Managing Safety and Health Construction

This course is designed to introduce management and employees to the seven key elements of a Safety and Health Management Program for the Construction Industry. It emphasizes steps in developing and deploying the seven elements.
OSHAcademy Course 618 Study Guide

Managing Safety and Health: Construction

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Contact OSHAcademy to arrange for use as a training document.

This study guide is designed to be reviewed off-line as a tool for preparation to successfully complete OSHAcademy Course 618.

Read each module, answer the quiz questions, and submit the quiz questions online through the course webpage. You can print the post-quiz response screen which will contain the correct answers to the questions.

The final exam will consist of questions developed from the course content and module quizzes.

We hope you enjoy the course and if you have any questions, feel free to email or call:

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Course Introduction

Construction is a high hazard industry that has a wide range of activities involving alteration, and/or repair. Examples include residential and commercial building construction, bridge erection, roadway paving, excavations, demolitions, and large scale painting jobs.

Construction workers engage in many activities that may expose them to serious hazards, such as falling from rooftops, unguarded machinery, being struck by heavy construction equipment, electrocutions, silica dust, and asbestos.

This course is an introduction to the Construction Safety Management System (CSMS), working with contractors, and worksite analysis.

The information, tools, and resources provided in this course are designed to help you, whether you're a worker or an employer, to identify, reduce, and eliminate construction-related hazards.

Like all construction companies, you need to tailor your CSMS to your own specific work operations and work environments.

An effective safety culture and CSMS has the following primary elements:

- leadership and accountability
- involvement and communications
- worksite analysis
- hazard identification, prevention, and control
- education and training
- evaluation and continuous improvement

The standards apply to:

- All contractors who enter into contracts which are for construction, alteration, and/or repair, including painting and decorating.
- All subcontractors who agree to perform any part of the labor or material requirements of a contract.
• All suppliers who furnish any supplies or materials, if the work involved is performed on or near a construction site, or if the supplier fabricates the goods or materials specifically for the construction project, and the work can be said to be a construction activity.
Modules and Learning Objectives

Module 1 – CSMS Basics

Learning objectives in this module include:

- Define and identify components of a successful safety culture.
- Define and discuss the characteristics of safety commitment and leadership.
- Describe the four primary components of a construction safety management system (CSMS).
- List and give examples of the four categories of employers on construction sites.
- Discuss employer and supervisor responsibilities on construction sites.
- List and describe safety programs for accountability, training, and hazard controls.
- Describe how an effective CSMS benefits productivity and profitability.

Module 2 – Working with Contractors

Learning objectives in this module include:

- Describe the importance of planning before the construction project begins.
- Discuss the importance of Pre-Bid, Pre-Mobilization, and weekly safety meetings.
- Discuss important safety criteria for selecting contractors.
- Describe the DART, TCIR, and EMR data is used in selecting contractors.
- Describe the roles and responsibilities for project engineers, head contractors, and safety representatives.
- Discuss employer options when confronted with contractor non-compliance.
- Discuss important multi-employer communication and coordination criteria.
Module 3 – Worksite Analysis

Learning objectives in this module include:

• List and describe the five primary processes for construction worksite analysis.

• Discuss the importance of the comprehensive baseline survey.

• List and give examples of hazards and exposure to hazards on the construction site.

• Identify the five primary categories of hazards in construction.

• Describe the importance of the Job Hazard Analysis (JHA).

• Describe the four primary categories of worksite change analysis.

• Describe the importance of conducting safety inspections.

• Give examples of the five "Hierarchy of Controls" hazard control strategies.

• Describe Deming's PDSA cycle for continually improving hazard controls.
Module 1: CSMS Basics

Safety Culture

Before we get started, it is critical to understand that the only way your Construction Safety Management System (CSMS) will succeed is to make sure the underlying safety culture includes a real long-term serious commitment and tough-caring leadership by management.

This first module will briefly explore some of the important components necessary in an effective safety culture. By the way, if you are interested in developing your CSMS, be sure to take course 833 Developing a Construction Safety Management System.

Believe it or not, OSHA actually has a pretty good definition for a safety culture. OSHA defines culture as:

"a combination of an organization's, attitudes, behaviors, beliefs, values, ways of doing things, and other shared characteristics of a particular group of people".

It's important to understand, from the employer's point of view, the company's corporate culture is something to be managed. However, ask an employee what culture means to them and they will likely tell you it's just the way things are around here.

Quiz Instructions

Read the material in each section to discover the correct answer to questions. Circle the correct answer. When you’re finished go online to take the final exam. This exam is open book, so you can use this study guide.

1. If you ask your co-worker what a safety culture is, he or she will likely say _____.
   a. "spending serious time and money in safety"
   b. "something that must be managed continually"
   c. "it's just the way things are around here"
   d. "it's something that you grow in a laboratory"
Commitment

The employer demonstrates commitment by providing employees with the tools and equipment they need to work safe.

The success of your company's CSMS depends on the willingness of top management to demonstrate a long term serious commitment to protect every employee from injury and illness on the job.

But how do you get it top management commitment if you don't already have it? Real commitment doesn't just appear out of thin air.

Management commitment to safety will most likely occur to the extent each manager clearly understands the positive benefits derived from their effort. Understanding the benefits will create a strong desire to do what it takes to improve the company's safety culture.

Managers will invest serious time and money into effective safety management by developing safety policies, programs, plans and procedures. They will also display leadership through effective accountability and recognition of behaviors and results.

**Bottom line: Serious commitment requires serious time and money.**

2. When is it more likely that management will make a serious commitment to safety?
   
   a. When managers understand the benefits
   b. When OSHA places the company on its inspection list
   c. After the company has suffered a serious accident
   d. When the company can afford to do so

Leadership

Every day, construction workers, supervisors and managers have many opportunities to communicate and act in ways that demonstrate safety leadership. Unfortunately, these opportunities go unanswered because they are just not seen as real leadership opportunities.

Employers and managers do not understand that the simple expression of tough-caring safety leadership – being tough about safety standards because you care about the employee - can result in enormous benefits. The ability to perceive leadership opportunities improves the company's potential to succeed.
Tough-caring leaders also assume their workers, at all levels of the organization, are good people trying to do the best they can with the skills they have.

Employees, on the other hand, do not always have the physical resources and psychosocial support needed to achieve the kind of results expected of them. Why is that? Because they are not being provided with adequate physical resources (tools, equipment, machinery, materials, etc.) or the education, training, time, and consequences.

Effective leadership can overcome these challenges by providing the resources and training needed for their workers to excel.

3. Which of the following leadership styles can have enormous benefits to the company?
   a. Tough-concerned
   b. Tough-controlling
   c. Tough-coercive
   d. Tough-caring

What is a System?

A "system" may be thought of as an orderly arrangement of interdependent activities and related procedures which implement and facilitate the performance of a major activity within an organization. (American Society of Safety Engineers, Dictionary of Terms)

Look at Syssie, the cow to the right. Syssie is a system, right? You can tell she's a cow because she looks like one: she has "structure." She needs food, air, water, a suitable environment, tender loving care, and other "inputs" to function properly. We know she has respiratory, digestion, circulation, and many other "processes" inside. Finally, she produces outputs like milk, waste products, and behavior.

Just like Syssie, the Construction Safety Management Systems are composed of the same four basic components:

1. **Structure.** The CSMS may be formal, informal, simple or complex depending on the size and nature of the organization. The structure is reflected in the organizational chart.
2. **Inputs.** Inputs include money, people, materials, equipment, and time.

3. **Processes.** Processes include inspections, training, investigations, safe procedures, and recognition.

4. **Outputs.** Examples of CSMS outputs include safe/unsafe behaviors, products, services, morale, and quality.

**Bottom line:** A construction safety management system will always produce what it is designed to produce.

4. Which of the following would be an output of the construction safety management system (CSMS)?

   a. Everyone uses proper PPE
   b. Management funds safety and health training
   c. The safety manager reports to the operations director
   d. Training is conducted for all new employees

**Employer Categories on Worksites**

On most construction worksites, more than one employer or contractor will be managing some aspect of safety as a result of the responsibilities they have been assigned. It's important to know on multi-employer worksites more than one employer may be citable for a hazardous condition that violates an OSHA standard. According to OSHA, there are four employer categories on a multi-employer worksite:

1. **Creating employer:** the employer who caused a hazardous condition that violates an OSHA standard

2. **Exposing employer:** This is an employer whose own employees are exposed to the hazard.

3. **Correcting employer:** This is 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 where an employer is given the responsibility of installing and/or maintaining particular safety/health equipment or devices.
4. **Controlling employer**: This is an employer who has general supervisory authority over the worksite, including the power to correct safety and health violations itself or require others to correct them. Control can be established by contract or, in the absence of explicit contractual provisions, by the exercise of control in practice.

It's also important to remember any one employer on a construction site may actually meet the criteria in more than one of the above categories.

5. **Which of the following employers on a construction worksite causes a hazardous condition that violates an OSHA standard?**
   
   a. The exposing employer  
   b. The creating employer  
   c. The correcting employer  
   d. The controlling employer

**Employer Responsibilities**

The controlling employer/contractor assumes all obligations under the standards, whether or not he subcontracts any of the work.

To the extent that a subcontractor agrees to perform any part of the contract, he assumes responsibility for complying with the standards with respect to that part.

With respect to subcontracted work, the controlling contractor and any subcontractors are deemed to have joint responsibility.

Construction companies should designate a person to coordinate, implement, and administer the construction safety management system (CSMS).

Employer responsibilities include the following:

1. understand potential job hazards and how to eliminate them  
2. conduct or assist with Job Safety Analysis  
3. assure compliance with OSHA construction safety and health standard requirements  
4. conduct regular job site safety and health inspections
5. establish safety and health procedures

6. coordinate regular safety and health training

7. conduct or assist with Tailgate or Tool Box Talks

8. maintain documentation of training, inspections, injuries and illnesses, and other safety records

9. participate in accident investigations and implementation of corrective actions

10. involve employees in the implementation of the CSMS

11. create statistical reports that compare severity and frequency rates against prior records

6. With respect to subcontracted work on a construction site, the controlling contractor and subcontractors _____.
   a. must integrate their operations
   b. must prove they are not responsible
   c. are independently accountable
   d. have joint responsibility

Supervisor Responsibilities

The supervisor’s attitude plays an important part in obtaining or preventing the acceptance of safe and healthful work practices, policies, and procedures. As an agent of the employer, it is the supervisor’s responsibility to identify potential hazards, identify methods to control or eliminate worksite hazards, ensure workers use safe and healthful work practices, and make sure everyone receives safety and health training to do their work.

Immediate supervisors should review, investigate, and take any necessary and appropriate action on all employee reports of hazards or potential hazards. The OSHA test for "adequate" proactive supervision requires supervisors to detect and correct hazards before their employee are injured.

OSHA Requirements for supervisors include:
• provide employees with sanitary and safe working conditions,

• assign safety and health responsibilities,

• give safety and health designers authority to correct hazards,

• ensure employees that they may voice safety and health concerns without fear of reprisal,

• inform employees of hazards,

• coordinate hazard communication with other employers on site and

• post the OSHA State or Federal Poster.

7. To be considered “adequate,” proactive supervision should _____.
   a. continually see to find safe spaces for their employees
   b. be forceful and consistent to endure compliance
   c. detect and correct hazards before they cause injuries
   d. conduct thorough investigations after each accident

Safety Programs

A safety program is composed of plans, policies, processes, procedures, and practices forming a plan of action to accomplish a safety objective. An effective safety program integrates safety-related decisions and precautions into them. Construction contractors should design, develop, deploy, and duplicate CSMS programs throughout all worksites, not just to comply with OSHA, but to keep their employees and worksites safe, and to make the company or organization more successful.

Accountability

Accountability may be thought of as establishing the "obligation to fulfill a task to standard or else." When you are held accountable, your performance is measured against specific criteria and consequences are applied appropriate to the quality of performance. Here are some examples illustrating accountability:
Example: If a builder has built a house for a man and his work is not strong, and if the house he has built falls in and kills the householder, that builder shall be slain. (King Hammurabi of Babylon, 18th Century B.C.)

"The ancient Romans had a tradition: whenever one of their engineers constructed an arch, as the capstone was hoisted into place, the engineer assumed accountability for his work in the most profound way possible: he stood under the arch." (Michael Armstrong- Former CEO of AT&T, Hughes Electronics, and Comcast)

Management may impose safety policies, programs, written plans, directives, rules, training, etc., yet if the appropriate application of effective consequences occur, desired behaviors will not be sustained.

If employees do not believe they are going to be held accountable for the decisions they make and the actions they take, you can be sure that any safety effort is ultimately doomed to failure.

Six important elements should be present in an employer safety accountability program:

1. formal standards of performance
2. adequate resources and psychosocial support
3. a system of performance measurement
4. application of effective consequences
5. appropriate application of consequences
6. continuous evaluation of the accountability system

You can learn more about accountability systems in course 712 Safety Supervision and Leadership.
8. Which of the following is TRUE concerning safety accountability?

   a. Performance is measured and results in consequences
   b. Responsibilities are assigned and carried out
   c. Employees must agree to accept consequences
   d. Formal compliance standards are developed and expected

Hazard Prevention and Control

Hazard prevention and control processes are conducted after hazards are identified and assessed. They help employers prevent existing and potential hazards and eliminate or otherwise control hazards in the workplace.

- Employers and workers cooperate to select controls are per the "Hierarchy of Controls" to eliminate or reduce hazards and exposure to hazards.

- To control hazards, elimination, substitution and engineering solutions are used. To eliminate or reduce exposure, administrative controls, safe work practices, and personal protective equipment (PPE) are used.

- A plan is developed to ensure controls are implemented, interim protection is provided, progress is tracked, and the effectiveness of controls is verified.

Effective hazard prevention and control methods protect workers and have the following benefits:

- Eliminate or reduce workplace hazards and exposure to hazards.

- Help employees avoid injuries, illnesses, and incidents.

- Eliminate or minimize safety and health risks.

- Help employers provide workers with safe and healthful working conditions.
9. What is the primary purpose of the “Hierarchy of Controls?”
   a. Mitigate all exposures through engineering controls
   b. Eliminate all hazards in the workplace
   c. Reduce exposure to hazards
   d. Eliminate or reduce hazards and exposure

Safety and Health Education

Safety and health education, through general instruction and technical training, is important for informing workers and managers about workplace hazards and controls so they can work more safely and be more productive.

- **General safety instruction** tells employees why safety is important through lecture, videos, discussion, etc.

- **Technical safety training** shows them how to do the task or procedure safely. Technical training requires demonstration and practice to make sure workers gain the required skills to work safely. On-the-Job training (OJT) is one of the most effective methods used to teach and verify skills.

It is important to make sure both instruction and technical training are emphasized. If employees do not know why safety is important, they are less likely to care about how to work safely.

Safety and health education also provides workers and managers with a greater understanding of the safety and health program itself, so they can contribute to its development and implementation.

Effective safety and health education programs have the following characteristics:

- All workers are trained to understand how the program works and how to carry out the responsibilities assigned to them under the program.

- Employers, managers, and supervisors receive training on safety concepts and their responsibility for protecting workers’ rights and responding to workers’ reports and concerns.
• All workers are trained to recognize workplace hazards and to understand the control measures that have been implemented.

10. What is one of the most effective safety training methods used in the workplace to teach and verify skills?
   a. Lectures and testing
   b. On-the-Job Training (OJT)
   c. Classroom group discussion
   d. Online video presentations

**CSMS Analysis and Evaluation**

Employers should analyze and evaluate each of the programs within the CSMS at least annually to assess what is and is not working, and whether the programs are on track to achieve their objectives. These analysis and evaluation activities are "proactive" because they ultimately help to prevent accidents on the worksite.

Whenever these assessments identify opportunities to improve the CSMS, management should adjust and monitor how well the various programs within the CSMS perform.

Sharing the results of monitoring and evaluation within the workplace, and celebrating successes, will help drive further improvement.

Effective program evaluation and improvement include the following characteristics:

• Leading indicators are used to analyze, evaluate, and improve programs.

• Control measures are periodically evaluated for effectiveness.

• Processes are established to monitor program performance, verify program implementation, and identify program shortcomings and opportunities for improvement.

• Necessary actions are taken to improve the program and overall safety and health performance.

After a CSMS program has been designed and developed, it should be deployed initially at one worksite to verify it is resulting in the intended improvements. If programs being evaluated are
deemed effective, they should be duplicated at all worksites. We'll discuss analyzing, evaluating, and improving hazards on the worksite in Module 3.

11. Which approach to analyzing and developing CSMS programs emphasizes preventing hazards and accidents?

   a. Integrated approach  
   b. Reactive approach  
   c. Hierarchy approach  
   d. Proactive approach

Safety Pays!

Take a look and download OSHA's Safety Pays software program that can be helpful in determining direct and indirect cost.

Annual Return on Investment (ROI) in Percent

\[
\text{(COST ÷ INVESTMENT) X 100}
\]

Management may ask you what the Return on Investment (ROI) will be for an investment in safety. Let's say you recommend a $1,000 investment in taking corrective action to eliminate a hazard that could cause an injury resulting in accident costs of $28,000. To determine the ROI, divide $28,000 by $1,000 which gives you 28. To express it as a percentage, multiply 28 by 100 and you discover that the ROI is 2800 percent.

Payback Period in Months

\[
\text{COST ÷ (INVESTMENT ÷ MONTHS)}
\]

Management may also want to know how quickly the $1,000 investment will be paid back: what the Payback Period is. To determine the payback period, divide the accident cost of $28,000 by 12 months (1 year) and you arrive at $2,333 per month in potential accident costs. Divide the investment of $1,000 by monthly accident cost of $2,333 and you'll see that the $1,000 investment will be paid back in only .43 months. After that, the investment is actually saving the company money.

If you want, take a closer look at some key elements of an effective recommendation.
12. What is the return on investment (ROI) if a company invests $1,000 to install a machine guard to prevent an estimated $28,000 accident?

a. 28 percent  
b. 280 percent  
c. 2,800 percent  
d. 28,000 percent
Module 2: Working with Contractors

Construction contractors are responsible for ensuring that all work under contract meets or exceeds the OSHA standards in addition to complying with the company’s safety and health standards. The contractor is responsible for ensuring safe work performance of employees and subcontractors.

To illustrate how important contractor safety responsibilities are to the safety and health of their employees, and the success of the construction project, let's take a look at one situation that resulted in the employer being cited about $90,000 in 2017:

A contractor on a construction site was cited for two repeat violations:

1. failing to conduct daily inspections by a competent person prior to the start of the shift, and
2. failing to provide an adequate cave-in protection system while employee were in the excavation.

If the general contractor had been communicating and insisting that the subcontractor meet all OSHA requirements, these repeat violations would not have occurred. This and many other instances of OSHA violations on construction sites, emphasize the importance of establishing regular communications and a culture of accountability on the worksite.

1. What is a major cause for OSHA violations on construction sites?
   a. Not posting a competent OSHA watch on site
   b. Not prioritizing worker safety on the worksite
   c. Lack of contractor communication and accountability
   d. Lack on common sense by workers

Involvement Begins Before the Project Starts

It's important the employer communicate about safety during all phases of the construction project. From the time the project is conceived until it is finished, safety must be a part of the process.

During the Pre-Award phase, requirements are developed, solicitations are sought, contractors are selected and contracts are awarded.
Key safety related efforts during this phase include consideration of a contractor's past performance during the contractor selection process, establishment of appropriate safety and health requirements in contract specifications and ensuring the inclusion of applicable safety and health clauses.

**The Pre-Bid Meeting**

In the pre-bid meeting, contract safety requirements should be discussed, including:

- site specific safety plan
- designated safety representative identification and requirements
- daily pre-work coordination meetings
- safety enforcement policies and procedures
- drug screening
- identification of potential hazards
- defining hazard control responsibilities

2. **When is the construction site specific safety plan discussed?**
   
   a. About a year before the start of operations
   b. At the pre-bid meeting
   c. After the initial bids are in
   d. When drug screening has been accomplished

**The Pre-Mobilization Meeting**

During the pre-mobilization meeting, the following should be discussed:

- contractual safety requirements
- site-specific safety plan
- pre-phase work plan discussion
• requirement for daily pre-task meetings

• requirements for safety talks, worker and supervisor training

• confirm assignment of safety responsibilities

• roles, responsibilities, accountability and authority of the owner, general contractor and all contractor personnel

**Weekly Safety and Health Meetings**

Once the project is underway, it's important to conduct weekly safety meetings with representatives from all contractors. These meetings are so important because of the constant change that occurs, and because it sends a message to all workers that safety is a value and that managers care about their employees' safety. The safety and health meetings should include at least the following:

• incidents and reports of incidents that have taken place since the last meeting

• a discussion and list of potential, upcoming hazardous situations such as confined space entry, steel erection, and roof work

• environmental concerns

3. **Why are the weekly safety meetings on construction sites so important?**

   a. To see who is paying attention
   b. To show workers who is boss
   c. Because OSHA requires it
   d. Because there is constant change

**Contractor Selection Criteria**

It's traditional to select construction contractors based on three criteria:

• low bidder

• lower bidder
• lowest bidder that can start now

However, in a world-class construction company that understands the importance of safety, they will not make a decision based solely on cost. They will use the following criteria:

• Total Days Away, Restricted, or Job Transferred Rate (DART) should be below national average

• Total Case Incidence Rate (TCIR) should be below the national average

• Experience Modification Rate (EMR) of less than 1.0 for past three years, and improving.

• past safety performance

• site-specific safety plan development

• key management and worker training and experience

4. **World-class construction companies select contractors based on all the following criteria EXCEPT _____.**

   a. low bid
   b. past safety performance
   c. Experience Modification Rate (EMR)
   d. DART rate

**Days Away, Restricted, or Job Transferred Rate (DART)**

The DART Rate (Days Away, Restricted, or Job Transferred) is another common incident rate used in all industries. The DART Rate is the number of CASES with days away from work or job transfer or restrictions (cases on the OSHA 300 log with either column H or I checked) multiplied by 200,000 divided by total hours worked by all employees during the year covered. You can compute the DART Rate using the following formula:
For instance, if a contractor has had 10 DART incidents and 200 full-time employees who worked a total of 400,000 hours in 2018, the DART Rate would be:

\[
(\frac{10}{400,000}) \times 200,000 = .000025 \times 200,000 = 5.
\]

On construction sites, the total number of hours worked by all employees will include your own employees, your temporary employees, and contractors directly supervised by you plus all contractor/subcontractor employees.

5. Which of the following is a common incident rate used in all industries?

   a. Total Accident Rate
   b. IMIR Rate
   c. Modified Incident Rate
   d. DART rate
**Total Case Incident Rate (TCIR)**

The Total Case Incident Rate, or “TCIR” is a common method used to report workplace injuries. It is defined as the average number of work-related injuries incurred by 100 workers during a one-year period. This number will be total injuries and illnesses of your own employees plus all contractor/subcontractor employees.

The TCIR is typically calculated as follows:

\[
TCIR = \frac{200,000 \times \text{annual # of injuries/illnesses}}{\text{annual total # of hours worked}}
\]

For example, if an employer with 50 workers reported 10 injuries in 2013, and workers in that industry worked 1,000,000 hours that year, then the 2013 TCIR for that employer would be:

\[
TCIR = \frac{200,000 \times 10}{1,000,000} = \frac{2,000,000}{1,000,000} = 2.0
\]

Use of the TCIR to report workplace injuries allows comparison of accident and injury statistics across industries, among industry segments, and from one year to the next.
6. **This common statistic is used to report the average number of work-related injuries incurred by 100 workers during a one-year period.**

   a. Average Case Incident Rate (ACIR)
   b. Total Annual Incident Rate (TAIR)
   c. Average Annual Incident Rate (AAIR)
   d. Total Case Incident Rate (TCIR)

**Experience Modification Rate (Mod Rate or EMR)**

The Experience Modification Rate (EMR) has strong impact upon a business. It is a number used by insurance companies to gauge both past cost of injuries and future chances of risk. The lower the EMR of your business, the lower your worker compensation insurance premiums will be. An EMR of 1.0 is considered the industry average. (Source: Safety Management Group).

According to the Michigan Construction Users Council (MCUC), the following EMR chart indicates the relative effectiveness of a contractor’s CSMS.

- 0.30 - 0.71 = Superior – Distinguished results
- 0.72 - 0.81 = Effective – Impressive results – Obvious commitment
- 0.82 – 1.04 = Average – Within industry norm
- 1.05 – 1.29 = Inadequate – Conspicuous past problems
- 1.30 – 2.05 = Poor – Lack of safety involvement

As you can see, safety is a serious consideration when choosing contractors to work on the construction project. Using this criteria will not only result in selecting a higher level of contractor safety, it will also result in selecting a contractor that will be more professional in all aspects of the contracted work that will be performed. See the [ABCs of Experience Rating, from NCCI](https://www.ncci.com) for more information on the EMR.
7. Which of the following contractors has the best safety record compared to the average within their industry?

   a. RTFQ Contractors - EMR = 1.5
   b. ABC Contractors - EMR = .5
   c. XYZ Contractors - EMR = .85
   d. TFB Contractors - EMR = 1.8

Key Players

The contractor, the owner, general contractor, project manager, site superintendent, and safety manager, should all have:

- adequate safety management training
- previous experience on similar type construction projects
- previous experience on projects of similar size
- a history of success on previous projects

All managers on the construction site should be competent in safety management. Workers should be competent in the work they are performing. An OSHA "competent person" is defined as "one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them" [29 CFR 1926.32(f)] Heavy equipment operators should all be able to show written documentation providing proof of competency. Also, a trained on-site healthcare provider or nurse should be present on large projects (more than $75 million).

Project Designers

Project designers that are involved in the construction phase should do the following:

- Identify the impact of changes in the design of the health and safety of those involved in the project.
• Provide sufficient information on health and safety associated with the design and planning to those who need it, so they can conduct the necessary training if needed.

• Cooperate and coordinate with the contracted parties, and, where appropriate, other designers/advisers involved in the project.

• Provide ongoing advice and information, if requested, regarding the head contractor’s health and safety plan (such as by advising of any changes to planned activities).

• Make sure other designers/advisers and contractors continue to carry out their duties and coordinate with others on the project (such as by asking for regular written activity reports or holding site meetings).

8. Who should be competent in safety management on the construction site?

   a. Primarily supervisors
   b. Workers
   c. All managers
   d. Only the safety officer

Head Contractors

The general or head contractor on site should do the following:

• Develop and carry out a site-specific health and safety plan.

• Make sure any contractor engaged to carry out construction work is competent and has made suitable provisions for health and safety.

• Obtain and check site-specific safety plans from subcontractors.

• Make sure there is coordination and cooperation of subcontractors regarding the following:
  
  o information and on-site activity (such as site meetings, site procedures)
  
  o appropriate communication arrangements between contractors on site for health and safety
- arrangements for discussing health and safety matters with people on site (such as setting regular toolbox/tailgate meeting times)
- incident and accident reporting

- Make sure training for health and safety is carried out.
- Make arrangements to monitor health and safety performance (such as reports, audits and inspections).
- Make arrangements to pass on information from the client or designer/adviser to other contractors and employees (such as activity reports).
- Make arrangements to control visitor access, including such things as delivery of materials.

9. **Who should be responsible to see that all workers on the construction site are properly trained in their tasks?**
   - Safety managers
   - Each subcontractor
   - Head/General contractors
   - Project engineers

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**Project Safety Representatives and Managers**

During the construction phase it will be important to do the following:

- Continue to identify the impact of changes on the worksite in safety and health of workers involved in the project.
- Continue to provide sufficient information on health and safety on the worksite to supervisors and those who will train workers on safety, so they can conduct the necessary training if needed.
- Cooperate and coordinate safety and health with the subcontractors and others throughout each phase of the project.
• Provide advice and information regarding the general contractor’s health and safety plan to everyone involved with the project.

• Make sure the general contractor and all subcontractors continue to carry out their duties and responsibilities to regularly submit activity reports and hold worksite safety meeting.

10. Who is responsible for ensuring all contractors submit activity reports and hold worksite safety meetings?

   a. Each employee working on the site
   b. The host employer and OSHA
   c. Safety representatives and managers
   d. Each subcontractor if assigned

Contractor Non-Compliance

If the Contractors, managers, or supervisors find an employee, contractor or subcontractor to be acting or working in a non-compliant manner he/she may have the authority to order immediate correction or cessation of the non-compliant occurrence.

Non-compliance with the Contractor Environmental, Health & Safety Guidelines or regulatory requirements may be grounds for immediate dismissal of the contractor, sub-contractor and their employees. The severity of the infraction and possible dismissal may be at the discretion of the host employer or contractor.

Failure of the contractor to comply with all local, state, and federal regulations and guidelines of the host employer could result in a notice of non-compliance and written notification to the contractors employer. If the contractor fails to take corrective action, the employer may exercise any or all of the following.

   • remove the contractor or their sub-contractors from the project
   • remove the contractor or their sub-contractors from the approved bidders list
11. What actions may be taken if a contractor is found to be in non-compliance with employer, local, state, or federal requirements and fails to take corrective action?

   a. Report the non-compliance to OSHA for possible citations
   b. Removal from the project and/or approved bidders list
   c. Require the contractor to give a reason for the non-compliance
   d. A verbal warning in response to the non-compliance

Multi-Employer Communication and Coordination

In today’s economy, an increasing number of workers are assigned by staffing agencies to work at specific "host" worksites under the direction and control of the host employer.

Before coming on site, contractors and staffing agencies and their workers are aware of:

   • the types of hazards that may be present
   • the procedures or measures they need to use to avoid or control their exposure to these hazards
   • how to contact the host employer to report an injury, illness, or incident or if they have a safety concern

It also means that host employers and their workers are aware of:

   • the types of hazards that may arise from the work being done on site by workers employed by contractors or staffing agencies
   • the procedures or measures needed to avoid or control exposure to these hazards
   • how to contact the contract or staffing firm if they have a safety concern
   • what to do in case of an emergency

Characteristics of effective multi-employer communication and coordination include:

   • Host employers, contractors, and staffing agencies provide the same level of protection to all employees.
• Staffing agencies provide general safety education to temporary employees and host employers provide specific technical training for required tasks and procedures.

• Host employers, contractors, and staffing agencies communicate the hazards present at the worksite and the hazards that work of contract workers may create on site.

• Before beginning work, host employers, contractors, and staffing agencies coordinate on work planning and scheduling to identify and resolve any conflicts that could affect safety or health.

12. Staffing agencies provide _____ and host employers provide _____ to temporary employees.

   a. general safety education; specific technical training
   b. specific technical training; general safety instruction
   c. general safety training; specific safety education
   d. initial safety training; follow-up safety training
Module 3: Worksite Analysis

Improving safety on a construction worksite is one of the most important contractor activities. To do this, we need to analyze the ways to identify what we have. Next, we need to compare what we have with what we know works best. Once we have this information, we can then make improvements.

In this module, we'll study the general steps in the worksite analysis, evaluation and improvement process. Failing to conduct a comprehensive worksite analysis on each worksite is a costly decision on the part of the employer.

Let's take a look at OSHA's Top 10 Most Frequently Cited Construction Violations for 2017 to get a better idea where to focus our efforts:

1. Fall Protection - General Requirements (1926.501)
2. Scaffolding (1926.451)
3. Ladders (1926.1053)
4. Fall Protection - Training (1926.503)
5. Eye and Face Protection (1926.102)
6. Hazard Communication (1910.1200)
7. Head Protection (1926.100)
8. Aerial Lifts (1926.453)
9. General Safety and Health Provisions (1926.20)

Ergonomics is not covered by OSHA. Ergonomic hazards cause back injuries, strains, sprains, and other musculoskeletal disorders. Although there is no OSHA specific rule on ergonomics, it is the cause of most injuries on the worksite: One cause for this is a lack of reporting by injured workers. OSHA may resort to the use of the "General Duty Clause" to cite employers for ergonomics-related violations or issue a ergonomic hazard alert letter.
1. Although OSHA cites fall protection requirement violations the most, what is the cause of most injuries on a construction worksite?

   a. Eye and face injuries
   b. Ergonomic injuries
   c. On-site traffic accident injuries
   d. Injuries due to excessive noise

Plan for Worksite Analysis

Worksite Analysis is a combination of systematic actions to provide you with the information you need to recognize and understand the hazards and potential hazards of your workplace. We will discuss five important processes in the worksite analysis plan. The first of these important processes should be the baseline survey that helps the employer determine the current status of the CSMS. When planning for a construction worksite analysis, be sure to include at a minimum all the following processes:

- **Comprehensive baseline surveys** (insurance inspections, OSHA On-site, etc.)
- **Job Hazard Analyses** (JHAs)
- **Hazard identification**, both hazardous conditions and exposure to those hazards;
- **Analysis of changes** in the workplace (new equipment, new processes)
- **Regular site safety and health inspections** (employee and management)

2. Which of the many worksite analysis processes should be the first to be conducted?

   a. Identification of energy sources
   b. The baseline survey
   c. Injury and illness trend analysis
   d. Job Hazard Analysis
The Comprehensive Baseline Survey

A comprehensive hazard survey is the most basic of all the tools used to establish the inventory of hazards and potential hazards at the worksite. After a baseline has been established, periodic comprehensive surveys need to be done to take advantage of new information about hazards or the introduction of new hazards into the workplace. Each time there is a change of facilities, equipment, processes or materials in your workplace, they should be analyzed for hazards before they are introduced. Ideally, auditing segments of the survey should be assessed for continuous improvement.

The baseline survey should include a review of the following:

1. copies of written inspections and surveys by: fire department, in-house as required by safety and health standards (e.g., overhead crane inspections, powered industrial truck daily inspection, etc.);

2. employee report of hazards or potential hazards;

3. accident and incident investigations with corrective actions and follow-up;

4. injury and illness trend analysis;

5. personal protective equipment assessment;

6. ergonomic analysis;

7. specific identification of confined spaces; and

8. identification of energy sources for specific machines.

As part of the worksite analysis process, the employer/general contractor should also require subcontractors to perform a baseline analysis as necessary in accordance with OSHA and company requirements. The subcontractors should share pertinent information with the general contractor, and/or other subcontractors.
3. When should analysis occur after the initial baseline survey?
   a. When OSHA requires it
   b. When the project is finished
   c. At least annually
   d. Anytime there is a change

Identifying Hazards and Exposure

A very important part of the hazard identification process is to look for the hazardous conditions, themselves, and the circumstances which may result in exposure to hazardous conditions. It follows that, to have an event that results in injury or illness a hazard and exposure to the hazard must exist. So, let's briefly look at the two concepts:

1. A hazard is an unsafe condition that could cause injury or illness to an employee. Examples include an improperly guarded power saw, an exposed electrical circuit, or an employee who is under the influence of a dangerous drug.

2. Exposure usually refers to an employee's placement relative to the hazard's "danger zone". If the employee is within the danger zone, the employee is exposed. There are two types of exposure: Physical and Environmental.
   a. Physical exposure means the employee is within arm's length of the hazard. For instance, an employee who came into contact with a sharp object and was cut, had physical exposure to the hazard.
   b. Environmental exposure means the employee may come in contact with the hazard no matter where he or she is located. If an employee entered a confined space that lacked an adequate oxygen level, and lost consciousness, he or she experienced exposure to a hazardous environment.

When analyzing the construction worksite, it's important we don't just look for hazardous conditions. We also need to identify potential opportunities for exposure to the hazards conditions.

The following is a list of topics relevant to worksite analysis by identifying worksite hazards:

- Evaluate operations, procedures, facilities, and equipment to identify hazards.
- Monitor exposure levels.
- Conduct regular safety inspections and accident investigations.
- Determine hazard control strategies to eliminate or mitigate hazards and exposure.

4. When a construction worker suffers an injury as a result of an unguarded saw, why type of exposure has occurred?
   a. Physical exposure
   b. Environmental exposure
   c. Psychological exposure
   d. Unnecessary exposure

Recognized and Foreseeable Hazards

When conducting the worksite analysis, it's important to look for hazards that are generally recognized within the construction industry. Recognized hazards are generally foreseeable on the worksite OSHA will require that these hazards are properly eliminated or controlled.

"Recognized" Hazards

As described in OSHA's Field Operations Manual, recognition of a hazard is established on the basis of industry recognition, employer recognition, or "common sense" recognition criteria.

- **Industry Recognition:** A hazard is recognized if the employer's industry recognizes it. Recognition by an industry, other than the industry to which the employer belongs, is generally insufficient to prove industry recognition. Although evidence of recognition by the employer's specific branch within an industry is preferred, evidence that the employer's industry recognizes the hazard may be sufficient.

- **Employer Recognition:** A recognized hazard can be established by evidence of actual employer knowledge. Evidence of such recognition may consist of written or oral statements made by the employer or other management or supervisory personnel.

- **Common Sense Recognition:** If industry or employer recognition of the hazard cannot be established, recognition can still be established if it is concluded that any reasonable person would have recognized the hazard. This argument is used by OSHA only in
flagrant cases. Note: Throughout our courses we argue that "common sense" is a dangerous concept in safety. Employers should not assume that accidents in the worksite are the result of a lack of common sense.

5. Which of the following types of "recognition" used by OSHA in citing employers is used only in flagrant cases?
   a. Industry Recognition
   b. Sector Recognition
   c. Common Sense Recognition
   d. Employer Recognition

The Five Workplace Hazard Categories

To help identify workplace hazards it's useful to categorize them into easy-to-remember categories. The first three categories represent hazardous physical conditions that, according to SAIF Corporation, account for only 3% of all workplace accidents. The fourth category describes behaviors in the workplace which may contribute up to 95% of all workplace accidents. The final category, the system, contributes to both the hazardous conditions and unsafe behaviors. If you consider both the surface and root causes for accidents, the CSMS is ultimately responsible for most accidents in the workplace.

1. Materials: Hazardous materials include hazardous:
   a. Liquid and solid chemicals such as acids, bases, solvents, explosives, etc. The hazard communication program is designed to communicate the hazards of chemicals to employees, and to make sure they use safe work practices when working with them.
   b. Solids like metal, wood, plastics. Raw materials used to manufacture products are usually bought in large quantities, and can cause injuries or fatalities in many ways.
   c. Gases like hydrogen sulfide, methane, etc. Gas may be extremely hazardous if leaked into the atmosphere. Employees should know the signs and symptoms related to hazardous gases in the workplace.

2. Equipment: This area includes machinery and tools used to produce or process goods. These examples all represent hazardous conditions in the workplace. Hazardous equipment includes machinery and tools.
3. **Environment**: This area includes facility design, hazardous atmospheres, temperature, noise, factors that cause stress, etc. Are there areas in your workplace that are too hot, cold, dusty, dirty, messy, wet, etc. Is it too noisy, or are dangerous gases, vapors, liquids, fumes, etc., present?

4. **People**: This area includes unsafe employee behaviors at all levels in the organization such as taking short cuts, not using personal protective equipment, and otherwise ignoring safety rules.

5. **System**: Every company has, do some degree, a CSMS. It's good to think of the "state" of the CSMS as a condition. For instance, management may develop and implement ineffective policies, procedures and safety rules. A flawed CSMS is a systemic hazardous condition because it could increase the number accidents.

Note: To remember the five categories, just use the acronym "MEEPS."

6. **Which hazard category is ultimately responsible for most accidents?**
   - a. Equipment
   - b. System
   - c. People
   - d. Materials

**Job Hazard Analysis (JHA)**

A Job Hazard Analysis is a technique that focuses on job tasks as a way to identify hazards before they occur. It focuses on the relationship among the worker, the task, the tools, and the work environment. Ideally, after you identify uncontrolled hazards, you will take steps to eliminate or reduce them to an acceptable risk level.

A JHA should be conducted for all hazardous jobs/procedures to determine potential hazards and identify methods to reduce exposure to those hazards at construction worksites. Here are the steps in a basic JHA:

1. List the steps in the job or procedure.
2. Describe the safety and health hazards in each step.
3. Develop preventive measures.
4. Write a safe job procedure.

Click here to see a sample JHA.

The JHA also serves as an excellent training tool that trainers can use to train hazardous procedures. The step-by-step format is great for on-the-job practice. You can learn more about conducting a JHA in course 706 Job Hazard Analysis.

7. Which of the following should be conducted for all hazardous procedures and tasks on the construction site?

   a. Proactive accident investigation
   b. Job Hazard Analysis (JHA)
   c. Phase Hazard Analysis (PHA)
   d. Employee interviews and surveys

Change Analysis

As you know, change is continuous on a construction worksite. Change analysis is simply the management of that change, conducted by competent persons, to make sure it does not introduce new hazards or unsafe procedures in the work environment.

A designated person should analyze how changes on the worksite can affect equipment, processes, and materials for hazards and potential hazards. Findings should be documented and plans developed to minimize or design out the new hazards.

Changes in the following categories need to be reviewed:

1. worksite layout
2. materials
3. process technology
4. equipment

To more specifically analyze how changes worksite layout, materials, processes and equipment, affect the work being conducted, include the following in your analysis:
• emergency routes
• site entrance and traffic routes/surfaces
• covered walkways
• protection from falling objects
• danger areas
• storage and personnel areas
• hazardous materials/dangerous goods
• barriers and fences
• loading and unloading areas
• bays and ramps
• working slopes for excavators, dump trucks etc.
• safety signage
• protection of pedestrians
• site security
• housekeeping and cleanliness

8. Change analysis should be conducted in each of the following categories except _____.
   a. weather conditions
   b. materials
   c. process technology
   d. equipment
**Safety Inspections and Reports**

Employees play a key role in identifying, controlling, and reporting hazards that may occur or already exist in your workplace. Safety inspection reports of potential hazards can be an effective tool to trigger a closer look at a piece of equipment, operation, or how work is being performed. The only caveat related to safety inspections is that, although, they may be good at uncovering hazardous conditions, they’re not so good uncovering unsafe behaviors. Reports of potential hazards can also provide suggestions to eliminate a hazard.

There are many positive reasons for conducting safety inspections, including:

- helping ensure compliance with OSHA and meet other legal responsibility
- involving both management and employees
- identifying areas of high risk and controlling hazards
- developing positive attitudes - demonstrating leadership
- suggesting better methods of doing procedures safely

9. **Safety inspections are better at uncovering hazardous conditions than _____**.
   
   a. lack of common sense  
   b. actual OSHA violations  
   c. unsafe behaviors  
   d. System weaknesses
Controlling Hazards and Exposure

Information obtained from the various hazard analysis processes are most useful when hazard control strategies are developed and incorporated into the worksite. It’s important to recognize that not all hazard control strategies are equal. Some are more effective than others at reducing the risk in the job.

Remember, a very basic hazard control principle is that we must either (1) eliminate the hazard or (2) control exposure to the hazard. The second principle is that it’s more effective to eliminate the hazard, if you can, than to control exposure to the hazard. After all, if you can get rid of the hazard, you don’t have to manage the exposure. These two important principles guide safety and health professionals in constructing a "hierarchy" of hazard control strategies.

Traditionally, a hierarchy of controls has been used as a means of determining how to implement feasible and effective controls. ANSI Z10, Occupational Health and Safety Management Systems, encourages employers to employ the following hierarchy of hazard control strategies:

- **Elimination and substitution**, while most effective at reducing hazards, also tend to be the most difficult to implement in an existing process. If the process is still at the design or development stage, elimination and substitution of hazards may be inexpensive and simple to implement. For an existing process, major changes in equipment and procedures may be required to eliminate or substitute for a hazard.

- **Engineering controls** are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The initial cost of engineering controls can be higher than the cost of administrative controls or personal protective equipment, but over the longer term, operating costs are frequently lower, and in some instances, can provide a cost savings in other areas of the process.
• **Warnings, administrative controls and personal protective equipment** are frequently used with existing processes where hazards are not particularly well controlled. Administrative controls and personal protective equipment programs may be relatively inexpensive to establish but, over the long term, can be very costly to sustain. These methods for protecting workers have also proven to be less effective than other measures, requiring significant effort by the affected workers.

The idea behind this hierarchy is that the control methods at the top of the list are potentially more effective and protective than those at the bottom. Following the hierarchy normally leads to the implementation of inherently safer systems, ones where the risk of illness or injury has been substantially reduced.
10. Which of the following hazard control strategies is best at preventing hazardous exposure to hazards?
   
   a. Elimination
   b. Administrative controls
   c. Best work practices
   d. Engineering controls

Include Safety Committees

Safety committees function best when they understand their purpose is to play the role of an internal consultant to the employer. The safety committee can assist by helping the employer analyze and evaluate CSHM programs and making written recommendations to improve the program where applicable.

To conduct an evaluation, we need to take the information gathered from the baseline survey and rate it against an established benchmark. A benchmark is a standard by which the system can be measured or judged, for instance, we might say XYZ's CSMS is the "benchmark of quality" in our industry.

OSHA has two excellent partnership programs to help companies achieve their benchmarks:

1. The Safety and Health Achievement Recognition Program (SHARP)
2. Voluntary Protection Program (VPP)

OSHAcademy and the American Society of Safety Engineers have excellent publications. We recommend purchasing:

- OSHAcademy's Ultimate Guides
11. An industry standard by which all others are judged is called a _____.
   a. apogee  
   b. apex  
   c. benchmark  
   d. top rung

Improving Hazard Controls

Dr. W. Edwards Deming is considered by most to be the father of Total Quality Management and Continuous Improvement. His PDSA Cycle uses a systematic series of steps to gain data for the continual improvement of a product or process. The process is called a "cycle" because the steps are continually repeated. As the image to the right shows, the PDSA Cycle contains four primary steps. These four steps may be used when improving the worksite through the use of hazard controls as follows:

1. **Plan**: The first step is to plan the design and development of the hazard control strategy. Base your design on objective facts about the hazard and best practices within the industry to eliminate or mitigate the hazard.

2. **Do**: Next, implement the control strategy in a limited manner. This is done to limit the "damage" should the control strategy not work. If you have many facilities, implement the control strategy in one facility (unless an imminent danger situation exists).

3. **Study**: Analyze the change in work to see if the control strategy has improved the process or work area. Once you have the data, discuss the results objectively.

4. **Act**: If the control strategy works, then adopt and deploy it to all relevant worksites. If it doesn't work, revise the strategy making small changes or throw it out completely and start over. It is also important to conduct follow-up analysis by moving on once again to the first step of the cycle.

Each of the four steps in the PDSA Cycle are important and must not be skipped.
12. **What is the correct action to take if hazard control did not work as anticipated?**

   a. Hope that others do not find out
   b. Use it since time was spent developing it
   c. Revise it or throw it out
   d. Stop the process because it’s not working
**Resources**

1. **Recommended Practices in Construction** - OSHA
2. **Field Operation Manuel** - OSHA
3. **Construction E-Tool** - OSHA
4. **Construction Glossary** - OSHA
5. **OSHA Training Guidelines** - OSHA
6. **Injury Data and Statistics** - CDC
7. **SLIDERULE for Buildings**
8. **The ABCs of Construction Safety** - OR-OSHA