



PDHonline Course G197 (2 PDH)

Construction and Contractor Safety - Responsibility, Management, and Basic Safety Considerations

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By: Timothy D. Blackburn, PE, MBA

Course Content

Introduction

Who is responsible for Contractor and Construction Safety? Whom would OSHA cite if a violation were to occur? What are the basic construction safety considerations of which I should be aware? How do I enforce and manage safety? How do I hire a safe Contractor? This course explores these questions. Although not intended to replace further study, offer legal advice, or claim to comprehensively represent regulations, this course will provide a practical overview to the student and enable him or her to better understand safety and our collective responsibilities. This course is written from a decidedly “Owner’s” perspective, with applications to the A/E (Architect/Engineer). In addition, engineers involved in Construction will benefit from the course.

*Note: Given the potential litigious and life-safety aspects of the course, please carefully review and accept the disclaimer before proceeding.*¹

Who is responsible for Construction safety?

There are four categories that must be addressed when we consider who is responsible for Construction safety. These include ethics, contractual, legal, and OSHA citability.

¹ **Disclaimer:** This Course is not intended to comprehensively cover or substitute for any federal, state, or local statute, regulation, or ordinances pertaining to safety as prepared by the Occupational Safety and Health Administration (OSHA) or any other federal, state, or local governments. As well, any references to such regulations represent the Instructor’s understanding at the time of writing the course, and the student should review all regulations before implementing a policy. No guarantee is given herein that adherence to the recommendations will necessarily result in absolute OSHA compliance or avoidance of potential safety hazards, and no liability is accordingly assumed. By proceeding with this course, the student accepts this disclaimer and holds the Instructor and PDHOnline harmless.

Ethics

As Architects and Engineers, we are all familiar with the “not responsible for means and methods” disclaimer. While this disclaimer is often necessary, any effective safety program will begin with a premise that we all are responsible for safety. This means that we all must participate in safe work practices, and notify appropriate individuals when unsafe work practices occur. We can’t ignore safety, no matter our role. However, this should not be understood that all individuals or entities bear equal regulatory, ethical, and legal liability for construction safety. The engineer, for example, should not always be held accountable for standard construction means and methods (true to the common disclaimer), although special projects might require more attention. For example, I participated in a renovation project many years ago that involved installing an elevator in an existing facility. This required structural support that was quite complex, and certain aspects required installation prior to demolition. Although we were not expected to include all construction methods in our design, we would have been remis if we had not addressed critical steps in the process. Morally (and thus ethically), we should participate in affecting a safe work environment when necessary, but we (depending on our roles) should take on increasing responsibility for our assigned roles.

Contractual

Our roles regarding safety can (and often should) be addressed in contracts and other construction documents. This is a means to make each party aware if it’s responsibility regarding safety. In addition, this enables some degree of legal protection and proper consideration for OSHA citability. See the section below which addresses the considerations of OSHA when deciding whom to cite for a violation. Consult with your legal counsel as to the extent of contractual language regarding Safety roles and responsibilities, along with any necessary (and reasonable) disclaimers.

Legal

Almost, anyone can file a lawsuit against anyone at anytime, even when unwarranted. Therefore, we should be diligent to exercise our legal responsibilities and understand legal exposure. While OSHA citations typically end in fines, their findings (or

lack thereof) can support one's legal defense. OSHA may also recommend legal action against the violating company.

While the legalities and regulations vary between states, the primary guidance for safety is found in OSHA regulations. For construction, see the Code of Federal Regulation (CFR), title 29 part 1926 (29 CFR 1926). However, the OSHA requirements for the specific industry in which you are working will also apply. For example, 29 CFR 1910 is very common and applied to general industry. Other industries have other applicable sections. Therefore, use the more stringent of the requirements between the construction regulations and relevant industry regulations. As well, OSHA regulations reference other industry standards, such as ANSI, ASTM, etc. The total of the base and reference regulations exceed several feet high of documents, and requires special expertise to properly manage.

But what happens when that accident does occur, or someone calls in a complaint? What does OSHA look for when deciding whom to cite?

OSHA Citability Exposure for Contractor Safety

OSHA is the Occupational Safety and Health Administration, tasked with governing safety for workers. If there is an accident or complaint, OSHA may pay you a visit. OSHA also performs scheduled inspections. When OSHA determines whom to cite for a particular safety violation, they may look at the following areasⁱ:

1. Who is the creating, exposing, correcting, or controlling employer. Note that a given employee might play multiple roles.
2. If an employer finds itself in one or more of these categories, it has OSHA requirement obligations. The extent of the actions required by the employer varies depending on the category.

Often, projects will fall in the "multiple employer" category. Multiple employer is defined as follows: "Where more than one employer may be citable for a hazardous condition."ⁱⁱ There can be Contractor employees, the Owner's employees, testing agencies, inspectors, and A/E staff located in a work area. OSHA issued a directive to clarify the multi-employer citation policyⁱⁱⁱ. During an inspection, OSHA will determine if

the employer's actions were sufficient to meet obligations. The categories are further described below:

- **Creating Employer:** This category is defined as an employer that caused a hazardous condition that violated an OSHA standard. Simply stated, an employer must not create violative conditions. Citations against an employer can occur even when employees of other employers are affected. As a practical application, if one's operations violate an OSHA standard that exposes any employee, it is citable. Therefore, one's operations must not present an OSHA violation to its employees or other's employees.
- **Exposing Employer:** This category is defined as an employer whose own employees are exposed to a hazard. The following are the conditions under which Exposing Employer is citable:
 - If the exposing employer created the violation, it is citable as a creating employer
 - If a violation is created by another employer, the exposing employer is citable if it knew of the the hazardous condition or failed to exercise reasonable diligence to discover the condition, and failed to take steps consistent with its authority to protect its employees. (This could certainly occur for A/E consultants and Owners – be careful as to the environments in which you send your staff.)

Bottom line, if the exposing employer has authority to correct the hazard it must do so. And if the exposing employer lacks authority to correct hazard, it is citable if it fails to take the following action:

- Ask the creating and/or controlling employer to correct the hazard
- Inform its employees of the hazard
- Takes reasonable alternative measures

As a practical application, the Owner and A/E should protect its employees from the work of contractors. This can be aided by posting signs, limiting access to authorized

personnel in work areas, requiring hard hats and providing other necessary PPE, evacuation during crane swings, training, etc.

- **Correcting Employer:** This category is defined as an employer who is engaged in a common undertaking (on the same worksite) as the exposing employer and is responsible for correcting a hazard. This usually occurs when an employer is given the responsibility of installing and/or maintaining particular safety/health equipment or devices. The correcting employer must exercise reasonable care in preventing and discovering violations and meet its obligations of correcting the hazard. Here is a practical application for this category – this classification may be applicable when one contractor has responsibility for a safety element of another. Be careful that you do not assume the role of the “correcting employer” if you are not qualified or willing to take the risk. Practically stated, be careful how your company assumes liability for safety.
- **Controlling Employer:** This category is defined as an employer who has general supervisory authority over the worksite, including the power to correct safety and health violations or requires others to correct them. General Contractors or Construction Management contractors may fall in this category, or others who assume aspects of safety responsibility. Control can be established by contract or, in the absence of explicit contractual provisions, by the exercise of control in practice. When so assigned, the controlling employer must exercise reasonable care to prevent and detect violations on the site. But sometimes safety is so specialized that the Controlling Contractor can't be expected to have sufficient expertise; in such cases, responsibility may be viewed by OSHA as being less than what is required for its own work. As a practical application, you might wish to avoid unnecessary supervisory authority over a contractor's safety, whether via contract or by action (this doesn't mean we should avoid pointing out safety concerns when observed, especially those potentially affecting our employees).

Again, who is legally liable? Often, that question is left up to the jury or a judge. Remember, OSHA requirements should be considered the minimum, and we are not

excused to take less care when necessary. But OSHA findings can be used for us or against us in a court of law.

Next, let's look at some typical applications of construction safety, and areas often in violation. Let's start with planning ahead – establish emergency procedures.

Emergency Procedures

During an emergency is not the appropriate time to develop procedures or determine how to respond. This is reactive rather than proactive. Plan ahead, and establish standard emergency procedures. The following are typical minimum procedures and practices that should be determined in advance:

- Reporting procedures (including all accidents, medical emergencies and near-misses)
- Who will call for and direct emergency personnel?
- Review emergency exit signs and evacuation procedures for the work area
- Require workers to observe all alarms and fire drills
- Review Owner specific requirements, such as permits (internal and external) and requirements for working in their occupied environments (if applicable)

What you should expect from a Contractor

We should make it clear that we hold our contractors responsible for safety. *Each* contractor should have a Safety Program that provides for safety and health on the job, protection of property, and public safety. Their safety program should also address education and compliance to occupational laws and requirements. (Later, we will consider specific contents of an effective Safety program). In addition, their safety program should also include frequent safety meetings and audits. The Contractor should keep OSHA Standards and appropriate safety codes and materials on the jobsite. They should have a nonexpired and fully stocked first aid kit. And, they should enforce safety requirements.

Basic Construction Safety – Considerations for Injury Prevention

As noted previously, this is meant to be an introduction of the topic, and considerable training is required to master the subject or to ensure compliance. There are professionals that dedicate their careers to safety. Therefore, the following is not intended

to represent an exhaustive study nor does it ensure absolute safety or OSHA compliance. However, it does represent my experience and opinions as to the major considerations related to construction safety.

We will review personal safety as it relates to protecting the body and minimizing the risk of injury as follows:

Protecting the Body: PPE (Personal Protective Equipment)

PPE is required when other means of protection are not practical, although it is one of the first things we think of regarding Contractor safety. (OSHA prefers engineered solutions as opposed to PPE as much as practical.) PPE is intended to protect various body parts from injury, and are essential on a construction jobsite. PPE provides protection for the following body areas:

- **Head:** Require hardhats when there is likelihood of head impact or falling objects, and for electrical work. Some limit requiring hardhats for activities that present a risk of head injury. However, when a *conditional* policy is permitted, I have found that many people will stop wearing their hardhats, or remove them when needed. Therefore, I recommend a strong policy that requires everyone entering a construction site to wear hardhats. This includes the construction staff, the owner's staff, as well as architects/engineers. Ensure hardhats are ANSI certified, and are in good condition. One indication of condition is the flex test – bend the sides inward about ½”, and observe if there are any cracks or other problems. Moreover, hardhats aren't a fashion statement – don't permit people to wear them backwards or apply personal stickers.
- **Feet:** Although steel-toed safety shoes are required under certain lifting conditions and for specific risks of foot injury, I recommend it be a blanket requirement for reasons similar to the hardhat policy. Exceptions should be minimized. Also require rubber soles in wet environments. Prohibit tennis shoes, open-toe shoes or sandals, or high heels in work areas (even for workers and visitors).
- **Face and Eyes:** Require safety glasses when there are activities that could result in eye trauma. Also, some activities may require a face shield in addition to safety glasses; however, face shields are never a substitute for safety glasses, and are intended to protect the

face. Know the difference between safety glasses needed to protect the eye from particulates, and those needed for chemical protection (the latter which doesn't have exposed breathing holes that would encourage chemical intrusion).

- **Ears:** Require hearing protection where noise levels are above 90 dBA or at marked areas. Contractors should also follow owner operational ear protection requirements.
- **Respiratory:** Use fit-tested and application appropriate respiratory equipment when work generates dust and/or vapors. Note that a dust mask might not provide adequate protection from vapors. Also, note that facial hair can impede proper respirator functions, requiring other solutions.
- **Hands:** Require protective gloves where needed. This is especially necessary where dangers of burns or cuts exist. Hand injury is one of the most common injuries.
- **Hair:** Contain long hair to avoid fire or entanglement in machinery. Rotating equipment has been known to scalp people.
- **Torso:** Use kickback aprons when using power machines such as table saws. Also wear welding aprons when needed.
- **Electrical Safety:** Considerable electrical safety PPE is required in certain applications, such as arc-flash protection. (The full extent of this is beyond the scope of this course.) Prohibit the untrained/inexperienced from working on electrical items and circuits.
- **Clothing:** Often, workers like to be excessively casual in a construction environment. I suggest requiring long pants and shirts on construction sites, which offer greater protection (including against sunburn). Don't not permit loose or frayed clothing, dangling jewelry, or neckties in construction areas (which can get caught in rotating equipment and cause suffocation and other trauma). Also, require special clothing when needed – some applications may necessitate special clothing requirements. For example, in my industry (Pharmaceuticals) disposal jumpers or lab coats are sometimes required, plus booties and hair/beard covers.

Protection against falls

Serious injury and death can result from falls, even from short heights. People can fall through holes and other openings – cover and mark floor openings. And, they can fall from elevated work areas.

First, let's review fall protection. Whenever people are working more than six feet off the ground or floor and are within six feet from the edge, provide suitable guardrails to prevent falls.² Where guardrails are not available, require a full-body safety harness with shock absorbent lanyard and double locking hooks. Only tie off to a point capable of resisting 5,000 pounds. But tie-off points capable of resisting this load are rare (roughly equal to the weight of over 2 early VW's), and certainly should not include pipes, conduit, and ductwork. In addition, watch out for the tendency for workers to walk on ducts and other unsafe surfaces, or to construct rudimentary platforms with suspect anchor points and no guards.

Also include Man-Lift safety in your program. Workers should wear fall *prevention* when working on elevated aerial platforms – anchor the lanyard to the lift. They should be trained to maintain safe work practices while in the baskets, such as maintaining a firm footing on the platform. In addition, they should never use planks, ladders, or any other device on the aerial platform for achieving additional height. Climb out of lifts only when proper tie-offs are available and from baskets designed for exit through a gate.

Another common risk for fall comes from working off ladders and scaffolds. These present many opportunities for injury, and it is easy to observe when good practices are violated (you will likely see many violations in this area.) To begin, I recommend you only permit the use of fiberglass ladders. Wood ladders can become easily damaged/unstable, and metal ladders are prohibited for work that could present an electrical hazard. Tie off ladders taller than ten feet. Permit only one person per ladder. Good positioning is also essential when working on ladders. For example, require workers to face the ladder with both feet secure on the rung, and stay off tops of ladders. A ladder with an inappropriate lean angle is also dangerous – the angle of extension ladders should be such that one-fourth the height is at the base. Fully engage stepladders and don't use them as a lean-to or extension ladder. Do not permit workers to carry articles while climbing a ladder; use a hand line. Do not permit ladders to be placed over doorways.

² Review the OSHA regulations for the industry in which the project is to be constructed – requirements may vary.

Good scaffolding techniques are also crucial. When people are on scaffolding, lock the wheels and don't move the scaffold. Never use a ladder for scaffolding. Remember to inspect scaffolds frequently as required by OSHA.

Protection from Tools and Equipment

To prevent injury (and facilitate efficient operation), all tools and equipment should be in good condition, not worn, properly operating, appropriate for the job, and should not cause a safety hazard. It is perhaps obvious, but use tools in accordance with manufacturer's instructions and general good practices. For example, hand tools should be clean, sharpened, oiled, and not abused. Keep "mushrooms" on impact tools dressed. Do not hoist tools by power cords. Ensure guards are in place before using power tools. Don't modify or make your own tools.

Other good safety considerations for tools are as follows: Electrical tools should be double insulated or properly grounded. Require Contractors to keep their tools in locked boxes. In addition to minimizing theft, it will aid in preventing unauthorized use. Stud guns should not be loaded when unattended.

Also consider site operating equipment. Require those using such equipment to be properly trained and experienced. Also ensure the equipment meets all current safety standards. For example, ensure Site or operating equipment has working backup alarms.

Protection from Excavating Hazards

Serious injuries and death can result from improper excavation techniques. The first step in preventing injury is to mark existing utilities. Injuries (as well as property damage) can result from damaging existing underground utilities. The local utility locator agency will often mark utilities free. However, they may not mark private utilities – you'll need to hire a private company. Also, perform necessary reviews of site drawings. I do strongly recommend utilizing the services of an underground utility locator before digging – as-builts are often incorrect.

Many people have been injured or killed from collapsed trenches. When trenching, ensure adequate shoring is in place, or sides are cut back to reduce collapse exposure. And, workers must always have a way out, such as a ladder. Placing excavated soils too close to

the trench can also add stresses that facilitate failure – place dirt at least two feet from the edge of the trenches.

Protection against Fires

We may think of fire protection as being primarily an exercise to protect property. In addition to the loss of property, fires can obviously cause serious bodily harm to construction workers and other occupants nearby. When thinking of fire safety on the construction jobsite, we primarily need to focus on Hot Work activities.

Whenever there are heat or spark producing activities (including grinding, welding, burning, cutting, etc.), the activity is *Hot Work*. Consider issuing *Hot Work* permits before any burning, cutting, or grinding. There should be a checklist of required activities necessary to prevent fires as part of the permit process. At a minimum, require fire extinguishers and individual(s) dedicated as a fire watch during and 30 minutes after the hot work activity. (Consider two fire watches for hot work penetrating the roof, one below and one above.) Also, protect adjacent spaces and combustibles. Provide welding curtains/partitions for visual and spark shielding. In addition, relocate combustibles a suitable distance away from the jobsite and sweep the area. Post signage to indicate the Hot Work is underway. Avoid Hot Work when sprinklers have been deactivated unless other suitable fire protection means are provided.

Protection against working in the Dark – Jobsite Lighting

People need to be able to clearly see dangers or trip hazards in their work area, as well as perform their tasks safely. Therefore, proper lighting is essential. Ensure there is adequate lighting in the work area. The minimum light level is typically 5 fc (foot-candles), and higher light levels are suggested (check your regulations). Provide the necessary temporary lighting – protect lamps against breakage, and don't suspend from cords. Ensure lighting will remain on, sufficient to enable safe egress in the event of a power failure. Also provide adequate lighting before permanent electricity is connected or during shutdowns (via generators or temporary power connections.)

Protection against Chemical Injury

In the previous section on PPE, we discussed some elements of protection against Chemical injury. Proper protections are necessary when handling chemicals. In addition, we should consider the impact when an exposure occurs. We cannot assume our PPE and procedures provide an absolute guarantee of safety. For example, provide an eyewash and shower in the event a worker is exposed. And, require the Contractor to maintain adequate ventilation when paints or solvents are used.

In addition, we should have procedures in place to properly handle chemicals and educate workers. This begins with the Contractor's hazard communication program, which should include training for the handling of all chemicals brought on-site. The Contractor should also maintain Material Safety Data Sheets (MSDS) for all chemicals used on the project (available for viewing at the jobsite). Workers should be aware as to the location of MSDS sheets. Remember to make workers aware of the location of the Owner's MSDS sheets.

Proper storage of chemicals is also a safeguard against injury or improper use. Chemicals should be stored in original or approved containers with a proper label and warnings attached. Also, limit the amount of flammable or combustible liquids in a work area outside a safety cabinet (see previous section that addressed fire safety).

Improper handling and disposing of chemicals also affects the environment (which eventually affects us). Allow no chemicals, solvents, paints, cleaners, containers, or any other hazardous or toxic materials to be flushed into drains or disposed of inappropriately. Require all waste to be sent offsite for treatment, recycling, storage and/or disposal. Require the Contractor to completely remove all remaining chemicals (except for attic stock required as by the project specifications.)

Chemical and other contaminants can also be encountered or uncovered as part of construction process. Instruct the Contractor to stop work if it encounters any contaminants during construction until proper resolution.

Protection from "Live" or Stored Energy

Workers should be aware of live or stored energy when working on equipment, piping, or circuits. This hazard can be in the form of electricity or mechanical forces that

could engage even with the equipment being shut off. Employ an effective Lockout/Tagout (LOTO) Policy when working on electrical circuitry, steam, compressed air, hydraulics, chemical lines or valves, or other stored energy. The LOTO policy should include a requirement for workers to use their own lock and tag, and never remove another's lock. Workers should also test all dead circuits before working on them, as well as other utilities.

Protection against Electrical Injury

While the topic of electrical safety is of a complexity and importance it can't be fully addressed in this course, let's review a few other general expectations as it relates to the Construction jobsite. First, only qualified electricians should work on electrical circuits or shut off breakers (be aware of arc flash). Second, use proper electrical equipment in the work area. Extension cords should be designated for *extra hard usage*, have a GFCI (Ground Fault Circuit Interrupter) device, and be elevated seven feet above the work surface or protect in other ways. Do not permit the use of frayed or worn extension cords.

Ergonomics

Some injuries do not result from falling or being hit. Many injuries (especially to the back, joints, and muscles) can be avoided by simply applying good ergonomic principles. Although good ergonomics are usually intuitive, many people violate the following basic principles:

1. Use proper lifting techniques, which include using the legs and keeping the back straight rather than bending
2. Consider size, shape and weight. Never try to lift more than you can handle safely and with ease
3. Whenever possible, use lifting aids
4. Push rather than pull
5. Avoid repetitive motion
6. Hold items close to body when carrying
7. Avoid lifting above shoulder height

Protection from Cranes and Hoisting Equipment

Improper operation of cranes and hoisting equipment not only expose hazards to operators, but other workers and occupants of adjacent spaces (plus property loss). To begin, ensure cranes and hoists have had a successful and current inspection by a qualified testing agency. Also ensure Operators are licensed and properly qualified. Further, ensure the equipment is in good condition and is proper to the operation. For example, use hook-type safety latches or wire the hooks when the load is to be lifted in excess of two feet to prevent slings from becoming dislodged from the hook. Also consider the bystander. Never move loads over personnel or occupied areas – ensure there are no people in the load path. There are some additional good practices as well, such as do not permit free-fall loads, and extend out-riggers before any load is lifted or the boom is activated.

Protection from Compressed Gas Cylinders

Compressed cylinders present considerable safety hazards, as they may contain dangerous gasses and are compressed at high pressures. This represents a considerable hazard, both from the inherent hazards associated with the gas properties and the mechanical potential. To begin, secure cylinders in upright positions. Also keep a safe distance or shield from welding or cutting operations. Install valve protection caps, especially while transporting or when not in use. There have been serious injuries and even death that occurred when valves broke, resulting in the cylinder to becoming a missile. Require the use of approved spark igniters to light torches (don't use matches). Elevate hoses seven feet above work area or protect from damage. Ensure oxygen and fuel gas cylinders are stored apart except for portable welding carts.

Confined Spaces

Confined spaces are defined as areas that have limited access, are not designed for continuous occupancy, but are large enough to allow entry. Serious injury and death has resulted from someone entering a confined space and while there experiencing oxygen deficits or other exposure, becoming injured from equipment activation, or encountering other problems. Require the contractor to test the environments of confined spaces before entry, and engage any LOTO and other protection means. Also require the Contractor to provide all means of rescue, rescue equipment, and atmospheric monitoring of the confined space.

Other personal protection means and methods

There are other considerations that relate to safety or contribute to a safe worksite as follows:

1. **Area Protection:** Protect adjacent areas from chemicals, moisture, welding sparks, and falling debris. Demark and isolate work areas with safety markers, tape barriers, blinker lights, and physical barriers (if necessary). Rope off areas under scaffolding and other overhead work.
2. **Signage:** Post signage as needed. The following are signage considerations:
 - a. *Safety signage:* These are intended to warn people of dangers and prohibit entry for nonqualified personnel or those that are not to be in the work area. Signage might include “Hardhat Area,” “Danger: Keep Out,” etc. as the circumstances dictate.
 - b. *Emergency data:* Post listing of emergency telephone numbers, physicians, hospitals, or ambulances. Show emergency exit paths and assembly areas.
 - c. *Other legal and essential postings as required*
3. **Housekeeping:** Good housekeeping may not be the first thing you think of as impacting Construction safety. However, a clean and organized jobsite facilitates safety.
4. **Disposal:** Use enclosed disposal chutes whenever dropping materials more than 20 feet and as needed for public safety.
5. **Structural Failure:** Brace masonry as needed to prevent overturning. Unless a Professional Structural engineer confirms the capacity, don’t place construction loads or rig from concrete or other structures.

Effective Enforcement

Now that we have reviewed the basics of safety, how do we enforce safety requirements from our Contractors and their workers? First, ensure your Contractor is serious about safety. It should have a robust, active, and persistent Safety Program. Ensure it

hosts toolbox safety topics, and covers major safety considerations before major events (such as crane lifts, etc.) There should be an individual designated as the safety officer for a given project – larger projects should have a dedicated individual.

Your persistence and leadership in this area will benefit as well. Contractors and workers need to know that you too are serious about Safety. They need to understand the consequences of failure to comply. However, many make the mistake of disciplining *after* an accident. This is too late, and can encourage unreported injuries. A better approach is to discipline unsafe behaviors *as* they are observed. There should be a low tolerance for unsafe behaviors. For construction workers, consider only one warning before dismissal for minor violations, and immediate and permanent dismissal from the project site for major violations or for belligerent behavior. People need to understand that their unsafe behavior, either to themselves or others, will have prompt consequences. This is negative reinforcement.

There is also positive reinforcement. Some offer rewards for *no lost time* accidents. This can be as simple as a lunch, or a drawing for a larger prize. However, it has been my experience that negative reinforcement is more effective than positive alone, although the two can be used in conjunction.

Finally, continuously improve. Learn from mistakes, and implement behaviors to prevent future safety problems. In addition, review your own obligations under OSHA.

But enforcement must be begin with hiring the appropriate Contractors. The cliché remains true that an ounce of prevention is better than a pound of cure.

Hiring Safe Contractors

Hire Contractors with a proven safety record. At a minimum, request necessary information in proposals, or include safety requirements in prequalification packages. The following are some areas that will indicate a Contractor's safety record:

1. Experience: Obviously, experience working with a Contractor will reveal their emphasis and success in safety. If you haven't worked with the Contractor, check references.
2. Contractor's Safety Program: Request to see and review their safety program. You should expect a safe Contractor to have a ready written program for their safety. AIHA (American Industrial Hygiene Association) recommends the following minimal elements of a Safety Program:^{iv}

- a. Management Commitment and Employee Involvement
 - b. Worksite Analysis
 - c. Hazard Prevention and Control
 - d. Safety Training
 - e. Program Review
3. EMR (Experience Modification Ratio): States require companies to provide coverage for occupational injuries and illnesses (sometimes smaller companies are exempted). If a company's claims were the same as the industry average, the premiums would equal the industry average, and the EMR would equal one. If, for example, the company had claims twice the average, the EMR would equal two. Therefore, look for companies with claims no higher than the industry average, or EMR's less than or equal to 1.
 4. OSHA 200 Logs: Companies are required to report their annual injuries and illnesses through the Bureau of Labor Statistics based on OSHA 200 logs. You can review statistics from the BLS or request the actual recent OSHA 200 logs from the Contractor.
 5. OSHA Citations: Request a list of any OSHA citations for review.
 6. Licensing Board: Contact the licensing board for any complaints.

Self-Directed Exercise

Think about an area related to your discipline that presents a significant safety concern, or an area of safety that contractors frequently violate. Then, research OSHA requirements for the area. An online search is acceptable if you don't have the standards handy. Then, develop a checklist of the safety requirements. Please spend at least 15 minutes on this exercise. The Quiz will ask if you completed the exercise.

Conclusion

In this course, we have reviewed responsibilities for safety. We also looked at the considerations OSHA may use to determine whom is citable for a safety violation. Then, we reviewed basic safety considerations to prevent or minimize the risk of accidents and injury. We concluded with a review of enforcement, and strategies to hire a safe contractor. The

student is encouraged to review specific OSHA regulations for further information, as well as other resources available.

Closing comments from the Instructor

Thank you for taking the course. It is my goal to provide you with the highest quality engineering continuing education courses that are practical, straight to the point, and packed with useful takeaways. Please look at the other courses I have authored, all of which I developed with this philosophy in mind. We welcome and request your input to the course, and how we can improve with future revisions. As well, we are interested in the other topics that would interest you.

Endnotes

ⁱ OSHA Directive CPL 2-0.124.

ⁱⁱ Ibid

ⁱⁱⁱ Ibid.

^{iv} AIHA's View of the Use of OHS Performance Criteria In Contracting and Procurement White Paper