19,618;
www.epa.gov/compliance/resources/policies/incentives/auditing/audit
policy.pdf.] These policies are not binding
on EPA, and do not guarantee privileges or
immunities. Thus, a corporation or other
organization may satisfy all eligibility
requirements and not receive any mitiga-

Methods of
Protecting Privilege
Organizations should consult extensively
with experienced counsel before relying
on the protections of the attorney/client,
work-product or self-critical analysis privi-

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17
 Evidence-Based Risk Prevention Strategy
A Success Story for an Integrated Healthcare Organization

By Eric Meittunen, M.S.; Sharon Mercill, RN; Jeff Nesbitt, B.S., ASP; Al Ottjes, CST; Elizabeth Thompson, RN; Steve Sobczak, M.I.S., CSP, CIH

Each day 2,000 workers experience eye injuries on the job (Professional Safety). One industry particularly challenged to reduce the frequency of eye injuries is healthcare, especially in the surgical environment. Although healthcare workers have extensive knowledge about potential exposure to biological agents—blood and body fluids (BBF)—in surgical areas, studies have shown that protective eyewear usage is inconsistent. Multiple factors complicate and may even inhibit the use of protective eyewear that includes standard of operating procedures, lack of consequence for not using eye wear, comfort, accessibility, peer/mentor influence and management role modeling.

The first step to protect staff is to assess the work area for exposures and then to promote compliance with a protective eyewear program (Professional Safety). This article explains the status of the use of protective eyewear in the surgical setting; reviews influencing factors in improving the use of protective eyewear; and introduces an observational sampling instrument that may be used to evaluate the level of protective eyewear use in operating rooms.

Introduction
National Safety Council reports that work injuries cost $131.2 billion in 2000, exceeding the combined profits of the top 13 Fortune 500 companies (www.nsc.org/lrs/statstop.htm). According to Bureau of Labor Statistics, 5.7 million injuries were reported in 2000, resulting in a significant burden to society (www.bls.gov/iif/oshwc/osh/os/ostb0988.pdf). The service industry contributed to the total with an incidence rate of 5.1, the third-highest among nine industries. Healthcare contributes to these incidents with a high number of exertion, sharps, and blood and body fluid (BBF) exposures. A recent study by National Surveillance System for Hospital...
Healthcare Workers (NaSH) reported that in the 60 hospitals participating in a BBF exposure study, 29 percent of the exposures occurred in operating rooms; 12 percent of these reported incidents were exposures to the mucous membranes. Nurses experienced 43 percent and physicians 29 percent of the blood and body fluid exposures (Figure 1).

Another study including data from 14 hospitals noted that 67 percent (504/755) of reported incidents by body part were to the face and head. The protective eyewear use reported in this study included goggles one percent, eyeglasses (nonprotective) one percent and eyeglasses with side shields one percent (www.hsc.virginia.edu/medcntr/centers/epinet/bbf99.html).

To prevent incidents of this type, the NIOSH Healthcare Worker Guidelines recommend that “if there is a potential for splashes, protective eyewear or face shields should be worn” (NIOSH).

Methodology
A study was conducted at a major medical center in the Midwest, which included the surgical suites within two hospitals, in order to evaluate the level of splash protection and to identify the factors affecting the use of eye protection devices. One hospital has 59 operating rooms, the other 45. Surgeries are performed on alternating staff day operating schedules. The incident data for this medical center supports the need to improve BBF exposure protection for staff in the surgical environment. The majority of splash incidents in the surgical suites in 2000 and 2001 involved BBF exposures during surgical procedures (Figures 2 and 3, pg. 19).

A subgroup of the Surgical Services Safety Committee conducted the study to evaluate the level of protective eyewear use. The process to evaluate and improve

continued on page 20
the use of protective eyewear included the development and implementation of a plan with a timeline, result measures, and collaboration with management to hold the gains. Table 1 details several specific steps.

The questions asked by the group during the planning process were: Why should we focus on this project? Why are staff not wearing the protective eyewear? What have other organizations done to solve the problem? The answer to the first question was that incident numbers supported the project, and it was thought that protective eyewear would be an appropriate place to begin a long-term injury reduction effort. Further investigation revealed that the protective eyewear available was uncomfortable to wear and inaccessible, and the procedure noted only that staff should wear the protective eyewear when an exposure is expected. The surgical safety committee worked with the safety department to find more comfortable eyewear options and placed the options on an intranet site with descriptions, images of the products and ordering information. In addition, when visitors to the surgical suite sign out a locker, they are handed the protective eyewear.

The new procedure raised the level of expectation to: When the patient is present, the eyewear should be worn. Finally, a literature search turned up few examples of successful healthcare protective eyewear programs.

The next step for the subgroup was to develop an observational sampling instrument that would offer a quick method for evaluating the level of compliance in the surgical suite areas (Figure 4). The observational sampling instrument was used to establish a baseline and subsequent measures on a semester basis. Staff were not notified of the time/date for the observational sampling.

Results
The results indicated that a process-oriented collaborative approach facilitated the implementation of a protective eyewear program within the operating environment. The main objective was to evaluate the status of protective eyewear use in the surgical setting, identify and overcome factors inhibiting the use of protective eyewear, and develop an observational sampling instrument to facilitate evaluation of the level of protective eyewear use in the operating environment.
Conclusion
Healthcare workers continue to experience a number of BBF splashes, particularly in the operating room environment. It is difficult to implement engineering controls to reduce the number of these splashes, thus establishing a protective eyewear program that addresses the factors which inhibit the use of protective eyewear is critical for healthcare organizations. Our successful process incorporates a collaborative approach including consideration of the psychosocial factors influencing the use of the protective eyewear.

Initially the observational sampling instrument was developed to measure the nonphysician health staff. The instrument was later modified for use in gathering data on other employee groups as well. The data are shared among all of the leadership groups in the surgical departments. Future studies will measure the use of protective eyewear by various employee groups over time including nonphysician, MD/resident and anesthesiology.

References


NIOSH. NIOSH Healthcare Guide. Appendix 5, pg. 7.


The authors are staff members at the Mayo Clinic, Rochester, MN. Nesbitt, Meittunen and Sobczak are ASSE members. For more detail on the subject of this article, see Meittunen, E., et al’s “Splash Protection in the Surgical Environment; Influencing Factors and an Observational Instrument to Evaluate Compliance.” Journal of Healthcare Safety, Compliance and Infection Control. 1(2): Spring 2003.

Industrial Hygiene for Dummies
By Mark D. Hansen, P.E., CSP, CPE, CPEA

Every time someone mentions the word industrial hygiene, our (SH&E professionals) collective heads begin to hurt and Excedrin headache #124 ensues. SH&E professionals are much more accustomed to dealing with hazards in the workplace than with illnesses that intermittently appear. As a result, we are not nearly as comfortable dealing with illnesses as we are with injuries.

What You Need to Know
Regardless of what industry sector you work in, at some point industrial illness will need to be addressed. What’s a SH&E professional to do? Well, here’s what I do. I examine the extent of the issue and either take action myself if it is within my realm of understanding, or I call my friendly neighborhood CIH. I do this to protect the company as well as my professional future. As a P.E. and CSP, I must ethically stay within my discipline and know where my expertise ends and another begins. This is in the best interest of the employee and the company, as well as my career.

When deciding to take action, I ask several questions:
• What chemical, physical and biological hazards are associated with the task?
• What will the hazards do to the worker?
• How does a worker know whether s/he is being exposed?
• How does the worker protect himself/herself?

Fundamentals of Industrial Hygiene
Industrial hygiene is the health discipline that deals with the recognition, evaluation and control of workplace environmental factors that can cause sickness, impaired health, or significant discomfort and inefficiency among workers.

Recognition
The first step in providing a healthy work environment is to develop the information needed to recognize and identify potential health hazards. Then, a hazard evaluation can be performed to determine whether controls are necessary. Following are some basic details on the recognition of potential health hazards in the workplace.

Environmental Factors
Environmental factors with the potential to become health hazards in the workplace include:
1) Chemical hazards. Employee exposures to chemical hazards can occur from inhalation of excessive airborne concentrations of dusts, gases, vapors, mists or fumes. Additionally, some chemicals can irritate the skin or eyes upon contact, or can be absorbed in toxic amounts through intact skin.

2) Physical hazards. These exist in the forms of excessive levels of noise, extremely hot or cold temperatures, vibration, microwaves or ionizing radiation.

3) Ergonomic hazards. Employee exposures can occur from improperly designed tools or work environments. Eye strain from computer monitors and carpal tunnel due to repetitive motions are two common examples.

4) Biological hazards. This type of hazard includes insects, molds, fungi and bacteria that may be present in the working environment.

Chemical Hazards
Employees can be exposed to chemical hazards in the form of solids, liquids or gases used in the workplace. Some chemicals are irritating or corrosive (cause tissue destruction) to skin and eyes if sufficient contact occurs. Solids and liquids can also be harmful if ingested (swallowed). If the chemical can penetrate intact skin, it can produce a toxic effect from skin or eye contact.

For contact or ingestion hazards, industrial hygiene precautions are usually aimed at identifying where these hazards occur.
and establishing procedures to prevent harm, such as using PPE.

Many chemicals can become airborne and be inhaled into the body where they can cause irritation or have a toxic effect. For some highly toxic materials, skin contact with airborne concentrations can allow enough material to penetrate the skin to cause a toxic effect. An important part of industrial hygiene is designing and conducting air monitoring studies to evaluate employee exposures to these airborne materials.

Air contaminants exist in several states in the workplace. The chemical or physical state influences the mode of entry into the body and possible toxic effect. The most important types of contaminants are:

- Vapors are the volatile form of substances that are normally solid or liquid at room temperature. The usual source of vapors is evaporation of a liquid such as a light petroleum product.
- Gases are formless fluids that expand to fill the space they occupy. Gases are usually stored under pressure to confine them. Natural gas, hydrogen and oxygen are examples.
- Particles are solids or liquids dispersed in air that have definite form. Examples are dust, fumes, smoke, aerosols and mist.

**Toxicity**
Recognizing potential health hazards in the work environment also requires some understanding of the health effects of substances or factors on the body (i.e., the toxicity of the substances). Following is some basic information on some important toxicity issues.

**Factors that Affect Toxicity**
The effect of exposure to an airborne contaminant depends on its state (whether it is solid, liquid or gas), the inherent toxicity of the material and the degree of exposure. Factors involving toxicity and degree of exposure will be discussed.

For particulates, such as fumes and dust, particle size is an important factor in exposure. Only certain diameter particles can reach and be retained in the lungs when inhaled. For example, most inhaled particles greater than five micrometers in diameter will be captured on the sticky mucus lining in the respiratory tract and never reach the lungs. Extremely small particles can reach the lungs where they either dissolve and enter the stream or remain as particles in the lungs.

The behavior of inhaled gases and vapors depends on the solubility in the body’s fluids. Very soluble ones, such as ammonia gas, begin being absorbed in the nose and other upper airways as soon as they enter the body. Ammonia thus causes irritation throughout the respiratory tract. Gases and vapors with low solubility can reach the lungs and sometimes pass into the blood stream to be carried to other organs of the body. They can cause such toxic effects as lung damage, kidney or liver damage, or central nervous system depression (drowsiness, headache) depending on their toxic nature and the magnitude of exposure.

**Acute & Chronic Effects**
A chemical substance can be classified on the basis of how fast it causes a toxic effect in the body as follows:
- Acute, meaning that there is a noticeable effect following a relatively brief exposure to a high concentration;
- Chronic, meaning that the effect occurs only after long-term (perhaps over many years) exposure to low concentrations of the material.

A special case of an acute hazard is a work atmosphere that is “immediately dangerous to life or health.” This term is used in selecting respiratory protective devices; it refers to an atmosphere that could cause death or serious harm to an unprotected worker. It can occur due to either high contaminant levels or a lack of sufficient oxygen to sustain life. Workers entering an atmosphere that is or could become immediately dangerous need to be equipped with a self-contained breathing apparatus so they can escape without harm. An important part of safety and industrial hygiene programs is identifying possible immediately dangerous atmospheres.

**Toxicity vs. Hazard**
“Toxicity” is the capacity of a substance to do harm or produce injury to a living organism. “Hazard,” on the other hand, is the probability that the toxic effect will occur and depends on the amount (dose) of substance received by the worker as well as the toxicity of the material.

For example, a toxic chemical may be hazardous to handle as a fine powder

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<th>FIGURE 1</th>
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<td>Hazard Severity</td>
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<tr>
<td>How Often</td>
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<th>FIGURE 2</th>
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<td>Hazard Probability</td>
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<th>TABLE 1</th>
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<td>Chemical</td>
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<td>1,3-Butadiene</td>
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<tr>
<td>Formaldehyde</td>
<td>B</td>
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<tr>
<td>Toluene</td>
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<tr>
<td>Xylene</td>
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that can be released into the air and inhaled, but relatively nonhazardous to handle as a large chunk since inhalation cannot occur. The toxicity of this material is the same in both cases, but the hazard is not.

The inhalation dose of a chemical received by a worker depends on two factors:

1) concentration: the amount of chemical in the air that the worker breathes;
2) time duration of exposure: whether the worker breathes the contaminated air for a few minutes per day or the entire shift.

The dose an employee receives (also referred to as the exposure received) can be expressed as follows:

$$Dose = concentration \times time.$$ 

The exposure thus depends on both the concentration and the length of exposure.

**Are You Being Exposed?**

Potential exposure indicators include smelling a peculiar odor, seeing a vapor, touching a liquid, hearing area monitors/alarms and physical reactions (e.g., rash, burns).

Many chemicals carry an identifying odor. For example, cyanide smells like almond and H₂S smells like rotten eggs. These odors can alert you to potential exposures in the workplace. When you see a white cloud in the workplace, don’t assume it is steam, it just may melt your safety glasses and hard hat. Steer clear of such clouds until you know the contents of the vapor. An alarm may signal that there has been a release that you cannot detect with your senses. Listen and follow the directions from the alarm. When in doubt, stay upwind of the alarm. When employees report rashes and skin burns without knowingly coming in contact with a chemical, use MSDS to examine the types of chemicals on hand that could cause such a result.

**Exposure Confirmation**

If exposure is suspected, conduct area and limited personal monitoring. Area monitoring means placing media to collect samples over a specified period of time to see what chemicals are present. You may also need to conduct limited personal monitoring to determine the likelihood of exposure in the workplace.

**Evaluation**

After the potential health hazards in the workplace have been recognized and identified, the next step is to determine whether controls are needed.

**Hazard Evaluation**

As noted, a hazard can be viewed as the probability that an adverse health effect will result and depends on the toxicity of chemicals being encountered and the exposure that employees receive. Therefore, a typical hazard evaluation involves understanding what chemicals or physical agents are present, then determining exposure levels. A chemical inventory for the facility or worksite as required by OSHA is an important element in the hazard evaluation. It identifies the substances used at a location and classifies them into physical form, application, amount of use and packaging, as well as chemical components.

With the information from the chemical inventory along with MSDS, product labels and other health information, possible sources of exposure can be identified by a walkthrough inspection of the workplace, performed by a qualified industrial hygienist.

**Exposure Monitoring**

Once possible sources of exposure have been identified, exposure monitoring is performed to evaluate the exposure levels.

Industrial hygiene monitoring is the process by which those hazards are measured and quantified. Such monitoring can be performed by using a real-time instrument that gives direct readings; an instrument that gathers and integrates data over a period of time; or a system of collection media, pump and chemical laboratory analysis.

**How Do You Protect Yourself?**

**Chemical Knowledge**

Chemical knowledge is the first line of defense. Look at the chemicals in the workplace and determine what level of protection is needed. For example:

- Special gloves. Based on the chemical knowledge gathered, I know how the chemicals present can affect me. Do I need gloves? What kind of gloves?
- Respirators/breathing air. Do I need a respirator or self-contained breathing apparatus?
- Aprons, impervious clothing and flame-retardant clothes. Can the acid penetrate clothes? Will it penetrate my clothes and expose my skin? Is the material flammable?
- Safety glasses. Are there flying particles that could enter through my eyes? Do I need to keep vapors out of my eyes?
- Hard hats. Are there overhead hazards that could injure if they fell?
- Steel-toed shoes. Are there hazards that if they fell could injure my feet?

All of these factors can be captured in a hazard assessment, which addresses both probability and severity (Figure 1).

**Survey Industry Standards**

Survey similar industries to assess their experiences with similar hazards. Ask questions such as:

1) What are your PPE requirements for specific jobs?
2) How did you determine these requirements?
3) Did you conduct a hazard assessment for PPE? If not, why not?
4) If you did not conduct a hazard assessment for PPE, how did you determine the need for PPE?
5) What companies have you used?
6) Which companies provided the best service?
7) What problems have you encountered setting up and maintaining your program?

The industry standard would then be incorporated into the hazard assessment (Figure 2).

**Cost-Effective Monitoring**

When stepping into a new facility without a history of industrial hygiene activity, a “mini” exposure assessment will provide useful information to implement a full program. By examining the operations, raw materials used for manufacturing, byproducts generated during manufacturing and end-products, in concert with MSDS, most exposures can be identified.

**Pitfalls**

Like anything, pitfalls can be encountered during industrial hygiene monitoring. I refer to these as the 4Ms.

**Molecule.** Determine whether the molecule is large enough to be captured

continued on page 24
on the media that you need to capture the sample. Consider these questions:

- Is the molecule large enough to measure?
- Is there enough of the molecule to measure?
- Using the specified method (e.g., NIOSH) is there enough for the method to capture?

Method. Many industrial hygiene monitoring methods are available. Consider the most reliable and applicable method to ensure the integrity of the data to be collected. Ask yourself:

- Based on the molecule and the composition, is this the right method?
- Will this method allow me to collect the right data?

Minutia. Details, details, details. Questions to ask include:

- Am I collecting all of the data I need?
- Am I disseminating all of the information to the employees?

Movement. When you hang monitoring equipment on employees you must ascertain the full exposure by asking:

- What are the employees doing during monitoring?
- What is going on during monitoring?
- Where are the employees during monitoring?

Cost-Effective Approaches
Most expenditures must be cost justified in some manner. Once you have identified what needs to be done, here are some cost-effective approaches to industrial hygiene.

Engineering Design. If you design the hazard out, no monitoring will be needed. One option is to select a less-hazardous chemical. Another option is to eliminate chemical reaction steps, which eliminates the need for employees to sample each intermediate step. Yet another is to design a closed system that eliminates the chemical exposure.

Cost-Effective Monitoring. By performing a hazard assessment, exposures can be ranked, benchmarked against industry standards and a course of action that best protects employees determined. This allows exposures to be ranked based on risk characterization of the chemical. For exposures that are similar, you can monitor for families of chemicals to determine the effects in the workplace by performing both area and personal sampling. For more hazardous exposures you can create tightly defined procedures to sample for specific chemical effects

Personal Protective Equipment.
Unfortunately, we can rarely completely eliminate the exposure. As a result, we must arm employees with proper PPE. Use MSDS to assemble the required PPE for the exposures and make it available to employees, train them in its use and field-validate that the gear is being used.

Example Industrial Hygiene Monitoring Program
Responsibilities
It is the responsibility of the safety and health manager to do the following regarding the chemical industrial hygiene monitoring program:

1) To ensure that the principles and procedures established in this chemical monitoring manual are followed.
2) To design, budget, schedule and implement the annual industrial hygiene monitoring regime.
3) To establish and maintain the industrial hygiene database.
4) To evaluate the results of monitoring and ensure that appropriate changes in procedures, personal protective equipment, and operating equipment and conditions are instituted to ensure worker safety.

Types of Industrial Hygiene Samples
Compliance samples are those that are collected and analyzed specifically to evaluate exposures against established standards. Generally, these samples are collected for comparison with the exposure standards established by OSHA.

Samples of these type generally fall into two groups: short-term exposure limits (STEL) standards and permissible exposure limits (PEL) also called eight-hour time weighted averages (TWA). For a compliance sample to be considered valid by OSHA, four factors are evaluated:

1) The sample must be collected in the breathing zone of a person.
2) The sample must be collected over the time period prescribed in the regulation (generally 15 minutes for a STEL and seven to eight hours for a TWA-PEL).
3) The sample must be collected and analyzed by an approved method.
4) Certain industrial hygiene practices must be followed, such as correct pump calibration procedures and documentation of the person’s job activities (or job post description).

Diagnostic samples provide details about the work process and worker exposure that better helps you protect the worker. Generally, these samples are collected during specific tasks, such as taking product samples or gauging tanks. The need for PPE may be identified as necessary during certain tasks. Also, the diagnostic sample often is used as a screening tool for later compliance sampling. Diagnostic samples typically include task, emergency and grab samples, and can include real-time measurements as well as measurements obtained by approved methods.

When to Sample
Several circumstances trigger the need for industrial hygiene monitoring:

1) To show compliance with OSHA and consensus standards (and associated exposure limits);
2) To verify the acceptability of worker exposures when a new chemical is introduced into the workplace;
3) To verify the acceptability of worker exposures when a process change is affected;
4) To address worker concerns about exposures;
5) To evaluate worker exposures of concern identified during the hazard assessments to be conducted for each job post;
6) To verify the acceptability of worker exposure during emergency or nonroutine activities.

Industrial hygiene monitoring will be planned on an annual basis, recognizing that emergency or changing circumstances can require unplanned sampling. The SH&E manager working with the operations personnel will plan annual sampling events consistent with his/her budget submission requirement. In planning these annual events, the following factors will be considered:

a) exposures of concern identified in the job hazard analyses;
b) exposures of concern identified in pre-startup safety reviews;
c) introduction of new chemicals in the workplace or changes to manufacturing processes;
d) new regulatory or consensus standards;
e) regulatory requirements (to sample on a prescribed schedule).

Facility Chemical Prioritization

Table 1 lists chemicals that have ACGIH exposure limits and are either produced or used at this facility. For most of them, monitoring can be done by use of a passive dosimeter badge, by far the easiest and most convenient method, which is indicated by a “B” in the table.

Selecting a Collection & Analysis Method

OSHA and NIOSH methods are to be used whenever possible. If an alternate method of sampling and analysis is selected, recognize that it is not acceptable for a compliance sample unless you can show written scientific documentation that it meets the precision and accuracy requirements established in the standard (or in the methods of the agency).

Determine the sampling and analytical error for the method. This will be in the published method, or in the OSHA Technical Manual. This information is requested in the database for a sample entry. Once the method is selected, read it carefully for any special requirements (such as limitations on sampling, interferences, disassembly of equipment, storage and shipping).

Select a laboratory to analyze the sample after you have read the method. Verify the laboratory is accredited by AIHA for the constituent of concern. Verify that the laboratory can perform the analysis by the method selected. Discuss any questions/special needs as well.

Obtain a chain-of-custody form from the lab you select. Verify that the lab can provide a QA/QC data package for the constituent of concern, if requested. Obtain necessary supplies and equipment for sampling. Conduct sampling according to selected method. Carefully document any deviations from the method. Use field blanks for 10 percent of sample population.

Complete the chain-of-custody form. Specify method and number as well as carrier. Specify what results are to be reported:

1) separately for front and back sections;
2) in weight units;
3) in concentration units (note: you supply volume information on chain-of-custody form).

Communicating Results

The chemical monitoring database will be used to prepare a letter to an employee and his/her supervisor upon entry of monitoring results, upon a prompt from the SH&E manager. The date the letter was prepared and sent is an entry in the database, and serves as confirmation that the information was communicated. The SH&E manager will conduct periodic spot audits to verify that the system works (i.e., workers get their letters).

Each quarter, the SH&E manager will print a quarterly update of all monitoring results to be posted on official company bulletin boards, presenting the results of all monitoring performed that quarter, according to job post, task (if applicable), chemical, concentration, whether the sample was compliance or diagnostic, an indication that PPE was in use and the acceptable exposure standards for compliance samples.

In addition, each quarter, the SH&E manager will print a similar quarterly update of all monitoring results to be provided to the company physician. The physician will also receive job descriptions (including job hazard analyses) for any employees s/he examines, and copies of substance-specific OSHA standards for such chemicals at this facility.

Recordkeeping

Industrial hygiene data must be retained for 30 years per OSHA’s Medical Records Access Rule. Complete entries in the database should meet the specific requirements of the regulation.

References


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Adding Value to Your Domestic & International Compliance Audits

By Jack Fearing, CPEA

Editor’s Note: This article is based on the author’s presentation at ASSE’s Safety 2004 conference. Wyeth, formally American Home Products, is a $16 billion multinational pharmaceutical company with global headquarters in Madison, NJ. In March 2002, American Home Products changed its name to Wyeth. It was more than just a name change—it was a cultural change for the company as a whole. This change continues today and has impacted the SH&E Audit Program. In 2003, after several months of redesigning the program, the Added Value Audit Program was implemented and included in the revised Wyeth EHS Policy.

Planning and conducting SH&E audits at a company’s entire range of operations can be a daunting task. These operations generally include manufacturing, research and development, distribution centers, office complexes and aviation facilities. It is more complex if the firm is a multinational company with extensive international operations. The planning must include considerations whether to base the process on compliance or system based issues, emerging legislation, costs and availability of appropriate resources, identification of customers, frequency and confidentiality.

Audits are emotional activities for most businesses. To be successful, the audit should address positive programs and activities (i.e., best practices), as well as program gaps, recommendations, local attention items and action items. Another cornerstone for successful audits is for the final report to be a clear and accurate evaluation of the overall EHS program.

Determining whether your program should be compliance-based or system-based is typically a result of a company’s philosophy and the maturity of the audit program. Costs and frequency are usually driven by a company’s concern with being viewed as a good corporate citizen. Responsible companies regard the costs and other related issues as the price of doing business responsibly.

Identifying the customer for involvement in the SH&E audit process and receipt of the report may not be as easy as we think. Facility management is typically concerned as to who in management should receive the report and how it will be viewed. This means that the customers can be the facility management, the local SH&E professionals, business unit management/division management as well as corporate senior management. All of these levels of management have a stake in the audit. As stakeholders, the audit should provide a service to fulfill each of their needs.

To help protect confidentiality, most SH&E audits are done under attorney/client privilege and anyone on the distribution list for the report may not be as easy as we think. Facility management must have a need to see the report. This can complicate the customer list and the sharing of information across company lines. To address this limitation, the distribution list for the final report should be large enough to include all the stakeholders we mentioned but small enough to protect the privilege.

Added Value Audit Program

In 2003, after several months of redesigning the SH&E audit program using both internal functional work teams and external consultants, the Wyeth Added Value Audit Program was implemented. Significant changes included:

• Expanding and identifying the customers of the audit program beyond the site SH&E team.
• Developing a better communication tool for senior and line management, “executive summary transmittal letter.”
• Evaluating what is good at the facility and sharing it throughout the organization—best practices.

• Providing line management the opportunity to participate in the audit program as “guest auditors.”
• Developing closure plans with the audited site and coming to agreement on dates.
• Formal and ongoing training for auditors and guest auditors.
• Tools for auditing in the form of corporate policy, guidelines, standards, protocols and regulatory aids for both domestic and international locations.
• Using both environmental and health and safety consultants.
• Developing a governance document for the audit program.

Audit Program Process

The Wyeth program is a three-phase process that extends more than several weeks from start to finish. These include the pre-audit phase, the on-site phase and the post-audit phase. Each phase is distinct in its activities and each subsequent phase can be viewed as a progression from the previous one. Collectively, they make up the entire audit process and depend on each other to be completed thoroughly, and in succession, in order for the audit to be successful.

Pre-Audit Phase Activities

Several pre-audit activities that are essential for conducting an effective audit at a facility. Some of these activities, such as selection of facilities to be audited and team members, are typically completed in the preceding year in order to allow both the facility and the team members the opportunity to schedule the time necessary in advance to conduct the audit.

The audit team leader generally begins communicating with the facility to be audited at least three months prior to the scheduled date of the audit. The communication will request that the facility complete the pre-assessment questionnaire (PAQ) or update the existing PAQ online in the audit database.
The team leader will also verify that the facility has the correct password and user ID for accessing the database. The return date for the PAQ should be no later than one month before the scheduled audit date. The team leader will ensure that the PAQ and any attachments are received in a timely manner and distributed to team members reasonably in advance of the pre-audit team meeting. If the PAQ and attachments are not received on time, the team leader contacts the facility and addresses the issue with the SH&E manager.

**Audit Team Meeting**

One of the most important activities that the team is involved in before leaving to perform the audit is a thorough pre-audit team meeting. This meeting should generally be held one to two weeks prior to the audit. During this meeting, the team leader provides each team member with information about both the facility and the specific programs that they will be responsible for evaluating. The PAQ contains site-specific information about the physical layout of the plant, processes, production-related data (e.g., number of shifts per day, days per week and product produced).

The team leader invites the previous team leader to this meeting if s/he is available. If that is not feasible, the two team leaders will attempt to debrief on the previous audit, especially any remaining open action items, at a mutually convenient time and place.

**Other Pre-Audit Considerations**

Other important items reviewed at the pre-audit meeting include audit resources available to the team, such as protocols and regulations, use of consultants for international audits, team travel and lodging information, site PPE requirements and developing a site-specific agenda for the audit. The team leader contacts the site after the pre-audit meeting to confirm the upcoming activities and schedule.

**On-site Phase Activities**

On-site activities during the audit are key to a successful review of site programs. These include the opening conference, orientation tour, program reviews using the Wyeth two-step methodology, developing action items, daily debriefings, pre-closing conference and closing conference.

**Opening Conference**

The SH&E audit opening conference is scheduled in advance with the facility and is generally held as early as possible on the first day of the audit. The purpose is to advise the facility of the function of the corporate environmental, health and safety department, in general, and the SH&E audit program, in particular.

The team leader conducts the opening conference. All members of the audit team, including any consultants used for the audit, must be present. Ideally, the facility personnel include the managing director and their staff, the SH&E manager and appropriate SH&E staff, and other facility representatives who will be actively involved in the audit.

The team leader usually opens the meeting and briefly introduces the team members. Each team member has the opportunity to review their primary responsibilities, years with the company, education and training, and audit experience. The team leader uses a PowerPoint template presentation, that has been customized for the site in order to communicate a standardized overview of the SH&E audit process.

**Facility Orientation Tour**

Following the opening conference, the audit team will participate in a facility orientation tour with facility representatives. The primary purposes of the orientation tour are to observe the facility infrastructure, briefly observe personnel performing their jobs and identify areas that may require a more in-depth review. The key point is that the orientation tour should not be conducted as a program

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review exercise. Keep it loose and moving along.

After the conclusion of the orientation tour, the team leader coordinates with the team and the appropriate facility staff to review the proposed audit agenda and finalize the interview and documentation review schedules.

Program Review
All Wyeth facilities are required to comply with all applicable national, state and local laws and regulations, the company SH&E policy, and SH&E guidelines, divisional policies, and locally developed standard operating procedures. To verify that the facility has evaluated the SH&E risks associated with their operations, and are in compliance, the SH&E Audit Program uses a two-step approach. The two-step approach is designed to review program content and program implementation. The audit team will determine whether the facility has developed the appropriate written programs, policies and/or procedures to address SH&E risks and impacts and whether the programs are fully and effectively implemented. Each team member uses specially designed protocols that allows them to evaluate each applicable program in a systematic manner.

Content
Evaluating program content is the first step in the two-step process. The audit team evaluates all written programs for content and consistency with applicable requirements. At a minimum, the written program must include all applicable elements of the corresponding requirements. The facility program may exceed these requirements. The appropriate company and/or regulatory SH&E protocol for each specific functional topic is used to help the auditor evaluate the program content. Any discrepancies noted by the auditor, shall note review and be reviewed with the facility SH&E staff at the conclusion of each interview, if possible, and during scheduled debriefings. Each written program must be reviewed prior to conducting the implementation step of the process to ensure that the team member has an adequate understanding of the written programs before making observations in the facility.

Implementation
Evaluating program implementation is the second step in the two-step program review process. Various techniques are used to accomplish the program review including interviews, observations and document reviews. The program content review must occur prior to making any conclusions about program implementation. Again, follow-up tours to verify program implementation should be scheduled only after the program content has been thoroughly reviewed and the auditor understands the program contents.

Interviews with facility personnel are essential to understanding what is actually being done to fully implement and maintain facility programs. Interviews can be informal and can take place during facility tours or as part of a scheduled meeting. Facility staff shall arrange interviews and make personnel available to the audit team. Interviews are to be conducted in an open environment and facility SH&E personnel and management can be present. Interviews are conducted exclusively for fact-finding purposes.

Each team member should document the results of the interviews. The time, area of responsibility, the function of the person interviewed and subject matter discussed shall be recorded to aid in the justification of potential action items. Any concerns noted during the discussion should be reviewed with the employee prior to concluding the interview. At times, bargaining unit considerations must be adhered to.

A representative sample of records from all areas being reviewed must also be evaluated. The records shall be checked for accuracy, completeness and timeliness. Sample size methodology must be applied. This generally means a 100-percent review of all records for small data sets and 1 to 10 percent review of a cross section of records for larger data sets. The 1 to 10 percent base can expand if findings warrant increasing the size of the record review.

Examples of typical records to be reviewed include daily monitoring records, manifests, work permits such as hot work and confined-space entry, training records and medical monitoring results. Reviewing medical records must be conducted by qualified personnel and under healthcare professional review, and must observe all confidentiality requirements.

Working Papers
During the audit, team members will begin to identify gaps or deficiencies that may lead to action items. Typically, team members will begin to develop draft action items when these gaps or deficiencies are first identified. Final action items are written for identified program content and program implementation gaps, including potential noncompliance with laws, regulations, corporate policy and procedures, division policies and locally developed facility SOPs.

The team leader and team members are responsible for justifying all action items. To do so in a systematic and objective manner, each team member must document program content and program implementation gaps noted during the audit. In addition, when identifying such a gap, the auditor must cite the appropriate regulatory, company or facility requirement for which the gap has been noted. For example, if the facility has not been using only company-approved waste contractors, then the reference would be to the applicable company standard. All audit-related materials should be quickly and easily retrievable from the working papers to share with the site staff on request.

Best Practices
As part of this program, all team members attempt to identify and share best practices. These help to focus the audit on positive areas as well as those that need improvement. Sharing these practices will help information flow throughout the company. The definition of a best practice at Wyeth is “a program or activity that meets all applicable Wyeth and regulatory requirements and is among the very best that have been reviewed.”

Once selected, the best practices are communicated to all Wyeth SH&E professionals through the corporate SH&E Intranet site, the assessment tracking system and the SH&E newsletter.

Some recent examples of Wyeth best practices include:

- **Wastewater treatment of actives by ozonation.** The facility describes in detail the method of detoxification via ozona-
tion treatment of their wastewater to destroy the active material.

- Batch methanol and water recovery system. The facility completed a 360-degree process waste review to identify where in the process the waste was generated and how the methanol and water could be recovered. The reviews lead to the identification of two potential streams to be further undertaken to some kind of recovery system.

The first one was the spent bottom stream from continuous distillation unit and the other was water clean out of filter press used during methanol extraction. Both aqueous streams were sent to the incineration with a consequent environmental and cost impact. The batch methanol and water recovery system eliminated the need to send these streams to incineration.

- Flammable liquid cabinet grounding and ventilation systems. The facility has modified the commercially available flammable liquids storage cabinet to provide mechanical ventilation and grounding and bonding of materials stored inside the cabinet.

- Working in proximity to above ground power line and high-reach permit. The facility has developed and implemented work practices and training program for employees and contractors to follow while working near electrical power lines and geographically limits for equipment being operated near electrical power lines.

- Compliance calendar. The calendar identifies submission dates for environmental monitoring requirements to the regulatory agencies.

- SH&E goals and objectives data tracking. The facility has developed a spreadsheet to view and track their SH&E performance with graphics.

The Wyeth approach to best practices can best be summed up in the following quote from a retired Fortune 100 company CEO, “Auditors must become business representatives and division SH&E representatives, as well as mutual interest from potential guest auditor(s). Guest auditors are classified into two categories—functional expert guest auditor and observer guest auditor. Below are the definition and responsibilities of each.

**Use of Guest Auditors**

Guest auditors are periodically invited to participate in the SH&E audit program. Guest auditors are selected based on a combination of the following: recommendations from the Assessment Steering Committee, recommendations from the SH&E business representative and division SH&E representatives, as well as mutual interest from potential guest auditor(s). Guest auditors are classified into two categories—functional expert guest auditor and observer guest auditor. Below are the definition and responsibilities of each.

**Functional Expert Guest Auditor**

The functional expert is an SH&E professional who has been selected based on his/her demonstrated expertise in one or more SH&E technical functional areas and has an interest in participating in the audit program. Other unique areas of expertise that may be included in this category include language and/or cultural skills and knowledge of state/country-specific compliance requirements. If selected, the candidate’s management must also agree to allow them to participate. When assigned to an audit, the functional expert is expected to attend all required pre-audit team member meetings and function as a member of the team during the audit.

**Observer Guest Auditor**

The classification of observer designates that the employee is not a functional member of the team. This position is reserved for select business unit management and other non-SH&E professionals as determined by the SH&E Assessment Steering Committee. The purpose is to provide the opportunity to participate in the SH&E audit program in order to gain a better understanding of the process and the scope of the program. Observers are encouraged to attend the SH&E Audit Training Program prior to participating in an audit. Observers are on the distribution for all pre-audit information received from the facility to be audited. It would also be expected that they would participate in the pre-audit team meeting, the opening conference and the full audit. During the audit, the observer spends dedicated time with each team member to observe his/her evaluation of SH&E programs and their interviewing techniques.

**Technology Review**

In addition to these on-site activities, the SH&E audit program also includes a technology review. This process has been developed to allow the team leader the opportunity to meet informally with site SH&E personnel during the audit for the purpose of reviewing various SH&E resources and tools, both internal and external, that are available for the site to help them perform their roles more effectively. This review normally lasts about an hour and is generally interactive.

**Daily Debriefings**

It is an important goal of the program that all audits are conducted in an open atmosphere where identified potential issues are properly and in a timely manner communicated to the facility personnel. The audit team maintains ongoing and frequent informal communications with the facility staff during the audit. The audit team frequently discusses the status of the audit and notes any observations, concerns, possible program gaps, and potential best practices being identified during the course of the audit. The team conducts daily debriefings involving the audit team and members of the facility SH&E department. (The debriefings are generally held at the end of each day, but may also be held at the beginning of each day.)

If appropriate, other facility personnel may participate in the daily debriefing session as well. All team members should be present for these sessions and be prepared to briefly state any potential issues noted during the day’s work. In this way, facility representatives will have the opportunity to correct any misunderstandings early in the audit process. In general, these daily debriefings meeting last for no more than 45 minutes.

**Developing Action Items**

During the audit, team members will begin to identify gaps or deficiencies that may lead to action items.

Gaps or deficiencies are generally written as action items reflecting single issues. Specific references to a law, regulation, company and/or division policy or procedure, as well as specific reference to a facility location, if applicable (e.g., building, room, area) are required for continued on page 30
each action item. All action items are written in a clear and concise manner. The action item must clearly identify the nature and the location of the finding.

The team leader, in conjunction with the team members, proposes the appropriate classification of all action items. Action item classifications include major, moderate, minor, repeat and transferred. A transferred action item is an item from a previous audit that has not exceeded its proposed due date.

The classification will depend on variables such as the potential for risks to human health and/or the environment, fines, or business interruption risk or that require capital funds to completed.

As part of the audit report review process, the classification of action items may change. If the category of an action item is changed during the post-audit review the team leader will communicate the change to the facility managing director and SH&E manager prior to the issuance of the final audit report.

Pre-Closing Meeting

Prior to the closing conference with senior facility management, the audit team will conduct a pre-closing meeting with the facility SH&E staff in order to review the proposed action items, address any remaining issues and attempt to resolve any differences prior to the closing conference. This will also provide the facility with another opportunity to correct any perceived misunderstandings on the part of the team prior to issuing the final draft report at the closing conference.

Typically, the pre-closing meeting will include facility SH&E personnel and the division and/or business operating unit SH&E representative, if they are attending the audit. Facility management personnel may also attend this meeting, however, in general this is not recommended since they will be attending the final closing conference. Audit action items will be reviewed in detail at this meeting, as will all potential best practices. Documentation will be available to support any potential action items and potential best practices.

Closing Conference

The closing conference is designed to review the audit process and the draft report with site management and SH&E personnel. At the conclusion of the closing conference, the team leader outlines the process for establishing completion dates for actions identified and considerations that the site should include in their planning process.

The team leader will review the written draft audit report in detail. The team member responsible for each action item will discuss that action item and be prepared to answer any questions for the facility. The team leader will ensure that the action items are clear and accurate and that the facility understands the requirements necessary to close each one.

The team leader shall also highlight the potential best practices and positive improvements since the last facility audit, if applicable. Potential solutions to action items may be explored during the closing conference, however, detailed engineering and/or problem solving should be avoided. Offers of future consultative services, contacts within and outside the company and corporate/division support systems shall be provided to the extent possible.

A copy of the draft audit report will be given to the managing director with a cover letter from the attorney of record. The division or business unit SH&E representative and facility SH&E manager will also be given a copy of the draft report. If the division or business unit SH&E representative is unable to attend the closing conference in person s/he should receive a copy of the action items prior to the closing conference and invited to attend via conference call.

Post-Audit Activities

The audit team leader generally completes the post-audit activities. They include various tasks that take the audit report from a draft document developed at the site during the audit to a final document. During the process, members of the Assessment Steering Committee review the report for quality, accuracy and consistency.

Development & Review of the Draft Report

In general, a draft of the final audit report, including the transmittal letter and action items with completion dates, is routed for review to the members of the Assessment Steering Committee within four weeks of completion of the audit. A follow-up meeting is typically held within one week to discuss and incorporate comments from all parties.

Facility Action Plans & Completion Dates

The facility is responsible for the development of an action plan with closure dates that reflect reasonable timelines for addressing the action items. The final report, along with a transmittal letter that summarizes the audit activities, is issued to various corporate SH&E professionals, both site management and SH&E personnel, and appropriate senior management business partners in the organization in which the audit was conducted.

Subsequent to issuing the report, the team leader works closely with the site to monitor facility activities related to closure of each action item. The facility is required to submit documentation that reflects closure activities, such as completed procedures, training records, copies of permits and photographs, as appropriate.

Issuing the Final Report

The final audit report includes a transmittal letter and the final listing of action items. The final report will be issued to the facility managing director from the vice president of SH&E with copies to the site SH&E representative and various corporate and division operations, SH&E and legal personnel. The transmittal letter includes a policy statement, purpose of the audit, facility overview, a summary and table of action items from previous and current audit, and a brief overview of the facility’s management systems, environmental programs, occupational health, safety and loss prevention programs, potential capital expenditures related to action items and potential best practices.

Facility Status Reports & Action Item Closure

The status of each action item is monitored quarterly using the Wyeth Assessment Tracking System (ATS). Various internal audit reports are issued at designated frequencies to summarize the report status and to highlight closure activities. Final closure of the report is established when all actions have been completed within the timeline specified by the site.
Audit Program Administration

The Audit Program Survey

Feedback is an important part of any process. To that end, the purpose of the SH&E audit program survey is to assist in continuous improvement of the overall SH&E audit program. The team leader reviews the audit program survey process with the managing director and his/her staff at the closing conference and sends the survey via e-mail to the site electronically later. The managing director is asked to review the audit activities with members of his/her staff and complete the SH&E audit program survey with the aim of offering constructive comments for improving the overall SH&E audit program.

The managing director is encouraged to wait until the final audit report is received prior to sending the completed survey to the audit program director so that all phases of the audit process can be evaluated.

Assessment Tracking System

The Wyeth ATS is a Lotus Notes/Domino database that is used to create the audit report, track action item completion activities and maintain the final audit transmission letters.

All facilities have access to ATS through the wide area network. They complete their PAQs, update audit reports, provide action item updates and request closure through ATS. In addition, all best practices are available to view and download to facility personnel through the ATS. Action item completion by closure date is tracked through this system. Closure of action item dates is one metric for facility management. They report monthly on closure completion percentages. The metric is coupled with other audits completed at the facility such as quality analysis/quality control assessments.

Conclusion

The Wyeth SH&E audit program has been designed to add increased performance to the traditional audit process. The process consists of three primary components: recognizing all our customers; knowledge transfer before, during and after the audit; and consistency and quality during all SH&E audits.

Our customers include all our domestic and international facilities, SH&E professionals and business unit management, as well as senior Wyeth management.

Knowledge transfer includes an understanding of our responsibility to facilitate knowledge transfer as part of our audit activities, including sharing and harvesting best practices and utilization of the guest auditor program.

Wyeth is committed to consistently delivering a high-quality product to our customers each and every time we interact with them. This is especially true as it pertains to the SH&E audit program.

Variation & Acceptable Risk

By F. David Pierce, CSP, CIH

Almost everyone in organizational or business management instantly recognizes the name W. Edwards Deming. Almost all know well the positive overall impact he had on the business and management world. Most readily link his name with total quality management (TQM), or couple his contribution to statistical process control (SPC). A few can somewhat describe at least four of Deming’s 14 points. Few, perhaps one of 200 managers, can name all 14, however.

But the area of Deming’s teaching that almost no one in management—especially safety management—has the foggiest concept of or has a real understanding of is one of Deming’s most important concepts: variation. In reality, Deming’s concept of variation lies at the crux of his leadership concept and is just as critically important to those in safety management.

The Concept of Variation

Peter Scholtes, the one-time leader of the British Deming Society, probably provided the best layman’s definition of this important concept. He explained variation as the difference between your good and bad days. In the safety, injury prevention or risk management arena, our variation could well be described as the difference between our best and worst safety or injury prevention effort; our best and worst annual or monthly injury rate performance; our best and worst department safety performance; our best and worst plant or facility safety performance; or least and most severe injury experience.

Deming also described two certainties concerning variation that are also important for us to know. First, variation exists and it will always exist. In other words, regardless of how hard you work to constantly have good performance (good days), you cannot escape the reality of variation in that you will also have bad days. The second important certainty is that variation will not improve (perform with less deviation between good and bad AND reduce the incidence of the bad) without measuring variation and focusing on the statistical outliers for improvement.

Why is an understanding of variation important? Simply stated, we live in a snapshot world. Daily, we conduct our business sensing the stimuli around us in continued on page 32
a still-shot fashion. As we observe incidents that appear to be out of whack (deviations from norm), we react, much like Pavlovian response, when in fact we do not know whether they represent unacceptable deviations or they are simply an incident within the norm.

Obviously, problem solving is the area where management, including safety management, is impacted the greatest by this lack of understanding. This lack of understanding has two negative results: 1) We waste a lot of energy, time and resources trying to solve problems that lie purely in the range of expected variation rather than focus our efforts on those which are truly outliers. 2) We cannot get a clear focus on the amount and severity of risk that we are paid to control, so we are unable to effectively advise upper management and focus line resources.

Variation at Work: An Example
A corporate vice president was touring a company facility. While on the production floor of the facility, a supervisor who was guiding a limited part of the tour suddenly asked to be excused because one of his employees had been injured. This corporation valued worker safety so the vice president started berating the top facility manager (who was also on the tour), asking why his safety program was out of control. The top facility manager passed the hot potato on to his safety program manager as soon as he returned to the office.

An extensive safety investigation was conducted that demanded thousands of indirect and direct dollars be spent. The corporate safety manager was flown in to lead the investigation. When finished, the report listed 27 recommended corrective actions and exhausted 52 percent of the safety program’s annual budget.

What was the injury? It was a simple finger laceration that required four stitches to close. This injury turned out to be one of 27 recordable injuries which occurred that year at this facility but it accounted for the lion’s share of resource allocation.

Looking further at this injury example, what was the maximum potential severity from the injury’s cause, a metal burr near a machine’s operation controls? In reality, it is hard to imagine a more severe injury resulting and easy to see that this burr, which had been in existence for years, had potentially been responsible for many near-hits and may have produced many unreported deminimus type of skin-scarpe injuries.

This example is far from an isolated event. This cause and effect happens many times in every safety program annually.

From our traditional safety perspective, without an understanding of variation, the test of our effectiveness focuses on whether or not the potential for a specific injury’s recurrence was minimized or removed. From the perspective of understanding variation, the test of our effectiveness is much different. From this perspective, one focuses on whether or not the range of variation was tightened and the mean of experience lowered. In other words, were the finite resources provided to safety improvement effectively allocated?

Why Not in Safety?
We have a hard time taking a variation perspective with respect to safety. Why? Taking a variation perspective seems to be much easier in areas such as quality; after all, few would argue that errors do not happen. Even in the best quality program, defects still occur. In quality, we understand this reality and seek to minimize the magnitude and range of errors (variation). It is called statistical process control (SPC). Taking this same variation perspective with safety causes much angst. Saying that injuries will always happen, even with the best safety program, causes great organizational and management repulsion and condemnation, when in fact this is the reality of variation.

This variation perspective is important for us to understand because it lies at the crux of our ability to efficiently use what time and resources we have, and it lies at the crux of our ability to identify, assign and communicate acceptable risks (or unacceptable risks) to management.

Using a forest as an analogy, having a variation perspective gives us the freedom to identify short trees and tall ones. But most importantly, it stops the “it’s a tree . . . it’s a tree” hysteria and helps us reduce or eliminate the tall trees with an accepted preference for shorter ones.

There will always be trees in our forest, but effectively focused, we can reduce the number of tall trees and, over time, shrink the forest and deal more effectively with the yearly variation-caused forest-size issues.

How does an understanding of variation change our definition of acceptable risk? Traditional safety practice knows only one dimension for assigning acceptable risk: severity potential. Understanding variation gives us two dimensions for assigning acceptable risk. Traditionally, the first dimension is guided by potential severity. Our traditional skills of assessing which hazards can potentially cause severe injuries are no-brainers. These have been valuable skills and continue to be so. Appropriate controls and process redundancy must be used to keep these high-potential injury hazards within acceptable risk tolerance.

The second dimension is guided by statistical process control. SPC then becomes a new deciphering means for focusing on true deviations from variation—outliers of assigned acceptable risk. Various nontraditional safety measures can be baselined to establish normal variation then used to identify true deviations. Depending on industry hazards, these safety measures could include reported incidents involving hands and fingers, backs, strains and sprains, or eyes. Safety measures could also be focused on injury cause groupings such as caught in, struck by, struck against or chemical exposure. Safety measures could also focus on process steps, job classifications, longevity of employment, etc.

Using statistical process control allows us to 1) know what normal incidence variation really is; 2) quickly identify statistical deviation (above one or two standard deviations); 3) focus investigative efforts on true deviations; 4) identify the causes of the identified statistical deviations; and 5) over time, reduce both the number of deviations (frequency) and the range and mean of the incidence variation.

So, what’s in it for me? Why is our understanding of variation, addition of a second dimension for assigning acceptable risk and the religious use of SPC worth adopting into safety management?

1) It documents and measures the value of our effort. We have long struggled with the “how do you measure the value of
things that don’t happen, given the simple rules of probability that are too often used against us?” question.

2) It allows the limited resources safety programs are given to be effectively focused on reducing risk/measured experience.

3) It stops the Pavlovian responses that too often have muddled safety progress, caused confusion and wasted resources.

4) It greatly reduces the frequency and severity of “management panic” concerning safety performance. SPC doesn’t lie.

5) It can measure safety improvement using dynamic, real-time scorekeeping, not the traditional injury rates that are too often just “luck indexes.”

Variation and acceptable risk like many other systems-related aspect are interrelated and interdependent dynamics. The latter management expects us to advise them of and keep under control. That’s why they hire us. The first is a concept we need to accept, and truly understand in order to make sure management understands and starts measuring. We cannot escape the fact that variation happens, but it can represent a real opportunity for us and our safety programs if we embrace it and use it.

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Ground Fall Injuries in Underground Stone Mines

Workers in underground stone mines have a high fatality rate caused by falls of ground from the mine roof or rib. NIOSH recommendations to reduce ground fall injuries and deaths address baskets, mechanical scalers, mechanical bolters, drill steel changing, personal protective equipment and training.

The Exposure
An informal NIOSH review in 1998 identified approximately 17 new underground limestone operations in various stages of planning; as many as 35 new underground stone mines are expected by 2005. Many sites will employ new or inexperienced workers with minimal knowledge of the hazardous conditions that exist underground.

Workers in underground stone mines have a fatality rate nearly 20 times that of workers in the manufacturing sector. Three-quarters of the fatalities in underground stone mines are caused by falls of ground from the mine roof or rib (Figure 1) (U.S. Census Bureau). From 1983 to 1999, nonfatal ground falls resulted in 140 injuries, or 15 percent of all underground, lost-time stone mine injuries. These nonfatal ground fall injuries resulted in more than 13,800 lost workdays (one third of all lost workdays). Ground falls generate more disabling injuries and time away from work than any other type of incident.

Because of the high ground fall fatality rate and high number of lost workdays from injuries, NIOSH examined MSHA’s accident and employment databases for worker activity at the time of injury for the period 1983 to 1999 (mine worker activity codes and accident narratives) (MSHA 1983-1999). During this period, 156 injuries (both fatal and lost-time) related to ground falls were reported. These incidents included all roof and rib falls listed in the database as well as incidents classified as machinery, for which the source of injury was caving rock. The frequency of ground fall injuries was associated with worker activities as follows: scaling activities, 47 percent; handling explosives, 24 percent; other activities, 10 percent; roof bolting, eight percent; drilling face, six percent; and handling supplies, five percent.

Injury & Fatality Review
To identify work practices for improving the safety of miners, the MSHA injury narratives and fatal accident reports were reviewed for each lost-time and fatal ground fall injury (includes mines with bolted and unbolted roofs). Results are summarized by the type of work activity at the time of the ground fall.

• Scaling was the most common worker activity at the time of a ground fall; almost one half of all ground falls were related to scaling. Nearly one-third of the scaling incidents were associated with roof or rib rock falling onto the basket, scaling machine, or outrigger equipment used to reach the remote areas of the mine. The jarring of the basket or scaling machine caused by the falling rock often caused workers to fall from the basket or against the basket rail.

• According to one incident narrative, two miners were hand scaling the roof from a bucket when a large rock dislodged and struck the corner of the bucket. The weight of the rock on the bucket caused the boom of the scaling rig to bend toward the mine floor until the rock fell to the floor. The boom then catapulted upward, throwing the two scalers from the bucket.

A second narrative described a worker who was hand scaling while leaning out of a basket. When a massive slab of rock fell and struck the outrigger of the scaling machine, it caused the machine to fall on its side. The worker was thrown from the basket, but a harness apparently prevent-

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ed the worker from being thrown to the floor or crushed by the machine. The worker suffered a fractured skull.

- Handling explosives accounted for a high number of lost-work injuries from ground falls. Most of these incidents occurred while the worker was loading explosives into the hole. These incidents resulted in injury to the victim’s neck, back or shoulder from small rock pieces that fell from the mine face and roof. Two fatalities from ground falls occurred while a miner was cleaning out bottom holes. According to the MSHA fatality report (1983-1999), workers routinely cleaned the bottom holes before entering the basket and going up to check the roof. They relied entirely on visual inspection of roof conditions.

- Roof bolting activities involving ground fall injuries accounted for more than twice the typical number of days lost per incident for all underground stone mine incidents. Miners working from a basket to install the bolts have more injuries than miners using an automated bolter.

- Drilling the face accounted for the highest number of days lost per incident of all worker activities. MSHA face drilling operation narratives indicated that in at least 75 percent of the drilling incidents, the victim was outside the cab. In most instances, the victims were changing drill steel or checking the drill alignment.

- Miscellaneous activities account for more than 40 percent of fatal ground fall injuries. The MSHA fatality reports (1986-1996) were reviewed to find other causes. Four of the seven recorded fatalities occurred while the victims were entering a recently blasted face area. These fatalities resulted from the fall of roof or face loosened by the recent blast. In two cases, MSHA was unable to determine why the victims had entered the blast area.

Controls
The following measures are recommended to reduce ground fall injuries in underground stone mines:

- Minimize scaling injuries that occur from the impact of rock falling onto the basket or lift.

- Make sure that safety harnesses and hard hats with chin straps are used correctly during scaling operations.

- Fasten harnesses to structurally secure locations on the basket with proper rope length to minimize the momentum of the fall.

- Provide proper training in putting on a harness and operating the basket manually in case the hydraulic system is damaged because of a ground fall or malfunction.

- Equip baskets used for scaling and roof bolting with padded railings and a canopy or caging to absorb and deflect ground falls. Ensure that canopies are convenient to workers and that they allow easy access to the roof. If possible, use a retractable canopy with a partially removable roof section.

- Use mechanical sealers with protective cabs instead of hand scaling if possible.

- Use PPE such as a hardhat with a back rim (similar to a fire fighters helmet) to help deflect small rock pieces from hitting the neck and back while loading explosives. In severe conditions, use flack jackets or padding devices worn by athletes for additional protection for the back (Grau and Prosser 1997).

- When roof bolting, use mechanical bolters with a protective cab if possible.

- Move the location for changing the drill steel away from the drilled face to an area where the rib and roof are stable.

- Use hazard training to emphasize the severe ground fall risk associated with a freshly blasted mine face and the proper procedures for entering the area.

- Develop a complete checklist of all critical safety procedures related to ground falls that can be used as a training tool.

To receive more information about occupational safety and health topics, contact NIOSH at (800) 356-4674; fax (513) 533-8573; e-mail pubstaff@cdc.gov or visit www.cdc.gov/niosh.

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References


Confined Space Entry: An Ongoing Issue & Concern

We are a public municipality. The employees in our wastewater department maintain the wastewater flow meters in the manhole. The flowmeter sensors are located 12” to 16” under the manhole covers. Therefore, when employees are performing maintenance and inspection of these devices, they have to reach, causing them to break the plane of the opening to the space.

Background
1) Our municipality has a quality safety program and a written permitted confined space program.
2) The purpose of the removable blockade is to guard employees from falling into the manhole (unintentional entry). However, because the blockade is removable, it does not prevent them from entering into the space. These engineers were trained not make an entry in any given situation as they were not fully trained and certified to perform permitted confined space operations. Their level of training is only in the awareness level, which describes the department’s policy for both permitted and nonpermitted entry, rescue practices and procedures, and training requirements.

We felt that they do not need certification because they do not actually make a full-body entry into the permitted confined space.
3) Employees are trained not to enter confined spaces unless they are fully trained and possess written certification.
4) The permit contains the checklist to conduct hazard assessment. Prior to making an entry into the confined space, our policy states that the space has to be air tested, ventilated and continuously tested and monitored throughout the duration of the entry.

A Technical Opinion
Robert Aguiluz of Roco Rescue in Baton Rouge, LA, provides an opinion addressing this technical question. Aguiluz is a CSP, attorney and an active member of the ANSI Accredited Z117 (Confined Spaces) and Z359 (Fall Protection/Arrest) committees. He has extensive experience with confined space entry and rescue and has offered his personal view of the issue, which follows.

Personal Opinion
By definition, this is absolutely an entry both under Z117.1-2003 and OSHA. Keep in mind that when the confined space rule was promulgated, OSHA specifically rejected all comments that called for something other than simply breaking the plane with any part of the body. This is discussed in the preamble. Although the preamble is not law, given the principle of agency deference in enforcement actions and administrative proceedings, preambles are very important in determining OSHA’s interpretation of a standard’s requirements, especially if the agency specifically rejected something in promulgating a regulation. The principle of agency deference states that the adjudicating authority cannot substitute its interpretation for that of the agency (whether or not there is another interpretation that can be made), provided the agency’s interpretation is reasonable. It is important for SH&E professionals to read not only the rule, but also the background materials.

In the photos, there appears to be measures to prevent the workers from entering the space (a framework placed over the manhole). This is not sufficient to render the space, one that cannot be bodily entered, in order to remove it from the classification of a confined space. In the past, I have recommended installing special covers that restrict access but allow persons to reach into the space (where clients have had specific cases in which they complete a task simply by reaching into the space).

However, the setup in the photos would not be something I would recommend for purposes of not treating the space as a confined space. If an insert were installed inside of the manhole that would be in place when they opened the manhole and that would require tools to remove, the space would be treated as a confined space upon removal of the insert. However, the General Duty Clause would still require that they assess the hazards and provide adequate protection against any hazards found. They may find that they are required to take similar measures as that required for permit-required confined space (PRCS) entry in order to ensure that workers are fully protected.

In addition, based on the federal requirements and Z117.1-2003, OSHA state plan states may have somewhat different requirements, so it is important to review the requirements for your state. ANSI Z117.1-2003 has generated great interest. For more information, visit www.asse.org/Z117.htm.

Furthermore, a Fatality Assessment and Control Evaluation (FACE) report released by NIOSH addresses a similar space that involved checking flowmeters in manholes, which resulted in death. It graphically demonstrates how circumstances can conspire against you when working around confined spaces. In this case, the workers were not supposed to physically reach into the space because they were retrieving the meter with a hook. It was during that process when things went wrong.

Follow-up Issue
I am not sure it is as clear an issue as you state. If the employer trains employees not to remove the barrier (I’m assuming...
ing its purpose is to prevent accidental falls into the space) to enter the confined space, my opinion is that the federal position would be that it is not a PRCS entry. OSHA has noted that warning signs or other effective means such as employee training are required to keep employees from entering a confined space. Note the following from OSHA’s compliance directive:

3) Definition of Entry. While the standard defines the process of “entry” into a confined space as beginning with the insertion of any part of the body into that space, it defines as confined spaces only those areas that can contain the whole body, and not cabinets or control panels which are accessed by simply reaching in to turn a valve or a switch. This is stated explicitly in the preamble to the final rule (page 4477 column 2 of the final 1910.146 standard).

The link you provided describes a full-body entry (although initially unintended). Part of the remedy, which was suggested by the New York FACE authorities, was to implement a confined space program and train the affected employees. If the municipality in question already has a program that trains employees not to enter the manholes without a permit, they are meeting requirements.

You made an excellent case for a PRCS entry, but I think that the individual submitting the question would be wise to obtain a written clarification/interpretation from CAL-OSHA since I understand the town in question is in California.

**Further Clarification**

I agree that if they are trained to not remove a physical barrier that prevents entry, they are probably okay, which is why I think the “secured insert” concept will work. However, the nuance as shown here is (and this is an assumption on my part) that the workers are putting an extremely temporary and, from what I can see, unsecured barrier over the space. There is no barrier in place over the space when they open the manhole. The question is whether the barrier they put in place after opening the manhole is sufficient to be considered as having converted the space into one that cannot be bodily entered and, hence, not a confined space. Although I believe that a temporary measure that physically prevents entry can be enough to consider the area not to meet the definition of a confined space, I would be very surprised if an unsecured temporary measure would be considered sufficient.

Keep in mind that this is not simply a matter of training workers not to remove a barrier. They are responsible for installing the barrier for the purpose of turning a confined space into an area that is no longer considered a confined space (assuming this particular barrier is enough). In addition, although it may not be easy, I surmise that some of the spaces between the bars in the barrier pictured are large enough for at least some people to squeeze through. In any event, using the barrier is a good protective measure to prevent falling into the space (for instance, if the worker leaning into the space passes out), and would eliminate the need for an entry rescue team as long as the barrier were in place during operations.

The compliance directive quote supplied refers to areas that cannot be bodily entered, which by definition is not a confined space. There is no question that you can reach into an area that is not a confined space without a permit. If it is not a confined space, it can’t be a permit-required confined space. The OSHA reference to using signs or barriers is to prevent entry into a confined space by those not authorized to do so, and is not a factor here, as “signs, barriers or other equally effective means” applies to confined spaces. The training reference is with regard to training employees as to the existence and location of confined spaces, and the prohibition against entering. The workers in this case are breaking the plane of the opening, so the only way it would not be considered a confined space entry is if it is not a confined space. Perhaps the most effective means (of doing the job without doing something that would be considered an entry) is to devise a system to remotely retrieve the monitor without breaking the plane of the opening.

Perhaps I should have been a little clearer on the point I was trying to make by supplying a link to the NIOSH FACE report (http://www.cdc.gov/niosh/face/stateface/ny/03ny027.html). You point out correctly that the fatality was a result of a full-body entry. However, the (unauthorized) entry is an example of the slippery slope that follows when you send workers to do a job involving a confined space that does not require entry—you give them minimal (or no) training because they are not entrants.

The lack of training can result in a failure to appreciate the true nature and severity of the hazards. In turn, this can result in the type of incident that occurred in this report. Even if the current barrier is considered sufficient to say the space no longer is a confined space, and leaning into the space can be done without a permit or an attendant, there should still be extensive confined space training, including the hazards and consequences of exposure to the hazards, to ensure that there is no incident like the one in the FACE report. A barrier placed on top of a hole and not secured in any manner is really no barrier to an incident like that documented in the report. Only effective training, employees recognizing that they are working around a confined space and an appreciation of the hazards will likely be effective to prevent someone jumping down in the space if an expensive piece of equipment is dropped in the hole.

For more information, contact Robert Aguiluz at rmaquiluz@rocorescue.com; or phone (225) 755-7626.
Controlling the Risk of Violence in the Retail Workplace

By George W. Pearson, CSP, ARM

Editor’s Note: This paper is a series of reports about workplace violence and what retail organizations can do to prevent or mitigate this hazard. It also presents steps employers need to take in advancing control over the workplace violence risk. It contains a background piece on the state of workplace violence prevention as a national issue and how retail organizations could be responding, followed by a discussion of how organizations can respond internally by preparing managers, employees and in-house SH&E professionals for the potential of violence in the workplace. The views presented here are the author’s perspective as the lead SH&E professional for a super-regional wireless telecommunications carrier.

Violence in the workplace results in unwanted and often dire consequences including bodily harm leading to the heartbreak it brings families, the stress and emotional strain of a violent confrontation, and the business impact directly or indirectly felt by the worker’s employer. Empirically, human suffering while at work from actual harm or from the fear of harm is unnecessary and avoidable. Until recently, however, the problem has been viewed as one for law enforcement.

Today, it is recognized as a national problem requiring a multidisciplinary approach involving SH&E managers and supervisors, human resources, law enforcement, government and academic professions. Regulators say no employee should come to work believing a violent situation with a nonviolent response and a means to defuse a situation with a nonviolent response and conflict resolution. This is why safety and risk control advisors should insist on the intervention initiatives. As key to the prevention and control of violence in the retail workplace, organizations should have a supportive network in place to assess threats before an incident occurs and to respond to incidents when they occur. Intervention at the early stages of an incident, once knowing that a threat exists, can mitigate its outcome. By having a team of trained professionals available, there is help for the employee, and a means to defuse a situation with a nonviolent response and conflict resolution. This is why safety and risk control advisors should insist on the reporting of all types of incidents and the employer should have a mechanism in place to respond and investigate.

In November 2004, NIOSH held a conference to identify ways to bring workplace violence research to practice—in other words how do we go about preventing, controlling and mitigating violence in the workplace? The goals were to identify successful strategies; find barriers to the implementation of prevention efforts; recognize research and dissemination gaps; and define what roles various governmental agencies should have to make progress in workplace violence prevention. More than 200 professionals from the health, safety, law enforcement, government and academic professions registered for the two-day program.

After the introductions and initial presentations were complete, a series of breakout sessions and numerous discussions were scheduled over the remainder of the two days that proved to be most beneficial. NIOSH staff will synthesize the results into a work plan for the agency to advance the body of knowledge on preventing workplace violence. What was promised is a NIOSH document that will serve as a roadmap on prevention, control and mitigation strategies, as well as a research agenda for preventing violence in the workplace. Lessons learned were shared at this conference and what follows is a discussion on what retail employers can do to help curb violence in their workplace.

Retail Risks & Response

The risks of workplace violence are classified by NIOSH and the FBI by the sources of the potential violence: criminal intent is when there is intent to commit robbery or theft; violence from a customer or client can be a customer dissatisfied with goods or services provided as with an irate customer; coworker violence is a worker-on-worker attack; and violence stemming from personal relationships are incidents where domestic issues erupt in the workplace.

Retail organizations will typically focus on theft from robbery and the risks from irate customers because these are the obvious threats to their businesses. Their rationale is to do this from experience in

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frequency and severity of past losses. They should, however, also consider the other sources of violence that can stem from coworker episodes or from a third-party domestic violence incident migrating to the workplace. What protections and controls are in place to protect against robbery? What preventive measures are in place to protect employees from an irate customer? What about coworker violence or third parties who may have troubled relationships with employees?

**Robbery**
A detailed cash control policy should be in place to minimize cash exposure and to protect the safety of employees. It should cover the handling of cash from the point of contact with the customer to making a daily bank deposit. One goal is to protect the cash from theft, while other measures protect the employees from being targets or victims of crime. For example, the policy advises not to make bank deposits at closing; handle cash while alone in the store; or use the rear door to exit the building at night with cash. There are also objectives to keep cash to a minimum and to use drop safes. These measures deter a perpetrator from stealing cash. These safeguards are designed to remove the opportunity to steal.

Physical features such as lighting are a powerful risk control factor and enhance store safety. Store lighting systems provide well-lit interior and exteriors. Open and properly lit store interiors also provide visibility from the outside. These measures deter potential thieves. Access and egress to and from stores should be through clear passages and well-lit areas. Security devices to be used in stores include cameras, alarms that summon police and one-way locking doors that lock from the outside only.

**Irate Customer**
Customer/client dissatisfaction can be a customer who becomes irate because s/he is unhappy with services, or the cost of the product or service, or misunderstands that an additional fee was waived. Customers under the influence of alcohol or drugs can be unreasonable and may refuse to leave the store. It is always wise to involve the police to keep such matters from escalating on premises.

**Coworker Violence**
Coworker violence may be detected early when there are direct threats of violence. The threats may be overheard by third parties which can provide a clue that an attack is being contemplated. It may involve discipline or termination. A toxic or demeaning work environment could provoke a violent response as well.

**Personal Relationships**
Violence stemming from a personal relationship may involve a troubled relationship that spills over into the workplace. There may be a history of domestic violence. Stalking at or near the workplace is a subtle form of violence that can be a sign of a potential attack. Absenteeism, signs of stress and anxiety may suggest victimization. The subject employee should be encouraged to contact the internal threat assessment or crisis response team. As with any matter that is troubling an employee, referring them to an employee assistance program (EAP) is recommended.

**What Can Retail Managers Do?**
It is common for a threat of violent behavior such as retribution or a stalking episode to be overheard, before the actual incident takes place or before the potential victim comes forward and makes a complaint. So be aware that a matter requiring attention may not always be an actual incident. In the event of a violent workplace incident, keep these steps in mind.

• Report all incidents and threats of violence to the threat assessment or crisis response team as soon as possible.
• Consider taking training in nonviolent response and conflict resolution. This helps managers recognize, intervene and defuse potentially violent situations.
• Provide prompt emergency medical response to attend to anyone who is injured in an attack.
• Make sure the scene is safe and that personal protection is in place if you are a first-aid responder.

**Examples of Policy Titles that Address Potential Protections from Workplace Violence**
Crisis Management
Employee Assistance Program (EAP) Counseling
Employee Coaching and Counseling
Employment Practices
Harassment/Sexual Harassment
Health and Safety
Health and Welfare Benefits
Internal Complaint Procedure
On-the-Job Conduct
Pre-Employment and Ongoing Background Checks
Professional and Business Code of Conduct
Relationships with Other Employees
Retail Store Security Practices
Retaliation
Standards of Conduct
Substance Abuse
Violence in the Workplace

**What Can Retail Employees Do?**
• Learn how to recognize and avoid potentially violent situations. Report violent episodes or threats of violence to your supervisor.
• See whether your employer offers training in nonviolent response and conflict resolution. This helps employees recognize and report, or if qualified, intervene and defuse, potentially violent situations.
• Alert supervisors or managers to any concerns about safety or with security systems.
• Support reports of violent incidents or threats of violence with written documentation containing important details of the incident.
• Protect any area of a facility that is the subject of a theft or robbery investigation. Such an area is considered a crime scene.
• When on company business, avoid traveling alone into unfamiliar locations or situations.
• Follow cash control procedures for bank deposits and for removing money from the drop safe.
• Maintain maximum cash drawer limits.
• Keep control of facility keys. Store keys to company facilities away from non-employees (other than an authorized contractor).
• Observe the rule for a minimum number of employees necessary in order for any location to conduct business.
• Follow proper store opening and closing procedures.

What Can the SH&E Professional Do?

Violence in the workplace is a social phenomenon that has made its presence felt too often and with extreme unwanted severity. It is no longer solely a law enforcement problem, it is a prevention problem. As a result of that paradigm shift, the SH&E professional is now a stakeholder. Often, the safety manager is called on to be involved in a workplace violence prevention strategy/solution. Here are some ideas that can guide SH&E professionals in this area.

• Support behavioral research by becoming involved in organizations that combat workplace violence. Look into law enforcement, human resources, crisis prevention organizations and professional organizations such as ASSE.
• Participate at the national level with governmental organizations that are moving ahead with a workplace violence prevention agenda. NIOSH is a good example as is OSHA, the Justice Dept. and the FBI. One suggestion I made at the NIOSH conference was for researchers to develop an assessment model that organizations can use to channel resources to the risk areas with the corresponding need. This should help answer the question: Are we addressing the right risks in the right ways?
• Look within your own organization and advance proactive programs to prevent, control and mitigate workplace violence, being an internal resource that you are. Develop partnerships and alliances internally with the security, human resources and retail sales departments. Strong alliances in these areas will bode well for successful programs particularly in an area where a team approach is really needed.
• Partner with local law enforcement authorities to keep up with area trends and to gain access to resources that can be of use in training managers and employees.
• Understand the elements of threat assessment and crises management. Be aware that threats are antecedents to violence and should be taken seriously.
• Become competent in nonviolent response and conflict resolution. Review what policies already exist in your organization and what protective measures may already be in place to protect against workplace violence that is derived from these policies (see sidebar). Examine them and assess their effectiveness in achieving that objective.

References
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